

001r

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p001r_1

Master Nicolas Coste, in the Rue de la Heaumerie, at the sign of St Claude/Mirrors

Master Jehan Cousin, who resides in the Faubourg St Germain, knows about the master

Master Jehan Garnier, in the Rue des Escrivains by St Jacques de la Boucherie, currier. Try
woad flowers

p001r_2

The harvester that leaves some ears is not blamed.

Sacra Eleusinae deae propalare nefas.

Trumpets, see the book of funerals

p001r_3

Vvolfangus Lazius

Petrus Appianus mathematicus Ingolstadiensis, Comment. urb. rom.

Hieronimo Ruscelli

Hermolaus Barbarus

Angelius Bargaeus, De aucupio et venatione

Nicolaus Damascenus

Caes{ariensis}, De rebus Persarum

Isidorus

Orosius

Eupolemus, historicus gentilis qui de rebus Davidis & Salomonis scripsit

-Cathalogue des villes

Calendrier des bergiers

Grammaire italiene

Arithmetique de Savonne

Instruction pour le faict des finances

Questions aenigmatiques

Des praeceptes d'agriculture

+Le secret des finances Ã Lyon

Synesius

Olaus Magnus

+Master Bernard Palissy, inventor of rustic figurines to the king and the queen mother.

p001r_4

Aquatilium animalium historiae, Hypolito Salviano Typhernate authore, Romae 1554.

p001r_5

Les Annales de Normandie

Alexander Aphrodisaeus

Polydorus Vergilius

Appianus

Athenaeus

Pausanias

Statius Thebaidos

Servius, In Aeneidem

Macrobius

Aulus Gellius

Alexander ab Alexandria

Festus

Nonius

Magius, Miscellanea

Pollux, Onomasticon

Hyginus

Berosus

Suetonius

Valerius Maximus

Cornelius Tacitus

Xenophon

Seneca

Dionisius Halicarnassensis

Sabellicus

cum permultisaliis Julius Capitollinus

Budaeus

Spartianus

Blondus

Volaterranus

Herodotus

Paulus Manutius

Strabo

Julius Firmicus

Quintus Curtius

Dio

Cornelius Nepos

Flavius Vopiscus

Monsieur

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p001v_1

For easing the belly

Prunes of Saint Antonin, and if you like you can put leaves of malva and viola, adding some sugar and, if you like, some cinnamon for the stomach.

Or in a chicken broth, add some marshmallow root. When fresh it is more mollifying.

Stirring together cirop de guindoles doulces with water and taking some of this in the morning eases the belly.

002r

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p002_1

Books to recover

The chronicles of Sigebert

Rufinus

Irenaeus, In [Haereses]

Paulus Aemilius

Paulus Jovius

Polydorus

Bergomensis

Philippe de Commynes

p002r_2

Against pain

Turpentine oil, oil of Jacob and salt from cabbage ashes.

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p002v_1

Practica, cioÃ" nova inventione di contegiare, stampata in Brescia per Vincenzo Sabio.

p002v_2

Emeralds of Brissac

I took minium, 26 â\204¥, crystal [â\200|] and ground on marble 12 â\204¥, verdigris3 |Ê
|222|. Incorporated all together. Put in a crucible covered by another well luted crucible
with a hole on top. Melting: 7 hours without blowing. The mass came out a fine green.

I took minium, 12 â\204¥, crystal, 6 â\204¥, verdigris, 2 grains. Melting: moderate, vi hou
rs, baked 24 hours. The mass came out green, yellow and red.

p002v_3

Sapphire

Pebbles or crystal, 8 â\204¥; minium, 16 â\204¥; smith's salt, 4 â\204¥; sparkling coryal,
4 grains. Melting: 6 [?] hours.

p003r

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p003r_a1Imitation coral

+

One must first make the branches from wood or take a fantastical thorn branch, then melt a pound of the best possible clear pine resin and add one ounce of finely ground vermilion together with walnut oil, and if you add a little Venice lake the color will be all the more vivid, and stir all together into the resin, molten over a charcoal fire, not over an open flame, lest it catch fire. Then dip in your branches with a swirling motion. And should there remain any filaments, turn the branch over the heat of the charcoal.

left-top

Colophony is nothing other than resin that has been cooked again. To do it well, you take a leaded pot and melt the resin, boiling it over the brazier for a good hour until it appears not thick but clear and liquid like water and it easily runs as a thread off the end of a stick, which you use to crush and test it. Then pour it through a coarse canvas or tammy cloth so that it falls into the strongest vinegar you can find, because the vinegar makes it strong and makes it less brittle. Repeat this two or three times and it will be fine and well purified. To imitate your coral, you can mix a fourth part of mastic with your purified resin to make it more solid and finer, and if you should use just one drop of mastic, it would be all the better, but it would take too long.

left-middleSulfur and vermilion have the same effect.

topCoral made of red enamel withstands filing and polishing.

right-topIt is made like cement, which is stronger when mixed with crushed glass rather than with brick. In the same way, together with the vermilion, one mixes in opaque red enamel, finely ground. It is the same way with all enamel colors.

p003r_a2Varnish for paintings

Take a pound of Venice turpentine and heat it in a pot until it simmers, put in half a pound of the whitest turpentine oil you can find and stir all together well on a charcoal fire and take it off immediately after, and it is done. But if you find it too thick, add more oil, whereas if it is too clear, you can thicken it by putting a little turpentine. And so you will give it whatever consistency you want. It could be made without fire, but it is more desiccative when heated. It is appropriate for panel paintings and other painted things, without distorting the colors or yellowing, and dries both in the shade and under the sun, overnight, and during the summer as well as in the winter. It is usually sold 15 sols a pound.

left-bottomYou need a little more turpentine than turpentine oil to thicken the varnish, which you need to apply with your finger in order to spread it thinner and less thick because when it is thick, it turns yellow and gathers [together]. Varnish is not used to make paintings shine, because it just takes the light out of them.

bottomBut it is used to enhance colors which have soaked in and to keep them from dust. Mastic varnish does not resist rain, whereas oil and rosin varnishes do.

p003r_a3Thick varnish for floorboards

There is a type of varnish that takes a long time to dry and is still damp up to two months after it has been applied to the floorboards. But the following varnish does not remain damp like previous ones, which were made of linseed oil from Aux boiled with garlic to exting

uish them and rid them of fat, and also with wheat. And this old one yellowed over time and made the blue color of paintings greenish. This one is made like former varnishes except that one puts in common thick turpentine

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p004r_1

Lavender spike oil varnish

One must heat lavender spike oil and, as it begins to simmer, put in powdered sandarac gum so that it soon melts. And stir continuously over a charcoal fire until the sandarac is well melted, which you will know by taking a little of the said varnish on a plate and, if it is fat enough when you handle it with a finger, it is ready. And for one pound of lavender spike oil, you should put five ounces of ground sandarac. Some only put in four ounces but this is not as good, nor as fat. The former dries promptly. To avoid the trouble of polishing their ebony, framemakers varnish it with this. So do guitarmakers. This varnish is not as fitting for paintings as fine turpentine varnish, though it is good for the paintings' moldings. When linseed varnish was in use, one would not commonly varnish the landscape of a painting because it would turn the landscape yellow. But with turpentine varnish one varnishes everywhere. Instead of sandarac, you can add to it pulverized mastic drop by drop or otherwise, and it will dry more quickly.

If you want to varnish plaster or a wall, first put on your glue de retaille, very hot, because if cold it would not penetrate the wall at all. And when you would have put your varnish on, it would come off.

left-top

Aspic oil varnish is not as apt for colors as that of turpentine, because aspic oil eats the colors, since it is too penetrating.

To remove varnish from an old panel painting that has yellowed and varnish it again

Take some white soap and ashes strained through a sieve, and soak all together in water. And with a sponge, take some of the said ashes and soap and rub the painting with it. And when you see that the old varnish has been taken off, throw a bucket of water at the painting to clean it, then leave it for a quarter of an hour in the sun to dry and revive the colors. Once your painting is dried, you can apply your turpentine varnish.

left-bottom

Make sure the colors do not come off.

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p004v_a1Black varnish for sword guards, metal bands for chests, etc.

Take linseed oil or, for a cheaper option, walnut oil, and rid it of fat with garlic cloves and hog's fennel (some also add bread crusts), which you will boil in it for a good quarter of an hour. Then add to one pound of the oil boiled in this way a piece of black pitch the size of a walnut and a double handful of wheat, without removing the garlic and onions, and allow to boil together for a good quarter of an hour. Once the pitch is well melted and the oil takes on body, you can remove it from the fire. Then, to varnish, place your iron over a warm charcoal fire and apply with a feather or a brush. When you see that it no longer smokes, it is done and your varnish is dry.

left-topFor an excellent black varnish, add two or three paternoster beads to the rest.

left-topSome consider walnut oil to be better.

left-topIf there is a quantity of varnish, it needs to boil for at least half a day, because the more it boils, the better it is. Should the varnish boil over, it is dangerous for it to catch fire and it is difficult to extinguish. So do this in a courtyard or other open space.

left-middleIn five or six lbs. of oil, one must put one lb. of galipot, which costs 4 sols, and some peeled garlic cloves. This varnish is not black in and of itself, but turns black when exposed to fire.

left-middleSee below, around the 3rd part of this book, after sands, in the chapter on furbers.

p004v_a2Black varnish without fire, without disassembling harnesses or removing metal bands from chests.

Take spike lavender oil varnish and mix it with charcoal black or lampblack and, without fire, it will mix in by itself. Apply the varnish with a brush and it will soon be dry. Turpentine varnish would work quite well but it does not dry as quickly.

p004v_a3Iron engravers' varnish.

Take linseed oil or walnut oil and instead of black pitch you will add some pine resin and you must cook it like black varnish on fire. And to apply it, heat your iron and apply just one layer of varnish, and when it no longer smokes, it is dry. Then engrave with a steel point whatever you want. Then take some salt and verdigris and soak it with as much of one as of the other in very strong vinegar, and leave it for XX4 hours before using it, and the whole will be soaked. Then spread this liqueur or sauce on the engraved object with a sponge

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p004v_a3

or linen cloth and leave it thus for xx4 hours and it will be engraved. But if you should want to engrave it quickly, varnish all your work and boil it in the aforementioned liquor, and this will engrave it quickly.

p005r_a1Steel mirrors

+They are called steel mirrors because in the past they were usually made of steel polished with emery paste. But more easily, various kinds are made of cuivre franc, which is rosette and tin, because these can be cast in a mold and made round, hollow, convex or in whatever various shapes you want to represent.

So take half copper de rosette and half soft tin, i.e. fine and yet unused. Place them in a crucible, and first melt the copper. Once it has been well melted, add the tin and mix them together and cast that in a white stone mold with no hole, and grease the mold, which should be moderately warm, with oil. Then, once your mirror has been molded, you can polish it in this manner.

Set one mirror in plaster to hold it firmly, then put the other one over it with fine sand between them, and rub one against the other, whether they are hollowed or flat, and thus you will polish both at once. If you want to polish them on both sides, you only have to switch them, which means putting the one that was polishing in the plaster and [using] the one which was in the plaster to polish. Once they have been polished with arene you can soften them with tripoli of Venice that should not be sandy, and then with paste. You use water with arene to polish, but polishing with tripoli and paste is done dry. Once the mirror has been polished, you can set it.

p005r_a2Concave mirrors

A concave mirror shaped in the aforesaid form produces an endless number of illusions which seem like magic. If one wants to see oneself from behind, you have to place the concave mirror on the ground on its foot, at a slant, and then look at it one step further. But if you look at it from a closer position, it shows you the right way up but with the face quite large and the hairs of your beard as thick as

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p005r_a2

a string and will reflect a nipple as large as a plate, and women can see the secret places they do not want to show to surgeons. It projects the reflection outwards, and if you touch with your finger the eye of the reflection, another finger will come against yours.

You will be able to provide light at night for someone quite far away, if you set the concave mirror behind a candle placed on a window sill. You will be able to read and write quite far from the candle if you set it behind the candle and turn the concave face towards you.

If you put the mirror at the far end of a table with a candle on it, it will reflect two lights on the table for you. To see what is happening in a street, shut the window, or the more you can shut the better, make a hole in the bottom pane, the size of your little finger, perfectly round all the way through. Then apply a sheet of paper onto the window and let the middle of the sheet be over the hole. Pierce the sheet in the same place as the hole and of the same size. Then turn the concave face of the mirror towards the hole, and anyone passing by in the street will be reflected on the sheet of paper. Do the same with the pierced door of a closed room. You can make wavy mirrors and triangular ones, such as are described by Ptolemy and Archimedes. The concave sort can also set fire to straw or light a candle from afar, using the sun. By reverberating fire too, it can provide warmth.

p005v_a1For bronzing in yellow and white

Take mirror tin and melt it. On half a pound of this, put half an ounce of quicksilver, and remove it immediately from the fire and grind it until it is like ashes. Wash it thoroughly in clean water, then grind it on a marble slab and soak it with water of glue de retaille. Then apply that on your wooden candlesticks and any other works you like, and burnish with a tooth. You can grind pin filings and apply them with the said glue de retailles.

006r

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p006r_1

To lay down and set burnished gold and give it a red or green or blue hue

Ceruse and lead white is not appropriate for polished white nor for burnishing because it is fat, but it is quite good for matte gold, which is made with oil by mixing it with yellow ochre and mine and tempering the whole with oil, and this matte gold so applied lasts in the rain, like gilded leadwork and similar things. Therefore, for burnished gold take good chalk, quite white, well ground and soaked with distemper glue and do four coats of it, one after the other, on the wood. And when the last one is dry, rub it with prele, which is a kind of grass otherwise named horsetail, to render it well polished. Afterwards, take fine Armenian bole and sanguine, as much of one as of the other, a bit of lamb tallow the size of a bean or a pea depending on the quantity of bole, and a little willow charcoal, or as much as the tallow, and half a walnut shell filled with half-burned saffron; some put in a little candi sugar. Grind everything together with water and apply it without gum or glue, and let it dry. And rub the place that you would like to gild with a piece of white cloth to better unify it, and when the rubbed place is a little shiny it is a sign that the gold will behave well. After rubbing, wash the place that you want to gild with a clean brush soaked with clear water and apply the gold at once, which you will burnish when dry. And if you want to set rouge clair and glaze with it, grind Venice lake on the marble with walnut oil or linseed oil. After grinding, mix in turpentine varnish or spike lavender varnish and apply on gold with the brush. Brazilwood and laque ronde fade. For green, temper verdigris with walnut oil or linseed oil and grind it, then mix in some turpentine varnish; not aspic varnish, which is not suitable for verdigris. If you want to glaze with azure it must be set on burnished silver. Take azure enamel, and without grinding temper it with turpentine varnish and apply it.

006v

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p006v_a1For cages

You can embellish them with thin enamel canes of various colors by covering the yellow latten or iron wire with said canes. These you will break neatly into the length that you want if you make a small notch with a cutting file at the point where you want to break them, and they will not break anywhere else. You can bend them with a wooden model over a brazier or by the heat of a lamp. A cane can be stretched out as long as you want in a small furnace made like a reverberatory oven but with openings on both sides. And once the large cane is red, they seize the hot end of it with small pincers that have long beaks, with one end of the beak inside the end of the cane, so that it may be stretched without becoming blocked. The other end of the cane is held with the hand, as it is not hot. Once the cane is stretched enough, the one who is working seated with his stove, the size of a carnation pot, placed in front of him, breaks it off and carries on. This is for making canes for capes, which may be cut, as already mentioned, with a file. Glass-button makers also use the said stove.

fig_p006v_1

<https://drive.google.com/open?id=0B9-oNrvWdlO5eVFRYjVCTmczcmmM>

left-middleUnder the door is a grill that supports the burning charcoal. The ash is emptied by turning the stove upside down.

p006v_a2For stamped ornaments used for embellishing and inserting into or covering the edges of mirrors, the tops of chests, or the friezes of bed valances

Etch with aqua fortis on iron or copper whatever you have pounced and drawn there, next make it neat with a burin or chisel. Then pour soft tin, yet unused, onto polished marble and flatten it, making it quite thin, with a wooden board. Or else pour it on a table as is done with lead, or put it through a roll-press. Next lay your tin plate over the engraving, and over the tin plate put a piece of felt and strike it with a hammer. Then gild it in the following manner.

p007r

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p007r_a1To gild with gold color and tinsel

Once you have colored or made your stamped ornament in tin (as previously described), or in iron or copper, you must not put glue as on wood, but just have some fatty oil, which is made in seven or eight days in the sun from walnut oil and white lead, stirring often, or cooked on fire if one should be in hurry. Then, with the oil thus made fatty, grind a little white lead, massicot and black graphite, at discretion, as much of one as of the other. Minium will color the gold. Then apply an even layer of that onto your stamp, taking care you do not fill the hollows. And once it is almost dry, apply the gold leaf on it using cotton.

Such gold will withstand rain on houses or elsewhere. And if you have made your gilt with tinsel, color it with smoke from a partridge or from yellow or red cloth, and it will look as fine as pure gold. You can cover trunks, mirrors, bed valances and posts in colored velvet or satin and then apply the gilded stamped ornament on them with strong glue.

p007r_a2To color stamped ornaments for trunks

The stamped ornament made from sheets of copper or latten are made with wood from a service tree engraved and cut, should you want to spend less. Next, the stamped piece is colored with the aforesaid lacquer colours of lacquer, verdet, blue enamel, and soaked in turpentine varnish. But wherever you want to make it azure, apply some fer blanc, which is more appropriate for an azure background.

p007r_a3Doublets

Good dragon's blood soaked in spirits produces its own mastic or glue. So do vert de vessie and saffron.

p007r_a4Fish glue or usblac and mouth glue

It is made from codfish skin that has been boiled rather than salted. Joiners use it on their masterpieces and guitar makers use it for their more delicate works. It needs to be strongly whipped, then soaked gently in barely boiling water.

Mouth glue is made of parchment scraps and used to glue paper or similar things without fire, by wetting it with one's mouth.

left-bottomIt is whipped and left to soak in white wine for one night, then melted over a low heat. Others soak it in spirits.

007v

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p007v_1To give the color of all kind of metals and woods and other things

Take touchstone and pumice stone as much of one as of the other and grind them together, mix that with a glue de retailles stronger than that used for painting, and apply a layer of it on whatever you like. Once dry, rub this layer on any metal whatsoever, then burnish it.

p007v_2Against windy colic

Take a dozen dried common walnuts and throw them one after another onto a good brazier where they may catch fire, and take them out with tongs, and let them burn and flame well in the air, and extinguish them in a glass of good wine. Then let the wine cool and filter it, then pour half of it, since six extinguished nuts make one dose. An excellent cure against suffocation of the matrix.

p007v_3To relieve the pain of g{out}

Take half a pound of finely powdered golden and yellow marcasite, half an ounce of storax, 4 lb. of urine, incorporate well together, little by little, in a mortar, then boil all together quite strongly. But the pot needs to be well covered so the smoke does not escape. Then distill the imbibed urine, separated by inclination, in an alembic, well luted and covered with a copper head. And soak a cloth with the said water and apply it lukewarm on the pain.

p007v_4Against gonorrhea

Cook .i. lb. of old smiths' water, .i. 204 of Armenian bole reduced in the finest powder, and .iii. 222 of common honey, until the honey stops foaming. Once cooled, strain with great pressure and use the results of filtration by injection.

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p008r_1

Gold lettering on paper

Write with fig tree milk then let it dry a little, afterwards apply the gold in leaf and, once quite dry, rub with linen and only the lettering will hold.

p008r_2

To explode grenades and give force to fireworks

Put into the powder one sixth as much of quicksilver

p008r_3

Tempering bullets to pierce bullet-proof armor

Heat the lead bullet as much as you can without melting it, and once it is hot dip it into the strongest vinegar that you can. And do this four or five times. Afterwards, mince some lard very finely and some linen also very delicately, mix all this together and use it as wadding, making it go into the arquebus or pistol with a little strength and very tightly. And before shooting, if possible, the bullet should be hot.

p008r_4

To make a breach in a wall by night

Having made a hole in a wall as you know, put one mortar inside, charged with powder, almost flat, and another upright, then fill in the hole and fire.

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p008v_1

To polish a ruby balay

Unlike others, you don't polish it with tripoli, but with marcasite powder and oil.

p008v_2

Ground gold and silver

You have to calcine your pure gold with $\frac{1}{3}$ and then let your amalgam dry well and the said mercury fly off. Then crush it on marble with gummed water. As for silver you have to use it in its raw form and corrode it with aqua fortis, then take it out with a copper blade and rinse it well and then grind it with gum water.

p008v_3

Polishing stones

There are three wheels for this purpose, one of tin, one of lead, and one of pure copper. On the copper wheel, only diamonds, rubies, sapphires and oriental jacinths are usually polished. The tin wheel is for softer stones such as emeralds, amethysts and others.

p008v_4

Pewterers' mixture

Because they often mix in with the pure tin half the quantity of lead, which renders the tin deaf. To correct this, they mix in some latten filings to make it resonant.

p008v_5

Perfect amalgam

Take the finest sandstone you can find and make a cavity in the middle. And put in it an eighth part of $\frac{1}{3}$ and rub it and wear it down while adding some water with $\frac{1}{3}$ or $\frac{1}{4}$ until the material becomes paste-like and even harder. Then, if you want, corrode it with good aqua fortis, if it is $\frac{1}{3}$ or $\frac{1}{4}$. Then melt it again, having taken it out as you know. The $\frac{1}{3}$ will have some color, and after being melted it will leave some flecks of $\frac{1}{3}$, and the $\frac{1}{4}$ will be very fine and will have almost no covering.

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p009r_1

Plowman

Since millet is naturally very dry, harvesters thresh it most often in the cool of night and in moonlight. Which could not be done with another, wetter, grain, because you must let the sunbeams pass over it, and one rarely threshes it before midday. Immediately after the millet is harvested, the earth needs to be plowed because its roots eat and make lean the soil as much as if the millet was still standing. The ground where millet will have been sown becomes quite diminished in fertility, which you can tell next time it is sown. But more than any other the grain called pomole in Gascony or baillard in northern France, makes the earth shake, according to the common saying, seven years later. Broad beans improve and enrich the soil, provided that one lets the roots and stems rot in it.

p009r_2

Painters

After laying down their colors, some smooth it with the back of a feather but the large brush is best.

p009r_3

Merchants

They commonly have four books. The tiro, which is a formulary for apprentices, by which they can know how much every item of merchandise costs and for how much it should be sold. The second is the waste book, where they put down in rough what they sell daily. The third is the sales book, where they put down the clean copy and detailed account of what is contained in the waste book. The fourth is the ledger, which mentions the sale, the balanced account, the bill and the term of payment, and this book is accepted as evidence in court.

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p009v_1

Painters

They melt orpiment entirely in a glass bottle on very hot ashes, but it would be more appropriate to sublimate orpiment in a long-neck matrass as for making garnets. The orpiment thus turns red like red enamel and it has to be ground first in distemper, because once entirely melted it is very brittle and difficult to grind. Then, once dry, you can thin it with oil and it will make a deep and saturated yellow. But to prevent orpiment from fading in contact with other colours and make it compatible with these and to make it dry quickly, a most rare secret is to calcine common salt and to grind it together with the orpiment. Green verditer is not used with oil.

@

p009v_2

Merchant

The order that merchants are accustomed to keep in their books, which are the waste book, the sales book, and the ledger, also called the account book.

Waste book

First, François du Cros owes from 2 September 1581, for 1 canne of batiste at 8 livres per canne, total -- 8 livres tournois

left-middle

Moved to the sales book at r. 25/

François du Cros owes from 2 September 1581, for 1 canne of batiste at 8 livres per canne, as shown by the waste book at r. 25

left-middle

Moved to the account book at r. 55/

François du Cros owes from 2 September 1581, for the merchandise taken by himself, as specified in detail in the sales book, No. 7, at r. 55, the sum of 8 livres, of which the aforesaid du Cros has made a bill on the aforesaid day, to be paid on Saint Andrew's day next, total -- 8 [...] r.

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p010r_1

Imitation jasper

Take horn as is used to make lanterns, quite thin, and underneath imitate your jasper, cornaline, and other stones. That will look more appropriate than doing it on glass, which is too shiny. And the horn gives a lustre and a fatty polish similar to jasper.

You know how you can imitate roses with scrapings of the said horn. The colors for this jasper need to have as a base clear turpentine or spike lavender varnish. And matte, opaque colours are not appropriate, no matter how fine they are. You have to oil the unpainted underside with spike lavender oil.

top

Thin glass looks very fine for this effect

left-top

You can inlay beds with it, and on the joints you can throw talc or metal filings on the fresh cement of the said joints. You have to bond them with gum amoniacum soaked in vinegar. To better imitate marbled jasper, apply coarsewool hair dyed various colors and intermingled. After you have laid down all the colors, scrape oblique lines into them then lay down gold and silver leaves. If you lay down colors made of turpentine on the horn, give it a backing of silver or of tin leaf. You can also file horn and mix it with strong glue and lay it down onto the joints of the horn piece and finish with a joiner's plane.

p010r_2

Scudegrun

It is made in Lyon from the juice of weld mixed with chalk or better yet with ceruse, which is appropriate for tempera and oil.

p010r_3

Roses

These are imitated either with the scrapings of horn used for lanterns, or with very light, fine and dyed parchment scrapings, used as you know.

p010r_4

Purple color

Painters make it beautifully by first applying an undercoat of ordinary azur, or better yet azure enamel, and then they glaze it with lacquer, which will be more appropriate for this if you mix in alum, which will give it a violet tint depending on the quantity that you mix in.

p010r_5

Powder for hourglasses

It must be made very fine and not subject to rust and with enough weight to flow. Taking i lb. of lead, melt it and skim and purify it from its filth, then pour into it four ²⁰⁴ of finely ground common salt, and take care that there are no stones or earth. And immediately after pouring it, stir continuously very well with an iron tool until the lead and salt are quite incorporated, and take it immediately off the fire, stirring continuously. And if it seems too coarse, grind it on a marble slab and pass it through a fine sieve, then wash it as many as times as necessary until the water runs clear, throwing out the fine powder that will float on it, renewing the water as many times as necessary until it is completely cleared.

010v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f26.image>

p010v_1

For painting in oil on taffeta without the oil running

One needs to make a layer of batture, which is made of colle forte soaked for 24 hours in water then gently boiled so it is not too strong. Then stir in a little honey to soften it, and bring it all to a boil. And on top of this layer, which will soon be dry, you will be able to paint in oil, which will soften the layer even more, and which will also serve to make an underlayer for gold. Alum water also keeps oil from running.

p010v_2

Underlayer for gold leaf on parchment or paper

Make very clear starch glue, showing little body. And apply six or five layers, and when the last is almost dry, apply your gold to it.

p010v_3

For cleaning gold leaf applied to iron

Rub your weapons or other gilt objects with dry horse dung.

p010v_4

For whitening ceruse

Hard-boil some eggs, cut them in half and take the yolks out, and between the two halves of the white put a bit of ceruse, and tie the two halves together with thread. Then boil in clear water, and it will become black, and thus the ceruse will be purified. Some reheat it over fire and it becomes very white.

011r

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p011r_1

Painting enamel azure in oil

This is a secret that is hardly known to common painters. Some take the most delicate they can & crush it with ceruse, which binds it, and next prick with an awl in several places the area they want to paint with azur d'azur, such that the oil enters & leaks in, & does not cause the azure, which in itself is heavy, to run. Others lay the panel flat & apply the azure on it, which is also done à destrempe. The main thing is to crush it well on marble, and before that, to have washed it thoroughly. Some grind it with thoroughly with an egg yolk & then wash it in five or six lots of water and lay it on not with a painceau, which would be too soft, but with a broisse highly softened & bent, & laying it on thickly as if one were applying it with a trowel; settling down it evenens out and flattens. I have experienced that crushing azur d'azur with egg yolk & then washing it in several lots of water is good, although it loses a little of its vividness in the crushing of it. I have also washed it in several lots of water &, when it had settled a little, I removed the water, still q blue, with a sponge and squeezed it into another vessel thus where it settled, & from the residue I had the ash, flower and subtlest part of the azure without crushing it, which is the best, for in the crushing of it, it loses some of its color. Those who make it in Germany compose it like enamel, in large pieces which they pestle, & pass through several sieves & wash.

To make azures beautiful, they wash or soak them in a rock water, as they call it; it is a water distilled from mines where azure or vert d'azur is found, which distills naturally through the mountain's veins or is distilled with an alembic par from mineral stones of azure or copper.

Azure ashes are only good for landscapes because they die in oil. Only true azure lasts. Azur d'azur cannot be worked if it is too coarse. Try it, therefore, on the fingernail or the oil palette. If it happens to be sandy, do not crush it except with the egg yolk or, better yet, wash it in clear water & with a sponge remove the colored water after it starts to go to the bottom, and in this manner you will extract the quite delicate flower, which will be easy to work with.

011v

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p011v_1

Applying the color of Damascene steel on knives

Rub the steel with common aquis fortis mixed with earth. After, rub everything with ashes or sand. Do with the gold and silver as you would do on a touchstone.

p011v_2

Getting rid of red eyes or black eyes

Make two small licks of raw mutton flesh, and with a blindfold, apply it at night on your eyes.

p011v_3

Applying unpolished gold

There is nothing better than the black varnish of sword-makers to use as a base layer because it dries quickly and makes the gold appear very beautiful.

p011v_4

Making diamond points for engraving

These are for sketching what you want to draw on stones and for engraving. When these points are too dull and cannot engrave, it is necessary to rub diamond against diamond; one can rub them with pumice stone powder. It is necessary to strip what you want to engrave on a lead wheel or with a stone or with glass, because the polishing is like varnish or glass and stops the diamond or sapphire from engraving well. This is why it does not engrave easily on horn, which is polished and fat. But when the polish has been taken off, it is easy to engrave.

p011v_5

Polishing a copper wheel

Instead of polishing your stone, it is necessary to remove the grease by rubbing the flesh side of a piece of leather on the wheel, all while spinning the wheel if you have not worked on it in a long time.

012r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f29.image>

p012r_1

For molding from sulfur

Sulfur is made beautiful by mixing in soot black or powdered sanguine, which makes it harder and stronger. After letting it melt entirely until it becomes liquid and similar to oil, then mixing it with verdigris, you can use it for casting a lizard or something else in plaster, very cleanly.

left-top

You must not cast it until it has cooled down and lost all its bubbles and eyes, and its surface has fallen and become flat as water. Soot black gives it a fine luster and makes it neater. Use yellow sulfur of the best kind, as the greyish natural sulfur is no good. Don't cast it in the wind and cold for it would fill with bubbles.

p012r_2

Cimolee

Cimolee or fullers' clay (fullers meaning those who finish cloth) is an excellent material for molding hollow or in relief. If you want to reheat it, it should first be warm and you should reheat gently from a distance, and little by little, otherwise it will crack. To reheat the figure put it in a pot in an oven, or in a closed oven. It comes out very smooth, clean and fine. With cimolee you can make a hollow mold of an animal and cast it in lead.

left-middle

The work needs to have dried for 4 or 5 days before you bake it. When you are molding and making a hollow in cimolee, don't press all at once, but gently, or else it would split.

p012r_3

Paper

The whitest and thinnest is the best. And when the hollow mold is quite clean, as when it is made of sulfur or baked cimolee, the paper comes out very clean. You can apply a layer or two of white, with a border of gold, to imitate alabaster. And after applying the white you may burnish it with a tooth. Yet in order for it to take burnish you should soak the lead white with egg white and peelings from the fig tree. Or better still, varnish your work with white varnish. Also while you are molding with paper, as it starts drying, burnish the back of it with the tooth.

p012r_4

Plaster

Mountain plaster is greyer, and that from the region of Albi is whiter. It has to be heated over a closed fire, such as a reverberatory furnace or fours de barbiers. The more freshly heated, the better it is to work with. It should be finely crushed on marble. After preparing your hollow mold of sulfur or another [material] and oiling it and surrounding it with a circle, soak your plaster in water, not too thick, and rub it well with your finger, and if it makes bubbles, throw on more powder of the said plaster and crush it with your finger until +

left-bottom

+ it makes no more bubbles. Then once more throw and sprinkle plaster powder on top and leave to set well, then scrape the powder off.

012v

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p012v

Moulding stucco promptly

Crush and pulverize finely brick or Armenian bole or sanguine and incorporate it with melted wax, and thus melted, cast like the others on a relief medal, and so you will have a hollow mold where you will be able to cast ground paper or cimolee.

left-top

Finely sieved brick is better, since bole is too fat

p012v_2

Cleaning yellow pearls

Gently boil them in a goldsmith's bouteure then, with tripoly and a small piece of leather, sprinkled on the flesh side with the powder of the said tripoly, rub and polish the pearl.

p012v_3

To whiten enilanroc

Some believe the ceruse-color crust that is on top to be natural. Others say that it is a lost secret of ancient lapidaries. Others say that it is enamel that has been reheated. And, from this crust, one can form multiple ciphers, letters, circles and other bizarre motifs.

As to the means, I proceeded thus: I once wanted to add a layer of arsenic ground on marble. However, I did the experiment without it, and I put the above mentioned thing, enilanroc, in a small iron casket on the fire of my goldsmith's forge with three or four small half-burnt coals and blew on it only with my mouth. However, the thing caught fire and became all white, not only on its surface but also inside. And then I let it cool on its own near the fire, since otherwise, exposing it suddenly to cold air, it would have cracked. While it was all white, I passed it through my lead wheel and I found it to be as hard as it was before. And after scraping off a little of the white, I found it to be of a clear fleshy tone.

Finally, I polished it and observed that it took quite a beautiful polish luster and that it could compare with a quite beautiful agate for the purpose of engraving it with some beautiful face and applying it to a table of

p013r

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p012v_3

agate of various colors. But because this overall whiteness did not correspond with the white crust on the surface that I was seeking, leaving the rest of the thing its natural color, I made a hole in a brick, precisely the same size as the object, and put it inside. Then I heated two glassmaker's soldering irons until they became red hot and, when they were red hot, I applied them one after the other onto the surface of the object until I got the white crust I was looking for, on which I made the drawing that I wanted, revealing the red background, with a diamond point, and I polished it with hog bristles and tripoli. I don't know if it would be better to reheat it under hot ashes, and if it would be good to encase it in alabaster, which is quite cold, as I did in the brick.

p013r_1

Flesh color with arsenic

Sublimated arsenic, that is to say, the white kind sold as stone, when powdered on marble, mixed with vermilion or laque or mine, produces a beautiful flesh color that always shines. Yellow arsenic has a very beautiful color, the white one works well in oil and goes well with lake.

p013r_2

To dye

Mix sal ammoniac and vitriol and boil them together. Then mix in lake or verdigris and azure or similar colors, and dye. This will not come off unless the animal sheds. @Non bona.

p013r_3

Polishing of stones

Engraved stones are not polished on a copper wheel, but with brushes and tripoli. Yet faceted and flat stones are polished on the said wheel.

p013r_4

Fine sieves of raw silk

Tammy of raw silk is made on a weaver, to make very fine and delicate sieves. And for that effect, you must not choose raw silk whitened by sulfur smoke: this covers the silk in a sticky vapor that would hold the flour and in the end would prevent it from

013v

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p013r_4

passing through so well. But for this effect, choose yellow and natural raw silk because it is stronger and rejects flour as horsehair does.

p013v_1

To recognize good azur dust for oil

The one that piles up in small clods and is lumpy is the best because it is finer. Also the one that is also very pale in color, because oil darkens it. Certain sophists mix them together, but you will find this out if you pour some onto a piece of paper and lay it flat and spread it with your finger since, if it is mixed, it will be found varied and so to say with light and darker stripes, but if it is whole it will be even and of one color.

p013v_2

Whitening pearls

When they have been applied in embroidery on some garment, they are greasy and may be cleaned in soapy water.

p013v_3

Toadstone

That which comes from the head of the toad and has the shape of the toad, painted naturally as you have seen, is the most excellent. It is said that if powder made from it is put on a brazier in someone's room at night, they will be unable to move, speak, or stop thieves.

p013v_4

Snakes

It is said that if one calls a snake in Greek, saying ἰ\237ἰ|ἰ\227 ἰ\237ἰ|ἰ\227, it will flee. Similarly, that if one calls a swine in Greek, ἄ-on, it will come.

p013v_5

Candles

Candlemakers never make good candles when the autan wind blows because they always melt, however good is the tallow they use in them.

014r

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p014r_1

For earth walls and rustic construction

Swallows have taught us this craft by building their nests out of mud mingled with wisps and bits of hay or straw to make it bond. Therefore, in places where stones and bricks are lacking, one can use earth to make walls thin and thick. The best for this is light earth, which does not form clumps when plowed, or better, that which in some way mingled with arene, because it can be most easily beaten and tamped down. It is true that it needs to be dampened and cut into clumps with a ditch-spade, and put and placed in this form. This one lasts more and does not require that much effort, and dryness doesn't make it split or crack. However, since such kinds of earth are not found everywhere, those who live on good and fertile land, after drawing the width and length of their foundations with a rope, drive in long poles and rafters along the edges on each side to support boards between which they throw the earth, making each layer about one foot thick, interspersed with S.S.S-shaped branches of heather or similar things, then they tamp it down and beat it with beaters of three different forms. One is called the mall, which has a triangular form like A, and this is used firstly to tamp down the earth. Then one uses another made of pointed woodblocks fitted onto a thick stick, and this one is used to properly press the earth at the wall's ends and edges where they adhere to the boards, and is called [blank]. The other one is called the bat and is used to flatten and beat the earth for the last time, as shown in C. Then one makes another layer of earth and heather and beats as has been said, and continues thus until completing the wall, which is covered with heather and then with earth. Some intersperse the said wall with rows of bricks. They also make walls with a sloped foot, adding width to the foundations according to how high they want to build the wall. When it is old it whitens, showing that it has saltpeter in it. Which is why, when they fall down, gunpowder makers profit from them.

fig_p014r_1

left-bottom

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015r

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p015r_a1Damask Cloth

You can make damask cloth of two different colours and imitate embroidery without adding anything else to it, as follows. Once it is dyed yellow, pounce onto it such a pattern as will please you. Then you will sew some string or a bigger cord loosely onto the pattern and throw it into a dye of woad or pastel and it will become green, except that which is beneath the string, which will remain yellow because the green dye will not have penetrated there. And you can do the same with other colours and, instead of string or cord, add some pieces of poor quality cloth cut in Moorish shapes on top of the first colour. In that manner, you will have cheap embroidery.

p015r_a2Casting metals

Candlesticks and small works are cast in a frame with sand. Having stamped the work, sprinkle it with flour in order to make the copper or latten run better. When the sand has been in use for one month, it is necessary to take some new sand because that which has been used, being reheated, dries & loses its binding power. Yet it is used mixed with the new sand, because it makes the work less porous. Large works such as artillery, bells and similar things are cast in earth, and copper cast in earth makes less crust and is whiter than when cast in sand. The earth is sandy clay mixed with horse dung and cloth waste. The earth that has been used for casting, which is black, baked and as if burnt, is mixed with artificial sand, and is very good. For softening and making the copper run, once it is melted, one throws in some lead, which does not form an alloy but is found on the surface of the cast.

left-middle+ by the heat of molten metal

p015r_a3Casting gold and silver

The sand must be made from something very dry and arid and reheated well because, if it were humid, like founder's sand, the gold and silver would leap out of the mold and sustain damage. It is also necessary for the earth to absorb the metal because cast gold or silver become very porous. That is why it must be beaten out again, otherwise it is brittle, as seen in spoon handles.

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p015v_1

Tablets

Some are made from boxwood and inlaid with ebony, sandalwood, ivory, or from gold and silver like damascening. After that one writes with silverpoint and then erases by rubbing them with a cuttlefish bone.

p015v_2

Making letters easier to read

One cuts the largest pieces of beryl or crystal round on one side and flat on the other, then one fits it with a little handle and puts the flat side on the letter

p015v_3

Stamping

If you have a bronze medal and you want to make it very light, make a lead cavity, then spread upon it a thin plate of gold, or sheets of lead or reheated silver, place your bronze medal on top and hammer it with a wood mallet.

p015v_4

Softening horn

Those who mount around Agnus Deis and make circles from horn for certain little boxes soften the said circles by soaking them in hot water and then shape them on a round or oval-shaped triblet.

p015v_5

Ears

When a defluxion occurs in the ear, be very careful not to put anything in it, and following the proverb, ears and eyes should only be touched with your elbow. However, to an affected ear, it is good to apply musky cotton, that is to say, cotton kept in musk, which comforts quite well.

p015v_6

Toothache

Some put a clove of garlic in the ear on the side of the aching tooth, and after two or three hours they feel better. Others put in their nostril, on the same side as the tooth that hurts, some green skin scraped from the stem of bisaube, namely that which is under the grey one that looks like a vine.

016r

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p016r_alMelting soft iron

It is a common opinion that once iron has been melted, it cannot be remelted because they only heat it in small forges, in which it only catches fire. Alchemists are confident they can melt it with realgar, lead or orpiment. But without all that, some have found a way to melt not only brittle iron, like that used for iron pots, but also soft iron such as pig or ingot iron, which are the most difficult ones [to work with]. For this result they make a furnace that is one pan and a half wide and two pans deep, and the tuelle, which is the barrel marked A where the bellows' pipes fit, has to be placed midway through the depth of the furnace so that there is one pan of the furnace opening on the tuelle and one pan under it.

left-topEach square pan of the furnace's opening can hold one quintal and a half, and the round furnace pan can hold two quintals.

fig_p016r_1

left-middle

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right-middleThe iron smiths, to make the iron run, at the opening of the forge, place two or three handfuls of wallwort in the direction they want to make the cast iron run, and that makes the iron wonderfully ductile and flowy.

It is necessary that the tuelle is inserted through to the middle of the furnace opening, which is a main clue for the secret because the wind will hit the edge and the wall, which makes up the center of the furnace and in that manner, it spreads equally everywhere, as well as above, like flames in a reverberatory oven, and thus heats much more; because if the wind hits the melted or ready to be melted matter perpendicularly, it would cool it down and it would stop it from running and melting. It is also necessary for the bellows to be activated by jumps and by the water stream as happens at forges, because in this way, bellows are activated with great precision and great speed, which the strength of workers could not duplicate. As you can see, the wall is thus raised up and the furnace is laid on the ground, at the edge of which you dig a pit, like at other forges. In order to put the moulds you want to cast inside, and for this purpose, you unstop the opening that you made at the bottom of the furnace to allow the melted matter to flow. You will be able to melt two quintals of iron each time and, in order to do this, you will choose the biggest charcoal you will find and put a measure of it at the bottom on the surface area of the furnace and pile up from the bottom to the top of the wall, in the shape of an upside down V.

left-bottomSome make a mould of the same size as the piece, then immerse it, then beat a soft iron piece cut to size, and when this bit is red hot, they beat it into the mould and round it out with a large file. These bullets are thought to be stronger than the melted ones which, being made of hard iron, are more prone to break.

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p016r_1

which is usually of 3 pans high. But first of all, you have to reheat your furnace with some big charcoal, so the bottom is red hot and then you will put the said charcoal measure in the middle of which you will put your iron, not at once but ten or fifteen pounds each time. And since it will be swallowed at the furnace bottom, keep putting some more. And add three or four shovels of bigger charcoal and avoid it from getting consumed too quickly by wetting it. And when you will see your furnace full of two quintals of matter, or less if you don't have that much, you will leave the charcoal consume itself. And when the charcoal is almost dying at the furnace's level, you will be able to pour in the moulds and iron or metal shells, which is even better for one metal will bite the other. And the inside of the mould has to be covered with soaked ashes, so it doesn't adhere to it.

p016v_1Against Go{norrhea}

Soak some quince seeds in some clear water and inject this viscous water

p016v_2To take fine forehead hair off

Have a loose silk needle and put it tight through hair bulbs and they will bite the silk like fine cotton wisps.

p016v_3Silk

Crimson silk is more frequent than all the other ones because its colour is not as expensive as blue or green ones which are, also, good bargain for the worker. Black silk is less frequent because it costs a lot.

p016v_a4How to keep oranges

You have to choose them whole and not rotten and then fill a firmly closed tin vessel with them and they will be fine for six months

p016v_a5Candles

They can be kept in some bran which make them white and last more, according to some. I believe, however, that it is enough to keep them in a cool and dry place, so they are not pressed. It is better if there is a hemp thread inside the wick of the candle to give more light and maintain wick straighter. If it is otherwise all cotton made, as those of Montauban do, it needs to be snuffed out often because if it has been burning for a while, cotton falls down and make the candle drip.

p017r

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p017r_1

On cannon-makers

Cannon has a range of five to six hundred paces, but for a battery, the range is a maximum of two or three hundred paces to be effective. It should not be any farther. Its cannonball usually weighs 40 lb of the King's standard. The fowler weighs 25 quintals and is a small, short cannon for fighting the casemates of moats and at close range. It shoots large cannonballs that weigh, like the others, 40 lb of the King's standard. The breech is two balls and a quarter thick; the mouth is one ball and a third thick. Its load is similar to the biggest ones, that is to say 20 pounds. And if you want to try it, don't overload it, for it would damage it. And the first time and the first five or six shots, it is better not to load it completely, it adjusts itself. What one can do in such a case, is to load 20 pounds of fine arquebus powder instead of ordinary cannon powder. And four good horses are enough to carry it. They are easy to use and on a small distance they are as strong as the big ones even for private houses and small billottes and less important fortresses. They are less prone to breaking than other cannons because they are short. What gives strength to the powder and increases the danger of breaking is the length of the cannon, because the powder burns entirely and its force is held longer within the longer cannon than the short one. The fowler is usually seven to eight pans long. It is true that this measure is a Montpellier pan and not a King's pan, the latter is not used for good cannon founding. Since the Montpellier pan is shorter, cannons made using this measure are shorter, but compensate in thickness the ones made using the King's pan, which are longer, but more fragile. The Fowler's strength for battery is 80 pans.

left-top

The great cannon, because of its cannonball's weight, ranges not further than a thousand or twelve hundred paces without landing, and usually makes 3 jumps.

left-top

Fowlers have only a short range efficiency.

left-middle

You recognize a cannon's good alloy when you see it. If there is green color on the surface becomes red, it means they are made of a sufficient quantity of rosette. Otherwise, the cannon's metal will appear whitish. If you don't see it, just scratch it and you will see it.

left-bottom

The good alloy for the cannon is three pans of rosette and one of big bells' fine metal, where there is more rosette than in small bells' metal. This metal usually costs 15 pounds and fine rosette 15 or 16.

left-bottom

Montpellier pan is equivalent to six King's inches, which is equivalent to two ordinary.

bottom

To level a cannon properly, one needs to have the mouth as high as the breech. Otherwise, you do not aim well.

017v

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p017r_1

The large canon is for great batteries and usually weighs fifty five or 60 quintals. The breech is two cannonball and three quarters each. The mouth is one cannonball and three quarters each. It is thirteen or fourteen pans in length. But they are very uneasy to drive. The proper battery, to be used rapidly and to have great impact, is a hundred fifty to two hundred paces. It is true that a fair impact can be had from three or four hundred paces, but more powder is needed. Its usual load is 20 pounds of powder; its cannonball weighs 40 pounds, and 25 horses are required to carry it. When one needs a longer range than the usual one, half a linstock of canon powder is added. 80 or a hundred shots can be made with this canon per day, but it needs to be cooled down after each nine or ten shots if the battery is continuously used; if there are some breaks, it is not necessary to refresh it as often. For each quintal of copper - or one quintal and a half for big cannons - a quintal of metal is added. The metal is composed of eight pounds of tin for each quintal of rosette and even less for big bells for which we use only six pounds of fine tin for a quintal of rosette, to give it a louder voice. Because the more tin there is, the clearer the sound is. For canon founding, if the material and charcoal is provided as it is usually done because masters cannot afford it, it costs 10 to 12 pounds per quintal. And when the master provides everything, you give him 40 pounds per quintal for big pieces such as cannons, according to the King's ordinance. And 50 pounds for smaller pieces. For the more matter there is, the more the master makes profit. Another kind of 30 quintal's fowler is founded which is longer than the others, and usually 8 pans long, which is used to attack fortifications and cassemattes by displaying them, at night, in groups on the moat's edge.

â\227-

left-top

Each side of the breech's opening is half a cannonball thick, plus a third of a cannonball.

We give it two linstock of cannon powder for its load, and half a linstock of arquebus powder and the same for the others.

left-middle

#

The alloy of cannons from France is made of one quintal of metal for two of rosette. But those of Toulouse and Poncet put 3 quintals of rosette for one of metal.

The rosette used to remelt is better than rosette for cauldrons, for the latter get all dirty.

left-bottom

The older pieces are composed of almost as much of each, that is to say a part of rosette and one of metal. This alloy can be recognized with a burin because the matter is acid and the part scraped off with the burin is yellow and white.

018r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f41.image>

p017r_1

Culverines are big batteries of forty quintals and eighteen pans long. Their bullet of the King's standard and battery weighs 30 pounds and is therefore lighter than the canon's one.

Therefore, It does not carry so many munitions because fifteen pounds are enough for its load. The canon has a bigger mouth due to the size of its cannonball, but the colverine is more precise and goes faster, having greater range due to its length. Its breech is two bullets and a third thick, the front is a bullet thick. Culverines are used for fighting fortifications from far away when it is not possible to easily approach them. And then canons come closer. They are used also to support the battery. Fifteen or sixteen horses are necessary to carry it. They are made of the same metal alloy than the canon, like all others smaller pieces of artillery. For these, we add a little bit more metal in order to make the melting run better. And for two quintals of rosette, you add six unit of metal per pound for smaller pieces. They range from 8 or 9 hundred paces to a thousand paces if the powder is strong and in the air half a league.

left-top

Some invented loading cannons with cartouches.

left-top

Some don't fill the canon with powder at once but twice and each time ramming the powder in, saying that each time you ram it, you raise it and give an inch more. But this is not sure for big pieces for they are loaded with a lot of powder.

The bastarde is a middle-sized piece of artillery which weighs thirty quintals and its cannonballs weight 15 pounds and is loaded with 10 or 12 pounds of powder. Its proportions are two cannonballs and a third part of a third one thick at the breech and one cannonballs and three parts of two at the front. They are used for fighting against less important defences such as gabions or sentries, topped with a tower, or similar thing. It is thirteen to fourteen pans long like the great cannon. Ten horses are necessary to carry it. It goes with the culverine for shooting because it carries small munitions.

left-middle

Some make the breech three cannonballs thick and the front two cannonballs.

The bastarde culverine weights 35 quintals and is 25 pans long. The breech is three cannonballs thick and the front two cannonballs. Its cannonball is like the bastard one, weighing 15 pounds. These are fixed pieces which cannot be carried on a carriage. They are for city defences. Some make cannons like these which are 27 or 28 pans long, like La Rochelle's vac he, but such pieces are strengthened at the breech with a width of three cannonballs. Their range is one league and a half. Its load is like the bastarde's one, and if one wants to hit horsemen very far way, more powder is added. After the cannonball there is a trace of smoke which drives your trajectory to where the cannonball is going. This is understood for cannons and the culverine, but not for small pieces.

018v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f42.image>

p017r_1

The average weights 18 quintals and is xii pans long. Its cannonball weighs eight or 9 pounds and its load is six pounds of powder. The breech is three cannonballs thick and the front is two. It is more appropriate against cities' defence rather than in battery. It is however sometimes used either to break a barricade or to support the battery after cannons have been shot, in order to prevent the assailed from rebuilding after the cannons have played and been shot. Four horses can carry it. It has a range of eight or nine hundreds paces and almost as many as the bastarde.

left-top

To cannons and big pieces we give as much powder as a cannonball and a half's diameter in proportion to the escusson. For medium pieces, such as campaign pieces, and the ones smaller, we provide them with powder the equivalent of two cannonballs have a quantity of powder equivalent to two cannonballs thick in proportion to the passevolant and smaller ones are given three cannonballs thick of powder. Usually, all pieces are loaded up to the escusson. We load all pieces under 4 quintals with the linstock, two linstocks of cannon powder or one and a half lantern of arquebus powder. For smaller ones, we only use one linstock. The pieces of one quintal as loaded with a little charge.

A battlefield piece weighs ten or twelve quintals and is ten or 12 pans long. Its cannonball weighs 6 or 7 pounds and its loaded is 4 pounds of powder. The breech is three cannonballs thick and the front is two, like all the pieces under the mid-sized. The breech is thicker for they are in proportion longer and also because they are more frequently used than big pieces against houses or elsewhere. Their caliber is also small, so we give their breech a thickness of three cannonballs. They are used to follow immediately a camp and for the defence of cities and houses, settling them on walls or in a tower. Three good horses are required to carry it.

The passevolant weighs 6 quintals and is eight or nine pans long. Its cannonball weighs two pounds, and its load is a pound and a half of powder. The breech is three cannonballs thick and the front two. Two horses can carry it because one single horse can't carry a piece. It is used for houses' defence or to be brought amongst the infantry to break a horsemen's rank.

A faulconneau weighs 4 quintals and is 10 pans long. Its cannonball weighs a pound and a quarter, its load is half a pound of powder. The breech is three cannonballs thick and the front two. To carry it, two horses, although these pieces are seldom moved since they are mainly used to defend houses. The ones which are carried over for battery or a fight, or a siege, are culverines, medium-sized bastardes and pieces

019r

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p017r_1

of campaign. Faulconneau is to commonly loaded with a linstock. There are also some other f
aulconneaux weighing three quintals, and which are nine pans long. Their cannonball weighs
half a pound. Their load is a quarter pound of powder. They can be loaded with a linstock,
but more commonly they are loaded with a charge. The breech is three cannonballs thick and
the front two. The small pieces which are under three quintals are at least three cannonbal
ls and a twelfth of a cannonball thick at the breech, and the front thickness is sometimes
reduced to get the proportion according to the length.

left-top

The strength of the piece is at the level of the tourillon, where the lighted powder starts
.

left-top

The strength of the berche is at the maslÃ©e, behind the breech.

A double musket weighs 2 quintals and is seven pans long. Its cannonball is a quarter of a
pound or less. The breech is three cannonballs thick, and the front two. It is loaded with
as much powder as cannonballs, to the top of the touch line, which is equivalent for such s
mall pieces to 3 or 4 arquebus powder cannonballs, because if canon powder is used, it can
be loaded five cannonballs high.

left-middle

This has to be understood as iron cannonballs. When a metal cannonball is fired, we overloa
d it with a quarter of linstock because if a cannonball weighs 40 pounds, a metal one weigh
ts 60 pounds. This is why the sight is higher when a metal cannonball is fired. Because if
an iron cannonball is fired directly, a metal cannonball is shot from six lines higher. A m
etal cannonball, mixed with copper to make it more brittle, is more effective at close rang
e than the iron one. But an iron one is more effective at long range.

A simple musket weighs one quintal and is six pans long. We disregard the ones that are les
s than two quintals, and which usually throw lead cannonballs by its weight, and [concentra
te on those] which are loaded by caliber. However, those [muskets] that can be loaded with
metal or iron cannonballs will work better, for they will do more damage than the lead ones
. It is loaded up to the touch line, which is 4 cannonballs thick.

Arquebus Ã croc weighs 60 pounds, the bigger one is five panels long, it is loaded up to t
he touch line, which is 4 cannonballs thick; it is loaded with lead cannonballs, and is for
house's defence. These great and small arquebuses are used for to make orgues, appropriate
for an assault outside and inside. They are casted separately in order to be used in variou

s ways. See the 4th leaf marked.

fig_p019r_1

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019v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f44.image>

p019v_1

Mathematical figures without a ruler or compass

you know how to draw a circle with a quill and otherwise with your right thumb nail and your folded big finger if you don't have any ruler, fold a paper sheet in five or six folds to use it. And if you want to draw a column, arch, oval, cartouche correctly without a compass, fold your paper so the fold is a straight line from which you draw within the relevant distance a point or a line and fill it with some ink. Then fold again the paper and rub it on its reverse and it will stamp whatever you have made. In that way, A is the line without ink made by the paper fold, B is the line you have drawn, C is the stamped one.

fig_p019v_1

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fig_p019v_2

<https://drive.google.com/open?id=0B9-oNrvWdlO5cy0tdXF5MGJTLU0>

fig_p019v_3

<https://drive.google.com/open?id=0B9-oNrvWdlO5R0VMdFQ3VC1lQmM>

fig_p019v_4

<https://drive.google.com/open?id=0B9-oNrvWdlO5TGJOZGVvTmV1LW8>

p019v_2

To write as easily from the left as from the right

Write in the best manner possible with some well gummed ink on as many cards as many words you want to write and when your letter is full of ink, apply your paper and rub with a tooth the back of the cards.

p019v_3

Enemas

They used to mount them with a leather handle or pocket, the best one being of cat pelt which is more padded than any other else. And then they started to fold the handle from one side and then they kept folding it and turning it on itself and in that way enema runs slowly, but this manner takes more time and is less easy than a syringe which has been discovered since then with which a man can give to himself an enema. It is true that it always gives wind at the end.

020r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f45.image>

p020r_1

@For making millas

You must have some millet soaked in order to remove the chaff and then clean it well. Next you must grind it again quite finely and pass through a cloth sieve. One must soak the flour with fresh melted butter and some milk so that it is very light, like the pastry to make beignets, and add egg yolk depending on the amount of flour, so that there are two egg yolks for each millas. Then you will put in some saffron if you want to give them a little colour.

Afterwards you must have some molds, which must be made from terracotta, in the shape of the bottom of the catholic hat, but it must be open at both ends. And then, having made a good fire, clean where you want to put your millas and then take your molds and grease them very well so that the pastry does not stick to them when baked. Once you have done that, put your molds in a place in the oven where you clean and sprinkle a bit of flour on the bottom and fill them with some of the aforementioned pastry. Then you will cover the said molds, with a lid made like the mold, but it must be bigger and not open at the top. Then once done, you will put some straw on the said lid and a lot of hot charcoal, and set a fire around it, once done, you will open up one of them after a bit of time and will see when it is baked, it will be hard.

p020r_2

@Glazier

Glass from Lorraine is smoother and more even than plate glass. It is more durable and enduring. But commonly it is tainted with veins as if with straight lines and wrinkles, which happens because once the glassmakers have made it put it still hot on straw which therefore stains it. One can, however, rub it off with some varnish, salt and other drugs used by glassmakers. Lorraine glass is sold by bands and each band is composed of three panels. A band costs usually X souls. The plate glass is made in France, it is whiter and clearer but it does not last as long as that from Lorraine. It is also commonly blown And in that case, it is better to cut little lozenges rather than large square pieces in the shape of a frame because they cannot sit themselves well evenly.

left-bottom

The plate glass is sold in sets. Every set contains 4 plates that are usually sold at 10 or twelve lbs.

020v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f46.image>

p020v_1

To whiten the face

Pound puffball in cistern water, and no other, and wash with this whitened water. This is highly regarded. And I believe that making it from wheat starch and using that would be even better.

p020v_2

Against windiness, colic, etc.

Sap squeezed from orange peel or water distilled from orange peel is excellent against windy colics. Candied peel is also excellent for stomach winds. And to try it, having poured sparkling wine in a glass, press orange juice on the wine's foam, which comes only from vapor and wind, and you will see that the foam will immediately disappear. Also, if you squeeze juice against a candle it will burn brighter.

p020v_3

Eschervis racine

They want to be planted in a very humid place or such that, with water from wells or fountains, they can be frequently watered, because this makes them tender. Otherwise a hard core forms inside, which takes away all their goodness.

p020v_4

Against burns

Pound an onion with verjuice and leave it to soak like this, then apply it.

Or better, apply black soap on the burn. Experimented.

p020v_5

A common saying

Steeple of Rodez, church of Albi, bells of Mende. However, the bell of Toulouse named Cardaillac is held to be one of the most beautiful in France, all the more since it weighs two h

undred and fifty quintals.

p020v_6

A form of regimen

Every morning, take two or three eggs laid on the same day or the day before. Heat them up but do not cook them. Eat the yolks well dusted with sugar. And afterwards drink one finger of wine. And in addition to being nourishing, it is good for the stomach.

021r

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p021r_1

Cannoneer

As for small cannons that are not loaded with a linstock, one loads them with powder all the way up to the touch hole, which is placed at a point on the cannon that indicates the appropriate measure.

To point a cannon, that is to say to fix the target, one needs to set the sights, in other words, take aim, from the sides rather than the top, that is to say the top of the cannon. By taking aim from the top, you can find the line of fire that leads to your target, but you will not find out if the cannon leans more to one side or the other. Then take your sights first from one side and then from the other and adjust your cannon to point at your intended target. Then set your sights from the top of the breech, which will be quickly done.

Next, use your discretion to lower the cannon a little if you are within firing range, because the force of the powder blast usually raises the barrel. If you are outside of the range in which the cannon can fire in a direct line, you should consider that the weight of the cannonball will lower the barrel.

p021r_2

Shooting a cannon at night

Some keep their cannons loaded and in the daylight hours. Then, so that the cannoneer can shoot into the breach where the besieged are perhaps repairing [the breach], the assailants raise a false alarm so that the besieged throw torches or artificial fire into the moats or around the breach, light by which the cannoneer can take aim. Sometimes by using the reflection off mirrors or jars full of water, the assailants can redirect the light onto the breach. The method that you know, using a sundial and lead line, is also very good. Others use

strong iron pegs to fix two or three planks onto a platform of wood made to carry a battery of cannon, and leave some notches empty where the cannon wheels can pass perfectly. And with this method you will always put the cannon in such a position so that it doesn't tilt to the right or the left. And so that it isn't too high or low when you fire the following day, you place a marker that is well fixed in the ground, that just touches the bottom edge of the canon after it has been aimed and adjusted for firing.

left-bottom If the platform, the wheels or wedge parts break or come loose, this invention holds no advantage.

021v

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p021r_2

Others place two well-staked poles into the earth in such a way that the one is as far from the edge of the cannon's mouth as the other. And underneath they place the above-mentioned ruler. Then when want to fire the cannon at night, they push their cannon straight towards the above-mentioned ruler and make it so that the edge of the mouth rests on the end of the aforesaid ruler. Next, they measure with a ruler, or a similar tool with measured intervals, from one pole to the side of the cannon and if it is too close or too far, they adjust the canon and make it the same distance as from the other pole.

p021v_1

Unspiking your cannon

Some people say that one should remove the cannonball if the cannon is loaded and introduce fire into the mouth of the cannon. But it is probable that the fire will leave again through the mouth rather than seek its exit through the touch hole which is spiked and restricted. The most reliable way is that the cannoneer, who is often a founder, drive in a nail and turn back the point of the nail that the enemies placed therein, and with a trephine, make another touch hole at the side of the spiked one, which can be done in an hour. And if with time the violence of the powder loosens the nail that the cannon was spiked with, you will make a nut in the second touchhole and place a screw in it, so perfectly that it will never come undone.

p021v_2

Defense of a town

There is nothing more efficient for defending a breach than mortars placed at the front line, as soon as the initial assault. They carry a lot of ammunition and are filled with cart nails, big steel dice, bits of chains and similar items. And when one senses that the enemy is close, one lights everything on fire. Grenades, well-constructed and thrown at the right moment, also cause much damage. And to make them worse, one can add some roughly crushed glass, either in the mold or in the crucible, when one casts them. This worsens the wounds. The grenades must not be too brittle, but it is good that they be somewhat alloyed with the material of the grenade so that instead of breaking up, they resist shock better and inflict more violence.

022r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f49.image>

fig_p022r_1

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The one depicted is a bit too big, see the following one.

Cannon ball, weighing 40 lb and being 12 lignes pied de roy long.

022v

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p022v_1

fig_p022v_1

left-top

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Orgues

Then they are affustÃ©s on a rather thick board close to each other and notches are made on to the board this way fig_p022v_2<https://drive.google.com/open?id=0B9-oNrvWdlO5RnQ2RilPenAlaDA>.

And through these notches is fit the harquebusâ\200\231s hook which has a hole through which we pass, from under, iron pegs. When you want to aim, you affuste the middle and side ones. If you want to make double, triple or four ranks or more, you have to put similar board rank one on the other, like the first one. This manner of making an orgue fait faute @ and makes it very stable. Because the other ones made of one massive and solid piece have cannons of only one and a half pan long. They therefore are used only for a salvo at an entrance or to protect a gate.

A small hooked harquebus a-crocque weighs 40 pounds and is 4 pans long, and is to be loaded to the touch hole, its breech is three cannonballs thick, its front two.

The double cannon is nothing different from the big ordinary cannon, apart from the fact that its cannonball has one line of thickness - or of diameter - more. A line is a twelfth part of a cannonball. At the breech, it has a thickness of one line more than the cannon, and the mouth is half a line thicker. Its load is six or seven lbs of powder, more than a cannon, that is to say of two big linstocks. Its cannonball weighs 56 lb. Thirty horses are necessary to carry it. It weakens the walls more than a cannon. But it is very uneasy to drive. This is why it is unused today and is more appropriate to be brought to a nearby place for close combat or for a [ceremonial] entry, rather than for an ordinary execution. They are called basilics, and they are unmovable pieces.

p023r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f51.image>

p023r_1

A mortar is made so that it weighs three quintals and carries a cannonball flat on the side from which it must exit and round on the side of the cannon, as if it was a cannonball cut in half. It is two pans long. It has to be loaded with xxv lb of powder because it has to be full to the opening and has to fire. Its bottom is not thicker than the opening and is made of one single piece. Its material has to be better than other artillery pieces, and for 4 quintals of fine copper there must only be one quintal of metal so that it absorbs the shock, and so that, when fired with more force, it is more efficient. It has to be used against a door with a large iron cross before the bullet, and once loaded, needs to be covered with a firmly sewed rough canvas which should be completely smeared with turpentine. Four handles need to be added to it while it is cast, it is thus easier to place. The iron cross is fixed to the opening with the canvas covering it. The handles have to be held at its opening's edge, as you can see. To place it, you need three or four iron pegs of one pan long and as thick as a finger, which have their point like a gimlet, and their body like a screw as they are strongly pulled, and a ring on the other side to turn them with a short stick that fits into the ring. And the pegs are fixed on the door, not straight, because they would not have any strength, but crooked as if you wanted to fix them towards the middle of the mortar, and to do the holes of the handles need to be quite large. In that way, the shooting mortar pushes the pegs back and forth into the door, and makes more damage. Once in place, you need to have saucisse de buckram @ made in this manner: take eight or nine canes of buckram selvaige or more if the gap is larger, which have to be as large as four or five fingers, have it sewn in such a way so that it is like an intestine where a stick as thick as a finger can fit. Fill it completely with good

left-top

This one is to be put below an undermined tower with its opening towards the top. One casts two large iron rings and, with a stick or two, four men carry it. They are also used for placing within wall breaches but just half a charge is necessary, that is x lb, and fill the rest with some pebbles and cart stones.

fig_p023r_1

left-middle

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left-bottom

It needs to be covered entirely with a waxed canvas and rubbed with turpentine and other combustible things. This cover is made to ensure that the bullet does not fall and so that, when the cover is given fire, the powder does not fail. Upon the fuse, you will need to put a good quantity of powder. Some put on the ball a cross of iron which is longer than the mouth of the mortar by two pans. Others only put the ball.

p023v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f52.image>

p023r_1

fig_p023v_1

left-middle

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powder. When the sausage is filled, dip it gently in two parts vinegar and one of spirits, to moisten the canvas but not the powder. Next, leave the aforesaid canvas to dry completely, and then you need to attach to the sausage a long string or cord twice as long as the sausage, but you must not tie it to the sausage but make it touch the two ends and sew it to the sausage in a few places in the middle. Next you need to smear all of the sausage with very good turpentine, and at one end, where you will want to join to the mortar's fuse for firing, you can sew or tightly attach with a selvage of canvas as large as one empan which should also be well soaked in turpentine, and this selvage should be cut in the middle so that it can be fastened and wrapped around the mortar, and you must attach it so that the tip of the sausage that is open will be joined to the fuse of the mortar. Then you need to place a lot of tightly-packed powder onto the fuse of the mortar. And next, the person outside of the ditch should draw the small string and cord that is joined to the sausage so that it is extended mid-way, but not so much that it is detached. And if there is water in the ditch, it will be necessary to support the sausage with a fork. Then, having placed himself and others in safety, the person who holds the tip of the sausage will be able to fire.

p023v_1

Mortars that one wants to fix on doors or iron gates are sufficient if they weigh 40 or 50 lb. For the rest, for its charge, cannonball, and process, you need to do all just as was already said before concerning the one of 3 quintals. One man can carry it.

p023v_2

The cannonball needs to be round on one side and flat on the other like a half of a cut cannonball. The cross also needs to stick to the ball - the latter melting if it is made with metal - and is enveloped in the middle of the cross.

024r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f53.image>

p024r

Grenades

Grenades should be made from the finest metal you can find, for there is fine metal and rough metal. Fine metal is that of big bells, because one puts in more copper to give them a bigger voice, and for small bells one puts more tin to give them a clearer sound. The metal of big bells is made with 3 quintals of rosette and twenty or xxv lb. of tin. Each grenade should weigh four to six lb. In order to throw them, they must be full of powder mixed with coarsely pounded glass. And in a quarter lb. of powder, one must put half an ounce of glass, so that on the face or places where the powder will have an effect, the wounds will be worse. The best harquebus powder is required. The hole needs to be as large as the thickness of a swan's feather, and there is no need to make it into a screw, it is enough to make it even. Then you make a pipe of well soldered fer blanc, which can enter into the hole up to the middle of the grenade and which juts out the width of one finger. You will fill it with good powder, pounded in a mortar and lightly tempered with good spirits or strong vinegar. One does so in order to slow down the powder. And in order to know if it will be slow enough to allow time to throw the grenade without danger, try this powder thus tempered in another pipe. You can keep your loaded grenades in a very dry place, and on the contrary you should keep your pipes filled with that tempered powder tight together in a humid place. And nonetheless, you should have some already inserted into grenades, so that you are always equipped. And every 3 days you will change them if you notice they have become too dry. To throw your grenade, take it firmly in one hand and with the other hand light your pipe with a wick, and throw it swiftly amidst the troops. The grenade should have twice the thickness of a knife spine.

024v

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p024v_1

To bring a canon over land

It requires a hundred roadworkers or more to even gap tracks and others obstacles such as trees, stone piles and similar things to make gabions on the road. Once one is close to the battlefield, the gunner goes at night to locate the most convenient place to display the battery and if he does find one, a false alarm should be raised so the ones inside throw torches. Very often,

you shoot as strong as possible so the assailed despising the battery do not fix it. Usually, there are not many gun-turrets or other defenses. And when a breach is made at the strongest and the cannon replaced, it will surprise the assailed. One should approach fortified towns at night, but [illegible]. The workers bring gabions and once these are displayed, some boards or plank are put behind gabions to keep the workers safe while behind, they fill the gabions with some earth by means of their shovels. And while this is being performed, another false alarm is raised from another side. And once you have shot a cannon ball at the defense, the gabions the workers display the boards to make a plain ground or a platform of four fingers or half a foot thick. And they are set into the earth. The platform is five or six feet larger than the cannon's wheels on each side if there is just one cannon. But if there are more, platforms are side by side. The space between the pieces is equivalent to the width of two gabions. As long as the battery lasts, gunners sleep and eat close to a cannon. In small spaces, one does not bother to dig trenches to reach the pieces but display many high gabions and run towards them. In large places one digs trenches. There are always in trenches or behind barricades units on guard duty to defend the pieces. A small powder container is kept containing three or four separate cags.

left-top

You have to know the French containers for the artillery.

left-top

It is good if the platform is slightly oriented upwards because the piece is more quickly put in action [amp; tient plus coup] and hits harder.

p024v_2

left-top

Lined cannons

are those with a lining in the powder container space. The bullet rolls only up to the opening of this chamber. These ones are not so efficient and are not easy to load but they do not light up so quickly.

p024v_3

left-middle

Steel touch-hole

is to be put as an anchor in the canons so it will not be damaged during the shooting unlike the others very quickly did. But these anchors are prone to jump off and injure the canonner. The only thing is to use an appropriate touch-hole.

p024v_4

left-middle

A touch-hole at the bottom level is the best. That way the cannon does not come backwards.

025r

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p024v_1

a hundred feet away from the battery and should be surrounded with barricades or trenches. And this is where they go and get powder in bags or baskets. And each piece has its own basket to it three or four times. Then, when the cannon is placed on the platform, one puts an arquebus bulletproof board between two gabions. Then, with a lantern, a gunner reloads it, and with the rammer which is at the other end of the lantern, two men press as hard as they can, nine or ten pushes, until the powder is dense. Then another one adds some hay or straw and the others ram for a while. Another one loads the cannon ball. And the one with the hay adds the same amount and presses again. Another one adds a wood hung but this might damage the piece. And if one has to shoot a lot, one would need many hungs which are heavy to bring. When the cannon is loaded, xx or xxv workers push it forward with the sticks by the side, behind the gabions without taking off the board until the cannon reaches it. Once the cannon is forward, the gunner adjusts it with the hooks at the back, pointing at the target on each side and then in the middle. Then another one nearby sets fire. Each gunner needs 3 cannoners: one to load, one to point at the target and one to set fire. Sometimes, against a camp where breaches are made, one shoots a cartridges, as you find elsewhere, or one may use a basket full of stones, cars' nails or similar things. A cannon must not be carried unless it is with two wood or iron carriages. And you need seven quintals and a half of iron to fill the cannon's wheels, flasques and other equipage. The best battery is, according to some people, made as a curtain which sideways, because by doing so you unsettle more stones.

bottom

Some add small wheels to a piece and a thick board to the end of the piece so it can be moved quicker and without noise. Others add some leather around the wheels and also add soles or leather shoes to the horses' hooves so they cannot be heard.

025v

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p025v

Gunner

There are three rings on a cannon, one at the breech, one in the middle, one at the mouth. When founders want to work on their piece or have a cannon or another lighter piece and easier to carry, they make it from the breech ring to the middle one in the same size and proportions as the bullets described below. But they taper it more or less one line on each side from the middle ring to the mouth ring, always using a compass for their measures from the straight line which they draw in the modelle en papier whatever pattern. And this reduction is consequently equivalent to seven or eight quintals less. And this does not make the piece less secure. This is done for big pieces, but for pieces smaller than the mid-one, one has to keep the aforesaid proportion and make the piece in one straight line from one end to the other. Usually the trunnions are situated one foot away from the middle ring in the direction of the breech.

But since some gunners prefer a piece heavier at the front for it is easier to adjust and for that purpose, it is sufficient to place the trunnions closer to the breech and further away from the middle. On the contrary if you want to make it heavier at the bottom, you will place the trunnions

closer to the middle of the piece or forward in direction of the mouth. When you drill your piece make a fluted cast iron bar like a bed poster and there must be sixteen flutes or notches in which you will fix sixteen well-even blades, so altogether they will cut and scrape similarly. Because should some not cut or scrape, there would be some waves and spaces in the cannon which would be bent and the piece might break in its middle. In order to avoid this the drill has to go evenly from the breech to the mouth and the piece's mouth must be evenly hard so the powder will be released at once with more strength. On the contrary, if it is blocked it goes sideways and makes the piece break.

026r

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p026r_1

top

This is the right bore measure but the drill always rubs a bit more off.

fig_p026r_1

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Cannon ball

p026r_2

Mortar

They are better when shaped as the crucible with a narrow bottom and a larger mouth. You have to strongly crush the powder and add either some sand or some cork or even better a pure pierced wax plate because it seals well up and is more efficient. A bullet just makes a hole, the powder only is more efficient. One knows that they are stronger when kept in a dry place for fifteen days.

fig_p026r_2

left-bottom

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p026r_1

fig_p026v_1

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Culuerin bullet

027r

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p027r_1

fig_p027r_1

top

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Cannonball of a bastarde cannon

fig_p027r_2

left-bottom

<https://drive.google.com/open?id=0B9-oNrvWdlO5cE1VQlVlV2ZWakE>

Medium-sized cannonball

fig_p027r_3

right-bottom

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Cannonball of a campaign artillery piece

027v

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p027v_1

fig_p027v_1

left-top

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falcon

fig_p027v_2

right-top

<https://drive.google.com/open?id=0B9-oNrvWdlO5OVloUjZocVpuVTg>

Four quintals falcon or passevolant reach 8 pans

fig_p027v_3

left-middle

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3 quintals falcon reach as long as 9 pans

fig_p027v_4

middle

<https://drive.google.com/open?id=0B9-oNrvWdlO5OWVRTXVjNTljRnM>

2 quintals reach a cane which is 8 pans in Montpellier

fig_p027v_5

right-middle

<https://drive.google.com/open?id=0B9-oNrvWdlO5T2k5QjJ0ZGtfc1U>

1 quintal reach six pans and a half

fig_p027v_6

left-middle

<https://drive.google.com/open?id=0B9-oNrvWdlO5WmlyWDktZUhka1E>

1 quintal and a half reach 7 pans and a half

fig_p027v_7

right-middle

<https://drive.google.com/open?id=0B9-oNrvWdlO5Z3BiOF9jTF1zdzA>

A 60 lb musket reaches 5 pans and a half or 6

fig_p027v_8

bottom

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5 quintals reach eleven pans and a half

028r

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p028r_1

The measures of the calibers of pieces

fig_p028r_1

<https://drive.google.com/open?id=0B9-oNrvWdlO5eUZXU293VG1mdVU>

left

right-top

The numbers and dots show how many quintals a piece marked with that caliber weighs.

028v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f62.image>

p028v_1

Pewterers

They think that the best tin is the one that comes in saulmons, which has not been remelted since it came from the mine, because the masters remelt it on the grill, weighing two or three pounds, to more easily cut it and sell it by the piece. And in this they often mix in left-overs from bars of soldering and common tin. And to recognise the best one, it is the most lustrous, which is almost burnished, because it is softer. Sometimes in their ingots they find pieces of iron, stones, or similar troublesome additions, made to cheat on the weight. The tin from England is so hard that the miners add lead to soften it. The one that comes from Germany is softer. Usually, the master pewterers, sworn in to the good cities, add 6 or 8 pounds of fine lead to a quintal of fine tin. The others, who work in the fields, add fifteen or twenty pounds or as much as they can, and to disguise the darkness and the softness of the lead, they put in looking-glass tin, 4 lb. per quintal, +, which whitens and hardens, and six or eight lb. of rosette, to give the plate a good ring. To cast platters and plates, they make them out of pierre morte, that is from grass, and they form and polish them on the potter's wheel. They melt their tin in an iron posnet on a charcoal fire, and with an iron spoon that holds the quantity sufficient for a platter, they cast in their cold molds, which they keep joined and squeeze between their knees. Soon, they open the molds so that they do not heat up, and having taken out the casting which is on the female side, and which breaks easily. Then, with a piece of cloth soaking in water, which they always have at hand, they rub the middle of the back side of the plate and around the edge, so that it comes out better, and they rub the female mold with it.

left-middle

+

When the tin is fine, one adds less glass-looking tin to it, that is 4 lb. per quintal, but if the tin is low-quality, that is allied with a lot of lead, one adds at least five or six lb. of looking-glass tin to it. If there is not a lot of looking-glass tin, one adds about two or three lb. per quintal. One adds eight lb. of rosette. But if there is a lot of looking-glass tin, about 4 or 5 lb., one only adds six of rosette. And commonly, for one quintal of tin, one adds x lb. of both.

p028v_2

Go to the fifth page.

029r

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p029r_1

Stucco for molding

Take tragacanth gum and put it to soak until, having absorbed its water, it is swollen and becomes like jelly. Then crush it quite forcefully on the marble and then take rye flour, which is better than wheat [flour] because it is more humid and does not make the paste as rough, and dust your tragacanth gum with it and thus continue to pound and mix in the very finely sieved flour, little by little. And knead as if you wanted to make bread, until you perceive that it has enough body and is as firm as bread dough that is ready for the oven. This is perceptible when it can stretch enough without breaking. And if it is not strong enough, it will not come off [the surface] properly. It being thus prepared, rub the hollow [part of the mold] with oil with a brush, so that the oil penetrates everywhere to make it come off better, and press the paste inside quite forcefully. And if it does not come off well, mix in more flour until it has enough body. With this you will mold very neatly such work, either masks or garlands, as you like, and they will be dry within one day. Afterwards, you apply them with strong glue or paste glue, as you like, and you will be able to paint and furnish them with gold and all colors. In Rome they make floor ornaments with it. You can make bed ornaments with it. If you want that the work remains white, it is better to mold with plaster instead of flour. It is true that it is also more brittle and firm, but it must be prepared like this: mix it while it is a powder in a good amount of water so that it is light-colored and pound it several times a day for fifteen days. Then pour water by inclination, collect the plaster and crush it fine on the marble, and put it in a clean lead vessel, so that no dust or dirt falls into it, and leave it in the open air for fifteen days with its water, and it will become matte, strong, white and light, very suitable to become the groundlayer for burnished gold. And you can mix some of this powder instead of flour with tragacanth gum, and your work will be beautiful. Instead of plaster you can mix in well ground chalk or lead white, and try bole armeni and similar things. This stucco with the tragacanth gum has the peculiarity that it is pliable before it is dry, it fits on either round or flat things, as you like. It is to make an ornament at little expense.

left-top

The flour is not good in this, but chalk or lead white [is].

029v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f64.item>

p029v_1

Color of gold without gold on silver

Color your applied silver leaf with some terra emerita and once dry, spread a handful of varnish of aspic and sandarac and it will be more beautiful than fine gold.

p029v_2

Brown gold layer on paper

Prepare your underlayer of starch soaked in water and your gold will turn brown very well. Clear starch water laid down on paper, then dried, and so by three times, is a good base for brown gold on paper and is not thick.

p029v_3

Removing stains

A good eau de vie takes it off if you rub your cloth with it.

p029v_4

Layer of gold

Ground terra emerita with some saffron, altogether mixed with some strong very white glue and sieved through a cloth.

p029v_5

Oil extracts

Apothecaries say that anything which does not stick to a mortar while ground is oleaginous.

p029v_6

Dragon's blood

Have a well chosen drop of it which shows its transparent red and put it in a glass bottle with enough quantity of the best eau de vie possible and close it diligently so it does not get exposed to air otherwise it will be worth nothing and leave it so for a long time, because the longer it stays, the more beautiful and better it will be and it will dissolve if it is good otherwise it will become like lees. When you want to use some, make a small hole in the bottle stopper and pour some and close it again each time and apply it on gold. Good dragon's blood can be found in grands lopins like cattle cake this one has no worth if it is sophisticated and broken it shows on its edges some transparent scale as light red enamel, it is also lumpy in some points like small rubies. The eau de vie must be very strong and plusieurs passes.

left-bottom

The darker dragon's blood is the best and the larme is the most dying one, which you can find in lapin like pitch and big nuts which look like

fig_p029v_1

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right-bottom

left-bottom

I put it in some ordinary eau de vie, adding some aqua fortis to give it strength. At the beginning the water turned slightly colored, but at the end it just looked like some tragacanth gum with which they sophisticate I think the dragon's blood.

left-bottom

When it is applied on gold, it is prone to break, this is why some apply on it some turpentine oil. Cold stops the water from pouring and taking the color off. And for that, you can hold it by the fire.

030r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f65.image>

p030r_a1Lead

The best, fattest and softest, is imported from Germany and is not in sows but in bands, of around an arm long and three inches wide. It is imported in Lyon and they use it in Nuremberg to make the [lead] leaves for small mirrors.

p030r_a2Pewterers

They also make their molds out of metal which last longer and cast more precisely than earthenware [molds], because the vessel is cast smoothly and evenly. But this is for the rich because a mold costs fifteen or sixteen francs. These metal molds are usually made for basins and ewers and salt cellars and similar things which are figured.

For pints, molds are made with white clay mixed with horse dung and wool and well beaten. Because the pints are deep half-circles, they will not be easily removed from the earthenware moulds, unlike the clay ones, which are softer.

Vents [souspirals] are made to metal molds, and we cast all at once, so that there is no smoky black line in the middle of the dish which comes from the metal's steam and smoke when it is casted. This means that in that particular spot, the work is knotted and very often pierced. However they can fix this by soldering, as I have said. This smoke is found in the middle right half of the cast, and in earthenware molds.

The vessel can be hammered so that it will sell better, but it will not last as long.

Depending on the size of their dishes and plates, they have natches on the spoke of their iron wheels. And when they want to apply

030v

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p030r_a2

any bowl or plate, they enlarge and break with the strike of a hammer the iron wedges that has play in the spokes of the wheel. And, because they are on the notches and points where they should be, they tighten the aforementioned wedges [by] striking them with the hammer.

When their plates or bowls have been cast, soldered if needed, and purged anew of the burrs around with the hot soldering iron, and then with a big file. They adapt it on the wheel, and first of all wrap their kind of esgrusouer with a rope, as thick as the little finger, and lean it firmly on the crossing bar to secure it well. And while somebody else quickly turns the wheel, they guide the sharp edge of the esgrusouer by hand towards the edge of the round hollow, and gently guide it all the way to the center of the circle. And this esgrusoue is for removing the first rough and lumpy burrs of the work. And then, they unite it with a cutting iron called a plane, the sharp edge of which they rub with a bit of putty on leather nailed with a piece of wood. And this in such a way that the flesh or flower is on the outside, because if the sharp edge of this plane was not rubbed and polished, it would not burnish and polish the tin, which would remain white instead of black and polished as a mirror. Moreover, they repair with this plane for the second time the work as they did with the esgrusouer. Then, with a knife or other cutting iron, they scrape the edges of the plates or dishes to smooth them so that they do not get cut while handling them.

031r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f67.item>

p030r_a2

Their hammers must be quite even and polished, and if by some accident rust or other usage has damaged them, they polish them first with stripping powder, and then they finish them off by burnishing and softening with rough metal. Otherwise they would not strike neatly. It is also necessary that the plane of the anvils be level.

p031r_1

A new vine

When [the vine] has taken root well, if you want it to grow many cordons, having dug furrows [next to it], put two handfuls of pigeon guano next to each rootstock.

p031r_2

Colored water

Distilled urine, distilled vinegar and eau-de-vie take on a blue and green color from powdered and finely ground burnt bronze. And the residue from this tincture will be red copper if you distill the things indicated with a filter.

p031r_3

Water-resistant varnish

Flanders varnish made with turpentine and its turpentine oil, or with mastic oil, can be taken off and doesn't subsist in the rain. But that made with white nut oil, as you do it, holds in the rain and is very clear and fine and dries quickly. This is why one uses it for painted standards and signs that one carries into the rain.

p031r_4

Fruit from sugar

Don't paint them with a brush like other color-moistened things, for the sugar would melt. But rub them with color with a finger.

031v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f68.image>

p031v_1

Painter

Scribes make darker shades of lake and other colors for clothing with egg yolk, but this is a fraud and does not last.

Others glaze rouges de mine and other [colors] that are not beautiful in oil using egg white so that they seem to be done in oil. But humidity damages all that.

p031v_2

Brushes

Take some that have been used a little by white-limers, because the harshness of the quicklime and usage make them easier to handle.

p031v_3

Lifelike painting

One should not attempt such working in poor sunlight because you might make your skin tones browner than they should be.

p031v_4

Painting on glass

For blue, they take some of the roughest azure d'email and grind it on shale, and mix in two or three rosary beads' worth of lead rock or more, according to the quantity of work. And having done their drawing with noir d'escaille (which is painted towards the light with the piece of glass upright), they lay all their pieces down over white paper so that by the whiteness of the paper they can judge the lighting of their scenes and put down all colors of the same kind at the same time. Then they reheat.

032r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f69.image>

p032r_1

The body of the cuirass

The high lames of the spaulder in a vambrace @ are like a master's chef d'Å\223uvre, because these pieces have to be very precisely hollowed and adjusted so that movement may be free. The bodies of cuirasses must be very evenly beaten and worked with a hammer.

Morions from Milan are all in one piece and thus better than which are of two.

p032r_2

Painters

As soon as the colors of paintings are well dried, the Flemish varnish them so they do not fade any further and remain in that state.

Those who know well how to work in distemper will work well in oil. But on the contrary, those who know well how to work in oil will not be able to work in distemper.

p032r_3

To lay down gold in distemper

Scribes and local painters make batture, which is joiner's glue tempered in water over the fire, somewhat clear, mixed with very little honey, that is a few drops to make it thicken, and then they use it to draw letters or whatever they want to gild with a brush, and immediately after lay down the gold, but the work they do is never quite neat, and if there is a lot of honey it dries only with great difficulty. This layer will be damaged in the rain.

Others do better, they temper candy sugar in water and mix it with sanguine that they call cocon, very crushed, and add a little soap. This makes it neat, and renders gold beautiful if one uses it as the underlayer.

032v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f70.image>

p032v_1

Mat Makers

Two kinds are made in Toulouse, one to cover rooms' walls which are finely woven, almost like straw hats worn by villagers, and are made in long rolls, some 10 straws wide, others 13. And they work on them mainly in summer and winter. Then when they prepare it they sew it, but beforehand they dye it in usually three colours: green, red and sometimes purple. The green one is made with only a pastel tincture since green is made from yellow and blue, so the pastel dyes the dark yellow straw. It becomes bright green. For red they use some alum and brazil wood, for purple they use pastel and some copperous which darkens blue with its black tincture.

p032v_2

Glassmakers

They have no way to produce a perfect red that needs to be annealed. Try, however, the German red which is scaled red. They produce their ordinary red with some sanguine, iced pewter, lead rocks, and some iron file dust. This red is to be applied on both sides of the glass because it is more colourful. If it were applied on one side only it would look pastel orange.

p032v_3

Founders

For 20 pounds they buy a quintal of rosette which is harder to melt than brass because it is milder. The milder great metals are, the harder they are to melt. Because the pewter used to make bells is fine and sour, it is easier to melt than lead, which is mild. Brass soured with calamine melts more quickly than red copper. The metal that is used to make bells is mixed with some tin, is very sour, and can be quickly melted. The more silver that is mixed in, the quicker it melts, and this is why solders are made with it. In Germany candelabras are made very light because they rotate by means of water, but they are breakable. A quintal of fine coppersmiths' rosette is sold for 30 or 40 pounds. Another type used by founders is sold for 12 or 15 pounds for a quintal of six pounds of metal.

left_bottom

+ Gold, silver copper

leton iron.

033r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f71.image>

p033r_1

Knife to cut a nose or a finger

fig_p033r_1

<https://drive.google.com/open?id=0B9-oNrvWdlO5RWldQ1c4cU5HN3M>

This is a well-furbished knife, assembled with a nail in the middle so that it can easily swivel to one side or the other and be hidden, alternately on side A or on side B, inside its handle marked C. The two stops you see on the tips of the knife are used to block it on one side or the other against a nail which is at the butt of the aforesaid handle, so that when one wants to press hard on something in order to cut it, it does not move from the handle. You might as well allow the side marked B to cut, only not during your performance, but the side that is notched and marked A must not be sharp, it should only be furbished. And the notch must also be as wide as the edge of a knife so that it cannot hurt. And you will only show the part where the knife is not notched, for the side with the notch must be hidden inside the handle. And when you want to cut a nose or a finger, pretend to sharpen your knife on your thigh and at the same time turn it deftly, and the part with the notch, which you will cover with one finger, will come into your hand, and you will place the notch, colored with brazilwood rosette or black cherry juice, upon the nose.

left-middle

The conjuror must not amuse himself by watching what he is doing, but must look at the spectators while entertaining them with hocus-pocus words to make them look at his face and not his hands.

p033r_2

To relight an extinguished candle in your hands without blowing

fig_p033r_2

<https://drive.google.com/open?id=0B9-oNrvWdlO5SFNtME0xWURubzA>

left-bottom

Take a twig of well dried wicker and cut a small piece like a toothpick, and put one of its ends between your index and middle fingers and clasp both your hands together, fingers well joined, and move them deftly around the lit candle as if you wanted to cover it, and your wicker will light. And instantly remove your hands thus clasped, and instantly put out the candle. And then put your hands around it again as if you wanted to cover it, together with your little light from the glowing wicker. By means of the smoke that you are holding in your two palms, the candle will light. And then instantly extinguish your wicker and secretly discard it.

033v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f72.image>

p033v_1

To make it seem to someone that he has a piece of silver on his forehead

Take a token or a piece of silver and wet it and hold it against your forehead. Then, say to your assistant that if you put it thus on his forehead, he would not be able to make it fall all without using his hands, no matter how he shakes his head and, making it seem as if you are placing it the coin on his forehead, keep it in your hand and wet your thumb with your saliva and press it quite strongly on his forehead and, thinking he has the piece on his forehead as a result of the coolness of the saliva, he will shake his head and will be able to do anything.

p033v_2

For making blood or wine appear on someone's forehead or on a wall

fig_p033v_1

<https://drive.google.com/open?id=0B9-oNrvWdl05MXk2RzNQdF9aeDg>

left-middle

Take a pipe or funnel of white iron which is double-walled in the body but not at the tip. At the top edge, make a small hole and another slightly bigger on the inner wall that will be a bit higher than the tip, just as you can see in the opposing example. Then when you want to use it, put in wine or liquid rosette of Brazilwood or black cherry juice, and blocking the hole at the bottom tip with your little finger, make sure that the pipe is well-filled so that the wine can enter inside the double wall through the hole at the edge, and if it does not flow inside well, act as if you are tasting the wine, sip and draw in a little air through the little hole. After, make a spectating neighbor drink the rest of the wine or throw it out or leave it to flow through the end, but before that, you must have pressed your thumb well against the hole on the top edge, because in this way, by the compression of air, the wine will be held inside the double wall. Then with a dagger dulled at the tip, pretend that you pierce the forehead of a person who holds a glass in his hand, and while you pierce, you conceal your act with the pipe that you hold close to

left-bottom

#

his forehead, then removing your thumb from on top of the hole on the edge near the top, the air, being free, will make the wine flow out from the double wall through the hole marked B, and fall through the tip marked C into the glass. But you must bend the head of the spectator well in order to do it properly.

034r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f73.image>

p034r_1

To tell someone that if he keeps holding his finger on his forehead, you will be able to stop him from going out of a room

Make him hug a bedpost or something similar, and with the same arm, make him hold a finger to his forehead.

p034r_2

Bet someone that when he walks to a certain place and returns, he cannot say boot without spurs four times in a row

If he tries to say it himself, be sure that he speaks loudly, so when he goes and returns you tell him that he lost because he needed to say boots without saying spurs four times, for that was your bet.

p034r_3

To hang a candlestick on a wall without making a hole

Make a groom hold it against the wall.

p034r_4

How not to break a glass with a log or a large stick

You will cut a piece as small as a toothpick from a log or a large stick, and thus you will give it to him and he will not be able to break the glass.

p034r_5

Cunning writing

Cut some long rolls in fine parchment and mark them in order with A B C et cetera, then sew them inside the selvage of a rough cloth shirt, like for a messenger, who will not notice anything if you want to steal his shirt from him.

034v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f74.image>

p034v_1

For melting or transforming a jewel placed in a box

fig_p034v_1

<https://drive.google.com/open?id=0B9-oNrvWdlO5VTA5cWtrWktEajQ>

Take a cylindrical ringed vessel carved in wood, as you see, into which you will insert another small vessel that easily fits, as you see in the one marked B, and make it so that it does not touch the bottom of the larger one marked A, but so that there is some distance. Whatever is entering the larger vessel must be planed, but that the rim is made in a circle so that, being joined, they will appear as if they are the same vessel. You must also have a round cover of leather of the same length as the vessel, as you see marked C, which will fit easily and surround the aforesaid vessels thusly, placed one within the other. But before you do your trick, you must put gold or silver powder or mercury amalgamed with silver at the bottom of the larger vessel, and then place the little vessel marked B on top. After, holding the vessel with your index finger on top, present it, and only showing the bottom of the smaller vessel marked B, put a ring or something similar in it. This being done, while placing the vessel on the table, cover it with the leather cap, and making the requisite facial expressions, you will remove the leather cap without showing the interior, and put it on the table and ask them to recall the ring that you placed in the bottom of the smaller vessel marked B. Then, place the leather cover gently back on top and after saying *inhonorificabilitudinitatibus*, take the outside of the leather cover with two fingers, and squeeze it more firmly than before, then you will lift only the smaller vessel that is inside and contains the ring and you will place both carefully on the table. Then you will pour out the powder or amalgam that is in the bottom of the large vessel, then replace the leather cover with that vessel inside it, as it was at the start. Then, removing the leather cover without removing the smaller vessel, you will show the ring that returned to the bottom of the vessel in its previous state, holding your index finger on the rim of the vessel so that it does not fall out.

p035r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f75.image>

p035r_1

To tell someone that you will teach him something he does not know, and neither do you

Take a string or a small stick and measure from the tip of his ear to the tip of his nose and show it to him. Thus you will teach him something you did not know, and neither did he.

p035r_2

To support a bucket of water on the points of three knives laid flat without touching the ground

fig_p035r_1

<https://drive.google.com/open?id=0B9-oNrvWdlO5SGstUTZ6TFRnUjg>

According to the strength of your knives, either kitchen or table knives, you will make them support a large weight on their tips laid flat arranged in a triangle, edge to edge, as you can see, and not touching the ground. And after arranging them this way, if you turn them the other way without disassembling them, the handles can also support a large weight without touching the ground. You can as well adapt this to other uses with pikes, with timbers, or to quickly make a tripod in a camp with three halberd points. If the edge of the knife marked A is turned to the left, the butts of the handles will rise, but if the edge of the same knife is turned to the right, the tips will rise.

p035r_3

To boil an egg in cold water without a fire

Empty an egg from both ends so that nothing remains inside, then fill it with quicklime and natural sulphur, then plug the holes with wax and put it in water so that it floats two or three fingers [above the surface].

p035r_4

To make rabbits come out of a burrow

Have some embers in a pot, and after putting sulphur on top, place it inside the burrows and block them with something light.

p035v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f76.image>

p035v_1

For preventing someone from eating a piece of meat

Dry some calf's foot root, otherwise iarus, and dust the meat with it. There is no danger in this. See @ Mattioli.

p035v_2

For making grain pass from one vessel to another

fig_p035v_1

<https://drive.google.com/open?id=0B9-oNrvWdlO5WEY2UUhMRTg4Y00>

left-middle

Take two small wooden cylindrical vessels @ of the same size, hollowed on the bottom exterior by about the width of one knife or more. One of the two will remain empty, and on the bottom of the other you will glue grain with starch so that it will be covered entirely with grain, and will appear to be filled with it. Also, take a wooden bell cover into which you will place as much grain as one of the vessels can hold, and over the top place a piece of plain leather that fits well inside the bell cover. Put all into a bag or a napkin or a folded handkerchief, unless you want to use a conjuror's pouch. First show the empty vessel, then in front of the audience fill it with grain, then replace it in the napkin. After, leave that one there and take the other where the grain has been glued with starch and it will appear to be the first one, filled with grain. Place it under a hat and place the bell cover on the table, gently this first time. And if you like, quickly and without stopping show the inside that is covered with white leather of the color of the wood. Then, pretending that you are showing the vessel that is under the hat, turn it deftly to the side that is empty and leave it covered, and then you will command that by invisibilim the grain pass into the bell cover, which you will have previously tapped on the table a little strongly, and the grain will fall to the bottom and cover the piece of leather. Then raise the hat, the vessel will be found to be empty and the bell cover full of grain, which you will scrape deftly with the piece of leather

036r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f77.image>

p035v_2

that cannot be seen, and you will skillfully and gently put all of it back into the bag or pouch.

p036r_1

To make a ball change into a fine thimble

fig_p036r_1

<https://drive.google.com/open?id=0B9-oNrvWdlO5UmZaWjV2VE82QjQ>

left-top

de cuir

Make a small case of plain cow leather or Spanish goat's leather quite thick, as high as three fingers, sewn like the finger of a glove and large enough that two fingertips can fit inside and which, at the tip, is a little creased, and has a round hole as large as a double liard. Take two boxwood balls that look the same, and one should be hollowed and opened by a round hole only on one side so that the thimble can enter. Thus, when you want to perform, you will place your leather case on the table with the ball that is not hollow. Put a stick into the leather case to show that there is nothing inside it, also show the round ball, and hold the hollow one which has the thimble inside it between your little and ring finger, and do this with your right hand with which you hold the stick. After, take the leather case and place it over the hollow ball which is between your fingers and pretend you put some goldibus powder upon it, and replace the leather case that contains the ball on the table, then you take the large round ball remaining on the table, and order it to enter from upon the table into the leather case. Then, lifting the leather, it will seem to be the same, although it is the hollow one. Then, cover it and command that it should become invisible, and lifting the case while pressing it, you will remove it at the same time as the ball, and meanwhile discreetly put it back in the case. In its place will be found a thimble for the ladies whose bottom hurts, that is the bottom of the needle.

p036v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f78.image>

p036v_1

Founder

Kitchen pots are high quality made, with the same metal used for bells, in order not to give meats a bad taste. It is true that founders add latten to pots to make them more yellow, in order to make them more saleable; but latten itself, just by touching it, is stinking and bad smelling.

Latten does not lose (or just very slightly) its calamine in an air-furnace when it is melted in a crucible -- nor does it lose it in a wood furnace -- but it does lose it in a bellows furnace because bellows produce intense flames.

p036v_2

Air furnace

Its mouth has to be narrower than its bottom; it is sufficient if the crucible can get in, and if there is space enough to remove it with pincers.

p036v_3

Glassmakers' glass

It is said that in Lorraine and Flanders linking glass is made of fern ashes and pebbles. First they blow up a long still that another worker breaks off and cuts vertically with big shears. Then this long still expands by being placed on a stone or large platine in a furnace slightly colder than one for melting. Furthermore, they flatten it by rolling over it a big and long iron stick. Then they take it out of the annealing furnace. Similarly, they make some in England that are quite beautiful. Close to Rouen in France, flat glass is made with some saltworth and pebbles and is whiter and softer than the Lorraine one, because it can be melted with a candle, unlike the Lorraine one. This flat glass is blown up in a long still -- the end of which someone else cuts and blows up whilst turning it, then flattens it using a plane which is on the ground, and then reheats it. Thus the middle of the still, where it began, always stays the same.

left-middleThe glass, when wet, can be broken again with the flame of a candle, but not as precisely as with hot iron.

037r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f79.image>

037r_1

Founder

The more it is melted, the whiter the metal becomes because the tin does not come off, and so it is more mixed. And, once it has been held in the fire for a long time, the dust is eaten away, which is what makes it sour. If you want to separate the tin from the copper, after it is well heated, throw salpeter on it often. Only this [saltpeter] and not the fire separates it, and purifies it, and eats away the dust. Metal can be cast very neatly. Copper is prone to swell, but because it is soft, it can be fixed with a hammer.

037r_2

Medicine for the stomach which warms it [stomach] and unstops the liver

Have some wormwood powder, dissolve it in some capilli veneris syrup or preserves, and make an opiate that you will take once a week on a piece of bread dipped in wine. Then you will be able to drink a bit of fully dipped wine. This clears the phlegm and gas which come from there. You can take six pepper grains, and grate their rinds so they are smooth, and swallow them without chewing them. This heals the stomach without warming the liver.

037r_3

Sheets for precious stones

Once they have been made, do not keep them in any iron or metal box because this stains them. But in some box of

037r_4

For preventing candles from dripping and making them [candles] white

Once they have been made, put in a mould some fresh water whipped with some bran, which should by no means be purged again of its flour, so that the water is white. And dip your candles in this. Then leave them to dry. And do so thusly two or three times.

037v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f80.image>

p037v_1

Gardener

To sow melons properly, it must be the end of a moon [cycle], because otherwise they would sprout too many leaves and not bear much fruit. Every two fingers, make small holes with a small pickaxe and, in each, put two or three seeds. Then, take very fine earth and lightly fill the holes with it. Afterwards, spread the thickness of one thumb of 'hanets,' that is wheat chaff, over everything, so that when the rain comes, it does not beat the earth and prevent their birth. 'Hanets' attract field mice that eat the seeds, and to prevent this, they must be moistened with a decoction of wormwood.

p037v_2

Glass-maker

Some do not lay gris d'escaille on the glass to work on it, but trace straight on the glass with noir Æ huile. However, it is important that the wood be degreased, because if it has even a little grease [on it], the color will not take at all. And even, if the working glass-maker has a stink from his nose or his mouth, and he breathes on the glass, the color will not take on it. Those who came up with the invention of working in small works of softened enamels use only azure enamel, which is blue, and esmail colombin, which is the color of purple, which they soften with rocks or lead glass. As for yellow, they make it from silver, red from sanguine, as is said elsewhere, black and gray and shadows from scale black, either strong or weak, carnation from light sanguine. Green is made first from yellow, then they overlay azure enamel, either strong or weak, depending on whether they want to make it bright or dark.

p037v_3

Yellow Amber

It is carved with a file, then one passes a certain pulverized salt on it, which an English man called desramonct. But I believe that this was pulverized pumice stone, because it had as much grit as gravel. And with a stretched cord, he polished his amber, then passed tripoli from Bretagne on it with his finger, others [did it] with leather or a cane. Amber loses its color if a person in ill health wears it, and becomes whitish. But to get it back, it must be soaked for a night in urine, then boiled a little in it.

p038r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f81.image>

p038r_1

Sapphire

There are sapphires that one calls trellis sapphires, for they are pierced and it is said that a certain king had a certain ornament in the shape of a trellis made out of these, as perhaps the Screen of Charlemagne, as it is named, would be, in the treasure of Saint Denis, in which the gemstones are set without foil, so as to enjoy their luminosity from both sides, & to show their vividness. I have a white one that seems to be rough & pierced, and is all over spotted with blue blemishes; I am of the opinion that these are artificial & made of taffre or very clear azure enamel fused on the sapphire. A file bites into it as it does with beryl.

p038r_2

Saffron

It is imitated & cut with half dried marigold leaves, & twisted like a thread, & placed in the hottest sun to dry, & is mixed, & the aforesaid marigold even gives some color.

p038r_3

Sapphire

Stone cutters sometimes choose old pieces of antique glass in church windows, which are much thicker than those of today & are of more vivid colors. If it is for soft sapphire, they choose beautiful blue & from such a place that there are no pieces grains, if it is possible. And having cut it into squares with emery, they cut it in bevel & polish it. In this manner, they imitate very beautiful sapphires. The old azure enamel for silver, verging on aquamarine, was very suitable for imitating sapphires, but it is scarcely found. Aquamarines are imitated with white glass, but they take it from the bottom of the glass.

p038r_4

Amber

The orange color of transparent amber, and of the other one which has body, is not internal, for it is whitish on the inside. But it acquires this reddish crust with age or through the wearing of it. This is why those who cut it with a file or on the wheel do not remove this crust if it is possible. But rather they only polish it, rubbing it with a willow stick or other soft wood dipped into water & dusted with Brittany tripoli, and it takes a beautiful polish. If it is too straw yellow, & you want to intensify its color, hang it inside a chimney where there is much soot & smoke, and it will take on a reddish-orange color. Try to take the most whitish transparent one, and put it under manure to turn it green, as with bones. Or smoke it in a closed space, in saffron or manganese smoke & other drugs that you know of. Or in urine and distilled vinegar mixed with colors, or in the vapor of aqua fortis boiling in copper, or aqua fortis boiling with silver & sal ammoniac; & some cut facets in the amber on a wheel of soft wood with putty instead of emery, & jet also. The salt called de Langlois de armoniac is a mineral salt that resembles marble

tone and is a very hard mineral with large pieces, like that of Cardona and Monserrat.

left-bottom

I have experienced that it turns reddish on the surface when boiled in lye or corrosive water. And if it is scrubbed with fir and soft wood before cooling down, it is easily cut.

038v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f82.image>

p038v_1

Black color for dyeing

Take lye made from quicklime and white lead, mix and leave to soak and you will have a dark brown dye, and reiterating the same you will make black. Try other colours with the lye made of lime.

p038v_2

Against nose bleeding and for dyeing

Pound some of the kind of vinete or lapathum acutum that is red-veined, which is called dragon's blood, and apply it on the bleeding person's forehead. This herb is a strong dye & makes beautiful violet.

p038v_3

Beautiful artichokes

You need to trim them every year so that only one stem is left, and water them a lot. Also plant some more every year, because the second year they will bear very beautiful fruits.

p038v_4

Planting trees

It is said that rarely a tree planted on Saint Paul's day will fail to take. To cover the young shoots, oxen manure is very appropriate, for it doesn't come apart in the rain like earth.

p038v_5

Merchants

Those who retail velvet and other materials do not keep double-entry books because they sell in small quantities and recording these details would be too much effort. They only have their sales book and account books. But those who sell in bulk and those who traffic in wool have a double-entry book.

p038v_6

Crimson

Because one aulne costs seven or eight lb. to dye, they use clothworth seven or eight francs. But if one wants something beautiful, one should buy some white cloth worth fifteen francs an aulne and dye it with some pure crimson woad & a little cochineal. Black fabrics are very fine because the dye is inexpensive.

p039r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f83.image>

p039r_1

Goldsmith

They bind silver filings with saltpeter which refines it & does not make it brittle. But gold filings are bound with borax or, to save the borax, with lead, which refines the gold & softens it, for the saltpeter would make it brittle, which it does not do to silver. This is why, in order to save, goldsmiths use it to bind it in order to save borax, which costs viii sols per ounce & saltpeter costs x sols per lb.

When goldsmiths have thus bound their silver filings with salpeter, a red enamel vitrifies at the bottom of the crucible. I do not know if the copper mixed in with the silver is the cause for this. Try for enamel.

p039r_2

Dyersâ\200\231 woad

It is grown in Lauragais where the deep soil is so fertile that every year wheat was grown there, it would lie flat for being too vigorous. This is why dyersâ\200\231 woad and wheat are grown there alternately. For cultivating dyersâ\200\231 woad, the soil is ploughed with iron shovels, as gardeners do. Next, it is harrowed with rakes, & broken up finely as for sowing some kitchen herbs. It is commonly sown on Saint Anthony's day in January. Eight harvests are made. The first ones are better. The best dyersâ\200\231 woad of Lauragais is the one from Carmail & the one from Auragne. And sometimes the dyersâ\200\231 woad is good in one field & in the one close by it will hardly have worth. The goodness of the dyersâ\200\231 woad can be recognized when put in the mouth it gives the taste of vinegar, or when crumbling & breaking it, it has some mold-like veins which are as it were golden or silver. It is assayed in the dyers' vat, and to fill a vat with it, six bales of it are needed. There several flocks of wool are dyed, and if it dyes fifteen times, it is said to be worth 15 florins, if it gives xx dyings, xx florins. The good kind dyes up to 30 times & commonly up to xxv or 26.

p039v

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p039v_a1Enamel

Enamel takes more readily on copper than on silver. It is true that the cut needs to be well hollowed out & rough. Azure in body & the red called gules, white enamel & thick green take very well. Having enamelled, one gilds the feuillages of the cutting[illegible]. Copper has a similar hardness when cut as pure silver or pistolet gold.

p039v_a2Colors for illumination on glass

In order that your turpentine colors shall not run, & become unified, mix in a little larme de mastic together with the turpentine.

p039v_a3Tracing a history on glass

If you want to trace a history in intaglio on glass, you can do so in different ways. Place your glass pane on, as thin as possible, over the printed history, & having cleaned the glass well with lye & ashes so that it is not at all greasy, trace over the lines visible to you with oily black or scales black with a pinceau, if you want to paint with colors in the manner of glaziers, who spread a wash of scales black all over their glass pane & then scratch & uncover what they want to coat with color, leaving that which is necessary for shading. But if you want to make gilt histories on glass with a background of colors, which imitates the basse-taille of goldsmiths, gild the whole glass pane with gum water or garlic juice or fig-tree milk. Then moisten your printed history with two wet linen cloths & lay it down on the gilt glass. Then with a pin mounted on a small stick, follow the lines of your history as if you wished to pounce it, & thus you shall vividly trace it on the gilding of the glass. & next you shall uncover the background & what needs to be empty with a quite pointy steel awl, & and neatly follow once more the lines & accomplish your work & fashion your faces & flesh tones in pounded silver; then fill the background with azur d'azur or verdigris or fine laque platte, tempered with clear turpentine, mixed with a little larme de mastic if you want the colors to be more unified & not to run. Next, apply on the back of the glass & over the colors a white tin sheet. And once this is dry, you can cover the tin sheet with color to hide your secret. The tin sheet gives light to the colors. Thus you will be able to paint without being

p040r

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p039v_a3

being at all expert in painting. If your glass pane is bulging as if taken from the belly of a jar, it will show better. When you apply your turpentine colors to your glass panes, first place them on a hot tile &;, once they are hot, spread your colors &; leave it a while on the tile, then lay down your tin sheet.

p040r_1

Dye

Some take the root of *Lapathium acutum maius*, which looks like monkâ\200\231s-rhubarb or sorrel, &; using the root, which is yellow in summer, they dye threads &; similar things.

p040r_2

Aqua fortis

Some put on for four pounds of aqua fortis matter four that is in the retort, four ounces of common water in the container, which is better than putting it into the retort. The alum is de-phlegmed &; calcined such that the water does not have as many dregs. Many make it without de-phlegming the alum.

p040r_3

Vinegar

One takes for granted that jec heat red-hot the mineral salt that looks like marble &; that is called in Catalonia &; at the border of Spain Cardona salt, &; throwing it in the red hot or quite hot in wine, it turns it into very good vinegar. Some make it with water poured on pomace soured after being pressed by grape pickers, but it will not keep &; spoils in heat &; thunder storms.

p040r_4

Silver gilt buttons

Because silver gilt does not fear fire, it is cut into lozenges flat[illegible] on one side, then they are joined together in a star shape with a paste of crushed enamel, which is then melted &; the enamel is gilt with gold leaf and then reheated.

p040r_5

Grottos

To fill some empty place that cannot be laden with hanging rocks, one puts a piece of thick parchment close to the fire, which shrinks & crumples. Then one paints it with distemper, then in oil. Next one affixes it.

040v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f86.image>

p040v_1

Cross of the commanders of Malta

The fine rouge clair which is the background of the white enamel cross is of fine dragon's blood drops soaked with eau de vie or Indian laque plate, which I believe is made in Flanders, distempered with clear turpentine and mastic drops and applied on a silver leaf, not the one used by painters but a thicker one, which is burnished by the makers of foil backings for gemstones or by goldsmiths, and that gives it its fine brilliance.

p040v_02

Latten and calamine

Founders do not melt latten in a bellow furnace but in crucibles, for in a bellow furnace and amid the charcoals, the calamine would disappear.

p040v_03

Metal

Tin needs to be pure because if there is any lead, it will go up in smoke whilst melting. Alloyed tin withstands fire for a long time but in ashes it will come apart.

p040v_04

Aqua fortis

If your retort is well luted you should not surround it with ashes, which would only prevent the vapors from escaping properly. But when, towards the end, you fire it intensely, surround it with charcoals lit elsewhere beforehand, such as those in the furnace should be, so they do not crackle or smoke. Place said lit charcoals around the body of the retort, not close to the neck, which does not need to be heated as much. The top grate, on which you place your retort, should be sufficiently far, one dour or half a foot, from the bottom grate where the charcoal is placed, since thus you will not waste as much aqua fortis.

041r

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p041r_1

Casting earth for founders

It becomes fat by being beaten and also mixed with horse manure. Potter's earth would be too soft and would break and wouldn't resist the fire. But [your soil] has to be mixed with one half of sand and a quarter or a fifth of horse manure. And leave it to dry, then reduce it to powder, then put it through a sieve to make it fine and free from gravel, which would prevent it from casting cleanly. The manure makes the earth more amenable [to casting] & easier to work with, but it should be free of straw and other things. And when the earth is very fat, you have to add more sand and more manure. But one does find fat varieties of earth [that are] naturally mixed with sand. If they are not, make them so artificially. One should always cook the soils again before casting.

p041r_02

Garden lily

If it is broken during its first blossom, it will not grow or bloom until the following year, and I believe it is the same for bulbous flowers [in general].

p041r_03

Sand

The sand to be used for casting should be chosen such that it is not too dry for it won't hold together, nor should it be too fat. And although you find some in nature, however, it is not everywhere. And if you are in a place where it is not found, you can put it together yourself but not from fat earth, because the sand should contain none at all, since it makes it porous. But you can make it bind by mixing it with brick well ground on marble, or plaster or calcinated alabaster or something similar, or the burned marrow of ox horn or burned asphalt. If you grind it quite finely on porphyry, it binds better & then you can burn it with asphalt or mix it with a quarter of tripoli. Make sure no bread falls into your sand and because this makes it porous.

left-middle

Try mixing in soot black.

p041r_04

Ducks

Young domestic ones do not grow for a month after hatching but remain in this state. But after, they soon grow up, even if they go into the water. They are fed boiled millet grains, to which are added crumbled bread and finely chopped lettuce.

041v

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p041v_1

Glassmaker's black

Filings of iron taken from bars that have been in the fire for a long time, which are thick, are much better than the common soft ones that fall under the anvil in the forge, because they imitate niello. To said black, described elsewhere, some people add a little minium.

p041v_2

Sheared ewes

If the shearer wounds them at some point, he applies the very excrement of the ewe on it. When they are fat, they are easier to shear and do not get hurt as easily.

left-middle

If the shearer wants to 'viscorter' them, that is to castrate them as [they] are one or two years old, he must not have been with his wife, because this would cause the sheep to die.

p041v_3

Colors and gilt on glass

You should not put as strong gummed water on glass for the silver layer as for the gold layer because a silver leaf is twice as strong as gold leaf. Also, silver is harder and therefore does not scratch as easily. And if gum was not a little [too] strong for silver, it would not crack so clearly. When you work, the exhalation of your breath humidifies the leaf lying on the glass, and therefore it would be good, when working, to heat it up a few times.

You have to very thoroughly wash what you want to be empty and used as a surface painted with colors, because if it is not really clean of the gum's grease and viscosity, and of other things, the colors will not be so clear on it. To advance your work you can smooth with a pumice stone, or [you can do this] to better lay down gum and leaf on a cut paper. This way, you will have to do very little repairs. If you want a gold color there without gold, mix soaked dried saffron with a little bit of massicot.

042r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f89.image>

p042r_1Founder

The clay mould should be baked until sometimes it becomes red hot, since otherwise the metal would be unstable and be no good at all. Similarly, the inner core must be baked very hard, and mixed with charcoal powder.

p042r_2Wax for seals and impressions

For large wax seals, you should always have tepid water handy, and keep your wax in it. Yet previously you should have kneaded it with your hands, so as to make it very smooth and even, for otherwise the water would penetrate the wax and prevent it from holding together. Afterwards, you can imprint whatever you want. Cover the wax in three or four sheets of paper, and, with a round and smooth stick similar to a pestle, roll it out as if to polish it. It will then stick to the paper, helping you to take it off from the seal. In this way you will imprint better than if you were dripping molten wax. You can carve figures and color them in gold, in silver, or paint them with couleurs & vernis, and transfer them onto a glass pane painted with couleurs & tourmentine & mastic. And if you want to apply these designs by inlaying, use gum ammoniacum mixed with vinegar, and it will stick well.

p042r_a3Casting in plaster

Melt some wax, and with a big brush coat it over the relief of which you want to have the cave, as if you wanted to paint it. And a light crust will be formed upon which you will cast plaster, to give it shape and consistency. Afterwards, in the cave of the wax, cast your plaster as well to get the relief, and it will come out very easily, because of the wax. This is done more often for large pieces in haut relief than for others.

042v

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p042v_a1Pounce for scratching satin

After pouncing with crushed flour or chalk, in order that the dots of the pounce not be erased, go over the trace with egg white beaten with the milk or bark of a fig tree, which will immediately make the egg white clear up like water, without becoming opaque, it will maintain the trace that you will go over again and scratch with a piece of glass or penknife.

p042v_a2Canvas for oil painting without breaking

In order that your oil painting be not broken or ruined as you bend it, make your (preparatory) layer with honey, a bit of oil, water, and flour.

p042v_a3Oil painting on taffeta

In order that the oil not run, make your first layer with honey, water of alum, and essence of amidin.

p042v_a4Casting sand

The key is to grind it well upon marble, and that it be extremely fine; mix in a bit of calcined alabaster.

p042v_a5For decorating a painting

Go over the lines with lacquer ground together with olive oil, which will not dry out.

p042v_a6White varnish on plaster

Put down two or three layers of white glue for painting. Afterwards, varnish with varnish of sandarac, aspic oil, and a bit of mastic. Put it into a vessel at night, everything ground well together without fire, which would make it turn yellow. Then, with a paintbrush, it becomes dry immediately. Filter the oil that will have absorbed the substance.

p043r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f91.image>

p043r_a1Mericoton and pavis

One should graft them before Christmas so that they will not freeze too much.

p043r_a2White bronzing on plaster

One must apply four layers of painters' distemper glue onto the plaster portrait, leaving one layer to dry at a time. Then apply gently some burnt English point ground on a marble slab, or some lead burnt, ground and distempered with a bit of gum or glue. When dry, rub gently with a little cotton and the plaster portrait will look like lead. Others grind minium with quicksilver.

p043r_a3Purpurine

Take half an ounce of soft tin, melt it in a spoon. Once it is melted, throw in an $\frac{1}{2}$ of $\frac{1}{2}$, mix together. Once they are cold, grind on a porphyry slab. Then take an $\frac{1}{2}$ of sal ammoniac and an $\frac{1}{2}$ of the yellowest sulfur that may be found, grind both. And then mix very well all the aforementioned materials. Then put all together into a glass sublimatorium. Hold this over a small fire for an hour, and for an hour over a stronger fire, and for an hour over a very strong fire, and it will be ready. Then, to use it, apply resin black with the glue used by painters to paint, two or three times, until it is quite black. Then apply a bit of varnish. Once it is dry, apply the purpurine dry with a finger where you want. The more you apply, the finer it will look. Then, if you like, you can apply varnish on top.

p043r_a4White bronzing

Apply some black with glue on the medal, as described above, and then varnish it. Once dry, rub it with English point using a brush or your finger. The said rubbed point embellishes lead medals.

p043v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f92.image>

p043v_1

Varied and transmuted wine

Grate Brazilwood very fine, let it soak for one or two hours in clear water. Then take this tinted water and add some clear water and you will make wine as clear as you like. If you please, put a drop of juice of lemon or of orange in it and it will immediately become white. You can drink it without danger.

p043v_2

Pearls

It is said that pulverised talc blown into a lamp makes them so.

p043v_3

Arquebusier

To shoot your arquebus precisely the end of the breech must come precisely on the edge of the light, because like this the powder catches [fire] and burns all at once without blowing and has more strength and does not recoil. On the contrary, if the breech is made hollow, as they commonly are, the powder catches more quickly in this place, makes it recoil, and blows. This is clearly shown [by] a arquebus with a chamber which recoils more than another. And since the cannon is bigger at the breech than at the muzzle the sights are also uneven, because that at the breech is higher than that at the muzzle. Additionally, the thickness of the cannon is greater than the caliber by about one line, and the sight by another. It would therefore be necessary to either make the cannon all of one size or to raise the barrel from the end and towards the muzzle, and push it in and lower towards the breech. The weight of the powder must be one third of the [weight of the] bullet.

p043v_4

Hail shot for the arquebus

If you want that it stays together put a piece of felt or leather or paper on it, depending on the distance, and let the piece be made with a form precisely cut depending on the caliber of the arquebus.

044r

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p044r_a1The reach of an arquebuse

The proportion of a fowling piece is: 4 king's feet long and the bullet weights xviii penny weights, the expulsion vi pennyweight of powder, its range iiii-by-xx paces and 3 and a half feet and two thumbs and around a line, which is the Paris aulne. The medium arquebuse, which is the usual one and the easiest, admits xv pennyweight of bullet, v pennyweight of powder & reaches lx paces.

p044r_a2Pewtermaker

They mix viii or ten pounds of lead for each hundredweight of tin in the cities that have regulated guilds. But elsewhere, they add as much as they can. One also uses ii. lb. of estaim de glace to bind it and three lb. of broken brass, that is, copper scrap that kettlemakers make. This makes the vessel more reverberant and it is not as breakable.

left-middleThis pewter is called ordinary pewter.

p044r_a3Arquebuse

To keep it from backfiring, clean your arquebuse every eight days, and rub it with oil, and when you draw out, wet some linen in oil & put it in instead of paper.

p044r_a4Lacquer

To test it, soak it and apply it to paper, and if one or two hours later it has not dried at all, it's fine and well-done.

p044r_a5Dyes from flowers

Red poppies that grow amongst wheat make a very beautiful columbine on white leather. The boufain makes a very beautiful blue. An herb which grows in hedges, which has a stem similar to flax, long and broad leaves like little bugloss, which has a violet flower verging on blue and looks like the fleur de lys, makes a quite beautiful turquin, better than azure. Another columbine flower of the shape and size of the bugloss flower, which has a leaf like that of the pansy, also makes a very beautiful turquin. It grows in wheat in light earth.

p044v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f94.image>

p044v_1

Horsehair sieves

They are made often in Normandy with horsetail hairy that they clean with some washing water because they pick them out with their mouth and separate short and broken ones. They do not make the thread longer than the sieve and it is round. They attach the black or white hair at the two edges of the thread, according to the piece they want to make. And the thread is woven above and below like any other fabric. And passing a small flat stick of ii or three fingers wide between two, they pass between after two bits of hair at each step strike and weave with three steps. The entire sieve is made of xvii bits of hair. They sell them by dozens and each xxx sols. They bring them to Toulouse to send them then to Spain and there, they exchange it with silk.

p044v_2

Excellent water against the pest by the Master of Montorsin

Take some theriac rue, dittany and good vinegar, put the whole in a glass bottle and leave it half-open and well attached. And put it in a bath for three or 4 days. Then take some of your brew from its container when you need it and pour some, when necessary, on a red hot tile and receive the vapor and also perfume your clothes. This is a very precious and proved secret.

p044v_3

White soporific oil

Have x or 12 Mandragore apples, put them in quarters together with some olive oil in a glass bottle which you will cook in a bain marie for two days and your oil will turn white with which you rub the sole of your feet and you will quickly feel sleepy.

p044v_4

Stucco

To stick stones, some do not use gem and pitch black rosin because it is too greasy, but they use as much rosin and sulphur and the same quantity of

wax and then add finely ground brick. Others some white chalk and crushed and powdered and sieved white stone.

45r

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p045r_1

Loading a pellet arquebus

fig_p045r_1

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It is necessary to make a wooden pipe 4 or 5 fingers wide that is perfectly hollow, according to the open end of your barrel, of the form represented in A. Then, having cut some paper, which has to be as strong as that of large printed books, in the form indicated in D and as wide as you want your cartridge to be long, wrap the paper around the baton B and at the top, where the pointed tip F will be around the aforementioned paper, and the cartridge will be formed. But, in order to make the bottom more uniform, put it into pipe A, then introduce baton B and, in the other end of the pipe, which is marked G, insert baton C and pack so as to compact and press the folded tip of your cartridge, then take it out, and the charge in this, put three or four drageons or larmes. Then, with a punch, marked E, of the same caliber of your arquebus or pistol, punch round pieces on cardboard or felt or waxed cloth, and put this round piece into your cartridge, and push it until the drageons with the baton B, the more drageons, 3 or 4, then a round piece. And continue like that until the cartridge is full, then put it into the arquebus. If you want your pellet to scatter earlier, make round pieces out of paper. If you want it to reach further without scattering, make the piece out of cardboard. If you want it to reach even further, make the round piece out of waxed cloth, or either of leather or felt, and a piece of waxed cloth on the top. And if you make the cartridge in part with waxed cloth or waxed paper, it will reach one hundred paces and will make a big hole, and the pellet, barely scattering, will produce a big opening. But if you make your cartridge with waxed cloth or a material stronger than paper, it cannot be so long, with the cardboard tip being like in D, because it is enough if it wrapped around twice. In such a way, the pellet barely scatters and makes a big hole in porte-corps armor or others.

p045v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f96.image>

p045v_1

Loading an arquebus

You must have different charges depending to the range that you want your arquebus to have, all of which have a screw on the end that fits in the nut of the the said arquebus' ramrod . So when you put the powder in the charge, which is in the nut, hold the ramrod upright. And raising your arquebus up, insert the said ramrod until the charge is in the bottom of the arquebus, then straighten the arquebus, the mouth of the barrel up, and remove the ramrod . That way, your powder will now be entirely in the breech without any grain or dust that lines the sides of the arquebus, which always has some grime in the chamber. That way it will not recoil, and you will shoot more true.

fig_p045v_1

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p045v_2

How to adjust a bent gun barrel

Take off the breech and put it [the barrel] on a well-leveled table set perpendicular to the floor, and insert a very smooth string without knots, on each end of which there is a plumb hanging from each side. Then look in the barrel along the string, and if it does not touch equally all over, note the place where it does not touch and hit it with a hammer on the exterior of this side in the same place, and this will make it straight. Do this all around it.

p046r

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p046r_1

Oil of sulfur for the teeth

Some people whiten them with compositions of eau forte, however one says that this corrupts them afterwards and causes them to blacken. One says that oil of sulfur is excellent, but it needs to be applied in this way: take as much clove oil as can be held in a nutshell, as much rose honey, and seven or eight drops of oil of sulfur, and put it all together, and after having cleaned the teeth with a small burin, touch them lightly with a good bit of cotton dipped in the aforementioned oils and leave it for a little while, then spit it out or rinse the mouth with tepid water, and repeat two or three times. Oil of sulfur penetrates and is corrosive, and but the clove oil and the rose honey correct it. Therefore use it with discretion.

p046r_2

Wheat oil

Applying it to hair makes it fall out and keeps it from growing back.

p046r_3

Against the falling sickness

Have fresh crow eggs, either four or five, and the over the space of four or five mornings cook one, and having mixed in it a bit of powdered gentian and a drop of oil of sulfur, give it to the patient. It is believed that the pain will not return.

p046r_4

Against cold gouts

Put Guaiac oil together with oil of sulfur and apply.

p046r_4

Tree flowers

Those that are seen with every new $\frac{1}{3}$ are hardly profitable. Only two buds need to be left on the graft.

046v

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p046v_1

Oil of sulfur for the writer

If the writer wants to quickly clean his quill of the thickness of the ink which dried on it, it only needs to be dipped in oil of sulfur, and immediately it will be white and clean. Urb.

p046v_2

Shoemaker

If he wants to do some tanned work on black leather shoes, he can dip in oil of sulfur a writing quill and paint with it what he would like on shoes, boots, and colets. And he will obtain a reddish color which no effort will erase. Urb.

p046v_3

Erasing a letter

Dip a writing quill in fresh and good oil of sulfur and, thus, retrace all the letters with the dipped quill and they will disappear from the parchment. Urb.

p046v_4

Writing without ink

Write with oil of sulfur and heat [it], and the letter will become as black as this one. Urb.

p046v_5

Making Ñ your letters in paper and other work

If you write d or trace something on the paper and heat it soon after, and immediately it will become black; then by rubbing with a sponge, the letter will be cut out because it will be burned. Urb. Or retrace the letter with a wiped quill of.

p046v_6

Making someone's boots burn

Rub the abovementioned oil, and as he warms himself they will burn without a flame.Urb.

p046v_7

Black letters on stone

The same oil on letters engraved in stone, once heated, becomes black and penetrates.

047r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f99.image>

p047r_1

For teeth

Sal ammoniac i â\204¥, rock salt 1 â\204¥, alum half â\204¥. Make water with the cornue, and no matter how little of it you touch the tooth with, the tartar and blackness will go away. It is true that it has a bad odor, but you can mix it with rose honey and a little clove oil or cinnamon oil.

p047r_2

Antimony oil

It yellows quite strongly, even silver, if you put it on it once heated.

p047r_3

Against falling sickness or dizziness

Wear, hung to your collar, some root of paeonia which has been plucked when the moon is waning.

p047r_4

Crucibles

Those from Bayonne, which seem to be made of grÃ's, are better because they last, without comparison, longer than others. And since they are not very thick, one wastes less charcoal to melt gold and silver because they are quickly heated. They do not absorb silver as much as others, and for this reason, there is not much laveure to be found in them. They are also not as likely to fall over as others that have a flat bottom.

p047r_5

Against diarrhea and dysentery

Against diarrhea, it is good to use preserve of symphytum, also [known as] consolida maior. And if it is against dysentery, you can rub the temples, the hollow of the hands, and the

sole of the feet with wax oil and take a drop of two of it with a spoonful of broth. The root of consolida maior, crushed and put between pieces cuts in a piece of beef, then boiled, rejoins them, as it is said.

p047v

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p047v_a1A beverage which tastes like wine

Take tartar from large vessels, dilute it in water, and it will taste like wine.

p047v_a2Melting

Some to make it flow neatly, put half metal and half copper. Others take a part of potin and a part of copperlatten. Others take a part of latten from candlesticks and a part of latten from a basin. And among basins, the latten from larger ones is harder than that from skillets because the material needs to be softer in order to give them such a small circumference. From the large ones, from which they take the more ample circumference, the harder material can be taken. The harder the latten, the better it flows and the neater it casts, but it must be cast very neat hot. One As one wishes to cast, one puts lead on the material, which makes it flow and run and goes up in smoke and be careful that the mold does not get damaged. And if you want to cast pieces on fire, mix more rosette than latten, so that it is less brittle. The crucibles used to melt metal should be better than those used by glassmakers because glass is not as heavy as metal. And in this instance, the crucibles need to be luted with earth and crushed glass.

p047v_a3Crucibles

Those made during the winter and humid weather are not good. Those used by founders should be thick and should be coated.

p047v_a4Cast

Finely-calcinated pumice stone casts 22 carat gold without needing repair, but it needs to be ablaze and red as the metal. And it will survive many casts.

048r

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p048r_1Founder

The hot [part]

fig_p048r_1

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A furnace to cast a large quantity of metal

p048r_2Curing dogs from mange

Give them a pill of precipitate, that is to say 3, 4, or up to 5 grains, mixed with their food. Having given them one for one week, give them another seven or eight days later.

p048r_3Excellent mustard

Dry some bread in an oven, then stick cloves & cinnamon into it and put it to soak in good wine. Then, being well crushed, pass everything through a cloth strainer and incorporate it with your mustard seeds.

p048r_4Keeping birds and animals

Take a measurement from [the part of] their body that is fleshy and more susceptible to decay, with some canvas that you shall cut according to their size and width. Having filled this with cotton and stitched it, skin them. But leave the head, neck, wings and feet of birds, and head, legs, feet and tail of animals, because those dry easily. Then use that skin to dress the mold made of canvas. Small ones can be dried in an oven or covered in sel ammoniac and (?).

048v

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p048v_a1Regulus extracts

Take one pound of antimony, half a pound of black soap, and half a pound of Montpellier tar. Once it is all pulverized, you have to boil it in a varnished earthenware pot on a big fire as you stir it with a piece of wood or iron. The soap will burn off and be consumed by the fire and the rest will stay red. The quantity has to be reduced to a third. Then throw that on a tile and it will turn blackish. You will have to melt and pour that on a tile four or five times and then you will have regulin from antimony.

Others pulverise the antimony and mix it with equal quantities of saltpeter and powdered tar and heat a pot or crucible until it is red hot, then add a little bit at a time, turning their back for fear of the smoke, and keep doing so until everything is added. They maintain the fire until everything is completely melted and melt that several times.

p048v_a2Lead tin

They crack if they are often melted again and thicken and burn, so that even if a salmon is made, the tin becomes thick at the bottom if it is not stirred often during casting. It is better for casting to melt some lead and some tin and to renew it each time. The antimony makes them breakable, the iced tin makes them whiter. Pewterers mix a pound of iced tin with a quintal of fine tin and two and a half or three pounds of red, mild cauldron copper, which is better than latten. There is fine and mild tin and sour tin. Pewterers cast the sour as grills to sell it better. They go better and more cleanly in stone moulds than in copper molds because copper is fat and draws the mild tin when heated. Or when casting a large work, three quarts of lead with one pound of mild tin produces a very liquid mixture which is appropriate for casting and is as shiny as a mirror. Laxunge glass lightens them. All things that lighten metals a lot and remove their thickness and natural density and make them as liquid as water make them appropriate for casting because their thickness stops them from flowing. The mild tin is more even than the sour tin, which is whiter and seems to have been polished like a mirror.

left-bottomTo properly alloy the tin and the lead, you have to melt them together, Then, mix them together a little bit at a time and throw it often on a marble tile. And when it is going well, you will see it becoming unified and shining as if it were burnished. Because sometimes it becomes spotted due to too much lead and sometimes due to too much tin. There is some tin allied with more lead. Ordinary tin is allied with some lead.

p049r

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p049r_a1Lead casting

Those who cast these small items, sold in front of the churches, melt half a pound of lead on a pound of tin, and cast in a stone frame. And if they want their work [to be] whiter, they use half of tin and half of lead, but the first mixture is the best, and does not make bubbles. You have to cast it hot enough, otherwise it won't flow. Some [people] smoke their molds with a rosin candle for neat casting. The antimony makes the matter harsh and breakable. The looking-glass tin makes the work whiter, but does not make it flow more than with tin that is correctly made with pure lead. Those who make very precise lead castings use punches. Tintiers cast with copper molds. It is said that one makes lead adhere to glass by using resin. Some people put a quarter of tin on lead. Glass tin makes the work stronger.

left-topPoncet. They cast by using the souldure the glass-makers use. Lump [of metal] of [..] Calcinated oyster shell.

p049r_a2Sand for lead casting

Rye straw ashes well boiled, dried and then well sieved. alloy it with egg white. One can add copper, latten and others.

p049r_a3Other

Burnt and calcinated pumice stone, burnt and calcined cuttlefish bones, in the same quantity; and ashes of walnut tree or vine, boiled, dried and finely sieved alloy with egg white.

p049r_a4Pewterers

They add one lb. of glass tin to one quintal of fine tin, which makes the tin ticker. There is two kinds of tin, one which flows better, like lead, while the other one is sour and can be made thicker. They are casted in thick and solid tin molds or, to cast more neatly, in chisel-engraved copper molds, or stone or earth [molds]. Latten scrapings mixed in make the tin more breakable and harder, and more difficult to work with. They cast in the very hot molds some very hot tin. They perfume their tin molds with resin candles.

Sour tin is often mingled with salmons, easy to cut but difficult to work with and melts if it is not mingled with the other soft one. And thus it would become leftover.

p049v

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p049v_1

Birds

Calandra larks and all birds taken from the nest and which have not known freedom are better, because those taken with a net never sing as well. However, wild birds give much pleasure with their chanting, but they must be taken before Michaelmas, otherwise they do not live long. All get a small impostume on the fork of their tail, sometimes, which some call "gallardise", which makes them sick and sometimes kills them, especially calandra larks. One can tell when they are sad and do not sing. It must be pierced, not with a pin, but very delicately by turning with the tip of a quite sharp feather. The calandra lark should not be without river sand, and grey sand, a little rough, is the best. It rubs itself against it and purges itself [with it].

p049v_2

Grain of lead

Take a playing card, pierced with a pin or needle, folded over on all four sides. Hold it with the end of a small split stick and, holding said stick by the other end, put your card three or four fingers away from the water that you will have put in a platter or a similar vessel. Then pour your lead, which should not be too hot, into the card and continually tap on the stick that holds it. And thus your lead will turn into round grains. And pass it through a large sieve to separate the larger grain from the smaller. The larger one will carry 25 to 30 paces.

p049v_3

Birds

Those that are caught at Michaelmas are good to keep, but those that are caught in March die, because they are starting to fall in love. Ortolans are fed oats all summer so that they eat without getting fat, to be more suitable for hunting and helping to catch others. Then, when one wants to fatten them to sell, one gives them millet. They sing at night. They must be caught after mid-July and before Michaelmas, because after the period when they have their young in this country, they leave as turtledoves do. Siskins should also be caught after All Saints' Day and before Christmas, because afterwards they leave for the mountains to brood.

left-bottom

Ortolans are ventriloquists, so that, singing without opening their beaks, they seem to be
\200;

050r

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p050r_1

Preserving fruit for the entire year

Take a rounded glass phial, with a large enough opening to receive cherries and plums and whatever fruit you want. Put in some hot water and leave it for two hours, and once your water is cold, throw it out and turn the phial upside down onto its opening on a perfectly even table and in a room where there is not a bit of draft or wind. Then prepare a stopper of fresh wax, wrapped in oilcloth, and adapt it precisely to the glass phial so that it will be ready to stop it once you have put in the fruit. And once you have hand-picked the fruit, only the non-rotten fruit, and on a warm and dry day, withdraw to the room, well closed so that no wind or draft can get in, and put it gently and deftly in the bottle. Then stop the bottle well with the stopper and lute it, making your lute, if you want, with some quicklime and oil, so that no water gets in. Then put your bottles into a tub full of water, in a cellar, during the summer, and in the winter put your bottles into a basket filled with some weights and lower it to the bottom of a deep well. Because in the winter the water in the tub would be too cold if your cellar is not warm enough, because the water needs to be like river water.

p050r_2

Molding

If you want to quickly mold in demi-relief anything you come upon, fold some paper five or six times over, and place it on the medal and make sure the paper is folded around the edges of the medal so it is very secure. Next take a stick, broad at one end and with a well-dulled point at the other, and rub firmly on the paper, and retrace the lines with the point of the stick until you reckon that your impression is well done. Then, at your convenience, rub oil onto the paper lightly with a brush, and cast some tallow or wax or sulphur into it. And the paper, without burning, will give you a neat design that you can then mold in plaster or tripoli and then in lead and other metals.

left-bottom Polished cardboard of little thickness and slightly humid is appropriate. Then if you want, strengthen it with some paper glued on the reverse side.

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p050v_1

Little Birds

Buntings sing during the night if they are left in the cool open air, but they are better suited to fattening for fine tables than for singing. Chaffinches are prone to blindness, and their eyes swell at the beginning of August. Goldfinches love lettuce seeds, and you can catch them in gardens on seedy lettuce using two lime-twigs. But because such a daily fayre would be too expensive for them, they are usually fed with hemp-seed. The owsell is purged with a spider, which you must give it once a week, so that it doesn't become too strong. The lark is purged with dry mortar, composed of lime and sand, to keep it from becoming too strong and fat. Small young birds are purged with the same dry mortar, by placing small lumps of it in their cages. The cuckoo lays its eggs in the nest of the bunting, otherwise known as verdaule. This bird is very simple-minded, I have previously let two go, which after a few days returned to their cage. To feed young goldfinches, it is necessary to crush almonds with very fine breadcrumbs, and lettuce seeds or hemp seeds. For linnets, some rapeseed.

p050v_2

Hot-worked steel and files

The steel that blacksmiths and other iron workers commonly use is not refined like that from Germany or Biscay, which is hardened in a molten iron bath, but among the iron in bars which is transported by flatboat from the forges of Foix and elsewhere, some is harder, whiter and more refined than the rest, as it comes from the mine. And the workers choose it and use it like the other steel. And because it consists of common iron, they call it strong iron. But it is not of such good quality as purified steel like that from Germany and Biscaye, which is sold in small beads. Some hot-work their steel, giving it a heating and then dipping it into a large quantity of water, then forging it. And fine steel, which is brittle, does break and crumble, whereas iron can be pulled out. Thus they separate the finest steel, which with another heating they make into a mass. The Germans make their files from strong iron.

left-bottomSteel is applied to tools not on both sides, but underneath the part where one sharpens and whets them, and this part must be made of very soft iron.

left-bottomLevantines refine our own steel because their country provides them with none, and they reheat it in a pot with bitumen etc.

p051r

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p051r_a1Copying off patterns

Make some soap water and with it, rub and moisten the engraved stone that you want to transfer the pattern from, then lay a white sheet of paper on it and rub strongly against it with a sharp piece or the bottom of a glass bottle and you will transfer your stamped piece. It is true that it will be on the left side, but if you apply aspic or turpentine oil on your paper, it will be stamped on the right on the other side. Then trace these lines with a paint brush or a quill, then heat the paper and the oil will evaporate and it will leave your paper white. And if you don't want that to be known if, by chance, you borrowed the cut stone, soak the paper and the polishing that the polisher made on the back side, which distinguishes what has been made, will not be recognizable. The soap water will turn the piece yellow, but well gummed water, which has the same effect, does not do this. If you want to, for the same effect, make gummed water then, dissolve some soap in it and do as is said.

p051r_a2Cutters of printing plates

To clean the copper plates or to have used ones print better, boil them for four or five hours in a good detergent with quite used laundry water. Then make your ink with some linseed oil instead of walnut oil and press with the rollers. The copper plates are ready sooner than the wood ones, but they are not so clean to print promptly. The wood ones are tedious but would have sooner printed twenty sheets against two [sheets] of the other. To print with wood, the secret is firstly to poach, that is to say to lay the transferred pattern or drawn piece down on the wood plank and to make sure that the drawn side is stuck to the wood. Once dry, you will gently rub with a moist handkerchief the reverse side of the paper which, by being rubbed, will become so fine that what will remain will almost only be the drawn part, which, after, one should trace while cutting the pattern. You could do that to ornamented glass and glass layered with black cut pieces, to then scrape and layer your colors on the uncovered [side]. To make ink for copper plates

left-bottomThese rollers are good for printing promptly with thick sheets of paper cut in different kinds of pastes.

left-bottomOne can place the plates among the linens when the detergent is rather fine, or also in a pot.

051v

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p051r_a2

which is different from the printers' one, you have to boil for a long time some walnut oil or, even better, some linseed oil, and after boiling for a long time, you will add garlic cloves and bread crusts to skim them and leave again to boil on big fire, then eventually you will add a measure of lampblack that you would have ground with some oil previously on the marble. And lastly you will mix everything and until you see that the plate prints well. And when you will have spread the ink, dry the plate with a white sheet of paper and do that until the paper looks clean and then print. If you dry the plates with a cloth, it would remove the ink off. Linseed oil gets thicker while boiling and becomes similar to a varnish and risks catching fire as soon as you boil it, so make sure that when you boil it, it is in an open space or where the flame cannot damage anything. Some burn some scale until it turns black and grind it with some non-boiled linseed oil or walnut oil that some consider to be better. This black is beautiful but the lamp smoke one is blacker. When you want to print, take with your finger's end and reasonably spread some of the said black all over the plate previously cleaned with some detergent as said, then, rub it with a white sheet of paper until the paper is completely white and do not touch it with your bare hand but with a paper applied on it. And after cleaning the plate perfectly, rub again the sides and edges with a folded sheet of paper. Then, have [available] a small even table and on it a piece of felt, then a few sheets of paper and eventually the one you want to print on, moistened between two humid napkins. And on this sheet of paper, put your sheet then some more paper, and at least another piece of felt. Then put it through the rollers and you can print a dozen pieces consecutively while always charging the plate with ink and cleaning it as you did. But if you stop printing, the rest of the ink will dry out in the plate's lines and so you will have to let it boil in detergent or urine, as said, to clean it. The rollers must not be too loose.

p052r

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p052r_1

The Work done in Algiers

Have a colt of three or four years and feed it on barley and straw cut in the same way as that which they use to feed horses in Spain. Let it drink water from a good fountain or river water. I do not know if it would be good sometimes to let him drink the water of sulfur springs, and to sometimes give him fenugreek or other hot foods, for the intention of the worker is to use the heat of his manure, and the climate here is cooler than that of Algiers.

Keep it in a warm place and use it and make sure it loses none of its manure or urine, of which you will make a mass or two so that while one cools the other will keep its heat and be suitable to continue. Also have a large flask as thick as possible, one finger thick if it can be so made, and with a capacity of one pitcher or clay jug, and around the feast of St John place a dozen and a half chicken eggs, that is to say, the egg without the egg white and the germ. Others say sixty yolks. And with this dozen and a half of chicken egg yolks put one half ounce (others say sixty eggs and a half pound) of female silk worm eggs. And after carefully luting the flask (I do not know if air will be needed for the generation) and bury it in the heat of the manure up to the neck, and leave it there until several worms are engendered and then remove the flask and do not bury it in the manure anymore. But put it on the hot layer of the manure until all the worms are eaten and consume one another by shriveling and stirring, and only one remains. Once this has happened, you must lure it at regular intervals, day and night, with the assistance of two men, who will care for it in shifts, and you will lure it with an egg yolk covered in gold leaf or with a liquid yolk into which the gold leaf has been incorporated. And be careful that it does not miss such fodder (some say one egg yolk per hour, others say three, but the thing itself will demonstrate the practice). So nourished in this way it will grow in two months or seven weeks and will become like a serpent, one span and four fingers long, and one pound in weight, and as the wings will begin to develop, you must kill it, doing so with a charcoal fire in a ring around the bottle one span away from it, and at that time lute the bottle well so that it does not exhale.

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p052r_1

or to be safer, go away until the fire is completely blown out and that everything is cold again. Because the exaltation may be dangerous. And for that moment, when you take it with some tongs, do cover your mouth with some good vinegar and have a protection and cover your self with it. Once it has died out, put it into a cloth or a canvas made of silk and fold it and hold it to a board exposed to air and the sun will dry it. Once it is well dry, powder it in a mortar and keep this powder cautiously Because one ounce of this one thrown on 3 pounds of melted pitch transforms it into a finer one than the other one. But there is not so much pitch. You also have to choose the oldest pitch possible which has often melted before and finely hammered into blades or other works, and at first purify it by melting and throwing it into some honey and vinegar. The completion time for such work is nine months from Saint John's day until the 25th April.

p052v_1

Linseed

If one wants to have it strong and very fine, one has to gather it before the seed is completely ripe. Because if you wait for the seed to be completely ripe, the base is so dried by the sun that it is brittle and hard. It is true that like this, the seed reduces by a third.

p052v_2

Colors

If you want to keep them moist and prevent them from losing their initial color, pour some white wine, the whitest and the clearest you can in a bottle with some tragacanth gum, and once you have corked the bottle, mix and shake it very strongly, and leave it still until the tragacanth is dissolved. Add also some fine white earth to lighten that. Some mingle the white wine with some spring water, and with this composition they mix their colors without grinding them, and they show very beautifully on miniature works.

p053r

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p053r_a1Soldering a vise

It is good that the jaws of the vise should be high for use in making a long piece, and that they join well to clamp a thin object. In order to solder the nut, after you have made the bolt, you will make a long iron strip of the right thickness to fit into the notch of the bolt when red hot, and you will bend it all around [the bolt] by striking it with a hammer. Once it is well wrapped around, you will insert the bolt around which the nut is wrapped.

p053r_a2Copper

If, while in the fire and while being cast, it touches the iron, that iron will be so sour that it will be impossible to forge.

p053r_a3Lead casting

According to some it is mixed, half tin and half lead and, in order to heat it, a little arsenic is mixed in. It is cast well in small sizes in a cuttlefish bone, provided it is good.

p053r_a4Molding from paper

Over hot ashes, boil some cotton in aqua fortis mixed with sal ammoniac like aqua regia. And the cotton will become very fine, like powder. Then soak it with gummed water and you will cast quite delicately.

p053r_a5Almond trees, apricot trees

They grow quite straight if they are grafted. And every kind of tree [whose fruit has] pits, such as nectarines, peaches, clingstone-peaches, apricots etc., comes best by shield budding on an almond tree by.

p053r_a6Lead and copper casting

Lead and tin come out well in white chalk but the softer it is the better. That from Champagne wins first prize, and it is transported to Lyon. Burnt and calcinated horse bones cast very neatly.

left-bottomI believe that the marrow from the horns of oxen or sheep, that is to say, the spongy bone from inside, casts quite neatly and is better than bone.

bottomNote that any sour metal comes out better than a fat one. Also, lean sand receives it and absorbs it better than dense sand.

p053v

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p053v_1

Silkworms

They are produced from grain, that is eggs, which are sold by the ounce, which is commonly sold in Languedoc 3 lb. and 5 s. The one from Spain brought by merchants is considered to be the best, because the worms coming from it are not so subject to illnesses and produce more silk. In Spain, one ounce of grain gives worms that commonly make 15 lb. of silk. But from one once produced in France, they do not make but 10 or 12. Three ounces of grain are to produce such a quantity of worms, with which you will be able to furnish a room with three or 4 shelves of wide boards. They begin to shed their skin on their own around Easter. And to do this, one has to put them in a pine box, like the ones in which we put pellet, warmly among feather cushions. And in the beginning, they shed their skin as little black ants, and as soon as there are two or three without skin, they have to be given white mulberry leaves. And then arrange them on the boards. And three times per day, it is necessary to change the leaves for fresh ones. And if during the day there is any storm or rainy weather, cloudy and cool, one needs to keep in the room three or 4 embers and with glowing coal, and to light incense until the room is filled with its smoke. And when the weather is warm and serene, they produce more and better silk. Some worms make it whiter, others more yellowish.

And even if it is white, it can be yellowed when it is extracted with hot water. From their birth until the moment they make their cocoons and prisons, worms sleep and rest 4 times, and each time they remain 4 or five days resting without eating, as if they were dying so as to be born again, because each one sheds their skin and begins by uncovering the head, then consequently, on different days, the rest of the body, and they go from white to grey, and from grey to white. And if one of them has some sickness and does not have the strength to shed, one needs to help it and to be careful not to squash it, because if it gives off a yellow liquor, it is no longer worth anything. And they do not even serve much if one handles them. Around Pentecost, they begin to want to climb on the dry heather branches that we prepare and attach

left-top

See Marco Girolamo Vida, Bishop of Alba and Cremonesi, wrote a poem on the nature of silkworms.

left-middle

How they are [illegible]

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p053v_1

to some of the upper boards, and one can tell when they want to climb up when, on the leaf, they stretch out and raise their heads and a part of their bodies when one takes them to the eather branches where they stop and begin to spin their prison, which we call cocoon, generally the size of a pigeon egg, although there are some which are much bigger because it sometimes happens that two or three and up to 11 worms put themselves in a cocoon, which is hairy and cottony, around which ball is filoselle or floret, and of the cocoon, which is a white, solid, continuous and firm skin, silk is made. The cocoon is so hard that it is cut with difficulty with a fingernail. And yet to leave its prison, the worm eats away at it on one end, and after having stayed inside, living on its own juices for three weeks, it comes out, reduced in size by half. Because when it begins to spin, it is as long as a ring finger and has eight legs, and when it comes out it is less than half as long and only has four legs. On the other hand, it has become a butterfly and has wings; however, it does not fly. There are males and females. As soon as they come out of the cocoon, the male mates with the female, and they are put on a piece of white linen where they lay their eggs, which will not be good and viable if the male was not given to her. When the male has detached himself from a female, one must get rid of it because it would not be good to give it to another female. They finish spinning and laying eggs in three weeks and around Saint John's Day. And then one keeps their eggs and grain until Holy Week, as mentioned. Some [worms] spin among the leaves and make their cocoons there without climbing high.

top-leftLa soye des

coquons ou il y a

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p054v_1

fig_p054v_1

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To dry jams that are [not?] liquid, have an open tub pierced on each side with a small, square window, and pass sticks through these from one side to the other, and place on these a sieve made of strings in the form of a net. And on this, you will neatly put your jam containers. And having put at the bottom of the tub a hot coal or two, cover the tub with a cloth folded in two.

p054v_2

To lead a horse

+One has to give it sweet bread and it will recognize the one who will give him this treat.

And in order to keep it good for leading, make it use a good gait from the beginning of the path and continue it.

p054v_3

Dogs

To keep them from biting, it is good to have pitch balls, formed like those of cobblers, to throw to them when they yap at you. They will bite on the balls so much that their teeth will get stuck together and they will not be able to harm you.

p054v_4

To disguise a horse

Cut his ears and tail and, with burning hay, singe the hair on his head and elsewhere.

p054v_5

Boots of hay

Lacking boots, you can make a rope out of hay and wrap it around your legs, and rain will never pass through.

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p055r_1

To shoot a gun without noise

Warm up the barrel and close the lumiere d'embas, and take a piece of the freshest porksuin t that you can find and as long as the phalanx of your little finger and the size of the diameter of the canon, and push it back and forth until it is completely melted. Then, load a cartridge which fits on the top of the barrel, as you know, and it will only make a little whistling.

p055r_2

Dipping for a bullet that will reach far away and will compromise the healing

Mix some suint and strong vinegar and dip the bullet in this mixture while it is still hot.

p055r_3

Against wounds

Hurt a chicken or a dog to test and put some sap and ground herb which is called sempervin a on the wound. It is the one with the leaves like small grains that some call vernicularis . It well-known that it will not die.

p055r_4

Oneneu elbirro trauf is no eheram

rus enn elbat no [illegible] ueirtse

Get in the month of June and July, many of the biggest snails you can find with their shell , put them in a glass bottle with a sufficient quantity of very hard and very boiled egg yolks with some good vinegar. Cork it and put it under some horsemuck for fifteen days. The snails will first survive thanks to the egg yolks, then with the heat they will come out of their shells and eat live on it. Finally, it will come a white salve. For your own safety you will not cut the bottle, keep it well closed and put it in strong sun and dawn for

p055v

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p055r_4

for fifteen days. Next you will break it [sc. the bottle] from a good distance & with a long stick without looking at it & your eyes covered, you will put it where you want, or rub a little in a running river or on a tree or on grass that is on the bank.

p055v_1

Another for waters

Toad in a pot, with quicklime, who will consume all this powder, next and.

p055v_2

Damascus steel

Distil some worms on one side & some horseradish leaf on the other & mix these two waters, as much one as the other, and do the tempering in that.

p055v_3

To know one's course in open sea

Soak a piece of cloth in oil, then attach it to the poop of the boat so that it is dipped in the water, and it will make a trail that will be visible for ten leagues since the water parts wherever the oil has passed.

p055v_4

For casting

Chalk most recently drawn from the quarry is good for lead. But do not wet nor crush it, make it fine only by grinding or grating it and passing it through a sieve. The same applies to pumice, which one must not crush with water nor corrupt its nature. Lead must be mixed with little tin, just to give it some strength, and two parts of lead for one of tin or more.

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p056r_a1Excellent temper for breastplates

Have the clearest and the most running river water you can, and heat it up slightly more than warm. Then have a bunch of reseda, take its seeds and dip them into the said water and bring it to a rolling boil it while stirring it with a stick. Then pour it into a muid or any other vessel, then throw into it two pecks of salt.

Then take a big cauldron full of the said river water and heat it up slightly more than warm. Take three or four times the quantity of red greasy earth you can hold in two cupped hands, dip it and throw it into the cauldron filled with the said water. Have as much pigeon manure as of the said earth, as much horse manure and as much iron scrapings. And mix each of these separately, throw into the caldron and leave for two or three days. Then throw it into the said muid and stir all strongly altogether. And the older this temper is, the better it will work.

p056r_a2Varnish for tempera

You can make tempera marble with lacquer or rose of Ghent and chalk. Once dry, glaze it with lacquer mixed with wine, for glue will dull and blacken it. And the whole will firstly appear red, but the varnish you will apply, which will penetrate it, will make dark and light parts appear as they should. The varnish is made like this: mix with clear Venice turpentine some aspic oil until it becomes clear and liquid, and this is done without fire. This is for things done in tempera, and the turpentine varnish that you know is for panel painting. Pure lavender spike varnish is not good for panel paintings because lavender spike oil is too penetrating and makes colours shine unless it has been made long beforehand.

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p056v_1

To paint

The lacquer and rosette from Ghent and elsewhere lose their color and die in contact with the air.

Any marble on which a knife can [illegible] is not worth to grind fine colors.

The chalk is not thick with oil, the ceruse is more appropriate but even better is the white lead. The ceruse is the whitest and is to grind firstly with some water, the white lead is grayish. But turns perfectly white with some oil.

When you grind your colors, start by cleaning your workshop because if you raise some dust while walking that will damage your colors which will never be beautiful if they are not clean.

The Florey must not be mingled with some azur enamel or anything else for it turns it into green.

Ivory is excellent to make a painter's palette Knots of the fir tree The pear-tree and if it is walnut tree make sure to cut with the grain of the wood.

You always have to stamp on wood to oil paint in order to fill holes and unevenness. And stamp with some [illegible] and ceruse mixed with oil, then soften with a feather which evens more than a brush. Or when the stamp is dry, rub it strongly off with a knife.

To use some azur enamel with some oil, you have to choose the finest one and to make it thinner, do not grind for it turns white but wash it and because the bigger goes at the bottom, choose the one at the top of the water or pour the cloudy water out and pile the azur.

left-top

Someone who operates with oil will not work properly with distemper if he has not been trained well during his youth. The manner of working is indeed very different because the brush point always has to be moisten for working with distemper. While when one cleans the brush in some oil to soften it, one should dry it well. Otherwise the work would drip and soon be damaged.

left-middle

The Italians hatch with a flattened rough brush which makes some serration.

left-middle

And do not apply their shades at once like the Flemish but apply them by hatching from the lighter towards the light then a darker and then an even darker to make more contrast.

left-bottom

With distemper do not mingle your various colors together for they will die but use each separately and in order to stop them from drying and to have time to soften, moisten the back

of the canvas.

057r

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p056v_1

Lake takes a long time to dry in oil and for that reason you have to crush glass with it, but you have to choose crystallin because it is neater. And since it would be too difficult to be crushed by itself, you have to heat it red hot, then, when it is entirely red, throw it into cold water and it will crumble and pulverize itself to then be crushed easily. After being crushed with a lot of water, it looks like crushed lead white, but for this reason it has no body. I think it could be good for casting.

Lead white is made with lead sheets beaten gently and put under some manure.

White turpentine varnish or aspic oil and turpentine is colored with powdered turmeric boiled together with it. It gives a gold color on silver which is even more beautiful when burnished. It dries within a quarter of an hour. Aloes would make an even brighter color but it takes time to dry whereas the other one dries within a quarter of an hour in winter as well as in summer.

Good lake moistened with saliva quickly darkens. That from Florence is mixed with too much gum.

If you apply one layer of printers' ink on velvet and apply gold leaves and then stretch it, it looks grainy as if it was powdered with gold sprinkled on it.

Vermillion crushed by itself is wan and pale but is more beautiful when it is crushed with lake.

In order to remove the grease off marbles, one crushes ordinary ashes on it, which afterwards are good to make the first primer coat of a painting to be done in oil in order to seal the cracks and veins of the wood. They are thicker than chalk and are quite greasy. They are mingled with the aforesaid chalk or with colors collected from the vessel that is used to clean brushes, and they are desiccative and spare the colors. Once this primer coat has been made on the wood, it is scrubbed with a knife until even. After, one makes a second coat with ceruse or with the poorest colors mixed together. On an oil canvas painting one only applies one coat and the mixed ashes can be used. Also, after crushing a color, one crushes the interior of a large loaf of bread in order to remove the grease off the marble.

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p057v_1

Tanner

Tanners use small skins of lambs and young goats

nearly as delicate as parchments and they keep them in some humid places and keep wetting them. When they want to print some stories on it they lay them in their molding hollows of their figure and then on top they spread some greasy fine earth used for trimming wool fabrics, well pressed and beaten and slightly humid and soft and then put on the earth a small one-piece board and put the whole under a press and leave that dry there. After the earth the leather only remains very neatly printed [missing word] of the size of a pea. And then apply on the leather two or three black copperas and iron scale layers one after the other like the tanners do. And since this tincture is astringent and shrinks the leather will be stronger more more easily printable. Once dried stick on the reverse some fabric with strong glue, and by doing so one can quickly imitate big statues and very fine medals and paint them and [illegible] and are light and can be carried and last for a long time. What can be printed on a relief can be made differently and can be reheated with a hot iron tool.

p057v_2

Painter

Good crayons are not made with glue but with women's milk.

Images made of card have to be dipped in some very fine and clarified melted rosin once they have dried. This strengthens them or they will turn flaccid in wet weather.

Venice masks are made with a molding hollow and the face covered with copper.

The Flemish do not use other white colors for oil painted skin colors after some white lead for the ceruse turns them yellow.

The 4 or 5 years old and clear nut oil is the best anti-dust color. The one slowly squeezed from the press similar to almond oil is white even if the nuts' skin is peeled off.

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p057v_2

You must make at least three layers of flesh color in order to paint faces in oil. And to begin, one places the black and shadow where it is appropriate. After, the highlighting with lead white must not be placed on the black. Flesh colors and [missing word] containing ceruse will yellow in five or six months, but lead white does not change.

Florence lake is better than lake from Flanders because in Florence they make the best dyes. To make a beautiful flesh color, the reddest and brightest lake is the best, because those that are purple and violet as a result of the addition of too much alum look like the flesh of someone that is very cold. That is why women who want to color their cheeks crush Florence lake very finely, then fill a little cotton with it, which they then wrap in a little fine cambric. And thus they rub the lake on their cheeks and then, with another clean cotton, they soften it.

Crystallin having been crushed in water appears to have body, but in oil it does not have any. It is crushed with lake and with bitumen, which would not dry for a very long time otherwise.

Aspic oil is commonly put with lead white, not entirely pure but mixed with a little walnut oil. The said aspic oil will not be good for lake and colors that do not have body because it will make them crack, but with those that have body and are somewhat greasy, it is quite appropriate.

Verdigris and orpiment must be first crushed with urine rather than thinned with oil. Thus they are beautiful and do not fade.

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p058v_1

Blacks

Coal black, ordinary black lead black, burnt ivory black, peaches stones black, black smoke
, black light, burnt oxes' feet bones black

p058v_2

Shadows

When you are making a painting with several persons shadows as well as skins have to be different

p058v_3

Frescoes

Azure is not good for that but [illegible] and you have to work with long brushes. Frescoes
cannot be made on wood

p058v_4

Azure

Turpentine oil makes it very beautiful, try some palma christi seed oil. Nut oil in Flanders
costs at least a hundred sols a pint. The azur requires some greasy oil for it is not thick

left-middle

Enamel azur hates more than any other to be ground, even with some water for it dies and loses
all its color. Because however it cannot be used if it is big, grind it not with some water
but with some oil and grind it thickly and so it will not die

left-middle

Always choose the thinnest one

p058v_5

Brushes

When the color has dried inside them and you want to clean them soak them in some spike lavender
oil and they will turn immediately soft again as before, then you will finish to clean them
in some nut oil. Nut oil is not as appropriate to soften them as the spike lavender oil

ne which is clear like water and penetrates and is not as thick as the nut oil. Brush handles are made by those who work with care from porcupine hairs, by some others from fine branches of Turkish wood with which they also make small sticks to rest their hand when they are painting

left-bottom

To work properly on small scale you need some very fine brushes with a strong point. And because the hair taken from a squirrel's tale is mollesin, the most careful ones use the of oldest rats' hair and even of dormouses if they can find some and put two or three in the middle of a brush. These brushes draw a straight line like a quill and all the other hairs stick to them. The hair of a stone marten or of a weasel and small animals used to make some musk are even better for just one hair is necessary in a brush

p059r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f123.item>

p058v_5

Lake and white lead and ceruse are easy to work with some oil, but every kind of azure is difficult. And to make a beautiful azure, one has to lay it not with big strokes of the brush but with fine strokes of the end. Not only for azurite ash and azur from Acre but mainly for enamel azur which has to be very fine, otherwise you will not be able to work with it unless with hard work and you have to mingle it with some turpentine to thicken it and then to mingle it with some white lead. Any azure must not neither be ground nor washed for it loses its color and become pale. But put some of it powdered on your palette and you moisten it bit by bit with some nut oil or turpentine, dip a knife point in some oil and then mix it bit by bit on the said palette

p059r_1

Shadows

First shadows which are closer to the daylight have to be light and very faint then the last ones very dark to enhance strongly the relief. The Italians usually make three shadows, the first one very faint, the second one darker and the third one very dark, then put these three shadows together by hatching them from the darkest to the lightest

left-middle

The varnish is more beautiful on a painting when the color has been completely soaked up

p059r_2

Azure

Azure is more beautiful when on the painting it has soaked up some nut oil with which it has been firstly thinned without any oil of spike lavender. If you want to know whether it is dry, breathe on it and it will not shine and will seem to be very soaked up, otherwise it will shine

Soaked with oil, azure of enamel leaves it and comes back to its first natural state if you dip it in some water

Colors for small scale works have to be very strongly ground and to be worked with a brush point if you want your work to be very fine

059v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f124.item>

p059v_1

Painting weapons

Black charcoal mixed with white lead is very appropriate for painting weapons, also mixing in a little azure if you wish. Charcoal by itself is somewhat bluish.

p059v_2

Painting crepe

First you need to make a greyish background using charcoal black mixed with white lead and a little azure. Then, after drying, highlight with strokes and lines in white lead.

p059v_3

Folds in clothing

You must take care not to represent any folds falsely, but rather imitate natural effects. Thick cloth hardly makes any folds, taffetas and silk cloth make more, and crepe more still. Observe which folds go lengthwise and which across.

p059v_4

Siccatives

White lead and massicot are most siccative, nevertheless they need a good two days. If you want to verify whether an oil is siccative, use it to distemper white lead, and if it soon produces a crust it means that it will dry.

p059v_5

Double layers

Azures, flesh tones and reds are applied twice. Other colors are not.

p059v_6

Mending cracks in a panel

If a painted panel breaks you can glue it well on the reverse, but to fill in the cracks properly in order to paint and repair it, you must not use any glue , which weakens in damp weather and would swell when touched with the oil of the painting. But have some white wax, which is harder than the other sort. The oil mixed into the wax prevents it from melting in the sun. The wax must not be hard, but soft as if recently cooled. Apply it on cracks and crevices with the tip of a knife, then scrape.

060r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f125.item>

p059v_6

and to prevent it from breaking, mix in a little oil and melt them together and fill the cracks and make them even and paint on them. And the oil mixed with wax will help colors to hold since they are also distempered with oil.

p060r_1

First whitening of the painting

Apply two or three layers of chalk distempered with glue on the painting, not with a paintbrush but with a large brush as if you intended to rub it down, and leave to dry. And repeat this two or three times, then make the last layer quite even using a knife, then apply a layer of glue upon which you will later be able to put your underlayer and then paint. But make sure that your first white layer is not too thick for it would break easily. Flemish painters have such paintings made by the dozen.

p060r_2

Working neatly

When you are at work make sure you do raise no dust, and when you leave your work cover it so that the said dust will not fall upon it. Also apply your colors as thinly as possible, for if they are thick you will be unable to soften them.

p060r_3

Oil

Nut oil extracted as if from peeled almonds is very white, like Palma Christi oil. And when the oil is a little thick the colors are softer, for if the oil is too clear the colors flow and do not bind, even those that are not that thick. Greasy oil that is not easily soaked up is appropriate for varnish. The oil is sufficiently desiccative when it dries as quickly as common varnish. Oils do not dry as quickly in cold countries as in hot countries. Oil left in the sun becomes very clarified but becomes greasy if you add some ceruse or filed lead or white lead or glasspowdered and calcined. To avoid this, put the flask in clear water.

Once oil colors are dry, they sometimes do not easily receive second colors. To avoid this, breathe on them and the color will hold.

left-middle

Do not apply color on color if they are not similar, such as white on black, but rather flesh over flesh, and so on. And leave empty spaces for shadows or different colors. By doing so, laying each sort of color directly on the underlayer, they will not fade and your work will be neat.

060v

<http://gallica.bnf.fr/ark:/12148/btv1b9059316c/f126.item>

p060v_1

Varnish that dries within an hour

Take white turpentine oil and turpentine and powdered and finely sieved mastic and boil them together whilst continuously stirring with a stick until dry. And add two liards of eau de vie and if you take the mastic larme off, it will be whiter and clearer. There is no need to put turpentine but only white turpentine oil and mastic, pulverized as much as one wishes, until it is sufficiently thick.

p060v_2

How to clean paintings

Some clean them with soapy water, others with urine, others with white wine, for dust damages the colors.

p060v_3

Wood color

Apply one bister layer and then a layer of varnish.

p060v_5

left-middle

Aspic oil

Do not put any into colors because it is so strong and penetrating that it makes the colors flake and afterwards they come off. And that is why painters use it to clean their brushes when they are dry, because it softens and cleans them immediately by penetrating the dry color which makes them solid. Sometimes painters who are jealous of the work started by another, secretly, in the evening, pour a few drops of aspic oil on the top edge of the painting so that, running down, it produces a stain that penetrates as far as the wood and makes the colors come off. At that, in order to make their work even and uniform, they need to redo it completely and so they lose their efforts.

p060v_4

Flemish work

They do all their oil paintings with the tip of the brush, like good illuminators, and grind their colors very finely, avoid any dust and often clean off the fragments of hair released by their brushes, for if these should remain on the painting it would be difficult to work neatly, which they do with great care. Thus their work appears very soft, especially small paintings, which require more diligence since one sees them closer. They usually complete the forehead, then the eyes, then the nose, finally the mouth and the rest. But they do not proceed like some others who apply two or three different flesh tones, one yellowish and one darker, because the colors always mix and end by fading. They just make their underlay

er carefully.

left-top

+

which you will know when it is placed on a knife in the wind and does not flow. This one is excellent for panels and is dry within an hour and does not stick like turpentine.

061r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f127.image>

p060v_4

and unite it well and being quite dry, they draw their portrait and apply their natural skin color, leaving the areas of shadow like the forehead and the side of the cheek and the empty space around the eyes and drying until they have filled the rest. Afterwards they apply separately the shadows which they do not make as dark as they could naturally be. In sum, they don't apply shadow on skin color nor skin color on shadow. So white is on white and black is on black and each color is separate, and in this way their work is neat and colors don't fade away.

p061r_1

Skin colors

It is necessary that you make it of two kinds, one more red to make the main layer, the other more pale for the highlights, as around the eyes. And then on this last skin color, you will touch lightly the main lights with a little white lead. But avoid applying too much of it because this will look like a face of death. The beautiful Florence lacquer makes a beautiful vivid skin color that resembles the complexion of alexandrine pink and incarnadine.

left-top

Certain colors need to be ground like minium or massicot. The ashes don't need to be ground at all.

p061r_2

Making things round

If you want to model well, soften round things by rounding them off with the brush point and the rest with a flat part if it is flat, and thus for the others according to their nature, and lightly with the dry and flattened brush point and with patience.

p061r_3

White lead

Without this, you can't work on a small scale for which it is necessary to soften with great care. But you can't do it with ceruse because it does not have enough body.

p061r_4

Lights

Your brush shows it to you by making some shadow which must always follow the back of your hand, not in a straight line like this, because the light would be too crude and too harsh, but obliquely and as an incline like this. It is necessary that the painting is not facing the light, but be half turned back against it, and above all look for a soft light, for it makes a soft shadow and soft work, like a harsh light makes a harsh work.

0061v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f128.image>

p0061v_1

Water to make light for painters

Distill some vine water and put it into a big bottle. Put your candle behind that, and it won't disturb your vision.

p0061v_2

Chassis used by Germans

Germans who work in small scale make 'chassis' not of glass but of canvas oiled with clear turpentine varnish, that is half of turpentine oil and almost half of turpentine, because such light, being less bright than glass, makes the lines appear thicker. And when they want to make something more delicate, such as veins and similar things, they use brushes made of two or three rat hairs.

p0061v_3

Azure enamel with oil

One must choose the finest possible, for if it is coarse one cannot work in oil. And if you cannot find any that is fine enough, you may as well grind it, not with water but with oil, and grind it thick. Then lay it on your palette and mix in some turpentine but not much, to make it bind, and make it as thick as butter or mortar, and then, with a large enough brush, work it while always moving the brush freely. Then, to soften it, make jagged hatching movements with the tip of the brush. The highlights will be made using the same diluted with ceruse, which makes it bind, making it easier to work. I have seen it used thus. It must be very thick, so that you almost need an effort to spread it with your brush. And it will be all the better if you lay down your painting. All these difficulties do not occur when it is very fine and fluid without being crushed, and it doesn't run.

left-bottom

Azure needs to be applied neatly, which is why it always fades when it is applied over old, already tarnished, azure to mend an old painting. In such cases, it is better to scrape off the old layer and prime again and then apply the azure. It is the same for almost all other colors. Also azure mixed with oil always remains shiny, which is not good for azure because use that makes it fade.

p061v_4

Grinding colors

A slab of glass one inch thick is more appropriate than anything else for grinding colours neatly, especially for lacquer and for whites.

062r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f129.image>

p062r_1

Perspectives

Painting perspectives in oil takes a long time because of the many lines that need to be drawn with a ruler, and for that reason one generally paints them in distemper. One chooses the vanishing points at will. The main thing is to know where the point is. One commonly sets two or three, sometimes up to five.

p062r_2

Ocher

This is used for faces, hair, skulls and rocks.

p062r_3

Distant people and animals

First one roughs them out in gray or in purple, which is made of azure ash and lake. Once dry, one highlights and finishes with flesh tones and other colors and white. And it will look better and is quicker to do than in black and white. Armies are painted the same way.

p062r_4

Drawing

After you have primed your panel and scraped it with a knife to make it quite even, you will start drawing with the longest possible piece of charcoal, because with a short one you would not see your line so well and you would make it rougher. Let the tip of the charcoal be sharp, and to prevent it from quickly becoming dulled and blunt, drag the tip flat, thus you will constantly sharpen it. Hold your charcoal as far as possible, and accustom yourself to drawing with a light touch. Because if you become accustomed to drawing delicately with charcoal, you shall do the same with colors. And whoever is rough with charcoal is never exquisite with colors. And by a line of charcoal, masters assess their apprentices. First make the contour of your drawing, that is the outline, lightly and without too diligent work, rather with boldness. By so doing, you will learn to be an artist, and if you need to erase anything, you will not waste as much time as if you had elaborated it. Afterwards work on all the details, not standing too close to your panel, but sometimes stepping back in order to better assess the proportions. Once you are satisfied with the first drawing, retrace all the lines with your paintbrush in pink or another gummed or distempered color. Thus you will work more surely with colors, and with less trouble.

062v

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p062v_1

Portraits

To become an artist, it is necessary to draw by eye, without compass or ruler. Masters do not allow apprentices to use them.

When the priming has been done a long while ago, it becomes greasy. It must be scrubbed with ashes and water.

p062v_2

Perspective

In order to tell where the vanishing point is one must lay a ruler over the lines, and the point will be where the lines meet. Some make a hole at the end of their rulers in order to fix the point by that hole while moving the ruler about. Others lay a ruler across the panel,, then on this ruler they place the tip of another ruler which, being attached to the former by a screw, will move about and reach as far as necessary without losing the point. The ruler and compass without discernment of the eye will cause errors. Perspective is very difficult.

fig_p062v_1

<https://drive.google.com/open?id=0B9-oNrvWdlO5ZkRNOG9hZmpMT2M>

left-middle

To paint a perspective in oil, you should not use a ruler, for you would smudge everything. Instead, in applying your colors you must keep and follow the lines of your first drawing.

p062v_3

Also, to make plumb lines, that is lines from the top to the bottom of the panel, you need to have a thread with a piece of lead attached to one end and a little hook to the other end for hanging the said thread from the top of the painting.

fig_p062v_1

<https://drive.google.com/open?id=0B9-oNrvWdlO5X0hKa0FueWdjMFk>

left-bottom

p062v_4

Painting

In order to draw and to apply the colors, especially in oil, you must keep your panel as straight as possible on the easel, since if it is tilted there is a danger that dust or impurities might stick on it. Keep the place where you paint clean and free of dust.

063r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f131.image>

p063r_1

Amaranth color

Although it is said to be immortal, white wine removes its coloration and makes it light red and the dried flower ends up white. Note that wine does so, and I have tried it. Spirits have the same effect.

p063r_2

Drying of oil

If the oil does not dry, put in massicot and minium. There is no better oil than walnut oil, because it does not dry out too quickly nor too slowly.

p063r_3

Casting

The Germans use lead from Flanders because it is very "doux". And to cast better they take lead ore and melt it, then separate the molten metal from impurities and "mine", and pour it into a separate vessel, then they make their cast with it. This is because the lead must not have been used before, but must be completely new. Some people cast into forms of iron or copper.

left-middle

or new lead coming straight from the mine. They melt this twice in a crucible. The first melting cleans it of impurities. With the second, they make the cast.

p063r_4

Shadows

German painters shade their flesh tones with crushed jet, stil de grain yellow and ochre.

p063r_5

Bister

It is only employed in distemper, and is used for the color of wood.

p063r_6

Verdigris and another very beautiful, gay green

One must not crush it with water alone, because that makes it fade. To make it beautiful in distemper, some crush it with vinegar, but that makes it turn pale and become whitish. To make it beautiful, crush it with urine and leave it to dry. Then, whenever you like, crush it with oil. And after you have collected it with the palette, before you finish cleaning the marble, crush it there with stil de grain yellow. And you will have a very beautiful green.

063v

<http://gallica.bnf.fr/ark:/12148/btv1b9059316c/f132.item>

p063v_1

Velvets and blacks

One must make the main layer very thick, and the folds and highlights of the meste lighten a lot with white and on the ends of its light, you apply a white line. For blue and green velvets, you shade with coal made from peach pits which is very black. Concerning the lacquer, the carbon black that produces a reddish black on lacquer for velvets. The common charcoal produces a whitish black.

p063v_2

Armour

Soft wood charcoal appears bluish. It is good for depicting armour.

p063v_3

Scudegrun

It is made with the broom flower well boiled in water, putting in it enough alum, then some ceruse.

p063v_4

Red copper

Some people add chalk, but the best kind is composed of white lead and Brazil dye.

p063v_5

Flanders blue-green

In the month of May, one puts some putrified cow dung under horse dung. Then mix them with iron.

p063v_6

Snow-covered landscapes

One only uses three colors: white, black and bister.

p063v_7

Softening

If you have worked and prepared your palette with some drying color, such as minium and similar colors, complete softening when the work is fresh, because if you wait until tomorrow it will be dry and you will not be able to complete it properly.

064r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f133.image>

p064r_1

Working neatly

If you can avoid it, never apply two colors on top of one another. But after making your drawing with great care, keep the shadowed areas separate for themselves and the lights and highlights as well, particularly without smoothly laying a color, then add to this highlighting or shading. And in this way, you further your hard work, spare your colours and work cleanly, which as a result, the colors are not muddled nor mixed together, they do not decay and you soften then better, thus finding it not so thick.

p064r_6

left-top

Yellow ochre

You need a bit in every flesh tone.

p064r_7

left-center

Softening

One softens in the same way on oil paper as on wood. But it is easier to soften on canvas, because the softening must be coarse there.

p064r_2

Greasy oil

Greasy oil does not work well with colors because it makes them thick, and as difficult to work as azur enamel. Thus use the clearest and freshest walnut oil that you can.

p064r_3

Vermilion

It must not be kept in water when crushed with oil because it loses its color. It is better to choose whitish vermilion than dark vermilion or or a blackish vermilion. Because vermilion is commonly mixed with a little lake, otherwise it would hardly be different from miniu

m. But the pale one shows more vividly than the dark one. It does not dry by itself, so for that effect one mixes in calcined crystal.

p064_8

left-bottom

Eyes

An eye must always follow the circle of the compass and not be flat or square.

p064_4

Oil colors in water

Commonly, after crushing them one puts a piece of tin leaf on top, and one puts them into water to keep them from drying out. But this is more appropriate for white lead, minium and massicot than for the others, for lake fades and loses its color, as does azure vermillion.

p064_5

Double layer

Verdigris does not fade, and therefore does not need to be applied twice. But lake and others, especially flesh tone, need two layers. Colors hardly change once they are dry.

064v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f134.image>

p064v_1

Apprenticeship of the painter

He is first made to draw an egg, in which he must draw half a face, then the entire face with the ears, then the neck, then the parts of the body separately, then joined, then one figure, then two and three, and finally a narrative scene, teaching him how to hold the charcoal by the point, and also the paintbrush. Once he knows how to draw, he is taught how to apply colors.

p064v_2

He is also shown these strokes and lines

The figure of the egg is the main pattern for faces and for curled-up bodies, as the cross is the model for a full, straight figure. Without these strokes you will never do anything well.

fig_p064v_1

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p064v_3

Softening

To soften well, you must not lay the colors thick, but rather lay them twice, except for azure enamel.

left-middle

All colors that lack body in oil also lack body in distemper. In distemper they even sink to the bottom. Distempered colors need to be fat, which you can tell when they stick to the palette after being distempered in oil.

p064v_4

Straight lines

You can use the ruler, but do not lay it flat on the painting, but somewhat lifted and resting on the edges of the panel. Otherwise you would smudge everything, and also you would not see the strokes well.

p064v_5

Distemper

It is necessary that distempered colors are kept darker while you distemper them, because they become lighter when they dry. But oil colors remain the same colors.

p065r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f135.image>

p065r_1

Shadows

Because blacks appear in different hues, some reddish black, others bluish, and others greenish, choose those verging on yellow in order to obtain beautiful shadows in oil, for shadows are yellowish, especially those of men. And for this effect use very strongly crushed jet, which you mix with a bit of yellow ochre and white lead. Or else, after you have crushed your white lead and gathered it with the , crush the jet into it. Thus it the black will be more desiccative, and a yellowish black on its own. When mixed with a bit of white, it will be perfect for men's shadows. Blacks which appear greenish black are appropriate for women's shadows. Take then some black of , a little sap green and some bistre, and you will have a perfect shading for [flesh tone] in distemper for a woman.

left-top

The powder of orber's grain is duller than umber and when you lack umber, the aforesaid powder may be used, but it lacks body.

p065r_2

Flesh color

You must know how to mix the colors and the appropriate shadows well, but above all make sure to soften them well. And note and observe that an object that appears flat needs to be softened in straight lines, such as from right to left like

fig_p065r_1

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, and whatever needs to be represented round must be softened in circles.

left-middle

One cannot lay down oil on cut paper or make a stencil as in distemper because the colour will run. Thus, in order to gild with matte gold, one has to pounce and then lay in the colors with the brush.

p065r_3

Mirror

When you paint flesh, it is useful to have a crystal mirror, which represents a lifelike image, and in which you will see if your shadows are soft enough or too crude. But do not look at it using a candle, because the light of the flame will make the shadows look reddish.

The painter also learns for himself with a mirror, because he sees in it what a lifelike image can produce.

p065r_4

Greasy colors

After the laid-down colors are absorbed, if some part remains shiny and does not seem dry, it means that this part is greasy, and that the second colors you lay down would not adhere either, unless you scrub this part with soap or breathe on it, because humidity will make the colors adhere.

left-bottom

All greasy colors, such as ceruse, minium, massicot, ochre, and white lead are good for making gold color.

left-bottom

Any color or thing that thickens when mixed with water, while being crushed has body. But those that lack it, such as crushed glass and lake etc., become clear.

065v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f136.image>

p065v_1

Mid-bright colors

When colors are absorbed into the canvas, it means that it has been primed only once, and for this reason the colors become matte rather than shiny. But that is best, as long as you retouch it twice, for in this manner, the colors, having more body, will not fade and are much more beautiful, especially azure and lake and those that lack body. But those who want to dispatch their painting carelessly prime twice. Thus the colors will not be absorbed, therefore they will not last as long. The second layer of these colors will not be absorbed and will remain shiny.

p065v_6

left-top

Lifelike

There are some who paint lifelike images on oiled paper, and if they do not complete their work in one go, they put their paper and unfinished painting in water so that it will not dry.

p065v_2

Painting large figures

You must attach your charcoal to the end of a stick in order to make your first drawing from a distance because up close, you would not be able to judge proportions as well as from a certain and sufficient distance. Also, when you paint up close, hold your charcoal as far as you can, practically with your fingertips. For in that way you will acquire an artist's touch and make your hand light.

left-middle

When painting on paper, illuminators distemper their colors with gum and mix in a little soap to make them run better.

p065v_3

Glazing

One usually glazes with colors lacking body, such as lake and verdigris. However, in order to use other sorts, one mixes in plenty of calcined and ground crystal, which also has no body and reduces their thickness.

left-middle

Painters should all learn how to paint from life, because it is their provision and annuity and means to earn their passage when travelling the land with only their "cocon".

p_065v_4

White and black

It is useful that an apprentice should work with black and white for two or three years in order to become an artist.

p065v_7

left-bottom

Priming

You must be quite careful about this, and do not do it, as some will, using gold color made by cleaning the oil brushes, because verdigris and other corrosive colors included will end by fading the colors that are laid in after. It is useful to do it with ceruse, yellow ochre, and a bit of massicot, and make it scarcely thick so that it will not crack.

p065v_5

Lead white

It does not fade and has a lot of body.

066r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f137.image>

p066r_1

Double layers

The Flemish & those who paint paintings by the dozen only apply one layer & finish in one go. But the colors soon die. And when they are laid twice, they will not die. One needs to lay them lightly & with minimal thickness, in order to soften them.

p066r_2

Shadows

For women: asphaltum, umber and a little lake.

p066r_3

Painting in distemper on wood

Because it is quite tedious to paint in distemper on wood, and difficult to paint a face well, some mix their colors with egg white seeped through a sponge, or mixed with the egg yolk, water, and well beaten with the peeling of the fig tree. With this they paint & soften on the wood, like with oil, and this supports the varnish, but this does not last.

p066r_4

Colors in oil that are imbibed

It is best that oil colors are imbibed, that is to say they do not remain shiny after they have dried for they will not die. But if in some places they are shiny, it means that the fattiness of the oil has remained in that place which will kill the colors. The varnish mends all this & unites them & renders each place as alike to one another.

The gold color needs to be laid thickly, for if it is clear it imbibes and runs.

On canvas & in distemper, one gilds with bol, & honey, & a bit of garlic juice.

p066r_5

Gilding painting mounts with or mat

See the other side of this folio this mark: *

The Flemish give one layer of distempered glue on the mount, then they mix lamp black or soot black with the same glue & leave to dry. Next, they pounce some moresque designs in the corners & paint them with minium, massicot, ochre de ru, and a bit of yellow ocher, mixed with the fatty oil in which they clean their oil brushes, because the three aforesaid colors are griping and dry immediatly. And next, they apply the gold, then varnish on top of everything. And it seems by this way to some, that all of the black is painted in oil, but that would not be good because the gold attaches everywhere, and not only on the moresque. Go back to the top to *

left-top

*

Ormat

It is made with massicot, minium, ochre de ru, & yellow ocher, so that the composition resembles gold. Gild the day after un jo it is applied, if you in the made the groundlayer the same evening as the color. Next, having gilded, leave it to dry & rest for one day. Next, rub the gilding with a feather & cotton, so that no small flakes remains, then varnish with Flanders varnish, which you make, mixed with a little spirit, to make it desiccative.

The varnish will dry in an hour. It will enhance the gold color. And this or mat withstands rain, even if one rubs it, but it must be well dry, for eight or ten days.

Gold color that is made of various colors cleaned from oil brushes is not so good & with time tarnishes the gold because of the verdigris. One must not touch with the finger the layer made for the gold because that will prevent it from attaching itself there. The or molu spoils if water touches it, but or mat withstands well the rain & in water. One must not burnish it, because the tooth would remove it. Collect the small flakes & small bits that the cotton removed when the gold is dry and that you clean it, for as little as an ounce is still gold. In Flanders, women make gild. It is more beautiful when it is a little thick but in France they beat it too delicately.

Breathe on the gold color, and if it loses its shine, it is dry enough, but if does not well come the vapor of the breath, it is not yet dry enough.

One should not do or mat gilding after with having applied gold color, but wait one day and one night, but take heed to not and, when it appears to be dry, it will grip the gold. Next, one varnishes.

066v

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p066r_5

left-top

When gold color starts to grip, it signals that in ten to twelve hours it will be dry and ready for gilding.

left-top

*

To make or mat beautiful, put in a little varnish or fatty oil, not the kind that is made from cleaning brushes, but the pure kind, that is made fatty in the sun, or mixed with ceruse.

Or mat of this kind is scarcely less beautiful than burnished gold, and lasts longer in the rain & the like, & is made more quickly. Burnished gold cracks with time and comes apart in the rain.

p066v_1

Preventing the swelling of breasts or to make those that became too large smaller

Take large loafs of bread freshly drawn from the oven and cut them in half &, as hot as possible, lay them on & ilz & do this 3 times a day & continue 4 or 5 days. Next, make a plaster with Venice turpentine or, even better, common turpentine. Mix in sumac, sloe from bushes, quince seeds, pomegranate flowers, leaves of olive trees, & the like, cooked & mixed with the turpentine. But, I forgot, one needs, after having laid on the hot bread, which is soggy & makes one sweat, to lay on linens soaked with water from a beehive, which is to say honey and wax extracted all together from the beehive.

p066v_2

Attracting pigeons

Fry in a pan with oil some hempseed & give some to the pigeons.

p066v_3

Against the bruises of eyes

At night, apply very thin sheets lead. Singular remedy.

p066v_4

Pinceaulx

In order to make them well, cut the hair from the tail of a squirrel, as much as can be held in one go in a card rolled like a hollow straw. And placing them thus in the aforesaid folded card, tap & shuffle it so that the hair gathers together & becomes of the same length. Put one or two hairs of a rat's whiskers in the middle, then grab & squeeze it tightly with the thumb and index finger. Dip the tip of all this hair well in water, then, moving yourself close to

p067r

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p066v_4

daylight, pull out the hairs which make the tip too long with the ends of your fingernails, until the tip appears good to you, & so that you notice in it the rat hairs that are entirely black and the hairs of the same squirrel that are at the whitish from the root to the middle. When it pleases you, bind and tighten it very well with a thread in two places, then cut what is superfluous & fit it in a quill of appropriate size, of a duck or a crow for the small ones. Good brushes are those that, once dipped into water, do not bulge when you trace on your hand.

p067r_1

Oil

Every oil that imbibes into paper &, when heated by fire, evaporates & leaves the paper clean, such as turpentine & aspic oil, is good for making varnish.

p067r_2

Sand

All things crushed and tempered souffle, according to some.

p067r_3

Furnace with bellows

Before you put in the metal, the back of the furnace needs to be red like a charcoal and well lit. Next, you [illegible] fill it up & cover the charcoal & adjust the bellows, otherwise the metal on top will melt as a result of the bellows & its bottom will be curdled & cool & will not run. But if you proceed in this manner you can melt every thing you like.

p067r_4

Varnish on paper

The Germans make boxes covered with painted paper & varnish it with egg white, mixed with gum and some oil, not aspic, but another odorant which looks like olive oil. Every work done with egg white sustains oil. It is with this that painters trick the poor peasants, painting their bands of taffeta with this egg white to be done faster. But the first rain washes away everything.

p067v

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p067v_1Files

If they are not trempÃ©es Ã paquet, that is, in the manner described, with soot, salt, & vinegar, they will not be good. The large square files used by locksmiths to draft their work are only made of fer doulx, But the soft files should be made of steel. Founders whose work is to repair latten & copper should have their files coarse otherwise they fill up with copper which makes them smooth & soon renders them useless. Latten, which is more brittle, welcomes softer files than copper does.

p067v_20x hooves for sand

Once they have been burned well twice & pulverized, they mold very neatly as sand & will not want to be recooked, but simply heated with the flame of straw. But if you mold them en noyau, give it its first layer, simple & very thin, with a pinceau, & leave to dry at ease. Next fortify the following layers with wadding mixed with the aforementioned tempered bone sand.

left-middleIt is the neatest sand that can be found for copper.

p067v_3Essential oils

Walnut oil mixed with an equal quantity of turpentine and distilled with an alembic produces an essence whiter than common water. But this has no body & does not unite colors, which are immediately imbibed, and then color is left unable to grip and fades away. Imbibed thus, they would not let you work with or soften them, anymore than in distemper. But you can rectify this flaw by giving it a little body with turpentine, but not as thickly as you would use for varnishing. And thus you can work with azur d'azur, & make perfect lead white. Turpentine varnish made from this oil dries within one hour.

p068r

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p068r_1Fanciful tables

You can make various grooved compartments & on these, paint fishes naturally & with color on simple carton & if you wish, on silvered and burnished paper to represent the scales. And next, cover them with very clear lantern horn. You can apply the very same to other works.

p068r_2Planting trees

Trees need to be planted in dry weather, & a lot of earth gathered all around their feet, like a mound, so that the rain won't fill the holes & drown the trees.

p068r_3Casting

I have tried four kinds of sand for lead and tin: chalk, crushed glass, tripoli and burnt linen, all four are excellent. As to the chalk, it needs to be of the softest kind available, like the Champagne chalk used by painters. It releases very cleanly, needs not be dampened with magistry or with anything else, but is used in its natural dry state and finely pulverized. The first cast is always cleaner, however it will sustain two or three castings. Should you only cast once, keep in mind, while remaking your box mold, to take powdered chalk that has not yet been used, since the one previously used in the box has dried out and will not bind and hold together as well as fresh chalk. Crushed glass can be made from ordinary glass sand, however cristallo glass is more excellent, because common glass contains saltwort only, while cristallo glass contains both salt of tartar and saltwort. Both of them help the fusion, during which the glass is calcinated and reduced to its prime matter. In order to calcinate it perfectly, throw your pieces of glass, of whichever sort, among the largest possible glowing coals, unless some other violent heat source is available. And once the glass is red hot, throw it into water.

left-middlePutty is considered excellent for these two metals.

068v

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p068r_3

and immediately you will be able to crumble it between your fingers and to easily grind it in a metal mortar, or better yet, in an iron one. After, it will be easy to crush it, not on a common marble slab that would be damaged, but on porphyry, and it must be finely crushed with water so that when you place it on your fingernail, you will find it soft without any roughness like the colors that the painters crush for oil painting. You can use this one instead of sand, when it is dry, for the box mold, without humidifying it with anything and without reheating it. If you do not like it, fumigate the hollow of the mold with sulfur smoke or with the tip of the flame of a wax candle that barely smokes, and with pure lead and tin the mold will make a very clean, shiny, and smooth work. I would say the same for finely pulverized rotten stone, which does not want to be reheated or humidified. Using burned cloth is easier than anything because it does not need to be reheated, nor to be humidified, nor to be cast and removed subtly or very cleanly, like the others I mentioned, and it stands up to several castings. First you must burn it with a flame, then leave it to rot and be consumed with its fire until it is completely burned, then refine it on marble or paper. And if you reheat it in a red hot crucible all of it will be rendered fine and insubstantial, I believe that this make it even better. But because a lot of cloth is reduced to very little when it is burned, if you want to save some, sprinkle and cover only the medal that you want to cast with it, and fill the box mold with crushed slate, that also molds very neatly, but note that the first cast is always the most beautiful and the cleanest. By the way, if you cast the soft tin that pewterers sell, the kind that appears to be burnished on these little turning wheels, very well cleaned and approaching the color of silver, without being mixed with anything else, it is true that it must be cast quite hot and that the molded object must be four fingers from the cast. In order to know the temperature you must first melt it quite hot so that if you put a paper or straw in it when it is simmering it quickly burns it. Then remove it from the fire and leave it to rest a little and cast the tin mixed

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p068r_3

with half lead works almost better than tin or pure lead, even though in any case they work well. Nevertheless heed that you cast lead not nearly as hot as tin. In big works it is necessary to wet the sands with magistra or egg white.

p069r_1Joiner

Three things take the longest, leaves, hair and garlands.

p069r_2Sand

For a cast, do not choose that [sand] that is in any way lean & arid, such that it does not bind at all, like that from the sea or from sandy roads dried out by the sun. But choose preferably that from quarries or rock caves, since that one is best, as long as it is very fine. You will know the vein if, in the greyish rocks or quarries that seem to be made of sand, after rainy weather, you see certain little heaps like dust attached to the said rocks, or if the humidity causes them to shed stones that crumble easily between your hands. You will also find sand in lean soils, which comes off in large lumps like tuf stones, or in boulders soils, which sands are much better than those from fat and strong soils. And do not take it from the surface, lest it be mixed with common soil, but three or 4 feet below and closest to the tuf or stone. When it comes off in large lumps it appears to have started to form itself into stone, but once wet it comes apart easily. When breaking it up, make sure that it is quite granular and that in crushing it between the fingers, it becomes really very fine, keeping nevertheless its sandy asperity, without muddying the fingers like clay. One dries it slowly on the fire, then pounds it and passes it finely through a double sieve or a linen sleeve, then wets it with wine or magistra etc. / Verte

left-middleThe Toulouse molder reheats it strongly then grinds it finely on a marble slab and passes it through linen and wets it with wine. He makes the cast very large and flat and hardly deep. He casts pure brass for scales and similarly thin objects. He casts very hot.

left-middleTry calcinated vitriol.

069v

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p069r_2

The sand near my area is very excellent. But in order to make an excellent work, take it fresh, hardly having been used. Because it dries out after having done a casting several times & is arid & has no body at all. If you cast some fine work which has hardly any thickness, your copper matter must be very hot so that it penetrates and runs. Some people mix lead within this molten metal, but this is for large works & not for small ones.

Sand from bulls' feet twice-burned and finely ground melts more neatly with copper, & without a coating, than sand that I've seen. I cast a medal with quite high relief in it, and slender, with the thickness of a knife blade or a card. And there being a hollow on one side, the obverse, with the relief being on the other side.

Lean sand needs to be more moistened than others, that's to say with magistra or good pure wine or wine boiled with elm tree roots or something similar. But very fine sands, like burned linen which is fat and soft of its own accord, want to be applied dry.

All moistened sand needs to be very beaten and tumbled in order to make it fine & flattened of the little globules that it makes in itself when it is drenched.

The olive oil that some people mix in with beaten egg white makes it puff out.

Sand of calcined glass lasts for many fusions. But there are only the first ones. It also puffs out.

Latten works well on its own, but it charges. It is good to mix it with some copper, about a quarter part, with frying pan material.

Founders cast box frames well up to about 30 or 40 pounds. But no more.

left-middleIt is good for big work. But for small it is troublesome to take away. This is because it crumbles. It would be good for it to be a little glued together with something fatty that binds, like molded tripoli or burned felt or salt ammoniac or tripoli & similar things.

070r

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p069r_2

Once you have molded, it is good to reheat your mold with the smoke of the material you are melting, because the cast would absorb the quality of the metal, then this metal will flow more easily in something that takes after itself.

The human bones are the best for casting when they are calcined.

Your material needs to be quite hot in order to cast clean. To achieve this, when your material is melted, add some iron shavings, or iron filings, or [iron in other form], because it heats copper very much and it cleans it of its fat. At the end, when you want to cast, add some saltpeter, and place your preparation between a folded sheet of paper in order to hide the composition of your mix, to keep it secret.

Sheep foot bones are even better than the ox foot bones.

Oil and tallow make fill with bubbles, and crushed glass and copper alone.

Ashy soil molds very well.

Ashes don't have enough body to hold copper.

It is better not to mix [different types of] sand at all, but to fill the chassis with one type [sand] only.

Brass is always fat, and does not mold very clean. It is believed that it turns out better being alloyed with a quarter copper, but it must be cast very hot.

Copper is good mixed with a bit of metal. If you mix metal with brass, it will be harder and more difficult [to handle].

A slightly coarse sand has more body.

Rock's sand is always better, because it looks like tuff in small pieces which has a beautiful and very fine grain, a bit fat. Grind it, then dry it in a frying pan on the fire, until it stops smoking. Then filter it through a fine double sieve and use it to mold.

left-middleCopper or brass cannot come out well if the medal does not sufficient thickness and if it does not have it, give it some with some wax.

left-middleSome mold through a hole done in the middle of the reverse side of the medal.

left-middleSome want to mold large works in brass mixed in the sand some ground glass to give the soil unity. But it makes it filled with bubbles. And you have to repair the work.

left-bottomOne puts a good amount of lead within a large work to make it flow, but not in a small one because it leaves grime all around the work.

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p069r_2

Copper and latten are ready to be cast and are at the proper temperature when, as you stir them in the crucible, they emit a very white flame and the bath is very liquid.

Some cast in well-crushed ceruse, and others in flour moistened several times with oil and dried in the sun.

Others, for casting in lead, use old printers' letters or types for the setting of letters.

Others add to the tin or lead a material of fixed quicksilver which makes it run.

071r

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p071r_1

Amber

It softens like a paste when it is boiled in molten wax, and colors when boiled with the grease of a young kid, since that the grease of a goat would break it, especially if it is glazed.

p071r_2

Streaked wood

The elm has in its knotty roots beautiful veins streaked with grey and black, and the root of the maple tree as well, but the grain of the wood needs to be chosen carefully. One gives the maple wood a certain yellow color and then varnishes it.

p071r_3

Sugared and mulled wine

When the English have a cold, they mull wine in this way. They heat wine in a large tin pot until it boils, and when it becomes frothy, they light it with burning paper to determine if it is hot enough. After, to mull the whole of it, they pour it from one vessel into another, as if they wanted to churn eau panÃ©e, and as they do it, someone else lights with a burning paper what is falling from the one vessel into the other, such that you would think you were pouring fire. When the wine is mulled enough, heat it again a little while adding a few cloves and a sufficient quantity of sugar. And they the English drink it when it is as hot as possible in order to overcome their melancholy.

left-middle

English commoners put sugar in wine as a substitute for new sweet wine, which they cannot have because, owing to the long sea crossing, the wine loses its sweetness and clarifies itself before it reaches their country.

p071r_4

Weary horses

In order to restore a harried horse, they make it drink some of the aforesaid wine through a horn, and it finds itself disposed to do an even harder labor.

p071r_5

Eau de vie

The Irish do not drink any wine because they convert it into spirits, which they use almost as habitually as we use wine.

p071v

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p071v_1

Varnish

Add 4 â\204¥ of sandarac and finely pulverized mastic to a half lb of aspic oil. First of a ll, boil your oil in a pot on a stove, and then add the aforesaid gum little by little, stirring continually with a small stick split and quartered at the end. And when you cannot collect any more gum on the end, it is totally melted and your varnish is done. And to make it clearer, put into the concoction a little lump of camphor. It is true that with this it will not dry as quickly. Heed well that the aspic oil is quite clear and not at all fatty, otherwise your varnish will not be worth anything. You can test it by soaking some paper in it and heating it. If the oil, which will evaporate, leaves the paper clean, without a yellow mark, it is good, if not, it is fatty.

p071v_2

Sheep fat

In a certain part of England, the sheep that graze there have very yellow fat and are nevertheless just as good as others.

p071v_3

Spider

There are no spiders in Ireland, & if one touches them with some wood that they have there, they die. That is why some rich people from England make their floors with this wood, and in this way, they do not have any spiderwebs.

p071v_4

Sand

The mold is very good for casting in copper. But do not use that from cutlery, because it's just sludge, but rather that of those who mold giant shears.

FiliÃ"res' stones, when smoothed by those who whet them, mold really neatly when scraped for lead. This is usually slate-colored. One frequently carries it from Carcassonne to Toulouse.

p072r

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p072r_1

Printer's letters

The people who make the letters mix with the lead nails heads of nails, old horseshoes, and antimony to help melting. This mixture is good for printing, and holds steady. It flows and is well suited to casting in lead.

p072r_2

Copper casting

The box mold should be even-shaped and well fitted onto the board where it is placed, so that it will hold steady and even when one moulds. The sand should be clean and carefully selected, well baked, and regarding the sand you will pour directly over the medal and press the harder while molding, it should be very finely pulverised on the marble. Be careful not to oil your medal or the metal will be brittle. Bake slowly and thoroughly, and let cool. Moistening your sand with wine boiled with elm root, and in it, cast well-flowing latten (that is, latten from scales and similar thin things). Cast as widely as possible, and although the stream [of metal] will not be very thick, it will not be any worse. Still, make sure it enters the mold well. Cast from the foot of the medal up, so that the face, further away from the heat, comes out better and the violent effect of the heat is softened. And if your box mold does not have furrows, draw some in the sand, from the borders of the mold towards the hollow where you will be casting. Cast very hot; you will know [if you are at the right temperature] by throwing a bit of your reserved material into what is already very molten, and if it melts right away, it is a sign that [your metal] is hot enough. Then maintain a vigorous heat in your furnace with bellows of an appropriate size, while holding the mouth of your furnace well covered with a large tile or something similar that needs to be red before the casting. When you want to cast, have your mollettes red hot, and the iron hook as well, to clean out the charcoals [fallen] in your material. Having cast, scrub your work with a latten wirebrush. The residual powder from large scissors and large knives is very good for copper.

left-middle

It is said to be a great secret to add persicaire to [the cast], in order to make it as fluid as lead. Try to extract salts from it.

072v

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p072v_1

Casting

Lead, which is soft and heavy, wants to be cast much hotter than tin. When it is not hot enough, it makes lines in the medal. Straw burns in it, if it is hot enough. It makes a solder so soft and runny that it can be melted in a tin dish. It is composed of one part out of looking glass tin, of one part out of soft tin, and another part of lead. If the solder runs very cleanly and casts in sheets, but the work is very rough and breaks. The best solder, for casting well, is the common one, but it leaves certain coarse crumbs. Combine lead with tin so that the ingot that you are going to cast becomes smooth and lustrous and polished, and doesn't make any eyes or bubbles except for a small point in the middle. And this sign will tell you that there is enough tin, otherwise the lead dominates too much. The sand is good for lead and tin. Good sand is well dried and fine and thin, which however can be picked up between the fingers. The sand wants to be recooked rather than put to work directly. And to mold with it, it wants to be well dampened and then recooked, not all at once nor under a lot of pressure, because this spoils it, and makes it shrink and also makes it crumbly. But if you reheat it, and take your time, it will make it very firm, to be good for molding. It is necessary to filter it through a shirt sleeve in order to make it the more fine, with the aim of putting it first on the piece to be cast.

One makes a solder with quicksilver that is white, but it is thick. Make sure your box is joined well and that one does not see any daylight between the joints.

The Germans cast lead very thinly, because they think it is better than very thick, but as it is too pliable, it is so thin they mix a little tin with the aforementioned lead which, otherwise, would fold like wax.

Some say the blackest lead is the best and the softest and flows the best. You recognize the goodness of it by rubbing it with your finger, which will blacken immediately.

The good alloy for the flow of lead and tin is [made] from one lb of lead, and one and a half lb of tin. It is solder which flows well that is good for casting, but it is rough.

right-top

To make the lead flow well, mix in a little quicksilver.

left-top

Rub a cuttlefish bone on a table in order to make it flat and one against the other and against the two bones with pegs to keep them in place.

left-top

Cuttlefish bone molds lead better than [any]thing there is, but try to see if it needs to be recooked. One must mold the back of the bones and along the side of them because the marrow there is more delicate.

left-middle

The marrow near the mouth is more delicate and does have not as many fibers and molds more cleanly. The shell which has the marrow which is calcinated is good for making sand.

left-middle

When you cast lead, you must cast it somewhat hot, and not at once and shake your frame and cast two or three times. However, if it is too hot, cast it, it will cast swollen and with bubbles. When it is very hot, it becomes blue; leave it then until the color passes and let it rest a little before casting.

left-middle

Some, such as printers, mix iron filings or pins filings with lead in order to render it hard. But this makes it rough and it breaks not under a hammer.

left-bottom

Have a scrub brush for cleaning your molds.

073r

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p073r_1

For making blue florey varnish or Flanders varnish

Take the blue florey and quicklime, and put on around four fingers' worth of water and leave it to soak for one day. Take the water where the aforesaid quicklime has soaked, and put your blue florey with it, and put it on the wood.

p073r_2

For orange color

Take the water where the quicklime will have soaked and some turmeric, and put them one with the other, and then you will put them on your wood.

p073r_3

For degreasing bone or horn

They need to be boiled in quicklime, and be sure that there is always water, and take a well-cleaned pan, and when they are clean, boil them in the ashes of vine shoots, and put it inside the hottest pot you can, and put some verdigris into the goldsmith's pot of water, and leave for some time and you will see a most beautiful green color.

p073r_4

For making gray wood

Take alum with river water and boil them together. Then take river water with some bran, pour in the bran and crush them together. Take iron filings and sulfur and verdigris and fuller's earth, and boil it all together, and crush maplewood which will have been soaked in water of alum and rainwater, and put it to boil together. All of this can be done better in a large crucible.

p073r_5

To make bronze with a gold color

Take one ounce of sal ammoniac and crush it in an iron mortar. When it is well crushed, take one ounce of sulfur, and

073v

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p073r_5

crush it separately. When it is well-crushed, take sal ammoniac and again crush them together. Then take one ounce of soft tin and one ounce of mercury, then melt your tin and add your mercury drop by drop into your tin while melting, and stir with force until it turns to powder.

p073v_1

For coating

Take some parchment glue and apply it with the white of one egg, then take a little saffron and vinegar and the sap of a fig tree, and do another coat. Then take the bronze and apply it on top.

p073v_2

Varnish

Take two ounces of aspic oil and one ounce of sandarac. Take a clean pot and warm it and then take it out of the fire, and after, put the drugs inside, then put them into a vial and apply it the mixture on the wood.

p073v_3

Another recipe for making varnish

Take one ounce of Venice turpentine, and one quarter ounce of petroleum oil, and one ounce of sandarac, and one of aspic oil.

p073v_4

The color of burnished copper

Take one ounce of sal ammoniac with one ounce of Armenian bole, and half an ounce of copper filings with one ounce of sulfur, and half a septier of vinegar. Push all of it into a small tiled oven and around it make a small charcoal fire and put your pot into the aforesaid furnace for the whole day.

074r

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p074r_1

To bronze in white

Take looking-glass tin and put it to soak in gum water, and pound it in a pestle. And afterwards, you will put it on the marble.

p074r_2

To make vermillion

Take two pounds of sulphur, and melt it, and add two pounds of mercury to it. And if this material ignites, cover it quite neatly, so that the air does not pass into the pot, then put everything for some time after into a leaded pot, into the fire. In the space of twenty-four hours, you will have good vermillon.

p074r_3

To make varnish

Take one pound of linseed oil, and then put it in a pot of earth mixed with a breadcrust and three onions, and put it on a charcoal fire, and you will cook it on a low fire, and let it boil for the space of five hours. You will take half an ounce of flour glue, and will make it boil just as before, and stir continuously with a spoon. And then afterwards, you will add two ounces of well-pounded sandarac to it, and will do so as above. And then afterwards, you will take mastic and gum arabic, two ounces of each, both well pounded, and will put everything together, and will have it boil, always stirring, for the space of five hours. And then you will add rock alum, two ounces, and then you will make it boil. And if you add two ounces of gum arabic to it, if you see that they are not cooked enough, have it cook more on a low

074v

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p074r_3

fire until it is cooked enough. And strain it through a cloth that is compact enough. And when you have strained it, leave it to cool a little. And if you see that it is so thick that you cannot strain it, you will add a little of that oil and will make it better.

p074v_1

To make red varnish

Take vermillion, and let it soak in quite light gum water, like the other, and make two or three ground layers as is said above.

p074v_2

To make yellow varnish

Take some gum arabic and let it soak in water, then take some well beaten saffron and soak said gum. And make it quite light, then make your ground layer on that which you want to varnish, and leave it to dry, and when it will be dry give another ground layer of the same [varnish], and leave it to dry as before, until it will be dry enough. Then take varnish from an apothecary, crushed by strokes far enough from one another. Then wash your hands quite well and spread your varnish with their palms.

p074v_3

Recipe for white gum

Take white wax and ceruse and a little fine pitch, very well pounded together, and put it in a small new pot and make it melt. And when it will be melted you will make a palette of wood and burnish what you want.

p074v_4

Green gum

Take green wax with a little verdigris and make it melt as said above.

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p075r_1

Red gum

Take red wax of vermillion and a little resin pitch, and make as described above.

p075r_2

Bronze of copper

Take some verdigris and clear glue and grind them together. Then apply a layer over your wood, and take some pin filings and grind it on a marble with water, then apply it over the wood and polish it with copper.

p075r_3

Bronze like tin

Take some bismuth and two ounces of quicksilver. Melt the bismuth into a new pot, as soon as it becomes completely melted add the quicksilver and then remove it from the fire. Leave the aforementioned glue to dry, then take a piece of tin, and burnish it on a marble slab with clear water, then coat it over the wood and polish it with a piece of tin.

p075r_4

Making aqua fortis

Take a demi-sestier of vinegar with one ounce of verdigris, one ounce of copperas and one ounce of solle, then pour all the ingredients into a glass vial.

p075r_5

Ground gold

Take some fine gold and put it on a very clean marble slab. Add aqua fortis and start grinding. Then take some saltpetre and ammonia salt, pour it into a large, clean shell.

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p075v_1

Making grey wood

It is necessary to take three demi-sestiers of iron filings per 18 deniers of rock alum, and for as much 18 deniers green copperas for six deniers of verdigris, pitch and a quart of currier water; and if you can't find any, use rainwater [blank] of a slight degree.

p075v_2

Gilding wood

First of all it is necessary to apply a coat of very clear glue; and when it is dry, you will apply a coat of yellow gold; and when this is done you will take fig tree wood and soak it for a while, and wash the place you want to gild, and cut your gold with a knife near where you will put it; and said gold must be applied with cotton, and if you can find some fig tree, take an egg white and stir it frequently.

If your gold does not have a nice enough color, you will take a partridge feather burn it in a chafing-dish, and turn the smoke toward what you have gilded.

p075v_3

Gilding with ground gold

Take a coquille of gold, soak it with gum water before you intend to work, and then apply it with a brush, and polish it with a wolf's tooth once it is dry.

p075v_4

Recipe for coloring all wood

To make it black, the wood needs to be soaked in olive oil and tough meat in a similar case for four or five days, then boil it in where the wood has soaked for one hour, then take it the wood out of the oil. Take some natural sulphur if possible otherwise take another

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p075v_4

sulphur. Cover the aforementioned wood with this powder, until it cools, and bring it back to a boil. Upon boiling one will see whether or not it is black enough. If it is not, take the aforementioned powder and apply some over the wood and boil it.

p076r_1

Making Wood Green

Take one quart of white vinegar, one ounce of green, and one ounce of rock alum. Mix them together and pour all your ingredients into a leaded pot over fire without taking any air. Then put the pot in manure for 15 days, after which time you shall remove and boil your materials for three hours.

p076r_2

Making Wood Red

Take one quart of old urine, three ounces of madder, and one ounce of rock alum, put all of the ingredients into your pot. Then follow the previously described green technique.

p076r_3

Making Wood Blue

Take one quart of urine, as above, one ounce of alum, and two drams of sal ammoniac, and half an ounce of woad, grind it all to powder. Then follow the previously described green technique.

p076r_4

For Making Purple Wood

Take one quart of urine and one ounce of alum and ten drams of sal ammoniac and one dram of lacquer, then do as previously described.

p076r_5

For Making Yellow Wood

Take urine, as above, and two ounces of woad, one ounce of fustet and two ouncesdrams of sal ammoniac, then do as previously described.

076v

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p076v_1

To make a very beautiful and inexpensive golden color

First of all take a very yellow orange peel and carefully remove the white parts, and pulverize it very well in a very clean mortar. Take the same amount of sulphur, grind all the ingredients together, pour the mixture into a glass vial, and store it in a cellar or other damp place for eight or ten days. When you want to apply it, the mixture needs to be warmed and applied wherever you like, and you will see a very beautiful color.

p076v_2

Making black gommiche

Take some glue and dilute it with vinegar and melt it until it is very clear. Take lampblack or another black, and dilute them together. Then apply the mixture over wood.

p076v_3

For white gommiche

Take white wax and ceruse, melt them together and apply the mixture to wood or to anything else.

p076v_4

Gilding iron or tin

First it is necessary to wash whatever one wants to gild in wine lees, and then wash it once again with white wine. Take three ounces of terra merita and one chopine of white wine. Boil the matter for half an hour, and apply your colors over your iron or tin, or whatever else. Then leave to dry on a sheet of paper and do not put your hand in your materials.

077r

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p077r_a1Against rednesses of the face

Make a small lead cap and wear it overnight. Excellent secret. Try a lead mask.

p077r_a2 Medicine of orientals against all maladies

fig_p077r_1

<https://drive.google.com/open?id=0B9-oNrvWdlO5ckxxXzJIeWhnMDg>

Dry some rosemary in the month of May, then fill this bowl with powder made of it, and place a lit charcoal on top. And, receive the smoke by a quite tightened mouth having closed your mouth well, and a part will come out by your nose. But if you want to purge the head also pinch the nose. Against colds, rheums, and other maladies.

p077r_a3Fatty earth

Founders use [this earth] to make the handles of their bells. Before it [the earth] is used, they beat it quite hard, [and] then they leave it to dry gradually in the shade for a long time. And they mold it quite neatly. But the earth must not be sandy; rather, the earth must be carefully selected and soft.

p077r_a4Recipe for making bronze and many kind of varnishes

To make an excellent varnish with clear water which you will use with a brush and which [the varnish] dries immediately for applying to paper, a little table, or any other thing

First, you will take five ounces of spirits and one ounce of benzoin. Crush them between two pieces of paper or cards or in a mortar.

p077v

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p077r_4

but it should not be too small, then take a glass flask not too big , not too small and into it put a half of each, that means two and a half ounces. Then take the mentioned vetjoin, also roughly crushed, and add it immediately to the aforesaid water and let it rest for one and half day, and then take the aforementioned water and put it into another glass flask and let it soak very well. And on the rest of the aforementioned betjoin, which remains on the bottom of the first flask, add the rest of the water on this should it react well repeat the process you just did and mix the first water with the second, because you use this to make something more noble.

p077v_1

Other approved varnishes

Take two ounces of linnen oil, and two ounces of petrol oil, and two ounces of mastic, the whitest you can find, and of roche alum and crush it and take a little bit of white copperoze and put all these drugs together into an earthen pot, which should be new. Put it for a while on hot ashes and you will have a beautiful varnish.

p077v_2

Another varnish

Take petrol oil and spike lavender oil, in the same even quantity, and mix them together with copperoze and let them melt over hot ashes, depending on the quantity you need. To apply this varnish, put three coats on the work you want to varnish.

p077v_3

Another varnish

Take one ounce of spike lavender oil and of sandarac and make

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p077v_3

melt the drugs in a new earthenware pot, and when they are melted, you shall pass them through a clean cloth and you will see a beautiful varnish.

p078r_1

Another varnish

Take one ounce of spike lavender oil and heat it over coals; take a half ounce of sandarac and grind it coarsely, and then put it in the spike lavender oil and mix it with a stick until it has melted, and then put it in a glass vial, and when you want to use it needs to be heated little by little over the coals, and before applying, lay a coat of very clear glue, and then apply it with a paintbrush.

p078r_2

To make red varnish

Take vermillion and dilute it with gum water as well as with other water and make it like said varnish, and mix this other water the same way as other varnish and then apply it as above to make green wood.

p078r_3

To make green wood

Take very strong vinegar, salt, and rainwater, and mix it together with verdigris, and put it with your wood in a new earthenware vessel, and lay it in some very warm horse dung for eight or nine days.

078v

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p078v_1

To make bronze the color of azur

Take rock alum and antimony, with twice as much rock alum as antimony, and pound it together in an iron mortar and soak with gum water, then grind it on a marble, and then it needs to be used with a paintbrush, and after letting it dry, polished with wolf tooth or dog tooth.

p078v_2

To make bronze the color of gold

Take copper filings, ochre, gum, and alum, grind it all together in a stone mortar, and when it is well ground, lay it as needed with a paintbrush, and then polish it with wolf tooth or dog tooth.

p078v_3

To make bone or horn green

Take verdigris and soak it in strong vinegar, and soak your bone or horn for an hour, and then apply as needed.

p078v_4

To make it bronze

Take pin and other brass filings, put them together, and grind it on marble, grind it well with water little by little, until it flows, and then put it in a new vessel and

079r

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p078v_4

when you want to use it, dilute it with very clear glue and coat what you like two or three times, then leave to dry. But before coating it with the bronze mixture (2 or 3 times), apply one coat of very clear glue and leave to dry. And after polish the bronze coat with a wolf's tooth or dog's tooth.

p079r_1

Making gray wood

Take some sandstone powder, __ __ __, iron filings, scrap iron, alum, du noir de courroieur, copperas, and rock alum.

p079r_2

Making water against illness of the eyes

Take some white copperas, heat lightly over fire, then grind it to powder. Put the powder on a white cloth stretched over a glass, then take some fountain water and filter it through the cloth, while stirring the powder with the finger until all the water has filtered through. Then wash your eyes as often as you wish and, with the help of god, you will feel well .

p079r_3

Making gold colored bronze

Take six ounces of tin [â\200!], six ounces of natural sulphur, and sal ammoniac. Melt the tin in a spoon. When it is molten add quicksilver and cast in a line. Then crush all the drugs together in a mortar, and

p079v

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p079r_3

and put in an earthenwarepot, and make it that very hot ashes are underneath. Little by little, make the fire underneath grow bigger and bigger, and the pot must not be moved. And when it is cooked, and if it takes up to six hours, mind that the smoke does not make you ill because it is bad.

p079v_1

Making varnish

Take some mastic, @sandarac, gum arabic, and aspic oil, as much of one as the other, and melt them all together. Before coating it, lay a coat of quite clear glue and let it dry.

p079v_2

Antidote against the smoke of metals

In the morning, take a piece of thin toast with butter, neither antimony nor any other vapors will harm you. Or put half a pig's bladder in front of your face.

p079v_3

Tin for casting

They use common tin, which is the one that pewterers use for plates, which is composed of 9 or ten pounds of pure lead on one quintall of tin.

left-bottomSome find that there is nothing better than pure tin.

p079v_4

Mixture for printers

Apply a coat of antimony, and pulverize on a coat of latten, old metal scrapings, or thin plates of iron or the iron nail heads, and continue in this way until the crucible is full. Melt it inside a four Å vent. And then mix in a little tin and fill the rest of the container with lead. Build up the fire and stir continuously to make sure that the substances are well-allied. The mixture for large letters is harder.

080r

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p080r_1

Mortar

They make them of fine material and fine copper in the shape of reinforced barrel, and which can hold 50 pounds of powder, and having made a clean hole in the ground at the foot of a wall, they embed the said loaded mortar in this hole, with the mouth on top, which will make a large breach.

p080r_2

Very hard white stucco

White wax, turpentine of Venice, eggshell, and ceruse.

p080r_3

Fountains

fig_p080r_2

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If you wish to raise water higher than its source, make a pipe descend as in A. to B. to give it push, then from B. to C. make the pipe ascend, but not quite to the height of the source, here represented by the dotted line, and then make it descend again in a pipe from C. to D., and then let it rise higher than the line demarcating the height of the source, and do this successively until you reach the desired height. Remark nonetheless that the length of the descending pipe is always twice as long as the ascending pipe. This cone also fills itself and demonstrates a perpetual fountain which you can adapt into a rock, attracting the water with which it is filled by the tip here marked, by sucking and breathing in. You can also make a watering can pipe in this way, so long as the bent pipe is just as long as the straight pipe, but does not extend as far down.

fig_p080r_1

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left-middle

fig_p080r_3

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left-middle

p080v

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p080v_a1Founders of small tin work

They usually cast from soft solder the things that should not become hollow, because hollow works require fine and soft tin. However, these things would not otherwise lose their coat or become hollow if they are mixed or include glass tin in them, just like they mix a little [glass tin] in the soft tin. They carve their work on stones of which the sharpening stones or barber's files are made. These are found in great flakes near the mountains, and resemble slate. They are found in three colors: one reddish, that is not as perfect as the others because it does not sustain heat ; [another] one is the color of dark slate, and the other is whitish. When they work a relief, first they print it on carton, which is one finger thick, to serve as a pattern. After planing their stones and rubbing them together, they use a compass or little iron tools to carve their figures. They make their molds with three or four stones, to make a circle or a square with the stones which join perfectly because the stones are of equal size. Before casting, they rub the mould over with tallow, and it [the mould] absorbs it quickly because it is hot. Then, having [put] fine powder of quicklime into a cloth, they rub the mould using pounce in beating the linen on top, then blow it a little on top; this prevents bubbles [from forming]. The main thing is to make some vents. If the work is big, they do as it is shown [on the picture]. They make a hole in the medal, somewhere where it is least visible, and with a bit they pierce the mold on the side of the medal.

fig_p080v_1

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And if they want their work to last, they pierce [it] somewhere and fit in a piece of cork. Lead or tin will not damage it.

left-topMake sure the pegs of your frame fit in easily so it will open with ease without moving anything else. Your box molds should fit well, and the table should be very flat.

left-topTry to carve with distilled vinegar.

left-middleTry calcined oyster shells; they are said to be excellent for molding.

081r

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p081r_a1Sand

Some excellent [sand] is found for use with lead, tin and copper close to the hill of Pech-David, close to Toulouse. It should not be reheated much because drying out suddenly, it will lose its binding [properties] and retract [?] at the first inflow of metal, which makes the work become rough and unclean. It is much better to reheat it from a distance, instead of with a straw flame, which generates grime. Instead of filling the frame, you can use finer sand which you will have in a very thin cloth, and polish the medal and then the wet sand and that you will put over it, which has more body, will grip it.

left-topTallow makes things fill with bubbles

left-topMercury stops the burning when one wants to cast. Allow the metal lead to flow, but if it is pure, it needs to be cast quite hot so it flows and vents.

p081r_a2Earth for moulding

Sheath maker's earth or the one potters use to blanch the pots to make the lead flow better on it and to prevent the lead from soaking into them is very good to cast the hollow parts of what you want in relief. It releases better than plaster or sulphur which become hard once they have grasped on [to the mould] because earth sticks. It needs to be beaten vigorously so that it does not break. If the piece you want to mould is very large you can mould different parts separately. If you reheat it, it must be over a closed fire. One finds this earth at Le Fousseret, and in another place called Ox.

p081r_a3Plaster

It needs to be well cooked, which you will recognize when cooking it in an iron or metal cauldron. Mix it with an iron rod and if it sticks to the iron, it is not cooked enough, and if it doesn't then it is ready. The water with which you soak it has to be a little warm and the mould of the above mentioned earth or other, also should be a little hot. The plaster work does not last and the faces and delicate things break if one does not use glue.

p081r_a4Carton

It is necessary to take paper from Florence, which is the finest, and crush it and and soak it several times and change the water every day, that way it does not smell bad. And after having moulded it into the hollow, put a cloth over it, and from the back side, rub the back of your paper with a sharp piece, as if you wanted to polish it and it will mould very neatly. Then glue some cloth from the back side with strong glue.

081v

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p081v_a1Sand

Brick alone, quite finely sifted, and rubbed together, is good for casting lead and copper, when diluted with urine. This whitish brick should be used.

p081v_a2Make copper and latten flow

At the end of the casting, as it is very hot, add some salt ammicke and saltpetre, it is a way to remove grime. Mix some clay with the latten. The metal must not touch the iron or the latten of the frame, but covered with sand or luth, it makes a very homogeneous cast.

p081v_a3Sand

Calcined black pebbles from the river are good [to use] for lead. But they are weakened if used with metal.

There is only ardille clay with which one can make tiles, recooked and reddened and passed through a long narrow bag carefully soaked with raw egg white.

Willow charcoal is excellent with sand [and] lead.

Latten flows better.

p081v_a4Cast of the frame

It is good to make it with bow wood. Turn it in order to make it homogeneous, as that is important for the casting. Cover the mouth of the frame with clay or sand, so that the molten metal, copper or lead, do not touch at all the iron or latten of the frame, because it would turn it sour, and make it filled with bubbles. Always cast higher than the mold. Pay attention that the cast is not too wide or too deep because the narrowest is the best one. Because when it is large, the weight of the matter which runs breaks and spreads the mold and fills the matter with bubbles. When you have casted, gently hit your frame, so that the matter spreads better. Black lead [de saulmon] of the first melting, works very neatly.

p082r

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p082r_a1Copper heat

It is hot enough when you see it is clean and smooth on top of its impurity.

p082r_a2Box mold

Iron and copper swell if the metal touches it [the box mold], and the wood warps. Thus, make a mold from wood, and [then] make the box molds from bricks in this mold the wooden mold of the thickness that you will want.

p082r_a3Egg white

Egg white gives strength to sand so that many casts can be made from it

p082r_a4Watchmakers

To distribute the teeth proportionately on their wheels, they do not use a compass because there is no compass so fine that it can draw distances as small as those of the small wheels. But they make a platform (as they call it) out of latten that has been divided into various circles, and each of those circles is divided into equal sections marked by a point. And each circle has a certain number of points, as for example one has 30, another 36, and others 40. Then, on the pierced center of the platform, they place the little wheel. And on the center of the wheel there is a flat line or an alidade which points to the number on the circle that you want to mark on your wheel. Then with a point, they draw a line on the wheel. Then they return the alidade to the following point, and they thus go on marking it the dial. And to mark the points on the circles of their platform, they divide the circle in three and then divide this third part into as many sections as is necessary with regard to the total division of the circle. And, in this manner, they make the teeth's division and distribution as fine as they please.

fig_p082r_1

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p082v_1

Watchmakers

Formerly, they dipping their springs by immersing them into molten lead. Today they dip the ir straight springs, and afterwards bend them, which is a beautiful secret.

p082v_2

Casting lead in lead

Some make their caves with lead, they make them thick, and then cast lead in it.

Lead that is not cast hot enough is white, and darker when cast very hot.

left-top

One can make lead molds and, to cast, smoke it with soot black. But that is never very neat .

left-top

Lead never comes as neat as tin.

p082v_3

Sand

If sand is too fat it should be reheated and sifted again.

p082v_4

Ways of bronze casting

Laiton de potin, which is the most acid, moulds neater than latten of cassole according to many people. All fine latten molds cleaner than red copper. If you want to cast something f ragile and tenuous, the secret is casting as hot as possible so that the matter boils. You will know that it is hot enough when it smokes a lot and stirring it makes sparks. For heat ing well you should place your crucible as low as possible, close to the forging mill, so t hat the bellows blow on the middle of the crucible, thus it heats better than on the grate on which we usuallyput the crucible, under which the bellows blow. It is true that the cruc ible can easily break but you can lute it as you know founders do. You need to keep feedin g the firewith coals, which are between the bellows and the crucible. Make sure to cast all at once and not in increments or drop by drop, otherwise the conduit will be plugged by th e matter. It is better to make an abreveoir to abreuver the medal. It is necessary that yo u stir the melted matter with a stick, so that the matter at the bottom heats well. Because

Iron turns the matter acid. Turn

left-middle

Some people add wool stuffing to heat up and make it runny.

left-bottom

Place one large iron slab under your crucible, the plate will redden and this will maintain the heat under your crucible.

left-bottom

Copper matter is good to cast because when broken, its grain is long and not short, that shows that the matter is soft. The matter is composed half of fine latten and half of red copper. This long grain is called longue tige long rod.

083r

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p083r_a1Sand for lead

Recipe: Take grey soot from the silversmiths' furnace, quick lime, and flour. Moisten according to [the rules of] the art, in the finest possible way you can.

left-topThe locksmiths' grey soot which is held in their forge is quite fine when ground. It molds and is removed very neatly.

p083r_a2Sand for copper medals

Recipe: Take hat felt burnt on a covered fire, iron dross, and burnt bone, all of which you should grind very finely, crush and spray with water and salt. Make a paste of it, mold it, and wipe it with hay fire. These three pulverized sands, having been very well refined on the porphyry slab, mold very well and cast well. Know that separately each of them is quite good. Burnt felt molds well and is removed quite neatly.

left-topPlaster molds quite neatly but it swells. Bone does not have much body while iron dross does. Felt allows for an easy removal of the cast.

p083r_a3Other sand

Take charcoal made from vine shoots and clay earth, both well searced, and mix them with well-beaten egg white. Next calcinate it the resulting paste in the oven and to use it, dilute it in vinegar.

p083r_a4Other sand for use with lead

Recipe: Take finely crushed slate and pumice stone mixed together. Calcinate them three times in a covered and sealed pot in strong fire, and each time dilute them with urine.

p083r_a5Other sand

Recipe: Take a tile that has not been cooked too much, grind it and diluted it in white wine with burnt black trasse paper. If you add burnt horse manure to it, it will be all the better. Moisten with egg white.

left-bottomTrasse paper burnt under a light fire becomes akin to soft black charcoal. It molds neatly and is removed easily when mixed with the others ingredients or sands?.

p083r_a6Excellent sand

Burn alabaster in a crusol under charcoal fire until it turns into powder. Once it is cold, finely pulverise it through a sieve to make it impalpable. With a pound of alabaster, one should use an ounce of sal ammoniac. Mix well and incorporate everything together. Next, put it in a cave or a wet location. And with this paste, mold whatever you need and then dry the mold under a fire. While the sand is hot, you cast whatever metal you may like and your cast will be as neat as the principal. And the sand will always work if it is kept in a wet location and dried by the fire.

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p083v_a1

Excellent type of molding with water

Dissolve some laxunge de verre in a moist place and then pour this water over what you wish to mold, having turned it in a circle. Then let it coagulate over hot ashes. Use the same process with vitriol and ferrous sulphate which are very calcinated and reduce in water.

p083v_a2

Molding one part in relief and one hollow side

It is necessary to cast two parts of very clean copper, latten or a similar metal and then when you mold the hollow in sand, leave the metal figure, that you have molded in the box mold, without budging it from its place. Then cast and if there is not enough thickness press a bit and force the figure down into the box mold.

It is wise to always mold the faces not close to the cast but the head in bottom because the strength of the material concentrates at the entry of the medal and where the force of the impurity is. Thus if you molded the face close to the cast in this manner, you could find impurities there. It is better that impurities remain on the clothes which you can repair more easily

Vinegar is better for moistening than wine. It is necessary that the box mold be quite equal, otherwise as you press one side, it lifts up the opposite one.

This is why the press is better because it tightens more extremely than by hand, and makes the sand become fat which loses its moisture. With soft and fine sand which is powdered, and dry, burnish the medal.

When you mold, always leaves your medal in one of the box molds without stirring it because if your pipe is not clean, it will not mold well. You can repair it thanks to the bolts which prevent it from moving. But first, burnish your medal with charcoal made from willow. Then clean your medal because that degreases it and makes it easier to remove it from the mold afterwards.

Do not knock as you are molding because that damage the box mold and the sand.

p083v_a3left-middleBellows

To cast with a bellows furnace, cast the hottest you can. Do not place your bellows at the bottom around the base of the furnace, lest some coal should enter them. Place the bellows under the grate. It is wise to place your furnace in a place where there is wind so that the heat will grow better. It is necessary to stop carefully the doors of the furnace, that way only the bellows have an opening. At the end of the cast, you will blow slowly, as you did at the beginning.

p084r

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p084r_a1Impromptu mask

Mold some paper and put it on the face of somebody who is making an ugly grimace, let it dry, then take your pattern to paint

and liftings. It is necessary that it not be too wet for the aforementioned reasons. Reheat little by little, and if you left it out to dry slowly in some dry place without any high heat after molding it, it would work better, since if you expose it all of a sudden to high heat, it warps. I think it would be very convenient to reheat it in the mouth of the oven after you take bread out of it. One should not complain about the difficulty of preparing it; it can take as many castings as you wish, because it becomes as hard as marble, you can polish it, and the mold cannot be ruined. Having used it, crush and sift it again, without making a special effort to crush it very finely, since, when sifted through a common sieve, it is stronger and strips better than when it is very fine.

p084r_a3Magistry

Dissolve rock salt or sandever that you have pulverized finely and placed on a marble slab in a pot. It will dry out while you reheat the mold, and will provide it with a binding to enable several castings. Try moistening it with tartar oil.

p084r_a4Flour

Ground during Advent lasts the whole year.

p084r_a5Sand from a Toulousain mine

Toulousain sand, which is harvested from the C teau du Puy-David, deep down in the earth, is excellent on its own, but to make it sustain multiple castings, I mix it with pulverized and moistened sandever, which hardens it, holds well together with it, and enables as many castings as you like. Try to moisten the crushed glass and other sands with the essences of the aforementioned salts. Like all natural sand, it needs to be reheated well. Before putting it to use, one pulverises it, because it is in a lump, and then one reheats it in a copper boiler (or similar) until it ceases to smoke.

left-bottomIt is necessary to reheat it before using it. It becomes better for casting because it is reheated, but when it has been used too much, it must be refreshed with new sand.

084v

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p084v_a1Sand

I tried the hoof of an ox, quite burned, pulverized and very well crushed on porphyry, until it is fine enough to slip through your fingers without being felt. On its own, it makes a very clean mold. But because on its own it is very dry and lean, it demands to be well wet and humidified, with a thick broth with elm root.

Dross of Iron, very burned ox hoof, and felt, all burn well in a closed fire. All three ground very finely on porphyry mold very neatly in lead, without any need to reheat it much, and by casting in a box mold either hot or cold.

Felt on its own provides a very clean mold if wet, and comes off easily. And also makes the other two come off easily

left-topThese sands can only undergo one cast.

left-topA fat sand which sticks together neatly, makes bubbles.

left-middle

A fat metal needs lean sand.

p084v_a2Eau Magistra

Some people think that salt water is not good, because the salt releases gas when heated and as a result causes bubbles. [In this case], there is only wine boiled with elm root.

Sanding charcoal makes [things] come off well. But one finds that willow charcoal creates bubbles, but oak or beech charcoal does the job without making bubbles.

left-middleTry burnt oysters.

p084v_a3Lead

For casting, there is only soft lead that can be cast at a high temperature. And soft tin.

p084v_a4 Sand, for the most excellent lead of all, for large and small reliefs

I took white lead and crushed it dry on porphyry, to make it very fine. Then I moistened it a lot with very well beaten egg white, so that it became like a paste, by making it stick together perfectly with the flat of a knife. I let it rest for a while.

left-bottom

x

left-bottom Mix it well with the knife.

p085r

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p084v_a4

and place it on a flat well-clean table, and since it has a desiccative quality, I knew it would dry out. I left it to dry for a while to reduce it to a powder and mold it with sand, it having been ground into small pieces with my fingers and the sharp side of a knife. I oiled my medal because oil cleans it without damaging it. And after cleaning and drying the medal with a cloth and small bristle brush of pork skin, I lightly oiled it once more with clear walnut oil, and gently swiped it with a cloth so that [the medal] would not be too oiled; having already considered that in this way [the medal] should come out easily, because the white lead, wet with glair, which would not damage the oil. This worked very well. I molded a medal very cleanly in high relief, without it having any lumps, which a lot of good sands such as felt, burnt bone, and iron dross failed to do on the first attempt. I re-cooked it and my mold became hard like marble. And then I knew that sands used to mold big relief must be very moist with some kind of water, which gives body and firmness, like egg white, gummed water, [or] one [water] boiled with elm root. And lightly oil your medal. It can take as many firings as you want because it is as hard as glass. But soft lead and solder tin must be cast at a very hot temperature.

Since that moment, I have realized that even though this sand is excellent, can be cast often and molds very neatly, it is fat and it makes bubbles. In this way, the soft lead does not suit the mold well. But I have tried to mix it with lean sand, such as pumice, metal scrapings, and similar things, in order to give it body, and to help it come off easily, because lean sand [alone] does not come off easily; and yet it takes metal well.

left-topTry to mix white lead or minium with other sands.

left-topX

left-topOil and smear with aspic oil, which will disappear when reheated, because the oil causes bubbling.

left-middleIt is necessary to mold with egg white, and then mix it well. And once it is in the box mold, beat it well on the top with a pestle, or something else clean. This helps to make molding better and come out more easily.

left-middleIt is best to fill the box mold in one go, because the mixture made of several sands, and the one from mines, that you use to fill the box mold, damages it.

p085r_a1Green varnish for copper medals

After casting them neatly, cover them with glass salts, which we use for sand, and moisten it. Within three or four days they will be green. Oil them after, and place them under some manure.

p085r_a2Glue

The Flemish mend their earthenware pots with orcolas, that is to say massicot, minium and varnish.

p085v

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p085v_a1Casters

They mix beaten egg white with earth of which they make the first layer of the crown of a bell in pieces. They also make bells and all other said pieces with the said egg white. This makes it come clean and sets and stabilizes the material. For the core of a small piece, egg white is also good.

Rosette in order to make it come clean, wants the mold to be a little hot and lead which is mixed with the red copper is therefore chiefly for small pieces.

p085v_a2Mortars

They should be of the finest material possible. In the same way, it is better to use copper for a cauldron than red copper, because it better resists a blow.

The mortars, therefore, used for grinding are stronger and there is less danger of breaking them if they are of fine copper. And for a private home, they do not ring so much and do not make as much noise as those of metal. It is true that those that are of metal ring louder for apothecaries.

Grenades must be made from fine metal

p085v_a3Sand from a mine

It wants to be well recooked for big metal objects. Some people burn it inside a furnace until it becomes quite black and they grind it on the porphyry. Other people burn it with asphalt, but when it is too burned, it does not mold so cleanly, because it lacks body, and is too thin. You can give body to the sand with tripoli or burned felt.

p085v_a4Sand Experiments

X I have tested sand of Th{oulous}e, and after seeing it well recooked two times in a skillet, I passed it through a fine tammy cloth, like the double sieve which apothecaries use, without grinding it further on the porphyry, as I have done other times. I moistened it the sand in infusion with elm root, and in it, I molded a big piece of a portrait of Jesus. I found it unmolded very well without having to tire myself out by hitting it from behind and it molded cleanly on one side of the relief and on the other concave. And [it was] of the thickness of a coin of forty sols. I cast this very hot

left-bottomX

left-bottom

Sand from a mine, well chosen and well reheated, is the most excellent of all without trying to find all other mixtures because it receives all metal. It does not like to be used hot because it bubbles the more finely. For large works, it is not the best because it does not have enough body to sustain it,

086r

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p085v_a4

with the material of a frying pan mixed with a knob of potin. And before that, I had so reheated my molded box frame, now on the flame of my stove, now putting glowing coals beneath it, that it became almost red. I let it cool and cast it. It came out with a quite neat relief on one side & hollow on the other, as much the figure as the letters. It is true that the material was whitish, as though it were metallic, but this was because of the potin. I made another cast with frying pan material, alone in the same sand, but not as reheated. It did not come out well.

Then I molded burned bull's foot bone, pulverized & strained through a double sieve, and wet with egg white or wine boiled with the root of an elm. I lightly knocked on top of it while molding. While opening the box frame, I found that the figures had come out not at all clean & it left the molds as though they were floury & crumbling. I wet the bone sand more so that it held together well between the figures, and in this way I molded neatly with good come-away. And even though it seemed like the ground bone was lumpy, when casting with frying pan material, it turned out that my figures were quite clean. It is true that I had really really heated up my box frame, it did not admit but one cast. I find that, when a sand is so fine that it gets as heavy as ceruse & even, without finding it arid, thin, sandy & rather spongy, that sic it molds quite neatly but it does not receive metal very well, as if it were porous and sucking up the material. But, being fatty & even, it puffs up & does not receive subtle impressions at all. I believe that the secret of casting well lies in finding a sand that conforms well to the metal, this one for lead, the other for another, because each has its own particular one, so that it be molded easily and keenly. Then let it firm up on its own for a few days if you have the leisure for it. And afterwards let it really heat up again, not instantly nor with a large fire, but little by little, otherwise it will crumble & always have some defects. Finally you must cast copper or latten or other great metals very hot and if possible with a large quantity of material that has a lot more heat than a small quantity. It's necessary that the box frame be cold & that you cast all in one go. Always lute the opening of your box frame because metal touching fire or metal.

left-top This bone has to be really crushed in a mortar, it must not be reheated very much, because then it would crumble.

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p085v_a4

[or metal] fills with bubbles. Most of all, make sure that the cast is always higher than the molded thing, since the sand swells very often when reheating if the, even in the middle, and therefore with the molded thing remaining higher than the cast, the metal cannot run easily or at all nor enter at all. Also make sure that the mold & the cast are indeed reheated. Also cast in one go & outside of the wind. And if your medal is really thin, when you want to mold it, put a card, or two or three thicknesses of paper, so that the mold will be lower than the cast. Also cast in the place where your medal will be least thick & where the relief is lowest.

p086v_a1Excellent sand for lead, tin and copper

D

Since, I molded with burned bone, dross of iron & burned felt, really crushed and ground on marble and mixed together. I got them very wet with beaten egg white. And, as in the other [casts], having covered the medal and filled the box frame with sable de mine, I gave it a little tap. I found it really stripped & molded quite neatly. I let it sit for a night. The morning after next I reheated it little by little for over the course of seven or eight hours (because if possible there must not remain any humidity at all in the box frame). Two times, I cast copper alloyed with $\frac{1}{3}$ there, as old K. The material came out really lustrous & resonant & without a chappe. And my sand was not corrupted at all. Since, I have cast in there many casts of sweet lead and tin, which came out the best and neatest of any others I have yet found.

When you mold make some grooves around your mold in the box frame, so that you draw in this manner the matter from all sides.

fig_p086v_1

<https://drive.google.com/open?id=0B9-oNrvWdlO5dWFuOW9Db1ZjZFk>

Potin from sernique & other works runs yet better than fine latten. But I believe that half copper and half latten is better, which has served & been in very thin works, like frying pans & similar ones. I've seen come out quite well this mixture of half

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p086v_a1

In order to mold well, it is necessary to cast several medals together in a large box mold, because when there is a lot of material and the crucible is almost full, it becomes hotter. Then, if you do not succeed with one of the medals, another will be good.

It is better to melt with a bellows furnace than with a wind furnace, because it heats more vigorously. It is true that latten melts better in the wind furnace, because it is more brittle than copper.

Some founders superstitiously believe that there are only three days in a week that are good for melting, that is, Tuesdays, Wednesdays Thursdays, and Saturdays. For them, the others are unlucky.

When you mold, do not excessively pound on the medal that is in sand, because that prevents it from being cleanly stripped, and cracks the mold.

See to it that sand does not go over the edges of the box mold, because if the molded medal is higher than the cast, metal will not easily enter the form. Therefore, always take care that the surface of your cast surpasses the mold in a straight line. To accomplish this, if you wish, put a piece of cardboard of whatever thickness you please on top of the mold.

To prevent their large casting works from becoming too porous, founders are careful to heat their molds very well. And to know if the molds are heated enough, they tap them with their finger, and if they start ringing like a pot, they are heated enough.

In order to cast their canons cleanly, they mix with their founder's earth some fine casting sand, if they can get any.

p087r_a1Sand of Toulouse

The sand generally considered good is the one found in a vineyard near Pech-David. But the best is the one is from the Touch, a river close to Saint-Michel and Blagnac, in a vineyard at a high altitude. This sand is thinner, and a bit greasier than the other, and better for small works. It should not be overheated.

p087v

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p087v_a1Sand, slate, and burned earth

Sand, when overheated, does not hold as well. Slate is baked and will mold clean, yet it is true that often it becomes porous, just like burned earth also does, as well as any kind of greasy sand.

left-topI find that one must not hammer at all on sand already very finely pulverised, because it would damage it, and then make the sand would not be able to release the cast cleanly. Still, it needs to be pressed hard, and moisten it sufficiently.

p087v_a2Magistry

Founders harvest the roots of a young elm when it is sappy, and boil it in wine, or better yet vinegar. They prepare a year's worth of it and store it in a cask.

p087v_a3Sand from sand pit from Toulouse

In order to use sand from a sandpit for casting, filter it through a double sieve, then having mixed it with molten resin it burns and heats, and becomes all red and hot as iron. Once it has cooled down it is completely black and can be pulverised on porphyry very well. Having prepared it like this and checked the smoothness of the surface with my nail, I moistened it with egg white and beat it vigorously, until it was not a paste anymore but a powder. I found this sand to release the cast very well, and molded very clean in lead and tin with it, however it needs to be reheated and at leisure.

Others beat it strongly in a mortar, in small amounts at a time, thus it detaches and comes out very fine; then they bake it moderately, just enough to dry it, and then they crush it dry on porphyry. Thus it is made almost impalpable, and yet not too dry, and it retains the consistency and the binding quality of the earth to which it is related, and is better than when it is burnt. When you moisten it with egg white and pass it through a sponge it releases very clean for a low relief, but not a figure in high relief. Considering this, since then I experimented with moistening it only with strong vinegar. That way it releases a figure I previously had not been able to release from the mold. I think that even when you wet the finest sort with egg white, or in a similar fashion, or the thick sort to fill chasses with water, salt, or vinegar, they do not mix so well. However, given that they are of one and the same nature, and are similarly moistened, they espouse each other, and hold together.

To mold well, when your sands are prepared, mold in one day. Bake slowly the next day, then cast the other.

left-middleIt is necessary to choose sand that like comes in clods and lumps, and deep down in the earth, because commonly the one near the surface is too much akin to earth, whereas the deep one is similar to rock.

left-middleI have sometimes molded with pure lead cast very clean hot, and the example as well as the principal were very clean, but since the vinegar gives it little binding, it held only for one cast.

p088r

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p088r_a1Vine

As with a bramble, it can be planted on both sides. And those who plant the larger side facing a slope say that it makes a larger stock. But it only has a higher point, because it grows higher.

p088r_a2Mortars

The fine copper mortars do not throw any flames, as long as the iron pestle is not tempered. If the mortar is indeed made from metal, when this is sour, in this case one makes the bottom of large mortars from fine copper.

p088r_a3Varnish

Turpentine oil: turpentine & good eau de vie, to dry it out; heat it without mixing on the stove, so that it mixes of its own accord in melting. After, test it on a very clean blade, & you will know from this whether it has enough body and whether it does not flow too much.

p088r_a4Grafting

One knows from experience that the young shoot that enters into the incision on the sunny side takes hardly often at all when it is also bowed.

p088r_a5Baker

Dust guards wheat against being worm-eaten. And to clean it well when it is stained & like rust, pass some ashes through a sieve and mix them with the wheat, then sift the whole thing with a bolting cloth made from rough cloth or canvas. The ashes will pass through & your wheat will stay nicely yellow & very fine.

p088r_a6Looking-glass tin

It makes material whiter.

p088v

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p088v_a1Sand from pulverised rock salt and sand from a minium finely ground on marble

After they have been dryly ground and beaten in the mortar, they are ground finely on the marble. I mixed the same quantity of each material, and in order to mix them better, I ground them on the porphyry again, and then filtered this through a double sieve or the sleeve of a shirt. Then, I put them on sheets of paper and stored it on marble in a cellar. In one night, they were both moist enough [that there there was no need] to dampen them further because rock salt, like all other salts, dissolves in dampness. I molded with this very neatly because both should be quite fine. They need to be moist enough so it can be removed easily.

p088v_a2Mineral sand

It does not matter if the sand color is white or yellow. Above all it the sand must be lumped together much like a precious stone or a stone, and the deeper in the earth one gets it from, the better. The signs of its quality is that it is thus gathered together, that, if the stone is removed as it should be i.e. in the correct way, it forms pieces and lumps together, which demonstrates its capacity for binding, and that it the sand is not too dry.

However, it should crumble in your hands. And the grain must be quite small, fine, and homogeneous. If this sand is not fine enough, you can filter it and grind it up finely either with water, or through a sieve, when it or on the porphyry. That way it loses its dryness and becomes greasy and well bound. You can mold it in a box mold or in a noyau without wadding, and try it with lead because, if it does not swell and casts neatly, it will bear out well too. Some say that fatty sands do not work for casting metal that is too hot. Artisans who undertake a big job and who want to save money do not need to crush sand and seek the curious properties of artificial sand; they have more to profit from finding natural sand that has the finest grain possible. And for a small job, they take advantage of finding the finest natural sand they can. For a smaller job, they only filter the sand through the sieve. But those who work on a very small scale crush the sand and grind it finely until it becomes impalpable, because they do not need as much sand.

left-middleGround wheat makes a tawny-colored powder that is quite fine and quite soft. Once this powder has been mixed, it can mix mold very neatly. Try wheat flour burned in an enclosed fire.

p089r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f183.image>

p089r_a1Powder of ox bone and rock salt

I pulverised them separately and ground them finely on the porphyry as much as I could. Then I mixed all of one with the other and re-ground it on the porphyry. Afterwards I moistened it in paper folded in a moist napkin which is made wet more quickly from the moisture of the night, or the moisture of the cellar. I have never found one which can be removed more cleanly from the mold than this, though it needs to be quite moist. And if you want to cast small works, make it very hot. It came out very cleanly from the doulx tin, like the main one, and has sustained several castings. For tin, I believe that it is not necessary to look further to find a material that takes to powder better, and even for use with fine lead which has almost better results than tin. The bone of an ox hoof is always dry, that is why you must mix it with fatty sand, so it will bind like tripoli, salts, felt, ashes and similar materials. If you do not mix ox-hoof bone, it will not turn out from the mold and will not mold cleanly because it crumbles.

p089r_a2Reheating or wiping a box mold

Always arrange the most delicate parts, like faces or handles, so that nothing will fall which would then disturb your fusion.

p089r_a3Natural sand

This should not be reheated for lead and tin, it is better all new and fresh.

p089v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f184.image>

p089v_a1Ammonia salt and alabaster

Dry ammonia salt, ground on a marble slab, molds very cleanly and is easily removed from the mold. When mixed with pulverized alabaster, use two ounces per pound of alabaster; it also is easily removed from the mold. It should be humidified in a cellar or in the cool humid evening air, or to have it quickly, in a sheet of paper in a moist towel. Take care not to leave it too long because it will soften, which would not be good if you wanted to use it as a box mold. However you can use it well as a core provided that you dry it gently and away from the fire. Otherwise the heat would make it swell, and push the salt onto the surface, causing lumps. If you want to mold a core, rub your medal with aspic oil. It is better to use 4 ounces of ammonia salt per pound. Humidify it in a damp place for two or three days, so that the material can be handled without sticking. You will mold very cleanly. Let the mold dry out and reheat it, that way it will get body, and become as hard as stone and when it is like that it is far easier to remove from the mold. If you do not reheat it, it could crumble when removed from the mold because of its thinness. It is the same with a large relief medal. Once you have molded, pulverize the material like before, and moisten it in a damp atmosphere.

left-middleAll sands which can be removed easily from the mold have body, well-made fat ammonia, and is sand that removes easily from a mold. There is nothing better for binding than the salt of the metal itself. When ground into powder, they pick up moisture, dry and reheat together.

p089v_a2White glassmaker's sand mixed with ammonia salt

You can find this sand in Cominge, near the town Aurignac. This sand is dry and as white as salt. Glassmakers and potters use this sand ground on the porphyry until it becomes as fine as possible. Easy to grind, this sand looks like calcined alabaster, and provides a very clean mold. I have not found another as suitable for delicate bas reliefs. It is also excellent to mold as a core, without any box mold. You must grind it very finely on a porphyry with gummed water or pure water, then apply a thick coat (as thick as mustard or a little bit thicker) over the medal, which has already been lightly rubbed with oil, walnut oil or, even better, aspic oil. For best results, let it dry by itself, away from fire, for one or two days. If you are in a hurry, you can heat it; it should not break if the coat is quite thick. If it is suddenly exposed to fire, some holes will appear; that does not happen if it has been gently dried. Once dry, reheat it, and it should allow for several castings.

p090r

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p090r_a1Sal ammoniac and iron dross

I pulverized sal ammoniac, previously well dried in a hot bronze mortar over heat. Then I filtered the salt through a double sieve; it became very fine. But to make it finer, I dry ground it on the porphyry, then I mixed it with iron dross which was pulverized and ground the same way. Both ingredients take a very clean cast of bas-reliefs, without being moistened with serain, or into the hollow mould, or anywhere else with the serviette, and the cast can be cleanly removed.

p090r_a2Sand

Molders from Foix who cast their medals sideways use crocum ferri and calcinated slate. It is used for very flat things.

p090r_a3Every kind of sand can be made useful

Artisans who do big works, and who need to search for things made by nature to pursue their work, because nature does not want to sell its wares to its children, and in order to save the time they would spend grinding, pulverizing and artificially preparing their sand, look for sand from sandpits, which is not too far from the soil, nor too arid and, consequently, without any binder effect. From deep in the sandpit, one can find some lumps and gravel that show the sand's natural compaction; it is quite hard to break, with very small and fine grains, quite smooth between the fingers. And since it is found solely close to mountainous regions or arid lands, you cannot find any near every good town, where artisans live. Thus, if they can't find any close to their home, they prefer to order some of this sand from afar, like Lyon, Venice or Paris, near the Sainte Chapelle, and similar areas, instead of preparing it themselves. Nonetheless, you can be assured that in all locations, you can make sand from the sandpit

090v

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p090r_a3

and will be good and will mold cleanly. Because the sand is coarse and dry, filter it through a sieve. If it is not fine enough, wash it. And when the water has settled a little, pour the soiled water into another pot. The coarse [grains] will quickly fall to the bottom of the first pot. But the sand from the troubled water pot, having settled, will be much finer. If this sand does not bind enough, dry crush it on the porphyry, thus making it impalpable, and it will bind as chalk does. If you wish you can reheat it, and straight after crush it and blend it with salts, or burned cloth, or felt, or paper ashes, or similar material.

p090v_a1Potters' clay

Grind it in a mortar mustard mill with water, and it will become as impalpable as possible. Dry it, then moisten it with salt water, which give force to all sands in order to allow several castings.

p090v_a2Orange trees

In Italy, particularly in the coldest areas like Lombardia, people plant the orange trees inside squared wood planters. The planters are larger at the bottom than at the top. People make handles on each side, where they attach straps in order to carry the planter, like one carries the gout sufferers, because if one used wheels to roll them one would damage the garden's paths. Every two years they remember to open the sides of the planters and meticulously cut and trim the ends of the orange tree's roots, which are dry. Otherwise, the roots find the wood [of the planter] and tighten on it, they double over themselves, the ends dry and the tree dies. Once trimmed, the roots gain new space to expand, without encountering resistance from the wood of the planter. That is why it is better to join the sides of the planter with screws rather than nails, to avoid shaking the soil when one opens them.

p091r

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p091r_1

Grafting

Any tree that has a large pith will be hard to be graft from, because the cutting is difficult to remove. If the pith is damaged, the graft will take in an unstraight manner, like with vines of all peach and apricot trees.

Apricot trees have a very thin bark, and so it is necessary to graft them onto young trees whose own bark is not thick yet, such as the young shoots of prune trees or apricot trees.

The graft will not take if the cutting gets wet. It is necessary therefore to graft in serene and mild weather, not too cold and not too windy.

One must use old wood to graft, if one wants to graft on a tree that is already mature and quite big; because if this is the case, it will compress the cutting, and if the cutting is of young wood, it will not grow properly. But old wood resists the compression of old wood better than the young, because it is harder than young wood. But if the graft is done with only old wood, it will never grow beautifully, but will be frail and short and will take a long time to grow.

p091r_2

Molding with cuttlefish bone

Pay attention to keep the bones in a dry place, because they are very prone to dampness. If you have a small medal, divide the bone into two pieces, then smooth the two parts with a knife. And on a dry, smooth rooftile [that has been] pulverized with willow charcoal, rub and polish the two half bones. In this way, the bones soak up the willow charcoal so that the bones will come off cleanly from the cast, and will not stick to it. Then on a fake bone, that is to say a bit of smooth brick of the same width as your bone, place your medal. And then on the medal, put your bone and press it firmly with another stone of the same size. And for a second time, mold it, and instead smooth over the top with willow charcoal and blow slowly, then press as before, and it will cast neatly. If it is for a spoon handle, two whole bones are needed. Any work that is cast is brittle and prone to breaking, because the metal swells when cast, and contracts and condenses when hammered. That is why it is necessary to retrace with a chisel the cast object and in this way the metal will contract again and let it escrouir. If the piece you have to cast is in high relief, first trace the mold and the hollow with a penknife, to make a clear path for the medal and then cast it. And if the medal has two sides

left-bottomRather than casting, heat the bones only to make them lose the coldness and wetness.

left-bottomWhen the lead gets too hot, it calcinates.

091v

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p091r_2

Because the two bones are joined, cut around them with precision, and make notches in different places which cross through where the two bones are joined, so as to recognize the place where they were first joined. Or with little shards of wood, you can also pierce the bones, or coat the joints with clay, and leave it to dry. Compress between them it with your two hands in between your knees; and do not use a normal press, otherwise the bones will break. Mold at your leisure two or three times, until you can see that it has the design come up and is well imprinted. And on each occasion rather than putting the piece straight back in the mold, smooth with willow charcoal because it helps it to come out easily. Once you have cast, rub your medal with oil and willow charcoal with a brush, to make it dull. Take care that your medal is not greasy or oily when you cast it in cuttlefish bone. Once you have cast, leave it to cool rather than taking the medal out straight away, because when one takes it out hot, some bone will come away with the medal. Cast at medium heat, which you will recognize because the bone should stay almost white. But when it is too hot, the bone becomes brown. The proportion of lead and tin is equal, one to the other. If the piece is difficult to cast, and composed of various pieces, cast it with a forked pattern, of three or four grooves, and make and make these grooves where the metal is the thickest. Also make these grooves around the medal and directly on the head because this attracts the metal and will fill the figure best. Lift your boxmold a little, once you cast, and in this way you will be able to make several clean casts. Tin that is too hot burns the bone which becomes damaged. Moreover, having come out of the mold hot, it risks breaking.

fig_p091v_1

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p092r

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p092r_1SandMixture easy to melt

One ¼ of part soft tin, one part fine lead, one part looking-glass tin and one part argent vif arrest[©] makes an alloy and a solder, so easy to melt that it could easily be melted in a dish of fine tin.

p092r_2Molding hollow on one side and in relief on the other

And for this effect, one casts a medal of fine tin, which is harder to melt. And since it is neat, one molds with it. And one leaves it in one half of the box mold, & presses it a little so that it holds better. And next, you shall cast in your box mold the solder described above, or another more meltable than fine tin. And thus, the second medal will melt and mold itself on the first one without ruining it. But to be safer, temper lamp black with water, & with a pinceau, give a light coat of this to the medal, which remains in the box mold, & leave to dry. Thus it will not melt.

But if you have a medal of copper or silver, you can leave it in the casting, if you want to cast with lead or tin; but it is necessary that it be a little hot, for the cold would make the tin contract.

Tin needs to be cast quite hot to come out neat.

Tin doux, which is the best for the cast, is the one that once cast en grille, is burnished & shiny & polished like a mirror, & appears to have been burnished, & does not have holes like the one that is brittle, & that is not shiny, as if burnished.

p092r_3Potin

Potin, once cast very hot, runs and drips like tin. But the medal becomes whitish and immediately casts off the green, which good substances do not do.

p092r_4Molding statues

Half founder's earth, which founders use, and half clay earth renders very neatly.

p092v

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p092v_a1Sand of river tellins and mussels

The long shells that can be found in rivers of fresh water, being calcinated, make a white and very fine [impalpable] sand which moulds very clean..

p092v_a2Freezing mercury

It can be frozen, as I tested, letting it boil one or two hours in a rather large iron pan putting, for each $\frac{1}{2}$ lb of $\frac{1}{2}$ lb of vert-de-gris and vitriol of saltpetre, each in the same quantity, with enough of the blacksmith's old water.

Or melt 4 $\frac{1}{2}$ lb of tin, and when it has cooled, purify it by removing the filth on the top, then make a hole and inside there add $\frac{1}{2}$ lb of $\frac{1}{2}$ lb and if you remelt it, it will be like tin but it will be fragile. If you want to know if it is tin or $\frac{1}{2}$ lb, redden a shovel and put a small piece of your ingot on the top. If it is tin, the piece will melt but remain, but if it is $\frac{1}{2}$ lb, it will melt immediately then, crackling quite hard, it will evaporate. It must be frozen in a ladle or in a hollow crucible, and make the hole medium sized.

It can also be frozen, as I tried, that is to say with aqua fortis which before corroded a bit of silver. This, mixed, will make tin and lead fluid.

p092v_a3Mixture

Pure tin, frozen mercury, smells like tin. Iced tin, pure lead, as much of one as of the other, makes a substance that melts very quickly but that is fragile and white. I think that it would be good for soldering. [Takes a] long time to cool.

093r

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p093r_a1Olives

The olives go bad if you do not refresh their salt water once a month, do not touch it with your hands, otherwise they will go bad.

p093r_a2Country folk's observation

When it freezes on Palm Sunday, it will freeze every month of the year

When the first flowers fall because of the frost, the other flowers also start perish.

p093r_a3Grafts

Do not use a graft from old wood, because it never makes a beautiful tree.

Leave only two shoots on the graft and no more, otherwise it will become weaker. The wind torments it and leaves it strengthless to propagate by cuttings.

Trees which have big pith, such as peach trees, and all other trees of their kind, and the plum trees, can't be grafted when freezing because the cold damages their pith, which also has to be protected avoiding to cut the bottom of the graft.

All grafts must not be done earlier than the sap flows up, otherwise they dry.

p093r_a4Sand

The white ash of all kinds of wood, which still sticks to the wood while burning, and which has not fallen into the hearth, molds very clean

p093r_a5Sand

Very fine pulverized soot molds and removes easily from the mold. The best soot, which is greasy and shiny, is the one from the big kitchens

Very fine pulverized quicklime works, but mixed flint, crumbled into the hollow, does better.

p093v

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p093v_1Faces painted with distemper

Because colors painted with distemper dry quickly and one would not have enough time to complete the shadows and touches on the face, one wets the reverse of the face, on canvas, with a wet sponge. Then, with a small pinceau, one makes the shadows, which won't come off. Next, one lays the flesh tones, which do not prevent the already painted shadows from appearing. And then, one retouches the more prominent areas with lively flesh tones. And with another pinceau one retouches the shadows in hatching. The shadow strokes do not come off because they are made of bistre, which stains the canvas like rust. The said bistre is good for making shadows with distemper, for in oil it has no body and would dry with great difficulty. One mixes ru ochre in the said bistre for shadows with a little sap green. The best bistre is the rich, shiny one from the fireplaces of large kitchens. It is difficult to grind and screeches on the marble slab.

p093v_2Azure

Azur desmail always wants to be cleaned because the filth that can be seen in the used water would make it die. It always needs to be coated twice, & first very thickly, driving the pinceau by laying it lengthwise then across. It is better used on canvas, which imbibes it immediately, than on wood. Varnish restores its vigor, because while imbibing, it becomes dark. To try it, painters bring their palettes to the grocers and distemper and mix @ it with a bit of white crushed in oil, for in this way the beautiful shows its turquoise vivacity, while the mediocre is lavender grey. The thinner one is best to work with. It is made thinner by being washed.

p093v_3Purple and lake

It is made of azure and lake which is also tested on the palette with white. The one which gives a clear red rose color, tending slightly towards purple, on a polished knife or on glass, is esteemed beautiful. The dark red one is not as pleasant.

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p094r_alBurnisher

The different parts of a sword are the handle, [and] the sheath of the sword. What comes next is the heel. The rest is the blade. The sides are the edge and the point. Certain blades, acute in point, have only one side filed in the middle & along the whole length, and are easy to break. Other blades are called of three molds or three grips, which have one good rise in the middle, but this elevation is flat as if it were acute in point but flattened. These ones are most certain. Others are called fluted, which are notched from the middle, & when it is along the whole length, they are just as easy to break as those acute in point and are more troublesome to burnish because the burnishing stick can't get in. But they make one specially that is narrow.

Making up the hilt of the sword are the pommel, the branches of the hilt and the cross-guard, which is this iron strip that closes off the guard [and] that is at the end of the heel to stop thrusts from sliding down the hilt. The rings are these two branches in half round that start from the eye of the guard and go all the way to the branch of the cross-guard. The branch that crosses the hilt is called the body and this escutcheon, by which the sword enters the sheath and to which all the branches return, and which holds them, is called the eye of the guard.

Following is the wood of the grip which one glues or more fittingly [uses] some mingled wax which is made of wax and pitch, for rosin would be too hard. He heats it lightly, then rubs the wood of the grip so that the tang takes hold, or the threads, otherwise, when a thread frays off, the whole thing will break all at once. With iron thread or dog skin, one also uses glue. The trimming set on the wood, which is made of silk or thread, is called the cord, which is made from two or three threads twined on the spinning wheel, or 4 if the silk is thin. A cord a little bigger holds better. The rivements, which are also made of silk at both ends of the grip, are called the buttons.

Some grips are made of silk, seal skin, iron thread reheated with gold and fine and false silver thread & velvet [thread]. Iron thread is of less price and is most durable. Next is that of silk, if one does not have the convenience of being close to the sea in order to recover some dog skin, which is quite convenient. The good skin costs fifty or less and makes 4 or five dozen grips. This one gives a good grip and a sure hand. To put it to work, if it is too hard, soak it for one or two hours in slightly lukewarm aqua fortis. Because if it were too hot, it would boil and spoil the skin. It is sewn with black thread.

fig_p094r_1

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left-middle

94v

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p094r_1

The gold handles are made with some yellow thin cloth set below or other kind of chalk-yell
owed fabric. And this cloth is set on with glue or aforesaid gum. This is in order to make
the thread hold better on it. These latter are made of cordons like the silk ones and betwe
en two cordons are put one or two threads to enhance it. The silver one is identically made
. And there is as much difficulty as for the silk one, not because silk is difficult to twi
sted, but it needs to be twisted twice. A fine gold handle is worth 28 or 20 cents.

The best sword point is of sage foliage.

This long stick on which the sword is laid down and attached in order to furbish is called
the chameau. It is commonly made from rowan which is hard and even.

The stick underneath which is folded bow-like is called the arch.

The stick above is called stick of the fustÃ©e.

And this square piece, used on the sword to burnish it, is called the fustÃ©e.

There are two horns, one is called the oil hornet and the other the emery hornet.

There is an iron tool with the shape of a halberd point, square and made of very even and w
ell limed steel called the grateau which helps to soften lime strokes on swords hilts and t
o sharpen blades once they are softened which is better than with stone or other tools whic
h leave some scratches.

To make the swords cut better, the edge from the point is also sharpened.

Those who create sword hilts are different craftsmen than furbishers.

The fustÃ©e is a three-finger-thick, square wood tool, made of boxwood which fit in the mid
dle of the fustÃ©e stick to furbish.

The fresil stick is made of willow wood which is to [â\200!] weapon with some clinker which
is the iron scale falling from the blacksmiths' forge.

fig_p094v_1

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left-top

le banc

des fourreaux

fig_p094v_2

<https://drive.google.com/open?id=0B9-oNrvWdlO5OEQ30EFSNnEzeE0>

left-middle

left-middle a b

D

le baston

a felinder

c

le flin ou pierre

de fouldre

095r

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p094r_a1

The furbisher buys his blades by the dozen which are not finished, [but ready] to be pulled from [their] sheaths since he does this himself in order to add them well at the pommels and guards.

Spanish swords are esteemed to be better for they are of better steel and iron but they are not as well-forged as Vienna swords, in DauphinÃ©. The Spanish ones are not as well sharpened from the forge since they sharpen them with their feet and this is what makes them wavy .

Vienna blades cost commonly Xviii or 19 lb.

The first thing the furbisher does to his new blades is to draw them out from the sheath, which he does himself or has it done by locksmiths or blacksmiths to whom he gives some liard for their charcoal. Afterwards they pass it over a grindstone to cut it down. Then they lay it down on the chameau, and with some powdered emery, fine and soft as flour, and soaked with oil to make it take, they polish the sword with the stick used to take off the tracks left by the grindstone and then they clean the blade well with the emery. And they add a drop or two of oil spread with the finger to give it luster. Once the oil is applied, they polish it again on the chameau with the "felin" which is a thunderstone mounted on the middle of a stick like the "fustÃ©e." And this stick is called the "felindel" stick. Once they used the "felin," they polish it again with some chalk and the oil [already] on the sword. After they follow this and going over it again, they polish it with dry chalk. Finally when they are finished with mounting [of the pommel and guard], they give it a sharp edge with a file. They then dry it and sharpen it and furbish it again with some dry chalk. At the end when they are completed and mounted, they give it [the blade] a sharp edge with a grater.

They are polished on a false mounting with the guards which are present in order to find out if they work well together. And employing a blade of the sort of which all the sizes should be made in the hand, one conjectures whether it will be as strong when mounted.

One puts the blade in a vice between two pieces of wood, then with a file, they enlarge [it] if needed for attaching the guard. Then to clench it, one positions the place to be riveted and the pommel on a piece of wood. And with a hammer, one beats on the top to make it very level and to secure the pommel. Then with the hammer, one finishes the rivet when the hammer is well secured and does not shake. The wood is placed so as not to put gashes in the pommel. Afterwards one makes a place for the rivet with a file or chisel. And some make the rivet [or attachment] in a diamond-shape but this is not as good as a round [topped one] because one cuts oneself on the corner of the rivet.

095v

094r_1

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p094r_a1

The end can be bought already made, a dozen of small ones costs six sols but the big ones 2 carolii. The end is fixed either with nails which are fixed on the sides of the cutting edge, but this only spoils the sword and rots the scabbard for the water goes into it via the juncture of the nail. The best way is to apply some resin or glue but the resin is better. And the best is when the end is tightly set and so hot when set that powdered resin on the end melts, in that way it doesn't fall and can't be undone unless it is put in fire.

Hilts are of different types:

Ornate

Guttered which is with round mouldings

Pearled

Scarfed when the bands are crosswise

Onioned which is with a flat head

In the King's manner, fully covered

The furbishers buy them by dozens, the dozen of full ones costs 10 lb. the worked one, 30 sols or [more] depending on its nature.

The first thing that the apprentice does is to furbish as said.

And then to adorn the sword and make a scabbard which is the summum of the art.

They buy scabbards' wood pieces which are wholly made of beech wood, a hundred for 15 or 20 or 30 sols, depending on how far they are made.

Theses wood pieces are thus called estelles, and have to be very clean and without any knots and are one finger thick.

Then the furbisher puts them on a small bench, called a scabbard bench and with a small iron tool similar to the joiners' bench, they maintain it firmly. Then with a plane, which is like a two-handled knife, they work the wood piece from the top, then use the joyner's plane to flatten it more. Afterwards, the inside is scoured with a

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094r_1

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094r_1

round plane, also two-handed, and then with a small narrow plane, it is gutted and scoured for half a foot towards the end of the heel. And a shorter scouring is better so that the sword does not always cut the scabbard.

The opening of the scabbard is called the mouth and on top of it is the shape of the knife.

The stitch which is a leather rim set on the edge of the knife shape is made to stop the sword frogs.

When the small planks are well flattened, the sword is laid down on them and with a black stone one marks the width and length of the blade. Then with a chisel the excess is cut. And a plane is used to even properly following the marks.

Then the two small planks are stuck edge to edge and all around only following the knife shape and not elsewhere. And this is to make the scabbard velvet leather hold.

Then the sword is put in the small planks and it is set in the scabbard which is sewed. And they rub what is glued directly on the knife shape with some tallow to run into the scabbard.

The scabbard is made of calf or sheep leather, the calf ones are in all one piece, but not the sheep ones. When swords are long, they are made of several patches sewn between leather and flesh and then they rub firmly the stitching with a boxwood piece to cover and even it. From a good calf skin, 8 or 9 or 10 scabbards can be made. A workman can easily make 6 a day. If they are too thick, they are lightly thinned out with a plane. If the skin is too hard, it is lightly dipped in some lukewarm water but not for long. Next, the same worker who worked wood piece has to adjust the scabbard in order for it to be well done. It is true that for common people, there are some good already all made, but they never fit perfectly. When the scabbard is made and sewed with black thread, it is rubbed with a boxwood piece or a slightly oiled cloth. The good cow leather scabbard is the best of all and costs also more than all except the velvet ones. Under the velvet one usually put plain canvas or a sheep skin scabbard or a parchment layer. But the best scabbard is a waxed scabbard covered with either velvet or calf skin. One covers the wood with thin canvas, which one then waxes, and covers in velvet or calf skin. A waxed scabbard is worth at least 30 cents, a cow leather one, 20 cents.

left-bottom

From a sheep skin, v or vi.

096v

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p096v_a1Grey hilts

When they are white, it is necessary only to clean them well, and then to heat them over a fire, and make them turn blue. And take good care that they do not turn too blue, since neither gold nor silver nor any color would set. To accomplish this, which is called *les faire passer*, have a caldron full of ashes that you cover with some blazing hot charcoal, and heat the ashes thus very well, for an hour or two. And when the ashes are very hot, put the charcoal aside and put the hilt where the charcoal was, and cover it completely with ashes. And when the body, which is the main part of the hilt, is completely colored, flip it onto the other side. In that way, the grey cannot color it too dark, unless some hot coal touches it. Greying can be achieved in an ordinary fireplace, too, but there is a danger that it may sit there too long and make a crust which will prevent the color from setting. Blue coloring is obtained as soon as the ashes have heated the hilts a little bit, but it will always be grey on some sides. After blue comes grey.

p096v_a2Color of water

For the color of water, pass a soft file on the hilts to whiten them, then the burnisher. Afterwards, you color them blue until they become grey. Next, when they are still slightly hot, pass bloodstone over them, and, as they cool, one turns them to reheat them, since the color of water is achieved only after doing this a few times. And if hilts weren't warm, the bloodstone would scrape them and undo the color. Pay attention that hilts don't become too grey, since they would give off soot that would prevent the color from setting. Almost one day is necessary to prepare, soften, and set the color of water, but as soon as they turn a little blue, it is enough for grey or other colors. Grey is the lesser color, after varnish made of two colors, either yellow or black.

p096v_a3Yellow varnish

One should vigorously whiten and clean the hilts well. After that, with a feather, one coats them entirely, when they are cold, with nut olive oil. Then, turn them over a good charcoal fire like that of the furbishers' furnace without letting them touch the charcoal or ashes. And when they stop smoking, it is done.

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p097r_1

Black varnish

This is explained at the beginning of the book where you can see that it is being made with some galipot.

p097r_2

Gilding

One prepares the hilts very well with a soft, indeed very soft file until there is no blackness left on the hilts, then heat them, and pass them as has already been said. But to gild and gild with silver, they must not be passed change their color too much, except maybe leaning towards a blue. Then while the hilts are hot, one ties them to a wood block and with some tweezers you apply the gold and fasten it with the sanguine and the sanguine is very neat and has been rubbed with putty. And when the hilts become cold, reheat them, then apply gold as said above. And you must start with giving the hilt two layers, until it is well-covered. And then reheat it as you did at beginning, and give it its third layer of gold. Then burnish it with a sanguine, very strongly and with good strength. But note that if you want to burnish well, your hilt must remain warm. And to know this, you bring it close to your nose and smell it. And because you cannot touch it with your fingers, take it out of the warm ashes with a small iron stick, which has been purposely made to fit into the eye of the hilt. And when you have finished burnishing it well, rub it well with a piece of white linen, and make sure your gold is thicker and stronger than the ones painters use. A quarter of a pound is worth fifty or lx s{ols}.

p097r_3

Gilding with silver

You must prepare the hilts and whiten them with a file, coarser than the one used for gold. And you want to pass them change their color to grey, as you have done for the gold. And since they are warm, you must double the leaves of silver and then divide them with a knife, and then apply them to the hilt with tweezers and a burnisher. And then heat them again, and apply the silver, until they are all gilded in silver. Then you must apply, for the third time, your doubled leaf as has been said, then burnish them very strongly and with good strength, not with the sanguine, but with a strong burnisher, just as you would not use a burnisher on gold.

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p097v_1

Mastic varnish dried a half hour

Some use 2 $\frac{1}{4}$ of mastic, half $\frac{1}{4}$ of turpentine and of turpentine oil, and spirits at your discretion since it evaporates when heated and nonetheless makes a more desiccative varnish. But I made it like this: I use turpentine oil, at my discretion, and add very little turpentine, since it remains humid and gets tacky if we add too much, together with some spirits and heat the oil in a varnished bowl and, as it become very hot I add some finely ground mastic and pass one-third of the oil through a sieve and let this heat up until it is melted, which will occur quickly on hot ashes. Once it is all melted, try it on your knife, and if you see that it has too much body add a bit of turpentine oil, and if it does not, add some mastic. And so it is finished, and keep it well covered so that no rubbish gets in. When you want to make this, take care to separate and choose the mastic that is white and pure of any dirt and dust and black dross. And when you wash it and dry it, make it very white and clean and make it even better, because if you don't purge it of these dregs and marks they will be pulverised into it, remain within the varnish, and when you wipe it onto some white or flesh-tinted surface, it will seem as if it were spotted and dirty. Having properly selected, pulverise it in a mortar and pass it through a very fine sieve, and afterward mix it in oil, as stated above. But if you want to make it more carefully, take a drop of mastic, as you know, pulverise, pass it, and mix, and you shall have something very singular for small projects. Be well advised when varnishing to not breathe on it for it will make the varnish white and thick.

left-top

It almost dries as you are working on it.

left

We know that this varnish does not have enough body when it doesn't take well to an oil painting, since it is like water. Add, therefore, powdered mastic and heat it until it is good. This varnish is very white and beautiful not at all like the aspic one.

left-middle

For some, instead of turpentine oil, use some spike lavender oil, which is not as good.

left-middle

This varnish is to be applied cold on the canvas with a very clean fingertip, and spread quickly.

left-middle

The Italians hardly varnish their paintings since they layer their paints very thick and these take a long time to be dry on the inside, even though they have a dry skin and crust on the surface.

left-middle

The varnish is applied with one's finger in order to thinly layer it, because it will yellow afterward.

p097v_2

To work nearby

It is a strange thing that the workers in this craft can only work if they have good breath, for if they have bad breath their work will crack when refired.

.098r

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p098r_a1Varnish for lutes

They take a little turpentine and some turpentine oil, or spike lavender [oil], and some amber pulverized and very finely sieved & proceed as with that of mastic, & they add some dragon's blood to color it and turn it red. And others some terra merita to turn it yellow.

p098r_a2Borders for a Garden

You have to work the ground, then then it with a rake, and afterwards if it is dry you must wet it. Then stretch a cord clean on the ground, and along its length hit the cord with the back of a pruning knife, so that the cord marks a right line. Along its length you will make holes with an iron stake, where you will plant rosemary, its head lopped off & cut to measure and thinned out at the foot.

p098r_a3Locksmith

To tin nails and other work, they file their work neatly, then in order to clean & degrease it well, it is boiled in vinegar. Then they dry it with linen, afterwards they heat it & pass some resin over it, which induces a shining skin like varnish. This done, they melt some pure & fine tin in their tinning tool, which is a square little iron box. And when the tin is well melted and moderately warm, they throw some resin in to consume the scum, & then they temper the head of a nail or something similar for a bit, and having been left in for seven or eight pauses, they take it out and shake it, hitting it with some iron to make the the superfluous tin fall off, & clean it with a small stick wrapped in tow. And if it is not well tinned, you will hit it until it is hot with a piece of resin and do as before before and leave it to get cold. When the work cools down it becomes yellow, which is a sign that the tin is the right temperature. But it becomes blue if the tin is too hot. Things so tinned are of a duration, & do not come undone at all, like the tinning done by leaves. But at the end of a year they can be clarified & renewed by heating & striking them.

Leadsmiths say that making a lizard die in the melted tin makes the tinning become very golden. Or else by adding sal ammoniac.

p098v

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p098v_a1Small dogs

Small barbet dogs are recognizable thanks to their muzzle which is larger than that of other dogs.

p098v_a2Salted artichokes

One should put them full and not too ripe in a small barrel full of brine. Then can be served all year long, with salads, oil and vinegar, raw, as prepared in this way they take long to cook. Make sure to try your brine with an egg: if it is good, the egg will float in it. If it does not float, it means [the brine] is not strong enough and would not conserve the fruits.

p098v_a3Trees

Those which carry fruits age early and do not last long.

p098v_a4Birds

Those who have been fed at the spit do not sing among or the company of other birds, they do only when they have their own cage. To teach them to sing well, they have to be taken from their nest as young as possible, and be covered with a duvet or rabbit skin. That way, having not seen their father and known their voice, they learn better to sing the way they are taught to.

p098v_a5Melting

The pot is made of burnt earth which has served for the melting. It is the earth bourn in the bolvene in which it has been melted. It should be ground against a large stone slab, and of this one should make the first coat of the mantle of the bell, where the letters and ornamentations are to be found. It does not require to be cooked again against any fire and will mold very neatly.

The earth used for the molding of the core is likely to swell if you do not strongly rub the molded piece with a brush or the finger and if it is not well oiled. And you need to do it one coat at a time rather than all at once.

099r

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p098v_a5

Earth or crushed wet sand with water needs to be reheated more than sand.

Latten from a candlestick is not pure since some filings and pot metal are mixed into it.

Latten needs to be cast warmer than copper, which I do not believe.

To cast scrupulously, you must not take all of the alloyed metals together, but take them in [their] pure [form] and mix them.

Iron should not [â\200!] to cast in copper or brass.

It is better to mold sand at once, either as a molding box or noyau, rather than several casts.

left-top

You must reheat a crucible on a charcoal fire which easily ignites for one or two hours with the material inside. Then breathe on it and cover the crucible with large pieces of charcoal and the opening of the stove with bricks, and let it consume two or three lumps of charcoal which shall fill the stove beneath the crucible. Eventually put the molding box on the fire and when the flame is very white and the material is as light as water and spitting some pale blue flames, [make the] cast. The secret to casting well is to do so at a very high temperature and speedily.

p099r_a2Thin white sand without bond is perfect for casting and it becomes thicker if you crush it very finely on porphyry or you calcinate it by making it red-hot several times, and if it becomes vinegar or thinner with water, as you know, it casts as well very precisely in a core, as I did the experiment. But don't soak it with salted water if you want to anneal it quickly for salt boils on fire and creates more dust while it is being pressed by the fire. I think that reheated cores gently would not react like this. I cast very neatly as a core some matter and [â\200!]. white sand smells sulphur when it is reheated, and I think that it would melt. And since the material has been cast into it, it takes in the mold a luster as if it were leaded or vitrified. I think that glassmakers could use it.

left-middle

A very little sal ammoniac must be dissolved in water.

p099r_a3

Bell handles

They can be repaired well without remaking the bell, which you must put back into the pit and the mold inside. But it is thought impossible to give back to it its original tone when soldering a cracked bell.

p099v

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p099v_a1Quince trees

They have to be pruned often; otherwise they die and do not produce good fruit.

p099v_a2Cannons

They are very difficult to drill when they are made of metal since the material is rough and brittle. But you must not push the drill too strongly or push all at once, but remove it often. In that case, the cannon mouth is bigger than the bullet in order to avoid drilling, since the material can be easily cast and slides. The drill should not be like a dovetail, or a point, but should be cut in round like a crankshaft. If it breaks, don't leave it to rust X

left-topX but instantly take it off from the light. What you will do is pour a little oil on it and then turn it down opposite to the light, strike the opposite side, and it will fall out. You have to drill gently when a piece is made of metal.

p099v_a3Bells

They are not made in a pit if they do not fit

p099v_a4To gilt frames paintings without gold

Some use some leaved orpiment and then powder it and make the leaves look Moorish, burnish them, and the orpiment shines like gold. However, ground metals or ground crystalline or touchstone are the best.

p099v_a5Orange Orpiment

Mix it with arsenic and grind it. Some prefer to melt it and then add a little arsenic.

p099v_a6Varnish

Some make the mastic varnish with two ounces of mastic and one of clear, white turpentine oil and some spirits as aforesaid; heat that on ashes until it melts and then leave it still and put it in another vessel to remove dust.

100r

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p100r_1

Gold color

To very quickly make a layer of or surmat on canvas or on other oil panel, one [exposes] walnut oil under the sun or on the fire to make it fatty, as previously mentioned, for it thickens by itself in this way, despite having neither lead, nor ceruse. And with it, crush massicot, mine, & other desiccants, but not vert-de-gris nor orpiment, for they make the gold die. It will quickly be dry. However, if the weather is not serene and dry, do not shade it, for if the weather is dewy & humid, it will turn black.

p100r_2

Portrait-painting from nature

One must carefully observe the eyes, the nose, and the beard, since these three things contribute much to the resemblance.

p100r_3

Gemstones

Your materials need to be pounded in a thick glass mortar coated with mastic & encased into another wooden mortar, so that it does not break; this can be useful to perfumers. & use a glass pestle too.

p100r_6

left-middle

Glass mortar and table for crushing.

p100r_4

Vitrified saltpeter

Melted with pebbles, it makes the glass very white. But rather, it needs to be calcined on a hot tile or paddle. And mix the liquid remains of the vapor with as much white, calcined pebbles. It is true that, in the little oven, it does not make it very clear. But for big windows, it makes the glass very clear, & white & clean.

p100r_5

Windows through which the sun will not pass

Take the aforementioned calcined saltpeter & expose it to a humid air or place, and it will convert itself into a liquid which, if rubbed on both sides of the windows, the sun will not pass through; rather, it will cast shade. One needs to put the saltpeter on any clean place, & put glowing coals on it, and continue all over until it no longer burns.

left-bottom

It also serves for melting & for adding in with alkali salt for cleaning hands.

100v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f206.image>

p100v_1

Gemstones

Take white pebbles that are found along rivers, along gravel banks, & paths and that are somewhat transparent. If they are perfectly transparent, it will be better. If not, use the best & whitest ones that you can find. Calcine them three or 4 times in your four Ã vent & quench them in water or vinegar. Afterward, take a â\204¥ of them and pound them in a completely pure copper mortar, with a pestle of pure copper, and grind them until they become very fine and soft powder; this is a sign that they have taken enough of the substance of copper to give them greenness. Then in your â\204¥ of pebbles, add in three â\204¥ of good minium, unadulterated by brick or something else, and strongly pound everything together again in a bronze mortar. And in all of this, add in a gros of sel de verre, & some and the common people put in sand ever that they find it among the glassmakers or apothecaries. But alkali salt, as you know, is better.

left-middleEmerald

In this way, the vulgaire makes emeralds & casts them in sand. If you do not have a bronze mortar, crush in a cauldron of pure copper.

left-top

The crucibles need to be reheated before putting materials in, and need to be put in the forge or four Ã vent instead of making & increasing the fire.

fig_p100v_1

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left-middle

They are done in an hour & a half.

left-middle

A gros of salt in four â\204¥ of pebbles & minium. When one says: for â\204¥, what is to be understood is: an â\204¥ of body & not of salts & minium.

p100v_2

For ruby take goldin leaves

Raise your stove by two tiles all around because more heat is needed to make rubies than emeralds. And take an $\frac{1}{2}$ of white, calcined pebbles, and put it in a glass mortar &, having roughly pounded it with the same kind of pestle, mix in the weight of a grain of gold leaves of the kind used by painters for gilding, & crush.

left-bottom

Some say that mixing the gold with pebbles and saltpeter gives the color of a peach tree.

left-bottom

Others say that the gold has to be cemented several times and then beat into leaves.

101r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f207.image>

p100v_2

again quite hard, and then add to it three $\frac{1}{4}$ of minium, & pound again together & put it in the crucible, which you will cover with an appropriate tile, not too thick, so that heat reverberates better. Then put it on the grill of your furnace, having put a few thick, rounded tiles under it. Next, fill your charcoal furnace to the mouth with charcoal, heaped to the top, and let it light, and always maintain the heat even, without letting the charcoal go down. And to this effect, always ensure that the furnace is heaped to the top & full of charcoal and maintain it like this for one day. The first experiment I made, only a yellow mass emerged, like minium alone when vitrified, & with gold grains, in a mass at the bottom. Try cemented gold together with antimony.

top-left

If you need more heat, put tiles on the edge of the mouth of the glowing furnace, lean them one against the other to make the heat reverberate.

fig_p101r_1

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left-middle

p101r_1

Topaz

The same dose can be observed for all gemstones, which is one part the weight of calcined pebbles with three parts the weight of minium, pounding all separately in a copper mortar for emeralds, & in an iron mortar to make topazes or amber color, with pestles similar to the mortars. Emerald & topaz are of the same heat, an hour & a half, otherwise they could burn. Ruby wants more time & more fire, & colored with gold leaf. I believe that pumice stone or fire-stone for the ruby would be better. See enamels. Also try to mix pieces of colored glass or enamels instead of pebbles. If the mass is not colored enough, pound it further in the iron mortar.

left-middle

Slightly burnt tartar mixed in makes beautiful yellow, but not much is needed. Arene also makes it more yellow.

p101r_2

Salt for melting

Mix saltpeter & common salt and melt them together & throw them onto copper, molten or in a bain, & it will purify it & makes it run marvellously. First, ordinary salt needs to be decrepitated, which is to say holding it over good heat until it crackles no more; or to melt it better, in an four Å vent. Throw it neatly onto a marble slab, then pestle it & crush it very finely, then put it in a crucible as much saltpeter. Let it boil & mix them together until

left-bottom

It cleans & purifies metal well.

x101v

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p101r_2

the crucible is red. Next, throw it on a marble, and you will have a white, hard & uniform matter, like alabaster, from which you will be able to cast medals which will look like marble; but guard them from humidity.

p101v_1

Jacinth

It is made, like rubies, with gold; but you do not need such a great fire. Rubies want fire for a whole day, and if there is not enough fire, it will only have red veins.

left-top

Always heat up your crucibles.

left-top

One holds that rubified antimony makes jacinth.

p101v_2

Topaz

I melted one part of calcinated & pulverized pumice stone with three parts of minium, the stone having been pulverized in a steel mortar. A very beautiful yellow came to me, without any grain more yellow than the others. It is true that it was strongly charged with colour. I believe it would be better to pulverize the pumice in a glass mortar, because it & the minium make enough yellow by themselves. A mass came to me, the top of which was the beautiful yellow, as mentioned, and the bottom was like a fire-stone without transparency. With which, in mixing other

p101v_3

Varnish

The Germans thoroughly boil the minium in linseed oil, & to give it the body of varnish

, they mix in thoroughly pulverized yellow amber.

p101v_4

Ammoniacum

One puts it by small lumps into a bit of good vinegar, & heats it, then passes it through a cloth strainer. All medicinal gums dissolve in vinegar.

102r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f209.image>

p102r_1

Provisions for the work of Colchos

7 limbecks of glasse

2 lbs. of â\230;

One measure of coarse salt

6 unleaded earthenware vessel

2 large unleaded pots for calcinating

2 alembics to distill vinegar

4 pots of good vinegar

3 or 4 lamps

2 lbs. of cotton

One pair of scissors

p102r_2

For the furnace

A chest with a ten inch wide square stone, and of a one-foot thickness, pierced in the middle

2 boxes or two earthenware pots with a lid

2 small pipes of white iron to evacuate the smoke of the furnace

Turnipseed oil for the lamps to heat the furnace

A fire-steel

p102r_3

Royal cement

One pound and a half of vitriol

As much saltpeter

As much rock alum

p102r_4

Glass vessel

The glass vessel must be either pear-shaped or round pyramid-shaped, of the same thickness as the small back of a knife, round on the bottom without folding over on itself, like flasks, its opening of such a size that a Dutch feather can just about get in, with a lip at the end, in this way of the height of seven fingers' width.

fig_p102r_1

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bottom

102v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f210.image>

p102v_1

Painting on crystal or glass

They paint without any traces of oil, except for faces where they outline the nose and the mouth in very fine black work. Then they make strokes and highlight them in white, and then they apply a coat of flesh-tinted color. As for the background, they do it in natural azure from Acre to make it more beautiful, or lacquer for a quickly-done red, or for a finer red, dragon's blood. But it is necessary to apply it little by little so that it is smooth and of one color, and in the same way for other colors. Then they apply underneath it, a leaf of topaz, gold or silver.

p102v_2

Infusion of anthos or rosemary

It is better to cook the flower in August and more suited to oil-making. Take as much as you want. Then put it into a bottle very well corked, and leave them to wilt in the shade for a day. Then add the first substance of wine and leave to settle three or four days; and express it all in another vessel and into this very same substance of wine, add seven or eight infusions made out of new flowers. Then leave the latest infusion in the sun for a month. Then distill it through a still. Then mix two ounces of this water with two or three spoons of white wine; but this is for the elderly. Paul the Third used it.

p102v_2

Casting

Tin casts better when it is thin and delicate, than when it is thick, because when it is thick it contracts in high heat. So if you want to mold a thick piece in tin, mold it only on one side, and if it is possible, make it hollow on the other side. In this way your piece will be neater. And then you can solder two half pieces together. But if you have no choice but to mold it thick, make the shape of it and mold force abreuvouers around the figure in this way.

fig_p102v_1

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103r

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p103r_1

Excellent burn relief

Heat linseed oil on a light fire, without letting it boil and simmer. But when it is hot put a quarter part (of the quantity of the linseed oil) of the newest wax you can find. Once it has melted, let it cool and when it begins to curdle, stir it continuously with a new wooden spatula for the length of time it takes to say 9 pater nosters, and while you say them, wash this composition with holy water, always stirring. Having said the first of 9 pater nosters, pour the first water out and add more, then wash and stir the composition for the time it takes to say 8 pater nosters. In the interval it takes to say 3 of the 7 pater nosters, and continuing thusly, add more water, as above, until there is only one last new pater noster left. Then you will have a soft white ointment, with which you will apply to the burn for 9 days. But don't apply any more, you must let the flesh grow over. Dress it twice a day and each time you wash your face with water, and mix it together a bit tepidly, without rubbing. But press it with wet linen, and wipe it similarly with fine linen, and apply the ointment. On which you can put binder's string. This will regrow your hair and prevent a scar from forming. A powder maker who was completely burnt but had no sign of burns taught it to me.

p103r_2

Against dog's gall.

The English, who fawn over their dogs owing to the care they take of their livestock, have healers for them the dogs who hold this particular office, and who melt pitch in water and, leaving it wet, rub the dogs with this water or with water sublimate.

103v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f212.image>

p103v_1

Enema

In order for the pipe to not hurt children at all, or those with swollen or protruding hemorrhoidal veins, one covers the pipe with a parcel of chicken entrail and fold it over the end, and in this way, one gives the enema.

p103v_2

Casting

Tin recoils if thick, therefore it is better to cast it thin and from one piece, to make two and then solder them together, if necessary. One makes use of a strong piece of taffeta to sieve the fine sand with which one first covers the medal, which is of the thickness of a teston.

p103v_3

To make colors fluid

Mix some vinegar with a bit of bile, put it into a glass bottle, and if you want to preserve it for a long time, add some salt and mix some of this with your colors which will make them flow.

p103v_4

Earwax

If you take enough with the tip of an ear picker and you sieve it with foam of urine, which often forms in the urine of those who have a headache, all the foam will dissipate.

p103v_5

Enamels

To well recognize their difference and their true color by candlelight, it is necessary to put the candle behind a crystal mirror, or a glass globe or jar full of water, because this light is like sunlight.

104r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f213.image>

p104r_a1Corroding and dissolving absolutely pure gold

Put it regular salt with aqua fortis into a violl. Let it rest for two hours, without heating it. Put [in this mixture] tenuous gold, and draw it out as if it had been separated from silver.

p104r_a2Engraving on iron

One $\frac{1}{2}$ of verdigris and 2 $\frac{1}{2}$ of coarse salt and a bit of sublimate, or crush some ochre with linseed oil, and use it to cover the blade or the very neat and polished iron. And let it dry on the fire or in the sun. Then, to engrave and make it beautiful, take a small coin's worth of verdigris twice that quantity of coarse salt and about four grains of ammoniac, and six grains of sublimate, and the water must not be hot.

p104r_a3Good mixture to color gold

Sulphur and small gravel as much of one as of the other, and the third part of this quantity of salt, and as much turmeric as sulphur.

p104r_a4How to silver plate copper and latten

Mold the silver as the gold, and put it in the oven in order to get a good gilt pot. And do not let it heat, otherwise the silver would tarnish. Once it will be well spread, make it boil in walnut oil, and then heat it a bit, and put it [into the water the silversmiths use to bleach their works].

p104r_a5Enameling a carnelian

Soak some wheat flour in white wine, and slop and cover the whole carnelian. Then cook the violet again, then soak it into white wine for one or two hours, then rub it and leave the part you want to keep on it, then lay on some more on top again.

104v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f214.image>

p104v_a1Against dogs' mange

For normal-sized dogs, take half an â\204¥ of stavesacre, and one â\204¥ for big dogs, as fine powder beaten with two egg whites and one quarteron of oil. They must drink the beverage on an empty stomach, after keeping them locked without any food. Approved.

p104v_a2For casting

If you've got a big piece which does not allow an easy stripping of casting, mold it with some wax, either on the hollow side or in relief, because it is soft and hollow and so can easily be separated from the piece without leaving anything. But be sure that the melted wax is neither too hot nor too cold. Some people use for molding some wax warmed in boiled water, but while pressing the mold it bends and becomes unusable. Once you have made your wax cavity, you can cast in some very soft and clear clay, and let it dry. Then, upon it you will make a lead or tin cavity, in which what you will make will easily be stripped.

p104v_a3Goldsmith

Know what it is to work on spangled garments, it is small pieces of pure silver and of silver-gilt with which one makes the archers' coats.

p104v_a4Spinnet playing by itself

fig_p104v_1

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left-bottom

Make an axle surrounded with wheels pierced all around in their thickness and attach feathers as for a cittern or a spinet and arrange them according to the song you want it to play, leaving a suitable distance. And, turning the axle either by yourself or by a clock spring, your invention will effect itself.

105r

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p105r_1

Turtles

Males have shells that turn down at the end near their tails, and their underbelly shells have lined marks along the bottom from their tails to their head. And the females have neither the turned down shell near the tail nor the marks.

p105r_2

Drying colors

Soot black and others will not dry in oil unless you add verdigris.

p105r_3

Painting

Colors that have been applied twice are more gritty by themselves, unless they have a binding agent. Otherwise, paint on wood; otherwise, on canvas; otherwise on walls.

p105r_4

Gardening

To graft, it is necessary to take the new growth that was produced within the year by the tree you wish to graft. And cut off a branch in which you can see that beside the place where the leaves join the stem, there are little buttons we call buds, the initial stages of a sprout. With dexterity you must, with a very sharp pen-knife, cut in the shape of a graft a small bit of the skin of the tree, which contains a bud or a sprout with the leaf, as you can see in B. Then on the tender wood, which is full of sap, and on which you wish to graft, cut quickly two lines as you can see, then add in the middle a slit thusly

fig_p105r_2

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. Then with the point of your pen-knife separate the bark from the tree, and open it from the slit in the middle, and having neatly lodged your graft so that nothing is sticking out, only the sprout, binding everything well and wrap the whole thing with a bit of linen or soft string. In this way, there will be nothing uncovered but the leaf, which in three or 4 days will indicate whether the graft has taken hold, by being green. Keep your graft in this way for seven or eight days. Then unwrap it, and join it to the bark, keeping the sprout itself straight, and then rewrap the whole thing gently, but not as strongly as before.

And if there is any growth, leave it some room to grow and then three or four times

fig_p105r_1

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left-bottom

p105v

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p105r_4

Then, when the graft has taken hold, cut the top of the tree, which is above your tree, three or four fingers above the graft for the first time. Then, closer so that it serves. But be advised that when you do your initial grafting there should be no small hole at the back of your sprout, because this means that root is broken and your graft will never take. Therefore make sure the back is in tact. This type of grafting can be done from mid-May onwards, because the trees have budded and made new growth, until the beginning of August when the trees are full of sap. Almond trees which are naturally drier lose their sap earlier.

Those who want to graft onto them the almond trees mericotons, apricots and nut-tree grafts, which are the best, should do so usually in January. Nut trees, such as perches mericotons should be grafted en fente. It is said that trees grafted by the shield-graft method take longer to bear fruit.

p105v_1

Gardening

It's not very strange to cultivate in your garden some arnols, because when your soup or broth goes cold, you get worms.

p105v_2

fountain

Recooked plaster runs when mixed with water, which you will see in the next recipe about wet molds. When put on the joints of the fountain conduits, it resists as much as any stucco.

p105v_3

Catching nightingales

See the 15th folio

after this.

In order to catch them, you must observe them in real life, the food that they favor and their mating season. The nightingale, as long as he is singing, marks his own territory. Therefore approach him by pretending to look for something on the ground. Take some worms from old flour or from beneath what you are kneading or from mills, which nightingales love, and put some on your hat, fastened with a pin or in any other way, so that it can wiggle. And five or six steps away from the hedge where it is singing, dig a hole, and place some worms in it, as well as your device made out of little criss-crossed sticks. As soon as you leave it will be anxious to go and see what you have done. And seeing worms it will enter.

left-bottom Some people sell nightingales on trees.

left-bottom It is easier to catch nightingales in the cool of the morning or evening, near fountains or shaded areas.

p105v_4

Nightingale

The iron wire used for its cage must be the thickest possible, so that should it try to leave, it will not hurt itself. At the beginning of its captivity cover its cage in fabric. The first day you will have to forcibly feed it, moving it from its cage in your hand and opening its beak and with a small wooden needle, place its food in its throat and make it swallow. And continue to do so until it is no longer willful. You must do this to keep it alive, because should it become thin or lose weight it will die.

p105v_5

Nightingale

It will need a cage made in the shape of a barn, like the ones for larks, lined with green fabric, because it feels the cold. And to get it to eat when it is first put in the cage, you must give it ants mixed with earth in the bottom of the cage to get it used to pecking, and you can give it minced sheep's heart, and sometimes eggs, and sometimes mealworm.

106r

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p106r_a1To cast

Asphalt from Germany is the most excellent sand you can find for molding in a box frame, because it is fitting for silver & for gold. And the more you use it and the older it is, the better it is. With it, one molds very slender & subtle things.

p106r_a2Making gold run for casting

Because gold cools down very quickly, you have to give it a mixture when it is well melted that will keep the heat. Sublimate softens it nicely. But, since it vanishes into smoke, it won't aid you for very long. Therefore mix this mixture into it when you want to cast it: of sal ammoniac, the best verdigris that you can find, a bit of borax and some saltpeter. And this, held over the heat, will become neat. The saltpeter makes it clear and heats it. But the key thing in this mixture is the verdigris, which has to be good. This mixture softens your gold so much that it becomes as tractable as lead, even if it is good gold.

For sand for molding flowers and leaves & other delicate things, mix in raw plaster, crushed brick and stone alum.

To moisten sand, spirits are excellent because it makes sand fine and leaves in a vapor when you reheat your box frame.

Dilute sal ammoniac is very good, is excellent for moistening sand, but for lots of water you only need a little bit of sal ammoniac.

A raw lump of metal, if you don't have crocum ferri, is good for gold.

The snakes and the lizards you wish to mold should not be kept for a long time, because if they are alive, they will waste away, and if they are dead, they will decay.

Plaster of Paris is as hard as stone and very good. When you want to choose some for your sand, take the rawest and the hardest that is possible for you & that does not make any powder. Transparent [plaster] and that which makes powder in giving way is that which is not good for this work. A sign of that which is near perfect is that it is hard & makes shining grains that look almost like sugar. Finally, to mix it into the sand to cast gold, it has to be put in the fire twice, & reheated twice.

left-top+ When gold is really pure, it is so dry that it can just barely endure a hammer. But this mixture softens it like lead.

106v

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p106v_a1Casting in gold

To cast in gold, crocum ferri is necessary, and more stone alum than in the following mixture. The stone alum mixture cannot spoil anything. The mold must be red & close it immediately with iron presses.

Shells of crabs & [shells of] crayfish are troublesome to burn & have their own proper way of being molded.

When molding rats and birds, the feet, being burned, are difficult to recover, because they are small and slender. The body is recovered more easily from the mold. The feet are cast in many pieces.

p106v_a2Tiles

right-middlethose of houses that are outdoors, ones [that are] a bit sandy seem to hold better in fire

Tiles with which one covers houses, the hardest and surest and recleaned of stones & large gravel, are taken to mix in with the sand for molding. But, rather, it is necessary to reheat them just until they have been quite red for one or two hours, and crush them and pass them finely through a sieve.

Little turtles just out of the egg are really delightful to mold.

Plaster]-->

middleIf the plaster is mixed with some dust or is not the hard kind, [...] in the fire and make [...]

The hardest plaster, as was said, is the best, being taken thusly totally raw from stones of this kind. Crush it as finely as possible and pass it through the most fine sieve or sieve that you can. Having been made fine in this way, put a good amount in a cauldron or frying pan over an open flame. & as it starts to heat up, stir it continuously. And heavy and lumpy though it is, it will become so light and so tractable that it will appear to you not to have any resistance to the said stirring, as though it were of water. Continue to keep stirring it continuously until it returns once again to being heavy and thick. And now this is the sign that it is cooked, but do not reheat it at all such that your stone alum brick be reheated & that clay circles form. Because this must be the last reheating, and when everything else is ready, because the less that the plaster remains reheated & the more suddenly it is put into the work, the better, because it takes rather better. It is not permitted to reheat it except when you want to mold. And to reheat it, put it, in fine, totally raw powder, in a cauldron on a clear flame & do not give it too much [heat] in one go nor too fierce. Stir continuously with a long stick, turning around the cauldron to avoid the vapor. And in the middle, in the form of a figure 8 at the beginning, you will find it heavy [and] clayey because it is full of moisture, [and] when it heats up, it will start to throw off [the moisture] in some bubbles on the edges of the cauldron. And finally it will become liquid & mealy and like bran and start boiling in the middle. Continue to stir continuously until you recognize that it has once again become heavy Ê\230Ê\230

Stone alum is that which binds well to sand.

Crocum ferri is fit for gold. It is this which, mixed into sand, breaks it up again & keeps it hot.

left-topPlaster

When you have it in stone form, choose the hardest pieces and those which do not easily break into small pieces with your nail, and clean it well of powder & filth rather than crushing them with it.

left-middlePlaster alone does not sustain [...] but breaks up into lumps.

Keep reheated plaster, as is said here, one or two months well compacted in a dry place, if it's not the rainy season but rather fresh out it is more excellent for exquisite work.

left-middleIt must maintain its fire and turn red like lit charcoal.

107r

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fig_p107r_1

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as heavy as before, and it should be like a paste not very thick, it must not be as easy to stir as a liquid. This state shows you that it is cooked enough. It must boil in the middle, and all around you must have a thick mixture. If you reheat it too much your mixture would be short of body, because if it becomes red the mixture will lose its strength and it will spoil the sand. Let it cool before mixing it to any other sand. [â\200;]

p107r_alCatching lizards and snakes

Take a stick, pin a net with a slipknot to the top. Whistle, and move the net nearer to the head of the lizard, and pull when it put it's head inside the net. It is more difficult to take a lizard with your hands than a snake, because lizards bite without letting go, and bite as strong as pincers.

You can take snakes with your hand, but cover your handle with a woollen cloth, because the teeth of the snake could go through a common cloth. You can recognize dangerous snakes by their blue eyes. They do not bite into water, as it is known by crayfish catchers.

The sand mixture is made of two thirds of ground plaster, reheated as it is said before, and of one part of reddened tiles which are finely ground afterwards. Use also stone alum, half of the quantity of the tiles. Use two full pots of plaster, one pot of tile and half a pot of stone alum. Do not use too much stone alum because that binds the sand, and allow sand to withstand fire without cracking or breaking. Without it [stone alum] sand would not withstand fire, you can use it for all kind of metal, but for gold add a bigger quantity of stone alum, add also crocum ferri, because they [these filings] attract gold.

All the sands you will cast, must withstand fire very well, it must withstand high temperature without spoiling anything.

It is difficult to grind stone alum, and it cannot be sieved, you must grind it on a marble slab. The white [stone alum] powder the apothecaries sell is good, it is easy to crush it into a mortar, use the pestle slowly, that way you will make it [the stone alum] very fine.

Crocum ferri must be heated into a glassworker's furnace during four days.

107v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f220.image>

Molds for fine things, like wormwood or something similar, can only be used once, dip the molds into water before breaking them. Things twice reheated are dissolve easily into water.

If you don't do that your work will be hard to be stripped of the mold without being spoiled.

Good stone alum is white and as shiny as white silk, this stone alum is made of long pieces, as long as a finger, and is very fragile and woolly and fluffy. Stone alum made of stone is harder and not so good. The best quality can be found in France near Ronan. For our sand, stone alum must be crushed into a mortar, and must be ground on the marble again. Don't even think about sieving it because this matter is fat and woolly, it wouldn't pass through any sieve because of the very fine and soft filaments. These filaments give the sand a much greater binding effect than natural wool or even the filler the foundry owner uses for big works, because natural wool and filler burn and stone feather alum resists fire.

When you cast surround the sand of your mold with very beaten greasy earth. Make a circle around your mold with this earth.

Archanum omnibus fere reconditum est in re fusoria,

v{idelicet} res exprimenda formis, sive herba sit sive animal

ut lucerta, inmergatur primum in vini spiritum

apprime rectificatum, deinde pulvere composito aspergatur

sive illinatur (si pulvis in formam pultis redactus sit, ut

assolet)

When you want to mold something hollow, the core must be made of the same matter, if the snake or the animal is curved or folded you must do your core in several pieces.

Try [to see] if distilled vinegar is good for eating away, it will dissolve the animal inside the hollow mold.

left-topIf you know that your plaster cannot endure fire without breaking, do not take the recipe of the mixture literally, sometimes you can add less stone alum than above. Because stone alum soften molds. Once reheated do not grind the stone alum again, leave it ground as the apothecaries did. It will not prevent the cast from being neat, and will give more binder to your cast. When the mold holds the color of the brick and is reddened then it will be harder.

108r

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To hold the cores, some [people] use wire made of the same metal as that to be cast because it boils down and is made similarly, but when it is melted or pliant the core varies. Other [people] find it serves them better to use sharpened iron wire about the borders because it holds more firmly, and having fine points it does not rise up any more than the point of a needle and one can apply gold or silver on this rather than putting it in works [where] one makes a hole in the work with a small chisel.

Spirits prevent the sand from bubbling and do not make little holes on the borders of the mold if the thing to be molded is very damp, the holes and farts and bubbling does not make it in the place of the mold which is thick but at the borders which are more delicate.

One casts ordinary silver of the sort goldsmiths coarsely work, which is made with mediocre alloys. And when one casts with solder, it runs even better.

Spalt is a whitish stone which can be found in Germany, mainly in Augsburg from which can be made the most excellent sand that can be found for [casting] lead, tin, copper, silver and gold. And the more it is used, the better it is. It is clean for casting flat things in a frame. For rounded things, it is not as attractive [because it] does not hold in the fire as the aforementioned [things] composed of plaster.

The snippings of [a] large [piece of] greasy leather are good to cast in melted copper and brass because they clean it and take away from it all its filth.

p108r_alSpalt

Spalt is white like cooked plaster and one can find it in mounds and stones made in long straits and long veins. It is very soft such that with a fingernail and it makes a powder like that of our chalk from Champagne. And because everything which is provided from the earth is mixed with some other substance, to purify it [the spalt], one boils it with somewhat large gemstones then tempers it with essence of sal ammoniac. One puts [a lump of it] the size of a walnut in a large bottle of water and

108v

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that way one tempers it & reducing it into small balls, [one] purges it of impurities [by] then putting it on to cook cleanly in a vessel of earth[enware] in a furnace like those in which pots [are made] and one leaves it there to the point at which pots would be fired. After one tempers it more with essence of sal ammoniac & boiling it very strongly and emptying the murky water & putting it in a separate vessel straight after put back the same water over it & one boils & one puts back the murky water again with the other. And one does this therefore until that which is there has passed away. In this way one purges and purifies and makes it a very fine and malleable [matter]. After one has taken away the water by tilting [it] or with a sponge, one takes the residue and dries it. Then moistening it with the aforementioned water the way one did with the other sand, one uses it in a frame or if it shrinks [this] is a sign that it is not fired enough & needs to be fired more. This one is proper for molding all metal and especially gold and silver and the more it is used the better it is. One should put alum which you have cast of lead or tin separately because it makes gold sour if you cast it there.

[p108v_a1Stone alum]

Stone alum must be reheated in a pot covered with a tile over a good charcoal fire so that the impurities which might be in it [are] burned with that which does not burn. This is done either in the goldsmith forge surrounded by bricks or in a little oven vented to the furnace fire such that the pot stays red for a quarter of an hour. This is more to purify it than for anything else. It becomes reddish on top and the inside remains white and dries best this way.#

left-middle# Once your stone alum is cooled down, crush it in a mortar, then grind it more finely on marble. And this makes it into very fine wooly dust that gives binding to sand without burning like all other things. [This is] a beautiful invention. Crush it on the mortar to being careful to keep the grindings together because the dust flying can get down your collar or on your face which can have very grave consequences. Put a little each time in the mortar to avoid the dust flying. It is best to grind therefore with the pestle trained on the mortar rather than on the marble where it spreads and on the mortar it gathers [the dust] from all sides and renders it very fine and sweet to the touch.

[p108v_a2Clay]

Clay used to surround molds, should be very fat and malleable, and should not be used for anything else except to make the contour of the molds. Therefore one should only choose that which is very fat and beat it very well and soak it moderately with water and have it in a pit or earthenware pot and make good holes with a stick with which one replenishes it with water to keep it always fresh and soft and ready to use when needed.

109r

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p109r_1

Working in rough with wax

When the wax is too hard, one mixes in some turpentine or a bit of butter, which renders the wax malleable, and cleaner than tallow, which the Italians mix in, because oftentimes, it is necessary to put the tools into the mouth, tools which are better when made from box wood or antler.

p109r_2

Wax for molding

Since the wax is molten, they have some sulphur in a spoon or crucible and pour it in the molten wax. And with the sulphur going to the bottom or staying on top, it stays where it is and mixes only its substance in the wax, and renders it more meltable when warming it, in such a way that having molded it, the wax gently melts in the mold like butter, without leaving any blister or boil. Also be warned to not give it too much heat.

left-topIf

p109r_3

Molding wax

So that your mold takes hold without repelling any surface on a form or figure in wax, it is necessary to rub the wax with oil and soak your sand in lukewarm water, because cold water repels oil even more and will not make a good layer on the wax.

left-middleRub the oil on very very lightly, use so little that it hardly appears at all. Then rub with some spirits. After soak your sand in lukewarm water so that it does not repel the oil.

p109r_4

Forge bellows

It is better that at the end with the air chamber the bellows be set in some kind of bit of cloven board because they are more secure this way. Afterwards you can lightly secure them from the top. It is necessary that the nozzles be four fingers above the bottom of the forge.

p109r_5

Molding snakes

When you get them for molding, if it is possible, do not remove their teeth if you [think you might] want to keep them, because having had their teeth removed, it hurts their gums and

d mouths, and they can no longer eat. You can keep [the snakes] in a barrel full of bran or even better of earth, in a cool place, or in a glass bottle. And give them some live frog or other live animal because they do not eat anything that is dead. Also I have noticed that

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p109r_5

when they want to bite or to eat something, they [snakes] do not go at it head on, but side ways and by sinuous coiling, as do Satan and his henchmen. The snake has a small head, but a very large body; the entryway to sin seems small and inconsequential, but the consequences are great indeed. A snake can abstain from eating for seven or eight days, once he has swallowed a frog, and can swallow three or four frogs, one after the other, and what it has devoured does not rot and is not digested all at once in its stomach, but each part little by little, i.e. the bones and everything. The rest is just as fresh as when the snake ate it, such that when one bothers and torments it, it spits out what it swallowed up, which, in part, is totally digested, with the other part as fresh as if the frog were alive. It can hold a swallowed frog down for two or three hours and spit it out alive.

p109v_1Toad

If by chance you want to mold this ugly animal and if it should piss in your hand, it will sting your hand and cause it to itch, as if you had been holding nettles. But the very best remedy for this is to put your hand into fresh dirt, and to cover it as if you wanted to bury it. Frogs are not so beautiful when molded because they have shiny skin, and toads have lumpy skin.

left-middleYou can mold the toad hollow, and leaving a notch open on the underbelly, you will make it jump with the twisted cord of the saw. If it is a small, put it on a magnet cut small to the size of the toad, then put it in good vinegar.

right-middleIf it is big, mold hollow, and if you want to mold it with its mouth open, put some cotton therein, and then put some melted wax on the cotton.

p109v_2Killing snakes for molding

Some put a drop of aqua fortis into their mouths, which stupefies them, so that the head and the body look dead. But the head is still alive, and when you stick it with a needle in order to fix it to your mold, it moves and spoils and undoes everything. Therefore, to kill your snake, put it into a bottle filled with good vinegar and some spirits. Do the same with lizards and other similar animals.

left-bottomIf you want to keep them, you can put them in a pipe full of dirt in a garden outdoors, but it is necessary that the pipe be covered with latten wire, because otherwise, the snakes will crawl and climb up quite high.

p110r

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p110r_1Casting

You could cast from already casted things and animals, but it never works as well as from the natural [original] ones, with which you can make four or five molds.

p110r_2Rock and cavern

You need to grind white and yellow marcasites & various kinds of mines. Wash them thoroughly, so the soiled and chalky end will be clean, in order that only the lustrous grain of the mine will be left, from which you will powder your rock previously covered with colle forte, if your cavern is not used as a fountain and touches water. You will thus obtain a nice work.

p110r_3Snakes

When they feel trapped, they seldom bite, and cannot really hurt unless they are really big snakes. The most important thing is to avoid being bitten before capturing them. Having put your foot as close as possible from the neck, you hold it as close to the head as possible. That way, it will not bite if it cannot stretch its neck and do a sinuous turn, it will not be able to hurt from a frontal attack, nor will it be able to twist into an S. I have found out that the person who taught me how to mold them was little afraid of snakes. He would catch one and pull it quickly, grabbed it by the neck and, putting it under his shoe, flattened it so it would eject from the behind, which is five or six fingers from the tail, everything that is bad and venomous in the belly. After that, the snake has no strength to bite and, if by chance it still bites and ejects from its behind some garbage, he [the man] would dig in the soil with a knife and bury his hand in the fresh and humid soil which, applied to the infected part of the hand, would suck all the venom, without doing anything else. It was the same with toad venom, as I have seen experimented.

left-middleIn three [days] it is as thin as if he had not eaten. Cast it right after catching it is the best, before it loses weight. You should kill it only a quarter of an hour before you want to cast it.

110v

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p110r_3

When a snake has eaten something; when twisting it, it will vomit the food. And if, after having eaten something, the snake is pressed underfoot, this troubles the snake a lot and makes it sick. If the snake is wounded, it will not eat voluntarily.

p110v_1Mussels

There is nothing better for opening them up than to oil them with olive oil, and nothing else. And afterwards, when you want to separate them, soak them in cold water; that is the secret. And you will see that the oil, although it seems to be imbued, will separate itself from the water as does grease. Mussels become stronger in cold water, and warm water would dissolve them with difficulty, although having been reheated, the mussels are then more handleable and easy to dissolve in the water.

p110v_2

Wheat oil

Is made on a blade of iron reddened in the fire, and the oil turns into drops, which is appropriate to oil the hair of a butterfly or similar thing, because this oil is instantly dry and makes the rest dry out. It is necessary that the coat or down of any animal that you want to mold be flat, because if left standing up, it will make the sand raise up and form bubbles.

left-middle# If you want to mold something delicate, like a pansy, some, to give it a little thickness, more than what is natural, some rub it with butter. But it is best to oil it with wheat oil because it has no opacity and does not block the smaller features as much, and makes the flower firmer.

p110v_3

A cast of lead or tin

Because you want to cast tin very thinly, if your medal, plant or other thing you want to mold is thin and fine, make sure to include more tin, much more than lead, namely less than the fourth part of lead for three of tin. And moreover, one only puts lead in as an alloy. Contrarily, if you want to mold something strong and thick, put a lot more lead in than tin. And for the one and the other you can put in a little looking-glass tin, but only a very little, with a little resin, when you want to cast. Since then, when molding with pure new lead, I put in two ounces of pure tin for every pound of lead. And when molding with pure tin, I put in two ounces of pure lead for every pound of tin. I made some plants and snakes as if they were real.

left-bottom

I cast tin when it was nearly red, and the same thing with lead, which however had not remained in the fire for too long, because it becomes brittle and burns up.

l11r

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p111r_a1Reheating molds

Box molds dry out readily, & do not get reheated, because to reheat is properly to turn molds red and inflamed in the fire, and drying out is to let both molds dry, or make them evaporate their humidity, placing them before a fire of flames or one of charcoal. Molds de noyau reheat easily & box molds dry out.

p111r_a2Latten smoke

It is good to reheat molds for casting latten in it, because this yellow chalk, which appears nevertheless to refill the molds, casts very neatly, being of the same nature.

p111r_a3For red copper

When it's melted, it is good to throw in a little fine tin, because this makes it run.

p111r_a4Clay earth

This, wet & well beat & kneaded as you know, is necessary for you to make the contour of your molds. But attend that it not be too soft. But likewise [attend that it be] sort of half dry such that it doesn't attack the hands at all, because otherwise it would attack your work. Always keep it in a damp place, and make some holes in it, and fill them with water, to keep it fresh.

left-middleThe gray [earth] is best which does not cleave at all.

left-middleIt is neater than [illegible] of lead.

fig_p111r_1

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left-middle

p111r_a5Iron wire

You have to be provisioned with different thicknesses according to the molds that you want to make, some large like packthread from [illegible] & some thin, like the fat cords of a spinet, for small works. With it reheated, make clamps to close the molds & make points like needles of various lengths according to your need, to fasten the animal to the mold & hold it subject. Needles would not be good for this since your points must be hollow & of the same thickness throughout, except at the point. And then you have to make them as long as you have need. Iron wire is harder than that of latten.

l11v

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p111v_1

sal ammoniac water

It is enough to use two chestnuts' worth of sal ammoniac pulverized in a pot of water, and that the water tastes lightly salted to your tongue, because too much is not good.

p111v_2

Sanguine

To clean the various colors of lead and tin, sanguine is pulverized, and it is rubbed on the molded work with pieces of fabric.

p111v_3

Crab and crayfish

They are among the most difficult to mold, and whoever molds them well will mold many other very subtle things.

p111v_4

Lizards

When one grabs them with two fingers from the sides of the head, at the level of the ears, one makes them open their mouth with the tip of the fingernail, then one grabs the edge of their lower jaw, and then [the edge] of the upper one. He squeezes the fingernail like a pair of pincers, but he cannot go through it, but he squeezes it quite hard; and if he bit the flesh, he would never let go of his hold, and there would be no better remedy than to cut off his head promptly. In the spring, as they have shed their skin, they are better-looking.

left-middle

The small lizards that one catches in the summer, the size of small female lizards, grey on the back and green on the belly, are very appropriate to cast in silver, gold, or other metal, because their scales are rougher than those of female lizards and show better.

p111v_5

Composition of sand

Everything being baked thoroughly as said above, take four molds full of plaster, two of brick, and one of alum de plume. Do not pass through the sieve to mix, because the alum would not go through. Mix it with your hands until neither one nor the other, neither white nor red, may be distinguished from the other. If your plaster is not strong, do not mix in as much alum de plume because it softens molds. Make sure too that your sand is not hot (since it has been baked thoroughly recently) when you will want to mix it with water, because that makes molds too soft and breakable.

left-bottom

You may sometimes decrease the quantity of plaster if you do not find it strong enough to resist fire and if it splits, so that the proportion of crushed tiles sustains it, with the alum de plume, which you can also increase so that it creates a better bond.

112r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f229.image>

p112r_1To temper the sand

You should have: a large basin full of water to dip the molds into in order to open them, a tankard full of common water, a dish to temper the sand, a small wooden spoon to pick up the mixed sand in the dish.

left-topTo make handles for your large oil brushes, if you do not have large enough feather pipes, take two of them, melt them and join them together.

fig_p112r_1

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left-top

p112r_2Decoction of sands

Already said

p112r_3Molding en noyau. Mixing of sand

Once you have reheated your sand, that is the plaster, the stone alum and the brick, and once you have finely filtered them through a cloth sieve, # mix them the following way: take four measures of plaster, two measures of bricks, and one measure of stone alum. Mix them all together with the hands, so that one may not discern one [ingredient] from the other. Once your sand is ready, you need to kill the animal that you wish to mold in this way.

left-center# except for the stone alum which should be ground in a mortar.

p112r_4Killing the animal to mold

You must have been careful not to hurt it while capturing it. If you have a stock [of animals] and you wish to keep them for a long time, place it in a glass bottle with bran or in a large barrel half full of damp fresh earth. Give them frogs to eat, live rather than dead, because should you keep them without feeding them, they would wither and become emaciated, and their skin would become saggy and wrinkled. Therefore, the sooner after its capture you mold it, the better it will come out. And kill it in the following manner: place it in a clean bottle or vessel so that [the animal] does not carry any dust; fill [the bottle] with enough good vinegar and urine so as to cover [the animal]. Shake [the bottle] and torment [the animal] inside there until it is dead which should take an hour or half an hour. But if you are in a hurry

left-bottomTo know if [the animal] is quite dead, take it out of the vinegar and take it by the tail. If it moves its tail, do not mold it because it still has feelings, and when pricking [its members], it would remove itself and harm the mold.

left-bottomWater snakes do not bite much.

p112v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f230.image>

p112r_4

to cast, force feed it your animal some good spirits or mix a bit of spirits with the vinegar. And soon it will be dead without any wounds that would deform it. As for large animals, for which it is necessary to have a lot of spirits, one uses vinegar and urine, but for small ones, spirits only are needed, and it will be done quicker.

When your animal is dead, take it out and clean it very carefully, relieving it of its old skin if it sheds, of its parasites like lizards have, and then apply it.

left-topin a glass, and submerge, continuously holding the head of the animal. Or if it is not very big, put the whole thing in.

left-topBe advised that before it dies, you must open its eyes, by blocking its eyelids with a bit of wax or something else.

p112v_1

Affixing and arranging animals

Having gotten in some fat earth called clay, that should be grey, because that is the best one, or another that will bind well and will be well prepared and beaten, so that it is malleable without being damaging your hands or the work, make a lazagne, or a pancake shape, of this clay equally flattened with a rolling pin, which pastry-makers use so that it is slightly thicker than a poultice. And on this pancake, affix your animal, making it as life-like as possible and the way in which it is naturally shaped. And firstly, with a good needle, pierce it from underneath, in the middle of the throat, up to the top bone of the head. Then take the needle out and in the hole, put the point of an iron wire, of such a length that it suffices to maintain the head of the animal as high as it must be, and if the skin gets in when you put in the wire, take it out with the edge of your small pincer, and arrange the skin as it was before. Pierce the other end of the wire in the sheet of clay. In this way the head will be held high, which will make it more graceful and proud. Arrange afterwards, the rest of the body, and the legs, and the curling as you think will look best. And so that it is secure and does not move when you put in the sand, secure the legs with little points of iron wire, having already made the first hole with a very sharp needle. Do the same on the body parts that you deem necessary, making sure that the points going through the animal are fixed in the clay sheet, and not so far in front that they jut out beyond the body of the animal by a

left-topTake a needle of fine steel, and which will be the sharpest you can find, so that with it, when you make your first hole in order to place the wire threads, it will pass through without effort, and take care not to rudely insert the wire or take skin with it. Then put a thicker wire in the thick bits [of the animal] and the thinner wire in the thinner bits. But take this secret advice and do not plant your pointed wire in one go through the animal and onto the plaster, but having planted it, take it out of the clay earth but not out of the animal, which is afterwards fastened there. One does this because by fastening the point the first time, it pushes in the skin of the serpent and by taking the point out, it replaces the skin in its original state.

left-bottomWhen you reuse the points you have already used, make sure to clean them well of rust, so that they do not take away some skin.

bottomThe main arrangement of your casting is to keep its head very high and have it looking sideways. For this effect, pierce the head on a solid plank or table, making the wire pass through the bottom of the throat up to the top of the head

fig_p112v_1

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p113r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f231.image>

p112v_1

a bit so that you can take it out if you need to. And be advised that these needle points must be of the thinnest kind of iron wire, with a length that is suitable to the animal; because the smaller your needle is, the smaller the leftover hole will be. However, you must have different sized ones because there are some needles that go on the body and in places that are thicker, like under the throat, and some needles must be longer and stronger than the ones used on legs and thin places, where the needles must be subtle and thin, almost like the biggest harpsichord strings. And it would be better if they were of iron wire, which is firmer than the one made of latten. And if piece of a tail, a piece of nail or a piece of leg to the body needs to be joined to the body, do not use the needle; it would damage these parts. But apply a bit of wax, as big as a grain of millet, between the body and the end of the tail. Then with a bit of iron wire, flattened and warm, touch the wax and join the two pieces by applying a bit of pressure. In this way, after your animal has been well-placed on the lute-shaped pancake of clay earth,

fig_p113r_2

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build around it a wall of the same clay

fig_p113r_3

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in this way. And join everything together. And then with a big knife, with which you have cut the clay, take away the extraneous clay surrounding the pancake. And place on a piece at the end of the mold to close it off, as you see in B. Then, with a small curved instrument, mark on the inside of your mold the thickness you wish, which for a common serpent must be two inches thick; so that when you put in your wet sand, you will see when it is thick enough. When all of this is neatly set out, moisten well the shaped body of the animal everywhere, with good spirits, with a brush. For this is the best-kept secret: because everything that is touched by spirits will come out very neatly and without any small eyes or holes that we call bubbles, which usually come not at the back or in the thick sides of the mold, but on the edges. And as soon as you have thusly moistened everything with spirits, put in your wet sand without letting the spirits evaporate, which they do quickly. And soak it thusly.

fig_p113r_1

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and make sure the needle is as long as you need according to how much you want to raise the head, and that both ends are sharp. Having been arranged thusly, affix your serpent on the clay earth, and place the head first and then the rest.

left-middle

If, once you have placed you animal on sheet of clay, you are distracted with other occupations, rub your animal with spirits and under the belly so that it does not stick or attach itself to the clay earth.

fig_p113r_4

<https://drive.google.com/open?id=0B9-oNrvWdlO5Qm8wSlJPOWxfZWM>

left-bottomIf, when you pierce the belly of your animal, it releases water on the plaster, clean it well with cotton because the sand that was wet will become lumpy. If it is on top of the animal, clean it very carefully and very neatly and touch it and strongly wet it with spirits.

p113r_1

Wetting sand and molding the first cast

Have a porringer of leaved earth of such a size that it can hold the wet sand which will be needed to fill your mold in one go, which is better than in two gos, because if you do not throw the second load of sand in very quickly, there is a risk that while you are preparing it, the first one will take and become solid,

113v

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113r_1

and this way, while heating it again, the two casts will dissolve. Therefore, have several dishes of various sizes with a pouring beak in order to cast better. In these, pour some regular fountain water and mix into it as much as an egg # can hold of sal ammoniac water, mixed as described. If you want to cast lead or tin - because one would need more for casting gold or silver - having the water in your dish, add the sand and not the other way around [by adding the water to the sand], and adjust it with such attentiveness that, while mixing it vigorously and wetting it quickly with a wooden spoon, it does not become thicker than mustard. And in such a way cast [i.e., pour] first the clearest part, as is always at the surface, by shaking it a little higher in your mold. And doing so, since your animal is nearly covered, Once your animal is covered, blow on it very strongly to eliminate the small bubbles from your soaked sand. Then pour immediately the rest which is at the bottom and which is thicker than the upper part, fill your mold to the thickness mark you have made.

fig_p113v_4

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And while casting do not forget to shake your mold, that way your soaked sand runs and get in through every parts. Also tip your mold up on the side of the head, which is higher than the body. That way the contents of your mold will have the same thickness, and you'll spare sand. This being done with care, your sand will harden within a quarter of an hour. Then peel the clay contour which can be used later. Let it dry a little bit, than separate your mold from the slab of earth, and you can mold properly straight after. Cut away the extra parts with a knife, and make it mandore shaped. You can reuse the clay frame. Scrape away what's on the back of the mold, because this part is the weakest; do not forget to make notches around it, that way the second cast would bind much better

fig_p113v_5

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and would not move.

left-top

Your half mold, in one shot and one mix is the best.

left-top

#

or two eggs, because there is no danger if there is more. If you cast twice, just add sal ammoniac water into the first pouring.

left-top

Make your mixture as clear as a pureed broth, or starch water, the one women use make their starch. It is not a problem if the mixture is very thin because sand settles in the bottom and water stays on top of it, which we scape as too weak and soft. It will not take long to harden, because burned things dry rapidly.

left-bottom

fig_p113v_3

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If you don't fill your mold with soaked sand at one go, do mix your second cast with the top part of the first cast, stir with a spoon, or the stick you had took to soak your sand.

You do not need to add sal ammoniac water if you cast small molds which do not need to be reheated too long. However it is better to add some.

114r

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p114r_1

Second Casting

When you have well molded the first part of the animal, that is to say the back, the spine, and the entire top part, and when the half-mold where the part is encased is hard enough

fig_114r_2

<https://drive.google.com/open?id=0B9-oNrvWdlO5SWVndzB0aEk5MWs>

turn over the bottom and the sides of the belly, sometimes using a knife for the thicker parts, and then with a pen-knife for the places where the more fragile parts are encased, like legs, tail, and similar things. Because the head is higher, you will have to dig deeper to expose it and do a deeper notch that has to be well exposed, by enlarging it from the outside, in order for the second mold that you cast on top of it releases well. A process for which the animal himself can be useful because his nature so permits. However, make sure that you reveal the lizard's throat more than you would do a snake, because the lizard has big jaws and big bones that do not cast as easily, and has deep ears in which the wet sand is not as easy to remove. But you will avoid all of this if you expose half of the head and those things that you know do not release easily. When everything is well exposed, blow over it and wipe each part again with a cloth made of swine hair, slightly dampened into salt water or clear water, do that gently, that way the lower part of your uncovered animal will be very neat. # 8\237\235\213 Once it is done, dip the covered side of your mold into water for a pater noster. It will suck water inside, that way when you'll rub with oil the uncovered side, the oil will remain on the top, and to prevent the second cast which you will cast on top from sticking. Dip your mold into water, take a particularly fine brush and rub with oil the entire mold but the animal; it should not be touched with oil. Make sure to use you brush between the parts and on all the fragile parts. And if by mistake oil is soaked, dip the mold into water, as it is said above, and drop by drop the oil will come back to the top.

left-top

Mold small animals as big ones, however, for small animals, use very fine tacks made of cords of cittern, short and long ones.

left-top

fig_p114r_1

<https://drive.google.com/open?id=0B9-oNrvWdlO5NVR5Y2FtZHM0ck0>

remove all the little tacks with the help of very small flat pincers.

left-top

#

then

+illegible

left-bottom

#However, leave the tack which is pinned into the throat so that it will help you to turn the head over, because it is sunk deeper than any other part, because when you drew the plan, you put higher up. It is at the level of the head that you must make the biggest notch and you should start at that notch to expose and then keep following by looking at the traces left by the tacks.

and if a small piece of nail, or piece of tail, or other fine things separate from the mold, put a little piece of wax between them, and join them with the tip of a hot iron wire, then smooth it in your mold with a knife, and make notches on the sides in order for the other half of the mold to adhere to it. 8\237\235\213

fig_p114r_6

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p114v

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fig_p114v_1

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left-top

p114r_1

This thus prepared, put your first half-mold on the disc of clay, surround it with a clay circle and do a thickness mark similar to the first one. Then, with a rather thick brush, wet with spirits all your animal's exposed half, without, if possible, missing any part, because therein lies the secret to casting neatly. Then, as fast as possible before the spirits evaporate, soak your sand, and cast it, shaking, blowing, and moving the mold, as you did for the first one, making sure that what you pour first on the animal is clearer than the rest, so that it is soaked everywhere and highlights the finer parts. So, leave it for fifteen minutes so it sets, then remove the clay circle and disc. And, with a knife, join your two molds together in a longish form, like a mandore, as we say, because of how you cast. Then soak a little in water the whole mold up to the level of the joints. Because this is another secret to separate them more easily. Otherwise, you would break everything. Separate them like this skillfully. After this, gently and patiently remove half of the animal still in the mold, pulling it sometimes on one side and sometimes on the other, in order to avoid breaking it, or ruining parts of the mold. The mold, being empty, rejoin both half so that no dust comes in, and put them aside until you want to heat them up, make the runners, the vents and put the clamps. As for the animal, to avoid it drying, and in order to be able to use it to mold 4 or 5 of times, put it on water. I believe that it would be better preserved in spirits. However, it would be best to make the 4 or 5 molds the same day because these animals rot and

will smell within the day. Having left your molds to dry out, for they will stay humid for at least a month, make the vents for one half.

fig_p114v_3

<https://drive.google.com/open?id=0B9-oNrvWdlO5dkk3MW10YzNIbDg>

left-top

+ Note that once you have made your second casting, if you left your mold without opening it for a day or a night, you would then need to put it into hot water or reheat it, rather than open it, like for the crab.

left-top

If after both halves of the noyau have set and hardened, it would not open if you did not dip it into water. But as you dip the back of your mold into water, oil comes back to the top and touches the joints which separates them.

left-middle

However, be sure that your second mold is thick enough, and hard enough otherwise it could break while dipping it into water if you want to open it. To avoid this mistake dip the entire mold into water and rub it everywhere, if the mold has set enough it will harden. Then take both molds with a rough cloth, in order to grip it better. Then strongly separate the molds as if you wanted to tear bread apart. But in case it breaks, rejoin them, and fortifies the joints with clamps.

fig_p114v_4

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bottom

Afterwards you can repair the mistakes with a small pair of scissors.

p115r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f235.image>

left-topFirst cast the tail or the back of your animal, make a cut from the head to the middle to the tail where you cast, and which is the end of the mandore. After casting do not forget to make holes, and to notch your casted metal. That way metal will run better than if do not notch it. Indeed metal get damaged into notches, do not run too much and does not swell as much as if you do not make any notch. Put small clamps made of wire to the joints separating both molds it will reinforce the joints of your mold. Clamps prevent molds from distorting and from getting damaged while heating.

p115r_1Note about everything above said

If your snake hasn't eaten for a long time, when you want to kill it into urine and vinegar, it would fill with water and would swell, and then it would dry when you fix it on clay.

Once casted, and removed out of the mold, you could see a small empty line between the animal and the mold where sand will come in when you make the second cast. Try to avoid that if you can, but do not give up your second casting because not much sand comes in this empty space and it will be easy to clear it with the help of a small needle, also this sand does not stick to the first cast.

Casts which must be reheated, like casts for gold or silver, or other matters which must be burnt inside the mold, need more stone alum than casts which are stripped of the mold easily, like lead and tin. However do not add too much stone alum.

p115r_a2Stripping animal

If you'd made such a twist to your snake that you can not stripped its belly easily of the mold, and if the head and the mouth are thinner, and easier to be removed, do cut away the extra parts of the mold, and do reheat the mold again. The matter inside will burn, then add some quicksilver inside which will attract ashes and burnt bones, the pipe will get wider, and your animal will get easily out of the mold without being damaged. You can strongly pull your molded snake, because it is soft and malleable, and your mold firm enough to keep its print undamaged.

p115r_a3Reheating molds

When your molds are reheated, and cleaned, cast as soon as possible, because if you keep your molds it will corrode and become damp. Reheat the thickest part, where the body of the animal is, on high position because if there is something to be burnt inside it will fall down. Mark the high part in order to recognize it.

Once well reheated, do not damp the outside of your mold too much because the inside must stay red when you cast.

left-bottomIt is the shape of the clamp

p115v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f236.image>

p115v_1Tin casting

If the herbage or flower you want to cast is delicate and fine, tin must exceed lead in your mixture; on the contrary, if the flower or herbage is thick, you must add into your mixture more lead than tin. For a fine thing, add one part of tin for four parts of lead. Your mold must not be too hot, so you can hold it with your hand when you cast. Your alloyed tin must be very hot and almost red for casting, and that way it will enter all the small parts of the mold. Otherwise, your tin will cool down before reaching the thin parts of your herbage. Do not forget to mix a little bismuth in your mixture; that way, your tin will run better and be firmer.

left-topWith your lead allied with tin, or tin allied with lead, you can add a very little quantity of bismuth and it will look silvery. But do not put too much, because it hardens the matter and makes it sour, and if your work on fine things -- like legs and similar things -- it will not cast properly.

p115v_2Giving ventilation to your mold

If your herbage is very fine, in addition to vents, you can drive a thread through the clay contour of your herbage instead of casting with a needle, and thread it also in the herbage. The thread will burn, like the herbage, and the hole will remain, thus giving extra ventilation.

left-middleDo not remove your annealed molds out of the fire before they have cooled down by themselves. Also make sure that your very hot molds do not come into contact with wind or coldness otherwise they would burst. Do not reheat your molds before they are drained and firm again, otherwise they would cast before the vent holes are made and the clamps are fixed.

p115v_3Annealing core molds

After your molds have their cast vents and clamps, fix the clamps as above mentioned. Then make a round, made of bricks, at the edge of your forge, or in a clean place. Fill this round with big, half-lighted pieces of charcoal. Put your molds on the round, and leave it during half an hour, that way it will gently heat up and not all at once. Finally, when coals start being white, add big half-lighted big pieces of charcoal and blow with your small bellows until hot. Do as such, slowly, until the molds redden inside and out. If you want to cast a herbage or an animal which are difficult to strip, and you need to burn what is in the mold, look into the cast and see if the molds are quite red and inflamed inside; this will be a sign that they are properly annealed. If it is not so, increase the heat and keep at it until it becomes thus. If there is nothing inside the mold to be burnt, this heat is good for tin casting. The molds for tin casting are much better annealed in a reverberatory furnace.

[image]

left-bottom

fig_p115v_1

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Do not heat too much at first otherwise your molds could break

left-bottomYou know that your molds are annealed enough if the hole in the cast is red, on the contrary if the hole is black the molds are not annealed enough.

left-bottomIf you want to cast silver, do not anneal twice, and if something stays in the m

old and that must be burnt because no good [â\200|]

p116r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f237.image>

p116r_1

Casting plants and flower bouquets

One must cast them as soon as they are picked because they wilt and dry out. Dunk them, the before, right away in good spirits and then put them in your sand mold, soaked like snakes.

There is nothing to be released from the molds because while the molds are heating up, the plant material burns away, which does not happen with animals, which have bones. For bouquets, the sand must be finer than for snakes because, if it were thick, it would crush the flower.

left-top

fig_p116r_1

<https://drive.google.com/open?id=0B9-oNrvWdlO5SEdPVDdsS2dEUmM>

burn the plants, flowers, and animal parts that are remaining. Afterward, they must be cleaned and the cinder removed. Then reheat them until they are red for casting. Reheat in the beginning with some charcoal lit over a gentle fire, and put your core molds down flat on the charcoal encircled by bricks. Molding frames are reheated on a grate.

p116r_2

Core molding the same sand for wax images, lead medals, and similar things

Make sure that these are well emptied. If they are not, fill them with wax, which will not be it, and then smear your wax or lead images with a very thin and light layer of olive oil in such a way that the oil does not give any thickness or body to the medal. Then heat it with a little spirits and, when it is lukewarm, wet the oiled medal, because if the water is cold, it will resist the oil. It will not hold on to it. After, cast your plaster sand, matton, and alum. Wet it on top having placed your image on clay mold in the shape of a mandore and having given it some contour to give the necessary thickness. These medals oil and rub against themselves in this way with the spirits because they are firm and hard, and they would not ready to be taken out of the mold, which is resistant like real animals, which are soft and flexible.

left-middle

When you have soaked your sand, do not cast on the middle of the mold, but on the edge so that the sand gently settles, so that the first cement be clear and thick afterwards. If your soaked sand sizzles like water falling in a mold, it is a sign that it is too light. Make

it, then, of an average thickness.

p116r_3

Casting gold and silver

The molds must be fire-red and ablaze when you cast gold or silver in them, or when you burn flowers and bouquets. The gate must not be very big where the thing being cast enters because the matter will flow better without disturbing the mold, and does not become so filled with bubbles.

p116r_4

A way to enamel very fine gold rose leaves and others

After you have cast or beaten in gold the thin rose leaves or other things, if you want to enamel them, you must solder or braze your fine gold leaves onto silver strips, which will strengthen them to support the enamel. After the things has been enameled, put the work in aqua fortis, which will eat away the silver and leave all the gold with its enamel. For this, the gold must have been passedâ\200;

116v

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p116v_a1Casting snakes in all seasons

Snakes hide underground during winter. Some people feed them a lot in barrels filled with earth and covered with manure. Other people make several molds in summer because you can make four or five molds with one single snake. Other people cast long, natural snakes without coils, using common plaster, annealed as said, with a core and two half-molds. Then they cast it in wax, that way they have a snake as twisted as they want. Then they cast metal as it is said.

left-topIf, while twisting your wax snake, some parts become undone, you can rework it if you remove the drips from the molded wax.

p116v_a2Tin and lead mixture

For fine herbs, flowers and greeneries. You need more than 3 parts of tin for one part of lead. If this material is thick and fat, you need 3 parts lead. Heat the mostly tin mixture, which must become red and very hot. When you want to cast, remove your crucible from the fire, and add two or three grains of resin for one and a half or two pounds of lead or tin. With the resin, also some fat looking-glass tin, the size of an auclane with its shell, mix and cast. Make sure you have more metal than you need; some metal should be set aside. If you haven't enough metal, keep casting and finish your cast, it will set, however it will not be so neat. Dip your mold into water, and dismantle your mold carefully with a point. Make an elongated cast in order not to damage anything. If you mold something very thin, you must make your cast with mostly tin.

left-middleIf you want to cast lead or tin as a core with the sand above mentioned, reheat your mold once only if there is nothing to be burnt inside. But if there are flowers or animals to be burnt inside the mold, reheat it twice. However do not reheat the second cast for as long as the first cast for lead and tin. As for gold and silver, those must be red when you cast. For lead and tin, let them cool down until you can dip your finger into the cast without burning yourself. The cast must be warm.

p116v_a3Copper and tin casts

For red copper you must add sal ammoniac. It will clean it and remove the crust when melted. Some people add big pieces of new leather. Other add peels of mice feet. Other add melted common salt only, or salt melted with saltpeter. The main ingredients are sal ammoniac and also a little bit of tin, depending on the cast you want to do. Copper is harder to cast than tin. But when it is melted it runs better, even if alloyed with tin. Add a quarter of copper to tin and mix it like copper. Calamine especially makes it run well.

p117r

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p117r_alA way to mold flowers and herbs

It is necessary to pick them in full bloom and color, and only pick them, if it is possible, when you are ready to mold them so that they will not wilt. Or if you need to carry them from afar, put their stems in a bottle of water, or even better in wine. Start with making a wax stick pointed like a big peg, of a size adapted to what you want to cast, as you see in the margin, marked A. At the bottom of this peg, put and prick a bit of iron wire, rather thick and strong. And at the pointed end of the big peg, you will fit your flower stem or your herb. This done, set it aside. Arrange your clay circle and outline as you did for the snakes, in the shape of a mandore according to the size of your herb. Then take the herb you have prepared to be cast, as we have taught you, and wet and moisten it daintily with good spirits with a brush. Then place the wire end through the end of the earthen mold, shaped like a mandore, so that the wax peg, where the herb is, touches the edge of the earthen mandore. And arrange your herb that lies thusly so that it remains in the middle of said mandore-shaped mold, without touching any of the side. So that the sand that you put in the mold will be of equal thickness everywhere, and will be two fingers higher than your flower. And having made sure that the wire is secure, quickly throw your wet sand that will be much clearer than the one used for serpents, in the mandore-shaped mold, and the quicker the better, so that your spirits do not evaporate. And adjust your mixture with a bit of essence of sal ammoniac, unlike the one for serpents. And when you make sand especially for casting your bouquets, mix in a bit of feather alum, this will only make it better. In this way, your mold will be in one piece and it will not be necessary to separate it, but you will have to separate it from the clay once it will have set. Let it dry. And then fire it again until the herbs are burnt. Note that if the herb you want to cast has a strong stalk and stem, you can cast it lying down, as said. But if it is fine and delicate, plant up standing up with the wax peg so that the sand will always raise it up, it being very clear. Do not forget to arrange two vent holes with two small sticks, which will start at the bottom of the cast, which is the pointed end of the wax peg.

left-topIf the flowers are so delicate that they come off the top when you are putting in the wet sand, you can stop this and curtail it with a net sewed onto the mold with a needle.

fig_p117r_1

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left-top

fig_p117r_2

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left-middle

left-middleThe more delicate the flower is, the clearer the sand must be.

fig_p117r_3

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left-bottom

left-middleThis is a core mold.

p117v

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p117v_a1To make the ashes of flowers and herbs leave molds

Some people put quicksilver inside. But, if it is a little work, or fine & delicate foliage, that only has a slender issue, they make two errors: the first, that quicksilver by its heaviness can destroy some delicate tract inside in coming out, the other, that some bit will always linger inside that will make [other] metals sour & inhibit the perfection of the casting. It is true that if it is to empty the mold of some large animal that has big conduits & passages through which the quicksilver can easily exit, like of a bird or a serpent, one can indeed put some amount of quicksilver to break the calcinated bones of the animal in escaping, because of which the said & will empty out & not remain at all.

left-topThe asparagus stalk is so hard that most often it perseveres as charcoal. Because of this, do it rather dried out or wet it with sulfur oil & turpentine, or indeed cast the little branches separately & solder them onto a fat stalk drawn through with a wire.

left-middleIf the burnt thing has left behind some filth or ash, let it cool down a little, & with an iron wire wrapped in cotton that can bend with the cavities that you have, investigate. Clean & blow to a fault, either with a soft brush or a clipped brush.

p117v_a2Daisies

They can be cast well in gold. But if you want to enamel them, you have to make them by hand & enamel them & then attach them. Otherwise, the leaves would be so pressured that it would encrust the enamel.

p117v_a3Sand that has already been used

Do not cast it. But because it is mixed with stone allum, you can use it in the mixture of other things & it can serve in place of brick.

p117v_a4Core molding wax figures or lead medals

Rub them with oil with a brush. But be sure that it be so softly that your medal be barely wiped with it & that it hardly appear to have been greased. After rub it with spirits and heat the water with which you will wet your sand, that of plaster, brick & alum, so that being sort of lukewarm when you cast it, the oil will not refuse it, as it does with cold water, & do not forget to moisten your sand with it, mixing it always with a little sal ammoniac.

left-bottomMedals molded in this way are very fine.

p117v_a5Snakes' blood

If you have to cut some snake inside a mold in order to burn it, cut it far from the intake of the mold so that no blood at all remains, because it makes a crust that afterwards would not be taken away by the same quicksilver & removes impressions from your mold.

p118r

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p118r_a1Snails

Those which are found in the ocean and similarly those in which certain small crabs dwell are very beautiful for grottoes, if they have been rid of the first layer of their shell with aqua fortis, because they really look to be made of mother-of-pearl.

p118r_a2For removing flaws and flashing from things molded in a core mold

If your molds are made of good plaster which withstands fire, they will not crack, especially if they are squeezed well between two tables with presses or in a pot filled with ashes or sand, and, therefore, they will not develop flaws. If they develop some flaws, you can remove them with a burin called chaple which has a tip like a small chisel.

left-middleThe old vine stocks

p118r_a3For grottoes

Stones made from water called stuf; charcoal; the confection of tin and pure brass; paper ground up and mixed with ground up glass; cork; heated parchment, and white coral, all of them are appropriate for making grottoes. But, once dry, bizarre pieces of wood, which [the bizarre pieces of wood] are found in the forests and among regular mushrooms and potirons growing on trees, are better than all of them because they are light. Mix in with small pieces of looking-glass tin which have a shiny luster. Grind in a little of a different kind of marcasite in order to clean the earth away, then powder the work, which is very beautiful. If there is no spring in the grotto, glue all of this with strong glue, and then the work is done. You must show all kinds of mines. The sulfurous marcasites which do not have a grain but are even like looking-glass tin are very beautiful.

left-middleRed copper is found sometimes mixed with certain brittle lumps which are pulverized under the hammer, which are very beautiful pulverized on grottoes.

p118r_a4Looking-glass tin

If one ounce of looking-glass tin is put in with it pure tin, pure tin whitens and becomes firm, that is, it is 1/4 of looking-glass tin in one lb of pure tin.

p118r_a5Salt ammoniac

Salt ammoniac water is naturally quite good for casting in gold and in silver.

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p118v_1

Casting in box molds

The same sand that was used in the reheated noyaulx, composed of plaster, brick and alum de plume as is said, is excellent for casting in box molds, and I have experienced it thus: I crushed the pieces which had come out of core molds in a mortar, dragging the pestle, because this sand is very doulx. I did not pass it through the sieve, because the alum de plume mixed throughout, which binds it, would not pass; but I ground finely upon marble what seemed to me too coarse. And having prepared it thus, I moistened it with sal ammoniac water, made of sal ammoniac, as much as the size of two walnuts, in a bottle of common water the same size as a bottle in which one boils tisane, or in a good pot of water so that you find the water fairly salty. I mixed throughout half a glass of sal ammoniac, two silver spoonfuls of spirits. Having thus moistened the sand in such a way that it took hold well, nevertheless coming apart easily, I sprinkled my medal with pulverized charcoal with a file to rid it of oil, and all other grease. It is necessary to avoid them, for they would hinder good stripping. I blew on my medal & molded it, and the female part of the box mold once filled, I marked & made a line on the reverse & edge of the medal, & on the nearby sand as well. In order that the second box mold take the imprint thereupon to indicate the place for making the cast, once filled the female part of the box mold once filled I uncovered the outline of the medal and pounced the whole side with pulverized charcoal, and then filled the male part with sand. Once made I separated the box mold and did not hit the corners of the medal to make it strip, because that knocks the sand and makes it crumble. Rather I struck the back of the box mold, retaining the obverse of the medal on the bottom, and it molded very neatly. If it had not stripped thus, I would have waited to remove it until the box mold had been dried out over fire. I lit a row of charcoals between two little trivets of iron in the form that you see, and put the back & reverse of box molds thereupon, & the imprint on top,

fig_p118v_1

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because in this way, they dry out gently. And if, by chance, they should crack from being too moistened, it is on the back that they take the harshest fire, & the imprint remains safe & whole.

left-topFor the best, it is necessary to reheat the sand that is used in the noyau rather than used it in the box mold, until it no longer contracts.

left-top

Excellent sand

Take a little of the same sand, the finest that you can, for covering the medal.

left-middleFor medals & flat things, the true heat of lead & tin is when it is melted gently.

left-middleNote that I filled the box mold before pressing it, and did not hit it, but rather pressed it with the strength of my hands alone, because hitting it makes it go awry. Secure your box mold that it does not shift at all, & if you put some moistened sand under it, it will only hold in place more firmly.

left-bottomMake the gate that it is not too thick, so as not to overcharge the medal, but wide enough near the medal that it embraces a third part. Do not forget the vents.

left-bottomDrying box molds is to keep them from humidity, that they no longer smoke, once

having nevertheless been very hot.

left-bottomRecuire is to redden the box mold, which is done for gold and for silver.

p119r

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p118v_2

When I saw that they did not smoke anymore, & scratching the back & the front of the casting & having found that they are rough & firm & hard on both sides, which is a good sign of their being quite dry, I leave them to cool down. I took some fine tin, one lb., & one ounce of fine & new lead. I melted it in a crucible just until it was a bit red. Being in this way quite hot & ready to cast & no sooner, I smoked every side of my box frame with the smoke of a tallow candle & pressed & cast & everything. I set my box frame, well joined, in the press. I drew my crucible from the fire. I let it sit a bit to quench the redness of the crucible's bottom. And wanting to cast, I threw in around two or three grains of rosin, and about the measure of a bean of looking-glass tin & blended it & stirred the crucible a little and cast. And the medal came out as neat as the original. I smoked it with the candle & cleaned it with my coat.

left-middleAlways cast through the foot of the medal because the head, which is lower, will come out better, and make the casting somewhat long. And when you cast several medals in a large box frame, they will come out better.

p119r_1Notice about everything above

Good tin is that which is hard as silver & soft nevertheless. If your work is fine, it must be almost all tin & alloyed as is said.

Looking-glass tin must not be mixed until the instant that you want to cast.

Nor must the forms be smoked until then.

If the sand shrinks in the box frame, this means that it must be reheated & turned red on the fire.

Good sand when moistened does not stick at all to the hand when pressed.

The perfect sand for the box frame is the asphalt found in Germany, which is soft as wet flour, & almost all the rest are lumpy.

Not that the casting must be fine & hardly thick so that it does not work the material at all, & must not exceed the thickness of a grain of wheat taken crosswise, likewise for tin that is going to be cast finely. For lead, a little thicker. There is no need to make air vents very large & deep either.

The sand that you use *Ã noyau* for the said mixture is excellent for a box frame. But in washing, crushing & reheating it several times, its nature will be corrupted & it will no longer be fit to be taken & molded *en noyau*.

p119v

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p119v_1

Way to rework spat

You find an earth in Germany, the color of cooked plaster, but have long and soft filaments which are easy to handle. Because it is mixed with earth and rubbish, one pounds it roughly and forms little balls having soaked it previously in sal ammoniac water, following the above indication. Reheat these balls in a potter's furnace. And then soak them in the same water again. Earth and filth will remain at the bottom, and pure aspalt, which is light, soft and malleable as soaked flour, sticks to water and rises to the surface, making the water cloudy. Pour this cloudy water in another pot. Letting it rests, one empties the water tilting the pot or taking the water out using a sponge. And the pureaspalt remains at the bottom. Dry it and use it in frame, having moistened it with sal ammoniac water Then soak it into sal ammoniac water, and use it for frames in which it shrinks when reheated or dried, that is to say that one needs to reheat it again on a good fire and reddens it, as for example for medals and flat things. Use this one, because it is the best of all for gold, silver, copper, lead, latten, and tin. Because it withstands fire and reddens whenever you need, without deteriorating. The more you use it the better it is, and does not change. In the beginning it is white, and while using it turns grey. However make sure to put aside the one that served for casting lead and tin and latten, because gold would get brittle, and would not come out well. And even better, you will put some of this aside to use it for each metal.

left-top

See gesnerus de lapidibus

left-top

It withstands 10 or 12 casts without deteriorating. It withstands fire and reddens. It is well suited for all metals. It is so resistant that if the frame is grooved, it holds.

left-middle

spat almost does not set, even if it is reheated and [even if] it is a kind of plaster, which you can easily break with your fingers.

p119v_2

Excellent secret to mould in hollow and very delicately in fine gold

Cast your animal or lizard or other thing with the above mentioned sand, with alloyed silver and it will come out very neat. But make sure to mould it hollow, or at least leave a small hole in it or in another place. Then gild your animal with fine gold, as much homogeneously as possible, three, four or five times, until your gold becomes as thick as a piece of paper or anything similar. And the scales will always come out evenly. Then dip your cast i

nto good aqua fortis, which will corrode the alloyed silver through the hole, and gold will remain hollow, light and wonderful.

p120r

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p120r_1Stamped medals made from wax

You can mold your relief with wax mixed with a bit of resin to make it harder and firmer, whatever relief that you wish, either an animal or a medal. And then, fashion a hollow out of this relief in brass or copper. Or mold your [wax] in relief and strike it in a sheet of tin. And fill [your final product] with lead, and heat it. Try [to use] blades of stone leaf to make the hollow for lizards &

p120r_a2Sand for casting gold

Take common sand made of alum, plaster and brick, according to the composition above-mentioned. Add to it some more feather alum. And add as well something a third part of crocum ferri. However whatever quantity is never harmful, because [crocum ferri] is the one that makes gold shiny and makes it come out of its cast easily. But it is best if your crocum has previously been left for three days and three nights in the furnace of glassworkers, in a flat box, where it is not very thick so that it will reheat better.

left-topYou can easily cast gold with the common sand of goldsmiths, but [make sure] that you add some substance that makes it runny. Before the invention of crocum, one cast flowers in silver, but not in gold. This has only been known in Germany for forty years.

left-middleSublimate is often used by goldsmiths for gold. Some people add sulphur, but they are all wrong, because sulphur makes things sour, even if it heats [well.], And sublimate gets agitated, boils and bubbles. It is very good to clean gold because its exaltation draws [the bad stuff] out that disappears in the smoke. But to heat up gold, and to keep the heat, there is only the color of verdigris, salt of ammoniacum, saltpeter, and borax. This makes it runny and you will be able to throw in a branch from the Santoing.

p120r_a3Nightingale

It is necessary for the cage, made like those for larks found in barns and lined with green fabric, to be made with something that slides out from underneath, so that you can refresh the dirt everyday, because the nightingale loves it, and mix in some ants. You can carry an ant-hill with its dirt in a barred full of earth, and keep them there and they will lay their eggs and in this way, you can always have access to them when you need them, should you enjoy feeding nightingales. When you caught it, it was fat and full. And to keep it in such good shape, on the first day, you must take it in your hand and open its beak and place in it, using a sharp twig, some mutton heart or other delicate flesh, chopped up not too finely, so that the belly does something, and make sure that it does not get smaller or thinner, until it has gotten used to it. And feed it in this way three or four times a day, and also give it something to drink. The next morning, you will give him in his cage some well-minced flesh mixed with the yolk of a hard-boiled egg, and change this mixture two or three times a day, because it will not eat it if it is hard and not fresh. And If it goes half a day without eating, you must feed it as before and do so until

120v

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p120r_3

eat by itself. And so that he likes it better, you can add to the meat and the egg some mealworm, because nightingales love them.

p120v_1Crocum ferri

It is excellent applied to wounds to stop the bleeding. The best one is made of needle filings.

left-topCrocum ferri hardens moulds that have been reheated, the more feather alum is added, the softer and pliant they become.

p120v_2Anatomy

You must skin the animal and boil it. Or skin it and put it into quicklime.

p120v_3Making silver runny

If it is for a large work, arsenic and pulverized tartar thrown into melted silver, makes the silver runny. This is enough [for silver.] But for subtle work, you need bronze, filings, copper, even antimony, sublimate, all neatly ground. All of this makes a mass that does not get smaller. If the plaster is good, you do not need to add crocum for silver, but one puts in more feather alum. It is also necessary to add melted common salt, and some saltpeter and the aforementioned drugs: arsenic, tartar, bronze, copper filings, antimony &

left-middleSciscitatio dubia

left-middleA bit of tallow, and some arsenic.

[image]

p120v_5

left-middle+

See the second folio following [this]

left-middleFlowers can also be kept in their same beauty in distilled vinegar in a vase, well-sealed so it takes no draft, well-sealed with wax and mastic. Carnations and roses, the residue of common vinegar makes them rot. If the sand makes dust, and sticks to the flowers and hardly comes off with a brush, it is no good. The most lean is the best.

Keeping dried flowers in the same condition all year

right-middleRiver sand, that is washed by the current of water, is good when strained in a cloth to make the powder compact.

This is a rare secret, and which is pleasing for decorating tables, rooms, studies out of season when winter denies you flowers. Be advised to pick them when they are in full vigor and still growing, because if you take them when no longer in bloom or when they are starting to wilt, they will not keep. Having therefore chosen them, take some sand, the leanest and driest you can find, that must be very well ground, like the one goldsmiths use to sand enamel, or like the one [used] for engraving. But this sand must not be dusty at all, nor must it stay on your hand or leave a trace when you have ground or poured it, because it is

left-bottom+

Make sure your box is well sealed so that the sand does not get out. Keep it uncovered in sunlight and keep it away from the evening dew, and the moisture of the night, and cover it

and keep it in a dry place.

left-bottomYou can not put these aforementioned flowers in big vases, because if you want to take one out, you will take the whole bunch with it.

bottomBe advised to not pick your flowers when it is rainy or humid, but when the sun has been shining on them.

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p0120v_4

a sign that there is some humidity, and if the flower was also somewhat watery it would rot. Nor should it be too rough, because its weight would burden the flower and make it lose its original shape. Once you have chosen it as needed, take a box and inside this start by making a small mound of sand on top of which you will lay the stalk of the flower flat, so that the flower touches neither the bottom nor the edges of the box but remains in the air. Then add more sand on the stalk so that it remains firm and fixed. Finally take some of the same sand and pulverize and sprinkle it finely with two fingers on the flower, imitating the flow of an hourglass. And once the flower is half covered or so, strike with your fist the table on which the box is laid, so that the sand drops and enters everywhere. Finally cover the entire flower and lay other flowers in order, one over the other, as many as the box will hold. After you have arranged them thus, put the box out in hot sun for several days. And while the flower is drying, the sand that is packed together, by continuously holding it, does not allow it to shrivel and shrink. On the contrary, it needs to dry remaining in the same state as when you put it there. But to that effect take care you chose knapweeds, marigolds, the yellow meadow flowers called ranunculus or palta lupina, amaranths, and similar flowers, such as broom and others that you will know from experience.

left-top

The sand that goldsmiths use to rub enamels and the white one that glassworkers use and any thin sand that does not set, you put through a sieve made of horsehair because it needs not be too thin. Then dry the sand well in the sun for several days in order to remove its humidity, and ventilate it as you would do with wheat so that the dust becomes separated from it. After taking that dust, well dried, use it as you know.

left-middle

Pansies are preserved in the same way.

p121r_1

Keeping fruits throughout the year

You need to pick them in calm and quite dry weather & by the stem, without touching the fruits with your hand, and to put them into glass bottles that have wide necks, such as tall glass jars for preserves. Protect them with straw or something else so that they may not break, and seal them well with wax so that they may not breathe. And if they have glass lids well sealed with wax, it will be all the better. Put them in a case and put this in the well, or in the cellar, or in a vat or plot of earth full of water.

left-bottom

Because wherever the hand touches them they will rot, and it is even best not to breathe on them. You can also put vine leaves with them.

121v

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p121v_a1Casting in silver

You need to place the animals as said, and make up the same sand out of four parts plaster, two parts refiredbrick, and one part annealed stone alum. Mix it well, and once it is ready and you wish to mold, take three parts of the aforementioned sand in the earthenware dish from which the peasants eat their soup. Add pure annealed stone alum that has been pulverized in the mortar, as much as you can grab with your four fingers and thumb, or a small double handful. Then, mix well and mix in a little of sal ammoniac and the remainder with common water+

left-middleWhich needs to be placed in the dish rather than in the sand, which is put in the water, and not the water in the sand

And stir it with your spatula so that it all becomes like a thick sauce or clear mustard. And having rubbed spirits on the animal with the brush, cast and blow, and beat the table to shake the mold and do as with the others. Do not forget to put in crocum, because it prevents molds from cracking, and it is appropriate for all metals.

left-topAlloyed silver is better for casting than fine silver, provided it is soft.

left-topThe stone alum needs be well pulverized and well mixed.

left-topSal ammoniac gets along well with gold and silver.

left-middleBrass is the enemy of gold and works well with silver.

p121v_a2Silver [used] to cast

It is not pure but alloyed silver, and it does not become perfectly white on the fire because they [goldsmiths] whiten it after the melting to clean up the welding marks that occur when an animal needs to be attached to another or when it needs repairing. [The process] is similar with teston silver and all alloyed silver as long as it is soft and good.

Before starting to cast in silver, in order to coat all round and strengthen your molds, you should use earth that can withstand fire, such as this sandy earth mixed with cloth waste which foundrymen use to cast their canons, or any good lute that can withstand fire. They need to all be red and to be tied with iron wire.

Rather than anneal the molds, have the mixture necessary so that the silver runs.

If goldsmiths knew the material to make silver run in their work, they would buy it in quantity. Some buy it five sols for a denier.

left-middleI have used silver from the capital.

left-bottomBefore luting and strengthening the molds for gold and silver with the said earth, the cast and the vents must be made and the molds must have been annealed and made quite red to burn the animals, flowers and herbs that are inside. The ashes in the molds should be cleaned thoroughly. Once the molds are quite clean and ready, lute them and bind them with iron wire. Anneal them straight away until they are quite red.

122r

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p122r_1

Fixing different animals

When you discover some twisted lizards which bite each other are the most difficult thing to mold because of the number of their feet and because of the tip of their tail which are very fine, steady the parts which are uncovered and which look like suspended in mid air, that way the second cast will not vary anything. If you need to steady the parts hanging in mid air, take a bit of wax, rub it and elongate it on a table, make it big needle shaped, then cut the part you need with a hot iron wire then join where it is necessary. Steady also the part which does not stick to the mould (when you uncover the half of the womb) with some wax with the point of a knife @, joined and melted with the wire. When you cast, pour only to the spot and at the edge of the wax which being attached to the animal will melt but still lead the cast towards it without damaging anything. This is a secret.

fig_p122r_2

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One can arrange embracing snakes, but only small ones.

p122r_2

Flower in the mouth of a snake

If you want to put a flower in the mouth of a snake or a branch of a herb which guards against its bite, take the best arranged little branch you can find, and display its stalk into its mouth. Then put two little pieces of wax around the stalk of the herb. Melt a bit of wax with the point of a warm iron wire, while you are closing the jaws of the animal with your hand. And then you can cut the head to make it burn with the flower. If the herb is strong enough, it will stay in the same position by itself but if the flower is light, like wormwood, which droops, the dampness of the sand will lift it up, make it swim and stand by itself, without any support, as well as if you had put some thread under it passing through with a needle.

fig_p122r_1

<https://drive.google.com/open?id=0B9-oNrvWdlO5ZDJlZ0g5OXNKedQ>

left-top

fig_p122r_3

<https://drive.google.com/open?id=0B9-oNrvWdlO5UDgyYnNSZnlndjg>

left-middle

fig_p122r_4

<https://drive.google.com/open?id=0B9-oNrvWdlO5elo4VzJZRUpOWc>

left-middle

p122v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f250.item.r=>

p122v_1

Cleaning the bowl and the spoon that one uses to temper sand

Be very careful to clean, vigorously & quickly after casting, your bowl & your spatula or spoon with which you temper your sand, because if it dries, it crumbles & falls into the fresh sand & makes a hole or fault get made. Also, when the mold gets reheated, these little pieces will chip & flake off & prevent neat casting.

p122v_2

Molding hollow

Wax on its own cools down too rapidly & does not spread well everywhere, & tallow holds its heat & spreads everywhere; but is not good on its own. But when wax and tallow are mixed the work behaves well. The bodies of crawfish & other small animals can easily be molded hollow, but as for the legs, it will be troublesome.

left-middle

The first part of the mold that is first cast on the plate of clay, cracks more easily in the fire than the second.

p122v_3

Molding medals and flat things

You are not limited to making the gate with legs thus

fig_p122v_1

<https://drive.google.com/open?id=0B9-oNrvWdl05aTlRdkx2eVdtZXM>

, but rather in this way

fig_p122v_2

<https://drive.google.com/open?id=0B9-oNrvWdl05WFBpaEV5Ti1hRUU>

, which embraces the medal well. For the other way with legs is only done to accommodate more delicate works and the other, which is wide and in one piece works better for flat medals. But take heed that all gates need to be very thin close to the medal & so as to say not as thick as the medal, if it is not very thin like paper. And then, from the medal out towards the opening of the gate, make it thicker and thicker for it works better thus. If t

he gate is thick at the entry to the medal, the work never comes out very well. Make that d
espuys from the middle to the top of the gate be moderately thick, & from the same midd
le to the bottom very thin. Do not forget to makes grooves in au hau the top of your gate
to prevent the metal from spreading furiously.

123r

[http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f251.item.r=](http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f251.item.r=p123r_1)

p123r_1 How to make argento run

Take white arsenic, two ounces, 2 â\204¥

Orpiment or yellow arsenic, two ounces, 2 â\204¥

Aes ustum, two ounces, 2 â\204¥

Fine copper filings moderately well ground, 2 â\204¥

Antimony, 2 â\204¥

Rock salt, 2 â\204¥

Raw Tartar, 2 â\204¥

Sandever, 2 â\204¥

Saltpeter, the half amount, namely 1 â\204¥

Course common salt, melted, the half amount, 1 â\204¥

Sublimate, the half amount, 1 â\204¥

Borax, the half amount, 1 â\204¥

Sal ammoniac, same quantity as borax, 1 â\204¥

Take these ingredients, the best ones you can find. Weigh them as described above, and crush them separately, keeping your face covered, over the nose & the mouth, from the eyes down, in order to avoid the exhalations of arsenic, sublimate, and orpiment. Mix them well all together, then put them in a good crucible that must be so large that the ingredients can have at least the fourth or fifth part empty. Cover the crucible with a good tile, precisely adapted in its roundness so as to fit the opening. And having connected it tightly with wire from top to bottom and around the sides, lute it with manure or founder's earth, that artillery founders use. And in this, be careful & diligent, & do not forget to mix in crushed glass throughout the lute to fortify your crucible, in a way that it takes no air, for the mixture would be worth scarcely anything, because the 4 five last ingredients would be exhaled.

right-top Note that you need to lute your crucible well, so that the ingredients do not take air, and would not be exhaled.

right-middle

Lute well your crucible, so that it does not break, for if it breaks, the materials evaporate & the fumes from it are dangerous. If within 12 hours it has not melted and intermingled, it will not be well made.

left-middle

Goldsmiths who know about these things sell a denier of this for 5 sols to other goldsmiths, & especially to those who make dishware and great works, for at the end of their work, they can solder over the first solder by the means of this mixture, in general all those who want to mold and cast something delicate. This mixture should not be divulged, so that it is not abused.

left-bottom The grain is like broken steel

123v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f252.item.r=>

p123r_1

Your lute once dry, put your crucible in an four a vent in the early morning, & at the beginning, give low fire, as much as you need to heat your crucible as to let the fury of the saltpeter pass gently. Then, little by little & with judgement intensify the fire. And y leave in the fullness of this your ingredients for 12 hours, or a natural day. Make a t each go a good quantity of this mixture to not have to repeat it too often, because the fumes, which are dangerous, could hurt you. And before working with it, take a good piece of buttered toast in the morning, and hold in your mouth the said butter, or zedoary, or gold coins, and ada cover your face with a towel from the eyes down. From this mass, the crust will serve to make run clarify the great works of the silver from the metallic mass like snakes & similar things when it starts to melt. But And then, the grain that will be at the bottom of the crucible should be reserved for principally delicate flowers and herbs putting a little in the melted silver when you want to cast it, However it is necessary to always put a little of this grain in the silver when you want to cast it is melted and when you are ready to cast as you do thus for fine tin on copper, & for looking-glass tin on lead and on tin. And just as looking-glass tin makes lead and tin too brittle if you put in too much, likewise the grain composed of the above-mentioned ingredients would make your silver too brittle if l you were to put in too much, and obscure it. This above-mentioned composition will suffice you for a long time, when it has been on a low low fire for a whole day at the beginning & intensified degree by degree until the end. Having thrown one load of charcoal, let it consume itself, & let your crucible cool down. Then break it. You will find two sheets & hard cakes in the crucible. The upper one looks stoned Once, once composed of salts,sublimated & mixed together. The lower one is metallic, composed of fillings, aes ustum & antimony, having very small grain. Pulverize the upper cake, made from salts, & put some in to lighten & clean the silver and the metallic grain can be used to put into the melted metal.

left-topCharcoal fire

left-middleOr, after you have pestled your drugs by a rustic, and having put them in your crucible, & the latter luted & dry as said & place into the furnace, have the fire managed by a boutique boy, familiar with charcoal.

left-middleOne sells this metallic mass to silversmiths to soften their solder, because when melting brass exhales. And with a little of this mixture, they solder over the other solder.

p124r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f253.item.r=>

p124r_1Hairy animals and very fragile and thin flowers/pa>

Hairy animals are difficult to mold because hairs raise up & come out looking intermingled & in clumps. At the beginning, it is necessary to keep it flat with a drying agent & that makes it firmer. And in this, the best thing to use is wheat oil, with which you will dawb it. Once cast, you will be able to repair it. The bodies of butterflies and herbs that have a stem & leaves that are flocked with capricious & downy hairs need to be daubed with the same oil to keep these flocks flat; likewise flowers that have very delicate & thin leaves because dry wheat oil makes them and rigid and firm. And if someone brags about molding anything presented to them, give them the downy head of the herb called dandelion to cast or a pappus, which comes from the seeds of burdock & takes flight at the slightest sigh of wind.

p124r_1Noyaulx for molding hollow

Animals of gold & silver are generally cast hollow to avoid weightiness, and costs as well, if they are not quite small. But in order to make the core & the noyau, the mold needs to be freshly molded and not dry.

p124r_3Spider web

It comes undone in water & because of this, cannot be molded in a noyau, but one casts the spider and then one draws the web filaments that they make in the fields stretched between blades of grass on some carton with a stylus. One makes around it an edge of paper, glued to the carton & one casts with tin mixed with very little lead.

p124r_4Fine gold

There is a kind of gold which, even though it is very fine & unalloyed & has been passed through aqua fortis & antimony, is however so brittle that it hardly withstands the hammer. And the composition of verdigris mentioned above to make gold flow, makes it as doux as lead.

124v

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p124v_1

Rouge clair @ enamel

Fine gold is unfavorable for it, for [illegible] on the former it is yellowish. But alloyed gold is more favorable, such as that of escu & pistolet. If Gold in its pale color decays the enamel's hue. Ma And for this occasion, once cut, one puts it back on the fire to give it a reddish color to make enamels beautiful. Otherwise, they are subdued.

There is rouge clair that once worn down with arene loses its beauty.

Some rouge claire is found with grains of gold inside. And it is also the opinion of good goldsmiths that the good one is made with gold.

p124v_2

Casting with gold

Molds are recooked better & more surely than otherwise in a closed fire, such as a pot a reverberatory furnace. So that when goldsmiths want to cast some piece of important work that cost a lot to rough out in wax, they put the molds in a pot & recover them, & fill the pot with earth, sustaining the fire that holds them unified & tight. Then, they recook mold, earth & pot together and when everything is quite red, they cast the gold. Fine gold does not run well, but rather alloyed gold.

Gold and silver do not become brittle: once entirely red and hot, dip them into water.

left-middle

Gold is a quarter heavier than lead.

left-middle

When gold reaches its perfect heat, it is green like an emerald.

left-bottom

Take care that where you want to cast with gold, there must not fall any lead, tin, or lime thereof in the forge.

p124v_3

A way to make the gate for small female lizards

Because you always have to make the gate by the tail, and that it is so delicate and thin that the casting scarcely metal would flow with difficulty, especially when the tail is fold

ed, roll wax in little filaments of this size

fig_p124v_2

<https://drive.google.com/open?id=0B9-oNrvWdlO5dWU4UEtpX0hBV0k>

and apply some with the hot wire, as said, one at the end of the tail & others that correspond in the same way, from one end side of the tail to the other, as you see depicted. But take heed to do it with the end of the hot iron so that the end of the wax scarcely touches the animal, for the sand of the second gate will not touch this part. But make the end of the wax arrange itself only at the end of the empty part of the first mold. Make as we all channels of wax around the legs &, around the contours of the body, which are a little long & they will serve as a trough for the molded thing.

right-bottom

Follow here above

fig_p124v_3

<https://drive.google.com/open?id=0B9-oNrvWdlO5STY2ZEPOSXFVWXc>

left-bottom

When the tail, which is delicate and closer to the gate comes out well, the rest will also come out well.

left-bottom

The most important is that the ears of the snake come out well-molded.

left-bottom

Your gate must be very thin at the entrance of the animal & of the thickness of a knife .

fig_p124v_1

<https://drive.google.com/open?id=0B9-oNrvWdlO5aGQ00TFCTklrQ0k>

left-bottom

125r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f255.item.r>

p124v_3

and with your pipes and abrevouers @, you can also place small threads of wax which are applied to the body so that the metal goes more easily from one part to another and runs quickly throughout. And with these pipes, you can guide

your cast and your vents without having ruined anything.

left-top

fig_p125r_1

<https://drive.google.com/open?id=0B9-oNrvWdlO5ZHJJRXJlU2RFZlk>

small rolls, you make your casts and vents without danger of chipping or [...] any of the mold because the wax, once it has been removed, leaves a thoroughly empty place. Make your vents proceed from the head [of the cast], which is at the bottom, towards the cast. Make your cast so that it is not thick, and make two or three notches inside the passage because this impairs the metal's flow. And it makes it flow easily without filling with bubbles, [and] it does not make too much smoke which dams up the passage. You can also divide it into two or three branches thusly

fig_p125r_2

<https://drive.google.com/open?id=0B9-oNrvWdlO5bDlqQzJZemktSFk>

when it [...] with the molded thing, and always make holes in the cast.

+

p125r_a1Plaster

When you mold something in order to cast with wax, first mold only plaster, you mold with plaster [that is] only reheated after [it] has been pulverized. Because, once [it] has been reheated on the stone slab, the outside is burnt, and the inside remains nearly unburnt. Transparent grey plaster is not strong, but the good one [plaster] becomes white once it has been soaked, and [it] sets well quickly. Nevertheless I have found the grey [plaster] to be quite firm and hard after it has set, but it takes longer [to work with it]. Know the nature of each. You will never mold very neatly if you do not soak until it is quite clear and liquid, your plaster or the core's sand. Soak it straight away after it has been reheated.

left-middleHowever, if you mold with plaster that has been reheated once as said, coat the first mold well with oil. And when the second cast has set and you have prepared it, soak it in water for a long time. And if it does not release, soak it in hot water, because cold water hardens it.

[Something] to know

And hot water softens it [plaster] more than cold water [which] does not penetrate it [plaster] as [it does] mixed plaster because it [plaster] is stronger and mixed plaster is spongy

ier. Medals are cast from this powdered, reheated plaster, [and the medals] will be waterpr
oof as though they were varnished. In Germany, people hang these medals on houses. See to i
t that the water is very hot, and if the water is boiling, it will not endanger [it]. All m
olds [made] of plaster only or molds [made of] mixed plaster are stripped from it.

p125r_a2Scimitars

Workers from Damascus or from Hungary, neighbors to the Turks, separate iron from the mines
with steel. And they cast the blades of the scimitar in sand with this first steel [that w
as] first casted from its mine. Afterwards, they [the blades] cut other iron without withou
t great difficulty because all melted iron is harder than soft iron beaten into [...] and b
ars. Thus is the steel of scimitars, but it is quite brittle. When someone takes the haft o
f a scimitar off, that person recognizes [it] well by the tip in the haft which is cast in
sand.

p125r_a3Hearing from afar

Make a small hole into the ground, put your ear against it during the night or during an eq
ually quiet time, and you will easily hear the muffled sound.

p125r_a4Secret

125v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f256.item.r=.zoom>

p125v_a1Vipers and snakes

I molded a viper, which is much cleaner to cast than any other snake, because it has beautiful & very visible scales on the entire body & principally on the head and under the throat. It has a flat heat, a ruddy snout tending to deep carnation, & thick and short like horned aspic or like the top of a pig's snout, big jowls, eyes very close to the snout, and the mouth wide open where it has double canine teeth on each side coming out of a reed of flesh that covers them and turns back. It also has a reed of flesh in the throat like a dog's penis from which comes its stinger. Other snakes have a double row of teeth.

left-top

If you want to mold snakes with open mouth, you must cut off the head & leave it inside, because it will not be able to be stripped.

p125v_a2Molding turtles

Casting snakes & herbs and flowers is a strange matter, since the cavities that are between the two shells require several pieces. To cast in sugar without making a casting, they are molded from plaster, as works for anything you like.

p125v_a3Plaster to cast with wax

When you want to cast in wax in a plaster mold, you must know this secret, that there is needed that your mold be in hot water. The animal will never come out as clean as in metal, because wax grips. But to rough out an animal as close to natural as possible in order to fix it afterwards, you have to remove all the scales, because the wax will permeate them & will not be able to be stripped off. In molding the animal, take off the scales for wax, but on the contrary [when not molding with wax] rub them against their grain so that they raise up, because then these animals [sc. those not molded in wax and prepared in this way] will show better. Do not wait to strip off your wax until it is cooled down at all. But while it is a bit hot, after you have molded the first casting of the animal, uncover it halfway so that it be stripped in so doing. And having as much in one mold as in the other, make very many large castings holding on to the animal in order to fortify them [...] stripping, & afterwards you'll cut it.

left-bottom

+ Alabaster [...] which is plaster in any case, is very hard, but it shrinks quite a bit. It is good for making medals. But it must be very finely strained.

126r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f257.item.r=.zoom>

p126r_a1

Molding fruits and animals in sugar

Sugar is fatty, and, with it, round things and large muscles are cast well but fine and delicate things [are cast with] difficulty. However, try well-purified sugar. The plaster mold must be soaked in water for a full night or a full day before casting sugar so that it [the mold] is saturated with water and does not soak up the syrup [the sugar mixture]. The [plaster] mold must also be stripped very well from it [the sugar], because sugar is aigre and brittle. Thus, do not cast anything with sugar which is not stripped easily from it, and which can not be neatly molded in two parts to open as will be needed. If you want to mold a grape, you must get it when it is very fresh; because if it is withered, it [the cast] will look the same. See to it, thus, that you make your molds in the natural season for each thing [fruit]. Grapes that one wants to cast in sugar are man-made, either with wax or earth or with grapes molded with melted wax, on some dish [plaste & chose pleine] in a way so that they are pressed closely together and easily stripped from it. And only a half [of the grapes] should be molded. Or, if you have some of those grapes called chauches or sauvignons which have well-pressed grapes, set half of the grapes in the dish of clay, and cast on the other half, and if any grape is not stripped from it, pluck it out. Note that a grape whose grapes are set apart and separated cannot mold well in either sugar or metal because the ends of the cluster are so fine. Similarly, if the grape is kept, that it cannot hold the bunched grapes. Therefore, a hollow should be cast, which you will not be capable of if the grape is not close together and without having them spread apart.

top

to cast and brittle, and [it] breaks when dry

left-top

+ In order to mold pears and apples in sugar, do not cast. Rather, fill half of the mold, and then join the two [halves], and keep turning [it] until the sugar is solidified and cold. Do not mix anything in the mold except the reheated plaster, as you know.

left-middle

The mold needs to have been soaked in cold water for one full day and night and [the mold] must be damp when you cast in sugar.

left-bottom

The sign that the syrup or the melted sugar has boiled enough in the water for casting fruits is when it makes threads when shaking it. And if it passes this point, it will not be good because it will make [it] damp. If the sugar corrodes itself, throw a bit of amidin in the mold or rub it with an almond.

126v

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p126v_1

Crocum ferri

It is made more quickly from iron rust than filings, because if you have good vinegar, it will bubble on contact with rust as if it were boiling, as if it were on fire, if you use filings it will not bubble up unless it is placed on the fire or warm ashes. However when you have put your filings through vinegar, and it has evaporated, and heated up and made it very warm, should you do this all for a second time, the vinegar will be a lot stronger and your crocum will be much more subtle and red. Those who use it to cast in gold buy it for forty or fifty sols per ounce.

left-topIt does not harden molds, and when you scrape the mold you cannot tell that it is harder. But it does make the mold more thinner, and it absorbs and attracts gold better.

p126v_2

Plaster

You can mold with it as large a piece as you wish. But if you make a mold upon large works and pieces of wood, it will not release cleanly unless you lather your wood with very hot wax. Because the wood absorbs and drinks, and because of this, it drinks up the plaster, which means it does not come out cleanly. You can assume the same thing will happen for any other large piece of wax. But the cure for this is to lather the work that you wish to cast in plaster with very hot wax. In this way, it will not absorb, and will release very neatly.

left-middleIf the plaster shrinks, it will always make flaws, look for harder plaster and rather than casting it, press your molds well.

left-middleIf it shrinks, it is not good plaster.

p126v_3

Plants that are difficult to burn in the noyau

Any herb that has a hard stem, like wood, is very difficult to burn in the noyau, such as a sparagus, thyme, and other similar things, because they remain as solid coal in the small conduits, and if they are not reduced to ashes, it is not possible to remove them from the mold. In this case, some reheat them two or three times. Others in mixing some herbs together in the mold, pass through the herbs and the earth circle, which is there to receive the tempered sand.

This is not due to the fact that those herbs have stems with lines in them because rosemary burns well. This is due to the nature of certain herbs.

127r

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p126v_3

some thread, as much to secure the herbs so that they do not rise when you throw in your clear sand, as to give them some circulation when they are reheated. Because by doing this the thread burns away and leaves some empty space around the herbs which acts as vents, and places for the air to escape, and places for the air to enter so that they burn more easily; because what keeps them carbonized, is when they burn in a closed fire with no empty spaces because of the fine sprigs. Therefore try to enlarge the main stem with a bit melted wax and leave it to cool. Then mold it. And when the wax melts, it will leave the main stem sitting comfortably and almost loosely so that it burns better. Or you could apply some petrol oil, sulphur, turpentine, brick oil, or similar things, or with aqua fortis or spirits, or make your sand with . Or make your sand with crocum filings of iron lumps or iron esmeri which allow for several days of high fire.

Animal bones are not as difficult to burn and reduce to cinders, because their flesh being burned, the bones remain loose and the heaviness of quicksilver makes them break and be crushed, being calcinated and burnt.

left-topAsparagus always remains carbonized like little pins. Try to take asparagus and thyme when they start to grow, so that the stem is still tender.

p127r_a1Plaster mold for wax

When your plaster mold is done and dried, be sure that your mold comes off cleanly because it sometimes happens that the animal, having been wounded or having lost weight or having withered, has wrinkles where plaster can get in the scales. Having not been rendered well, the animal will attack itself and break and will never be perfect. Be also advised to make your casts for wax very big. In this way, your casts will not be too thick. They are done when the mold of both sides is done and when the animal

fig_p127r_1

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has been removed from the mold.

128r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f261.image>

p128r_1

Casting with gold and silver

To cast silver and gold do always put a little ground stone of borax on the bottom of the crucible, and put your matter on it. That way the acid smoke won't corrupt these two matters, but it is especially efficient for gold.

If you have several molds to cast, do not fill them all in one cast, because metal would get cold. Cast one after another.

When your mold start being red inside, look at the cast, if you do not see any black spot keep the same heat, and if needed, add a few half lighted charcoals with the help of pliers.

However, put ground borax at the bottom of the crucible, and put silver on the top of this matter, then put your crucible into the forge, reheat your crucible which is between lighted charcoals, until it becomes red; do not blow before that. When you'll use the bellows, make continuous longitudinal moves, tug a little bit the bellows, push and pull, that way the heat will become greater. From time to time remove your crucible out of the top of the forge with the help of your warm pliers, because if your crucible is close to the tuyere silver would cool down rather than heat up. That why it is better to put the lighted charcoals above the tuelle, three fingers far from the wall of the forge. That way the crucible is heating much better. When your silver starts melting, if you find that it is too acid by noticing that the lumps are cracking and bursting, take the size of a walnut of arsenic, and twice as much of crude tartar which is coarsely ground, that way it will heat better. Pour some of this mixture on silver in the crucible, it will get clearer. But if you have some of that sublimate crust on the metallic matter, and which looks like grains of steel, # put some of this matter in your melted silver.

right-top

Some people leave the silver to rest a little out of the heat before casting.

left-top

silver and gold which are melted with the above matters won't become porous.

left-top

For gold, you need not as much crocum as stone alum.

left-middle

Small molds can be reheated soon. But you should oven-dry large and small molds because dampness go out of the mold with the heat. The intense heat of charcoals drives the heat from within outside.

left-bottom

All silver alloy make chape and all other metals too.

left-bottom

Silver should not be peeled off when [still] molten.

left-bottom

Coarsely powdered.

bottom

Lumps of deteriorated silver vitrify red because of arsenic and orpiment.

p128v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f262.image>

p128r_1

You will see that it will stir it and heat it intensely and soon will make it quite liquid and ready to cast, and lighten it as it should. When it is in that state, very white and polished, shiny like quicksilver, be ready to cast. To that end, have thin, diluted sand in a pot or other vessel, which will be helpful to your mixture. Make a hole in your sand, and with you pincers put your red hot mold in this sand hole. Cover immediately the opening of your mold so that no ash or dust enters in it, and then surround it with sand up to the level of the gate and the vents. This done, peel off your mold and cast you well molten silver, the size of a pea of this metallic grain, which will immediately spread your silver all over, making it boil and cover everything. Cast as soon as you have spread this matter; that is the secret to make silver run, because its crust heats up and lightens it up. You can cast silver thinner than the Capital league [norm], as the royal one.

left-top

Don't forget to add first some borras in your molten silver, even if silversmiths do not. However, it is good to do it and I have seen it done. Then we add matter from the crust twice, and then some of the metallic thing. Keep it from [illegible] that be laid at the very end of your forge.

left-top

Si tu want to blow away the ashes that are around your mold when you hold it with your pincers, hold it upside down and blow.

left-middle

When silver is well melted you can expose and blow it with a small bellow, but not continuously like you would do for gold, to get rid of the charcoal and fill it only with matter that make it runny.

p128v_1

Whitening of cast silver

People, even German people, commonly cast silver of poor quality. Because this kind of alloy produces defects and crusts, some silversmiths are eager to whiten their works, including the coarser ones. To do this they mix an equal part of tartar and common salt in their bullitoyre. I saw an excellent German working that way. In my presence, he casted a lizard with a teston league alloy, which had produced a dirty crust. To clean it, this German boiled it in a bullitoyre with tartar and powdered common salt mixed with common water on the fire of his forge. Then he scrubbed it because he thought it was not neat enough. From this crust he burned tartar on a piece of paper until it was black and did not smoke anymore. Then he diluted this tartar into the water from the bullitoyre, and covered all his lizard with this. Then he put the lizard between red hot charcoals in the forge, and he blew a bit. When the lizard became red, he removed it, let it cool, then reheated it with the bullitoyre mixture, and scrubbed it into clear water.

left-bottom

+

Note that the bullitoyre for silver is not appropriate to use in a crucible because the tar tar evaporates. But the vessel, being made of copper, is excellent to whiten silver and for the mixture which colors gold.

left-bottom

He made sure that his tartar water would not boil over, because its strength would disappear, so when this first boiling happens, remove it from the fire and put it on again. He held this burned tartar mixture put on low quality silver to be a secret.

129r

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p129r_1

Painting metal herbs

If you are in a hurry it would be better to dilute your color with a gum not too thick because its oil takes a long time to dry, and it runs if thinly applied, as you have to do with herbs. If you are still in a hurry, dilute your color with egg white beaten with fig peels; and your work will soon be dry. But do apply it thinly.

p129r_2

Wormwood

The pallid white of this herb is made from green verditer, white lead or ceruse, a bit of massicot, scudegrun, and cendrÃ© d'azur. Mix and arrange your color with a branch you have.

p129r_3

Viper color

It is the most beautiful snake to mold, because it has very beautiful scales, round and transparent. Its natural color is made from good verdigris well ground, with good vinegar, if it is made of lead or tin. And in the darkest parts, season this first color with a little sulfur, as you know. And if you need to lighten and whiten, like under the throat, rub these parts with a rough cloth. Because of its nature, the male ejects a kind of small lump from its backside when pressed, like a half arquebus ball, made in its genitals, and full of highly poisonous prickles.

left-middle

+ Add a bit of looking-glass tin in your tin; your lizard will look as if made of silver.

p129r_4

Molded roses

Roses are molded with difficulty because of their petals, which are very delicate, weak, and doubled. To avoid this, rub them with wheat oil which is very dessicative, and once dried it stiffens and firms up the leaves to separate them and for them to withstand soaked sand. Do the same thing with flies, pansies, and other delicate things like capers.

129v

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p129v_1

Animals oven dried for a long time

Stick your animals on a slab of earth, fix them with sharp pointed iron wires, as if you wanted to mold them, then dry them into an oven as hot as when bread has been taken out. It is the same for snakes, birds and other animals. But they have to be promptly dried.

left-top

Note that you have to arrange them and put them into the sand as for flowers, and promptly dry them in an oven as warm as when bread has been taken out. Leave it there one day and one night in order for them to be very dry, otherwise it would stink. However, be sure that the oven is not too hot, it should be as warm as the sun in June, otherwise the animals would cook. Once they are dry, do not soak them; clean them with a brush or a paintbrush.

p129v_2

Animals casted in copper

Once casted in copper, try to burnish them as we do with leaves made from gem, to see if they will get the same color.

p129v_2

Advice about casting

Be careful that your cast is not too thick, and do not forget to make 2 or 3 holes and notches in the conduit, when your cast is coming near the molded thing, divide it between 3 or 4 parts like fingers, and not deep. Thus the metal will run more gently, without preventing vapors and smoke.

right-middle

Always make the entry of your cast close to the medal and the notch, when lumpy, it will lessen the metal's fury.

To cast a spider on a leaf, and to prevent the sand from covering the under belly, fix a bit of melted wax at the end of its tail, and bottom part of the body, with the help of a warm wire as you know. Once the leaf has burnt and the wax has melted, two small holes remain on the leaf, that will be the cast of the spider.

p129v_4

Casting a spider on a leaf

Usually big spiders have hairy legs, which are difficult to mold if you do not lay hairs down flat, or if you don't burn them with the flame of a candle, or if you stiffen them and lay them flat by oiling them with wheat oil. Kill them into vinegar and urine, like snakes, or in spirits. Then arrange your them on a beautiful vine leaf, or another leaf, then you can make the undisciplined hair look like tamed hair by rubbing them with mouth glue, or something similar. Their true color is vinegar or greenish. And season with sulphur in random places. Arrange your slab of clay and place your vine leaf on it, your dead spider in the middle. Pierce the middle of the spider's body with the tip of an iron or latten wire. Then fix diagonally some small latten tacks all around the vine leafs in order to secure it. Then block the end of the legs with a bit of melted wax using a warm iron wire, and smooth it out with the tip of a pair of small pincers. do the same with the other edges of the spider. Return

ø\237\234\212

left-middle

ø\237\234\212

When the wax is cool, scrape away the superfluous parts with the point of a penknife, that way the end of the legs will stay neat. Then arrange the disc of earth around the spider, and cast your soaked sand, as you did for others. In this fashion you will have to burn the vine leaf in the mold. Otherwise, you will not have to. To cast your spider more easily, make sure the animal is dead, avoiding the entanglement of its legs while agonizing. When you have done your first cast, peel this side of the leaf, then do the second cast.

p130r

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p130r_1

Drying animals in an oven

One can skin small cats and remove their eyes and all their guts. Then place a small stick vertically between the teeth in order to open their mouths. Then with iron nails one should attach their feet to a small board, arrange the required position. Once they are tied by their feet with small iron rings, one has to hang them upside down into the sun. By doing so, they will get the right shape and dry, the belly will tighten and the tail will remain high up thanks to the twist that you made. Once they are already a bit dry, one may twist the head as he wishes and secure the position with any tool. One may finish to dry the animal by placing it in an oven once the bread has been taken off. Then place some realistically painted lead balls or wax balls in the eye-sockets. One should paint them with gummed ink so that they look like jet. One can add a painted tongue, or horns, or wings or anything you may imagine, same goes for rats or any animal.

p130r_2

Reddening lively crayfish which will look as if they were boiled

Rub your crayfish with good vinegar diluted with a little eau-de-vie and not much, then you can present them as if they were cooked and yet they will walk.

p130r_3

Molding a single spider

One has to display it on the jacket of clay as it is said for the vine leaf. Then do the first cast. And once it dry, peel the mold off to the middle of the legs and do the second cast.

p130r_4

Molding a single vine leaf

Attach it with brass wire points on the jacket of clay and then cast the first mold. Once it is dry peel off the back side and make the second cast. Then peel away the back side, and make your second cast. Once it is dry, you may remove the leaf. You must heat your mold only once, because there is nothing to be burnt inside.

left-top

fig_p130r

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which surround the fingers of the paws and which stick in the jacket of clay.

left-bottom

Also. One cannot mold the hairy legs of big spiders or any other hairy animal if they had not been rubbed with wheat oil before they are laid flat. This will make the hair firmer and will dry very quickly. Hairy things entangle in the sand, and do not burn very well.

p130v

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p130v_1Molding a crab

It is a secret and a masterpiece to mold [a crab] well because it is necessary to proceed differently [than you would] with other animals, because its shell is quite difficult to [...] and that is why it is necessary to reheat the mold three or four times. And on top of all that, it leaves a hard crust [that is] gray like ash. It is not molded from one piece and one cast as [is done with] plants. Rather, [it is moulded] in two casts as [is done] with serpents which are easily stripped from it [the mold]. After it is opened, nimbly remove the crust with the very fine point of a pen-knife {and not with quicksilver which removes nothing from it} and likewise those small crusts of the second cast which get into the cavities that the sand or the molded animal made because it has curved legs. Here is the subtlety and the secret of stripping it. As you molded it [the crab] from the back side in the way [that you did for] the others [animals], remove the stomach and all the curved legs from it. Make your second cast in the way [that you did for] the other [animals], but as it will have set, take care that you not open the mold unless you have first reheated it well. Otherwise, because of its curved legs, you would break the whole thing. Herein lies the subtlety. If, after it has been well reheated and opened, you see that the crust is not burned enough, reheat [it] until it is burned [enough].

left-topIt [a crab] can be painted like a crayfish.

left-topIt does nothing.

left-bottomFor opening the mold, it is not necessary to soak it because, once reheated, it will open itself by itself.

p130v_2Stag beetle

Like a crab, it [a stag beetle] is also difficult to burn, therefore do [stag beetles] as you did crabs.

p130v_3For molding thinly

After you have molded the first mold as the core, leave it to dry well before removing the figure from wax, so that the mold is not ruined. Afterwards, then make a small lasagna of paste as thick as you like, and, once you have greased the cavity of your first hollowed mold with butter, apply the paste to it [the cavity of the first concave mold] and then the upper part of the second mold. If you grease [the mold] with oil, it will be soaked up [into the mold] and it will not be as clean as butter.

131r

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p131r_1Herbs difficult to burn in the mold

Mold them in two or three castings; being annealed, your mold will open, and it will be easier to extract the charcoal from inside.

left-topTry [this]

p131r_2molded letter paper

Write with some ink well thickened with gum or any other color dye which has body, and which is not erased if dampened with brandy. Then put your paper on the sheet of clay, and dampen it with brandy. Cast both sides [of paper].

p131r_3Adorning beds, mirrors and similar things

Model any drawing in half relief on a flat slate in order to set it on round or flat things. Cast with very fine tin, then you can gild it with gold leaf, and set it wherever you want. Fill the bottom of the relief with small rubies, orpiment, or any colored little grains.

p131r_4Training a dog

You need to keep your dog attached; when it does what you command, to win its love, give it a piece of cheese which was held under the armpit. This cheese would be a bad drug if the master, or the apprentice, is red-haired.

p131r_5Molded wax

Wax representations made from white lead and cerussite are not made to be burned and melted in a mold where you want to cast silver and gold; this would make it brittle. Moreover if you use such a mold, the wax would be stripped thanks to the violence of the fire which makes it boil, and the mixture made of cerussite or any other metal would attack the mold. That's why if you want to sketch things

left-bottom

+White wax is more delicate than the other, and it doesn't leave any filth when you want to mold it as a core, or to mold hollow.

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p131r_5

to be cast with gold and silver. Do not add to your wax all the drugs you are preparing, but only melted sulphur, as the candle melts, and also candle smoke. Melted sulphur falls down to the bottom of your mold, but lets the wax keeps some of its quality, melting it but leaving it a little firm. You can thus melt your wax representation on fire. If your wax is composed of cerussite or something similar, you need to put your mold into boiling water.

left-top You don't need all this to mold flat representations made of wax, because the wax can be removed completely from the mold, and won't remain inside it.

p131v_1 When lead or tin casts fill with bubbles

If your casted work became porous, it can be repaired with very firm wax, and you can gild or silver it afterwards. If you cast fine, the alloy of one $\frac{1}{4}$ of lead to one lb of tin is good. But if you cast with lead [lique illegible], indeed you need one lb of lead to two $\frac{1}{4}$ of tin, because lead is fat and sticky, goes over the alloy. I have cast a very small lizard that way. If you cast something thick, which keep the heat for a long time, it will make bubble if there is not enough tin. Your mold should not be cold, but cool enough that you can hold it without burning your hand, or that you can hold your finger into the cast without burning yourself. Your tin or lead must be like red. Cast your lead first, then cast tin. When you are going to cast, add a piece of resin to your mixture, then a little looking-glass tin. If you add too much lead to your tin, the mixture wouldn't be fluid enough. To know [the right proportion], If tin cries loudly, it means that there is not too much lead; if tin cries softly, it means that you added too much lead. Be wary

left-middle You can solder with the same matter, then rework it and [remove away all the unwanted thick parts] with a burin.

left-middle

Tin is a metal that can [â\200|], makes bubbles and burn, and more capricious to work with than gold and silver.

left-bottom

Lead must not be only red, it must be quick, and as liquid as water, which is a sign of its perfect heat. Your mold must be so hot that you couldn't bear to put your finger into it. Do not open your mold until it has cooled down. Just as for silver and gold, it is a sign of good casting when lead comes out through the vent holes.

p132r

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p131v_1

not to heat your mold too hot because it makes it brittle, it makes bubbles and shrinks tin, and would also break the molded thing. Do not dip you hot mold into water because tin and lead would shrink.

p132r_1Mold made from two casts

It opens once anealed. To clean it after, fix the clamps again, lute the mold, particularly the joints. Then let the earth slowly dry. When it doesn't smoke anymore, let the mold cool down until you can hold it without burning your skin. Then put your molds into the presse s, or into a pot filled with sand, and cast with tin. If you cast gold or silver your mold needs to be cast twice, and cast when your mold becomes red-hot.

left-topIf your heated mold [â\200!], shrinks because of the bad quality of the plaster, open it after the first heating, tighten it, the lute it and clamp it again.

p132r_2How to anneal the molds

Light your charcoals from the forge, then place them in a line in a corner of the forge according to the size of your mold, in order that it be surrounded with 3 or 4 fingers of charcoals, particularly at the bottom of the mole, where it is thicker. Then put your molds on these charcoals -- and not on a grate as some people do -- because they would get too strong a heat. Let your furnace heat up gradually for a while, always adding burning charcoal. As long as the mold is humid, your charcoal will be dampened at the bottom, but when it is dry, the charcoals start to blaze. When one side of the mold is dry, turn over; when both sides are dry and don't smoke anymore, increase the heat and cover your mold with burning coals. When the mold starts being red, do not blow on it with small bellows, because the mold would burst. Similarly, when your mold becomes red-hot, keep it well covered with burning charcoals and do not uncover it because it would crack. Prevent the draft from a window from reaching it. Then let it cool down.

left-middleWhen you want to anneal your molds, luted or not, do mark the belly of your mold, in order to place that side at the bottom, against the burning charcoals, because if the intensity of the heat made the mold crack, it would be better that it do so on the bottom part instead of the top part.

left-bottomIf your mold is small, do not heat it as long, otherwise it would crack and be damaged.

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p132r_2

dry by itself. When your mold starts to redden, it will soon be become completely red-hot. But make sure that its bottom is red-hot too, without any black spot.

p132v_1 Common quarry sand

In a frame, If you cast it hot, sand will bubble; thus you have to just dry it.

left-topI have tried to prevent molds blended with sand from cracking when annealed, and thus not get any with flaws that crack.

p132v_2Crocum ferry

After I processed it with vinegar and reddened under heat, I had it ground very finely on the porphyry, until there could be no ruggedness felt under the nails. Then I soaked it in very good vinegar for 2 or 3 days, stirring the mixture several times a day. Then I boiled it and made it red-hot in a pot, and put the whole thing into an air furnace. I obtained a mass full of eyes, but that crumbled finely between the fingers. I mixed half as much as stone alum in the sand. I diluted the sand very thinly, and molded a very small lizard, which molded very cleanly and finely. Crocum ferry does not make the mold harder, but makes it firmer. When your mold is soft and fat under your nail, it means that the crocum is good, very fine and well prepared. You can add any quantity of crocum, your mold will not be damaged because it is a friend of gold. I think it would be the same with silver. And in order that molds made with it do not crack, make it with needle filings.

left-topSand is better made with distilled vinegar.

left-middleYou can add this sand to the molds you want to use to cast silver, because it makes molds firmer, and when you scratch it, you will find it a bit rougher than the other molds not made from this sand. You mold very clean with this sand.

left-bottomYou can use this one for all molds, because it prevents them from cracking and bursting when heated. This sand withstands several casts for molding flat medals. Sand from steel or needle filings is redder and better.

p132v_3Gilding animals casted with silver

You can gild them with an amalgam, the lines won't be damaged if they are made from silver.

133r

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p133r_1

Hard wax to imprint seals

One makes these [seals] out of white wax which is harder than the other and one mixes in it some cerussite or leaded white very finely ground such that it is as hard as you like and mix in a drop of turpentine to bind it. Afterwards mix it in the color that you want. It is in wax that serves goldsmiths for modeling.

p133r_2

Casting the feet of small lizards in gold and silver

Because the feet of these [lizards] that are very small are [also] very fine, once you have molded the top and you have uncover the vents and underneath the feet are covered lightly with wax, and then cast a second mold. And the wax that one removes, it leaves a little cast for these said feet, and again such that the underneath [part] comes out in one piece that you can repair well, And the scales on top of the toes come [out] well.

left-top

Around the big lizard nails, put on each a small round of wax to make the cast like this.

fig_p133r_1

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left-middle

p133r_3

Marks [made by] the [pin] points of iron thread which one finds on the head of an animal

With the points [or pins] with which you have dressed [your animal] all over, do same with the head, but [out of] the head which is pierced, a certain moisture seeps out around the wound and this little exudation prevents the sand from covering the point well and there always remain little pinpricks. But to avoid this, you can plant in the plaster of the said blunt pin point and around the upper part of the point, and over this point, there put a little hard wax or a little mastic or cement. And by the medium of the hot thread of iron there you can hold the throat of the animal which one removes [the iron] when you come to uncover the vents and the throat for doing the second cast.

p133r_4

Clamps and the broken mold

When you have done the first firing and taken off the clamps and you have opened your mold to clean it by taking off the bubbles with quicksilver which one cannot do with closed molds, reclose the mold and reattach the clamps but not in the same place as the first time. Reapply lute and dry it but if this is for casting silver or gold [use] lute with the rest of sand which has been used because this is the best netting. If your mold is broken in refiring you can augment it with clamps and lute.

left-bottom

X

133v

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p133v_1

Porosity and little holes which are in the mold

It often happens when you cast two or three molds one after the other using the same dish, because the last casting comes from the bottom of the dish and is thicker, and then often the last cast which comes from the bottom and which is the thickest of the dish, may easily become porous. Cast thinner and neater, as long as you blow very strongly on the soaked sand while casting in order to clear the little air bubbles.

left-top

When the sand is casted thick, it often becomes porous

p133v_2

Thing that cannot be released from the mold

You must cut it inside the mold in order to burn it. Cut it with scissors at once, that way blood doesn't flow on the mold, and doesn't make dirty. Because this dirt would be removed with difficulty when reheated. Then place your mold into a furnace, or something similar, in order to quickly dry the mold which must be removed before the forming of crusts or molds.

left-middle

+

When you mold small lizards, and when you want to peel away the first molded part, start to peel away the heads, you will know its place thanks to the needle.

Don't peel away the legs before peeling away the entire body, to avoid that the naked body, moving, doesn't remove the legs from their place, which would not be easy to put back into place. When you remove the small needles fixing the legs, block the legs or press the legs with something, that way while removing the needles the legs won't move; finally, you can fix the legs again with wax.

p133v_3

Various animals entwined

You can entwine a snake with a lizard, each one biting the other, or a snake eating a frog, or a wall lizard or something similar. But since these interlacings cannot be stripped, cut what's possible, and allow the rest to burn. To make the mouth of the snake, which must stand high, hold a wall lizard, which is small and would need to be held in the air, because the snake's head is higher, put under the wall lizard a mound of earth suitable to support it. And if you place the mold in a furnace, the animal drying quickly, it will quickly shrink, then it will burn more easily. These interlacings are also made to mask wounds or defects on the animal which happen when we catch them. Do not forget to join with wax, applied carefully with a hot iron wire, all the parts of the animal which are one on top of the other, or those which are not well pressed on the slab of clay, so that the soaked sand does not remove them. Do that in order to

p134r

p133v_3

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p133v_3

avoid putting pins that should not be put, only on the top of the head, the thickest parts of the body, and on the delicate parts like the middle of the lizard's feet, the nails of which you will drive into the clay, thus they won't move. Once your first mold is casted, peel away the belly of the animal, but do not forget to put some tenuous little pieces of wax at the tip of the lizard's feet. But if it is from a wall lizard, lightly cover all the sole of its feet with wax, which will be removed with the second cast. A cavity is left which will be fill these little fingers with metal. then rework it. Make sure that wax is fixed well on the parts of the animal which are one on top of the other, so that the soaked sand which comes in does not make them move. If that happened your jacket of clay would be spoiled and your mold wouldn't get the right thickness, would have holes, and would be spoiled. To obviate that you can make a thicker mold. If this occurs you could rework it in this fashion.

p134r_1

To repair a pierced mold

If the molded animal pulls of in certain places, moves from the place you had fixed it, or has not completely died, or if you didn't fix it well with the iron pins or with the melted wax, or if the animal hasn't the right thickness on the outside at the relief, or if it is pierced, instead of removing the animal from the mold, peel away the weak parts, or the pierced part, and make holes all around these parts, then dip the back side of the mold, quickly cast onto this place with the same soaked sand which will go into the holes, the cast will adhere to the first cast. But you will have to lute this spot afterwards.

p134r_2

Sand made of crocum [ferri]

You can use the mixture made of crocum ferri to cast silver or gold, this mixture will make these casts firm, and prevent these from cracking and making burrs. And I believe that for flat things, it would withstand severa casts. Which however is not commonly done for gold and silver.

left-bottom

Try crocum ferri for lead and tin.

134v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f274.image>

p134v_1

To make gold fluid

Put as much verdigris as sal ammoniac, as much borax as saltpeter. But don't add a greater quantity of borax and saltpeter than half the quantity of verdegris and sal ammoniac, in fact add as much borax and saltpetre all together as verdigris. Grind into powder the ingredients on the marble slab, then grind again with very good vinegar until it is very fine, like a ground color, grind verdigris with oil, then leave to dry if you have time, if you have n't so much time dry it with the fire of the forge, make so that it is very dry.

left-top

Grind

left-top

One of the principal things for casting is to cast very hot, especially large metals

p134v_2

Casting big works with gold

Not only should one clamp the mold very well, but also strengthen it with good iron wire links or adequate straps.

left-middle

Before casting with gold, clean thoroughly your forge with lead and tin.

p134v_3

Secret for soldering small works made of gold and silver

If some little pieces of legs cannot be easily removed from gold or silver casting, it is because you didn't cast wax under these parts. Beat some soldering gold very finely, then cut it into very fine flakes, cut the quantity you need. Take some of this phlegm or white and thick saliva which is on the teeth, put some of this matter to the place you want to solder with the point of a burin, then place your flakes, then put to the opposite part a mixture made of a small quantity of soaked fat earth and saliva, thanks to the mixture the solder will better adhere. Then pulverize a bit of borax on it, and heat up Quince pulp seed water to a boil and others too.

p135r

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p135r_1Colors for gold, or sauce

Take as much verdigris as sal ammoniac, & saltpetre the size of a bean. Because if you put in too much, it would make the whole thing boil so much that it would all pour out. Saltpeter is only put in to make it boil, so that you know when the material has boiled enough. This color put on sour melted gold makes it soft instantly.

left-topSoftening gold

p135r_2Casting

It must be lengthened out with respect to the thing you have molded. And at a minimum for large molds it must be four or five fingers in length. You can make it large enough for half the mold & then divide it in three points of such a sort, and so the molded things will [each] be small. But your points must be small. And in the middle of the casting & of its points, make some holes to impede the fury of the metal & make it run more softly. It is also necessary to fix the bent parts of the animal with little notched lines, and similarly the end of the tail and other fine parts so that the metal goes throughout & flows from one part to the other.

Do not forget to make a wax cast of the paws of [illeg] & things as subtle as this.

left-top

When you have molded an animal in the first part of the mold, do not let this part dry out before you have removed the said animal, because when the mold dries out it will shrink and it will also make the animal shrink. Keep it therefore in a damp & humid place until you have done it.

fig_p135r_1

<https://drive.google.com/open?id=0B9-oNrvWdl05U3BqOGxwTHNPevk>

left-middle

left-middle

Vine leaf is painted with a green made of scudegrun & verd de terre.

p135r_3Vine leaf and small frog

To mold, take vine leaves as they are blooming, just as with all herbs & flowers, or a young vine regrowing after it has been cut or when the leaves come off in autumn, because new leaves are knottier & have more evident veins. By contrast, old leaves are smooth all the way through & full of holes in many places. Place therefore your leaf, its back behind it against the clay plaster, and fasten it with little pins. Leave it nevertheless with its natural curling. And make a notch in the clay to hide the stem for the first cast. And when it's done and dry, take out the stem of the leaf and clean it well with your jacke

t and press it with a little scoop of clay. Afterwards, make many castings around the leaf with wax, as you know well, & make a slender casting & with many lines & knots.

left-bottom

You can cast a spider or frog & whatever you like on the leaf.

135v

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p135v_a1Casting gold

Take a crusol that can contain a certain amount, as you wish to place roughly crushed borax into it. Place [the borax] at the bottom and then the gold on top of it. Arrange the coal in the forge in such a way that the wind of the bellow will blow above the crusol and not on its side as it would cool it down and would not heat it enough. Also, make sure it is three good fingers away from the wall of the forge so that it is quite surrounded by coal. Allow the crusol to anneal until it is quite red. Then, have your boy strongly blow the bellow with long pushes, as in this manner it heats it better. Meanwhile, once the gold will be melted, blow a small bellow above it. Because [otherwise] the gold would turn sour and would acquire some kind of coat. As long as there will be some swirling smoke as you blow this way, it means that it is not soft enough for the cast. Therefore, uncover the melting pot and without displacing it and without stopping the bellow, tilt it towards you so you may well see what is inside. Throw a ferue of borax in it and blow wind towards it with the small bellow in a jerky fashion. Should there be coal inside, blow a bit stronger to make them come out. And if the gold still smokes and swirls, add borax again and blow above it. Beware that it is still sour and not soft enough, it will show a coat when you blow it as if it had cooled down. By contrast, if it does not show this sign, it is soft enough. Then, blow strongly so that it [the gold] is quite heated and once you think it is hot enough, throw colour on top of it in the crusol and the colour should be composed as following: verdigris, saltpeter, sal ammoniac, and a bit of borax. And continue blowing with the small bellows, and the gold will turn shiny like

left-topIf you cast in gold some piece of important [dimensions], lute your mold with the same sand or put crocum on it.

left-topIf you wish to cast some large work, or of important [dimensions], create at the bottom or at an extremity of the forge a vented furnace where you may hold your mold in the sand so red.

left-middleOne may cast two or three pounds of gold.

136r

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p135v_1

[FROM PREVIOUS PAGE: And continue blowing with the small bellows, and the gold will turn shiny like] a mirror. And once you will want to [start] casting, put a bit more colour in and let it rest a little, still blowing wind with both the small and the large bellows. Finally, place your mold quite red between the small molds or in a crusol full of sand quite hot and [start] casting. And once it will have stuck, you may, if you wish, throw it into water as gold does not get damaged like tin which breaks.

To melt gold bullion, there is no need to blow above [the crusol] with the small bellow.

For large works, the crusol made of sand has to be placed in a wind oven so that it is all red at the end of the furnace.

Gold, when exposed to wind or when forged becomes black. But a bit of aqua forte removes [the black] instantly.

If you have to forge a work made of gold on brass, as is done on small statues, put a lead sheet between the gold and the brass, and rather than anneal it and put it back in the fire, dip it in the aqua forte and it will be soft.

It is enough for the cast to be of the same thickness as the medal, that is from the middle of the cast, up to the medal. But if the medal is very thick, one should not thicken the cast as a result, because a thick cast never comes out well. It may be done large to embrace the medal as much as possible.

p136r_1Enamelling thin works

Goldsmiths polish the gold leaf using a burin and then they apply the enamel onto it.

136v

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p136v_1

latten casting

Take latten from skillet pans, used to make baby's cereal, which is doulx and apt for the cast. Some people say that counter from Germany contain a lot of calamine. However, when they are tempered, calamine evaporates, calamine mixed with melted latten always evaporates, because latten becomes red again, thanks to the reiteration of melting. However, fresh calamine and only fresh calamine, which is blended with remelted latten, makes latten run, and allow a clean cast. Because calamine which is added to remelted latten is half-damaged compared with its natural state. This half-damaged calamine make latten porous and agitated because it has a tendency to evaporate. Thus add only very fresh calamine to melted latten. Make sure to cast your mold very hot, you mold must become red-hot, like molds to cast gold, silver, copper and metal. If you pour fresh calamine, avoid its smoke which is pernicious. To cast a medal, I took thirty counters from Germany and xii clous de rosette made of doulx latton, like for claires medals which are made of soft latten. This matter contains a lot of calamine like all kind of yellow latten, and make a lot of smoke which prevent latten from running, and make it porous, that is why it is necessary to make many vents and to cast very hot, latten must be as white as water, or as melted silver or as a polished mirror of steel. The second fusion will come out much better because evaporated calamine does not make as much smoke. If you use a molding frame that does not break and holds its own, the second [casting] will come more neatly out of the mold, because the frame is impregnated with the smoke of calamine. If you add sal ammoniac to your latten, this latten will be clear and shiny, but will be even more shiny with huile tingente. Do not use another sand than the above mentioned to mold a noyau, and the mold must become red-hot, like a mold to cast gold. Make a lot of vents. If you cast yellow latten with the prepared tutty you will not get any smoke.

left-top

This metal is capricious to cast because of the smoke of the calamine. Do not leave it out of the fire, as some do with silver. Because when air or wind touch it, the mold gets cold at once. When you cast it, this metal always leaves burrs, like when casting glass. Foundry workers do not usually use this very yellow latten as much because of the calamine which is heated. They cast red copper and turn it yellow with fresh calamine, or with some prepared tutty. Before casting, clean it with charcoal with a quere made of copper or iron. Then cover it with a cloth soaked in lard blended with saltpeter, or sal ammoniac, in order to protect it from wind, which would cool it down.

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p137r_1

Casting red copper

Pure cauldron red copper, or copper of any other small works, is good to cast. To make it runny, add some sal ammoniac to it, and when you are about to cast, add a little bit of fine tin. One must cast the copper very hot into the mold, so that it is burning and very red, like gold, silver, latten, and metal. You will know that it is hot enough when it is clear and shining like a newly polished steel mirror, or like melted silver. Protect it from wind so that it doesn't cool down too soon. Cover your cast with tow in order to prevent it from cooling down. Red copper is cleaner than latten, which smokes a lot, which prevents the metal from running. I have moulded it as a noyau very neatly, and as thin as a piece of paper. It must be very hot, white and shining like melted silver, or a mirror. I have moulded it as a noyau with the same sand mentioned above.

left-top

It takes more time to melt copper and latten than any other metals, even red copper. It will run and will come out well if you cast it very hot, and as thin as water.

left-top

Remove your mold from the fire, and set it into embers, which should fill a pot or vessel.

p137r_2

Huile tingente to make metal runny

Take some mercury, some real sublimate of Venice, and not sublimate of arsenic, aes ustum a poix, sal ammoniac, a poix. Ground everything separately, then blend them together in a glass bottle, and put it on warm ashes. You will see that everything melts like wax, and will have bright colors. Leave to set, add a small quantity of this mixture on every metal, it will run marvelously.

left-middle

Foundry workers who make large casts to mold statues, clean the dirt from these molds with calamine, and a lot of sal ammoniac in order to make moulds clear and neat. When they want to cast they add a lot of tin. Dampness and cold could spoil their works, that is the reason why even a small source of water in the hole can damage the whole thing.

p137r_3

Clamps

To make clamps use flat tongs made from wire, which is reheated and bent, and hammered on

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anvil. Since those clamps are thinner, they burn more easily, being used in reheated molds.
So use new clamps.

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left-bottom

p137v

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p137v_alWetting sand to mold flat medals

Flat medals, made of wax or metal, must be oiled very lightly and then touched with a brush of spirits. So that the already moistened mold takes well the oiled thing without rejecting it, one warms the water well in order to wet the sand, because with cold water it would be rejected. It is necessary to oil medals, because they do not expand and in this way would break the mold. Animals, which expand, do not need oiling. The hot water must be of such a heat that you cannot keep your figure in it without it becoming too warm. Wet the thickest sand for flat and solid medals rather than [for] lizards and finer things. Once your sand has set, clean and scrape your mold on one side and the other, and on the bottom edge of the thrown side of the medal, make a notch so that it is easier to take out. Lower the mold, scraping what surrounds the medal, so that on all sides you can take it out easily without it damaging the mold. Then make some gashes around the first mold used to throw so that the second time that you throw in it, it will be identical to the first one, and in the same way, make a notch at the bottom of the mold, where the head of the item cast lies. Also make some [gashes] in the sides of the cast. This done, wet the back of the first mold in oiled water, and after the second casting moisten it with warm water if you have molded your medal in a noyau mold. Having done the first cast, and this one having set, cut around the edge of the medal with the point of a knife so that it comes out of the throw and is not buried in it. Then having made the second cast, and having opened your mold, take away the medal in one go, with two knife points, one on the side of the cast object and one on the side of the head, which is at the opposite end.

left-middleTake care not to oil your medal too much because if the seeps out, it prevents the sand from serving its purpose and coming together and renders it wavy and lumpy. You must only touch the middle of the medal with the tip of your oil brush and then smear the oil everywhere.

left-bottom

Make especially sure that the throw is as wide as you can on the medal and holds it together well. The gate of your cast must always be big and always narrowing as you go towards the medal. Also do not forget to notch the gate of your cast.

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p137v_a1

If you want to cast gold, silver, copper or brass, it is necessary that they be perfectly reheated, and fired on the inside when you cast, and perfectly reheated twice, if there is something inside to be burnt and cleaned.

The molds of animals that you burn must be reheated in such a manner that the animal burns up. But if it has big bones, it is frustrating to take out and often breaks delicate things because of its heaviness. One does not put in molds that can open. It is of ten molds for flowers that do not open because they are cast in one go.

When you want to reheat your molds, fix cramp-irons on the joints, so that when they reheat they will not bend, contract or break. This is done once the cast is made.

The scrapings of the mold can also be used instead of bricks after being reheated, and also the leftover bits of the mold that have already been used. You can also pat it over important things, like works in gold or silver. You can also reheat it and blend it with water diluted with sal ammoniac, like spar from Germany, and is excellent sand for box molds for all metals.

The molds with things that need to be burnt out inside them, those ones will not open until the thing that is inside is burnt, like the molds for crayfish, crab, great-horned beetles. Do not open the molds in which you will burn something, not before the thing is burnt, it could be crayfishes, crabs, stag beetles, pictures, and pieces of wax and black sulphur, which do not come out of the mold [easily].

You must not mold on brick or wood because they absorb and attract water too early, and do not allow the sand to set. The best place for [the sand] is on a fresh layer of clay. And yet, I have experienced that grey earth dries out the mold too quickly. Yellow [earth] is better.

left-middleFor medals, and flat things, the sand must be quite thick and moistened so that it sets quickly. And when the sand is thusly thick, you can shake and move the table where you mold lies, so that [the movement] makes the sand go everywhere. But when the sand is clear, as for flowers and herbs, you cannot shake it, nor can you do it when there is something attached to wax or other things which are prone to come off, such as the legs of crayfish or other similar things. And if by chance your sand is too thick, you must quickly add some water. And having put the sand in the water, examine it until it is thick on the bottom and clear on top. The clearest is thrown in immediately and then bubbles and the thickest is thrown in at the end so that it strengthens the mold.

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p138v_1Talcum mixed with the molds

I used the one from which I had extracted the oil. I crushed it very finely even more into a steel mortar with a pestle [which was] rough like a file. I crushed it very finely into a cottony, downy powder. I mixed it with the sand and soaked both matters together, and I casted it en noyau. It molded very clean and there is no doubt that it will withstand fire.

p138v_2Gold casted very thinly

When goldsmiths have to solder something quickly but don't have enough time to forge it, they melt gold and then they pour it on a cloth or on anything else that withstands fire. Then they flatten it swiftly with a hammer or another similar tool, and it [the gold] is very tenuous and it even retains the impression of the cloth.

Unalloyed pure gold can be cast into a medal but not into herbs and lizards or other very delicate things if it is not alloyed.

A pansy which is oiled with wheat oil can be cast with alloyed gold.

And other fruit leaves, but with branch[es] that are not large and especially the leaves, once cast, can be soldered.

p138v_3Imitation diamonds set into the work

Spread a fine layer of imprinting black wax on the inside of the frame then coat it inside with wheat oil, then dust it with lamp smoke because this color should not be lustrous for fake stones. Having done this, set your stone with a piece of wax then, with a steel point, or a small finishing hammer, join the edge of the frame with the stone, so that light can not get in but be careful not to hit the stone, which would break.

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p139r_1Casting with lead and tin

The way I have done it for lizards and serpents is with two $\frac{1}{4}$ of pure tin for one lb. of unrefined lead that is impure. The mold is made out of the aforementioned sand, common for all metals, when it is reheated, leave it to cool until you can put your finger in it without causing a breach in the gate of the cast. As for the lead, it is melted in a crucible with a bellows' fire until both the crucible and the lead are red. When it gets to that state, cleanse it anew with charcoal or with a specially made scraper or with the puffs of the little bellows. This done, leave it to rest in its red state and you can even reheat it, then if you want, throw in a bit of resin to burn away the filth. However, some think it best not to put any in because it leaves filth. But when they are ready to cast, they cannot forget to also throw in a bean-size quantity of bismuth for each pound of lead. And it must be as red as the melted metal when it enters the mold. If the mold is large, it is much better to put it in a press so that they join well and so that the lead does not come out of the mold. However, should this happen, and that for the first, second or third time your mold does not fill up, cast heartily because for as long as your metal is red it will mix and join with the other one and will come out very neatly like the main one. The same thing can be said for pure tin used for thin things. And that way for doing pure tin is one $\frac{1}{4}$ of new lead for one lb. of the former. Large molds must be put in a press held tightly between two layers of copper, and then bury the whole thing in sand, which is better than ashes, because being heavy, it will seal better. Otherwise large molds are prone to open because the metal is heavy. Some make square molds

left-topWhen the metal is thick, you do not need to cast as hot as when it is thin.

topWhen you melt this often, it becomes sour and fragile because it has to be cast very hot and it makes it half-calcanated. Use new stuff.

left-top+

left-topNote that If you want to cast with cuttlefish bone, they cannot be too warm because that would burn the cuttlefish. For this effect, try paper. If it becomes brown, it is enough, and it is good for casting, but if it blackens the paper, then it is too hot.

left-bottomIf you want to cast paper with writing on it, make a mixture with half lead and half tin. As soon as it is melted, throw it between two pieces of cardboard on a flat place that is level. And with a point of gold or hard wood, engrave on the left the writing that you want. And having poured the lead onto the cardboard, press onto it the other piece of cardboard.

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are made of earth or blades of copper, or iron, or wood covered with white iron, in order to bury more easily these aforementioned molds between the thin sheets of copper, estric or one of iron.

p139v_1Casting wax to mold an animal that one has not got

Take some white wax which is much more appropriate for this kind of work than anything else, because it is much firmer and does not leave as much filth, as much as you need to cast the animal that you propose, and no more. And [take] a half quantity of ground coal and neatly sieved through a cloth or coal sleeve, using it to give some color to your wax, that would otherwise be transparent and you will not be able to see your lines as clearly. Put your wax on the coal fire to melt. And when it is well-melted and well-liquified, have, for a full eared-porringer of melted wax, as much sulphur as a large walnut. Pulverize it. Melt it over a slow fire and when it is melted, do not leave it on the fire because it will become too hard. But take it off and keep stirring it with a little stick and when it has finished bubbling and is as liquified as water, cast it into the wax that you will have previously removed from the fire. And mix and stir both of the them so that they join together. After stir in little by little while continuously mixing, the charcoal that has been repeatedly ground, and in this way it will be very well incorporated. This is how you will know that your wax has gone beyond its ideal heating point, it will release no more smoke, it will start to have lines appearing on the side and not in the middle, and those lines will be close to each other. If you cast too hot, you will not be able to separate your wax from your mold and it would stick to the cast. When it is at the right state, stir it with a little stick so that the pulverized charcoal is well mixed in and has not fallen to the bottom of the mixture. And in this way, throw it in your mold bit by bit and not in one go, because wax is not runny

left-topThis black sulphured wax is for fashioning round figures that do not come out of the mold. And they need to be burned in the moule au noyau rather than be opened like the ones that have something jutting out or an intertwining of legs and arms. And this wax, thanks to the sulphur, will melt with little heat and leave without leaving any filth. If by some misfortune the crushed charcoal remains in ashes, when you open the mold and blow on it, it will come clean.

left-bottomTo make wax serpents or other things to affix to candles, it is necessary to cast them with esbaucher wax of all colors.

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p139v_a1

not like other things. And for this one, you can cast two or three times until your mold is full. Now, concerning this mold of pulverized white plaster & reheated in the manner of the sand from the preceding recipes, you should have made it long ago because it is used many times. But, before using it, soak it for a good hour in cold water, & at a minimum, at least as long in hot water that at first is so hot that you can't hold your finger in it. And note that it absorbs no more, but that it appears very wet overall without water seeping into it. In removing it closed from the hot water, cast your wax in such a state of heat as has been described. And neither the first nor the second casting will readily come out well, hardly, until the mold is soaked. Let it cool down before opening it so that the cast thing not break. You will know that the casting is good when the wax coming back out of the mold is thin and even. Remember to make several castings along the whole length of the mold so that in this way the wax runs better.

Make the first

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casting twice as large as other molds. And if, in the first casting, your work fills with bubbles and in so doing does not come out neatly, it's all the same, because you have to face the fact that the three or four first do not readily come out well. Firstly, you will know whether there are a few barbs that keep it from stripping well. And you will remove them if, on their own, they do not remove themselves in the two or three first castings. And the more that you cast, the more you will do it neatly. And your mold will serve you more than one hundred times if it is well governed. But it is good to soak it one night or one day before casting so that it be well soaked. The same must be done for fruits made from sugar. This wax is very soft & friendly & pliant, like copper. And if it is hard [this is] because of sulfur, which makes it melt more easily than other [wax], so much that you can see evidence on a hot slate. And the sulfur that you put inside will be found the second time that you melt it, [as] cracks on the bottom. Having in this way passed through wax, it will not catch fire at all when put to a candle. And in this case, I believe that it will cast quite the medal [illegible]. One uses the same wax in place of varnish to [illegible].

left-middleWhen your animal is cast, cut away the froth & superfluous things with a hot pen knife. And if you want, plait and wrap it around some stick or candle, put it in some hot water to soften and hold it in turning it around.

left-middleLower the protrusions of the castings so that they be even & that the wax has more silver so that it can run all in one go without turning through the windings of the snake.

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to engrave on silver & copper with aqua fortis. With this [wax] too, one fills the cavity of a relief, & then casts in this cavity, with moistened sand, which immediately takes the relief very neatly. And then you can cast its cavity on it in copper, gold, and silver, and make really singular seals.

left-topSeals

p140v_1To cast in sulfur

To cast neatly in sulfur, arrange the pith of bread under the brazier, as you know. Mold whatever you want into it & let it dry & you will have very neat work.

left-top

Try sulfur passed through melted wax, because it will no longer ignite & and make eyelets.

p140v_2Molding and shrinking a large shape

Mold it with the pith of bread just out of the oven, or like that aforementioned, & in drying out it will shrink & consequently so will the medal that you will cast. By these means - lengthening out or enlarging the imprinted bread - you can vary the shape & from one face make several different ones. The bread straight from the oven is best. And the one which has been heated twice contracts more. You can cast sulfur without letting the imprint on the bread dry, if you want to cast it as large as it is. But, if you want to let it shrink, let it dry to a greater or lesser extent.

p140v_3Casting of lead and tin in plaster

If you want to cast any flat medal or any animal that is not very heavy, and that must not be burnt inside the mold, you can indeed cast in mixed plaster & briques, as above; and not in plaster alone, because it contracts too much feeling an ardent fire if it is not so mixed. But, with the brick, it holds well. However, take heed to dry out your mold at length & on a slow fire & with patience, because there is no need to reheat it. But when your work is of flowers or other things that want their mold to be reheated & set ablaze, mix the plaster with stone alum & even with crocum. I have molded in very neat plaster & brick & it has sustained several castings.

left-middle

I tried both plaster & brick alone and molded en noyau with like the others. My mold was very clean, having lightly oiled & rubbed my medal with spirits. I made my casting wide at the entrance, narrowing it as it goes along until it reaches the medal which is very thin. I notched the casting which embraced the medal well. I dried the mold out well on a slow fire & finally, I heated it well without turning it red. I let it cool in such a way that I could hold my finger to it without burning myself. I made a line of 4 of ti

n, & ix deniers of lead. I cast it red, and it was quite good and beautiful. Afterwards
I put xii deniers of lead on top of 4 â\204¥ of tin. It is very good & beautiful.

left-bottom

When there is nothing to burn in the mold, it is not necessary to reheat it for lead and tin. But for flowers and other things that must be burned, it is.

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Casting a crayfish

The crayfish is one of the most fantastical to cast, but also provides an example for casting other difficult things. You can distinguish males and female by the eggs that the females carry, and by the four little white back legs that males have in their tails after behind main eight legs. It is good to dry them out a bit so that the bumps come out more hard and beautiful, because none of what is made of shell shrinks. It is true that should you dry the little inside legs for too long, they become diminished and have no body. If they are too dry, the flesh separates from the scales. Be sure then to maintain the mean. They have certain hairs between the legs and at the end of the tail. And because all hair is difficult to cast, because it gets mixed up in the sand and does not release, you can burn it by putting a hot iron on the crayfish so that the hair cannot be seen. As for animals that have hair or feathers, you must grease the hair with wheat oil, which is very dry and which will make the hair lay flat and straight. In this way, you will have form of your animal and you will have the hair. Should the hair be wavy, it can be repaired. If your crayfish has eggs, which are delicate, and which will be difficult to take out of the mold without breaking, you would do better to make the first cast with the crayfish on its belly and eggs. In this way, you will open the mold with it the crayfish on its back, which will be hard and easy to manipulate. And the belly and the eggs will remain in the mold. And rather than opening your mold for the second time, you will have to burn it with them in it. This way, it will open easily, and what has been burned will come away cleanly. In this way, the second casting, which is done on the first one that has successfully taken hold, separates easily from the first, after having been refired. This is a singular secret for similar moldings.

left-topThe casting is made by the very thin tail.

topIf some little thing is missing, you can reattach it or else fill it with goldsmith's cement.

left-topDo not forget to rub with spirits before you mold.

left-topStag beetles, crayfish and crabs are molded in the same way.

left-middleIf your crayfish has no eggs, mold the back on top and the belly on the bottom. You can give it some.

left-middleIt the crayfish can be molded hollow for the body, but not for the legs. And for a good result, take note that the crayfish is rather fantastical to mold hollow, this ought to be reserved for turtles.

left-bottomWhen you open your mold, you will find the crayfish has white bones, but they will not be powder. And without opening it, the mercury will not have affected the process.

bottomApply very light oil colors.

bottomTo paint it, boil it with wine and a bit of salt so that they become very red and use this as a model. Paint the back with vermillion mixed with laquer, and the sides and the underside of the belly and the legs with vermillion and yellow ochre and white.

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p141r_1

Let your crayfish dry a little in the sun, by itself. If it has spawns, they will shrink while drying, and be all the more beautiful for it. Make your paste out of yellow potter's earth, just like for the other representations. Lay your crayfish on it, the back side down, and the other parts which are more tricky to mold -- legs, belly, eggs - side up. Drive in the back side in the clay paste up to the legs, which is about the half part of the crayfish's body. Fix the body with a pointy iron thread in the middle and, if you feel you need it, you can also drive another one at the edge of the tail. And in order that the big legs be lower than the head, which is lower because it is linked from below, add a little clay under the head. Then add a bit of clay under the jacket in order to raise it. Hide the feelers under the clay and under the crusher claws, then arrange it as you like. Stretch out the walking legs to the joints, and for the first cast, bend the second part of the walking legs. Fix the joints of the legs with wax and a warm wire so they will not move. If you want to mould something fancier, fix the end of one walking legs on the body or on a crusher claw, using the same wax. If the female has spawns, bent half the tail over the spawns, and keep the shape by fixing the tail with a wire. Be sure that you will be able to clean this part. Finally rub your crayfish with spirits, and cast your sand. Once the sand is hardened, uncover the back side, the head, the eyes, and the small legs close to the crusher claws, and the walking legs all along. One must uncover these parts as much as possible. Then bend and cover the spawns again. The other animals

left-top Fix what may raise the two padded edges on each side of the mouth with melted wax under them.

fig_p141v_1

<https://drive.google.com/open?id=0B9-oNrvWdlO5R0NIbHoyNTNQRIk>

left-top

left-middle Uncover as many parts as possible, but be sure the channels you make are well stripped.

left-middle Incline your mould to the thickest side of the animal.

left-bottom To paint the crayfish, one paints the middle of the back with vermilion, mixed with a bit of lacquer. The sides, the belly, and below the legs with a mixture made of vermilion, ceruse, and a bit of yellow ochre. As with all things, always keep the real one in front of you in order to copy it as realistically as possible.

left-bottom Lay the feelers on the crusher claws, or solder this part with a wire made of bleached brass.

bottom When you arrange the legs, be sure that they do not get over the belly, and that they are well set against the belly otherwise [illegible]

p142r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f289.image>

p141r_1

are not so uncovered. But since crayfish are troublesome to burn & clean, you have to uncover them as much as you can, even the little legs just until the tips, because they are troublesome & if, in order to not alter them, you have to take them out, you could break something of the mold. Having uncovered it with the point of a knife, like an engraving stick or another fitting thing, clean off the sand at the joints & elsewhere with your little brush really very scrupulously. And if something is loosed from the crayfish, attach it with wax, as is discussed. And also attach the horns this way. And also do the casting the length of the extremes of the little legs with wax. And refill the holes that have been made with the needles of iron wire with it. And everything being quite clean & having uncovered more than half of it, oil your mold after having soaked the back side in water, & do not forget to oil all the fine parts that are between the legs and the little beaks; then rub the crayfish with spirits. And do your second casting after having made the first mold even, so that the cramp-irons join better. Your mold must be larger on the side with the impression than on the back. Do not open your mold after the second casting, so that it not become clayed & reheated & that which is inside not be burned. Do not forget to mix crocum throughout your sand when you mold the crayfish, because you must really reheat it & the crocum withstands this marvelously. To mold a crab & to mold a crayfish are exactly the same. When you have uncovered your crayfish on one side do not delay at all before doing the second casting, because crayfish dry out. It is not enough to uncover the crayfish such that you see the whole half the half you uncover, but take heed that your mold, even when you are uncovering, be good and stripped, because if the crayfish gets well burnt, you will not be able to open your mold without breaking it.

topRestore it with a pen knife, little chisels, or engraving sticks.

left-topAs you see here, but a wax casting all around & at the end of the tail, where you will do the principal casting, two or three more.

fig_p142r_1

<https://drive.google.com/open?id=0B9-oNrvWdl05Qkh2MDhvUkFnUW8>

left-middle

left-middleMake the casting with candle wax shaped in a thread like a large packthread, the whole length from the end of the claws to the extremity of the tail. If there is also some claw end or other part that is extended past the rank of the others or is raised up higher or turned up all alone, make a wax casting for it from its end just barely not joined to the body or to one of the large claws or to some other place where lots of metal will be wedged in.

left-bottomHaving uncovered it, attach & secure the two little bearded horns of the crayfish, and anything else that is not secured, with wax.

142v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f290.image>

p142v_1

Molding grasshoppers and things too thin

If you have to mold a piece of written-on paper that is too thin, after you have done the first cast and it has set, give a little thickness to the reverse of your paper with melted butter, which is the most appropriate means there is, & for strengthening the wings of either a butterfly or a grasshopper, or any delicate part of an animal to which you need to give thickness. But take heed to apply this melted butter under the wing or in whichever place it will not be seen. For giving thickness to a pansy or other flowers, butter is not good, but rather wheat oil, which is soon dry & holds firm. Wax would not be appropriate here for it is too hot once melted, and it makes the thing to which it is applied contract. But butter is amiable and handleable.

left-topIf you write on paper or on common carton and your letters are made with gum, the moisture of the clay plate (?) or the wet (?) sand for a noyau will moisten your letters and undo them. Write therefore with cinnabar mixed with oil, on oiled & stamped (?) paper .

left-middle+Reheat your molds with charcoal firstly lit in the forge, so that the fire is not too hot and does not break the molds. And do not fire as strongly where the mold is thin as where it is thick.

p142v_2

Molds

Make some notches in them the molds that enter more into the inside of the mold than the outside because in this way, they have more strength. Take care to keep from reheating them suddenly in a burning hot fire, because this will make them break.

right-middleDo not keep them molds in a humid place, nor an enclosed place if they are not well dry, because they will mold. The same with dried animals.

left-middleIt is not at all necessary to reheat the molds two times when the animal can pull away without burning, as do toads, which can very well be molded hollow like all thick animals. However, it is always good to redden the mold once.

p142v_3

Lute for luting your molds

I have not found a lute that is made more quickly than this one, nor a better one. Take some of the lean earth that artillery founders and bell founders use to make their trusseaulx and molds, which is lean and sandy. Soak it moderately like a very thick mortar. Mix into it about one half of horse manure and then beat it well. Afterwards mix in one third of cloth waste or cloth shavings and beat it again quite strongly. You can reheat your mold as soon as the lute is ready.

p143r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f291.image>

p143r_1

Moulding turtles and tortoises

The turtle the one that lives in water is more beautiful to mold because it has prettier scales and straight legs. And the tortoises have crooked ones. They eat a lot. To get ready to kill them, open their mouth and pass a long penknife through all the intestines. And then make it swallow some vinegar mixed with spirits or urine, as one does for snakes. It is necessary to mould them in several pieces, and even the back sometimes because the sides of certain ones are narrower than others and in this instance do not release from the cast. To make them die, you must not boil them, because they come apart, even the shell, in the hot water. They the shells come out better when hollowed because their great thickness spoils the mold. Turtles are more lively. The tortoises are leaner, slower, and more sleepy. If you scratch turtles on their shells, no matter how sleepy they are, they move; tortoises do not.

left-top They turtles/tortoises die rather quickly in vinegar mixed with a little spirits or urine, as with all other animals.

left-top They turtles/tortoises keep their eyes closed in the winter, and appear as dead, having been numbed by the cold. They hide in the earth or under balls of grain or warm manure, and survive only on the dampness of the earth.

left-middle You must not mold them too soon after they die because they are still stiff. But on the day after, you will be able to manipulate them and bend their legs as you wish.

p143r_2

Moulders from Foix

Those who mould from across the way make their sand from crocum ferri and calcinated slate, but slate always retains its bumpiness and swells because it is a fatty. In the noyau, it is not good; in sand, it can be put to use. They the moulders from Foix sieve their sand, grind it on porphyry, and soak it in water, and they keep the finest bits which are on the top, then they reheat it.

p143r_3

Toad

Having been molded, you can take it out without burning it, because it releases easily from the mold. Choose the biggest and the lumpiest toads. Because they contain a lot of metal, it is best to mold them hollow, since they turn out better. You could make your cast in one great piece, but it would be troublesome to cut. It is best to do it in three or four parts, which will be thicker close to the animal, and include the most amount of edge that is close to the cast/mold. Make as well some casting conduits all the way from the end of the cast.

left-bottom

fig_p143r_1

<https://drive.google.com/open?id=0B9-oNrvWdlO5cnJFVXFaRURaY3c>

Let the mold cool rather than opening it, even for thick things.

p143v

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p143r_3

from one leg to another, so that the spread out limbs are in connection with one another due to the aforesaid casting conduits, which you will start in the waxless round parts that you have put at the edge of the legs to attract the metal. In this way, because you are casting in wax, there is no danger chipping any part of the molded animal. It's quicker to make the wax casting conduits thus, because in this way you can cast the second mold after the first, rather than wait to do them the conduits after the mold has been recooked, because then, if possible, you will need to have everything ready. You need to heat well, and even redden the molds where there are wax conduits so that they melt and leave nothing inside.

p143v_1

Openwork carcanets

You can mold them "en noyau" like crayfish, first with one side being made higher with clay, which is hollow, and then you open it from the other side and make the second casting. You can just as well cast them "en chassis", provided that they release well. If they do not, you can do a rough cast in wax, or you can fill up the cavities which do not release well with wax or clay.

p143v_2

Iron filings

Because usually filings are mixed with impurities, it is good to heat them over fire to burn the filth and then wash them in clear water. In this way, the dirt will rise to the top of the water, which you will throw out, and the good filings will go at the bottom.

p143v_3

Carnations

Because those that you usually cast are generally quite big, they are heavy. And so for these, you make them with silver leaf or slivers.

144r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f293.image>

p144r_1

Turtles

Turtles are much more beautiful and easier to mould than tortoises, being that they are flatter and have a longer head and tail, and straighter legs and release better than tortoises, who are scraggly, wrinkled, and deeply entrenched in their shells. They tortoises also have a rounder top shell which is however narrower on the sides than in the middle, which means that the top shell cannot be nicely molded in one go, like those top shells of turtles.

Thus you will mould the top shell into two pieces, and the lower shell into two, three, or four pieces according to their appropriateness. If you want to release your turtle from the mold without burning it, you must mold it in several pieces. But if you want to burn what is inside, you can mold your top shell in one piece. So to get started, once you have completely killed it in vinegar and urine, as we know, leave it to fully dry out. And clean it well with a cloth. Then take your clay base place it on it, and scrape the base a bit so that the undershell fixes in. Having nevertheless previously arranged the head with a strong needle, as you do with other animals, holding it high by means of a bit of fresh clay that you will work with from beneath. Stretch the aforesaid head and legs with your little pincers. Once the head is in place, dextrously put a grain of yellow millet into each eye with the pincers, because as soon as they die, the eyes pop out and rot. You can do the same for any other animal with a large amaranth seed, a small one, or a grain of rapeseed. This done, you will arrange the legs, securing them with little iron needles. And then plug with clay the holes all the empty spaces around the turtle, that is to say, what is in between the two shells, so that the sand does not hinder the releasing of it. And because the legs must be lower than the bottom shell, make a little dimple in your clay base to accommodate them. Your turtle

left-top

When they are the well tender and mortifiedes & left aside, in two or three days you will be able to bend and manipulate them better.

fig_p144r_1

<https://drive.google.com/open?id=0B9-oNrvWdlO5emg1MXZLREtSRk0>

left-middle

left-bottom

animal eyes of my own invention

fig_p144r_2

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left-bottom

144v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f294.image>

p144r_1

having been thusly arranged and well cleaned with brushes, put the circle of clay around the base. Then, with a roll of clay placed on the middle of the back of the turtle, as you can see, and at the widest place, divide your mold. Next, oil with your oiling brush half the half of the shell you want to mold. If your sand is a bit thick, temper your sand with warm water, so that without burning yourself you can put your finger in it without burning it. And before casting it, rub the shell with spirits. And then cast your sand and let it take hold. And note that all things that have shells, or that are hard, or do not yield as snakes and lizards do, must be oiled to come out cleanly. The things that yield do not need this. Warm water means that the tempered sand sits better on the oil, which otherwise would not work. With the half turtle having been thusly molded, separate it with its mold from its clay base, which you will put aside to use when needed. Then clean your half-mold, join it and flatten it like for the others. But because there will be the roll of clay, the half mold will have more than just half the turtle in it, cut and crop cleanly the excess clay and clean everything well with the brushes. Then at the top of the edge of the mold on the side where it is cut, at the halfway mark, make two notches as you have done with other molds. And flip the turtle on its base, as it was, and secure the two legs that are not molded with iron pins and fill the empty areas around it, up to the edge of the top shell with some clay. Then place the circle around it and place a roll of clay on the first mold, a bit above the notches. And having oiled the first half-mold and its notches and the shell of the turtle, and having also sprinkled it with spirits, warm your water, temper your sand with a bit of salt water, ammoniac, and the aforesaid hot water, make your cast. Having taken hold, keep the sides of the two molds neatly together, and for each side secure the joints, which are not prone to do so naturally, with two clamps, so that when you uncover the bottom of the turtle the top joint does not open. Then open the side with the belly and the throat, in the same manner that you would open a crayfish, which is the hardest animal to mold of all animals that are molded in two parts.

fig_p144v_1

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left-top

fig_p144v_2

<https://drive.google.com/open?id=0B9-oNrvWdlO5SlhGM2FYLUUteXc>

left-middle

left-bottom You can also mold your turtle in one piece for each side, but you will need to burn it. And then to make the hollow, the recooked mold cannot be well-oiled because it absorbs the oil.

left-bottom+

If there is crocum in your sand, the joints of the molds will not join well together.

bottom

Turn to the second leaf.

p145r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f295.image>

p145r_1

Casting in three frames

You can cast bronze mortars and similar things which release well in three frames. That is to say the body of the mortar in one, its noyau in the other, and the base of the mortar in the third one, because otherwise the cast which is there will not release well.

top-leftInquire

fig_p145r_1

<https://drive.google.com/open?id=0B9-oNrvWdlO5MXRaSlDvRzY2UTg>

A

p145r_2

Cuttlefish bone

You must not the the tin or lead too hotly, otherwise they will burn the bone and become lumpy. And to know when it is the right temperature, dip in it a little piece of twisted paper. If it turns black without catching fire, it is the right temperature. But if it burns & catches fire, it is too hot. You can cast gold & silver, but it never comes out neatly. To cast something delicate well, it is necessary that the bone not be extremely dry, because it is rough & does not release as well & crumbles & is brittle. In any case, before you cast, dry them the bones & especially for gold, which does not react well to humidity. You will know that they are dry enough when, after having exposed the insides and the imprint to the fire, they hiss & crackle when you bring them near your ear. Now join the bones & daub the joints with a little lute and slowly dry it near the fire & cast & then shake the mold or scratch the rough crannies and let it cool down before opening it. Usually one cuts the bone in the middle, and the dull part that does not have half circles is more delicate and smoother to mold with, and therefore one always uses it to do the main part of the casting, the other part of the cuttlefish bone is crumbly on the inside as on the outside. Therefore one does not use this to cast delicate things which need to be molded in two places. One evens out & flattens these two halves on some piece of wood, then one rubs some charcoal on top so that it releases well. And to make sure the charcoal is evenly spread everywhere, tap the side of the hand which is holding the half bone. Both having been covered in charcoal, take the first bone that has been prepared & rounded on the edges, and having placed the medal above it, press the medal down strongly.

p145v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f296.image>

p145r_2

But with fingers you cannot press evenly, because if you press on the edges, the middle will remain hollow. Start therefore with the middle, & then do the edges. But to do it better, put something flat & even on the medal, or some large square file, & press with that; because you will press evenly, sometimes with your knee, other times with your foot with your shoe taken off. & do it from above, so that you impress it without breaking it. If it is not well molded on the first go, do it again several times. Then restore and flatten your halves of molded bone from the sides. And to cut them well, always start from the most tractable part, coming out to the shell. And if your medal does not come out on its own, scratch the rough bone from behind and it will strip. When you want to cast, settle & affix the two bones with little pins of wood & in order to cast neatly, you have only to try it with sand.

p145v_1

Moulding herbs and flowers

You do not need thin sheets of clay, because the herbs and flowers will not lay on it, but as it were in the air, not touching any thing from any side, so you only have need of a circle & contour that is higher than for flat molds. And in this way, take heed to make it strong and thick, with the heft that you find suitable. Otherwise, it will sink in when the sand is inside. Fix & fortify it well with your foot & firmly attach all the joints. Then, have your flower well attached & assuredly fixed to the bottom of the casting with wax that is not at all rough, but smooth, so that it can strip off well. Then moisten your flower or herb in good spirits in a tall glass.

p145v_2

left-top

+

Flowers

When you mold them, if they are not strong enough to hold themselves upright, run a thread through the mold to keep them lest they do not hoist themselves up. & cast the sand little by little & continuously and blow on it strongly and constantly so that it covers everywhere. Otherwise, it will become lumpy. Since you won't put anything in thin sheets of clay, the mold sometimes sticks to the table on which you mold. To release it, strike a great blow on the side of the table with a hammer.

fig_p145v_2

<https://drive.google.com/open?id=0B9-oNrvWdl05b1FOQ1Z5b1J3TWc>

left-bottom

left-bottom

It's enough to reheat your clayed mold once for flowers & to heat it the second time if you cast in tin & lead, insomuch as for gold & silver, you have to reheat it twice .

bottom

When very red, cast your tin into the mold when it is so hot that you can[not?] hold your finger in the hole without [illeg].

146r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f297.image>

p145v_2

so that it is wet everywhere. If not, wet it with a large brush dedicated to this. Then pass the end of an iron wire that holds the wax casting through the end of the mold that closes the circle and have the iron cleave the clay mold as you see; & position it on the bottom, attending that the herb or flower does not touch anything, and leave some thickness to your mold, because the moistened sand always elevates the herb or flower. Even so, if it isn't thick of its own accord, pass a slender thread through the flower with a needle to keep it elevated. Or, if you forget this, lower the flower with a little stick just until the cast sand starts to thicken. With your flower well-positioned, take a platter large enough to moisten all the sand that you will need to fill the mold. Put a little sal ammoniac water in it, and then some spring water, and when your platter is almost full, put a sprinkle of your sand on it, & mix it, & steep it until it becomes totally uniform, because if it were to clot it would consume the mold. For flowers it does not need to be very thick. And likewise, at the beginning, when you just barely pour it so it remains transparent on your flower & covers it sort of half way, blow strongly everywhere so that you eliminate the little bubbles, and afterwards finish filling it & blow, always slightly tilting your mold down towards its larger side. And if you find some remainder of thick sand that was not well soaked, set it rather close to the casting than otherwise. Then you can cast some thicker moistened sand to make it set sooner. I molded a marigold, with its leaves, in this manner. Crocum ferri is safer for flowers, and when there is some crocum, clay it with the same sand that has already been used and is the most excellent of all.

left-top

The stem on which I cast a large branch of marigold with its flower, its buds and its leaves came out neatly, just like nature, was made of one lb. of fine tin mixed with two ounces of lead.

left-top

If there are a few froths, fix it with a pen knife.

left-top

Uncover the molded flower while gently breaking the mold with the point of a knife. And, even better, soak it well in water. Afterwards, try a pig brush at the end of an iron wire, etc.

left-middle

When the mold is reheated for the first time, leave it to cool down halfway. Then, run an iron wire gently through the casting to make an opening for the burned ash inside. Afterwards, blow inside with a bellows and turn the mold over on the casting to make everything leave, & sometimes blow and suck in with your mouth.

left-bottom

Heed that you not attach the stem of the flower too firmly to the casting with wax, lest it consume something when you remove the wax from the casting. To remove it, you have to loosen it a bit all around & then draw it out by the iron wire with little pincers.

p146v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f298.image>

p146v_1

Moldingturtles

This page is the continuation of the preceding second page. Since you have cleanly uncovered the part of the belly of turtle, its underparts, its throat, and its legs, and having cleaned it all well, do not forget to neatly uncover the cavity that these animals have in their shell between the neck and the shoulders. Turtles do not have as deep of a cavity as tortoises, which are more scraggly, and even amongst those, there are some that have a deeper cavity than others. Do not therefore forget to neatly uncover all of this in order to better represent its likeness. But if there is a cavity which spirals too much inside, and is not visible, nor releases well, apply some small lumps of wax and with heated needles of thick iron and work the aforesaid wax. Then plug the entrance to all of these cavities with soft clay. Put the circle of clay around the mold, which has already been made of two pieces and contains the back of the turtle. And to mold its belly, you must separate it in three as you can see. That is to say, you will put a roll of clay on top of the throat and another one on the edge of the shell of its tail, so that only the shell of the entire stomach will be accessible to be molded on its own. Having oiled the shell of the belly and having rubbed it with spirits, throw you slightly thick sand, which has been tempered with hot water as before. Having taken hold, remove the rolls of clay, then uncover the front and back legs, that is to say the bottom bit, and the throat and the tail, and remove the clay of all the cavities in one go if you can, because this will show you if the cavity will release well. And if the removed clay carries with it some of the wax you have applied, put it back into the places that did not release well, as has been said. And if some bit of the turtle has come away with the clay, or fallen off, attach and rejoin it to the mold with some wax, using a heated iron needle. Do not forget to put some melted wax at the edge of the turtle's nails when you cast. Having molded and uncovered the shell of the belly, you will see the mold in this way.#

fig_p146v_1

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left-middle

fig_p146v_2

<https://drive.google.com/open?id=0B9-oNrvWdlO5WGEzek5peHJ6VDA>

left-bottom

147r

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p146v_1

Be warned to make an edge of wax melted with a warm wire all around the edge of the top shell which is close to the tail in order to make a better cast. And make it so that two small strings of the same wax goes from the end of the shell of the belly to the aforesaid wax edge, which is around the backbone of the shell, and the turtle's tail should stay in between those two strings. This to make a better cast. This done, oil your mold and what you can see of the shell. Put the circle around this, and cast with hot water as before, and doing what you have done in the same manner to mold the third part which is the tail. And having taken hold, take away the clay contours, clean your mold, bring it together, and flatten it on all sides with a knife as you have done with other molds. Lightly dip it in water, then try to release it. Usually, one starts by the shell of the back, which is to say the top mold that is made of two halves. And this one is easier to release. The other follows directly after, but because it is next to the turtle's shoulders which are deeply entrenched, it is sometimes troublesome to do this when lightly shaking and pulling the mold. Be advised to pull the easiest one first, because you will need to release them one after the other. The hardest one of all is the one molding the throat, the underside of the legs, and the cavities of the shoulders, which are so difficult to release, that if you do not plan accordingly by filling it with wax rather than molding what cannot be released, it will be difficult to take the pieces without breaking something. But if it happens to you again, there is a solution, provided that you keep the broken pieces, because you can reassemble them with strong iron needles, and fill whatever crack or flaw you have with some melted wax and hot iron as you have with others so that the noyau to mold hollow is easier to do. After

bottomSee the second page

left-bottomTo prevent breaking while releasing, be advised to uncover up to the point where it can still hold.

147v

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p147v_1

+

Casting with copper alloyed with $\frac{1}{3}$, which is like very low solder and ard[...]es and old K and some Re out of xii

I have cast the cleanest I have ever seen, making very small figures as thin as paper. I have cast extremely hot in the very red mold, and have put into the melted mixture the two compositions which makes silver runny, and have done as if I wanted to throw with pure silver. This league is white when it boils, as with every other alloy which contains even just a small bit of silver. To cast something very delicate, use this.

p147v_2

Lute

There is none better than the one you have used to mold, that is to say lumps from your molds. But you need to choose some of the better recooked ones.

p147v_3

Crucible

Beware that it should be three fingers away from the mouth of the bellows and that the aforesaid bellows is positioned underneath the bottom of the crucible, otherwise it will cool it down.

p147v_4

Latten casting

I have taken the one you find in latten skillets, which have been beaten and forged quite thinly. Having well-heated it, I threw in two or three grains, like beads of sal ammoniac.

This will clarify it like a mirror, having turned very white from all the heating, I threw in it some crushed raw and pure calamine. The I casted it in its very red mold. I cast cleanly and thin like paper, and hollow on the back. Because it has become crusty I cooked it again, which to means to say, I reddened it, and left it to cool, then put it in bleach, made partly with raw tartar and half of common salt. Having boiled it well, I brushed it in clear water, because the first time it was

left-bottomDo not let it cool down when melting. It always makes into filaments, as you would find with melted glass, because of the calamine. Usually, the soft letten of skillets, becomes red from casting, even when it has been in the fire for a longtime, because the calamine evaporates. But the brittle letten of candleholders becomes yellow, as well as the filings made of needles.

148r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f301.image>

p147v_4

not come out as clear as I wanted. I reheated it again, let it cool, put it into the bleach again, and brushed [it]. It came out very clear. In this way, you will do [the same] for copper and silver. And if you want to give...

p148r_1

Beautiful color for brass

Having cleaned it well, as is stated, and brushed it well, boil it in water with curcuma root or terra merita, and it will become very beautiful.

p148r_2

Bleach

If it is for silver, do not grind your tartar with something made of iron, but with the handle of a hammer, because if you touch [your tartar with iron] and [end up] getting some iron in your bleach, the silver will come out red, like copper, and you will need to reheat it and put it back in the bleach. Mix in nothing with your tartar that should not enter the bleach, because this ruins it. Do not let it spill out when it first starts to boil because all its strength is in it [at this point]. Bleach is made with one part pulverized tartar and a half part of common salt.

p148r_3

Moulding the foot of the bittern, or eagle, or other birds for the base of saltcellars or vases

One commonly molds the foot and the legs up until the calf. And for this effect, one molds it in five pieces: the leg in two pieces, the top of the foot in two, and the bottom in one piece.

left-bottom with three pieces

p148r_4

Crocum Ferri

To make this quickly, redden the filings in an iron ladle, stirring it often. Then sprinkle it with some good vinegar and let it evaporate. And without taking it away from above the

e fire, let it redden and take flame. Having been cooled, pulverise [it] on the marble and
return it to the heat, sprinkle with vinegar, and then set it on fire. In this way it wil
l soon be colored and made fine.

148v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f302.image>

p148v_1

Molding turtles

Join the parts of your mold and fix very carefully clamps on all joints, which are on the top, the bottom and the sides of the mold; do not forget to notch the joints as you did with the other moulds. Once you have fixed all the clamps, remove the sides ones, not the other s. Thus your mold, made of several pieces, will open as if it was only made of two parts. If you want to mould hollow, pierce a hole big enough to thread the end of your little finger in the middle of your mold's belly. Widen the outside of the hole, like clervois, in order to cast the core. You could avoid all these difficulties if you didn't mold hollow; you could then mold your turtle in two pieces, more quickly, and burn it inside of the mold like other animals. But a turtle is weighty, and would be heavy if not molded hollow. This is why it is considered better to mold it that way. It takes three days to make the proper hollow mould. To mold hollow and fantastic forms, you need very strong plaster which can withstand fire without bursting. But if you can't get this kind of plaster, add to it a little more stone alum, and also add crocum, which fortifies it the plaster and makes the flaws -- if there are any -- so fine that they can be easily removed. Do not forget to tighten your mould with a press in order to avoid flaws that happen when your mold is not tight enough, or when it bursts. To repair it, if the lines are not apparent enough retrace with a burin, then soften the lines with a ciselet. You can remove the flaws with a chaple, a kind of burin. For the lumps and crumbly bits, they can be made with a gadet or a small carving tool which isn't hammered, and hitting with a small file.

left-topMake this hole before joining the mould.

p149r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f303.image>

p149r_1

Softening iron and making it really soft

Take some sublimate, some quicklime, soap from Venice, some horse manure, use less sublimate than the other ingredients. Moisten all of them together, forming a paste and apply this to the iron, and wrap the whole thing in a dirty rag. Then reheat it until it becomes very red. Or leave it overnight in a good fire until the morning. It will be very soft and you will be able to engrave whatever you wish on it.

p149r_2

Gold of lesser quality from Germany, Electre

One calls it gold from the Rhine, which you can find in the rivers, and it comes in gold flakes. German goldsmiths wanted to refine it, thinking that they could separate it from the whiteness, which they thought was silver. But it always stayed white, which proves that this whiteness is fixed and it's only fault lies in its color. This is electre, from which you can make cups, which will reveal poison.

p149r_3

Various arts from Germany

They make great use of water mills, and most of these artisans working with gold, silver, and any other metal, bring their large works to the mills to be hammered. And to pull iron thread, they heat large amounts of iron, making it into a point, they hang it up still red, and very quickly pull it.

p149r_4

Repairing medals

If you want to mold any medal to use as a model, and at the same time repair it, cast it in a greater quantity of tin, and put in it a good amount of tin alloy to make it harder.

p149v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f304.image>

p149v_1

Molding vases in several pieces

Goldsmiths who make large works and crockery use a turning lathe to get the model they wish in wood. Then with some wax, the goldsmiths model on top of this the masks, festoons, or anything that they wish. Then they mould the model in three, four, or several pieces.

p149v_2

Gold solder

They take on a gold penny a small pinch of refined aloc, as you would find in old sous.

p149v_3

Molding flies

Large flies can be molded & cast. But you must apply underneath their wings some wheat oil, which dries quickly and firms them up & gives them a little thickness. The same thing can be done with butterflies, cicadas, grasshoppers & similar things. But to cast them more easily, you must set them on some leaf or bouquet. The others should be placed by hand on a very slender silver blade. You cannot keep your insects when they are dead, since they will dry out and their legs will break.

left-bottom

Wheat oil should be put underneath delicate things to make them more rigid & firm, & ; to make them hold their natural posture, since being weak & delicate, the tempered sand, adding weight to them, would change their form.

p149v_4

Bats

They have very thin wings and if they are large & dry and the wings are extended, you need a very big mold & it is not certain that the metal will run sufficiently; thus, when you want to mold some, choose the medium-sized ones & and arrange them so that they have their wings are half folded, since in this way they will come out better. But be sure to apply, as you known, some wax on the side of the wings, so that the cast flows well.

150r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f305.image>

p150r_1

Very strong wax

Mix with this some resin and bole. Do not cast very hot.

p150r_2

Diverse liques of tin and lead

For hollow things like turtles, use half refined lead and half tin.

For flowers, use almost all lead, that is to say, a lb of refined tin, and two â\204¥ of refined lead.

For lizards that are as thick as one or two fingers, use almost all lead, that is to say, a lb of refined lead and 4 â\204¥ of refined tin.

p150r_3

Moulds

They are less prone to cracking while reheating when they are very thick, rather than thin, provided that thickness is sufficient. Because when they are thin, they do not need to be fired for long, and prolonged exposure to heat corrupts them. The same thing will happen if you plaster is not strong.

It is better to reheat one mold on its own, rather than heating it with others, because should this be the case, you will need a stronger and hotter fire, than for just the one mold. And because charcoal will accumulate between multiple molds, the heat will transfer from mold to mold in such a way that you will often find that your molds have burst and crack on one side more than the other.

Therefore reheat your molds, not applying fire, except to cover it.

And because your lead and tin become brittle when melting the over high heat, in order to make them less brittle, heat them over low heat, and cast in stick form.

Brick cools the metal, and if this is not for binding, it is not necessary.

left-middleThe reheated moulds cannot withstand several casts, but the ones in which you only cast tin or lead and flat medals, these being dry, withstand a lot of casts.

left-middleIron filings being finely ground, makes them molds very firm and strong..

p150v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f306.image>

p150v_1

Molding hollow

This iron thread needle which you put thusly in the mold, is to better secure the noyau and keep it from shifting. All of this having been thusly arranged, lay your mold on the table, hole facing upwards, as it is explained at the side. And then fashion a circle made of soft clay, of about two fingers high around the hole, as you have done with other molds. And then temper your molding sand to an average thickness, and throw it in the hole until it mold is very very full, that is to say until you reach the clay circle. Be advised not to throw it sand in the middle of the hole, but from the sides, because the already made mold, will drink and suck the moisture. And the new sand that you throw on the sides of the mold, because drying quickly, will plug the mold and not leave you enough time to fill up. Where as if you throw it the sand from the side, when you realize it is drying too quickly and plugs up, you can make a path for it. Having thrown it in, blow on the tempered sand, and insert the tip of your finger in the hole a few times, or some kind of pointy thing to keep it moist, in order to make sure that the hollow wax does not fill up. At the end throw in the thicker tempered sand to strengthen the mold, because when water rises up to the edge of the mold, it always makes it softer. Having taken hold, get rid of the clay circle and any raised parts that relate to the hole through which you threw the noyau, and you will not even realize the process took place. Once your mold has been thusly prepared, lute its outside with the same sand that you used to make the mold. Then reheat it on with a low heat to begin with, slant the mouth of the cast downwards so that the wax trickles out slowly, because if you reheat it over very high heat to make the wax come out, it will boil inside the mold, and will leave blisters and lumpy bits on it the cast, as long as

left-top

This iron thread needle is placed in the middle and the hole of the cast, when the mold is in many pieces, as is the one for turtles. And you do this so that the noyau does not shift. But when the mold is made out of only two pieces, it is not necessary to put needles in the middle.

fig_p150v_1

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fig_p150v_2

<https://drive.google.com/open?id=0B9-oNrvWdlO5SUK5cUNtNnpqbXc>

left-topRather than cast the noyau, make some notches around the edge of the hole through which you would like to cast, so that your mold is even more secure.

left-topMixed tallow means that when you empty your wax when you are emptying the mold of wax, it does not clog.

left-middleYou will need half tallow and half black wax.

left-middleEvery thick piece comes out better when molded hollow, because a thick mass of mostly lead will stay warm for a long time and eat away at the mold.

left-bottomAfter the cast, you can mold the part of the shell of the belly where you made your hole on the real thing animal and fix it with solder.

left-bottom

XNote that after your noyau has been cast, it is better to put your mold in hot water to open it, so that you can take away as much wax as you can, always softening it in the hot water. Because the less wax you have on it, the better it is, because it will reboil when you reheat your mold, and you will get blisters and lumps. And if you have little wax left in the mold you will not need to reheat it as much. When you open your mold the cast will break. But it can easily be repaired as long as you castA

p151r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f307.image>

p150v_1

the white wax you have used to make black sulfured wax has so little substance, being dry and purified, that it leaves nothing with it the mold mentioned in the first part of this recipe and trickles very gently. As for the coal which is mixed in it, if there is some left, it burns and reduces to ash, and can be taken out afterwards by blowing into the cast. You can open your mold after the wax has been melted, if it does not contain a fantastical piece which could break, which are like pieces added on or similar. After having covered the clamps with lute from your sand, and having covered the entire mold, add to this a layer of common lute, and then sprinkle ground brick so that you can better manipulate it. Leave the lute to dry slowly, rather than putting it in the fire, which will melt the wax. The wax, having exited the cast, that which remains of it, mixed up with the charcoal, will burn. Having reheated it for the first time, lute it again, because should your plaster be bad, it will have eaten away at the mold and it will be found in the space between joints, which can result in large overflow. And for the second time, you must not reheat it if you want to cast only in lead or in tin, simply make sure that the lute is very dry and your mold attains an average heat. For those very large turtles that have enough thickness, it is better to cast using an alloy of half tin and half lead, as you do with hollow things. Because if you only need to cast very thin and fragile things like flowers, rely instead on using more lead than tin, which bubbles when cast a bit thickly and will easily cause some flaws to your cast. Mr. Alexander says he has never gone astray with using half tin and half lead for things that are heavy and as thick as the back of a knife. If there is crocum, you will not be able to clearly see the joints and as a consequence the metal overflow is very small and thin. You can repair this, and through the hole of the belly draw out the earth from the noyau, leaving it to soak for a long time.

left-topWhen you have thrown your black wax in the mold and it has well-cooled, you will have to open half of your mold to make your cast. Should your black wax figure break, there is no danger, because it can always be reattached with a hot iron needle. Or if the pieces have not separated well from their mold, they will meet up and join as before, by joining and tightening the two halves of the mold. When your figure is big, you must interweave more iron threads inside to give support to the noyau.

fig_p151r_1

<https://drive.google.com/open?id=0B9-oNrvWdlO5dEhadHEzVWlxejg>

left-bottom

Only in lead or in tin. You must however heat the mold as much as if you were about to burn an animal inside, so that the wax melts well and leaves nothing inside, and trickles out while holding the mold slanted towards the cast and at the same time reheating it. And when the mold has been reheated, leave it to cool slowly, then blow inside and suck out the wax ashes. Do this with a bellows.

p151v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f308.image>

p150v_1

However, do not remove it before you have prepared the whole turtle, because you will use this earth as cement, should you need embed something or make repairs with a chisel. If you have some metal overflow at the joints of your mold, you will remove it, either with a burin, called a chaple, or with a very sharp pen-knife, or with a small file followed by the chisel. Always keeping in front of you the real thing to do as best you can. You can curl on a file a chisel point, which is not at all moistened, to make something lumpy. For these turtles and any other hollow things which you can assume are quite big, create a ligue of half lead and half refined tin. There is more to do when molding a turtle than when molding a dozen flowers. If there is crocum in your sand, there will be no metal overflow and if you are unfortunate enough that there should be some on the sides, these will be as thin as paper, as long as your mold is very tightly pressed together. And to make the scales of turtles and other animals, you can make little chisel marks in the shape of round punch cutters, others in the shape of a gouge, or shaped like a snake or lizard scale, and other using a file used to make twisty bits and lumps. Turtles that do not need to be molded hollow are not as much work, because they are molded in two pieces and repair them with little chisels that make punch cutters, little couge, and serrated chisels.

fig_p151v_1

<https://drive.google.com/open?id=0B9-oNrvWdl05bk1US2QxRTVwa2s>

left-middle

p151v_1

Wheat oil

You must make it between two empty iron blades, the bottom one in particular will be slanted downwards and on this one you will put an even and equal layer of wheat. Then you will place on it the other blade, which is very hot, and you will press it down until you see the black oil drip. Remove the top blade when you have enough. This oil dries very quickly. It gilds silver and varnished things, deepens the color of gilded things, can be used as a varnish on iron before you engrave it, and to varnish the tanned leather parts of sword hilts. And it could also be used by those who make gilded leather.

left-bottomYou must use this, as has been done recently. And for things you need to mold, it must not be as thick as for dyeing.

left-bottomYou cannot use this to oil hairy animals, because it is too strong and rigid, but it is good to apply to the foot of a little animal, like a fly and other similar things. It is also excellent to dye white stones [illisible]

152r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f309.image>

p152r_1

Molding a rat

The hairs of his whiskers are difficult to come out of the mold, you can therefore burn them away, as did the Tyrant of Syracuse, which you can always replace with life-like silver ones. The tail comes out beautifully because it is made of little scale-like circles, almost like the ones of a lizard. And to make sure that the hair does not keep you from molding well, burn them away with a little candle. The rest of the body must be oiled with wheat oil, which will keep the hair rigid and flat, so that it will not be removed when it mixes with the sand, which will keep you cast from releasing cleanly. Wheat oil, being dry, will dry quickly, you will therefore be able to comb the hair with a very fine comb, so that the hair will be visible when cast. On a small mouse you can use common oil to flatten the hair. Rather than molding these animals immediately (except for snakes and lizards), keep them dead for a day or two so that they become easier to handle. Because they are very stiff after they die and cannot be shaped into a life-like looking position unless they are softened. However, if you mold it straight after it dies, and give it its shape before it becomes stiff, that will be good. And because the eyes die unless you mold them immediately, you can replace them with half a round pea taken out of its shell. Some cast their rats without any added preparations; others oil them with olive oil which suits the purpose, because wheat oil is thick and has too much body. This is why we only use it wheat oil in light strokes on fly's feet or beneath a wing, to keep them stiff. Others flatten the hair with an egg yolk, which dries quickly and does the job. Arrange it the rat on its clay base before oiling it. Raise its head with an iron needle, and also secure its feet with needles, and its tail. Rub it with spirits after the oil has dried. Then throw in your sand. Uncover it as you would other animals, then do your second casting. You must not open the mold until it is completely reheated and the rat has burned away.

left-top+If it is a big rat, it is better to cast it hollow, because it is thick. A mouse is easier to mold because it has shorter hair. It is impossible to mold an animal with big bones well, such as a bird or rat, without opening the mold to clean it well, because bones do not burn well.

left-middleAll kinds of feathers and hairs are difficult to mold realistically.

left-middleIt is better to use butter to grease hairy animals than wheat oil, because it is better suited to the purpose.

left-bottomIf the rat is big, it is better to remove its entrails, or having molded it, let it dry in an oven, because the large amount of moisture it contains would boil inside the mold, which would ruin it and make it lumpy.

left-bottomOnly put your mold in the oven after it has cooled, drying slowly, otherwise it will absorb the moisture and break.

p152v

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p152v_1

Repairing things that have been cast

It happens often that what you have cast has metal overflow, through a fault in the mold, the cast, or the metal. Faults in the mold arise from plaster which is not hard and strong and cannot withstand fire, which is corrected by mixing in crocum. If you use too much tin to cast things that are of an average thickness, it will not release well, because tin that is cast thickly, shrinks and bubbles. Similarly, the things you need to mold hollow can be fantastical to cast. If therefore you happen to have a flaw, have at your disposal a small leather pouch full of fine sand, and having placed it on the edge of a goldsmith's bench, where one files, place upon it your work, and secure it there with a rope which passes underneath your foot. The sand in your pouch will respond to the pressure of your foot, and will immediately be thicker on one side and thinner on the other. Then immediately with a burin, outline and quickly make the subtle parts of your cast which did not come out, or which did not come out distinctly enough, or with a file or a chample, remove your metal overflow. If there is a flaw in your materials that has left a hole or something too hollow, scrape it with a burin and make notches around that hole, then make an imprint of this with wax. And place this imprint on a fine lead blade, and in this way mark the appropriate size of lead, or of any other alloy which resembles your casting material the most. Then place this piece of work on the notched part and attach it well with some with yellow latten or copper wire - and if you are dealing with tin or lead rub in some rosin around the edge - and apply all around it the replacement piece some little thin pieces of solder or tin, or any other thing. Then with a hot iron, or above the heat source of the forge, solder it together, and then repair all of this with the aforesaid tools and the appropriate chisels.

left-top

For gold or a small work, you will need to attach them to a lead ball, which you will then place on the leather pouch and it will help secure the piece with the rope.

fig_p152v_1

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left-middle

fig_p152v_2

<https://drive.google.com/open?id=0B9-oNrvWdlO5cWhfVmhvbWszZlE>

left-bottom

p153r

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p153r_1

Moulding the hollow part of a mold for seals or other things

Firstly fashion your figure in wax on an even slab of glass or slate. After, mold it with our aforesaid sand, having beforehand lightly oiled it with oil as you know, and having rubbed it with spirits, while tempering your sand with hot water. Having made the hollow part, cast it in lead, using the same alloy as you do for other figures that come out very neatly. However, if it does not release cleanly, repair it. And then mold you lead relief with some wax. After, in your wax hollow part, throw in your tempered sand which will give you a relief, upon which you will cast your hollow part with silver, or any other metal used for seals. But note that you must not make your hollow part with melted wax, but only with wax warmed in hot water, or even better in hot urine. Or else, if you have a relief in gold or silver, or any other very neat and flawless metal, mold your wax hollow part directly upon it, and throw your sand in it wax hollow, which will form your relief, upon which you will cast your hollow part to make your seal or any other work. You could also cast a hollow part directly from the main part of your metal, even should you want to cast in lead or tin, which will not make the main part of your metal melt, if it has been lightly brushed with crushed chalk, or covered with candle soot, or with dried egg white.

left-topWhen you have the wax imprint of your seal, mold in a noyau this piece of wax, which is hollow like your seal, and your noyau will make a mold similar to the imprint and the seal.

left-middleYour wax must be mixed with a color that has little body, so that you may better see your imprint. The lamp black or soot black is good for this. White wax to do this is even better.

p153r_2

Giving a medal the thickness that you wish

Having cast your first mold, mix some crocum or well-ground iron scales to make it your mould firmer. And having taken hold, and made your hollow part very neat, take some paste made of fine

p153v

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p153r_1

flour. And to flatten it, take a small stick of wood that is round and of an even thickness, which has at both ends a small circle that sticks out from the rest, in order to give the necessary thickness to your paste. And then with this rolling pin, flatten it so that it becomes thin and tenuous. Then apply it on the hollow part of your mold and press it down with cotton, and your figure will impress itself on the paste, in relief on one side, and hollow on the other. This done, with a brush that is dipped in melted butter, grease the part of the paste that is hollow. Then trim off the extra paste which extends beyond the hollow of the mold. Also oil your mold with olive oil, as you have done with others. Apply your clay contour, and cast your second mold. And you will have a medal as thin and hollow on one side as you wish. You can have various rolling pins which some edges are more raised than others, in order to make various thicknesses, or you can use sheets lead and copper of various thicknesses, or cardboard, all cut with the rolling pin.

fig_p153v_1

<https://drive.google.com/open?id=0B9-oNrvWdlO5czR5TF9scDhsSG8>

left-top

left-top If you were to oil your paste, the paste would absorb the oil and if the oil would penetrate through the paste, right up to the edge of the mold and attack it. But butter remains on the surface of the paste, and does not penetrate it. For these back bits, you must not temper your sand with hot water, because it will melt the butter.

fig_p153v_2

<https://drive.google.com/open?id=0B9-oNrvWdlO5c3FRZnZSMnU1Njg>

p153v_1

Testing the virtues and strength of sand that is to be reheated

Once the sand has taken hold, you must find it soft and easy to cut, and not surly. It is better to test it in a large and fantastical mold, rather than a small one, because the big one will stay in the fire longer and the small one reheats very quickly.

p153v_2

Softening gold

Sometimes, you can find gold that is so dry that neither cement nor antimony can soften it. Only verdigris can soften this gold.

154r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f313.item.r=>

p154r_a1Removing gold

Gold as gilding goes away if the coin is reheated and placed against a strong fire, even if there is lead, because lead, which contains much mercury will pierce a gold coin in a fire .

p154r_a2Cutting lead

Because it [lead] is fat, hard to catch and corrosive to the knife and the scissors, wet it up and you will [be able to] cut it like glass.

left-topSometimes, gold and silver, exposed to a certain kind of smoke, take on a coloration during the casting. But these are neither flakes nor coat but a colour which will go away during the whitening.

p154r_a3Softening silver

When goldsmiths who work on a large scale have forged their plates, to their loss [these plates] quite often break and crack because they have been sharpened too much. In order to avoid this, when it is quite melted, throw in ground dry mortar made of sand and good lime which has been used before.

left-middleGoldsmiths do not work with silver from real because it is rich in lead and becomes sour when forged.

For small works and things that need to go only once to the fire, some weld with some old sol or carolus reheated and beaten. However if the sol is not quite good [enough], the welding will not hold as there is too much copper and one will have to weld twice. Others weld with [an alloy made of] half silver and half fine copper.

p154r_a4Iron flakes

Once it is quite ground and refined on the marble slab and mixed with the sand from the core [mold], dry it slowly without reheating it, and it will allow for several casting of lead and tin. Copper and brass come out fine of it. But if it is not ground as finely as crocus, it sinks unless the sand is soaked and quite thick.

p154r_a5Metal file dust

It does not melt by itself if it is not helped with some portion of similar metal melted to assemble it and bathe it, as it is more burnt than melted. File dust from tin and lead are made with tallow, [file dust] from gold with saltpeter, [file dust] from silver with sandever.

154v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f314.image>

p154v_1

Latten

Latten is wonderful to cast. It is necessary to be cast very hot. And to master it better, throw in some sal ammoniac to clarify it. You can also add a bit a red copper, and if you wish to, add in a bit of tin to make it runnier. It always leaves filaments like melted glass. It does not require as long of a cast as others.

p154v_2

Moulding

It is a good thing that it be cooled on the outside, but nevertheless remain hot on the inside, because when it comes out of the fire, the air and the strong fumes from the fire do not reheat the cast well.

p154v_3

Casting silver

Silver requires a long cast, whereas for gold it does not matter. Silver, when soldering, withstands the water you throw at it. Whereas gold sizzles, and because of this one throws it on the solder.

left-middle

Let the mold cool well after the casting, rather than opening it.

p154v_4

Strengthening flowers and delicate things

For flowers and small plants, do not use wheat oil. Instead, use some melted butter which you will apply lightly with a small brush on the back of the rose leaves, and pansies and any other flower that needs it. But one reinforces the little feet of flies and other small animals with wheat oil to make them stronger and hold up.

p154v_5

Strawberries

The leaves are cast separately and then rejoined with solder. And because the strawberry fruit is cast solid, and because of this it is heavy, and the tin stem is slender, it will not be able to sustain weight without breaking quickly. One makes the stems with latten thread and then solder them back onto the fruit.

p155r

[http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f315.item.r=](http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f315.item.r=p155r_alMoulding_a_rose)

p155r_alMoulding a rose

Because of the little branches of the rose bush, which are around the flower, are sometimes very spread out, they would demand too big of a mold. We make and cast them separately, the rose and the rosebuds separately as well. And then one brings them together, soldering the little branches and leaves of the rose bush to the stem of the rose, on which you will have purposefully left bits of the small branches. Put your petal or rose as low as you can in your mould, because sand will always bring it up or raise it. You can also mould several petals together, arranged one on top of the other, separating them some thread. And for the look of the rose you can give a thin layer of melted butter on the back of the petals, but only on the outside petals, not the inside petals, to stiffen them and give them the strength to withstand, so that the wet sand does not stretch or spread them out more than necessary. You can also mold well the leaves of a rosebush, strawberry plant and similar things, that are flat and can be flattened without being spoiled. For two castings, to open your mould, when it has been reheated and then clean the ashes out, make some vents, and [you will be able to do] several casts. This is the easiest way and you can also do the other. And with little veins of wax that has been adapted and joined from leaf to leaf, you can make casts. You can even make a little vein of wax from the back of the first petal, which will join up with the main cast. All of this will facilitate the casting process. The main thing is to let your reheated moulds cool down rather than cleaning them and blowing inside them to make the wax come out, because when the mold is hot, the ash almost attaches itself to it. But when it is cold it, it detaches and leaves with air draft or when one draw in one's breath through the small opening.

fig_p155r_1

<https://drive.google.com/open?id=0B9-oNrvWdl05b3lFZl8wbGducEk>

left-top

left-middleYou can also give a little thickness at the ends of the stems that are holding up the petals, by lightly oiling them underneath with melted butter, because the petals are big and weigh heavily, and the stem made of lead or tin will not have enough strength [to hold it].

left-bottomI would be of the opinion to mold the rose on its own with a bit of its stem close to its bud, and then to join the rose to a longer one [a stem] made of glazed brass, because the rose bloom is very big and heavy.

bottomMoisten your rose with spirits before placing it in the clay. Do not forget to oil the wax cast. And when you have thrown in your wet sand, blow heavily, until it begins to set. The rose came out well. But because the sand was mixed within the petals, soak your work in water for a long time so that when you shake it in the water, the earth comes off.

155v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f316.item.r=>

p155v_1Rose

Because the rose bloom is rather wavy, and its petals are all mixed up and arranged in various ways, it will not be beautiful if it is not painted, and you must also consider that its weight cannot be supported by the tin stem which is so soft and fine. One moulds the flower of the rose in a separate mould, casting it thickly so that it comes out more easily. Then one cuts the cast at the edges of the stem of the bud, in which you graft and solder a stalk of brass wire to which you also solder the leaves. But because this tin, being so thin, is hard to solder, and may melt some of the leaves and also the cast flowers; [you should consider] that cast flowers, especially roses, are not beautiful without being painted, so one does not make the effort to solder them, but [instead] one grafts the pieces that you want to join together and glues them with fish glue that has been a little moistened and melted until thick. And so that it takes better, you heat the work in tin lightly and for a long time, because if it is cold, the glue will not take. Once your flower is thusly repaired, you follow the joints of the added parts with some esbaucher wax, which is a white wax mixed with much well-ground ceruse, or even better, white lead, melting it and placing it on your work with a small warm bit of iron needle. In the same way you can repair the little filaments that are in the middle of the rose, or the holes that may appear in some of the petals. Then paint your rose realistically. If you cast your rose in gold or silver, you can also rejoin [parts] and solder its. And in those materials, when you have joined something very delicate together with the flower, such as a fly or other similar things, fish glue is excellent, and holds very well, fixing it with a few little needles that act as nails. The leaves and buds can be cast in two molds that can be opened once they have been reheated, but not before. Then these things join up [with the flower].

p156r

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p156r_1Quickly molding and reducing a relief to a hollow [mold]

Make an impression in colored wax of the relief of your medal. And you will get a hollow mold, in which you can cast en noyau a relief in sand. In this, you will cast your hollow in lead or tin. In this, you you will cast your wax relief. And then on this wax, you will make your hollow moule en noyau, in order to cast in it the relief in gold or silver or any other metal you would like. But to make this process go faster, if you are in a hurry, make the first impression and the first hollow out of the inside portion of the bread loaf, prepared as you know, and which will cast neatly. And inside this, cast in the melted wax which will give you a nice relief on which you can make your noyau.

p156r_2Work of gold, very light and hollow

Cast a lizard or any medal you would like in silver, of low quality, then gild it lightly and once the first gilding is done and dried up in the fire, burnish it, brush it with a wire brush. Apply another layer of light gilding, repeating the whole process. Do this three or four times or even more depending on how thick you want your gold to be. Then, in the most discrete place you can find, make a small opening, and submerge your entire work in some good aqua fortis, which will penetrate into the silver through the opening and will corrode the silver without damaging the gold. In this way, you will have a lizard that is hollow until the tip of its nails or any type of work that is so light that when you blow into it, it moves. But be advised not to apply a thick layer of amalgamated gold in one go, or apply layers that are too thin each time, because this will block the finer details, but if you proceed as I have said, [i.e.] lightly and in many goes, and cleaning it well, then you will be fine.

left-middleIf you want the aqua fortis to corrode well, you must cast in low quality silver .

p156r_3Chiseling

Lead is so fat and soft that one cannot hammer it harshly, one should have a light touch. Other big metals are easier to work with. With a graver called an onglete, you make and retouch the finest of details. With the ordinary graver, you make the larger ones, and with the chapele, you can remove the bits that have run, and with the [â\200] soften [â\200] some lines you flatten or raise the lines.

p156v

[http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f318.item.r=](http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f318.item.r=p156v_1Moulding%20a%20fly)

p156v_1Moulding a fly

Take the fattest flies, that go to pantries, which are not hairy, if at all possible. If they are hairy, oil lightly their fur and their unmanageable hairs with olive oil to make them lie flat. Take them also and use them as quickly as you can after they have died, because if you leave them to dry out, their legs will break when you want to stretch them. You must also, to get a better cast, arrange them on some kind of leaf or other similar thing. This will help to cast their little legs, that are so fragile that unaided, they will not cast easily. They can be arranged on a sage leaf or something similar. They cast well in gold or silver but one usually the legs and wings separately and then join them [to the main body.] I have cast one on a bouquet of sage that had seven or eight leaves. And to arrange it, I affixed the legs on the largest leaf with a bit of melted wax and joined them with the pointed tip of a hot iron wire. And to make sure that the wings will [eventually] join more easily [to the body], I applied on the underside some melted butter with a small brush. And with same pointed end of a warm iron wire I applied wheatgerm oil on the legs and feet. To tame and bed the downy hair that it has I also apply a bit of olive oil.

I do not let wheatgerm oil dry out a lot because it is very thick and has body, and the spirits cannot penetrate it.

For applications, tallow is too harsh, pork fat is too soft, and but is excellent because it is rather dry and curdles and instantly melts and is firmer. Be advised that the legs and feet are well set on the leaf, and not go beyond the leaf, because the whatever exceeds the leaf will not cast as well, even if cast in silver, because these parts are so fine that they will not cast. And truthfully, feet set on a leaf, cast well, but those set from leaf to leaf which remain iffy did not come out well in tin. The rest of the fly was cast, and likewise the sage bouquet which cast very beautifully.

left-topYou could also cast them well in gold or silver without the feet, and without attaching to a flower by casting it underneath the belly and then joining the feet with soldering. And if you need to, cast the wings in the same metal and it could be enameled if you fortify the wings and feet as previously said.

left-topIf you sage leaf or your branch needs to be repaired, do as I have said underneath. And then paint in a realistic way.

fig_p156v_1

<https://drive.google.com/open?id=0B9-oNrvWdlO5VjFPeWlJc05CbDQ>

left-topHaving been cast in gold, one enamels the wings with window glass from Lorraine, which is and transparent.

left-middleIt is necessary to cast the fly from the ass with some melted wax, fitted by an iron tip, as you know, to which the fly attaches itself, and then the wax, as it melts, serves as a cast for the fly.

+

left-bottomIf it happens that you have some defects with your fly's wings, hammer some very fine tin, or gold or silver, if you cast it, and shape with scissors the amount you need for your wings. And then apply it with tweezers and glue it with fish glue, applied like it is shown underneath. And before doing thing this heat your work lightly so that its coldness does not repel the glue, which will dry quickly, heating it from afar. Then cover lightly the joints of whatever you've attached to the cast with some esbaucher wax, which is a white wax that is mixed with a lot of ceruse or white lead, melting it with and warm iron tip

. You will also cut little bits of harpsicord string and will glue them with the aforementioned glue when they are dry. That is the say, the feet, having been reworked thusly, you will make them bigger with this same melted wax so that they are equal in proportion [with the rest].

p157r

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p157r_1The mode in which goldsmiths mold hollow molds

They mold their animal, or another solid work that they have already made or rough-hewn in wax and cast in lead, in two cuttlefish bones. When it is good and impressed in the two cuttlefish bones, they put a piece of paper between the two bones & join the bones and cast. The work comes in parts by halves. And then with a chisel they dig into the two half castings of gold or silver as subtly as they like, and then they solder or braze them.

p157r_2Bright red

Some goldsmiths try it out on finely beaten gold that is well burnished with a chisel. But it is better to try it out on a gold ingot, and to test it as well on a work or [illeg.] your materials fantastic, since if they look good & extraordinary on a big work, they will show excellently on a common work.

p157r_3Flies

They mold better on a single leaf than on a bouquet or a flower or the branch of an herb, since the single leaf is molded in two halves that being reheated can be opened up and cleaned well, & the cast will be better. In picking up the fly, take heed that you do not break its legs or let it dry out too much, because then the legs will fall off. And if this happens to you, glue the same legs back on with fish glue and wax, or adapt the hairs of a pig or the cords of a spinet. Fix the leaf on a flat piece of clay with two pins, and the fly with one pin in the middle of its body & the feet with wax.

p157r_4Cleaning and degreasing your cast tin works, and others

Make some lye passed through scrupulously with good ashes, and it should be new & without any fat; boil your molded work in it. And the tallow and fat will leave.

p157r_5Arranging an herb or flower to cast

Always put the front side of the thing on the upper side because it will come out better and neater than the lower side. Make the casting large & prepare the supraplus, which is the mass, after the founders of large castings, even for silver, which needs a very hot mold & is cast very hot. Very fine thing must be cast very hot.

left-bottom

When you know that the stem of a flower burned in a mold that will not open at all is totally reduced to ashes, this is the sign that everything else is well-burned.

p157v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f320.image>

p157v_1

Ashes in the moulds

You must let the mold cool down rather than blow into it to try to get the ashes out. Because when the mold is hot, the ashes stick to it, and when it cold, they separate from it more easily, and will exit by blowing with le vent a vapeur.

p157v_2

Moulding a bird

You must give it its pose. And to do so, place it on its side on a clay base and hide it in the aforesaid clay base and sink half the aforesaid bird in it, so that it is only showing one leg and foot, then you will apply butter to keep the feathers down and then apply some spirits. Then cast it. And having taken hold, clean and uncover what needs to be uncovered. Because the feet are made of bones which are hard to burn, and which will not be able to be cleaned neither with quicksilver, nor by any other means, if the mold does not open, uncover the bottom of the foot and the toe, or the nail of the claw, and mold it with a separate piece. Make a second cooking and open your mold and clean the bones. Feet generally remain too weak to support the a heavy bird. Because of this one adapts an iron thread in the foot mold which goes through the body before you cast. In this way they are reinforced. Some mold the wings in a frame. Some mold the head and the aforesaid wings separately en noyau, then reattach and repair them to start shaping the bird, which will firstly have a rigid shape and support the tempered sand.

left-middleThey are skinned and filled with cotton cloth. And for the best result, you must prepare it in the way that leather-workers do, so that they do not lose their comely feathers. The preparation is made of alum and flour paste.

p157v_3

Po{ur} f{air}e h{â\200{}} vin f{â\200{}}rs [?]

Prenez un chausson du pied droid t qui ait este porte et le faictes

tremper en eau et de leau q{u}i en sortira la f{air}e boyre au mesme

ou autre et v{er}rez merveilles

p158r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f321.item.zoom>

p158r_alMercury in molds, for cleaning

Take heed that your mold be quite cold when you blow in order to get the ashes out. And afterwards put in â\230¿ in order to finish the cleaning. Because if the mold is hot, the â\230¿ will go inside & seek out the conduits in escaping, & will leave its own odor, which will aggravate the tin or other metal that you will cast, such that it will break in touching the mold at all. The heat of the mold also retains some little grains of â\230¿ that will make lumps & stick to the sides of the molded leaves and attach to them & make them frangible. The â\230¿ cleans ashes well. Likewise flat things where there are not delicate traces that it could break with its weight. And therefore, if you can cast neatly without putting it in, don't use it at all. But if you have need of it, mix your crocum s and so that it withstands fire well. And after having put in the â\230¿, evacuate it, bouncing the end of the mold from below while moving it. Afterwards reheat your mold gently so that the â\230¿ is gone from everywhere. In this way I cast a branch of periwinkle leaves & flowers very neatly. Having put a branch of melted [illeg] in the flower, on the back of the flower [illeg].

left-bottom

Reheat your mold until it is good and red before casting, so that the â\230¿ evaporates well.

p158v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f322.image>

p158v_1

Colors for green leafs

One usually paints them with oil colors, because distemper colors do not stay on. For marigold flowers, lightly ground minium for some of them; for more yellowish ones, mix in a bit of massicot. For green, the vert-de-gris is dark and too somber. If it is a yellowish-green, you can mix with the vert-de-gris a bit of yellow ochre and scudegrum. If the green is dark, mix in some coals made from peach pits, which makes a greenish-black, in the same way than the bone of an ox foot bone makes a bluish-black. And in such a manner, by judgement and discretion, put the color on the natural flower or leaf to see whether it is similar to the original. But paint it on very lightly so as not to cover the features of the work.

p158v_2

Large molds

Because of the heaviness of the metal, it is necessary to put them in a press so that they do not open.

p158v_3

Candle smoke

It allows the piece to be taken out more easily, and even if it is slightly thick, it does not stick because it has no substance. I have perfumed my core molds this way for tin and lead, and I have casted in a cold mold, but drying it well beforehand, and the piece came out quite cleanly. It is true that lead mixed with half the quantity of tin, because the medal was very thick, was very hot.

p158v_4

Casts

If the medal is very thick, do not pour a cast that is as thick; the cast just needs to be half as thick as the medal. But if it is thin, make a cast that is of the same thickness. Do not forget to make vents in the cast or the whole matter will fill with bubbles.

left-bottom

Never forget to oil the cast with wax when you cast herbs or flowers, otherwise it will break and cannot be taken out.

p159r

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p159r_a1

Portraits in Wax

If you do not mix your wax with any color dye, and if you paint some colors on the wax, the se colors would fade if you cast it en noyau. But the representation is not damaged, rub it very lightly with spirits diluted with hot water. If your representations are varnished, repeat the molding process two or three times in order to remove this varnish which sticks to the mold. When the varnish is removed, your mold is very clean. If your representation is set on wood, it is necessary to pour very hot melted wax on the wood, otherwise the mold sticks to the wood. It is much better to mix your white wax with white lead than ceruse, because white lead is whiter and more firm.

p159r_a2

Chasing tool

If a chasing tool has passed through any part of the representation, it is necessary to rework the whole thing and follow it all again. Otherwise it would look like an additional piece.

p159r_a3

Fish glue

Beat it very finely and thinly on a well-cleaned anvil, then dilute your glue with spirits, put the mixture on hot ashes, and on a low fire, it will melt very soon. If the glue is not strong and thick enough, add spirits in greater quantity. Do not melt it in a fatty pot, but in a new pot if possible. It melts on fire and dries very quickly on fire. When your glue sets on the work, heat it away from fire, it will stick very strongly. One reworks flowers and delicate things made from silver, gold, tin and other metal with this glue which will not spoil your work.

p159r_a4

Tin and lead

They must be beaten out very finely and tin will not get brittle or break, lead is a bit fatter. But that is why it is necessary to reheat it under hot ashes, and to beat several leaves together.

159v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f324.item.r=>

p159v_a1

Cleaning files

Sometimes they get fat from the grease of lead, which is naturally fat, or also filings corrode them. And you will be able to clean them with hot charcoal or a wire brush made from brass.

p159v_a2Carnation

Mold a carnation like a rose, marigold, and all other flowers as discussed, that is to say cast the flowers in one mold, and the leaves in two parts in order to solder them onto the flower, this is the better way. But you could mold the flower and the leaves together in one single closed mold. I tried one which came out well from the mold. But the sand must be very thin, and you must blow very strongly.

fig_p159v_1

<https://drive.google.com/open?id=0B9-oNrvWdl05LXNkdWdBLXZlRVk>

left-middle

p159v_a3Molds

Try to make one side as thick as the other, that way the two parts will be equally reheated. You can open this kind of mold in order to clean it, when you mold some animals, like crayfish, which burn. When your mold is reheated, do not wait too long before casting again, because it gets damp and loses its strength.

p159v_a4Unmixed plaster

If you reheat plaster as a stone it would crumble into water, but if you grind it before reheating it, it will not crumble into water, on the contrary it will harden in water, if it is good plaster like the one from Paris or from Spain which is as hard as a stone, and which is found through poor and dry earths, and which looks like white salt. German people use this plaster to make statues for their fountains, even if the statues are varnished they will not be damaged with water. On the contrary harden this plaster with water. When this sand is unmixed it sets much sooner. Oil very lightly your shapes of metal or of other materials otherwise you will not be able to strip plaster from the mold. And dip your mold into hot water in order to open it, if it does not open in hot water, it could open into boiling water.

p159v_b4bIt is sometimes even necessary to boil the mold in hot water, as you would with wax if you were afraid it would not strip well.

Cold water draws oil out to the surface of the plaster that has sucked it in and thus it strips.

160r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f325.item.r=.zoom>

p160r_1Presses for large moulds

fig_p160r_1

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fig_p160r_2

<https://drive.google.com/open?id=0B9-oNrvWdlO5MEUzMjhxUVl1ZTA>

right-top

It is made of two sheets of iron, fasten with four small iron pillars, in such a way that the upper sheet is able to move and run freely along the pillars, while the lower one is fixed. A St André cross, made of iron, stops at the end of the pillars; there is a screw in the middle of the cross, which squeezes the sheets against the molds placed between them.

For small molds, we make a frame; having put the mold between two metal sheets, we squeeze it in the frame with for small moulds, put the mould between two iron sheets, and squeeze it with wedges.

Big wooden presses, with a screw, apart from being heavy to move to the furnace for casting, make it difficult to see when they squeeze too much, and they often break the molds.

The screw is fixed to these nuts which are nailed down the upper plate, this way it raises and presses the mould.

p160r_2Sand to cast flowers

In casting with thick sand, flowers crumple; it squeezes them into a mass. For this reason, be sure to dilute your sand very thinly, and blow on it so the flowers are not entirely covered. When you dilute your sand, do not only stir it with the small shovel, but beat it as you would egg white.

160v

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p160v_a1Moulding a foot or a hand

Mix resin to the wax. Once well blended, soften the mixture in hot water or urine. Then press [the foot or the hand] in the mixture in order to get an impress, then pour plaster; the cast will which will be clean and come off easily.

p160v_a2Fine work made of gold or silver

You can mold flies by hand, without casting; the wings and the feet can be soldered, which you could not do with fine works of lead or tin, because they would melt. You can enamel the work made of gold.

p160v_a3Catching crayfishes

On the end of a stick, attach pieces of liver or lung, from beef or mutton. Then hang a basket to the stick with a little string. Put the basket into water where crayfishes eat; they will soon aggregate on the flesh. Pull very gently your stick out of the water; the crayfishes which will try to return to the water will fall into the basket.

p160v_a4Catching passerines

If they sleep in the farmyard, like they commonly do, close to the house, let the closest window open, and put a lighted candle close to the window. The candle itself must be hidden, only its glimmer must be seen through the room and through the window; all the passerines will then lock themselves into the room. But the night must be very dark, without any moonlight.

p160v_a5Catching birds

During winter, when birds have molted, skin them and fill them with cloth and stuffing, or dry them well in an oven. Then arrange your birds on trees, have some [look like they are] singing, [look like they have assembled] and are numerous.

the oven must not be too hot. This [method] is good in the summer, because flies would set into the eyes and make works before they [birds] could dry. You can work on the birds more easily in the winter, because they dry by themselves.

161v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f328.item.r=>

p161v_a1Crocum ferri

It can be made quickly if you put very filings that are very neat and have been washed in a n iron drum that is only two fingers high, and cover it, and redden in a reverberation furnace, having washed it in good vinegar for a whole day. And it will be very well burnt and clean, mixed and crushed on a marble slab. Having been well crushed and when well mixed, the vinegar will corrode it easily and will redden it quickly and bind it. Wet it with the strongest one you can find and burn it after. And after three or four wettings and burnings it will be ready. This one will be the color of columbine and is considered firmer for casting than the one that is redder and more beautiful in color, done with rusty filings and has more color in it. Some burn the filings many times on a shovel of red iron, watering each time with vinegar.

162r

[http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f329.item.r=](http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f329.item.r=p162r_a1)

p162r_a1For La Boutique

According to Herodotus the Portuguese did not invent [deep sea] navigation as they put about. At the beginning of the first book entitled Clio, he says that the Phoenicians used to come navigating straight across from the Red Sea to the Greek coast, mainly to Argos, where they would bring merchandise from Egypt and Assyria, which they usually sold out within 6 days.

left-top

Navigation, commerce

Herodotus, page 1 of Clio, says that the Greeks traveled in a long ship to the coast of Colchis and to the River Phasis, where they carried off Medea.

left-topGalleys.

Herodotus, page 3, says that Gyges offered to the temple of Delphi "pateras aureas sex pondus 30 talentorum".

left-bottom

Gold vases

Halyattes, the father of Cresus, "pateram ex ferro compactilem apud Delphos dedicavit spectatu dignam inter omnia quae sunt Delphis donaria, opus Glauci Chii qui solus omnium compactilem ferri excogitavit." Compactile ferrum means made by assembling separate parts.

left-bottom

Iron vase assembled and soldered

As small peddlers lay open small wares in order to buy more precious ones & to make more and more profits, I also, from a desire to learn, am laying open the little that is in my boutique in order to have through receive through a common commerce des lettres much rarer secrets from my benevolent readers.

p162r_a2

Aes ustum

When it is finely ground it moulds very cleanly. It has a certain fatness that makes it bind better than filings, I believe that it may not be ill suited for casting.

p162r_a3

Rotten wood

Wood that is white, being light as a sponge, if burnt in a close fire, may be used for casting lead in a box and molds very cleanly, but these things [such material] do not withstand [open?] fire.

162v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f330.item>

p162v_1

Peach trees

Because they cast and blossom from the outset, and so are caught by the frost. We expose their roots during winter so that the cold slows them down, and they blossom later, which benefits their flowers.

p162v_2

Olive trees

In Spain they expose their roots during winter and in spring they earth them up again.

p162v_3

Foot of bittern

To mold it it is better to extend its fingers and nails on something flat and let them dry this way for a few days, because in drying the scales will be rougher and the nerves and tendons will be more apparent, and so the molded foot will be more artistic.

p162v_4

Molds of things which have not been

pelted

Animals who have not been pelted can only be molded in a double mold, which can only be opened after they have been refired and after the enclosed animal is completely burnt. Animals with bones or scales which are not reducible to powder thus remain in calcined pieces which will never be removed from the cast, however much bellowing or whatever amount of quicksilver is put in, or by using a feather pipe while molding to make a gate. This is why you mold in two halves: so that once the mold is opened after having been refired, the thing you've burnt can be cleaned out. But I advise letting it cool so that in taking off the clamps (being hot) nothing cracks while it is still fragile. While it is hot the crust and cinders which it leaves and which stick to the mold can be more easily removed when it is cold. Also note that on the side of the lower mold when you reheat the animal, which in boiling leaves a crust, in this case, always mark on the mold where the back of the animal is so that in reheating it is to the top and above and will by this method stay cleaner.

163r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f331.image>

p163r_1

Perfume-makers

They readily make their perfumes with half amber and half musk, and a little civet, because the scent of amber is stronger than the scent of musk.

To save using amber, perfume-makers readily add a small quantity of musk to the white layers, in order to get a stronger scent. But to remove or hide the blackness of musk, they add a bit of starch from England, which is perfectly white.

To give off a scent of white amber, in the same way that the Portuguese do, take a chunk of amber that you have broken up into pieces. Having put in a small silver porringer a spoon of flower oil, should you not have some, linseed oil. That is to say, use the type of silver spoon one might use at the table. Pour into this your ambergris, then place it on a low fire, it will melt quickly if your amber is of good quality, and there will be no lumps. Having melted it all, put in a small bit of civet, and melt it all and blend it well together. Then take your gloves which you have cleaned and dried properly, and lightly dip the edge of your finger around the edge of the oil, with patience slowly spread the oil along the glove, and rub the glove between your hands and trace along the fingers and its stitches, one after the other. Leave it to dry. Then repeat the previous procedure until you have used up all of the amber.

p163r_2

Spirits

Spirits are excellent for making molds clean, in such a way that where you do not apply some, common sand will attack the figure. But it needs to be passed three times. And because it does not take well on oiled things, I believe it may be best to put some into the water with which you have moistened your sand.

p163v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f332.image>

p163v_1

Crayfish

The hairy little horns that the crayfish has under its snout tend to come out lumpy and unclear because, after they are burnt, it is difficult to remove and clean away their ash, which, staying in the mold, prevents the metal from running well. And for this reason, one makes a small gate of wax thread at the tips of them, in order both to hold them up and to blow away the cumbersome ashes from inside.

left-topDo not spare any pins, placing them not only in the middle of the body, but also on the big legs, and two or three on the tail, according to the positioning that you want to give it.

p163v_2

Crocum

That which has become rusty by itself, having been doused with water, salt, and either vinegar or urine, and then well-dried and reddened by heating, is deep red when crushed on porphyry and is of the color of bol de levant, almost like minium. But that which is doused with urine and dried acquires a deeper color and almost like crushed aes ustum or like vermillion. But the first one, finely crushed, acquires a bright red color like cinnabar when placed in spirits. And the one and the other, when prepared as said above, finely ground and made very hot, produce a red smoke like an acid vapor if, being thus hot and fine, one throws vinegar, urine or spirits on top. The urine makes a lot of color and the spirits as well.

fig_p163v_1

<https://drive.google.com/open?id=0B9-oNrvWdlO5anJvd0FQQ3BkRFE>

p163v_3

Repairing

It is much better to only lightly repair your work with a burin called an "onglet" or the one called "chaple" or with a small file. Above all, avoid touching your work, but touch only the burr or lumpy parts that will have occurred during the casting. While reworking, moisten and rub your work with a small bristle brush.

164r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f333.item>

p164r_1

Casting

When you make a cast of delicate animals, like snakes, start by casting the belly side, or the under-tail, for this side has straighter lines which are easier to rework than the back side, which is more veined and is more marked.

p164r_2

Repairing burrs

Remove burrs very carefully with the point of a chaple or a burin, then scrape the burrs with the side of a burin, or carefully with a small file, and rub with willow coals and small brushes. Continue, also, with the lines not interrupted by burrs.

p164r_3

Leaded silver

A lot of silver is wasted because of the lead which is mixed with it, as occurs in cupellation, and makes it leap in small bits onto the edges of the crucible and onto the charcoal which covers it and is also gross. And by this means, it is good to melt silver coins, like reals and others, and make them into ingots prior to casting lizards or animals, for it comes out better. I cleanly molded a small, silver viper, like in the first recipe above. And at the end of the line of 4 reals (of 20 S of Spain), and one coin of 20 S from France.

164r_4

Blowing

When you smelt silver and gold do not blow too hard or with force, because the charcoal will become spent and the crucible will sink and, potentially, spill over. But when your mold is ready, blow strongly in order to properly heat the silver or gold. When all are melted it is necessary to blow over the top with a small bellows, doing the same for gold, for it removes and reduces the smoke.

p164v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f334.item>

p164v_1

Molds

For molds wherein something must be burned (away), and do not open before being reheated: do not cast before refiring/reheating. For large molds that produce large and wide casts, it is necessary to score it with strong notches so that the pitch of the metal does not run as forcefully. These will not make many burrs if they are pressed. Prior to doing so, place between the mold and the press pieces of thick felt for mittens, which will fill the cavities and protect the mold from cracking. The clamps should be placed prior to heating or drying.

top-left

When the ground from which you are making your earthen base to lay out your animal is too soft, the pins you place come out easily when you cast the sand and so the mold is spoiled and the design is defeated. Therefore when you know that your slab is too tender and soft, spread some hot cinders over it and blow with the bellows.

p164v_2

Sable

If you don't add enough alum de plume or crocus your mold will easily crack when heated. But if your sand is mixed as it ought to be, the mold will sustain itself. You'll know it's of good quality when, while still hot after casting, it immoderately soaks up the water when dipped and breaks easily, because the alum and the crocus render it spongy. To the contrary, bad sand, which is composed of plaster and brick and is not well mixed with alum, breaks easily in fire and hardens in water. If possible, cast all at once.

p164v_3

Molds

When you cast lead, your molds must be very dry, even if the molds are large. The outside of the molds must be reddened, and it is necessary to keep them in continuous heat until they do not smoke anymore inside. Do not reheat your molds several times, but continue when you have begun and do not let them cool in the cold because they will crack. Let them cool near the fire. When your molds are still as warm as above, remark, you can put your finger in to the casting gate without burning your skin. If your mold is large, it takes more time to

cure and to dry, and you must also cast warmer.

165r

<http://gallica.bnf.fr/ark:/12148/btv1b9059316c/f336.item>

p165r_1

To repair

If in your cast, there appear some little hole, fix it with black or gray filling gum wax.

p165r_2

Lacquer

If, having been ground, you let it dry without keeping it in water, it will dry out and it will be quite difficult to crush it as before.

p165r_3

Stretching a canvas portrait

If it is crumpled or folded from when it was rolled up, moisten the back side with a wet sponge. Then stretch it very evenly without damaging it.

p165r_4

Plaster for molding

When it is long to set and dry, it means that it is too fat and moist, which is what makes it shrink away from the fire and crack. [This is] where burrs come from. The one that comes from lean earth is better. You must not store your moulds made of fat plaster for a long time, because they resemble fat earth, which when drying, cracks. The best is to reheat them soon after they have been made and cast. Moulds made of good plaster can be stored a long time.

left-middle

It is necessary to oil it well, because it is more difficult to separate the two halves of these moulds than when it is mixed.

p165r_5

Dragon's blood

You can imitate dragon's blood with lacquer, which surpasses it in beauty, if [when] diluted in oil, you use it to ice gold or silver. Diluted with varnish, it fades.

p165r_6

Repairing snakes and lizards

You could make some marks according to the form of their scales, making some bigger ones and some smaller ones, according to the shape of the neck, the body and the tail. If there is something broken, you can attach it with small iron or steel nails, and glue it with some mouth glue, then cover the whole thing with gray or black wax. But it is necessary to let the glue dry for one day without touching it.

165v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f336.image>

p165v_1Positioning animals

Not only with iron pins, but also with melted wax, are animals secured to the plate of earth. Wash them first in clear water, after they have died in the mixture of vinegar and urine. And with a sponge clean off their mouth, eyes and head of the froth coming out, because the sand would never set well there and would become lumpy.

left-topIf you want to keep their mouths open, insert a little bit of harpsichord string, which will not take up much space.

p165v_2Keeping animals

Having molded them once, if you want to keep them for molding again, put them back into the mixture of urine, vinegar and spirits where you killed the others, and they will keep for a long time without decaying. If you have a cut on your hand, take care that this mixture does not touch it.

p165v_3Molds

After molding them do not keep them for long, but use them as soon as you can, because when kept for a long time, they are prone to spoiling.

When your molds are reheated, the thing comes out better.

p165v_4Lute

When reheating, you might as well use common lute, But when you want to cast, strip it from the mold and, using a brush, quickly apply a layer of plaster lute that has been used for molds, because it will be dry as soon as it settles, and cast. This lute should be mainly placed on the joints.

p165v_a5Silver

When it quivers after melting, that is a sign that it is very hot. And since it commonly contains much lead, it is good to throw in some lime mortar because that attracts and gathers in the lead.

p165v_a6Fly wings

So that they come out best, place wax sprues from the gate up to the tips of the wings. Also make sure there is enough wax under the belly, because that is what makes the cast succeed.

fig_p165v_1

<https://drive.google.com/open?id=0B9-oNrvWdlO5UmhqY1RkWFRhYzg>

left-middle

p165v_a7Attaching a fly wing or something similar

They can be attached with fish glue mixed with spirits over slow heat, heating also the work. Then that is covered with wax "Ã Ã baucher", that should be grey.

166r

[http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f337.item.r=](http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f337.item.r=p166r_al)

p166r_alFor The Workshop

If anything has been omitted: the harvester is not blamed for leaving some corn ears.

If some craftsmen complain that their craft secrets are being discovered, as the goddesses of Eleusis complained to Nâ\200| the Pythagorean that their mysteries were disclosed, excuse yourself in the words of the ancient Hebrews quoted by Josephus.

As a hen will carefully search the rubbish thrown out of a house for a crumb or a seed to distribute to her chicks, so will the orphans receive whatever has been discovered in those arts that are considered vile and despicable.

Tablet of Cebes: idle. But The Workshop represents all things active.

If the jealous will disapprove picking up these things and taking them from others, reply that since "Nullum est jam dictum quod non dictum aut factum sit prius" and it is commonly believed that all arts were invented within a thousand years, do not imagine you could invent anything new but rather rediscover the long-buried, unknown and forgotten books of Numa in order to reveal them to those who are ignorant of them; and that, just as the day before teaches the day after, you also needed to learn from those before you in order to teach those after you. The Latins learnt from the Greeks, as Cicero did from Plato and Virgil from Homer (Aulus Gellius). Valerius Maximus only reawakened various authors who had written previously, and Livy's 23rd book [revived] the 2nd or 3rd book of Polybius. Among the Egyptians, Serapis was deemed the inventor of agriculture, but among the Sicilians, it was Ceres. Pythagoras and others from Tyana learnt during their travels those disciplines which, back in their countries, they claimed to have invented. Does one not call a weaver the maker of his precious cloth or fabric, even though he did not himself dye and twine [the yarn] nor wind and prepare the reels and balls of thread? Is a mason not the builder of the house, for picking up ready-made stones? "Apollo a Chirone medicari didicit & tamen deus medicinae habitus." "Homerus Orphei poema imitatus est, nam cum Orpheus sic prius exorsus esset, 'Iram cane dea Cereris frugiferentis', ita reddit Homerus, 'Iram cane dea Pelidae Achillis'". In Justino martire, Circa princip.

166v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f338.image>

p166v_1

In addition to Greek examples, there is a psalm of David mentioned by Saint Athanasius in the Synopsis. It begins "Parvus eram" and in the second verse the royal prophet says, "Manus meae fecerunt organum et digiti mei aptarunt psalterium."

p166v_2

Keeping chestnuts

They must be left in their burs until you want to eat them. And in their burs, store them in a humid place, or in the drain of some roof.

p166v_3

Scented candle from Le Mans

They melt in with wax and candles rosin that is called in France [rosin] from Burgundy, which is white and not as rough or dry as the other rosin. They also perfume the wick and the end of the wick.

p166v_4

Softening gold

Dissolve some caput mortuum in distilled vinegar. Filter and congeal in salt and cement the
â\230\211 with this, and it will soften wonderfully.

p166v_5

Improve the color of gold

Put some aqua fortis made with vitriol on hot embers. Cover the bottle, that is, the vent, with a tile. Then uncover it and a thick smoke will come out in which you put the gold and it will take on an excellent color.

p167r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f339.image>

p167r_1

Mortars

fig_p167r_1

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Mortars are made of the best alloy of "mā@tal" and the finest possible rosette so that they do not burst, that is to say one part "mā@tal" and two [parts] fine rosette or old caudron, which is even better. Some of them are of fifteen or seventeen lb. and are loaded with two and a half lb. of grain powder, and they are put on common windows and doors. Others are of a weight of 25 to 27 lb. and are loaded with eight lb. of powder. And in such a way, they are made according to the stress they have to resist. On the outside, they are all the same shape, but in the inside, they are made like a crucible,

fig_p167r_2

<https://drive.google.com/open?id=0B9-oNrvWdlO5OUZCVWpfdm1zbWc>

narrower on the inside of the bottom and getting wider towards the mouth. And this is to reinforce the bottom, given the quantity of powder they hold, and so that they do not burst. Those of 4 s. lb. are eight lines thick at the bottom, and get thinner in the inside towards the opening, which is of 4 lines. They have xiii "poulsses" long and seven in diameter at the mouth and opening.

167v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f340.image>

p167r_1

The ones weighing about 27 lb. are ix "pousses" long and the mouth is 6 [pousses] in diameter. At their bottom, they are 6 "lignes" thick, and 3 for the mouth. The ones weighing 17 lb are 8 "poulsses" long and the mouth is five [poulsses]. They are all covered together, all the forks, rods, and tools which one uses, with a big canvas or big cloth so that they do not make any noise. It is good that they sit loaded for a while. After the powder has been put in, it is grinded very hard and then tightly pressed paper is put in, then a cake of well pressed wax and, on the wax, another slab of cork that fits in very snugly and that you have to force in. In this way, the powder remains well packed and gives much greater force, and if you wish, you can put on the cork slab one of wood pierced in the middle, if the mortar has a pierced bottom, which is believed to be the easiest and which makes a greater hole because it cannot recoil. And for these that have a pierced bottom, one must have a good gimlet to first make the hole so that the rod, which is made by the point of the gimlet, has before and without noise attached the mortar. And for these, one must cover the button, which is quite sharply filed, with waxed canvas, or add wax to it so that it completely plugs the hole in the bottom. But because the doors are sometimes iron and the iron rods cannot pierce it, an iron fork made like pincers and another iron stick made with three claws, like you see painted, are use. And in this way, the mortar stays in place well and is immediately steadied. The iron rods must come out of the mortar from every point made by the gimlet, namely by three or 4 finger lengths, which all enter in the door. When the mortars are placed, the touch-hole is filled with good powder and inserted in it is a feather shaft filled with tightly pressed powder and moistened with vinegar, or if needed, the powder is firmly pressed with the palms of the hands and, having wet it with some saliva, you shape it like a cocoon or

168r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f341.image>

p167r_1

fig_p168r_1

<https://drive.google.com/open?id=0B9-oNrvWdlO5RUdzVWVNM3l6QVU>

left-top

rod that we put into the touch-hole, and then, with a rope wrapped around the end of a baston, we ignite it and promptly retreat to take cover. The small mortars of 16 or 17 lb. are attached promptly with a short, hooked rod made like a wimble, and if it is of a good alloy, we can ignite it by hand. It is done in this way for mortars of 27 lb., but then we only put three lb. of powder. The door really needs to be strong so as not to be blown off for seventeen lb. mortars. Some people use little bells worn by oxen or mules as a door for the mortars. Others load two canons of guns and, with a gimlet and a string, tie them with the opening against the door. If the mortars are good and do not explode, they only recoil and cannot harm if one is next to them.

A is a small rod, hooked like the hinge of a door and made as a biron on one end in order to quickly attach a small mortar with handles of fifteen or xvii lb. for a common door or window.

B is a small mortar with handles.

C is a common mortar of 27 or 30 lb. pierced at the bottom, where a large iron rod passes, button-like on one end made like a biron on the tip so as to quickly hang the mortar against a door that will not be covered with iron plates.

D These are slabs of wax, cork and wood for loading the mortar and well packing the powder.

E iron fork made in the form of pincers as tall as a man, used to quickly set the mortar without a rod. It must be of soft iron so that the sides fold easily, if needed, and to accommodate the height or width of the door.

F is another iron fork of the same height that supports the fork made as pincers and also sustains the mortar, and with its low claw prevents the pincers from recoiling.

168v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f342.image>

p167r_1

G mortar with handles placed with its rod.

H knife-like saws to cut, if needed, a portcullis.

J the big iron rods that cross and tie the mortar.

K are like iron rods, all round and covered with cloths, like all the rest, so as to make the big iron rods, pierced close to the button, turn.

L axes that one must always carry to chop and to break, in the fortuitous case that the mortar has left anything entirely.

M a large wood mallet for knocking down what was begun and weakened by the axes and "biron s".

N are big wheelwright augers and biron s for easily cutting a door or window by making large holes close to one another.

O crutches as tall as a man that must be carried to put under a portcullis immediately after the canon has been shot and to prevent the portcullis from falling.

P are small iron pincers for putting any low mortar against the bolt of a door.

169r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f343.item>

Molding a tortoise

Furry animals

Birds

Leaf of vine - put

Of the strawberry

Piece molding

Molding a vase in a chassis

Molding capilli veneris

Molds that need to be supported by nets

Molding a bouquet

Rose carnations

Hollow molding

Hollow gilded silver

Molding wort plant put

+ Crayfish put and seen

Grasshoppers

Barbots

Butterflies

Flies

Bats

Enameling thin gold

Molding in sugar

Molding fish

Molding in sulfur put

Cardboard

+ Wax put

Roughing out

Stamped medals full of lead

Molding large carved wooden pieces

Molding and making casts of metal animals

+ Wheat oil put and seen

Stag beetle

Foot of a bittern molded

Thickness of a medal

Very hard wax

Molding the engraving on a ring

Molding pieces of carcanets

Things that do not release from the mold â\200;

Fountains

Grottoes

Sundry mosses applied

Molding in three chassis

Tempering iron in order to engrave it

Etching on silver and iron

Stamping

White enamel, softening it with black calcinated river pebbles

169v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f344.image>

p169v_1

Molding very thin likebimbalotiers do

They mould in paper or cardboard, because neither sandy earth nor metal would mold so neatly and would not receive. Or they engrave with stone from Istre, for the main side, and the reverse is in paper or cardboard.

p169v_2

Reducing a round form into a hollow one

You must firstly mold it with plaster as has been said before, and in the plaster throw in some wax from which will come a relief that you will repair very neatly, and will shape at your pleasure. Then you will mold this wax relief once more in plaster, or even better with your tempered sand, #, as if for a noyau. And in the latter throw in some lead and from this you will have a very neat relief, and if it is not, repair it on cement or a similar material, and beware that it should always release well. And this one will always serve you as a model for making as many hollow molds as you would like. In this way, place half of your lead figure which you have oiled, and moisten it with spirits as we have seen above, on your clay base, then mold this half with a white plaster. Having taken hold, and having smoothed and flattened the plaster, take your black wax mixed with sulphur as we have seen before, because it leaves nothing in the mold and melts quicker. Dip it in hot urine, and once it is softened enough, make an imprint with it on your half figure in lead. And you will have a very neat hollow mold. Then adapt your wax hollow mold into a square shape, as it pleases you, as long as you have sufficient thickness, and make sure it is well even on all sides, and then mold this hollow wax; and having it imprinted on one side, and having it flat and even on the other, in the same way that you would mold a flat medal in wax or metal in a noyau. And the noyau mold will give you, whether in silver or any other metal you wish, a figure similar to the wax one, which is to say, flat and even on one side, and hollow on the other. And having cleaned this hollow, and having put it in the bleach, if it is made of silver, you can put into it some sugar work

left-topHaving made a hole in your clay base and having placed there your half figure in wax, oil it a bit so that it comes out more easily.

left-middleTransparent wax is not good as opposed to one that has body, for making good imprints.

fig_p169v_3

<https://drive.google.com/open?id=0B9-oNrvWdlO5MGtBY2MyYTNKTUE>

left-bottom

left-bottomBecause you have molded one of your halves with plaster and wax, you can do the same thing to the other half.

170r

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f345.image>

p169_2

perfume and similar things. But be sure that the black wax with which you cast is hard, so it will come off rapidly when dry so you can see if it has been stamped correctly. It can be made harder by adding more melted sulphur in the melted wax, and a bit of resin.

p170r_1

Common medals

Relief awls are made of untempered steel, and then it is tempered. With it we beat on a matrice, not red hot on the fire as some people think, but on some steeled iron, reheated and adoucy, that is then tempered.

p170r_2

Casting

Do not cast all at once because in doing so, the metal overflows and gets cold instead of going to the bottom [of the mold]. Rather, cast it bit by bit, and gently.

p170r_3

Iron clamps

When you put them for the second time, make sure that the mould does not wobble.

p170r_4

Molds

Those with noyau, when reheated, should be placed on half lit charcoal, without being in contact with the air; like the frame molds, they need to dry in the open, and uncovered.

p170r_5

Thick tin pieces

They should not be casted with lead or red tin, like thin and fragile things. It is enough if they are well melted and hot. Fragile things need to be red hot and made of red tin.

p170r_6

How to clean closed molds

You have to leave them cool down rather than blow inside to clean them, because they hold the ashes when they are hot. Once cooled, they are easier to clean. Have a fine brass wire or steel wool to thoroughly clean the guene because it is through it that you cast. Blow into it and siphon, bringing it to you. Give it volume before casting the tail with wax, then cut it.

fig_p170r_2

<https://drive.google.com/open?id=0B9-oNrvWdlO5amQ1YVRWWnFGWUE>

left-top

fig_p170r_1

<https://drive.google.com/open?id=0B9-oNrvWdlO5S3FNaEt0QmN1a1U>

make a tail by soldering a latten wire. The grains of a flower are quite little, so they can be removed with the chape, but the leafs need to be peeled off correctly, then the paint will cover everything.

170v

<http://gallica.bnf.fr/ark:/12148/btv1b10500001g/f346.item>

In the year fifteen hundred seventy-eight, the second of July, the heirs of the late Sr. Ouyrier received (two hundred and five ecus), the rent of Saint-Frajou, amounting to twelve hundred and thirty livres.

They have also received, as part of the revenue of the year fifteen hundred seventy nine, three hundred forty three and one third ecus.

And for the first year, they remain [to be paid] eighty livres and fifteen sous, | and for the second settlement, they have not yet received anything.

p170v_2Against plague

Against pestilential fever or poison or plague, take an ecu's weight of your opiate soaked in scabious or bugloss extract, or heavily diluted wine, if you are already ill. After taking it, you must make yourself sweat.

p170v_3To preserve oneself

Acetum paratum ex ruta baccis juniperi simul tusis Eoaceto extinguantur lateres igniti. Et vapor excipiat ore [et] naribus. Rue vinegar together with crushed juniper berries. Pour the vinegar over red hot bricks and inhale the vapor through the mouth and nostrils. This is to preserve oneself when going into noxious air: a garment can be perfumed with this vapor in order to remove infection from a room, house, etc. And if you find yourself in a place where you do not have this preparation, carry rue and berries crushed together, then, if need be, boil them in vinegar and use as described.

Ottonis episcopi | Frisigensis | Ab orbe condito

Abbatis | Urspergensis | Chronicon

Hieronymus | Mercurialis, | Variarum

Rerum Scoticarum Historia, Georgio Bucanano authore

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