to them, and the piece is turned round, no ſide may belly ' out more than another. To find theſe two centres, lay the piece of wood to be turned upon a plank ; open a pair of compaſſes to almoſt half the thickneſs of the piece ; fix one **of** the legs in the plank, and let the point of the other touch one of the ends of the piece, brought into the ſame plane with the plank on which the compaſſes is fixed and very near the fixed leg. Deſcribe four arches on that end at equal diſtances from each other at the circumference of the end, but intersecting one another within ; the point of interſection is the centre of the end. In the ſame manner muſt the centre of the other end be found. After finding the two centres, make a ſmall hole at each of them, into which inſert the points of the puppets, and fix the piece ſo firmly as not to be ſhaken out, and yet looſe enough to turn round without difficulty.

The piece being thus fixed, it is neceſſary in the next place to adjuſt the cord, by making it paſs twice round the piece, and in ſuch a manner that the two ends of the cord, both that which is fixed to the spa*ng* and to the *foot-board,* come off on the side on which the turner ſtands, that the piece many move againſt the edge of the cutting tool and be turned. If the lathe be moved by **a** wheel, the manner of adjuſting the cord needs no directions.

If the workman does not chooſe to be at the trouble to find the two centres of the piece in the manner described above, let him lay, as nearly as he can, the centre of one end upon the *point* of the left hand *puppet,* and then let him puſh forward the right hand puppet, ſtriking it with a mallet till its point is as near as he can in the centre of the other end of the piece ; and then fixing the right hand puppet by **a** gentle blow of the mallet on the key, let him turn round the piece to ſee by the eye if the centres have been proper­**ly** found. If any part of it bellies out, let him ſtrike that part gently with the mallet till it goes properly ; then let him ſtrike one of the puppets pretty smartly to drive the points into the piece, and afterwards fix the puppet by ſtriking the key. If the workman cannot judge by the eye whether the piece be turning properly round its centres or not, he ſhould apply gently the point of an inſtrument called **a** *tri­angular graver,* leaning it on the *rest,* and it will mark by **a** line the place where the piece is out of its centre ; and by striking upon this line with a mallet, the piece can eaſily be placed properly. The *rest,* of which we have just ſpoken, ought to be placed upon the two arms of the lathe, and fixed with ſcrews as near the piece as the workman pleaſes.

The piece being fixed between the two points of the puppets (or, as we call them in Scotland, the *heads* ), the cord adjuſted. and the *rest* fixed as near the work as poſſible without touching it ; the workman is now to take a *gouge* (fig. 2*.* in which *a* is the mouth and *b* the handle) of a pro­per ſize in his left hand, and hold it by the handle a little inclined, keeping the back of the hand lowermoſt. With his right hand, the back of which is to be turned upwards, he is to grasp it as near the end as poſſible on this side of the *rest ;* then leaning the gouge on the *rest,* he is to preſent the edge of it a little higher than the horizontal dia­meter of the piece, ſo as to form a kind of tangent to its circumference; then putting the right foot on the foot-board, and turning round the wheel, and holding the gouge firmly on the *rest,* the piece will be cut neatly. In the ſame man­ner are the chiſels, formers, and other inſtruments to be uſed, taking care that the wood be cut equally, and that the inſtrument be not puſhed improperly, ſometimes ſtronger than at others ; and taking care alſo that the inſtrument uſed do not follow the work, but that it be kept firmly in the hand without yielding.

The young turner ought to endeavour to acquire the management of the gouge and the chiſel, which are the instruments by far the moſt frequently uſed, and the moſt neceſſary in this art : by them, almoſt entirely, are the ſoft woods *turned* ; for as for hard woods and other things, as box, ebony, horn, ivory, and the metals, they are hardly ever turned except by s*having off.* In that caſe gravers are to be uſed with ſquare, round, or triangular mouths (fig. 3, 4, 5.). They ſhould be held horizontally while applied to the wood, and not obliquely as directed for the gouge and the chiſel.

After the work is completely turned, it is next to be poliſhed ; and this cannot be done with the inſtruments hitherto mentioned. Soft woods, as pear-tree, hazle, maple, ought to be poliſhed with ſhark ſkin or Dutch ruſhes. There are different ſpecies of ſharks ; ſome of which have a greyiſh, others a reddiſh ſkin. Shark ſkin is always the better to be a good deal uſed ; at firſt it is too rough for poliſhing. The *Dutch-rush* is the *equiſetum-hyemαle* of Linnaeus, which grows in moiſt places among mountains, and is a native of Scotland ; it has a naked, simple, round ſtem, about the thickneſs of a writing pen. The oldeſt plants are the beſt. Before uſing them they ſhould be moiſtened a little, otherwise they break in pieces almoſt immediately, and render it exceedingly difficult to poliſh with them. They are par­ticularly proper for ſmoothing the hard woods, as box, lig­num vitæ, ebony, &c. After having cleaned up the piece well, it ſhould be rubbed gently either with wax or olive­ oil, then wiped clean and rubbed with its own raſpings or with a cloth a little worn. Ivory, horn, ſilver, and braſs, are poliſh­ed with pumice-ſtone finely pounded and put upon leather or a linen cloth a little moiſtened : with this the piece is rubbed as it turns round in the lathe; and to prevent any dirt from adhering to any part of it, every now and then it is rubbed gently with a ſmall bruſh dipt in water. To poliſh very finely, the workmen make uſe of tripoli, a particular kind oſ earth, and afterwards of putty or calx of tin. Iron and ſteel are poliſhed with very fine powder of emery ; this is mixed with oil, and put between two pieces of very tender wood, and then the iron is rubbed with it. Tin and ſilver are poliſhed with a burniſher and that kind of red ſtone called in France s*anguine dune.* They may be poliſhed alſo with putty, putting it dry into ſhammy-ſkin, or with the palm of the hand.

To succeed in turning iron, it is neceſſary to have a *lathe* exceedingly ſtrong in all its parts, and exceedingly well fixed. The puppets ſhould be ſhort, and the *rest* well fixed very near the work : the back of the *rest* ſhould be two or three lines lower than the iron to be turned.

The lathe and other inſtruments being prepared, it is ne­ceſſary to determine the length and thickneſs of the iron to be turned according to the deſign which is to be executed, and to make a model of it in wood a little thicker than it ought to be : Then one exactly like this is to be forged of the beſt iron that can be procured ; that is to say, it muſt not be new, but well prepared and well beaten with hammers ; it muſt have no flaws, nor cracks, nor pimples. New iron, which has not been well beaten, often contains, round drops of caſt iron, called by the workmen *grains,* which blunt the edges of the gouges, chiſels, and other in­ſtruments uſed for cutting ; break them, or make them slide. The iron being forged according to the model, it ſhould be annealed, that is, heated red hot and allowed to cool ſlowly on the coals till the fire go out of itſelf. Some people, to ſoften the iron, cover it over with clay and allow it to cool. The iron cylinder being thus made, it is next to be put upon the lathe, finding the centres as formerly directed and boring a ſmall hole in them that the iron many not escape from the points.