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# Samuel FREEDMAN

# Chemalloy

Like Eugene Anderson's "CB II" alloy (which is dubiously claimed to catalyze the decomposition of water --- eyewitnesses have stated that the pieces of alloy appear to be diminished after the demonstrations), Chemalloy also generates hydrogen/oxygen gases, though catalysis has not been claimed for it. Chemalloy has several other unique properties, and the preparation has a distinct "alchemical" flavor to it. Very interesting stuff...

**S. Freedman: Science & Mechanics (1960s)**

**USP # 2,796,345: Process of Producing Lead-Zinc Alloys**

**USP # 2,927,856: Multi-Purpose Alloys of Controlled Homogeneity**

***Science and Mechanics*** (early 1960's.) ~ *Provenance*: Transmitted by Alex Peterson to Peter Lindemann, who shared it at the KeelyNet Convergence 2001 conference; the text below is provided by Dan York. Posted on KeelyNet June 25, 2001 and transcribed from scans sent by Dr Lindemann to Rex Research.

### "CHEMALLOY --- A New Alloy for the Science Student"

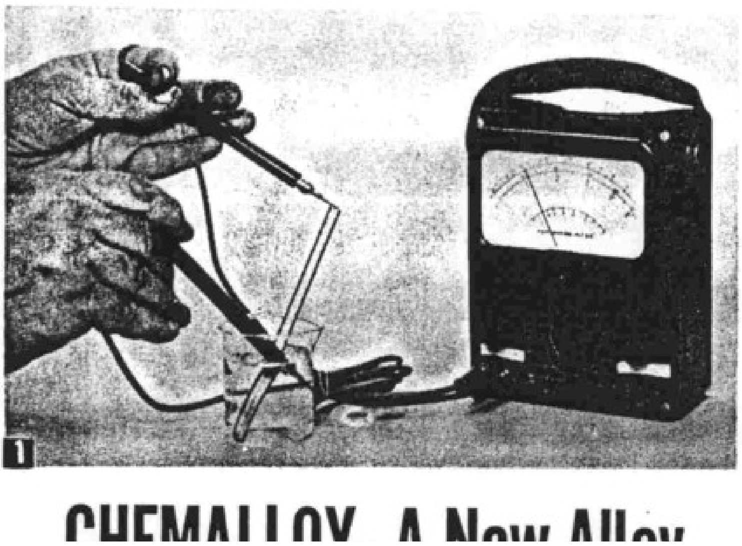
**by**

**Samuel Freedman**

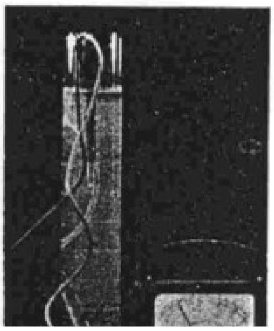
Originally conceived as a soldering alloy, this patented substance has anti-friction properties, will aerate soil, improves seed germination, stimulates pant growth, will generate electricity, and ????

What relation there can be between soldering aluminum and promoting the growth of huckleberries is hard to see --- yet in the broadest view, scientists say, all things are in some way interrelated. Chemalloy, with its strangely diverse properties seems to support this view.

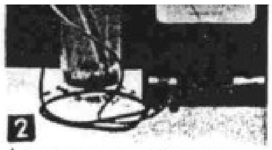
Put a Chemalloy rod in plain water (Fig.1) and you have a battery of 0.55 volt potential that will last as long as the rod is kept wet, generating enough power to operate a voltmeter, milliameter or oscilloscope. In different liquids, voltage varies from almost zero for petroleum to 1.1 for certain types of chili sauce.




Place a rod of Chemalloy in water, touch one probe of a voltmeter to the rod and immerse the other probe in the water—result: .55 volt d-c. According to the inventor, this potential will remain indefinitely.



# CHEMALLOY—A New Alloy for the Science Student

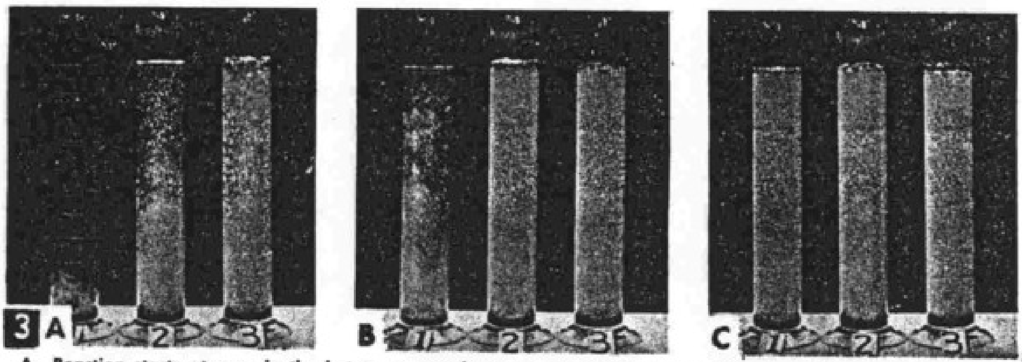


2 Powdered Chemalloy also produces over ½ volt potential in water, but in addition liberates hydrogen.

As a bearing material, Chemalloy in a solid dry state withstands friction without coolant or lubricant.

Chemalloy powderized to about 1,000,000 particles per pound exhibits the same elecritical properties (Fig. 2) as the solid rod. Here it generates slightly more than 0.5 volt, and in addition decomposes the water, liberating hydrogen.

This process is further examined in Fig 3. First fill three graduated cylinders with water, one cold, the second warm, and the third hot. Add equal amounts of Chemalloy to each graduated cylinder. Instantly, the graduated cylinder containing hot water liberates hydrogen (Fig. 3A).



A. Reaction starts at once in the hot water, graduate 3, more slowly in 1 and 2. B. In a few minutes hydrogen production in graduate 2 equals graduate 3. C. A few minutes later, all three graduates are bubbling equally.

Heat is generated by the reaction so that with the passage of a few minutes (Figs. 3B and C) the three graduated cylinders are equally warm and hydrogen production in all three is the same.

One of the most significant uses of powdered Chemalloy may be the warming and loosening of soils that are too cold or compact for optimum seed generation and plant growth. The warming and areation of soil on a laboratory basis is shown in Fig. 4. A sample of dry soil is placed on top of powdered Chemalloy in a glass case. Note the temperature rise from 94º F. to 126º F. Voltage remains approximately at 0.6.

A. At the start of the soil aeration experiment, dry soil is placed atop Chemalloy powder. Soil temperature is 94°F. B. Water is added to the soil, moistening it. Soil temperature rises to 104°F. Voltage is .6. C. Moments later, soil temperature is 126°F, voltage constant.

From this point on, voltage will remain constant, but soil temperature will decline and finally stabilize at a point a few degrees above the environmental temperature. The electrical action will continue and will generate warmth at this reduced magnitude. To date, the capability of Chemalloy to generate electricity in water has been observed for seven continuous years, and no limit is known. The liquid, rather than the metal is the substance which is consumed and must be replaced.

A Provincial Horticulture Station in Alberta, Canada, summarizes an experiment in seed germination as follows:

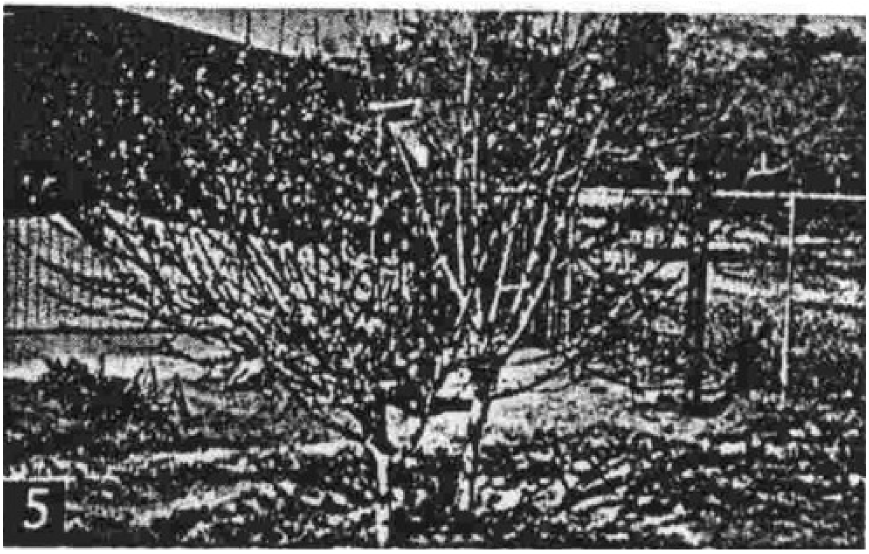
| Vegetable | %germinated (Chem. Treated) | %germinated (untreated) |
| --- | --- | --- |

| | | |
|---|---|---|
| Cucumber | 50 | 16 |
| Red Beet | 96 | 70 |
| Lettuce | 64 | 34 |
| Leek | 86 | 54 |
| Carrot | 68 | 32 |

The assistant superintendent supervising this experiment stated that the addition of Chemalloy powder resulted in speedier germination of seeds as well as larger percentages germinated. Initial growth of the plants after emergence was also more rapid in the case of treated seeds.

For field crops, Chemalloy is applied at the rate of one to five pounds per acre, in the row or hill with the seeds. It is not broadcast over the entire field area, as this would waste material. It needs to be buried where it will be in contact with soil moisture since it is inert when dry.

The peach and nectarine trees in Fig. 5 were planted in poor compact clay soil in El Cajon, Calif., and stands in sharp contrast to anything else in the area having grown in 1-1/2 years to the height shown from 1-in. diameter stubs.

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## US Patent # 2,796,345

## Process of Producing Lead-Zinc Alloys

**(June 18, 1957)**

**Samuel Freedman**

This invention relates to welding or soldering alloysand to processes of making such alloys.

One object of this invention is to provideawelding or soldering alloy which can be used to unite metal parts including aluminum parts, without teh necessity of employing careful cleaning procedure or fluxes, and without the necessity of employing the drastic cleaning measures or using the corrosive fluxes or specialized equipment previously required with aluminum welding or soldering processes in order to remove the tenacious oxide film from the surface of the aluminum.

Object is to provide a welding or soldering alloy for uniting metal parts, including aluminum or aluminum alloy parts, which alloy is quickly and easily employed by merely bringing the aluminum or aluminum alloy parts together, heating them at their proposed junction by any suitable means such as a gas torch in order to raise them above the melting point of the welding alloy, and then stroking the parts at their juntion by passing a rod of the alloy back and forth along their juntion, whereupon the welding rod melts and flows by capillary attraction into and along the joint without previously applying a flux, uniting the parts tenaciously in a firm and permanent joint.

Another object is to provide a welding or soldering alloy for uniting metal parts, including aluminum or aluminum alloy parts, wherein the welded area, after welding or sodlering, has a strength at the junction which is greater than the strength of the adjacent metal, so that if the parts are sibjected to excessive force, they will break adjacent the junction, but not at the junction itself, even if the welding alloy has approximately the same thickness at the junction of the adjoining aluminum or aluminum alloy parts which have been welded.

Another object is to provide a welding or soldering alloy for uniting metal parts, including aluminum or aluminum alloy parts, which alloy has a silvery appearance at the welded junction and which will not rust or corrode, and which can be readily machined, polished, plated or painted.

Another object is to provide a welding or soldering alloy for uniting metal parts, including aluminum or aluminum alloy parts, which alloy can be employed by inexperienced persons without special training and without the need for any of the special preparatory measures previously required in uniting aluminum parts, and not requiring welding hoods, colored glasses or special eye protection.

Another object is to provide a welding or soldering alloy for uniting metal parts, including aluminum or aluminum alloy parts, wherein the welded area has a very fine grain structure without porosity, and wherein soft solder will adhere so as to enable the attachment of wires to aluminum or aluminum alloy parts by soldering the wires to the welding metal.

Another object is to provide a welding or soldering alloy for uniting metal parts, including aluminum or aluminum alloy parts, where special grooving or other special preparation of the edges of the aluminum parts to be united is not necessary, because the welding alloy of the present invention penetrates throught the oxide film to the interior of the metal to make a strong fusion, and flows readily without spattering or creating lumps, and without the production of the fumes or odors produced when fluxes are used as in prior processes of uniting aluminum or aluminum alloy parts.

Another object is to provide a process for making a welding or soldering alloy having the characteristics set forth in the preceding objects, wherein the process enables the introduction of chemicals into the alloy while it is in a molten state, without the production of dangerous explosives which have hitherto characterized the attempted mixing of such chemicals with molten metal, these chemicals giving the alloy its properties of penetrating through oxide layers or coatings of impurities and of flowing easily and naturally by capillary attraction into the junction between the parts to be united.

Another object is to provide a process of making a welding or soldering alloy, as set forth in the object immediately above, wherein the danger of explosion in introducing the chemicals into the molten alloy is further reduced by the use of a layer of carbon, such as fine grain charcoal forming an insulating blanket, over the top of the molten alloy, the porous material containing the chemicals being placed upon this carbon layer and pushed through it into the molten alloy beneath it, the slag, after being freed from its chemicals, floating to the surface where it is skimmed off.

Hitherto, the welding or soldering of aluminum has been a difficult procedure requiring specialized knowledge, skilled workmanship, and careful preparation of the aluminum or aluminum alloy parts to be welded. The tenacious film of oxide which adheres to the surface of aluminum or aluminum alloys, unless removed by careful preparation or by the use of corrosive fluxes, effectively prevented the obtaining of a strong welded junction between the parts being united. Furthermore, the fact that aluminum melts suddenly at 1217º F without any advance indication, such as discoloroation, of nearing nearing the melting point, has made high temperature welding procedures dangerous, due to the possibility of destroying the parts themselves by their sudden disintegration. The corrosive fluxes hitherto used have also caused the creation of annoying fumes and odors, and protective goggles, hoods or the like have been required because of the danger to the eyes of the welding material spattering or sputtering. Nevertheless, without first applying a flux to create a flow path, the welding or soldering alloy would not flow along or into the junction of the parts to be united. The welding alloy of the present invention, as made by the process of the present invention, eliminates these defects and accomplishes the new results and advantages set forth in the above-stated objects.

In preparing the alloy of the present invention, the following metals and metal alloys are melted together in a crucible in the following proportions to provide the metallic ingredients:

Yellow brass (30% zinc and 70% copper): 8 lb
Aluminum: 8 lb
40-60 solder (40% tin 60% lead): 1.5 lb
Silver (.1%) or Nickel (0.1%): 0.1 lb
Zinc, to make up a 100 pound batch or: 82.3 lb

The chemical ingredients are next prepared in approximately the following proportions, for a 100 pound batch of the above metal ingredients:

Powdered copper slag 3.0 lb
Yellow sulphur 1.25 lb
Willow charcoal 0.75 lb
Commercial muriatic (hydrochloric) acid 0.50 gallons

The chemical ingredients are mixed together thoroughly and the acid added and stirred into the dry ingredients until a thin or watery paste-like mass is produced.

Meanwhile, the metal ingredients in the crucible have been heated until they reach the temperature of approximately 1450º F. and a layer of fine grain powdered charcoal of approximately a half-inch thickness is deposited on top of the molten metal to form an insulating blanket. When this charcoal layer has become red in color, the wet mass of chemical ingredients is deposited entirely over the top of the charcoal blanket in a thick layer. Using a suitable pushing device, such as a metal rod, the chemical mass is forced down through the charcoal blanket into the molten metal mixture, a small area at a time. The charcoal blanket shields the remainder of the mass from explosion or excessive reaction. As the chemical mass is pushed into the molten metal mixture in the crucible, a multitude of tiny reactions occurs throughout it, instead of a single large explosion, due to the fact that the chemical particles are separated from one another by the porous inert slag and by the particles of charcoal. As each portion which has been pushed down into the molten mixture is absorbed into the latter, another portion is pushed down and so on, until each portion of the chemical mass or layer has been pushed through the insulating charcoal blanket, a small area at a time.

After all of the wet chemical mass has been pushed downward into the molten metal mixture in the crucible, the entire mixture is stirred thoroughly to release all of the chemicals from the pores of the copper slag and to cause the tiny reactions and the explosions to be completed. When this has been done, and the slag has lost its chemical impregnations by these reactions and minute explosions, the slag floats to the surface of the molten metal mixture, along with other impurities or superfluous materials, these being skimmed from the surface of the molten mixture, leaving the latter in its finished state. The chemically-impregnated alloy thus formed is then poured out and formed into suitable shapes such as rods, bars or ingots.

During the period in which the chemical ingredients are being pushed downward through the charcoal blanket into the molten metal mixture, corrosive fumes are emitted which must be carefully disposed of or they will discolor paint, corrode ferrous metals, and cause annoyance to persons in the vicinity. After the alloy has been made in the above manner, however, it may be subsequently remelted without the formation of such fumes. The chemically-impregnated alloy remaining after the process has been completed is a finely homogenized, high quality alloy which is easily machined, plated or painted, as desired.

The present process also enables the combining of zinc and lead in an alloy, even though these metals are normally incompatible. For example, only one-half of one percent of lead in a zinc based die, such as is used in aircraft production, causes the die to crack during use, because lead will not ordinarily mix with zinc satisfactorily.

The copper slag mentioned in the foregoing process is the waste slag produced in copper smelting plants, and is useful because of its porosity and inert characteristics. It will be obvious that other porous materials which are similarly inert may also be employed to subdivide the chemical ingredients in the above manner and thereby convert an otherwise dangerous single explosion into a multitude of tiny harmless explosions and reactions.

The chemical ingredients thus incorporated into the metal alloy impart to the alloy the capability of flowing naturally and easily by capillary attraction when the alloy is applied to the junction of metal parts, such as aluminum to be united, without the previous use of a flux. Hitherto, it has been necessary to apply a flux in order to form a flux path at the junction of the metal parts to be united, or otherwise the welding metal does not flow well, and does not easily enter the junction between the metal parts to be united.

The proportions, and indeed, the components of the metallic mixture are not critical and many variations may be used. In place of the brass, pure copper or even bronze can be employed, more copper giving greater strength. The nickel and silver components are mere traces which produce better uniting of the metal components with one another. The chemical components of the alloy enable the alloy to penetrate the oxide film on aluminum without wire brushing or other previous preparation and to penetrate the crack or other junction between the parts to be united and to emerge on the opposite side thereof.

Proof that the chemical ingredients remain in the alloy is found in the fact that shavings of the alloy placed in a glass of ordinary tap water cause the flow of an electric current which may be detected by a voltmeter, milliampmeter or cathode ray oscilloscope when leads or electrodes connected thereto are inserted in the water. Moreover when the alloy particles or shavings have been permitted to remain in the water for several hours, gas bubbles will emerge from the water and form on the surface. Each of these bubbles explodes upon the application of a match, showing that **chemicals in the alloy shavings produce hydrogen and other gases when placed in water**. A still more powerful effect is obtained when salt water is used. Moreover, if the alloy is prepared in the form of a powder, this powder tends to come to the surface of the water and float thereon even though its specific gravity or weight is nearly seven times that of water.

In the use of the alloy of the invnetion in soldering or welding metal parts, such as aluminum, the extreme and exacting cleaning measures employed are unnecessary. the parts to be united, if not already satisfactorily supported adjacent one another, are placed in proximity to one another at the location where they are to be united, and heated by any suitable means, to a temperature which sufficient to melt the alloy. A temperature of approximately 800º F at the point of weld is sufficient, and as this is 400º to 500º degrees lower than the melting point of aluminum or aluminum alloys, there is no danger of harming the parts if ordinary care is taken. No special heating equipment is necessary, as the parts may be heated electrically, as by a hot plate, or by the application of a flame, such as from a gas torch, Bunsen burner, spirit lamp or the like.

When the parts have been so heated, a piece, such as a rod, of the alloy of the present invention is rubbed against the parts and passed to and fro along their proposed junction. Since the melting point of the welding alloy of the present invention is below 825º F, it melts and flows easily at that temperature, forming a silvery liquid resembling mercury. No flux is necessary to cause the alloy to flow, penetrate or adhere. As the rod is rubbed back and forth along the junction, the alloy melts and flows easily and naturally by capillary action into the junction where it quickly solidifies. At the same time, it attacks the oxide film on the aluminum or aluminum alloy, and penetrates below that film into the metal itself, so that a strong weld is obtained. The alloy, upon cooling, has a silvery, attractive appearance which blends well with the adjacent aluminum or aluminum alloy. It also has a very fine grain structure and is substantially free from porosity.

The alloy of the present invention may be used either in soldering, brazing or welding any aluminum or zinc-based metal with a very high efficiency and also in uniting other metals or materials with varying degrees of efficiency. The welding handbook of the American Welding Society in effect states that soldering takes place below 800º F, brazing above 800º F, and welding at such higher temperatures where the parent metal itself has been disturbed and fusion has taken place.

The metal parts when united by the alloy of the present invention, may be machined by the usual techniques and equipment, as the alloy machines easily and is also painted or plated.

The use of the alloy of the present invention may be summarized by stating that it may be employed for (1) welding of the metal parts without fusion, namely soldering or brazing; (2) welding with fusion of the metal parts, namely use of sufficient heat to cause surface fusion of the metal parts to be united; and (3) welding with fusion of the parts to be untied, accompanied by capillary action, namely welding wherein the alloy flows along the parts and through the junction thereof without the previous use of a flux.

The use of the alloy of the present invention for soldering, brazing or welding metals other than aluminum alloys, such as the zinc base metal mentioned above, is carried out in a similar manner except that the working margin of the temperature between the zinc in the parts to be united and the present alloy is much smaller since aluminum melts at the relatively high temperature of 1217º F, whereas zinc melts at the relatively low temperature of 713º F. To lower the melting temperature of the alloy of the present invention, therefore, the silver and nickel should be omitted and the proportionate amount of brass reduced, as these metals contribute to raising the melting point. Experiments have also shown that the alloy of the present invnetion may be used to solder, braze or weld magnesium, but considerably more care and vigilance is necessary because magnesium, although melting at about 1200º F, occasionally catches fire at about 1000º F. Here also, the working margin of temperature is rather small and consequently operations must be conducted with caution.

In the process of preparing the alloy of the present invention, if the furnace heat is inadvertently raised to too high a temperature so that some of the metal ingredients start to volatize, particularly the zinc, the operator immediately covers the top of the molten metal in the crucible with a layer of willow charcoal, which stops the volatilization.

Normally, however, the operator does not use more charcoal after the layer which he initially applies, and waits until this charcoal powder has become completely red before he attempts to push the chemical ingredients downward through it into the molten metal. In practice, if the chemical ingredients are forced through the charcoal blanket prematurely, that is before it becomes fully red, the charcoal powder will puff up in clouds of black smoke which is irritating to the lungs and soils the clothing and the surroundings. It has been found best to permit the charcoal to ignite and burn at the outer periphery of the crucible and gradually consume itself toward the center of the blanket, whereupon the flame disappears and the top of the molten metal in the crucible becomes tightly sealed with a red charcoal coating.

To improve the free machining characteristics of the alloy, the proportion of solder may be increased, the machinability increasing as the proportion of solder is increased. Thus, in the formula given above, instead of 1.5 pounds of solder for a hundred pound batch, as much as 3 to 5 pounds of solder may be beneficially employed.

Additional sulphur is employed occasionally if, for example, it is found that high melting components of the alloy are not properly melting, even though the temperature has been raised to the point where other ingredients, such as zinc, are ready to volatize. In that instance, the operator throws yellow sulphur into the portion of the crucible where the unmelted brass is located, whereupon a blue flame arises and increases the temperature in the immediate vicinity of the sulphur, causing the brass to melt readily. Thus, the addition of sulphur has the opposite effect from the addition of charcoal in that sulphur increases the heat or fire where charcoal puts it out or minimizes it.

The muriatic acid may volatize, to some extent, when it encounters the molten metal, but it undoubtedly reacts chemically with the metals in the crucible to produce salts such as chlorides which increase the tenacity of adhesion of the alloy in welding or soldering, and thus render the use of a separate flux unnecessary. The charcoal blanket however, reduces the tendency of the muriatic acid to volatilize, especially if only small portions of the chemical ingredients are pushed through the charcoal layer into the molten metals at a given time. The copper slag of the formula, being inert and heat-resistant, merely serves as a vehicle or carrier or modulator in a manner analogous to the phenomenon of modulation in radio wave transmission. Thus, the alloy of the present invention is characterized by the presence of chemicals in solution with the metals, these chemicals remaining in the alloy upon solidification and enhancing the flow of the alloy by capillary action during welding without the use of a separate flux.

The use of the alloy of the present invention enables aluminum to be substituted for critically scarce copper in many installations or applications where aluminum was previously considered unsatisfactory because of the difficulty of welding or soldering it. The present alloy may also be used to coat aluminum wire by a procedure analogous to "tinning" copper wire so that the thus coated aluminum may be soft-soldered to other metals. The present alloy may also be used in the form of a molten bath for "tinning" aluminum articles for soldering them or for hermetically sealing them.

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## US Patent # 2,927,856

## Multipurpose Alloys of Controlled Homogeneity

**Samuel Freedman**

[ This patent largely repeats USP # 2,796,345. The unique sections are excerpted below:]

Another object is to reduce the melting temperature of soldering alloys by the homogenization of normally incompatible metals such as zinc and lead.

Another object is to increase the homogeneity and reduce the heterogeneity of zinc-lead alloys.

Another object is to permit the introduction of a violent liquid chemical into molten metals without hazardous explosion wherein the chemical is introduced into the molten alloy by being minutely subdivided into particles separated from one another by inert material.

Another object is to cleanse molten metals of superfluous impurities while in a molten state.

Another object is to create metals having reduced corrosive and galvanic actions.

Another object is to provide metal alloys which in the presence of moisture cause the conversion of the latter into escapable hydrogen gas.

Another object is to provide a free machining metal alloy that requires no coolant.

Another object is to provide a metal alloy which electrifies and decomposes moisture in contact or during immersion.

Another object is to provide a metal alloy which can penetrate aluminum surface oxides and travel in the direction of most metal by capillary action instead of burning through the thin thickness of light gauge metal...

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