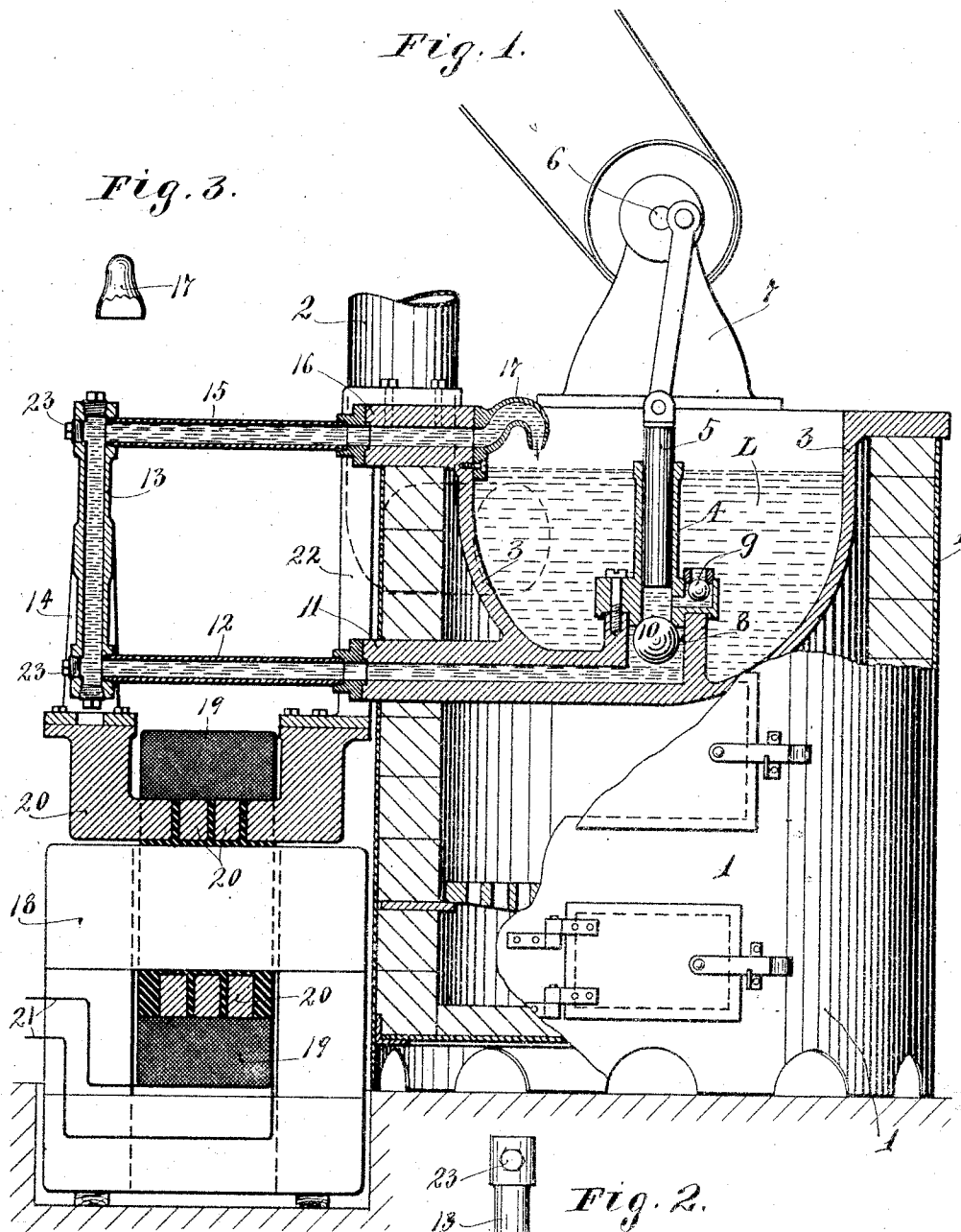


G. A. GOODSON.
 APPARATUS FOR TREATING METALS.
 APPLICATION FILED FEB. 10, 1908.

978,448.

Patented Dec. 13, 1910.



Witnesses.
 A. H. Opsahl.
 M. E. Roney.

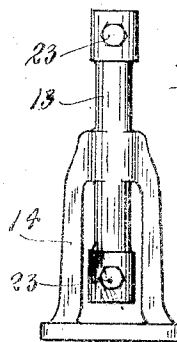


Fig. 2.

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR TREATING METALS.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, GEORGE A. GOODSON, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Apparatus for Treating Metals; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention is in the nature of a novel apparatus for producing an allotropic modification of metal.

The said invention is hereinafter described and defined in the claims.

The accompanying drawings illustrate my preferred form of apparatus for carrying my process into effect.

In said drawings, wherein like notations refer to like parts throughout the several views; Figure 1 is a view chiefly in vertical central section through the entire apparatus, but with some portions broken away and others shown in elevation. Fig. 2 is a detail in left end elevation, with respect to Fig. 1, showing one of the parts detached; and Fig. 3 is a detail showing the inflow nozzle detached, in plan view, with a portion broken away.

The numeral 1 represents a suitable furnace, preferably adapted to the use of coal or coke as the fuel, and the numeral 2 represents the smoke flue of the same.

The numeral 3 represents a suitable melting pot which, as shown, is of such construction that it rests on the top walls of the furnace, with its body or bowl portion depending into the fire pot of the furnace, in proper position to get the best effect from the burning fuel therein.

In the bowl of the melting pot is mounted a suitable pump, the cylinder of which is marked with the numeral 4, and the plunger thereof with the numeral 5. The pump plunger 5 is shown as connected to a power driven crank shaft 6 supported by a pedestal 7. The pump cylinder 4 has an expanded base which is rigidly secured to the walls of a well 8 formed in the bottom of the melting pot 3. The intake to the pump cylinder is controlled by a steel ball check valve 9, and the outlet from the pump cylinder is controlled by a steel ball check valve 10. The well 8 communicates with a discharge nozzle or outlet extension 11 formed integral with

the melting pot 3, and this is detachably connected, by a pipe 12, with the lower end of a tubular casting 13 formed integral with a yoke-shaped supporting bracket 14. The upper end of the tubular casting 13 is detachably connected by a pipe 15 with an entrance extension 16 formed integral with the melting pot 3. An inlet nozzle 17, of goose-neck form, is rigidly secured to the inner wall of the melting pot 3 in position for the channel therethrough to register with the passage through the inlet extension 16; and said nozzle 17 has a flattened mouth, as shown in Fig. 3, so as to deliver the metal therefrom in the form of a sheet.

The numerals 18, 19 and 20 represent, respectively, the core, the high tension primary coil and the low tension secondary coil of a suitable alternating current step-down transformer supplied with current from any suitable source (not shown) over wires 21. To one of the terminals of the secondary coil 20 is rigidly secured a heavy metallic bracket 22 which is bolted fast at its upper end to the melting pot 3; and to the other terminal of the secondary coil 20 is rigidly secured the yoke-shaped metallic bracket 14 which has the tube 13 cast integral therewith, as shown in Fig. 2. The lead L, or other metal to be treated, is placed in the melting pot 3 and reduced to molten condition by external heat available from the furnace 1. Then the current from the transformer is turned on and the pump started into action.

In virtue of the construction and arrangement of the parts above described, it is obvious that when the pump is in action, the molten metal L will be kept in continuous circulation from the melting pot through the parts 11, 12, 13, 15, 16 and 17, and that while the molten metal is passing through the said circulating connections, the same will be closed into the electric circuit supplied from the low tension side of the transformer.

The step-down transformer is so constructed, with reference to the current available over the wires 21, as to afford a current of low electric potential and great amperage.

The pump draws its charge of molten metal from near the bottom of the mass in the melting pot; and it follows, that the entire mass of molten metal, whether in the circulating connections or in the melting pot itself, is kept in continuous circulation.

The circulating connections 11, 12, 13, 15, 16 and 17 are of relatively small bore, and, hence, it follows that, at the time when the molten metal is being subjected to the electric current, it is in an attenuated mass. From this fact, and the fact of continuous circulation of the molten metal, under the action of the pump, it follows that all the molten metal will be subjected over and over again to the electric current. Moreover, this electric current is of great amperage relative to the attenuated mass of molten metal to which it is applied, and therefore the current is applied in such a way as to be most effective on the metal.

In practice, I have usually proportioned the parts so as to render available a current of not less than 1300 amperes to a cross section of molten metal of three-eighths of an inch in the circulating connections.

The process and apparatus, herein disclosed, was especially designed for the treatment of lead, or an alloy of lead and antimony, in order to produce such an allotropic modification of the said metal as to adapt the same for successful use in plating iron and steel bodies, as set forth in my pending applications S. N. 288,981 filed November 24th, 1905; S. N. 268,230 and 268,231 both filed July 3rd, 1905; and S. N. 308,445 and 308,446 both filed March 28th, 1906. I have found that by thus treating lead, or an alloy of lead and antimony, for a sufficient length of time, it becomes so modified that it can be successfully applied to iron or steel bodies whether in the form of wire or sheets, and that it will permanently unite therewith. The said method and apparatus, herein disclosed, was also designed for use in forming an alloy of lead and zinc which will be homogeneous and contain a sufficiently large percentage of zinc to make the alloy positive to iron, thereby affording a plating metal of superior commercial qualities, as set forth in my pending application S. N. 361,829 filed March 11th, 1907.

While the invention herein disclosed was especially designed for creating metal intended to be used for plating steel and iron bodies, it will, of course, be understood that it may be serviceable for treating other kinds of metal for putting the same into

condition for other uses than those above named. It will also be understood that the novel process or method, herein disclosed, may be applied by other suitable forms of apparatus.

In respect to the apparatus, it should be noted that while the circulating connections for the molten metal, illustrated, are made of metal as described, and are themselves connected into the electric circuit, this is only a convenient means of rendering the current available on the molten metal passing therethrough. The circulating connections themselves might be made of some refractory insulating material, as long as means were present for connecting the attenuated mass of molten metal, flowing therethrough, into the electric circuit.

The tubular casting 13 is provided with removable plugs 23 opposite the adjacent ends of the pipes 12 and 15, to afford access to the said pipe, for cleaning the same, when necessary.

What I claim is:—

1. The combination with a melting pot and circulating connections of small bore outside the melting pot through which the molten metal may be passed, a pump operative to force the molten metal continuously through said circulating connections, and means for subjecting said molten metal to an electric current while passing through said circulating connections, substantially as described.

2. The combination with a furnace, of a melting pot subject to the heat therefrom, circulating connections of small bore, outside the melting pot for said molten metal, a pump operative to force the said molten metal from the said melting pot through the said circulating connections and back to the melting pot, and means for subjecting said molten metal to an electric current of large amperage while passing through said circulating connections, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE A. GOODSON.

Witnesses:

H. D. KILGORE,
M. E. RONEY.