

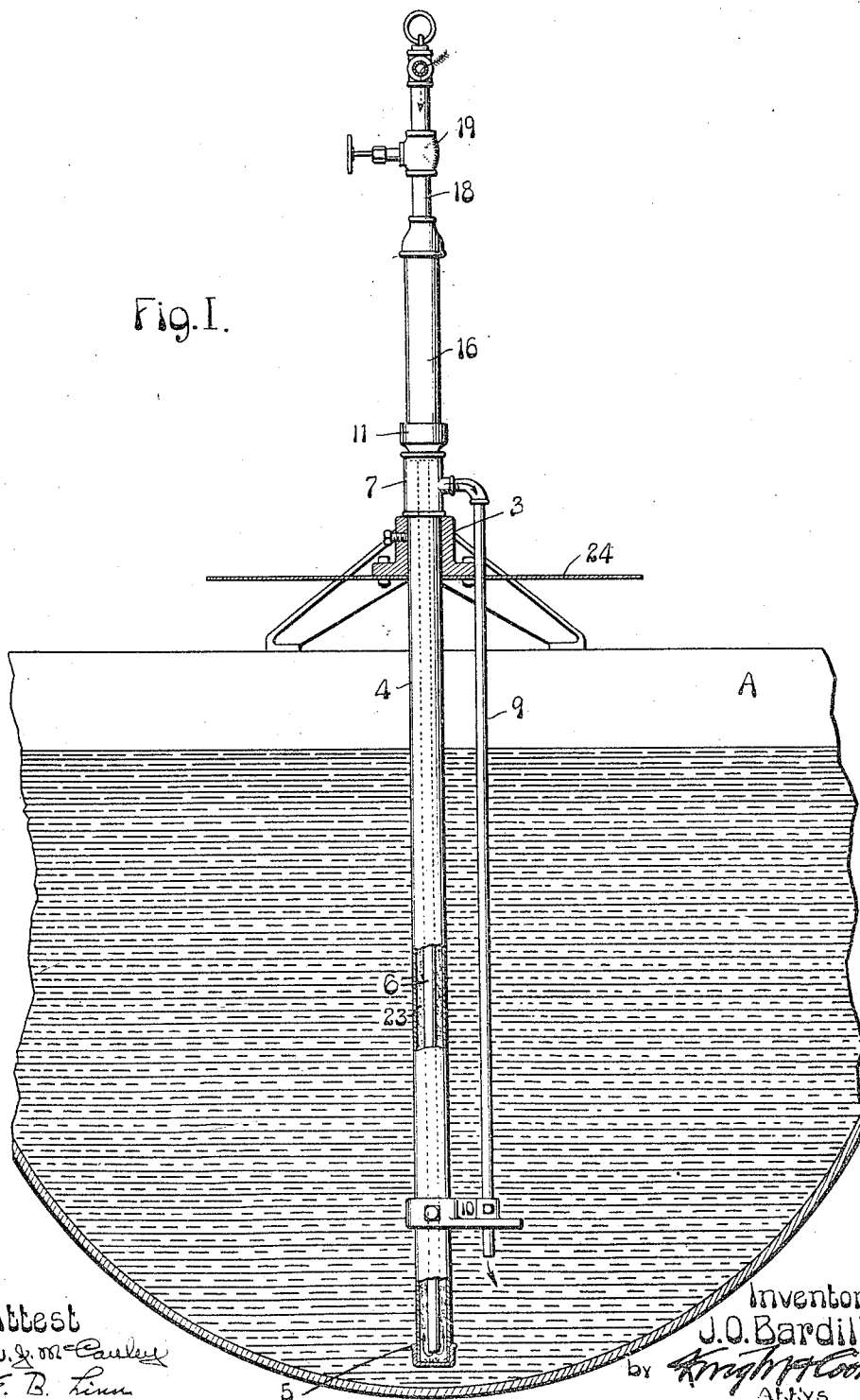
J. O. BARDILL.
 APPARATUS FOR SEPARATING DROSS FROM MOLTEN LEAD.
 APPLICATION FILED JUNE 3, 1911.

1,013,635.

Patented Jan. 2, 1912.

2 SHEETS—SHEET 1.

Fig. 1.



Attest
 W. J. M. Caulley
 E. B. Linn

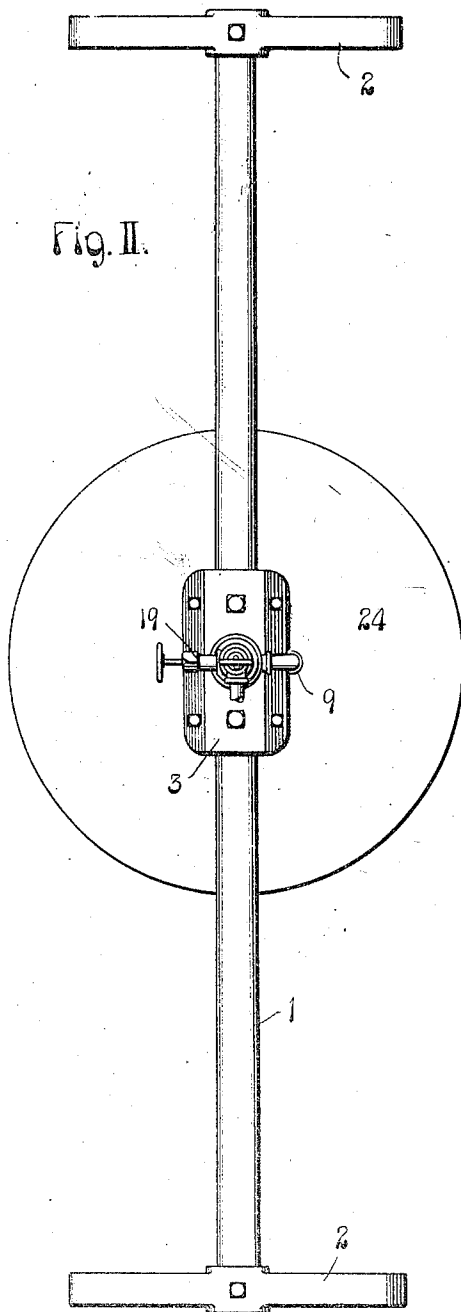
Inventor:
 J. O. Bardill
 by Knight & Cook
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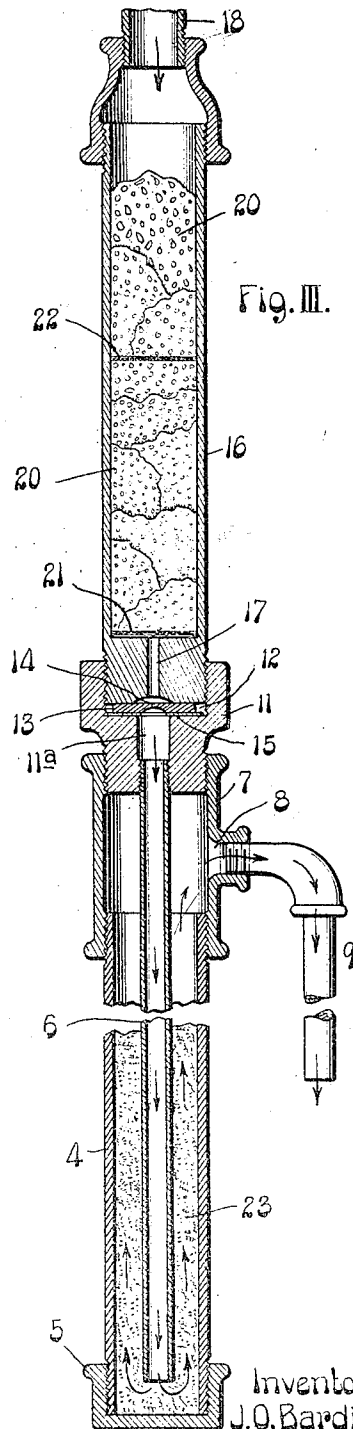
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2 SHEETS-SHEET 2



Attest
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UNITED STATES PATENT OFFICE.

JOHN O. BARDILL, OF HERCULANEUM, MISSOURI.

APPARATUS FOR SEPARATING DROSS FROM MOLTEN LEAD.

1,013,635.

Specification of Letters Patent.

Patented Jan. 2, 1912.

Application filed June 3, 1911. Serial No. 631,103.

To all whom it may concern:

Be it known that I, JOHN O. BARDILL, a citizen of the United States of America, residing at Herculaneum, in the county of Jefferson and State of Missouri, have invented certain new and useful Improvements in Apparatuses for Separating Dross from Molten Lead, of which the following is a full, clear, and accurate description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to an apparatus for use in agitating molten lead to create such disturbance thereof as to cause the dross in the lead to rise to the surface of the lead mass in order that it may be readily removed from a vessel in which the lead is contained during the agitating operation.

Agitation of lead in a molten state for a purpose similar to that for which my present apparatus is intended to be utilized has in the past been accomplished by the injection of steam into masses of molten lead, and such apparatus has been quite efficient to produce the desired result. The steam, however, has been commonly generated at a distance from the molten lead into which it was to be injected and it has been a matter of frequent occurrence for the steam to become condensed before it was delivered into the molten lead with the very obvious consequence of permitting drops of water to enter into the molten lead and cause explosions or such disturbances of the lead as to spatter it from the containers to such degree as to greatly endanger workmen engaged in their duties in proximity to the molten metal intended to be agitated by the injection of steam thereinto. It is of course a well known fact that steam or vaporized water may be injected into molten metal to provide for disturbance and agitation thereof in a limited degree, provided the heat of the metal be not of too great a degree, whereas if a drop of water is injected into the same metal, there will, in all likelihood be an explosion or very violent agitation of the metal entirely different from the mild agitation produced by the injection of steam only.

It is the object of my invention to provide an apparatus in the use of which steam is generated from water by the heat of the molten metal into which the steam is to be introduced and which, therefore, provides

for the production of steam in such manner and the delivery thereof into the molten metal in such manner as to avoid condensation of the steam and the injection of drops of water into the molten metal.

Figure I is a view partly in elevation and partly in vertical section of my apparatus in position for service in a kettle containing molten lead, the kettle being shown in vertical section. Fig. II is a top or plan view of my apparatus. Fig. III is an enlarged vertical section, partly broken out, through the generator and filter of my apparatus.

In the accompanying drawings:—A designates a kettle such as commonly used as a container for molten lead when it is to be treated after it has been smelted from its ore for the purpose of removing the dross present in the metal.

My apparatus is intended to be supported above and extending into the kettle A by a support that preferably comprises a supporting or bridge bar 1, the ends of which are mounted in pedestals 2 that may be seated on the rim of the kettle, or the top of the furnace in which the kettle is seated to provide for the maintenance of a certain degree of temperature in molten lead that is to be subjected to agitation. The supporting bar 1 is provided intermediate of its ends with a bracket member 3 that serves in connection with the supporting bar as a support for the generator and the filter of my apparatus.

4 designates the shell of a generator that extends downwardly from the supporting rod 1 and is closed at its lower end preferably by a cap 5. Within the generator shell and concentric therewith is a water conducting pipe 6, the lower open end of which is preferably located in proximity to the lower end of the shell so that water delivered through said pipe is emptied therefrom at or near the bottom of the generator and at a point remote from the steam escape opening at the upper end of the generator to be presently referred to. The generator preferably includes a union 7 located at the upper end of the shell 4, and in which is an escape opening 8 for steam produced within the generator.

9 is a steam pipe or leg leading from the steam escape opening 8 of the generator and located exteriorly of the generator shell, the pipe preferably extending parallel to the

generator shell and having its lower end held to the shell by a bracket arm 10, (see Fig. 1).

11 designates a coupling above the union 7. The lower end of this coupling is connected to said union and the water conducting pipe 6 is attached to the coupling so that said pipe is upheld within the generator shell 4 in a manner to maintain the lower end of the pipe separated from the bottom of the shell. The coupling 11 is provided with a pocket 12 and in this pocket is located a jet plate 13 that contains a jet hole 14 that registers with the duct 11 in the coupling 11 which leads to the water conducting pipe 6. The jet plate 13 is preferably seated on the packing washer 15 to provide for a close joint between the plate and the seat therefor in the coupling 11 and prevent the passage of water beneath the jet plate, which may be necessary that any downward passage of water beyond the jet plate shall take place through the jet hole in the plate.

16 designates a filter shell surmounting the coupling 11 and having its lower end seated in said coupling so as to rest firmly on the jet plate 13 and hold it positively to the seat provided therefor. In the lower end of the filter shell is a duct 17 through which water entering into and passing through the filter of my apparatus may gain access to the jet plate 13.

18 is a water delivery pipe leading to the filter shell 16 and preferably provided with a valve 19.

In the filter shell 16 is a suitable filtering material 20, preferably sponges, this material being arranged in two layers, one of which is arranged above a screen 21 at the bottom of the shell above the duct 17 and the other of which is arranged above a screen 22. The filtering material 20 performs the office of removing foreign matter from the water that is delivered into the filter shell 16, so that any solid matter present in the water will be caught in the filter and not passed to the jet plate 13 to clog the jet hole therein.

In the generator shell 4 is a body of heat transmitting material 23, preferably iron borings, through which the water percolates after escaping from the lower end of the water conducting pipe 6. This heat conducting material serves to transmit heat communicated thereto from the shell of the generator to the water delivered into said shell, and it also serves to restrain the water from rapid flow in the generator in order that there may be ample opportunity from the generation of steam from such water before it rises to the steam escape opening of the generator.

In the practical use of my apparatus, the water introduced into the filter of the ap-

paratus passes slowly therethrough and, as it is discharged from the filter, it is delivered with a minute flow through the jet hole and jet plate 13 to the conducting pipe 6 of the generator, thereby providing for a restricted delivery of water to said generator. The water as it passes downwardly through the conducting pipe 6 and enters into the shell of the generator rises to only a limited extent within said shell by percolating through the body of material 23.

It is to be understood that while the apparatus is in use, the generator thereof and the steam pipe 9 are immersed in the molten lead that is to be agitated by the entrance of steam thereinto and the generator is, therefore, heated to a sufficient degree to vaporize the water before it has had an opportunity to rise to any considerable height in the generator shell. Therefore, while the apparatus is in use, the upper end of the generator receives steam only and this steam is discharged through the steam escape opening 8 and passes therefrom through the steam pipe 9 into the mass of molten lead to create disturbance and agitation thereof with the desired result of causing the dross in the lead to rise to the surface of the lead. Inasmuch as the water for the generation of steam is introduced gradually into the generator and the heat from the molten lead is sufficient to rapidly generate steam from this water, there is no opportunity for passage of water to the steam pipe 9, nor any opportunity for condensation of steam resulting in the injection of any drops of water into the molten lead with the consequent result and danger incident thereto hereinbefore mentioned.

In view of the possibility of my apparatus being introduced into a molten mass of lead at a time when drops of moisture might be present thereon, I provide as a safeguard a shield 24 that surrounds the generator of the apparatus and serves to prevent the spattering of molten metal to such an extent as to greatly endanger the lives of workmen introducing the apparatus into its position of service, in the event of violent agitation of the metal.

While I have described my apparatus as intended more particularly for use in agitating lead in the separation of dross therefrom, I wish it understood that I do not limit myself to its use for agitating this specific metal; and it may be used in agitating any other metal it would be serviceable for agitating with the object in view herein pointed out with respect to lead.

I claim:—

1. In an apparatus for agitating molten metal, a steam generator shell, a steam conducting pipe having communication with the upper portion of said generator shell and having an open discharge end located

exterior of the generator shell, the generator shell and the open end of the steam pipe being adapted to be submerged into the molten metal, and means for conducting water into said generator shell and discharging it therefrom at a point beneath the point of communication between the generator shell and the steam conducting pipe.

2. In an apparatus for agitating molten metal, a steam generator shell, a water conducting pipe leading downwardly in said generator shell from its upper end to a point adjacent to its lower end, means through which a restricted quantity of water is admitted to said pipe to pass there-through to the lower end of the generator shell, and a steam pipe having communication with the upper portion of said generator shell and having an open discharge end located exterior of the generator shell, the generator shell and the open end of the steam pipe being adapted to be submerged in the molten metal.

3. In an apparatus for agitating molten metal, a steam generator shell, a water conducting pipe leading downwardly within said shell from its upper end, the said pipe being open to communication with the interior of the generator shell at its lower end, a heat transmitting material in said shell around said water conducting pipe through which the water is adapted to percolate, and a steam pipe having communication with the upper portion of said generator shell and having an open discharge end located exterior of the shell, the generator shell and the open end of the steam pipe being adapted to be submerged in the molten metal.

4. In an apparatus for agitating molten metal, a steam generator shell, a water conducting pipe leading downwardly from the upper end of said generator shell and having open communication with the lower portion of said shell, a jet device through which water is delivered in a restricted quantity to said water conducting pipe, and a steam pipe leading from the upper portion of said generator shell, having an open end located exterior of the shell, the generator shell and the open end of the steam pipe being adapted to be submerged in the molten metal.

5. In an apparatus for agitating molten metal, a steam generator shell, a water conducting pipe leading downwardly with said shell from its upper end and having communication with the lower portion of the

shell, a jet plate through which a restricted quantity of water is admitted to said water conducting pipe, and a steam conducting pipe having communication with the upper portion of said generator shell and having an open discharge end located exterior of the shell, the generator shell and the open end of the steam pipe being adapted to be submerged in the molten metal.

6. An apparatus for agitating molten metal, comprising a steam generator shell, a water conducting pipe leading downwardly within said shell and from which water is discharged into the lower portion of the generator shell, means for delivering a restricted quantity of water to said conducting pipe, a filter through which the water passes previous to its passage through said delivery means, and a steam conducting pipe leading from the upper portion of said generator shell and having an open discharge end located exterior of the generator shell, the generator shell and the open end of the steam pipe being adapted to be submerged in the molten metal.

7. In an apparatus for agitating molten metal, a steam generator shell, a water conducting pipe leading downwardly within said shell from its upper end, and having communication with the lower portion of said generator shell, a jet plate above said water conducting pipe, a filter connected to said generator shell and seating on said jet plate, the said filter being provided with a duct leading to said jet plate, and a steam pipe leading from the upper portion of said generator shell and having an open discharge end located exterior of the shell, the generator shell and the open end of the steam pipe being adapted to be submerged in the molten metal.

8. In an apparatus for agitating molten metal, a steam generator shell, means for conducting water into the lower portion of said generator shell, a steam pipe leading from the upper portion of said shell and having an open discharge end located exterior of the generator shell, the generator shell and the open end of the steam pipe being adapted to be submerged in the molten metal, and a shield surrounding the upper portion of said generator shell, substantially as and for the purpose set forth.

JOHN O. BARDILL.

In the presence of—
D. L. CLEAVES,
GEO. L. OLMSTED.