

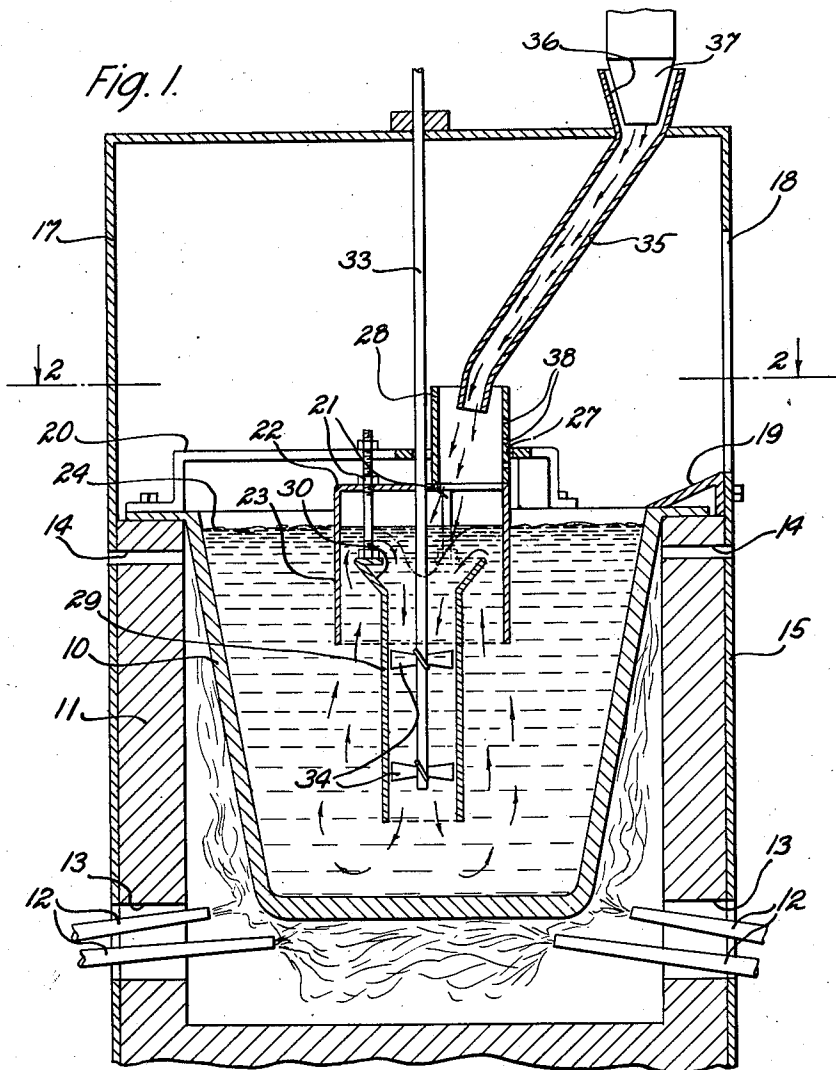
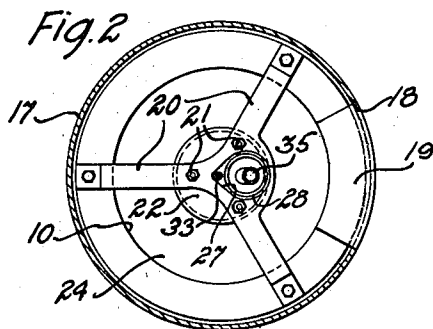
Nov. 5, 1929.

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1,734,747

MIXING APPARATUS

Filed July 24, 1928



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MIXING APPARATUS

Application filed July 24, 1928. Serial No. 295,099.

This invention relates to a mixing apparatus, and more particularly to an apparatus for introducing crushed antimony into molten lead.

5 This invention is particularly applicable to the manufacture of metallic sheath for cables used in connection with telephone systems. In some instances such sheath is made from lead alloyed with a certain amount of antimony and applied in a solidified state from an extrusion press directly to the cable. The practice heretofore, in certain cases, has been to introduce the antimony in the lead prior to the casting thereof into billets, which are then placed in a kettle individual to each extrusion press where they are melted, the molten lead being supplied directly to the press. By introducing the antimony directly into the individual kettle containing the molten lead and thereafter supplying the molten lead alloy directly to the extrusion press the casting operations and the other operations incident to the handling of the lead billets are eliminated. The problem encountered in this latter mentioned process of producing such a lead alloy is to effect a very intimate mixture between the lead and the antimony with a minimum of oxidation of the molten lead and antimony to prevent dross formations from being drawn down into the molten lead during the alloying process.

The object of this invention is to provide an improved and simplified apparatus for economically mixing ingredients under predetermined conditions.

In accordance with the general features of this invention an apparatus is provided for introducing crushed antimony into molten lead which comprises a kettle for holding a lead bath and having arranged axially therein a tube of comparatively small diameter which receives the crushed antimony at its upper end, which end is arranged slightly below the level of the bath. Arranged within the tube is a constantly driven shaft having fixed thereto a plurality of mixing and propelling blades which serve to draw the molten lead from the bath over the top of the vertical tube and cause it to commingle with the antimony being introduced into the tube, thus

a very intimate mixture between the lead and antimony is effected. In order to prevent dross, refuse or other foreign material from being drawn into the tube from the level of the lead bath a baffle or cover having elongated sides is provided which extend beneath the level of the bath and also the upper end of the tube. The cover in combination with the tube establishes a predetermined path for the lead during the agitation and circulation thereof as it is drawn from the bath, over the upper end of the tube, through the tube and into the bath again and prevents the flow of dross from the level of the bath outside of the cover into the tube for circulation within the bath.

Other objects and advantages of this invention will more fully appear from the following detailed description taken in connection with the accompanying drawing, in which

Fig. 1 is a fragmentary vertical sectional view of an apparatus for introducing an alloy constituent into molten metal embodying the features of this invention, and

Fig. 2 is a section on the line 2—2 thereof, on a reduced scale.

Referring to the drawing in detail wherein like reference numerals indicate similar parts throughout the several views, there is shown a melting furnace comprising a kettle 10 which is mounted on a refractory structure 11, shown broken away at its lower end, but which, in practice, is mounted on a suitable foundation. Gas or other suitable burners 12 may be employed for heating the furnace, the burners being inserted in apertures 13 formed in the structure 11 and arranged to direct the flames against the kettle 10, the furnace being provided with vents 14 for the escape of the spent gas or fumes. The structure 11 is covered with a metal plate 15 which extends for a suitable distance above the top of the kettle 10 to form a housing 17 provided at one side with an opening 18 for the purpose of admitting a supply of metal pigs to be melted in the kettle 10. In the present application of the apparatus wherein crushed antimony is introduced into molten lead, lead

pigs are deposited on an inclined runway 19 which directs them into the kettle.

Attached to the upper surface of and spanning the kettle 10 is a three armed spider bracket 20 having suspended from its under surface by a plurality of threaded rods and nuts 21 a baffle or cover 22 in the form of an inverted circular cup provided with an elongated continuous side wall 23 which extends beneath the level 24 of the bath of lead contained in the kettle 10 and concentrically arranged therewith and covering only a small area of the bath. The spider bracket 20 is provided with an eccentric aperture 27 through which extends a tube-like member or hopper 28 secured within an aperture eccentrically formed in the top wall of the cover 22. Also suspended from the rods and nuts 21 and concentrically arranged with respect to the cover 22 and the kettle 10 is a comparatively small diameter vertical tube 29 having an upper outwardly flared mouth 30 to inwardly extending portions of which the rods and nuts are attached. The upper end of the tube 29 is arranged slightly below the level of the bath and above the lower end of the cover 22, while the lower end of the tube 29 is suitably spaced from the inner surface of the bottom wall of the kettle. By adjusting the rods and nuts 21 it will be apparent that the cover 23 and tube 29 may be readily adjusted vertically with respect to each other and the level 24 of the bath.

Extending through the top wall of the housing 17, the aperture 27 of the bracket 20, the top wall of the cover 22 and into the tube 29 to a point adjacent the lower end thereof is a rotary shaft 33 having attached thereto, within the tube 29, a plurality of mixing and propelling blades 34, the shaft in the operation of the apparatus being continuously rotated from a suitable source of power (not shown). Attached at one side of and extending through the top wall of the housing 17 is an alloy constituent feed pipe 35 which extends angularly to the hopper 28 secured in the top wall of the cover 22, the extreme lower end of the pipe being positioned in the hopper 28. The upper end of the feed pipe 35 projects above the top wall of the housing 17 and is flared outwardly to provide a funnel shape mouth 36 for receiving a supply container 37 similarly shaped, holding the alloy constituent, in the present instance antimony in a finely divided form. A plurality of apertures 38 are provided in the wall of the hopper 28 facing the opening 18 in the housing 17 for the purpose of permitting an operator to view the inside of the hopper during the feeding of the alloy constituent and thereby actually see that the constituent is deposited in the hopper, whereupon it will drop onto the inside surface of the out-

wardly flared mouth 30 of the tube 29 and therinto.

In practice the kettle 10 is positioned adjacent the extrusion press which it serves, the molten lead alloy being fed by gravity from the kettle to the extrusion cylinder of the press, a suitable channel or trough member being arranged intermediate an outlet (not shown) provided in the kettle and the cylinder.

The operation of the apparatus when used for introducing finely crushed antimony into molten lead to be manufactured into sheath for telephone cable is as follows: The kettle 10 is charged with lead pigs in the manner described hereinbefore, which are then reduced to a molten state by the burners 12, the lead when reduced reaching substantially the level 24. The mixing and propelling blades 34 are set in motion, resulting in the column of molten lead in the tube 29 being simultaneously churned and propelled downwardly through the tube and out of the bottom thereof and into the bath, the lead above the tube flowing over the flared end thereof with the level 24 of the bath within the cover 22, due to the vortical movement of the metal through the tube, assuming substantially the form indicated in dotted outline (Fig. 1). A continued flow of the lead thus takes place in the direction indicated by the arrows, downwardly through the tube 29, outwardly into the bath and upwardly between the cover 22 and the tube. During this flow of the lead in the bath a predetermined amount of finely crushed antimony from the supply container 37 is deposited in the feed pipe 35 which directs it to a point close to the center of the bath. The antimony drops from the pipe 35 and immediately through the level 24 of the bath, due to the downward flow of the lead through the tube 29, and into the flared end thereof and is subjected to the same vortical movement imparted to the molten lead within the tube and thus a very intimate mixture between these constituents is effected during their circulation as hereinbefore described, the crushed antimony going into solution within the liquid lead almost instantly, due to its finely crushed form.

The baffle or cover 22, it will be apparent, due to the position of the lower end of the continuous side wall 23 thereof with respect to the level 24 of the bath, its concentric arrangement with the tube 29 and the relatively small area of the lead bath which it covers, serves as an efficient baffle to prevent dross, refuse or other foreign matter formed in the bath and settling at the level 24 on the greater area thereof, outside of the peripheral surface of the cover 22, as indicated by a wavy line on Fig. 1 at the bath level 24, from passing into the tube 29 and thus circulating within the bath. The cover 22 also serves with the tube 29 to establish a predetermined

path for the lead during the circulation thereof, the whole serving to prevent the antimony, the specific gravity of which is considerably less than that of lead, from rising to the level 24 of the bath outside of the cover 22 which would prevent it from being thoroughly mixed with the lead.

Although the invention has been disclosed and described as applied to an apparatus for introducing a particular constituent into molten metal, it is clear that it may have a more general application and that modifications can be made without departing from the spirit and scope of the appended claims.

What is claimed is:

1. In an apparatus for introducing an alloy constituent into a bath of molten metal, a vertical casing submerged in the bath, means for causing an agitation and flow of the metal from the bath through the casing and into the bath again, and a cover for a relatively small area of the bath level provided with a depending flange surrounding the casing for preventing the flow of dross from the larger area of the bath level into the smaller area thereof.

2. In an apparatus for introducing an alloy constituent into a bath of molten metal, a vertical casing submerged in the bath, means for causing an agitation and flow of the metal from a point adjacent the level of the bath over the top of the casing and therethrough into the bath, and a cover for a relatively small area of the bath level immediately above the casing and provided with a depending flange surrounding the casing for preventing the flow of dross from the larger area of the bath level into the smaller area thereof.

3. In an apparatus for introducing an alloy constituent into a bath of molten metal, a vertical casing submerged in the bath, means for causing an agitation and flow of the metal from a point adjacent the level of the bath over the top of the casing and therethrough into the bath, and a cover for a relatively small area of the bath level above the casing provided with a depending flange surrounding the upper end of the casing, the cover and its flange establishing a definite path immediately surrounding the casing for the flow of the metal from the bath and over the top of the casing without a flow of dross from the larger area of the bath level into the smaller area thereof.

4. In an apparatus for introducing an alloy constituent into a bath of molten metal, a vertical open ended cylinder submerged in the bath, means operating in the cylinder for causing an agitation and flow of the metal from a point adjacent the level of the bath over the top of the cylinder and therethrough into the bath, and a cover for a relatively small area of the bath level arranged coaxial with and above the cylinder and provided with a depending flange surrounding the upper

end of the cylinder for preventing the flow of dross from the larger area of the bath level into the cylinder.

5. In an apparatus for introducing an alloy constituent into a bath of molten metal, a vertical tube submerged in the bath, a vertical rotatable shaft arranged axially within the tube, means fixed to the shaft for causing an agitation and flow of the molten metal from a point adjacent the level of the bath over the top of the tube and therethrough into the bath, and means for introducing an alloy constituent into the bath comprising a circular cover for a relatively small area of the bath level immediately above the tube, the cover having apertures for the shaft and the entrance of the constituent into the bath and provided with a depending flange surrounding the tube for preventing the flow of dross from the larger area of the bath level into the tube.

6. In a mixing apparatus for liquid, means for impelling a portion of the liquid downwardly while agitating the same, means confining the action of the impelling means to a relatively small portion of the liquid, and a baffle member extending downwardly from the surface of the liquid adjacent the impelling means to prevent surface flow to and from the impelling means.

7. In a mixing apparatus for introducing an ingredient into a bath of another ingredient, means for impelling a portion of the bath downwardly while agitating the same, and a baffle member surrounding the impelling means and enclosing a relatively small area of the surface of the bath to prevent surface flow to and from the impelling means.

8. In a mixing apparatus for introducing an ingredient into a bath of another ingredient, a rotary agitator adapted to impel a portion of the bath downwardly, a cylindrical submerged member open at both ends surrounding the agitator, and a partly submerged baffle member surrounding the agitator and the submerged member and enclosing a relatively small area of the surface of the bath to prevent surface flow to and from the vicinity of the agitator.

In witness whereof, I hereunto subscribe my name this 7th day of July, A. D. 1928.

GEORGE ALLEN SEELEY.