April 9, 1935. E. E. SCHUMACHER ET AL 1,997,200

ALLOY COVERED CABLE MANUFACTURE

Filed Feb. 21, 1933

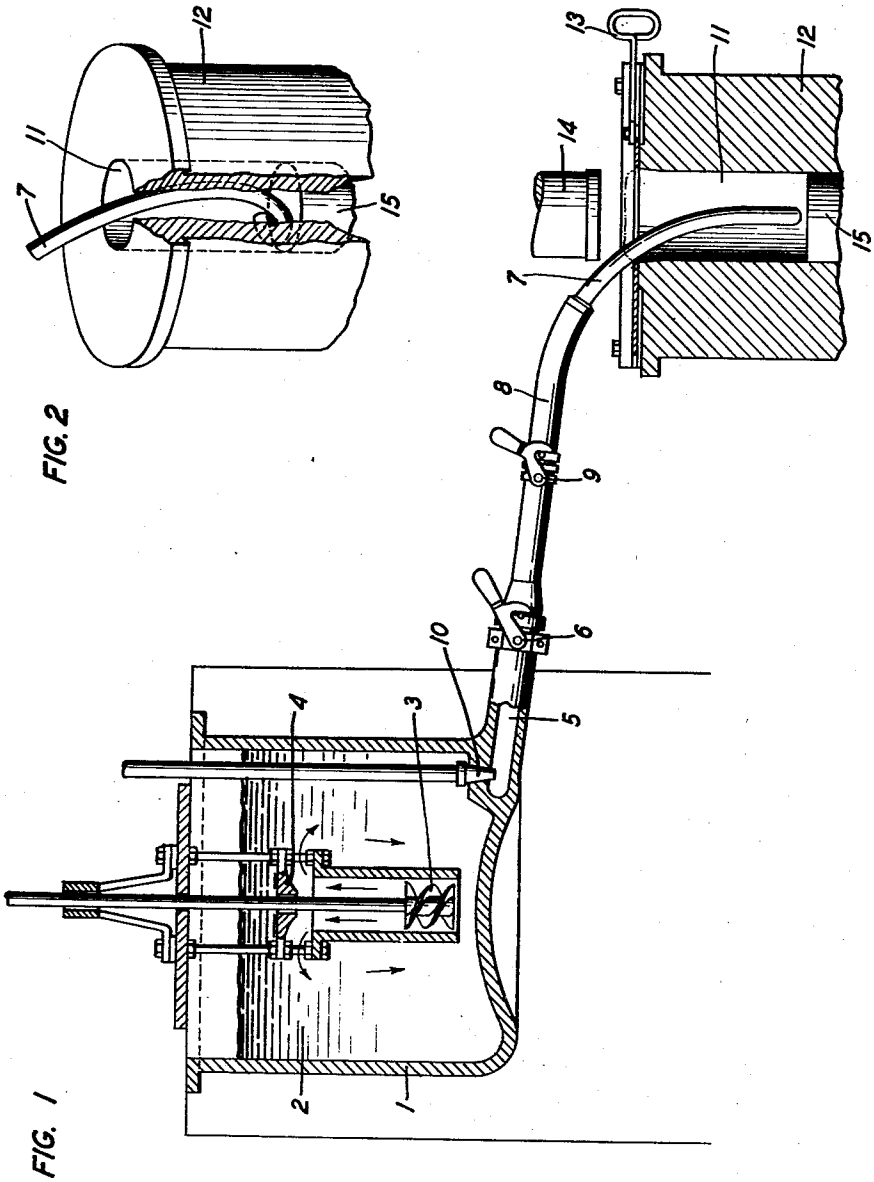

FIG. 2

FIG. 1

INVENTORS E. E. SCHUMACHER
G. M. BOUTON

BY J. W. Schmied

ATTORNEY

Patented Apr. 9, 1935 1,997,200

UNITED STATES PATENT OFFICE

1,997,200

ALLOY COVERED CABLE MANUFACTURE

Earle E. Schumacher, Maplewood, N. J., and George M. Bouton, Lynbrook, N. Y., assignors to Bell Telephone Laboratories, Incorporated, New York, N. Y., a corporation of New York

Application February 21, 1933, Serial No. 657,802

2 Claims. (Cl. 207—1)

This invention relates to the manufacture of lead covered cables. In particular, it relates to an improved method and arrangement for charging the charge cylinder of a lead press.

This improved method and arrangement will be explained by describing the application of the invention to the manufacture of cables which have a sheath composed of an alloy of lead and calcium. However, it is to be understood that this invention is not to be limited only to the manufacture of cables having a lead-calcium sheath, but that it may be applied to the manufacture of cables having a sheath composed of lead or any alloy used for sheathing purposes.

The reason for taking lead-calcium cables for an example is that in the manufacture of such cables much difficulty is caused by the presence of oxides of the lead-calcium alloy. Whenever a molten lead alloy is exposed to air, oxides of the constituents of the alloy will be formed. In the case of a lead-calcium alloy, such oxides are particularly troublesome as they are easily formed and are difficult to remove. If these oxides are not completely removed together with the dross usually present in the charge cylinder of a lead press, they will be included in the cable sheath. The presence of these oxides and dross in a cable sheath leads to such defects in the cable sheath as are commonly referred to as splits, doubles, faulty welds and dross inclusion. Naturally, these defects are highly objectionable in that they impair the cable sheath to varying extents, and considerably shorten its life of service. The sheath of a cable is intended to protect the cable; but, when it is defective, it can only give uncertain protection.

In the manufacture of cables having a sheath composed of an alloy of lead and calcium, the lead-calcium alloy is commonly reduced to a molten state by heating it in a kettle. The molten alloy is then poured into the charge cylinder of a lead press. Generally, the molten alloy is passed through a feed pipe leading from the bottom of the kettle to the top of the charge cylinder. Heretofore, this feed pipe has usually terminated in an external opening located at the top of the charge cylinder.

It has been noted that, when the molten alloy is poured out of the external opening of the feed pipe, it strikes the bottom of the charge cylinder with a splash. This splashing of the molten alloy continues during the process of filling the charge cylinder thereby causing considerable agitation of the molten alloy in the charge cylinder.

It has also been noted that, during the time that the charge cylinder of a lead press is being charged with molten lead-calcium alloy, there seams to be a considerable amount of dross, oxides and air-bubbles at the top of the charge. Although an operator of a lead press usually skims off what appears to be the major part of the dross, oxides and air-bubbles, it is believed that there is still an appreciable amount of them left in the charge by reason of being forced into the main portion of the charge and mixed therein by the splashing mentioned above. That is, splashing caused by pouring the molten alloy into the charge cylinder forces air-bubbles into the charge. It also drags down the dross and oxides floating at the top of the charge and mixes them in with the body of the charge. Furthermore, while the molten alloy is being poured from the external opening of the feed pipe, it is exposed to the air thereby facilitating further oxidation. The oxides thus formed are mixed with the body of the charge and are extremely difficult to completely remove from the charge.

Accordingly, it is an object of this invention to reduce to a minimum the agitation of a charge in the charge cylinder of a lead press during the process of filling the charge cylinder.

Another object of this invention is to provide an improved method and arrangement for charging the charge cylinder of a lead press.

Still another object of this invention is to reduce to a minimum the amount of dross, oxides, and air-bubbles present in the charge in the charge cylinder of a lead press.

A further object of this invention is to reduce to a minimum the presence in a finished cable sheath of defects, such as are commonly referred to as splits, doubles, faulty welds, and dross inclusion.

These objects of the invention are accomplished by means of an improved method, known as bottom pouring, of charging the charge cylinder of a lead press. Bottom pouring means that a charge of molten lead-calcium alloy is poured into the charge cylinder at the bottom of the cylinder. It is effected by means of an improved arrangement for charging the charge cylinder of a lead press. This improved arrangement comprises extending the feed pipe almost to the bottom of a charge cylinder so that its external opening is located at, or close to, the bottom of the cylinder. In order to further avoid splashing, the molten alloy should be poured into the charge cylinder in a steady stream with the feed pipe completely filled.

A preferred form of the extension of the feed

pipe has a curved nozzle near the bottom of the extension. This curved nozzle causes the molten alloy to flow into the charge cylinder at a small angle to the bottom of the cylinder and tangentially thereto. This will impart a rotary motion to the molten alloy as it leaves the external opening of the feed pipe thereby further reducing splashing.

Thus, by means of this invention, the molten lead-calcium alloy is exposed to air only when it is first introduced into a charge cylinder. As the surface of the charge in the cylinder rises, the external opening of the feed pipe will be covered thereby preventing the incoming molten alloy from being exposed to air. Since splashing and agitation of the charge are accordingly reduced to a minimum, the dross and oxides at the top of the charge are not so apt to be mixed into the charge as was formerly the case. There are also fewer air-bubbles introduced into the charge. The result is a lead-calcium cable sheath in which the presence of defects has been reduced to a minimum. Such an improved cable sheath is able to give better protection to a cable than the cable sheaths heretofore manufactured.

The invention will now be described in detail with reference to the drawing in which:

Fig. 1 represesents the improved arrangement for charging the charge cylinder of a lead press, and

Fig. 2 represents a preferred form of the extension of the feed pipe.

In Fig. 1, a heating kettle 1 is shown filled with molten lead-calcium alloy 2. This kettle 1 is shown to have an agitator 3 and a stationary baffle 4. At the bottom of kettle 1 is an outlet 5 leading to the outside of kettle 1. At the external end of outlet 5 is a clamp 6 for uniting the end of feed pipe 7 to the external end of outlet 5. A portion of feed pipe 7 is shown to be covered with asbestos 8 in order to provide heat insulation. It is advisable that feed pipe 7 be divided into two sections so that a short section may be removable in order to facilitate cleaning of feed pipe 7 and outlet 5. If this is done, it is necessary to have a clamp 9 for clamping together the two sections of feed pipe 7. A control valve 10, located inside kettle 1, is used to control the flow of the molten alloy 2 through outlet 5 and feed pipe 7.

Feed pipe 7 leads into charge cylinder 11 of a lead press 12. A mechanical skimmer 13 is located near the top of charge cylinder 11 for the purpose of removing that portion of dross which floats on the top of a charge. A ram 14, located directly over the top of charge cylinder 11, is used to force the charge out of cylinder 11 and down into the lead press 12.

As is shown in Fig. 1, feed pipe 7 extends down into cylinder 11. It can be seen in the drawing that the external opening of feed pipe 7 is located at, or close to, the bottom of cylinder 11. Perhaps it should be stated by way of explanation that the bottom of cylinder 11 is made up of solidified alloy 15. This solidified alloy 15 is an unused portion of the previous charge and is left in the press 12 at the end of an extrusion strike. It represents the limit of the extent of travel of ram 14 in cylinder 11.

Of course, during an extrusion strike, feed pipe 7 must be removed from cylinder 11 as otherwise it would impede the travel of ram 14 in cylinder 11. Various methods may be used for removing feed pipe 7 from cylinder 11. However, since ram 14 is usually located close to the top of cylinder 11, the preferred method of removing feed pipe 7 is to release clamp 9 thereby unfastening the two sections of feed pipe 7. When this is done, that section of feed pipe 7 which is in cylinder 11 may be readily removed therefrom.

Fig. 2 shows a preferred form of feed pipe 7. As shown in the drawing, feed pipe 7 has a curved nozzle near its bottom. This curved nozzle causes the bottom part of feed pipe 7 to lie in a horizontal plane parallel to the surface of the bottom 15 of cylinder 11.

The method of bottom flowing will now be described. The operator of lead press 12 will first put the long section of feed pipe 7 into cylinder 11. He will then clamp together the two sections of feed pipe 7 by means of clamp 9. Then he will open control valve 10 thereby allowing the molten lead-calcium alloy 2 to flow from kettle 1, through outlet 5, and through feed pipe 7 into cylinder 11. When cylinder 11 has been filled, the operator will close control valve 10. Then he will release clamp 9 and remove the long section of feed pipe 7 from cylinder 11. The apparatus is now in condition for ram 14 to make an extrusion strike after which the operation just described may be repeated.

By having the external opening of feed pipe 7 near bottom 15 of cylinder 11, it will soon be covered over by the incoming molten alloy 2. As soon as it is covered over, the flow of molten alloy 2 will be protected from the oxidizing action of air. Since this external opening is near bottom 15 of cylinder 11, splashing and agitation of the charge will be reduced to a minimum as the incoming molten alloy 2 will swirl around cylinder 11 instead of splashing on bottom 15. This has already been explained above.

In order to further protect the molten alloy 2 from the oxidizing action of air and to further minimize splashing, the molten alloy 2 should be poured into cylinder 11 in a steady stream with feed pipe 7 completely filled. This may be done by causing feed pipe 7 to have a small inside diameter. It may further be accomplished by having a large supply of molten alloy 2 in kettle 1 in order to exert considerable pressure upon the molten alloy 2 flowing through feed pipe 7.

By using a feed pipe 7 having a curved nozzle, as shown in Fig. 2, the molten alloy 2 will be caused to flow into cylinder 11 at a small angle to bottom 15 of cylinder 11 and tangentially thereto. This will impart a rotary motion to the molten alloy 2 as it leaves the external opening of the feed pipe 7 thereby further reducing splashing and minimizing frothing.

The arrangements shown in the drawing and described above are illustrative of the operation of the invention and will serve to assist in interpreting the claims. The claims are not to be restricted to the precise construction described above, but are intended to include all changes and modifications employing the principles and features of operation of the invention.

What is claimed is:

1. An attachment for an extrusion press for covering cables with a metal sheath of improved quality, said attachment including instrumentalities for minimizing that splashing and frothing of a charge of molten metal which occurs when such a charge is introduced into the charge cylinder of said press and for reducing the amount of dross, oxides, and air-bubbles forced into and mixed with the charge by the said splashing and frothing, said instrumentalities including a feed pipe leading from the outlet of a heating kettle

to the bottom of the charge cylinder of a press, said feed pipe having a curved nozzle lying in a horizontal plane parallel to the surface of the bottom of the charge cylinder.

2. An apparatus for the extrusion of lead and other metals comprising in combination an extrusion press, a portable tube, means for supporting said tube at its upper end inside the container of the press in order to receive the molten metal, with the lower end of the tube resting upon or in close proximity to the surface of the remainder of an old charge, the lower end of the tube having a hole for the discharge of the molten metal from the said tube into the container of the press.

EARLE E. SCHUMACHER.
GEORGE M. BOUTON.