

No. 737,595.

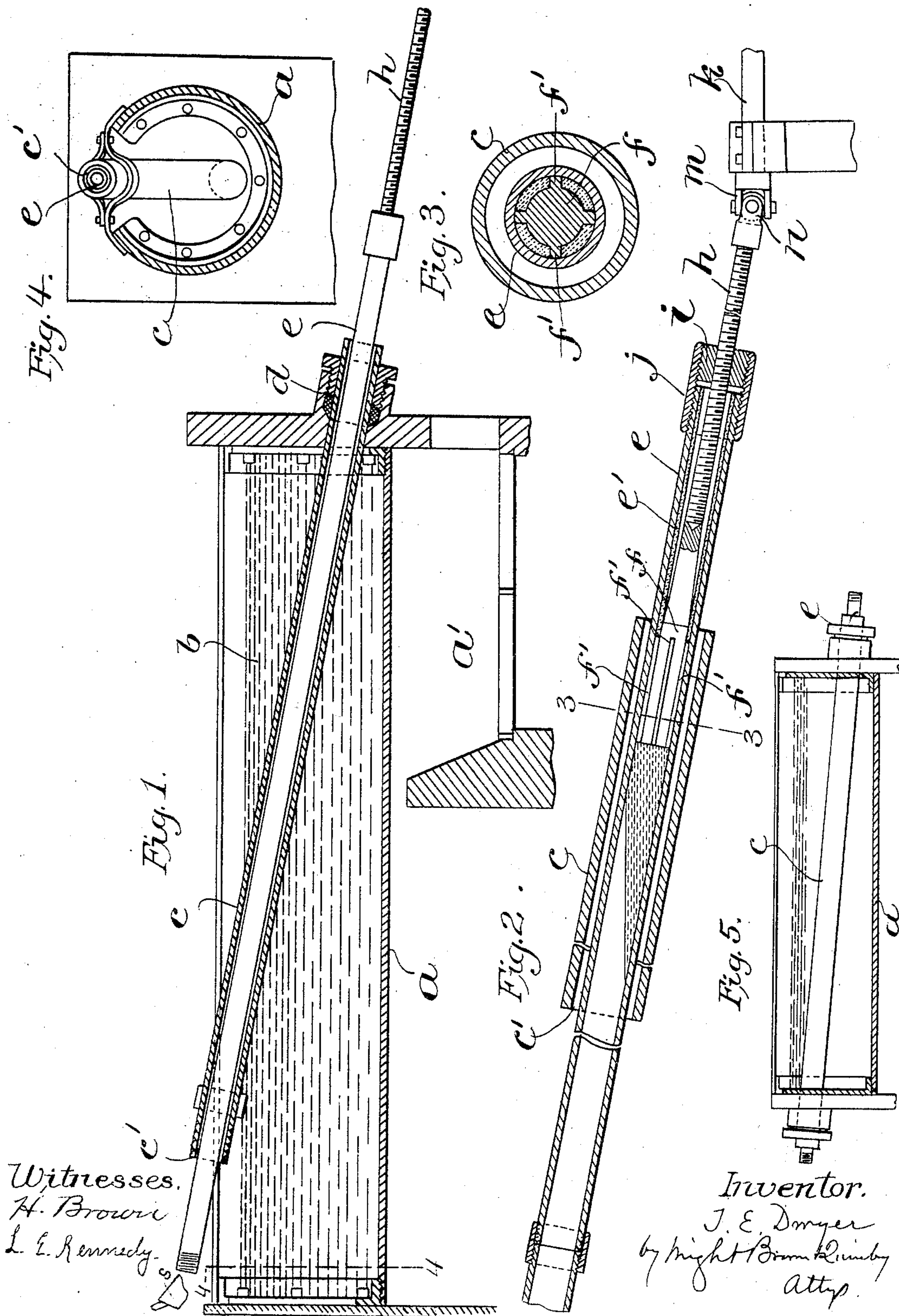
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T. E. DWYER.

APPARATUS FOR COATING METAL PIPES OR CONDUITS.

APPLICATION FILED MAY 22, 1903.

NO MODEL.



UNITED STATES PATENT OFFICE.

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APPARATUS FOR COATING METAL PIPES OR CONDUITS.

SPECIFICATION forming part of Letters Patent No. 737,595, dated September 1, 1903.

Application filed May 22, 1903. Serial No. 158,318. (No model.)

To all whom it may concern:

Be it known that I, THOMAS E. DWYER, of Wakefield, in the county of Middlesex and State of Massachusetts, have invented certain
5 new and useful Improvements in Apparatus for Coating Metal Pipes or Conduits, of which the following is a specification.

This invention relates to apparatus for forming in a hard-metal pipe an internal coating or lining composed of a fusible metal or alloy, such as a mixture of lead and tin.

The invention has for its chief object to enable a hard-metal pipe to be passed through a body of melted metal contained in a heated
15 tank without coming in contact with the body of melted metal, so that the pipe may be kept hot by heat conducted from the body of melted metal without having its external surface affected injuriously by contact with the
20 melted metal and without the necessity of providing means for preventing the leakage of metal from the said body around the pipe at the point where it emerges from the tank.

The invention consists in the improvements
25 which I will now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a longitudinal sectional view of an apparatus
30 embodying my invention. Fig. 2 represents an enlargement of a portion of Fig. 1, showing the lining-forming mandrel and a sectional view of the pipe to be lined. Fig. 3 represents a section on line 3 3 of Fig. 2. Fig. 4 represents a section on line 4 4 of Fig. 1. Fig. 5
35 represents a sectional view of a modification.

The same reference characters indicate the same parts in all the figures.

In the drawings, *a* represents a tank adapted to contain a batch of molten metal, such as lead, means being provided, such as a furnace or fire-box *a'*, to keep the body of metal
40 *b* in a melted condition.

c represents a tubular guide which extends
45 through one end of the tank and has a liquid-tight fit in the said end to prevent leakage of the melted metal from the mass or body *b*, the tight fit being insured in this case by means of a stuffing-box *d*. The guide *c* is a
50 fixture and is not intended to be moved with the pipe to be lined. Said guide extends

through the body *b* of molten metal and has a receiving end *c'* located outside of said body, so that the molten metal of the body *b* cannot flow into the guide *c*, but must be transferred from the body *b* into the pipe to be
55 lined by means of a ladle *s* or otherwise. In the preferred embodiment of my invention (shown in Figs. 1, 2, and 4) the guide *c* is inclined, so that its receiving end *c'* projects
60 above the level of the molten metal in the tank *a*.

e represents the pipe to be lined, said pipe being formed to enter and pass freely through the guide *c*.

f represents a mandrel which is formed to enter the pipe *e*, the mandrel having longitudinal ribs *f'*, which bear upon the interior of the pipe *c* and hold the periphery of the mandrel concentric with the interior of the
70 pipe, the molten metal which is poured into the upper end of the pipe *e* passing downwardly from the pipe between the ribs *f'* and forming a seamless lining between the periphery of the mandrel and the interior of the
75 pipe, the completed lining being indicated by *e'* in Fig. 2. Means are provided for supporting the mandrel against endwise movement at a suitable point within the guide *c* and preferably within the part of said guide
80 that is located in the stuffing-box *d*. The ribs *f'* are preferably shorter than the mandrel, so that there is an unobstructed annular space between the outer portion of the mandrel and the interior of the pipe *e*. The lining is solidified in said annular space, the
85 heat of the lining material being sufficiently absorbed by the pipe and the surrounding portion of the guide *c*, aided, if desired, by streams of cold water poured onto the outer
90 end of the pipe *e*, which projects outside the tank. The means here shown for supporting the mandrel comprise an elongated rod *h*, which is of smaller diameter than the pipe *e*, its outer end being supported against end-
95 wise movement at a suitable distance from the tank to permit the pipe *e* to be entirely withdrawn from the tank and to surround the rod *h*. The rod *h* may be utilized as a part of the mechanism which withdraws the
100 pipe from the tank, and to this end a screw-thread is formed upon the rod *h*, said thread

engaging a nut *i*, with which is engaged an internally-threaded coupling *j*, screwed upon the end of the pipe *e*. Means are provided for rotating the rod *h*, said means as here
 5 shown comprising a shaft *k*, journaled in fixed bearings and rotated by power applied in any suitable way and provided with a coupling member *m*, engaging a complementary coupling member *n*, affixed to the rod *h*. The coupling
 10 members *m* and *n* are here shown as parts of an ordinary gimbal-joint to provide for the rotation of the inclined rod *h* by the horizontal shaft *k*. The members *m* and *n* may be disconnected by the removal of one or more
 15 of the connecting-bolts to enable the rod *h*, with the lined pipe thereon, to be removed from the apparatus, the rod being subsequently withdrawn from the pipe and replaced for another operation.
 20 The operation is as follows: The tank *a* being charged with the body *b* of molten metal, the pipe *e* is inserted into the guide *c* and the mandrel is inserted in the lower portion of the pipe. The operator then by means
 25 of a ladle or otherwise transfers a sufficient quantity of the molten metal from the tank to the upper end of the pipe *e*, the metal flowing downwardly to the mandrel and being kept in a melted condition by heat conducted from the body *b* through the guide *c*.
 30 The pipe *e* being fed lengthwise, the lining *e'* is formed progressively therein, as illustrated in Fig. 2.

It will be seen that the guide *c* prevents contact between the body *b* of melted metal and the external surface of the pipe *e*, so that said
 35 external surface is not smeared or coated with the molten metal. Contact of the molten metal with the exterior of the pipe is undesirable for various reasons, among which are the following: First, the molten metal is liable to adhere to the surface of the pipe and form a thin coating thereon, which coating is of no
 40 benefit to the pipe and results in a waste of the melted metal; secondly, when the pipe *e* has a coating of galvanizing composition upon its external surface said coating is liable to be injured or removed by the direct contact of the molten metal *b* with it. Heretofore in
 45 apparatus of this kind the pipe to be lined has been passed directly through the molten metal *b* with its external surface in contact therewith and passed through the outlet in the end of the tank, said outlet corresponding
 50 to the stuffing-box *d*. The sliding contact between the moving pipe and the outlet results in rapid wear of the packing material of the stuffing-box, so that constant attention is required to keep the packing material intact.
 55 This difficulty is obviated by the described improvements.

If desired, a second section of pipe *e* may be coupled to the upper end of the section within the guide *c* before the latter has been drawn
 60 into the receiving end *c'*, a coupling-sleeve similar to the sleeve *j* being employed to con-

nect the two sections of pipe *e*. To permit the said coupling to pass through the guide *c*, I make the latter of sufficient internal diameter to receive the coupling. 70

In Fig. 5 I show a modification in which the guide *c* extends through both ends of the tank, so that its rear or higher end is not necessarily above the level of the body *b* of molten metal in the tank. 75

The mandrel and the means for supporting and feeding the same are not claimed herein, the same being substantially as shown in the application of George W. Harrington for patent for apparatus for coating metal pipes, 80 filed January 29, 1903, Serial No. 140,990.

The elongated guide *c* may be heated by other means than by the body *b* of molten metal—for example, by a furnace or fire-box substituted for the tank *a*. In this case the
 85 lining metal may be supplied from a different source. I prefer the arrangement shown, however, because of its compactness, simplicity, and convenience.

Before the pipe is passed through the guide 90 *c* it is necessary that the inside of the pipe be cleaned and coated with a thin coating of tin. This preliminary coating or wash of tin is necessary irrespective whether tin or lead is thereafter added as a wall by means of the ap- 95 paratus described in this specification. Various expedients may be adopted for cleaning the inside of the pipe. For convenience, however, I prefer to place the pipe inside another pipe and close by a union or coupling 100 the space between the two. The two pipes are then put in an acid-bath. The acid entering the bore of the inner pipe cleans its surface. The acid of course will also attack more or less the outer wall of the outer pipe, 105 but cannot get in between the two pipes. Thereafter a thin wash or coating of tin is applied in any preferred way to the inside of the inner pipe. Then the two pipes are uncoupled, and the inner pipe is then ready to 110 be passed through the guide *c* for the purpose stated. Various other means may be adopted for effecting the cleaning of the inside of the pipe and the application of the preliminary coating. 115

If desired, any suitable means may be employed for applying pressure to the fluid or molten metal *b* within the pipe in order to effect a more certain union and application of the metal to the inner wall of the pipe. 120

I claim—

1. An apparatus of the character specified, comprising an elongated tubular guide formed to receive a pipe to be lined, means for heating said guide, a lining-forming man- 125 drel, and means for supporting the mandrel within the pipe.

2. An apparatus of the character specified, comprising a tank adapted to contain a melted metal or alloy, means for preventing contact 130 between the melted metal and the exterior of a pipe within the tank, a lining-forming man-

drel, and means for supporting the mandrel within the pipe.

3. An apparatus of the character specified, comprising a tank adapted to contain a melted metal or alloy, and an elongated tubular guide having a liquid-tight connection with the tank and passing through the body of melted metal therein, said guide being formed to receive a pipe to be lined.

4. An apparatus of the character specified, comprising a tank adapted to contain a melted metal or alloy, and an elongated inclined tubular guide extending through a wall of the tank below the level of the melted metal and closely fitting the opening in said wall through which it passes, said guide extending upwardly within the tank above the level of the

melted metal and being formed to receive and guide a pipe to be lined.

5. An apparatus of the character specified, comprising a tank adapted to contain a melted metal or alloy, an elongated tubular guide having a liquid-tight connection with the tank and passing through the body of melted metal therein, said guide being formed to receive a pipe to be lined, and a lining-forming mandrel adapted to enter a pipe inserted in said guide.

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

THOMAS E. DWYER.

Witnesses:

R. BULLOCK,
E. BATCHELDER.