No. 737,618. PATENTED SEPT. 1, 1903.

G. W. HARRINGTON.

APPARATUS FOR COATING METAL PIPES OR CONDUITS.

APPLICATION FILED JAN. 29, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

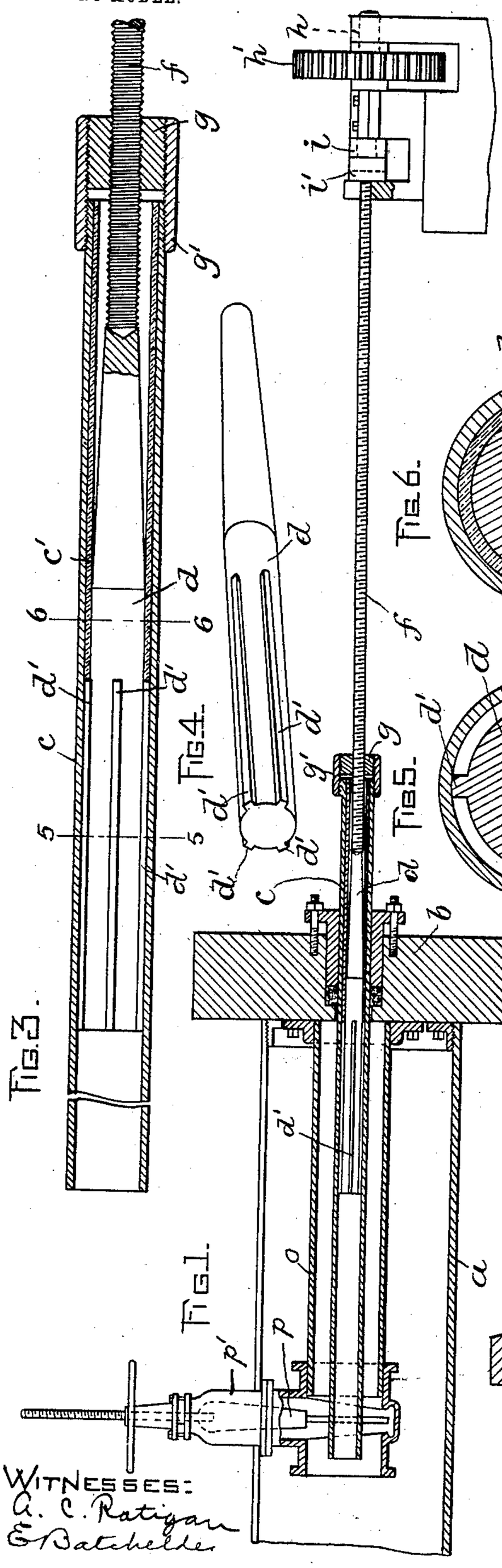

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 1.

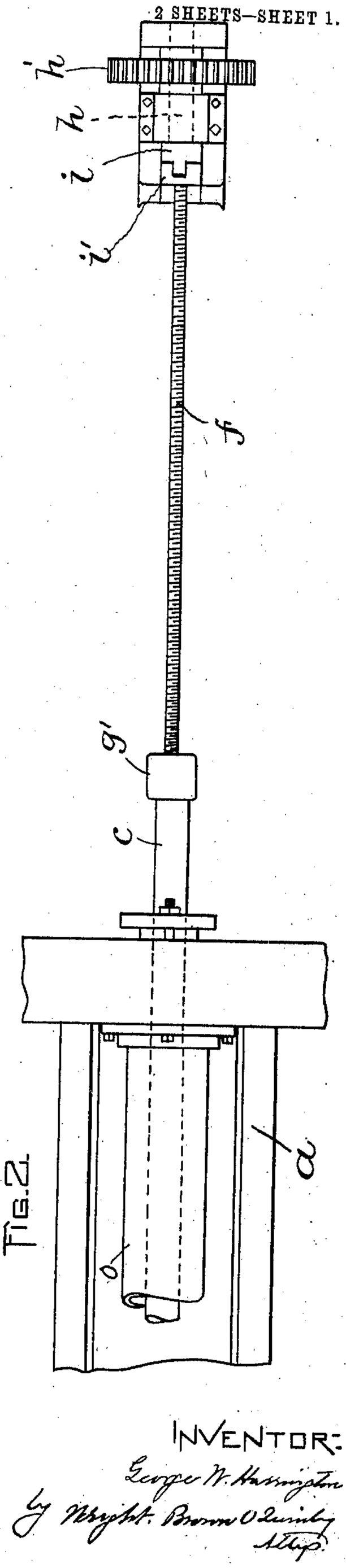

Fig. 2.

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NO MODEL. 2 SHEETS—SHEET 2.

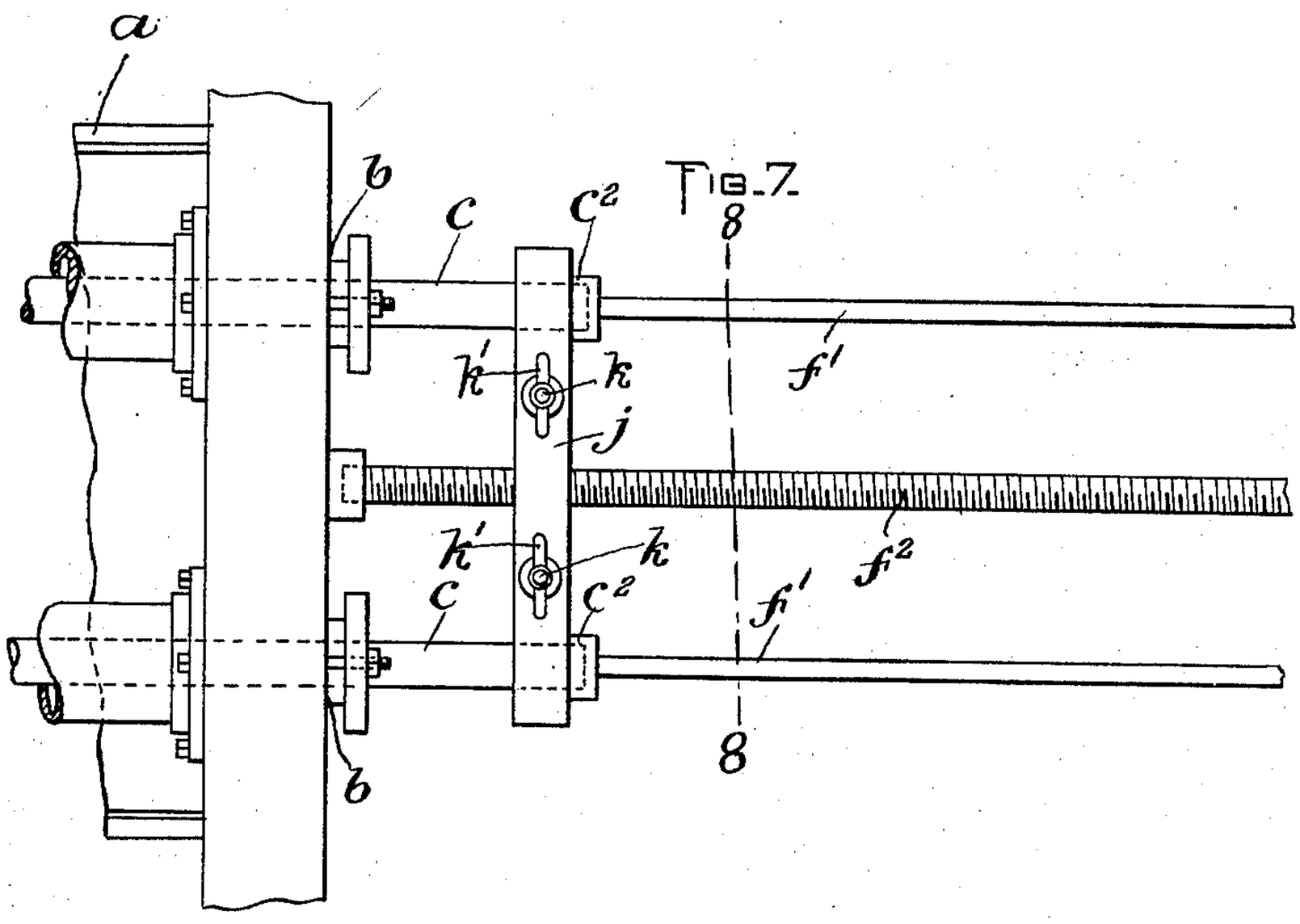

FIG. 7.

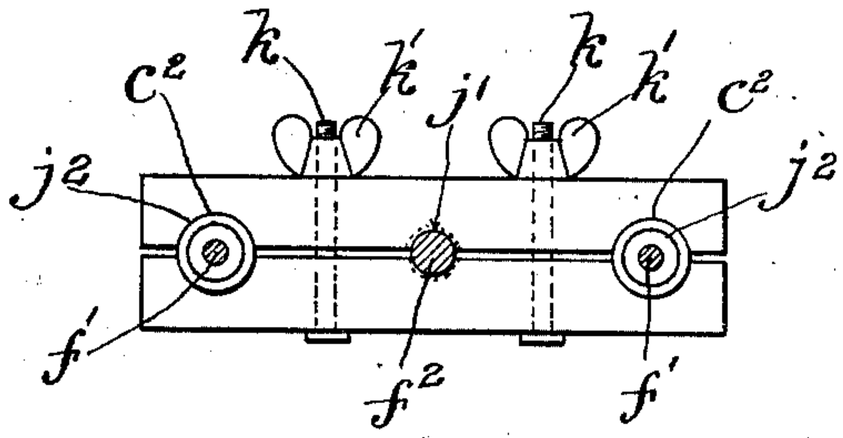

FIG. 8.

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No. 737,618. Patented September 1, 1903.

UNITED STATES PATENT OFFICE.

GEORGE W. HARRINGTON, OF WAKEFIELD, MASSACHUSETTS, ASSIGNOR TO THOMAS E. DWYER, OF WAKEFIELD, MASSACHUSETTS.

APPARATUS FOR COATING METAL PIPES OR CONDUITS.

SPECIFICATION forming part of Letters Patent No. 737,618, dated September 1, 1903.

Application filed January 29, 1903. Serial No. 140,990. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. HARRINGTON, of Wakefield, in the county of Middlesex and State of Massachusetts, have invented certain 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 object to provide simple and effective means for supporting a lining-forming mandrel within the pipe to be lined and for removing the pipe from the tank containing the lining material as fast as the lining is formed.

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

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a longitudinal vertical section of an apparatus embodying my invention. Fig. 2 represents a top plan view of the same. Fig. 3 represents an enlargement of a portion of Fig. 1. Fig. 4 represents a perspective view of the lining-forming mandrel. Fig. 5 represents a section on line 5 5 of Fig. 3. Fig. 6 represents a section on line 6 6 of Fig. 3. Fig. 7 represents a top plan view of a modification. Fig. 8 represents a section on line 8 8 of Fig. 7.

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 metal in a melted condition.

b represents a tubular outlet extending through the front end wall of the tank, said outlet being formed to closely fit the exterior of the pipe *c* to be lined.

d represents a mandrel which is formed to enter the pipe *c*, the mandrel having longitudinal ribs *d'*, which bear upon the interior of the pipe *c* and hold the periphery of the mandrel concentric with the interior of the pipe, the molten metal passing from the tank between the ribs *d'* and forming a seamless lining between the periphery of the mandrel and the interior of the pipe, the completed lining being indicated by *c'* in Fig. 3.

In practice the pipe to be lined is inserted in the tank and immersed in the molten metal therein, the outer end of the pipe projecting sufficiently through the outlet *b* to enable the pipe to be engaged by a feeding device hereinafter described. The mandrel *d* is inserted in the pipe and is supported in a fixed position relatively to the outlet *b*, so that as the pipe moves outwardly from the tank the mandrel remains in place and forms the lining progressively. The support or holder for the mandrel is an elongated rod *f*, which is of smaller diameter than the pipe *c* and extends in alinement with the outlet *b*, its outer end being supported against endwise movement at a suitable distance from the tank to permit the pipe *c* to be entirely withdrawn from the tank and to surround the rod *f*. Said rod constitutes a stop which prevents outward movement of the mandrel. I prefer to utilize the rod *f* as a part of the mechanism which withdraws the pipe from the tank, and to this end I form a screw-thread upon the rod *f* and engage therewith a pipe-feeding member formed as a nut *g*, having at one end an internally-threaded flange or extension *g'*, which is detachably engaged with the pipe *c*, the latter having an external thread formed to engage the said internal thread. Means are provided for rotating the rod *f*, said means, as here shown, comprising a shaft *h*, journaled in fixed bearings and provided with a gear *h'*, to which power may be applied in any suitable way, and with a clutch member *i*, engaging a complemental clutch member *i'*, affixed to the rod *f*.

It will be seen that the rotation of the rod *f* will cause the latter to act as a feed-screw, causing the nut *g*, with the pipe *c* attached thereto, to move outwardly endwise, this movement being continued until the pipe has been withdrawn from the tank and deposited upon the rod or feed-screw *f*. The detach-

able connection afforded by the clutch members *i i'* enables the rod with the lined pipe thereon to be removed from the apparatus, the rod being subsequently withdrawn from the pipe and replaced for another operation.

As shown in Fig. 1, the ribs *d'* are shorter than the mandrel and do not extend into the outlet *b*. Hence there is an unobstructed annular space within said outlet between the mandrel and the pipe *e*. The lining is solidified in said annular space, the heat of the lining material being sufficiently absorbed by the pipe and the walls of the outlet, aided, if desired, by a stream of cold water squirted onto the outer end of the outlet and the portion of the pipe emerging therefrom. To close the outlet when the apparatus is not in operation, I affix to the outer end of the tank a tubular casing *o*, having at its inner end a valve-casing *p'*, in which is a shut-off valve *p*, adapted to close said casing.

In Fig. 7 I show a modification in which the tank *a* is provided with two of the outlets *b*, so that two pipes may be treated at the same time. In this case the mandrel-supporting rods *f' f'* are not screw-threaded and are not rotated, said rods being suitably supported at their outer ends and bearing against the mandrels in the pipes that are being lined. The feeding mechanism in this case consists of a feed-screw f^2 and a yoke *j*, having an internally-threaded orifice *j'* to engage the thread of the feed-screw, and sockets j^2 j^2, formed to engage the outer end portions of the pipes *c c*. The yoke *j* is preferably constructed in two parts or sections formed as a clamp, as shown in Fig. 8, said sections being detachably connected by bolts *k* and nuts *k'*. The pipes *c* may have collars c^2 temporarily screwed upon their outer ends to bear upon the outer side of the yoke *j*, as shown in Fig. 7.

It will be seen that the above-described means for supporting the mandrel or mandrels and for feeding the pipe or pipes outwardly from the tank enable the pipe to be conveniently manipulated and readily removed from the apparatus after the lining has been completed.

The location of the stop (for preventing outward movement of the mandrel) outside the tank, so that it bears against the outer end of the mandrel, prevents contact between the stop and the molten metal in the tank, so that the stop is not heated by the metal, and therefore is not liable to be warped and bent by the weight of the pipe upon it. Moreover, there is no possibilty of the stop being caught in the mass of fusible metal in the tank when said mass cools and becomes solid.

Similar and other obvious advantages attend the location of the pipe-feeding member or nut *g* at the outside of the tank out of contact with the molten metal.

I claim—

1. An apparatus of the character stated, comprising a tank adapted to contain a melted metal or alloy and having a tubular outlet, a lining-forming mandrel within said outlet, and a stop located outside the tank and arranged to bear against the outer end of the mandrel.

2. An apparatus of the character stated, comprising a tank adapted to contain a melted metal or alloy and having a tubular outlet, a feeding member formed to engage the outer end of the pipe and located outside the tank, and means for moving said feeding member away from the tank to draw the pipe therefrom.

3. An apparatus of the character stated, comprising a tank adapted to contain a melted metal or alloy and having a tubular outlet, a lining-forming mandrel or core within said outlet, a feed-screw outside the tank, and a nut engaged with said feed-screw and movable thereon by the rotation of the shaft, said nut having means for detachable connection with the pipe to be coated.

4. An apparatus of the character stated comprising a tank adapted to contain a melted metal or alloy and having a tubular outlet, a lining-forming mandrel or core within said outlet, a feed-screw in alinement with said outlet and bearing against the mandrel, a nut engaged with the feed-screw and movable thereon by the rotation of the screw, said nut having means for detachable connection with the pipe to be coated, and a support for the outer end of said feed-screw, the screw being detachable from said support.

5. An apparatus of the character stated, comprising a tank adapted to contain a melted metal or alloy and having a tubular outlet, a lining-forming mandrel or core within said outlet, a feed-screw in alinement with said outlet and bearing against the mandrel, a nut engaged with the feed-screw and movable thereon by the rotation of the screw, said nut having means for detachable connection with the pipe to be coated, a shaft journaled in bearings at the outer end of the feed-screw and constituting a support or stop to prevent outward movement of the feed-screw, said shaft and feed-screw having complemental detachable coupling members, and means for rotating the shaft.

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

GEORGE W. HARRINGTON.

Witnesses:
THOMAS E. DWYER,
C. F. BROWN.