(No Model.) 2 Sheets—Sheet 1.

C. Q. GOODWIN.

APPARATUS FOR COATING WIRE.

No. 434,866. Patented Aug. 19, 1890.

Fig. 1.

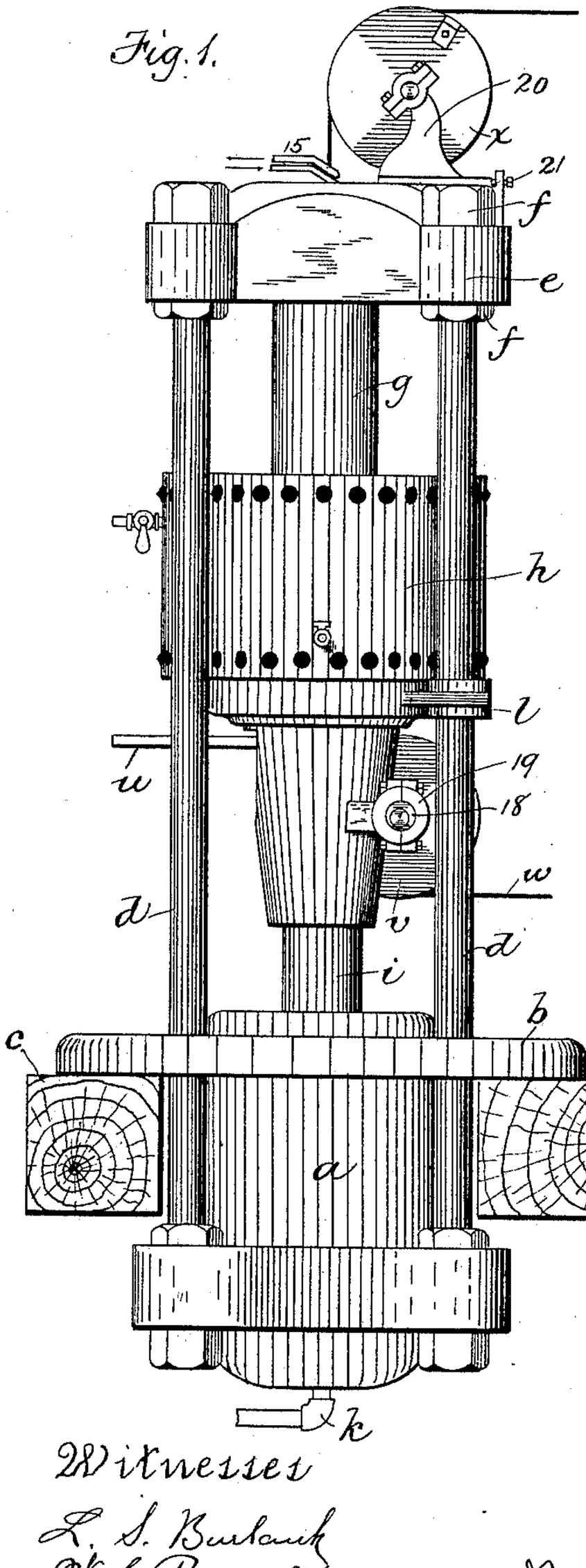
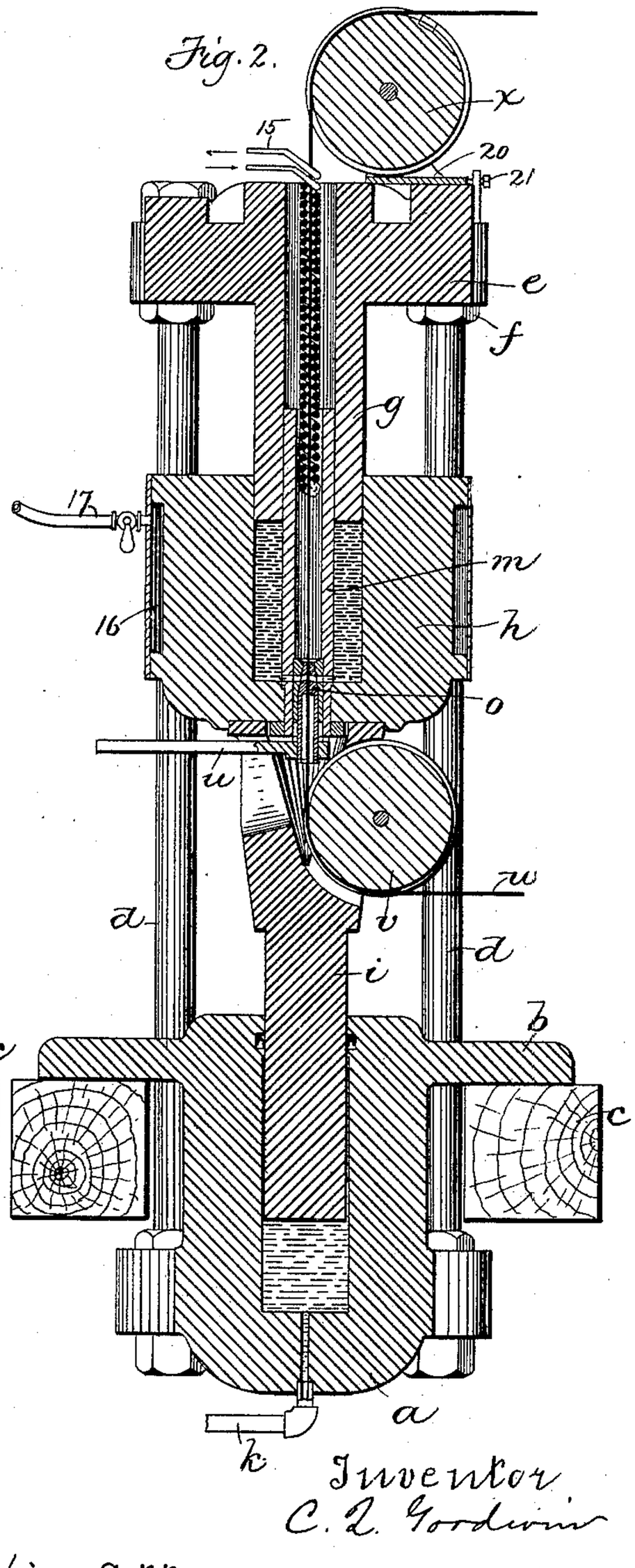


Fig. 2.



Witnesses
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(No Model.) 2 Sheets—Sheet 2.

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Fig. 4a

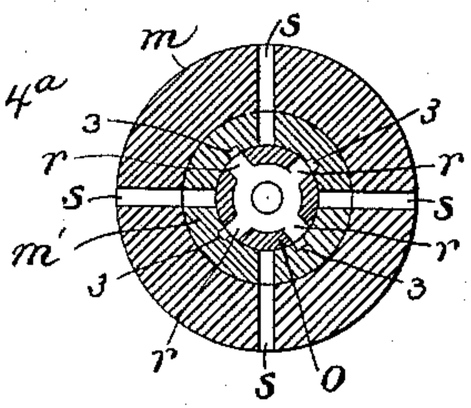


Fig. 4.

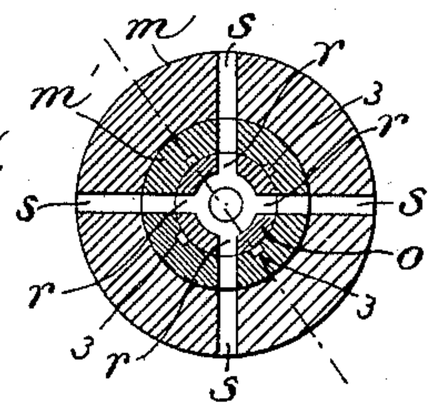


Fig. 3.

Fig. 5.

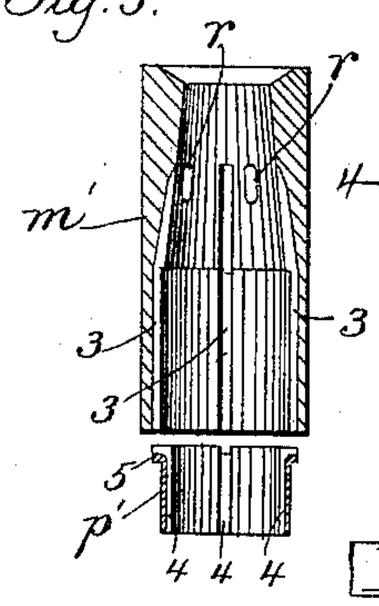


Fig. 8.

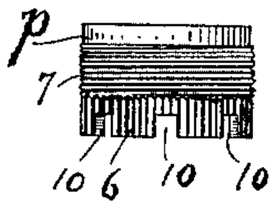


Fig. 6.

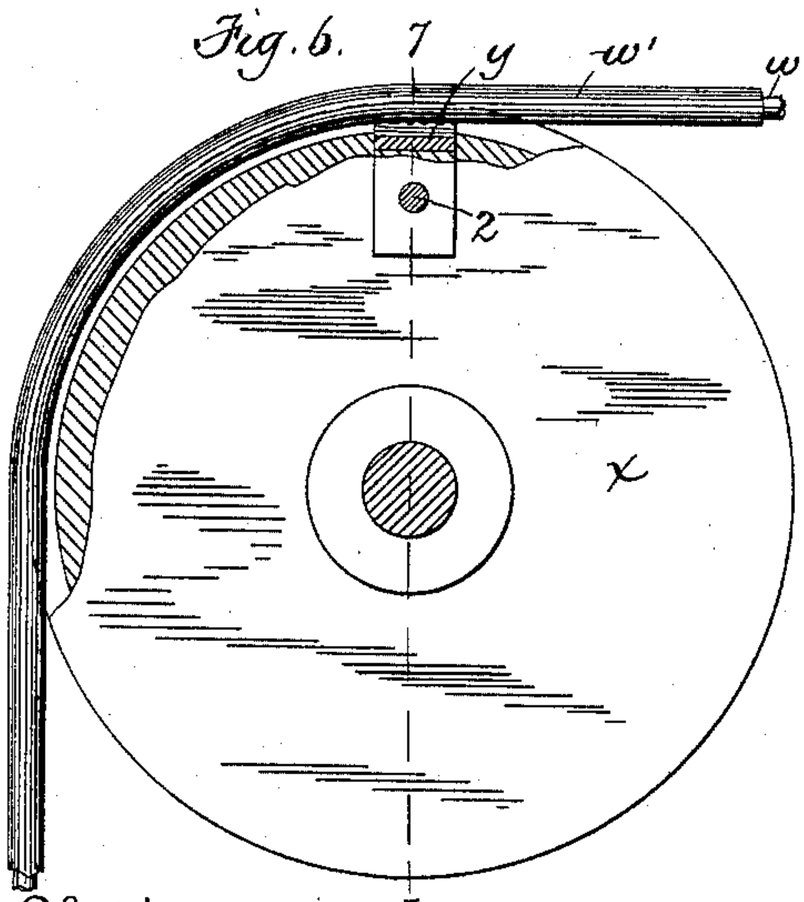


Fig. 7.

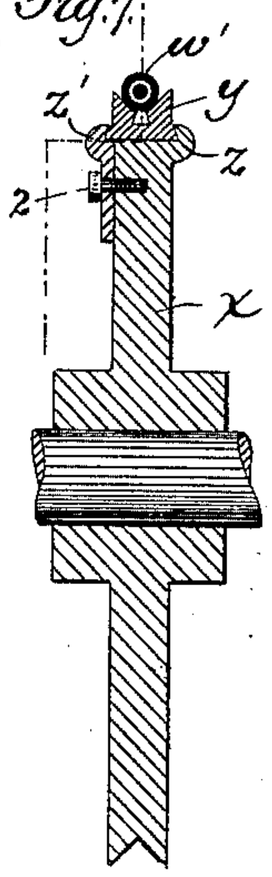
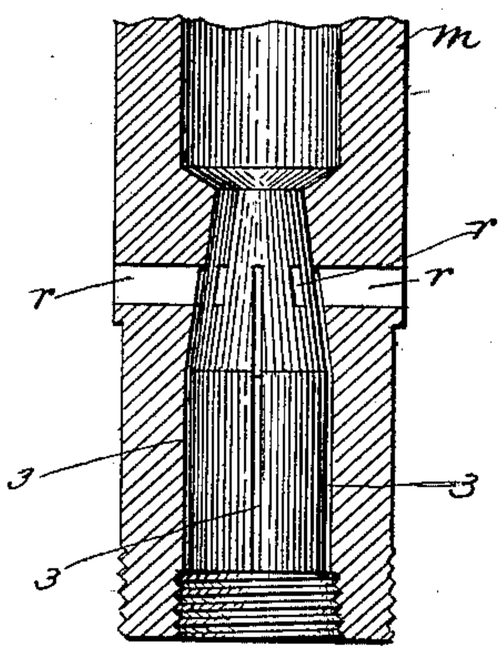


Fig. 9.



Witnesses
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Inventor
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By his Attorneys
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UNITED STATES PATENT OFFICE.

CHARLES Q. GOODWIN, OF MALDEN, ASSIGNOR TO P. B. WILEY, OF WAKEFIELD, MASSACHUSETTS, AND THE BELL-ROCK ELECTRICAL CONDUCTOR COMPANY, OF PORTLAND, MAINE.

APPARATUS FOR COATING WIRE.

SPECIFICATION forming part of Letters Patent No. 434,866, dated August 19, 1890.

Application filed December 6, 1889. Serial No. 332,788. (No model.)

To all whom it may concern:

Be it known that I, CHARLES Q. GOODWIN, of Malden, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Apparatus for Coating or Covering Wire, of which the following is a specification.

This invention relates to machines for forming a seamless sheath or covering of lead or other material in a plastic condition on wire for the purpose of protecting or insulating the latter; and it consists in the several improvements, hereinafter described and claimed, relating to an organized machine comprising a vertically-movable reservoir or receptacle for the plastic material, a fixed boss or piston entering said reservoir and acting as a plunger to expel the plastic material from the reservoir when the latter is moved against or toward said piston, and a mold within the reservoir through which the wire to be coated passes, said mold being separated from the wire by an annular space, through which the plastic material is forced and by which it is formed into an annular sheath upon the wire.

In the accompanying drawings, forming a part of this specification, Figure 1 represents a side elevation of my improved wire-coating machine. Fig. 2 represents a vertical section of the same. Fig. 3 represents an enlarged vertical section of the lower portions of the reservoir and of the fixed boss or piston, showing the mold and the tube or holder that contains the mold. Figs. 4 and 4ª represent transverse sections of the mold and its holder on the plane of line 4 4, Fig. 3. Fig. 5 represents a longitudinal section of a portion of the mold-holder detached. Fig. 6 represents a side view, partly in section, of the pulley over which the coated wire passes as it emerges from the machine. Fig. 7 represents a section on line 7 7, Fig. 6. Fig. 8 represents a side view of the ring that secures the mold in place. Fig. 9 represents a sectional view of a modification.

The same letters and figures of reference indicate the same parts in all the figures.

In the drawings, *a* represents a hydraulic cylinder constituting the base of the machine, and provided with a flange *b*, resting on supports *c c*. To said base are attached vertical standards *d d*, which support the fixed head *e*, the latter having ears which receive said standards, and are secured thereto by nuts *f f*, engaged with the standards. The head has a downwardly-projecting cylindrical boss *g*, which enters and closely fits the interior of the reservoir *h*, as shown in Fig. 2. Said reservoir is attached to a ram *i*, which is fitted to move in the hydraulic cylinder *a*, and is adapted to be forced upwardly with the reservoir by the entrance of water under pressure into the cylinder through the pipe *k*, the reservoir having one or more ears *l*, which slide upon a like number of the standards *d*, when the reservoir is moved up or down. The reservoir is attached to the upper end of the ram *i*, the latter being suitably formed at its upper end to support the reservoir. *m* represents a tube attached rigidly to the bottom of the reservoir and extending through the bottom of the latter and upwardly into the fixed boss or plunger *g*. The lower end of said tube is formed as a seat or holder for the mold *o*, which is held in the tube by an externally-threaded ring *p*, hereinafter described, Figs. 3 and 8. Said ring is screwed into the internally-threaded lower end of the tube *m*. The mold *o* bears on a seat formed to receive it within the tube *m*. I prefer to make said seat on a separate tube or lining *m'*, which is driven tightly into the tube *m*, and thus rigidly attached thereto. The inner surface of said lining-tube *m'* is tapered at the upper end to form a tapering seat for the mold *o*. Said mold is tubular and has a series of orifices *r*, which when the mold is in position to coincide with similar orifices *s* in the tube *m* and its lining *m'* admit the plastic material to the interior of the mold. Above the orifices *r* the mold is contracted at *o'*, said contracted portion or throat *o'* constituting the forming portion of the mold.

To the lower end of the mold is attached a tubular shank *t*, which extends downwardly

below the tube *m* and into a cavity in the upper end of the ram *i*. A handle or lever *u* is attached to the lower end of said shank and extends outwardly through a side opening in the ram *i* as a means for turning the mold, so as to either connect its orifices with those of the tube *m*, as shown in Figs. 2, 3, and 4, thus permitting the plastic material in the reservoir to enter the mold, or to disconnect said orifices from those of the said holder and tube, as shown in Fig. 4ª, thus shutting off the plastic material from the mold.

v represents a pulley journaled in bearings on the ram and arranged to guide the wire *w* on its way to the mold, said wire passing from a suitable reel (not shown) under the pulley *v*, and from thence upwardly through the mold *o*, tube *m*, and boss or piston *g* to and over a pulley *x*, which is journaled in bearings on the fixed head *e*. The last-named pulley is provided with a removable die *y*, which is secured by means of a dovetail lug *z* on one side of the pulley *x* and a dovetail gib *z'*, attached to the other side of the pulley by a screw 2, Figs. 6 and 7. Said die is formed to impress any desired mark or character on the sheath *w'*, which is on the wire when the latter passes over the pulley *x*. The removable connection of the die to the pulley enables the mark to be readily changed.

The coated wire is drawn over the pulley *x* by any suitable means, preferably by a power-driven reel or drum, which coils up the sheathed wire as fast as it emerges from the machine.

It will be observed that the mold is removable from the machine, so that molds of different sizes may be used interchangeably to form coatings or sheaths of different diameters, it being necessary only to unscrew the ring or collar *p* to permit the removal of the mold and the insertion of another.

To prevent the plastic material that remains in the interior of the mold from remaining and hardening in the mold, (particularly if such material be lead,) I provide the interior of the lining-tube *m'* with vertical grooves 3 3, Fig. 5, arranged between the lead-admitting orifices *r* and extending to the lower end of said tube. When the mold is turned to shut off the lead, its openings *r r* coincide with the grooves 3, as shown in Fig. 4ª, and the lead in said openings *r r* immediately flows out of the machine through said grooves and through coinciding grooves 4 4, Fig. 5, in a collar *p'*, which is fitted in the interior of the holding-ring *p*. The collar *p'* has a flange 5 at its upper end, which is seated on a shoulder near the upper end of the ring *p*. The shank *t* of the mold has a shoulder, which rests on the upper end of the collar *p'*, so that the mold and its shank are supported by the collar *p'*. The collar *p'* is free to rotate in the ring *p*, so that in case the collar is caused to adhere to the mold-shank by the hardening of a portion of the lead passing through the grooves 4 of said collar no difficulty will be caused by such adhesion, because the collar will turn with the shank in the ring *p*. It will be seen that the collar, with its internal grooves, prevents the escaping lead from touching the ring *p* and in any way obstructing the rotation of said ring, so that the ring can be unscrewed at any time without difficulty. I prefer to provide the periphery of the ring *p* with vertical corrugations 6 below the threaded portion 7 of said ring. (See Fig. 8.) An adjustable tooth or dog 8, Fig. 3, attached to the lower end of the tube *m* by a screw 9, passing through a slot in said dog, engages one of the corrugations of the ring and locks the latter after it is suitably adjusted. Slots 10 10 are cut in the lower edge of the ring for the reception of a spanner, whereby the ring may be rotated.

The mold and its shank are made in two separable parts fitted together, as shown in Fig. 3, the upper end of the shank being formed to receive the lower end of the mold. A cavity 12 in the lower portion of the mold contains a packing, which is held by a gland 13, supported by a removable sleeve 14 within the shank *t*, the whole constituting a stuffing-box, which prevents the escape of the plastic material around the wire below the mold.

15 represents a water-pipe, which is arranged in a double coil in the interior of the tube *m*, the pipe being arranged to conduct water downwardly into the tube and back, the water entering and leaving the upper end of the tube, said pipe being connected to a suitable source of supply of cold water. The coated wire passes through the interior of the coil, and its hot sheath is partially cooled by the proximity of the cold water to it.

The reservoir *h* is provided with a steam-jacket 16, which receives steam from a boiler or generator through a flexible pipe 17, the steam heating the reservoir and preventing the too rapid cooling of the contents thereof.

The pulleys *v x*, that guide the wire, are adjustable, so that the wire between them may be kept exactly at the center of the mold. Said pulleys are grooved, as shown in Fig. 7, so that the center of a wire of small size on said pulleys will be nearer the axis of the pulley than the center of a larger wire. Hence by making said pulleys adjustable wire of any size can be accurately centered in the mold.

The pulley *v* is made adjustable by means of an eccentric collar 18, constituting the bearing of the shaft of said pulley, said bearing being clamped in a bracket 19, affixed to the ram *i*. By loosening and partly rotating the collar or bearing 18 the pulley *v* may be adjusted, as will be readily seen. The pulley *x* is journaled in a bracket 20, which is adapted to slide on the head *e*, and is adjustable by means of a screw 21, working in an ear affixed to said head.

The machine here described is particularly intended to apply a lead sheath or covering

to a wire that has been provided with an insulating-coating, the lead sheath being formed on the insulating-coating; but it is obvious that any other suitable material in a plastic condition may be used—for example, a composition containing asbestus or a suitable insulating material.

In the operation of the apparatus, the reservoir being charged with the plastic material, the wire is set in motion upwardly through the mold and the latter is turned to permit the entrance of the plastic material, which is immediately formed into a sheath and carried upwardly with the wire, said sheath being partially cooled in passing through the coils of the pipe 15 and marked or stamped by contact with the die on the pulley *x*. If it is desirable to stop the sheath-forming operation while a quantity of the material remains in the reservoir, the mold is turned by the handle to shut off the material, that portion of it remaining in the mold escaping through the grooves 3.

It will be seen that the machine is of simple and strong construction and that the mold is firmly supported, so that lateral displacement of it is impossible, the mold being in close proximity to the bottom of the reservoir, so that it has the benefit of said bottom as a lateral support in all directions, while the tube *m*, supported laterally at its lower end by the bottom of the reservoir and its upper end by the fixed boss or piston *g*, cannot deviate at any point from its proper position.

The lining-tube *m'* is used as a matter of convenience, it being easier to form the tapering mold-seat and the longitudinal grooves 3 in said lining-tube than directly in the tube *m*; but it is obvious that the lining-tube may be dispensed with, and the tube *m* with the grooves 3 made in one piece, as shown in Fig. 9, which shows a longitudinal section of the tube *m*.

I claim—

1. The combination of the fixed head having the tubular boss or fixed piston, the movable reservoir having a cavity fitting said piston and provided with a tube extending upwardly from its bottom into the tubular piston, means for impelling said reservoir and the mold within the said tube, said mold and tube having openings for the passage of material from the reservoir into the mold, as set forth.

2. The combination of the fixed head having the tubular boss or fixed piston, the movable reservoir having a cavity fitting said piston and provided with a tube extending upwardly from its bottom into the tubular piston, the rotary mold within the said tube, and means for rotating said mold, the mold and tube being provided with orifices which coincide when the mold is turned to a given position and permit the passage of material from the reservoir into the mold and are disconnected when the mold is turned to a different position, as set forth.

3. The combination of the fixed head having the tubular boss or piston, the movable reservoir having a cavity fitting said piston and provided with a tube extending upwardly from its bottom into the tubular piston, the mold within said tube communicating with the interior of the reservoir, means for moving the reservoir toward the fixed boss or piston, and thereby causing the latter to force material from the reservoir into and through the mold, and pulleys *v x*, located, respectively, below and above the reservoir and mold and arranged to guide a wire centrally through the mold, as set forth.

4. The combination, with the reservoir, the mold secured to and communicating with the reservoir, and means for forcing material from the reservoir through the mold, of the wire-guiding pulleys *v x*, located, respectively, above and below the reservoir and mold, and means for adjusting said pulleys to compensate for variation in the sizes of wire guided thereby, as set forth.

5. In a wire-coating apparatus, the combination of the reservoir, the tube *m*, rigidly attached to the reservoir and extending through the bottom thereof and provided with an internal seat, the rotary mold inserted in the tube and fitted to the seat therein, said mold and tube having orifices which may be connected and disconnected by partial rotations of the mold, said mold being insertible through the lower end of the tube, and means for detachably securing the mold in the tube, as set forth.

6. In a wire-coating apparatus, the combination of the reservoir, the tube rigidly attached to the reservoir and extending through its bottom, the mold insertible in and removable from the tube through the lower end of the latter and provided with a stuffing-box below its forming portion, whereby escape of the plastic coating material around the uncoated wire is prevented, and means for detachably securing the mold to the tube, as set forth.

7. In a wire-coating apparatus, the combination of the reservoir, the tube *m*, rigidly attached to the reservoir and extending through its bottom and provided with radial orifices *s*, communicating with the reservoir, and with longitudinal internal grooves 3, arranged between said orifices, and the mold adapted to rotate in the tube and provided with orifices *r*, which register with the orifices *s* when the mold is in one position and with the grooves 3 when the mold is in another position, whereby the material is allowed to escape from the mold when the latter is turned to disconnect its interior from the reservoir, as set forth.

8. In a wire-coating apparatus, the combination of the reservoir, the tube rigidly attached to the reservoir and extending through

its bottom, the mold removably inserted in the tube and adapted to rotate therein and provided with a tubular shank extending below the tube, and the retaining-ring screwed into the tube and provided with the internally-grooved collar, which supports a shoulder on the shank of the mold, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 25th day of November, A. D. 1889.

CHARLES Q. GOODWIN.

Witnesses:
PETER B. WILEY,
A. D. HARRISON.