(No Model.) 3 Sheets—Sheet 1.

E. C. SLOAN.

MACHINE FOR COVERING CONDUCTORS WITH LEAD.

No. 355,843. Patented Jan. 11, 1887.

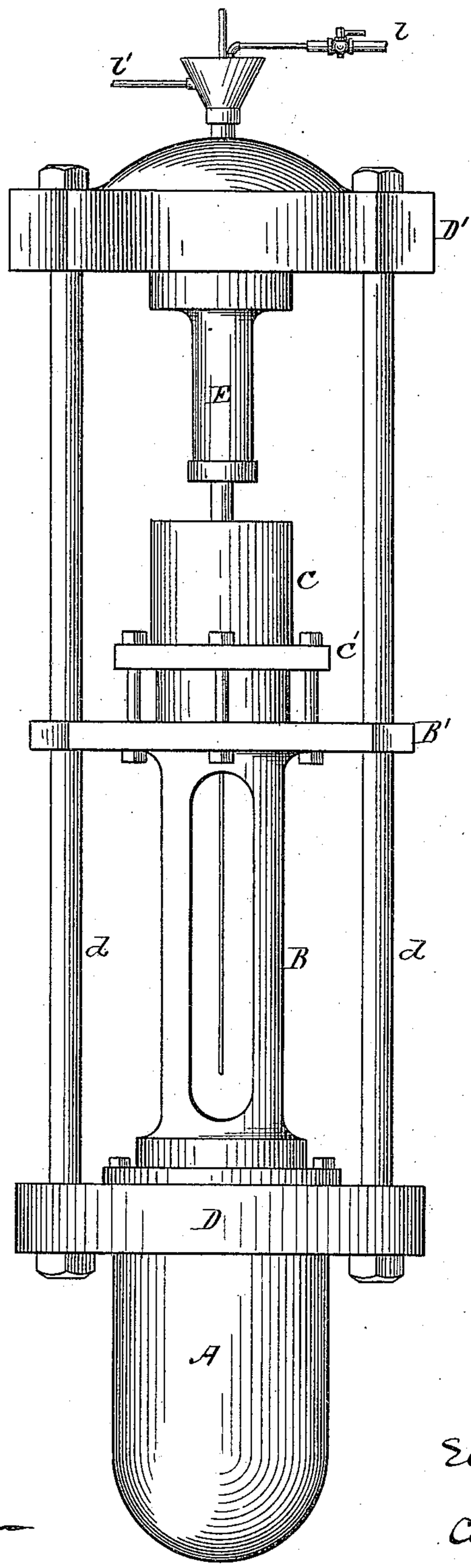

Fig. 1.

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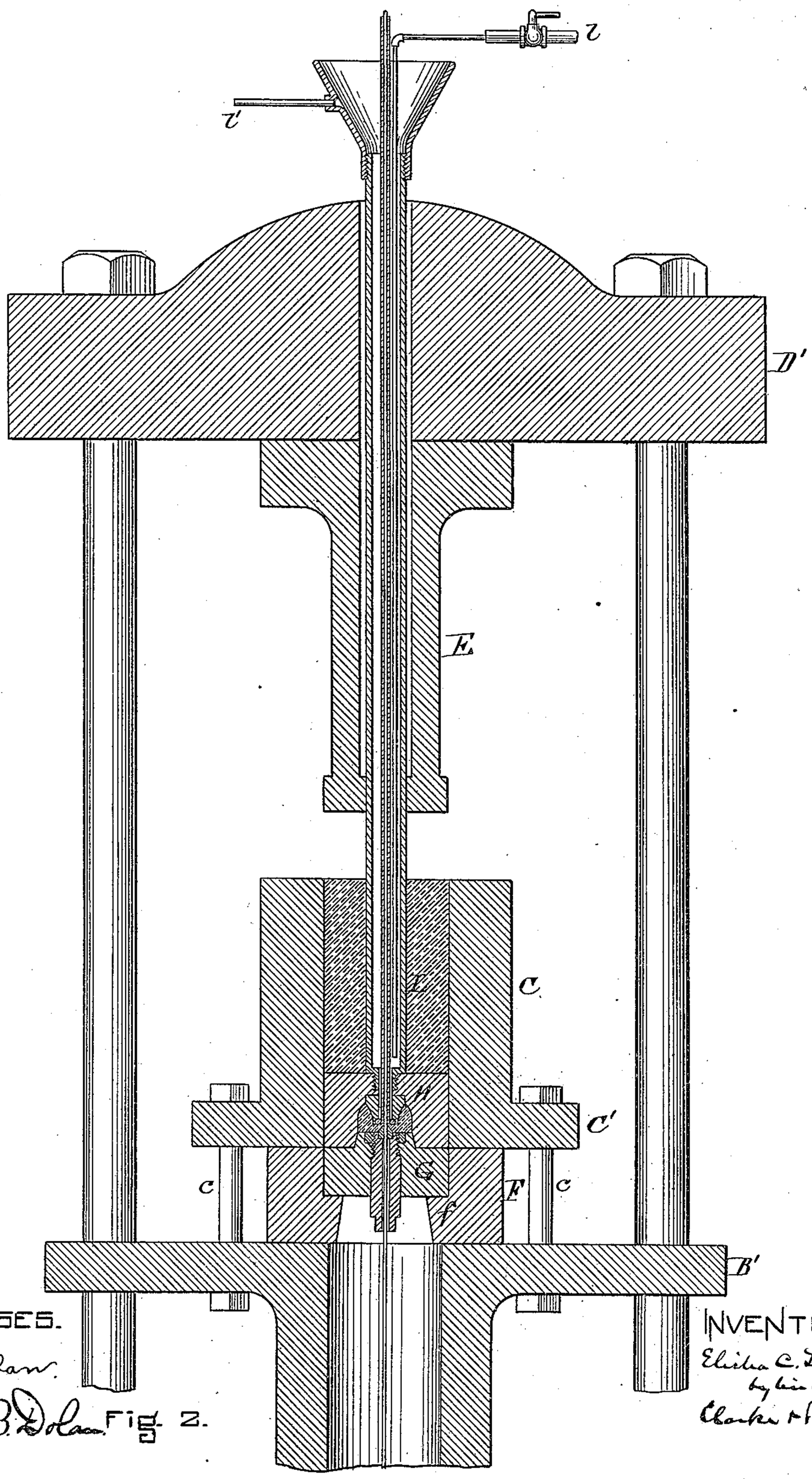

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Fig. 2.

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E. C. SLOAN.

MACHINE FOR COVERING CONDUCTORS WITH LEAD.

No. 355,843. Patented Jan. 11, 1887.

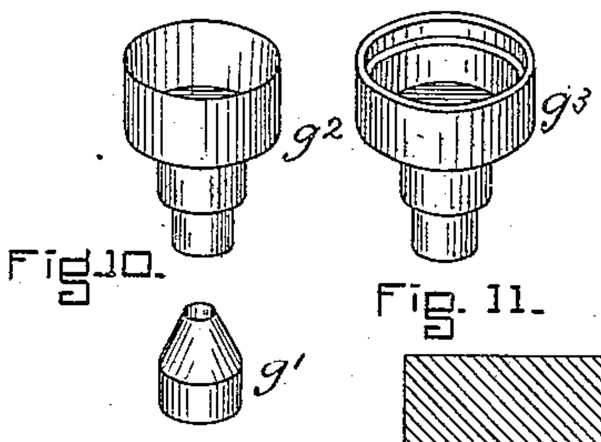

Fig. 10.

Fig. 11.

Fig. 9.

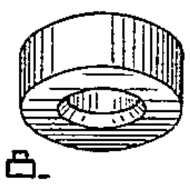

Fig. 8.

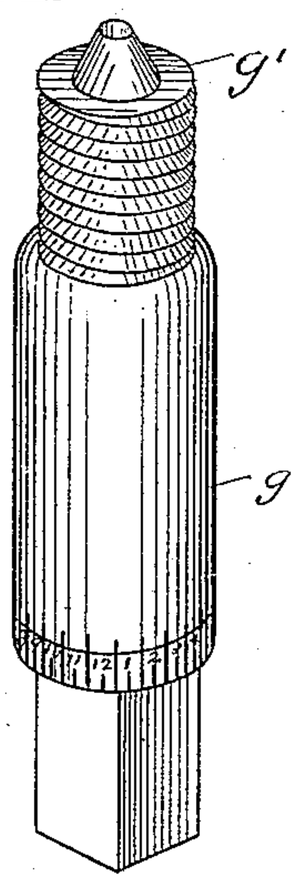

Fig. 7.

Fig. 3.

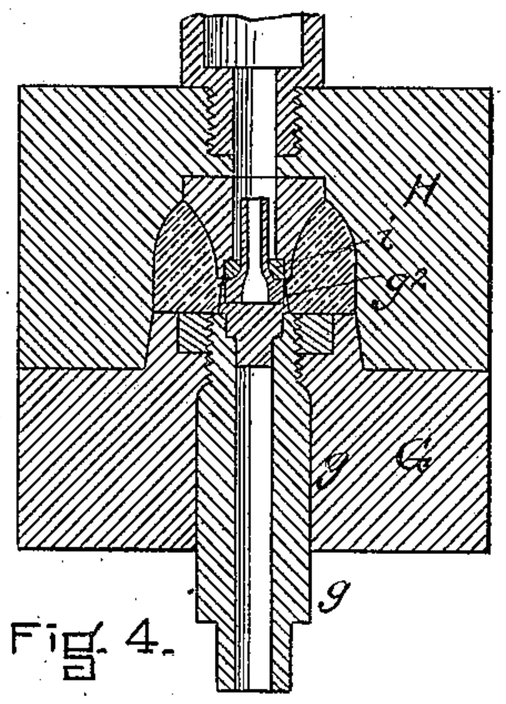

Fig. 4.

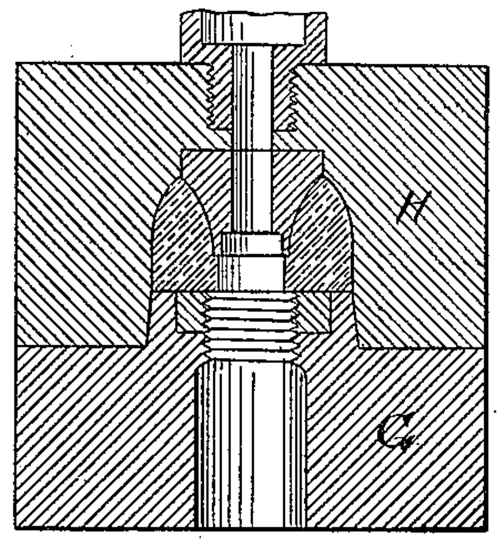

Fig. 5.

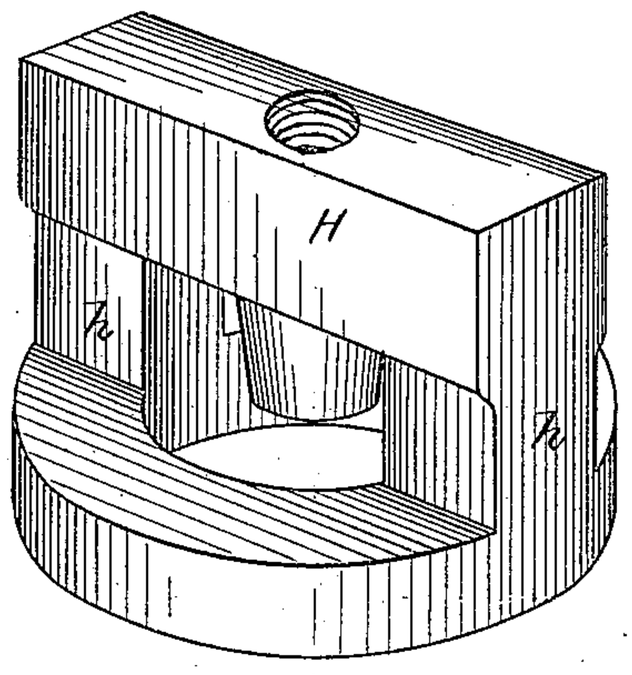

Fig. 12.

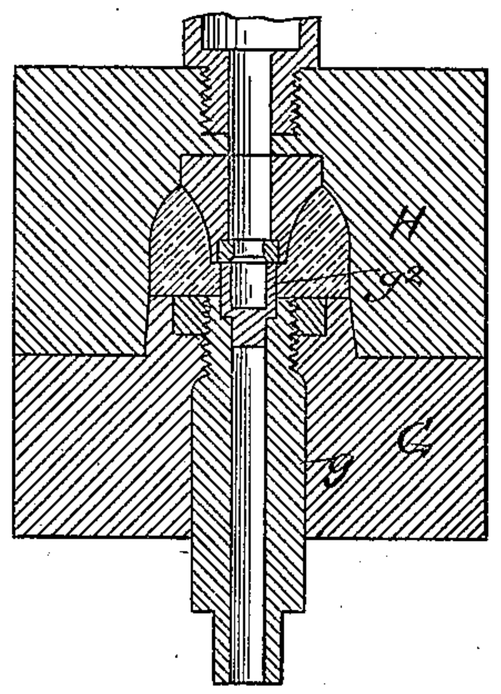

Fig. 6.

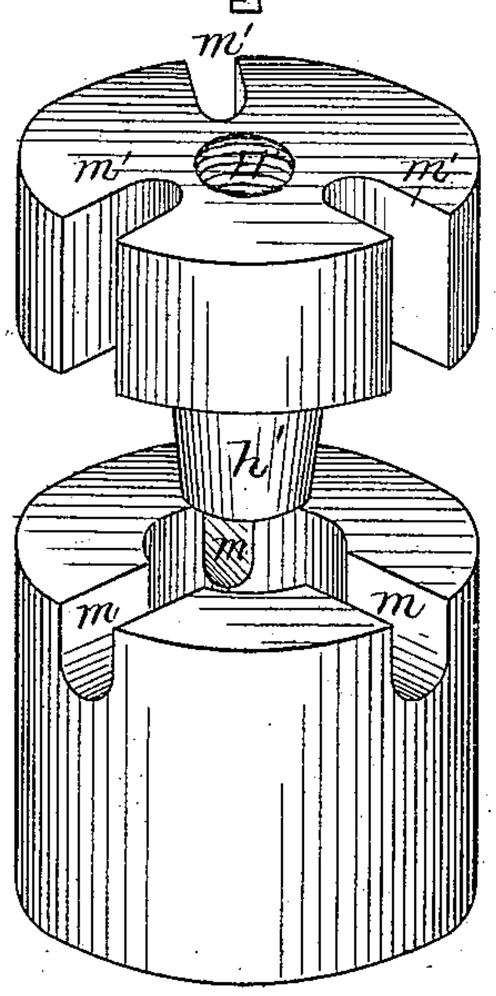

Fig. 13.

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UNITED STATES PATENT OFFICE.

ELISHA C. SLOAN, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE CHADWICK LEAD WORKS, OF SAME PLACE.

MACHINE FOR COVERING CONDUCTORS WITH LEAD.

SPECIFICATION forming part of Letters Patent No. 355,843, dated January 11, 1887.

Application filed March 15, 1886. Serial No. 195,298. (No model.)

To all whom it may concern:

Be it known that I, ELISHA C. SLOAN, of Boston, in the county of Suffolk and State of Massachusetts, a citizen of the United States, have invented a new and useful Improvement in Covering Electric Conductors with Lead, &c., of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

Recent needs of the community have developed the requirement of casing with some incorrodible material electric conductors which are to be placed under ground, and for other purposes, and for reasons of economy it has been considered desirable to employ for this purpose soft metals, which can be applied by the lead-pipe machine, and to apply them by a process developed from the process of manufacturing lead pipe. Among the things, however, that are desirable in this invention is that the insulated wire should be protected from heat before the lead is applied to it, and also that change in the qualities of insulation should not be induced in the process of covering it with lead.

In this specification the word "lead" will be used as a generic term for the various metals that can be applied by the aid of the lead-pipe machine. These are principally lead, tin, and their alloys.

In the drawings, Figure 1 is an elevation of a lead-pipe machine of a usual construction modified to be used for covering electric conductors with soft metal. Fig. 2 is a vertical section of the same machine. Fig. 3 is an enlarged vertical section showing the position and run of the conductor and the lead as it is applied to it, and also showing the parts which are adapted to do the work. Fig. 4 is another vertical section at the same point, showing the manner in which the dies may be changed. Fig. 5 is another vertical section at the same point, illustrating still further the method of changing the dies. Fig. 6 is another vertical section at the same point, still further illustrating the method of changing the dies. Fig. 7 is the adjusting-screw and holder of the coring-die. Fig. 8 is an elevation of the outside die. Fig. 9 is an elevation of the coring-die detached from the core-holder shown in Fig. 7. Fig. 10 is an elevation of the cutter employed to remove a plug of lead in changing the dies. Fig. 11 is an elevation of the set used in putting the outside die into position after removing this plug of lead. Fig. 12 is an enlarged view of the bridge in which the outside die is set. Fig. 13 is a modified form of the bridge, which may be used if desired.

A is a motor, which is usually a hydraulic press. It rests upon a suitable pedestal or base, and has upon its inside a piston which is forced up by hydraulic pressure. On top of this piston rests a hollow column, B, and on top of this hollow column a lead-cylinder, C, and guide-yoke B′. A yoke, D, fastened to the top of the outside of the hydraulic cylinder A, is connected by connecting-rods *d* to another yoke D′, to which is attached a hollow piston, E, against which the lead in the cylinder C is lifted in order to form lead pipe or to cause the lead to flow out of the cylinder C through passages which govern its eventual shape. All these parts are common and need not be further described. A sliding yoke, B′, is attached to the top of the hollow column B and surrounds the connecting-rods *d*, and serves to guide the cylinder in its movement upon the piston.

In order that this common apparatus may be used in covering electric conductors, the bottom of the cylinder C is made with a flange, C′, which is connected by holding-down bolts *c* with the yoke B′. Between this flange C′ and the yoke B′ is the hollow block F, which block has a slightly tapered cavity at its upper part, terminated by the shelf *f*, and which surrounds a somewhat smaller cavity at the lower part of the block F. Upon this shelf *f* rests the die-block G for holding the coring-die, and upon this die-block G for the coring-die rests the bridge H, the top of which forms, in fact, the bottom of the lead in the cylinder C, all of which can readily be understood from Fig. 2. This bridge is usually made as shown in Fig. 12, has a short cylindrical and annular piece at the bottom filling the cavity of the cylinder and having two pedestals, *h*, and a transverse piece at their top, in the center of which transverse piece, in a suitable socket made for the purpose, as shown in Fig. 3, the die-holder *h′* is placed, which die-holder has

tapered and, I prefer, hollowed sides, and has a recess at its lower extremity, into which the outside die is set. The outside die is lettered *i* in Fig. 3, and is shown on an enlarged scale in Fig. 8. It is a simple cylindrical block of metal having a hole along its axis, which hole flares on its lower side toward the lead in the basin of the bridge. The die-block G for the coring-die is formed as shown in section in Figs. 2 and 3. It has a cavity in its axis, into which the die-holder *g* (shown in Fig. 7) is screwed. The top of this die-holder is recessed, as shown in Fig. 3, and into the recess is set the conical-pointed coring-die *g'*. (Shown in Fig. 9.)

It will be noticed in Fig. 3 that beneath the bridge and around the die-holders and dies there is a suitable cavity for lead. The point of the coring-die *g'* is tapered on a pretty abrupt slant, much more so than any other machine with which I am acquainted. The position of this die upon the end of a screw die-holder, *g*, allows it to be adjusted up and down toward the die *i*, and thereby gives facility for regulating the thickness and tension of the lead upon the cable or wire to be covered.

In using this machine a wire or cable, *k*, is fed up through the hollow column and through the hollow shaft of the die-holder *g*, and through the hollow center of the coring-die *g'*, and through the axis of the outside die, *i*, into a continuation of this axis in the bridge H. Into the center of the top of this bridge is inserted a pipe, L, which goes up through the hollow arm E and through the yoke D' to the outside of the machine. The cavity of this pipe L is considerably greater than the hole through either of the dies, and a water-pipe is let down into this cavity to the bottom, as shown in *l*, Fig. 2, and an overflow-pipe, *l'*, is attached to the upper part of this pipe L, or to a tunnel at its top. This allows water to be applied to the outside of the lead that is put upon the cable after the cable has been covered. The wire having been led into the proper position, the hydraulic-cylinder is started up and the cylinder C rises against the piston E, which rests upon the lead in the cylinder C and compresses it. This lead flows down into the cavity or basin beneath the bridge, and is pressed from all sides upon the slopes of the coring-die *g*, and by that turned up toward the outside die, *i*, as shown in Fig. 3. The wire to be covered being in the center of this outside die, the compressed lead flows upon it and is firmly laid upon the exterior of the wire in a continuous cylinder and the wire so covered by a lead envelope runs up through the machine into the pipe L, and there is cooled from the outside. If upon investigation it is discovered that the amount of lead put upon the pipe is too great, or its tension is too great, the quantity and tension of the lead may be adjusted by adjusting the coring-die holder *g* up or down in the machine.

When it is desirable to change the outside die in the machine, the coring-die holder *g* is taken out and a circular cutter, g^2, (shown in Fig. 10,) is inserted into the top of the coring-die holder *g*, or into a similar tool without the screw and of somewhat smaller diameter at the upper part, by which the lead between the dies may be cut out, as shown in Fig. 4. This tool is then taken out and a cup, such as is shown in Fig. 11, g^3, is inserted in the die-holder *g*, or a tool of similar shape, and carried up to the place of the outside die, with which cup the outside die can be taken out, if it has not already come out with the piece of lead which has been removed, as will usually be the case.

Fig. 5 shows the appearance of the die-blocks and bridge H and G after the removal of the central lead and the outside die, and Fig. 6 shows their appearance at the time of inserting another die by the die-holder *g* and the cup-ended tool g^3. The die having been changed, and an appropriate coring-die having been fitted to the end of the coring-die holder *g* and properly adjusted in place, the machine may be again started up, and lead will flow in as before and cover the cable without any particular raggedness.

In lieu of making the bridge and die-blocks as shown in Figs. 3, 4, 5, 6, and 12, the die-block G may be made as shown in Fig. 13, G', with three or more radial grooves, *m*, leading into a central cavity, M, and the bridge may be made as a cylindrical plate having the downwardly-projecting die-holder *h'*, and with notches *m'* upon its edges which communicate with radial cavities *m*, and carry the lead through from them to the central basin, M; but this is obviously but another form of the apparatus hereinbefore described.

I am aware of the Farrell patent of August 1, 1885, No. 262,027, and the Tatham patent of October 6, 1885, No. 327,835, neither of which shows a die-holder adjustable to and from the die forming the outside of the lead covering, by which adjustment the quantity or tension of the lead applied may be regulated while the press is in operation, a thing which is of some practical importance in the use of such a machine.

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States—

1. The combination of the die-block G, the adjustable coring-die holder *g*, with its means of adjustment arranged within the said die-block G and below the lead-cylinder C of the lead-pipe machine, with the block F also arranged below said cylinder C and with said cylinder C of a lead-pipe machine, substantially as and for the purposes described.

2. The combination, with a coring-die holder, *g*, and its coring-die *g'*, at the bottom of the machine, of a bridge, H, provided with an interior basin and carrying an outside die, *i'*, and with the vertical pipe L, substantially as described, whereby wire may be covered with lead when fed from the bottom toward the top

of the machine, and the lead may be cooled from the outside by cooling-liquids, substantially as specified.

3. The combination of the block G and the removable coring-die holder *g* with the bridge and outside die-holder, substantially as described, whereby a change of outside dies may be effected in the manner and with the tools described without interference with the lead-cylinder and with but little loss of lead, substantially as described.

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Witnesses:
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FRED. B. DOLAN.