S. C. BISHOP.

Telegraph Wire.

No. 17,481. Patented June 9, 1857.

Fig. 1.

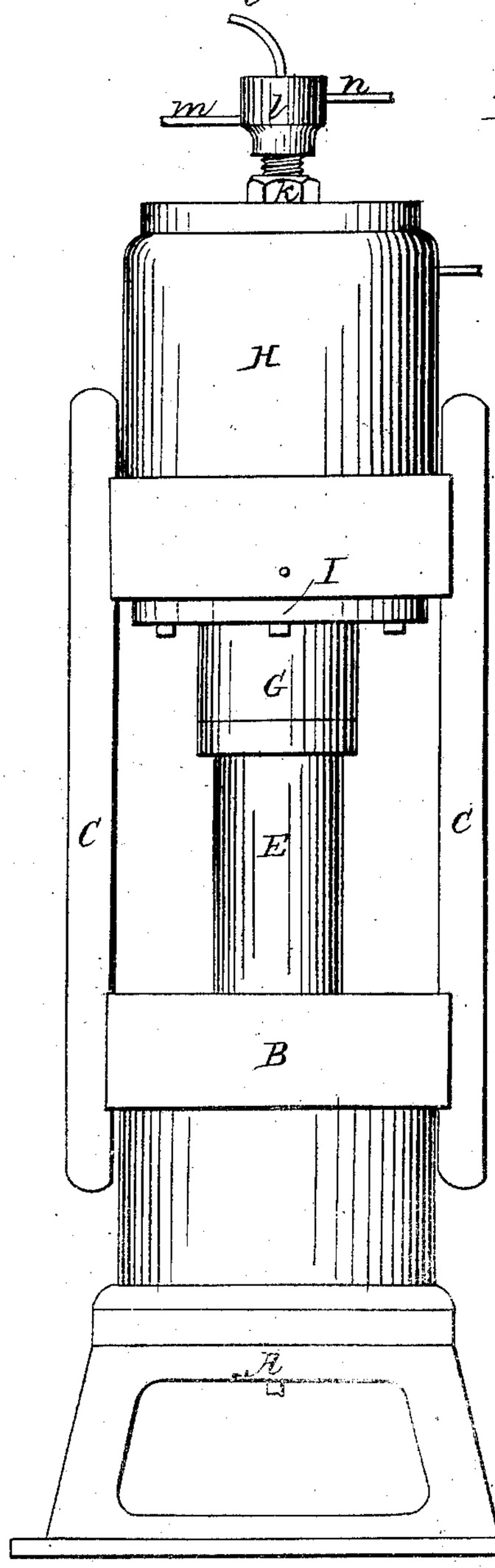
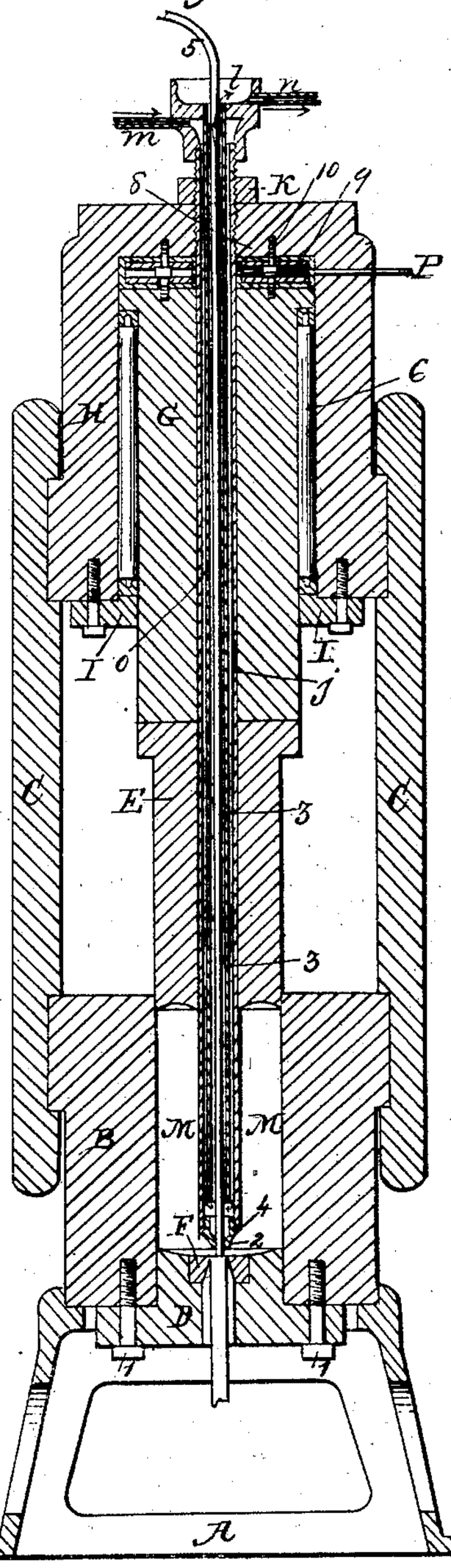


Fig. 4.

Fig. 3.

Fig. 2.



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IMPROVEMENT IN MACHINES FOR COVERING INSULATED WIRE WITH LEAD OR OTHER DUCTILE METAL.

Specification forming part of Letters Patent No. **17,481**, dated June 9, 1857.

To all whom it may concern:

Be it known that I, SAMUEL C. BISHOP, of the city, county, and State of New York, have invented a new and useful Protected Insulated Electric and Galvanic Conductor, and new and useful improvements in the process and machinery for making the same, of which the following is a specification.

My new article consists of wire, insulated by a covering of gutta-percha or india-rubber, firmly inclosed in a coating of lead or other ductile metal.

My new process in giving a metallic coat to the gum which covers and insulates the wire consists in arresting the progress of caloric conducted from the hot metal by receiving it into and conveying it off by a fluid caused to flow in a current through a suitable vessel or vessels between the lead and the insulated-wire, to prevent the caloric passing into and heating the insulating-gum, thereby keeping the gum coating cool, as it and the melted metal move along on opposite sides of substances which would otherwise furnish an easy passage of the caloric from the metal to the gum, thus securing the proper relative temperature of the hot metal and the cold gum while they are moving in the same direction toward and by the time they reach the point of union by the action of an interposed current of fluid.

My improvement in the machine employed in my said process to produce my said manufacture consists of a combination of tubes, or other equivalent conductors for a current of fluid, with the die.

The whole machine used consists, essentially, of a tube through which the insulated wire passes, a second tube surrounding the first and forming an annular ring or space between the two for the circulation of fluid, a hollow point at the end of the last-mentioned tube of a caliber of such size that the insulated wire being coated with gutta-percha or india-rubber will pass freely but closely through it, a plunger fitting the lead-chamber and with a hole in it to receive the outer tube, and a lead-chamber with a hopper to receive the lead, a die into which the point of the outer tube just enters, leaving a sufficient space around it to allow the lead to pass into the die and around the gum, an inlet and outlet at the end of the tubes opposite to that of the die for admission and emission of the current of fluid, and all supported by a suitable frame-work, and connected with a hydraulic press, as hereinafter described.

I will now describe my invention and the parts thereof and its operation more in detail, reference being had to the drawings hereto annexed, in all of the figures of which like numerals and like letters represent like parts.

Figure 1 is a side elevation of the machine. Fig. 2 is a vertical section. Fig. 3 is a longitudinal section of a piece of the new manufacture. Fig. 4 is a transverse section of the same.

A is a frame or table supporting the cylinder and other parts, and which may be made in the form of a square bench, widest at the bottom, with a flange at the top, to surround the bottom of the cylinder to keep it from slipping off, or in any other suitable form.

B is the lead-cylinder, and receives the lead into the chamber M, which is poured into it through a suitable opening or hopper at the top. This cylinder has the upper external part made square, and projecting sufficiently to form a shoulder or flange for the purpose of being taken hold of by the clamps or supports C C.

D is the bottom to the lead-cylinder, and is securely bolted to the cylinder by the bolts 1 1, so as to resist the downward pressure of the ram.

F is a die fitted into the bottom D, which die I make circular on the outside, and on the inside it may be of any form in which it is desired to have the outside coating after finished; but it is most commonly used, and in the drawings it is represented circular on the inside, with a bore large enough to allow of a coating of lead sufficiently thick to form around the gum which covers the wire.

J is a tube or conductor passing down through the machine from the top to the die, terminating at the end, in a hollow steel point, 2, of the proper form and size to allow the wire with its coat of gum to pass easily through it, but at the same time not so loosely as to allow water to pass between the gum and the inner surface of this point. The distance of this point from or into the die can be regulated by means of the nut *k*, screwed onto the tube J, and resting on the head of cylinder H. The hollow steel point 2 and the die F are both movable, so that any others can be substituted adapted to any form and size of the insulated wire.

O is a tube extending through the bore of

the tube J from near the lower end of it—say from 4—to and out of the top of it, and terminating in the bottom of the cup *l*, to which it is soldered or otherwise attached, and communicates with the inside of the cup. The bottom of this cup *l* is screwed upon the upper end of the tube J. The insulated wire 5 is to be passed through this inner tube, and its size is to be such as to leave an annular space between its inner surface and the gum coating the wire sufficiently wide for a current of fluid to flow through it, and the relative size of the tube J and tube O must be such as to leave an annular space between them also wide enough for the circulation of fluid.

The tube *m* communicates with the water-space between the two tubes, and the tube *n* communicates with the inside of the cup *l*, and through that with the inner tube, O, so that if the water be forced into the tube M it will travel down the water-space between the tubes until it reaches the bottom of the inner tube at 4, where, passing under that tube, it will enter the space between the sides of the inner tube and the gum on the wire and travel up that space to the top and be delivered into the cup *l*, and thence run off through the tube *n*; or if water be forced down through the inner tube it, traveling the opposite direction from that described, will be discharged from the tube *m*, and in either case there will be a current of water preventing the insulating-gum from being heated.

The article, as it comes from the die through the bottom D, should be received into cold water to thoroughly cool it as fast as formed.

Other fluids may be used instead of water, but water is best.

The mode and means of operating is as follows: A current of water or other fluid is started through the water-courses, as described, the wire covered with the gum is entered into the inner tube through the bottom of the cup *l* and pushed down until it enters the die F. The melted metal is then poured into the recess M. The ram E is then forced down by hydraulic pressure or other sufficient force, whereupon the metal will be forced out of the chamber M through the die, and as it leaves the steel point 2 is closed around the gum, and with sufficient impingement to draw the wire down as it (the metal) advances, so that each part of the insulated wire in succession is caused to pass the point where the metal leaves the steel point 2, and is therefore at that point exposed to the action of the metal, and this, too, after the proper condition of temperature has been obtained between them.

In this process it is obvious that to subject the gum which insulates the wire to the heat which unarrested would be communicated to it from the lead through the tubes would practically destroy the gum.

The conditions and operations in reference to temperature and the method of keeping the gum at a low temperature while the lead around the outer tube, when pressed into the chamber, must be of a high temperature, and the process of disposing of the surplus caloric is as follows: The tube J, being a good conductor, when the hot lead comes into contact with it, readily and rapidly conducts caloric from the lead to the inside surface of the tube. Along this inside surface of the tube is constantly flowing the current of water, which enters cold at the end of the tube. This water receives the caloric from the inner surface of the tube J and bears it on with it to the place of exit, where it is thrown out with the waste water, and thus, to render it practicable to pass the lead hot along and against the outer surface of the tube J, and the gum to remain cold while being passed in the same direction through the tube O, a proper agent is kept traveling between the lead and the gum to intercept the caloric in its transit from the hot toward the cold body, and to carry it away without the injury which its further presence would cause.

The ram or plunger E may be operated by any power sufficient for that purpose, but hydraulic pressure is most efficient, and when this is used the ordinary hydraulic press must be adapted to and combined with the other parts described, as shown in the drawings, where H is the water-cylinder. G is the piston, with a hole through it for the tubes above described, operating upon the plunger, and for that purpose may be attached to the ram or plunger E, or the piston and plunger may be made in one piece.

I is a packing-ring bolted firmly on the lower end of the cylinder H, to form a bottom to the annular space 6 outside of the piston. This space is packed top and bottom to make it water-tight. As the tube J passes through the piston and out of the top of the cylinder H it is exposed to the water between the top of the piston and head of the cylinder H, and therefore requires to be suitably packed to make the joints water-tight. This may be done by the cup-packing, as shown in the drawings, 8 being the leather, and 9 metallic plates holding the leather by the screws 10.

The pipe *p* is to conduct the water into the cylinder H.

What I claim as my invention, and desire to secure by Letters Patent in this application, is—

Causing the metal and insulated wire to move in separate channels toward a die, where they are to be united, and preventing the gum from being heated while it and the lead advance toward the die by a current of fluid passing in a suitable vessel or vessels between the metal and gum to receive and carry off the caloric, all substantially as described.

SAMUEL C. BISHOP.

In presence of—
D. T. CASTON,
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