2 Sheets—Sheet 1.

A. K. EATON.

Process of Insulating Telegraph-Wires.

No. 225,811. **Patented Mar. 23, 1880.**

FIG. 1.

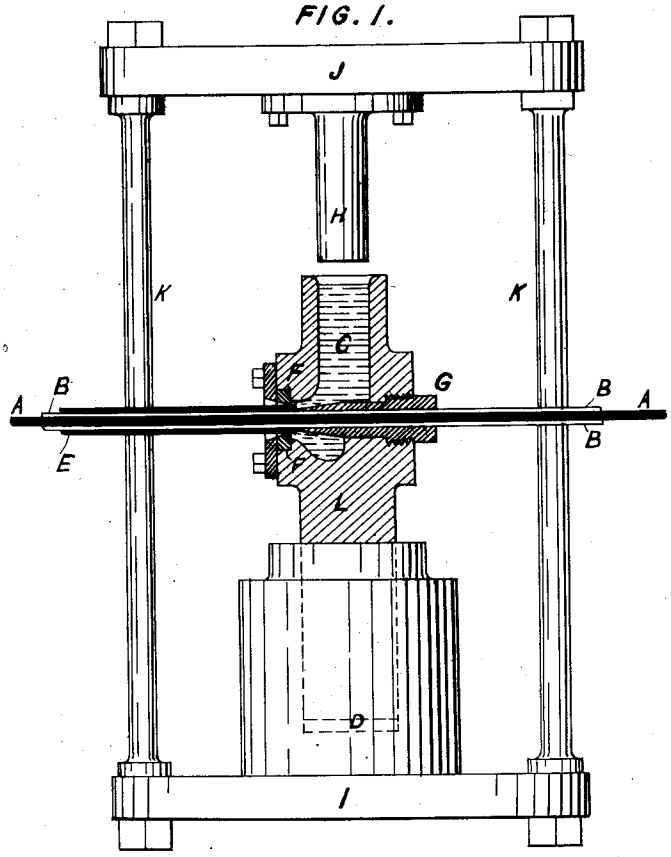
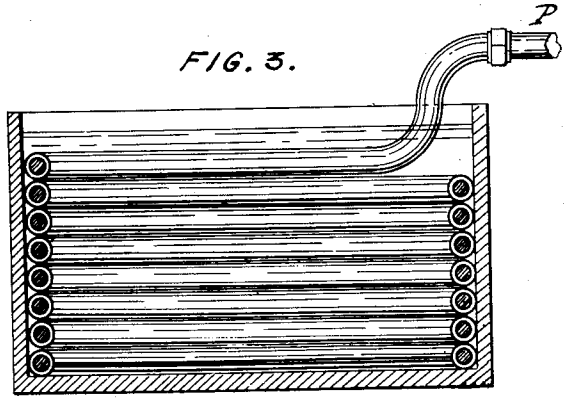


FIG. 3.



WITNESSES.

Fred. G. Dieterich

B. L. Dieterich

INVENTOR.

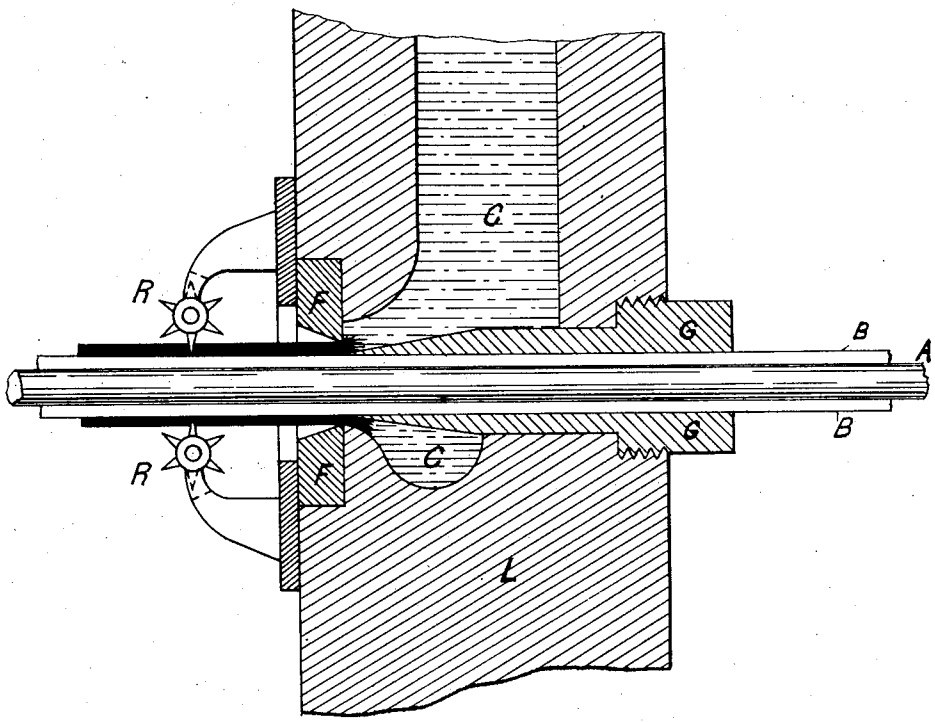
Asahel K. Eaton

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FIG. 2.



WITNESSES.

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UNITED STATES PATENT OFFICE.

ASAHEL K. EATON, OF BROOKLYN, NEW YORK.

PROCESS OF INSULATING TELEGRAPH-WIRES.

SPECIFICATION forming part of Letters Patent No. 225,811, dated March 23, 1880.

Application filed January 20, 1880.

To all whom it may concern:

Be it known that I, ASAHEL K. EATON, of the city of Brooklyn, county of Kings, and State of New York, have invented a new and useful Improvement in Telegraph-Wires and in the Method or Process of Manufacturing the Same; and I do hereby declare the following to be a description of the same in such full, clear, and concise terms as to enable any one skilled in the arts to which it appertains or with which it is most nearly connected to make and use the same, reference being had to the accompanying drawings, making part of this specification, and to the letters and figures of reference marked thereon.

This invention relates to an improvement in the manufacture and insulation of compound wires for telegraphic or telephonic purposes, by means of which I am enabled to produce such wires of any required length and of any desired degree of insulation.

My invention consists of a process involving several steps: first, of flocking a wire of copper or other metal with asbestus or other equivalent non-combustible material; second, by means of a lead-press, of covering the flocked wire with a sheathing of lead or its equivalent; third, of subsequently filling the interstices of the flocking material with a proper insulating substance.

To effect this end and overcome the difficulties hitherto encountered, I have adopted the following method or process for manufacturing the compound insulated wire:

Reference being had to the drawings, let L, Figure 1, represent the ram of a hydraulic press, in which is made a retaining-cylinder, C, in the bottom of which a tubular nipple, G, is fitted over or opposite a die, F. The nipple G is set transverse the axis of the retaining-cylinder and enters the die F, leaving an annular space between the die and the end of the nipple, through which the lead issues in the form of a tube, E. Now, let the wire A be covered with a coating of spongy flocking of some non-inflammable spongy or fibrous material, such as asbestus, mineral wool, spun glass, or some good and well-known substitute for this purpose, as indicated in the drawings by B, and let the covering be just thick enough to fill the hole in the nipple G, and just hard enough to carry the weight of the wire and hold it in the center of the hole, and let this spongy or fibrous covering be as porous as possible. Now let the wire be inserted into the nipple and the cylinder C filled with lead and kept hot enough to maintain it in a half-fluid condition, and let power be applied to the ram L to force the cylinder upon the plunger H.

By these means the lead will issue through the die in the form of a tube, as shown by E, in size equal to the small end of the nipple, which should be small enough to make the lead tube bear hard enough on the spongy covering to carry the wire forward as fast as the tube is forced out of the die, but not hard enough to compress the coating upon the wire, for the object is to get the coated wire in the center of the sheathing-tube without compressing it, but in as loose and porous condition as possible. If, therefore, it is found that making the tube small enough to take the covered wire and carry it forward as it issues from the press compresses the coating too much, some other means well known to the arts, of which there are many, can be adopted to carry the wire forward as fast as the sheathing issues from the die.

The wire is now coated and incased, but only partially insulated.

To complete the insulation and the wire as a whole, let a compound be made of paraffine, gutta-percha, india-rubber, and rosin in the proportion of about seventy-five of paraffine, ten of gutta-percha, ten of caoutchouc, and five of rosin. Let this compound be heated to at least 450° of Fahrenheit's thermometer to thoroughly expel any moisture that may be in the coating, and let the wire be immersed in the liquid compound, as at Fig. 3. Now let the receiving-tube of an exhausting air-pump, as shown by P, Fig. 3, be applied to one end of wire thus immersed, and the hot liquid compound drawn or forced between and into the pores of the fibrous or spongy coating between the wire and the sheathing, by which, upon the cooling of the compound, the wire will be perfectly insulated with a flexible elastic coating proof against ordinary changes of temperature, and capable of resisting and maintaining in insulation currents of electricity of as high

I have described what I conceive to be the best method of filling the fibrous or spongy coating with the insulating material; but in case the spongy coating be sufficiently open and porous the pump can be dispensed with, as the hot liquid compound will run into and through the spongy coating without the aid of the pump, and especially if the sheathing be perforated to allow the liquid to enter.

The sheathing can be readily perforated as it issues from the press by perforating disks or rollers applied to the press around the die, as shown by R in the drawings, Fig. 2.

The spongy or fibrous coating may be applied to the wire in any of the well-known ways of covering wire, either by flocking, winding, or braiding. A good way to flock it is to first cover the wire with a silicate of soda, and then apply the flocking by passing the wire through it, or by any of the well-known means of flocking.

The apparatus shown by the drawings is intended to illustrate a practical machine to be used in the practice of the method or process; but it is not intended to confine the patent to this form of apparatus.

Fig. 2 of the drawings shows a section of the wire, the dies, and nipple upon an enlarged scale.

It is easy to produce short lengths of lead-sheathed insulated wires; but when it is required, as is the case in the present advanced state of the art of telegraphy, to produce continuous wires of very great length and the most thorough insulation, the difficulties increase in a great ratio. In attempting to introduce the insulating material during the process of manufacture, I find that, owing to the presence of air and moisture in the flocking, the space between the wire and the sheathing is not filled solidly by the insulating material, but cavities are of frequent occurrence, that break more or less the continuity of the filling, and diminish, or in some cases quite destroy, the insulation.

By this method it will be seen that the hot insulating compound enters only at the lower end of the sheathed wire, gradually driving before it all air and moisture, and expelling it through the other end, which is not immersed in the melted material. It is the only method by which I have been able to thoroughly exclude air and moisture and secure a solid, unbroken inner filling of insulated material.

What I claim as my invention is—

The process of manufacturing continuous lengths of incased insulated conductors, consisting, first, in covering a copper or other wire with a loose envelope of non-combustible porous material; second, in forming around such covered conductor a sheathing of lead or other ductile metal; and, third, in filling the interstices between the conductor and the sheathing, after the sheathed wire comes from the press, with a hot insulating material under pressure, substantially in the manner set forth.

ASAHEL K. EATON.

Witnesses:
FRED. G. DIETERICH,
JOHN M. KESSLER.