(No Model.)

J. E. WALCOTT.

METHOD OF AND APPARATUS FOR COVERING ELECTRIC WIRES.

No. 450,839. Patented Apr. 21, 1891.

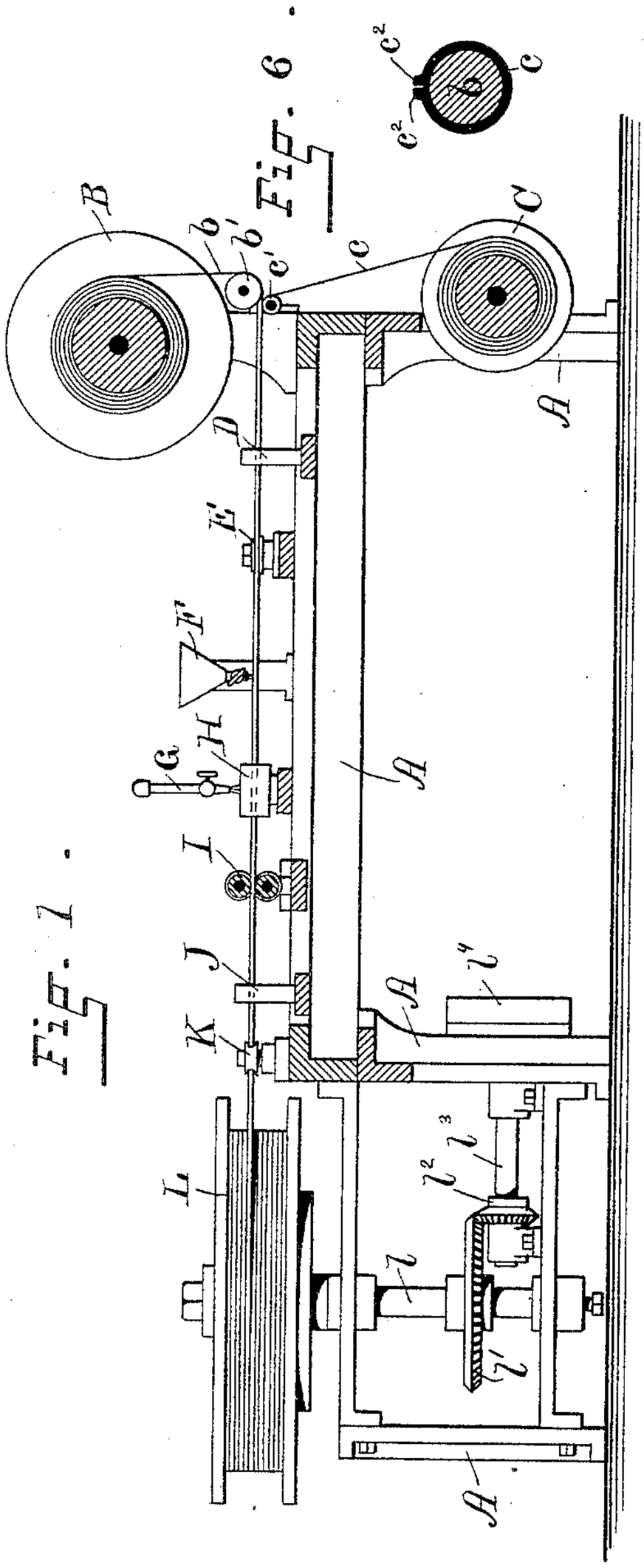

Fig. 1.

Fig. 6.

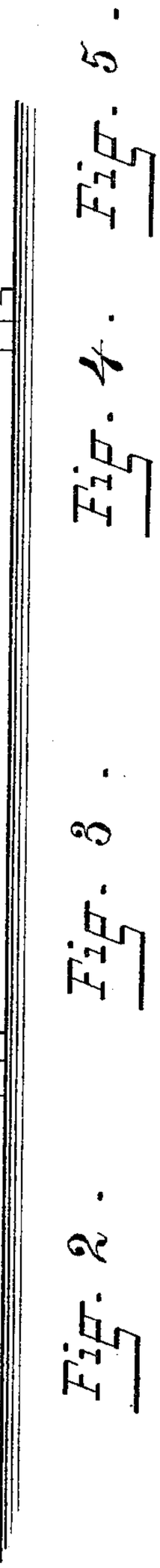

Fig. 5.

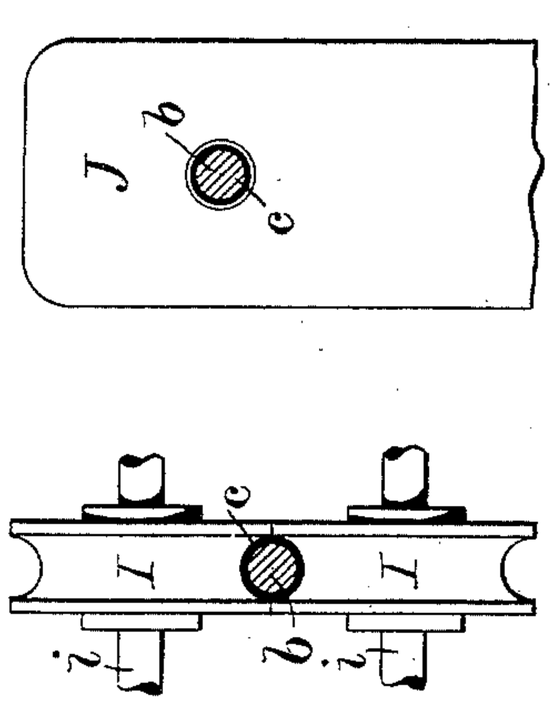

Fig. 4.

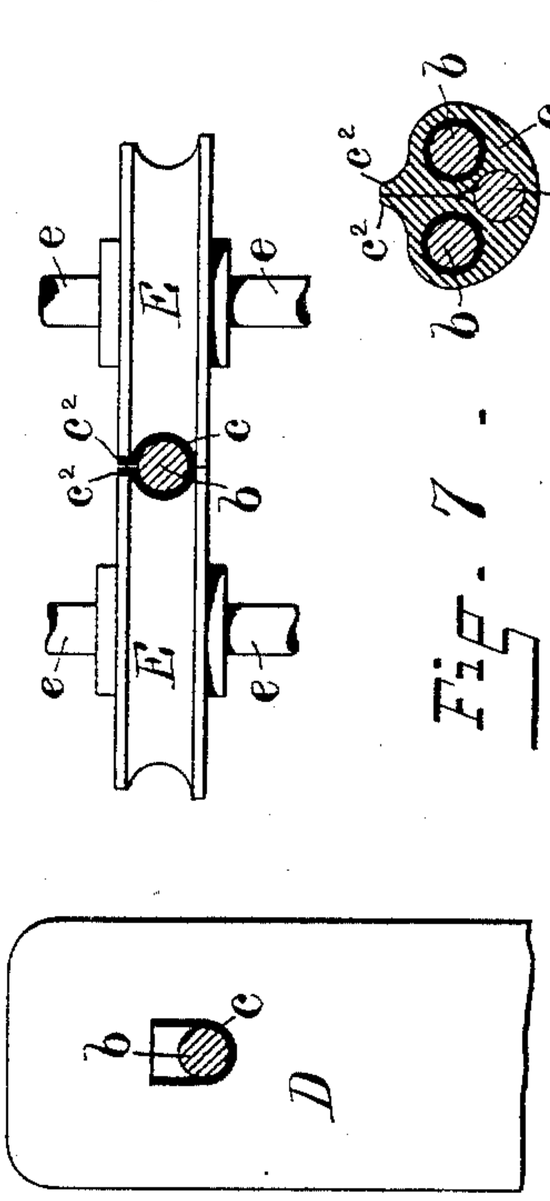

Fig. 2.

Fig. 3.

Fig. 7.

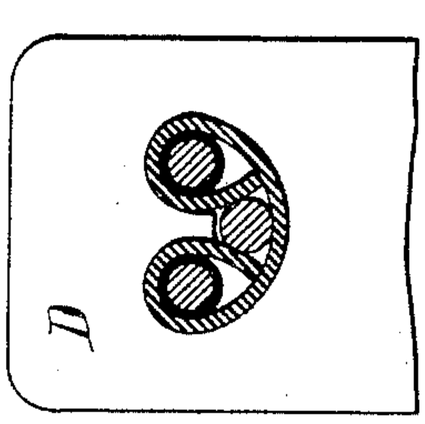

Fig. 2ª.

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JABEZ E. WALCOTT, OF PROVIDENCE, RHODE ISLAND.

METHOD OF AND APPARATUS FOR COVERING ELECTRIC WIRES.

SPECIFICATION forming part of Letters Patent No. 450,839, dated April 21, 1891.

Application filed September 30, 1884. Serial No. 144,344. (No model.)

To all whom it may concern:

Be it known that I, JABEZ E. WALCOTT, of the city and county of Providence, and State of Rhode Island, have invented an Improved Method of and Apparatus for Covering Electric Wires, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to the protecting covers or sheaths of insulated or non-insulated electric conductors; and the object of my invention is to produce by means of a rapid and continuous method an improved form of covering or sheath which shall perfectly incase the wire or wires and which shall be capable of enduring without detriment all of the strains, including handling, coiling, and suspension, to which this class of structures is subjected.

To this purpose my invention consists in the peculiar and novel method of covering the wire or wires, and also in the peculiar and novel apparatus for carrying said method into effect, as hereinafter described and claimed.

In order that my invention may be fully understood, I will proceed to describe it with reference to the accompanying drawings, in which—

Figure 1 is a side elevation of my improved apparatus. Fig. 2 is a front elevation of the forming die-plate used in covering a single wire. Fig. 2ª is a similar view of the die-plate used in covering three wires. Fig. 3 is a detached view of the rolls for inclosing the wire in the sheath and for forming the uniting-lips. Fig. 4 is a similar view of the finishing-rolls. Fig. 5 is a front elevation of the finishing die-plate used in covering the wire or wires. Fig. 6 is a detached sectional view of the wire as it emerges from the rolls shown in Fig. 3. Fig. 7 is a similar view of the three wires as they emerge from said rolls.

Before entering into a detailed description of my new method and apparatus for carrying said method into effect I would state that my method is based upon a certain property of lead or of the composition of lead and tin, or of any other soft metal which is capable of being laid around one or more wires to form a sheet-armor, my improved sheath or covering being formed of either of such metals or compositions. The property referred to is that of uniting homogeneously upon the simple application of heat, such unison being not only homogeneous, but strong, durable, and not readily apparent after the substance has been so treated. Thus, if two contiguous surfaces of lead or other soft metal be subjected to the action of a fusing heat, such surfaces will unite so perfectly that the mass will possess a perfectly-homogeneous character, and such united surfaces will not only resist all wear as a single surface, but all traces of their previous divided character will be completely obliterated. Great difficulty has been experienced in adapting lead or similar metal to such use.

Heretofore metal has been applied to the wire or wires in the form of a strip or ribbon, the meeting edges of which have been laid either spirally around or parallel to the axis of the wire, and in either case such edges have been united by solder. Practical observation and experience prove that the sheath thus formed is seriously deficient both in lasting properties and in resisting the strains incident to handling and coiling and uncoiling. This serious defect is due to the fact that the soldered union of the contiguous edges of the strip destroys the homogeneous character of the covering, and consequently the sheath is extremely liable to become ruptured or perforated at the points of such union.

Now my improved method consists, essentially, in forming this union of the same substance as that of which the sheath is formed, whereby I secure perfect homogeneousness in the sheath. To this purpose I form a raised lip upon each contiguous margin of the strip and then "burn" or fuse these lips together, the result being that the sheath has apparently and in reality all of the appearances and properties of an integral envelope. There are certain subordinate steps in perfecting my method, to wit: a preliminary bending and rolling of the strip, the use of tallow previous to the "burning," or fusion of the joint and the finishing of the joint. The result of my improved method is that the sheath is as fin-

ished in appearance and as capable of resisting rupture or perforation and strain as a solid cylindrical mass or bar.

I will now proceed to describe the apparatus whereby my improved method is carried into effect.

The operative parts, hereinafter described, are mounted upon a table or frame A, which may be of any suitable or preferred form, capable of properly supporting said parts. Above this table and at one end thereof is placed a drum or reel B, upon which the wire or wires *b* are wound, such wire being either covered with a suitable non-conducting coating, or naked, as desired. Below this table and at the same end upon which the drum B is mounted is placed the reel or drum C, upon which the strip of lead or other soft metal *c* is wound. The wire or wires and the metal strip pass from the drums B C to a drum L, which is located at the opposite end of the frame. The covered wire in finished condition is wound upon the drum L, which is revolved by suitable gearing—as, for instance, the beveled gear l', mounted on the shaft *l*, which carries the drum, and the beveled pinion l^2, mounted on the shaft l^3, which is driven by a pulley l^4, by means of which motion is imparted to the gearing through a driving-belt from a suitable motor. The drum L exerts the requisite tension upon the wire and metal strip and feeds them properly through the machine. As the wire or wires and metal strip pass through the machine, the strip is acted upon successively by the forming die-plate D, the forming-rolls E, the reservoir F, the blow-pipe G, and chamber H, the covering-rolls I, and the finishing die-plate J, after which the covered wire is guided by the guiding-pulleys K to the winding-drum L.

I will now particularly describe each of the devices which are interposed between the drums B C and the drum L, arranging such description in the order in which said devices act. The wire *b* from the upper drum B passes under the pulley b', while the metal strip *c* from the drum C passes over the pulley c', and from thence the wire and strip pass, the former above the latter, in parallel lines to the forming die-plate D. The die-plate D is placed upright upon the frame A and contains an aperture through which the wire and strip pass, during which passage the strip is folded partially around the wire. As shown in Fig. 2, this aperture is U-shaped, and a die-plate with this form of aperture is used when the sheath is applied to a single wire. In this instance the strip *c* is bent up into U form, so as to partially inclose the wire *b*, as is clearly shown in Fig. 2.

In Fig. 2^a the die-plate aperture is of a peculiar form, by means of which three wires are partially covered, and it is to be understood that my invention contemplates the covering of one or any desired number of wires, the form of the apertures in the die-plate being such in any given instance as to properly prepare the covering for the action of the next successive device.

The wire or wires and the strip pass from the forming die-plate D to the forming-rolls E. (Shown in Figs. 1 and 3.) These rolls are peripherally grooved and are mounted horizontally upon the frame A in any suitable manner—as, for instance, upon the axles *e e*, as shown in Fig. 3. The lower flanges of the rolls E come into contact, while their upper flanges, being of less diameter, are separated sufficiently to permit the margins of the strip *c* to pass between them. The thickness of the rolls E being less than half of the width of the strip *c* when bent by the die-plate D produces the upturned, continuous, and parallel lips c^2 c^2 upon the upper side of the strip, and the grooves of the rolls E serve to bend the strip almost completely around the wire, there being but a slight degree of separation between the lips c^2 c^2, as is shown in Fig. 3. It will be readily perceived that a similar result will be produced by the rolls E when three wires (or more than one wire) are being operated upon, as is shown in Fig. 7. The wire or wires and the strip now pass from the rolls E beneath a reservoir F, which may be provided with a cock or valve to regulate the discharge of the contents. This reservoir contains tallow which is caused to flow down upon the two lips c^2 c^2 as the strip and wire or wires are fed along the machine. From the reservoir F the wire or wires and strip pass to the blow-pipe G and burning-chamber H, where the two lips c^2 c^2 are burned or melted down. The pipe G is shown as a hydrogen blow-pipe, and is placed in inverted position above the chamber H, into which the flame from said pipe is blown. The chamber H is made of fire-brick or any other substance which is adapted to withstand the action of intense heat. The precise form of this chamber may be of any such character as will permit of the free passage of the wire or wires and the strip, and concentrate the heat from the flame within itself and upon the lips of the strip. It is also important to observe that any suitable device other than the blow-pipe may be used to produce the requisite heat for application to the lips c^2 c^2. After being acted upon by the blow-pipe flame or other heating agent the wire or wires and the strip pass from the chamber H to the covering-rolls I I. (Shown in Figs. 1 and 4.) These rolls are mounted vertically one above the other upon the frame and have horizontal axles *i i*, through the medium of which said rolls are driven. The peripheries of these rolls are grooved and the flanges at the margins of said grooves are maintained always in contact, so that as the wire or wires and the strip enter between the rolls the lips c^2 c^2, which are in a soft condition, are rolled down flush with the external surface of the strip, and the latter is thus converted from a bent strip to a complete sheath or covering. These rolls not only roll down the lips c^2 c^2, but cause said lips to

perfectly unite, so that almost all traces of the lips are obliterated and the character of the sheath is as perfectly homogeneous as though said sheath were an integral tube. The tallow which was previously applied to the lips serves to insure this perfect union. After the operation of the rolls I I it only remains to finish the sheath. For this purpose the wire or wires and the sheath pass through the finishing die-plate J. (Shown in Figs. 1 and 5.) This die-plate has a circular aperture, in passing through which the outer surface of the sheath is properly finished and all traces of the joint thereof are perfectly obliterated. Fig. 5 shows the die-plate for finishing single-wire cables, and the only difference between this and the plate for finishing double or treble wire cables is in the increased size of the aperture. From the plate J the cable passes between the guiding-sheaves K and thence to the drum L.

I have not shown any devices for driving the rolls E I, nor for conducting the fuel to the pipe G, as such devices may be readily arranged by any one skilled in such matters. Thus it will be seen that the method and apparatus are simple and produce rapidly and by continuous steps a sheath or covering which is entirely free from the serious defects heretofore found in such coverings.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. An improved method of covering wire with sheet metal, the same consisting in bending the strip around the wire or wires and forming lips or raised edges upon said strip and then burning said edges together, substantially as and for the purposes specified.

2. An improved method of forming covers or sheaths for wires, the same consisting in bending a soft-metal strip partially around the wire or wires and forming raised edges or lips thereon, then burning or fusing said lips, and finally rolling down said fused lips, as set forth.

3. An improved apparatus for forming soft-metal covers or sheaths for wires, consisting of a forming die-plate for bending the strip partially around the wire or wires, a pair of rolls for forming raised edges or lips upon said strip, a heater for burning down said edges, and a pair of rolls for depressing said burned edges, substantially as described.

4. The combination, with a suitable frame carrying the drums B, C, and L, of the forming die-plate D, the forming-rolls E, the reservoir F, the pipe G and chamber H, the covering-rolls I, the finishing die-plate J, and the guiding-sheaves K, all constructed and arranged to operate substantially as described.

In witness whereof I have hereunto set my hand.

JABEZ E. WALCOTT.

Witnesses:
JOSEPH A. MILLER, Jr.,
M. F. BLIGH.