

(No Model.)

E. D. McCracken.  
INSULATED ELECTRIC CONDUCTOR.

No. 454,060.

Patented June 16, 1891.

Fig. 1.

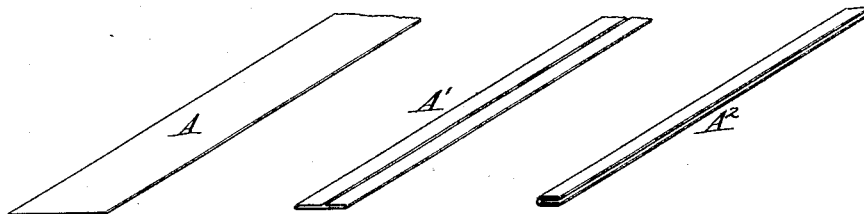


Fig. 2.

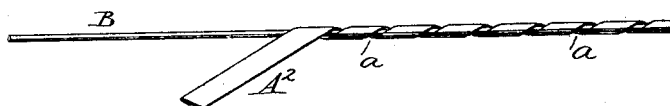


Fig. 3.

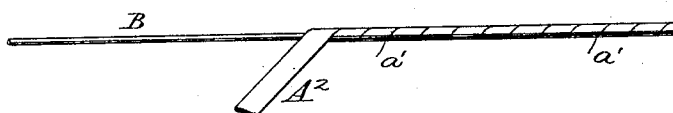


Fig. 4.

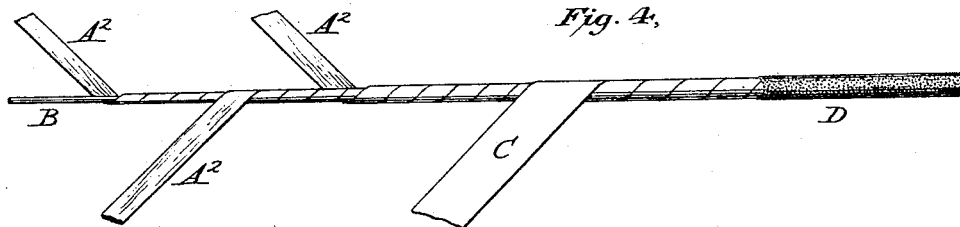
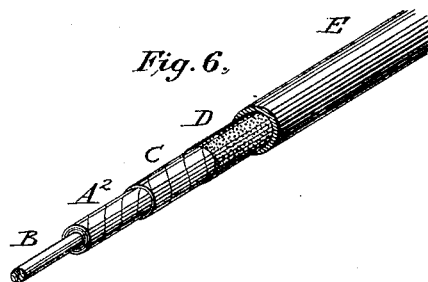


Fig. 5.



Fig. 6.



Witnesses  
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# UNITED STATES PATENT OFFICE.

EDWIN D. MCCrackEN, OF ALPINE, NEW JERSEY, ASSIGNOR TO THE  
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## INSULATED ELECTRIC CONDUCTOR.

SPECIFICATION forming part of Letters Patent No. 454,060, dated June 16, 1891.

Application filed March 5, 1891. Serial No. 383,860. (No model.)

*To all whom it may concern:*

Be it known that I, EDWIN DODD McCrackEN, a citizen of the United States, residing at Alpine, in the State of New Jersey,

5 have invented certain new and useful Improvements in Insulated Electrical Conductors, of which the following is a specification. My invention relates to that class of insulated conductors in which ribbons of paper

10 are wound spirally thereon.

The object of the invention is twofold. When plain flat ribbons of paper are wound spirally around the electrical conductors, it is necessary that a comparatively high speed of operation should be attained, and although the machinery may be of the most approved pattern and constructed in the best manner the ribbons of paper are so deficient in tensile strength that they frequently break and the

20 time spent in repairing the ribbons, stopping and starting the machine materially reduces the output and correspondingly increases the cost of manufacture. This is one of the difficulties which my invention is designed to obviate. In some cases it is desired to wind the paper ribbons around relatively small conductors—such as are used for telephone purposes—in such manner as to leave an open spiral space

30 between the adjacent spiral edges of the ribbon. A flat paper ribbon sufficiently narrow to permit of this being done would have so little tensile strength that it would be impossible to apply it to the conductor by means of any machinery of which I am aware.

Another object of my invention is to permit the application of paper ribbons to a small conductor in the manner just described.

To accomplish the objects of my invention, 40 I fold the paper ribbons longitudinally, either two or more times, so as to give two, three, four, or more thicknesses of paper. This materially increases the tensile strength, since there are then no exposed edges liable to rupture. The paper ribbon may be folded a sufficient number of times to reduce it to the desired width.

In the accompanying drawings, Figure 1 indicates a flat and folded ribbon. Fig. 2 shows the application of a folded ribbon to an electrical conductor, and Figs. 3 and 4 are similar

views. Fig. 5 is a cross-section of a cable of such insulated conductors, and Fig. 6 a perspective view of the end of a conductor insulated according to my invention.

55 A indicates a flat ribbon of paper of any suitable width. At A' this ribbon is shown folded inwardly from each edge, and at A<sup>2</sup> the ribbon is again folded on the line of the edges of the ribbon, as seen at A'. The paper 60 may be folded in any other manner and any desired number of times, this depending upon the width of the ribbon and the narrowness to which the folded ribbon is to be reduced. Thus, if the ribbon A is of sufficient width, it 65 may be folded two or more times and yet be of such width when folded as to permit of its application to electrical conductors in the manner now commonly practiced—namely, by winding the ribbon around the conductor 70 in overlapping spirals. Obviously the tensile strength of such a multiple layer ribbon is far in excess of the ribbon when unfolded. It may therefore be wound around the conductor more firmly and rapidly and with less liability of rupture and consequent stoppage 75 of machinery.

B indicates an electrical conductor. In Fig. 2 a folded ribbon A<sup>2</sup> is shown as wound thereon in such manner as to leave an open 80 spiral space between its adjacent edges, as indicated at *a*. As shown in Fig. 3, such a ribbon may be wound upon the conductor with its adjacent edges abutting, as indicated at *a'*. In Fig. 4 I have shown three folded 85 ribbons A<sup>2</sup>, of successively greater width, wound one over the other, so as to break joints. If these ribbons are of the character shown at A' when three ribbons are applied, as in Fig. 4, six thicknesses of paper will have 90 been placed around the wire; or, if each ribbon be composed of four thicknesses of paper, as shown at A<sup>2</sup>, Fig. 1, twelve layers of paper will have been wound around the conductor. The number of layers of paper and the thickness 95 of the insulation depends, of course, upon the size of the conductor and the purpose for which it is intended.

Outside of the insulation thus far described I may wind a flat ribbon C of a single thick- 100 ness of paper wound in overlapping spirals, and, if desired, this winding may be coated

with a waterproofing, sealing, and insulating compound, as indicated by D. Where the insulated conductors are laid up into a cable they may be enveloped by an exterior lead sheath E, as usual, or a single conductor may be insulated in the manner described and covered with a lead sheath E, as shown in Fig. 6.

The paper ribbons may be folded in the manner described by being passed through suitable folding-dies as the ribbons are drawn from their bobbins and passed to the conductor around which they are being wound; or they may be previously folded and wound upon bobbins in the same manner that the ordinary flat ribbon is.

A very important feature incident to this method of insulation is that between the layers of paper there necessarily exists air-spaces. As is well known, the presence of such spaces materially improves telephone-conductors in that their static capacity is reduced.

I claim as my invention—

1. The combination of an electrical conductor and an insulating-ribbon of paper

folded longitudinally and having therefore multiple layers applied thereto.

2. An electrical conductor having wound thereon an insulating-ribbon of paper folded longitudinally, substantially as described.

3. An electrical conductor having wound thereon in an open spiral an insulating-ribbon of paper folded longitudinally, substantially as set forth.

4. The combination of an electrical conductor having wound spirally thereon two or more insulating-ribbons composed of paper folded longitudinally, successive windings of the ribbons breaking joint with the preceding winding.

5. The combination of an electrical conductor, one or more insulating-ribbons composed of longitudinally-folded paper and having therefore multiple layers, and a lead sheath enveloping such insulation.

In testimony whereof I have hereunto subscribed my name.

EDWIN D. MCCrackEN.

Witnesses:

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EDWARD C. DAVIDSON.