

(No Model.)

2 Sheets—Sheet 1.

E. D. McCracken.
ELECTRIC CONDUCTOR.

No. 459,378.

Patented Sept. 8, 1891.

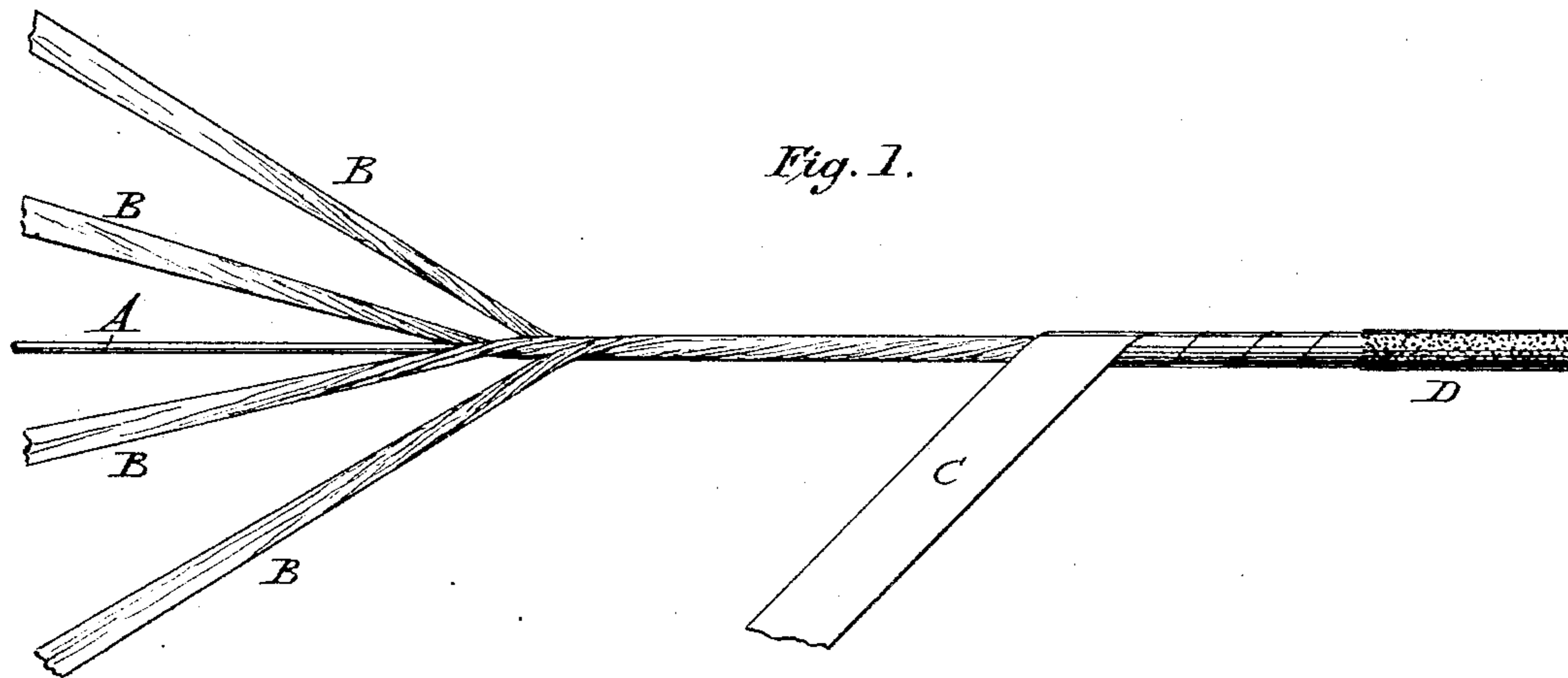


Fig. 2

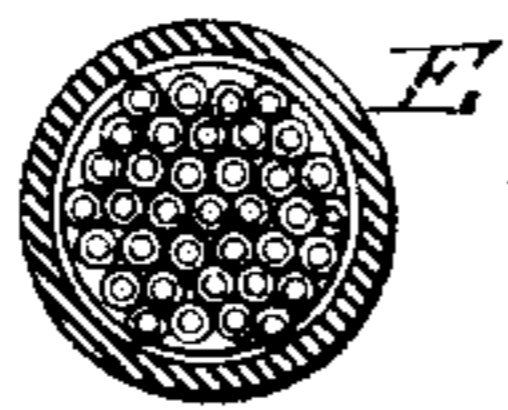
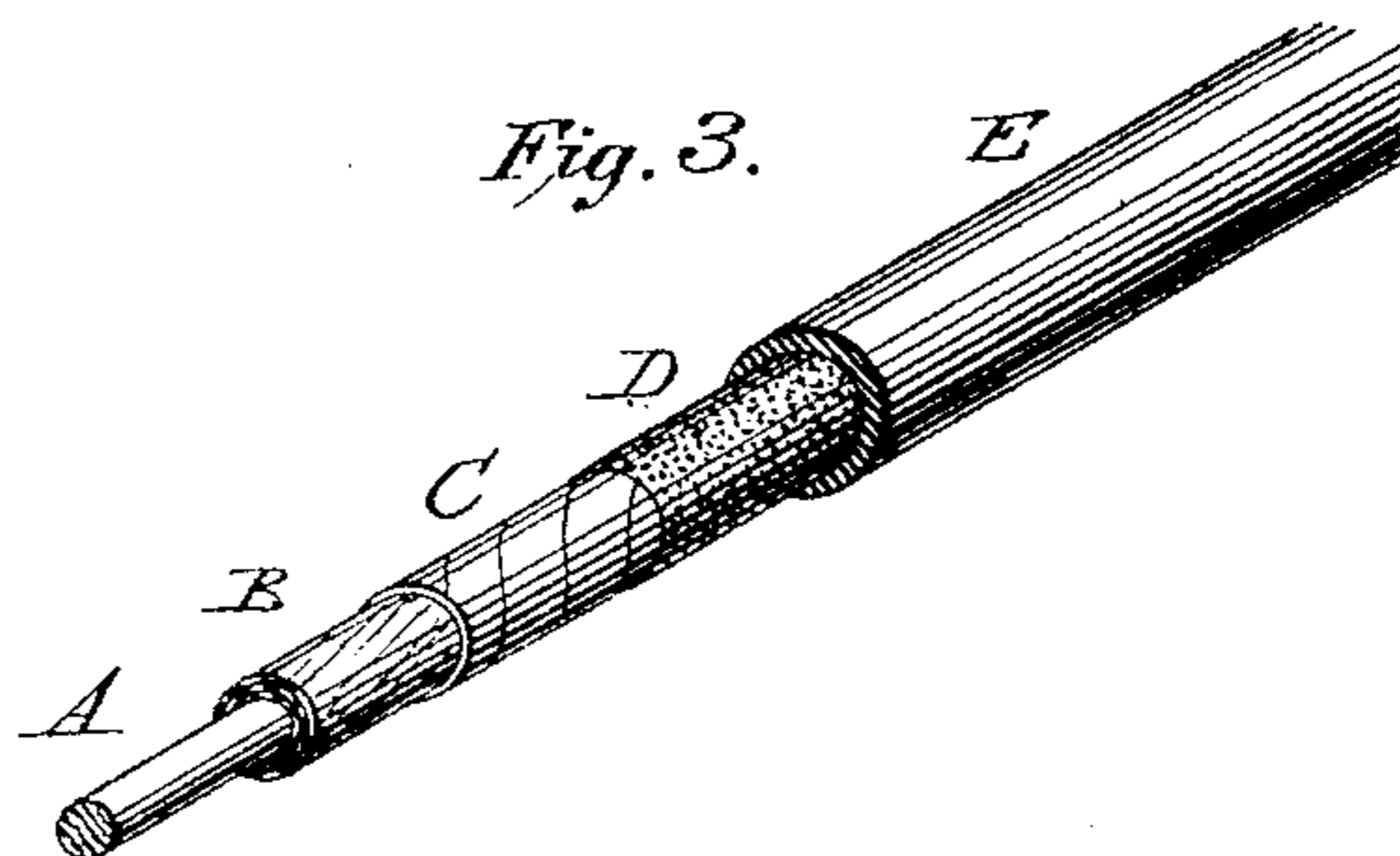


Fig. 3.



Witnesses
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By his Attorneys
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Fig. 4.

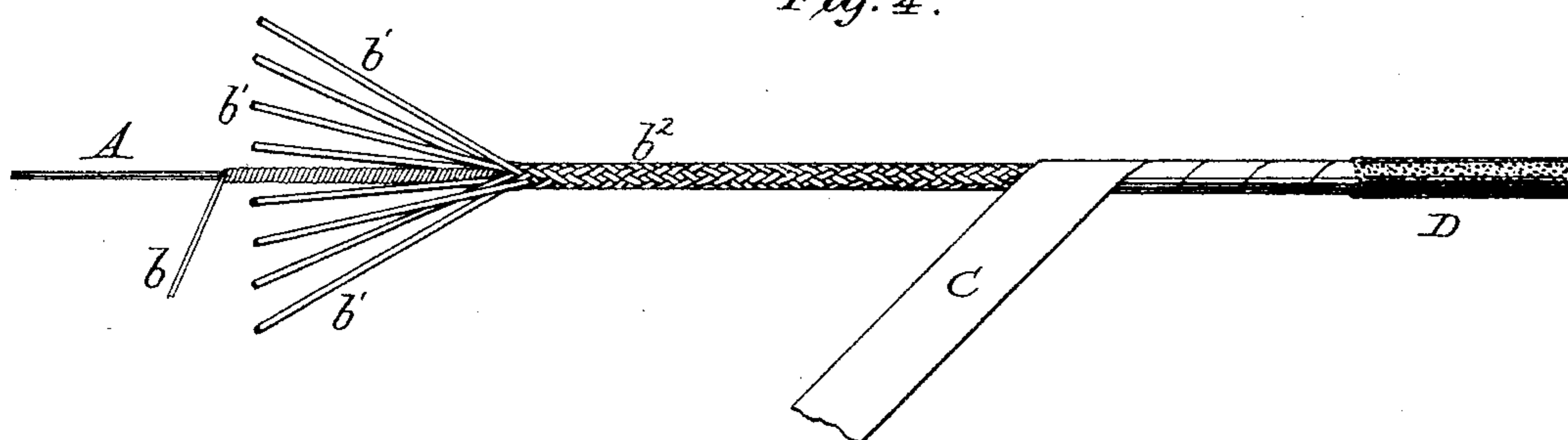


Fig. 5.

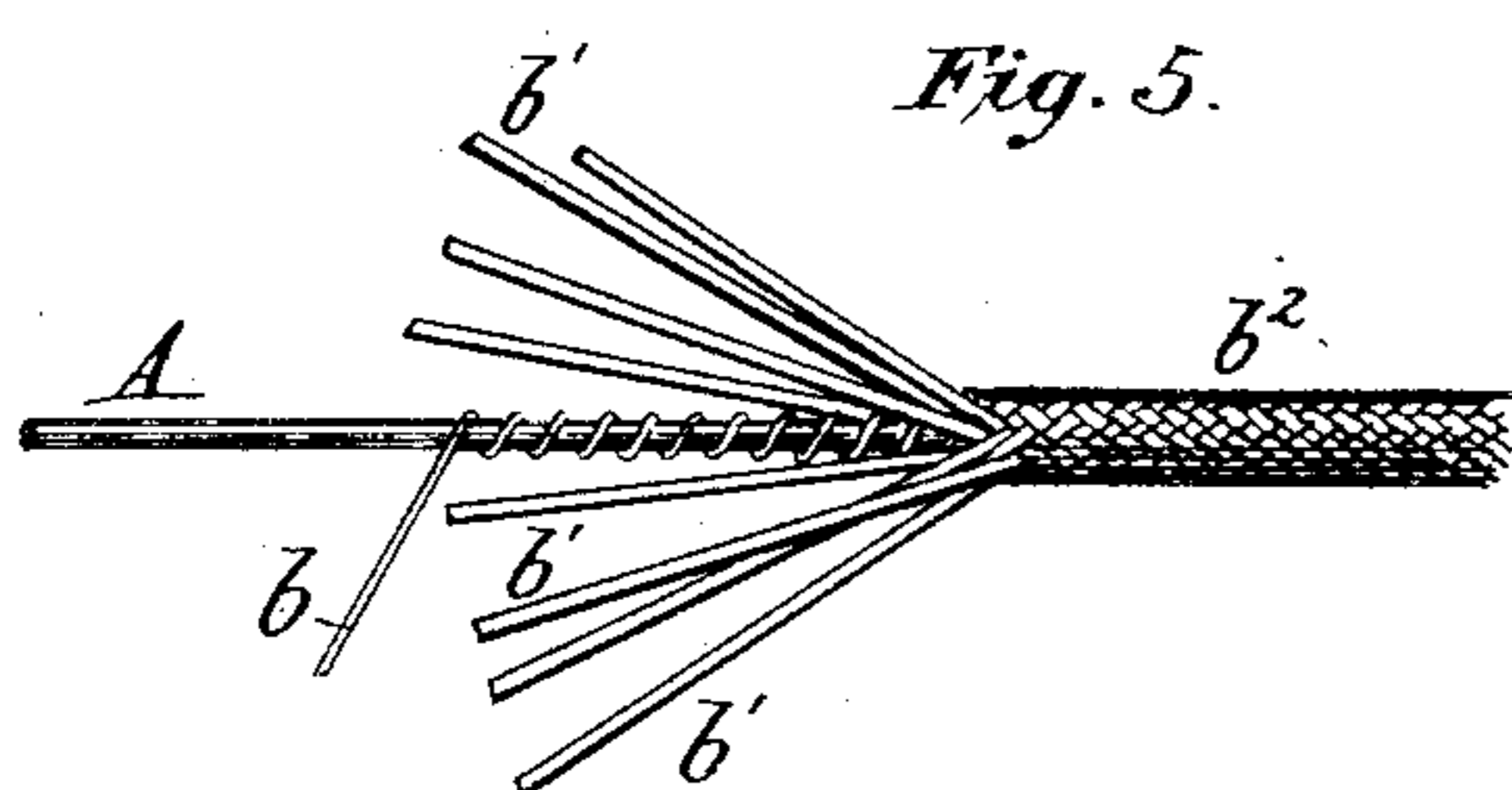
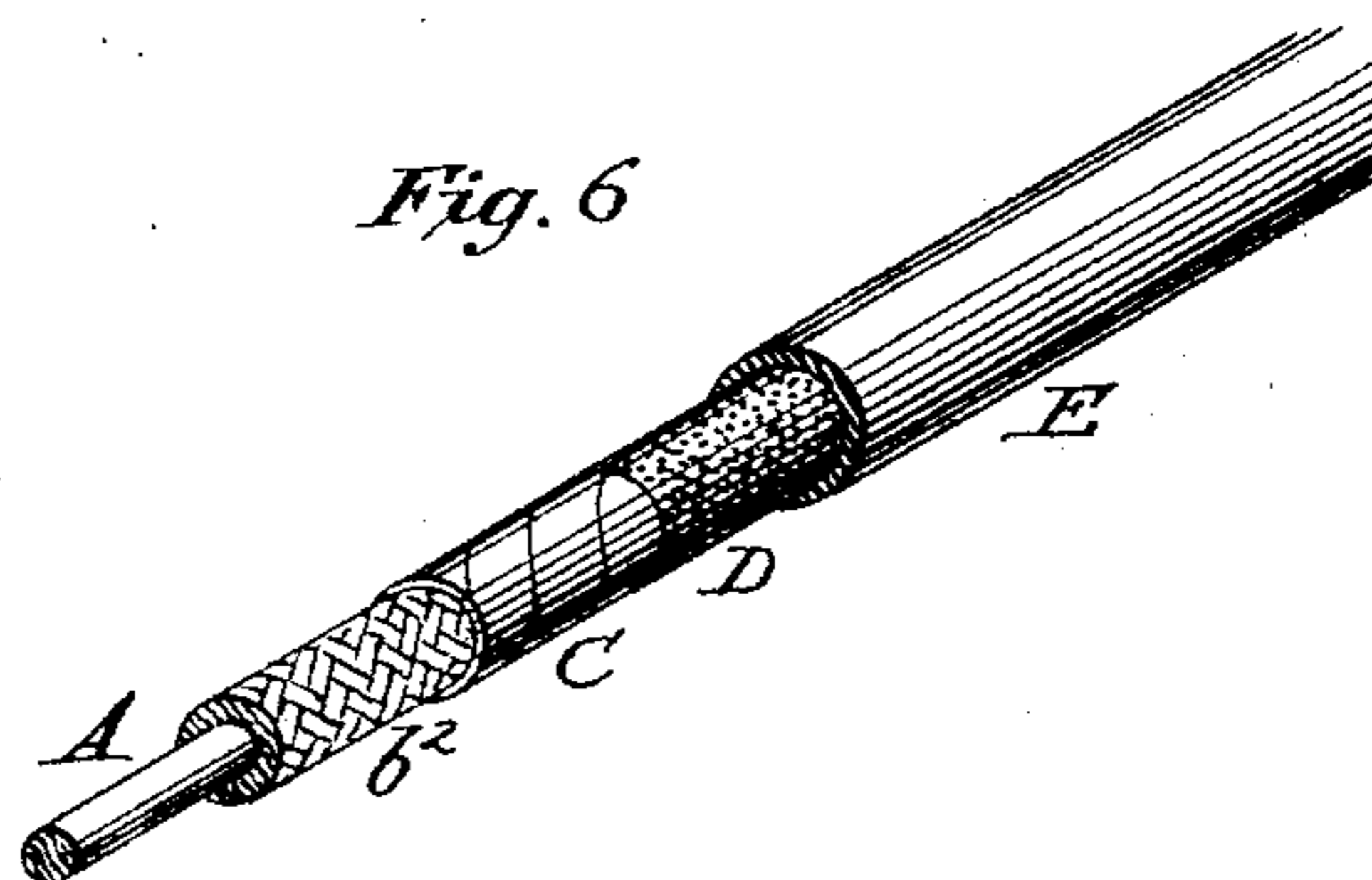


Fig. 6.



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UNITED STATES PATENT OFFICE.

EDWIN D. McCracken, of ALPINE, NEW JERSEY, ASSIGNOR TO THE
NORWICH INSULATED WIRE COMPANY, OF NEW YORK, N. Y.

ELECTRIC CONDUCTOR.

SPECIFICATION forming part of Letters Patent No. 459,378, dated September 8, 1891.

Application filed March 5, 1891. Serial No. 383,862. (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 county of Bergen and State of New Jersey, have invented certain new and useful Improvements in Paper-Insulated Electrical Conductors and in the Method of Applying the Insulation, of which the following is a specification.

My invention relates primarily to that class of insulated conductors in which paper applied in the form of a ribbon constitutes the insulating material.

The object of this part of my invention is to improve such insulated conductors, more especially those used for telephonic purposes, by applying the insulating-paper in such a manner as to leave a number of air-spaces throughout the insulation; to so apply the paper to the wire as to permit of an increased speed of working, thereby reducing cost, and to so manipulate or treat the paper before its application to the conductor that its tensile strength will be increased and liability of breakage and consequent stoppage of machinery reduced. These ends I accomplish by twisting the ribbons of paper and then spirally winding them around the conductor. By preference the paper ribbons are dampened, so that they have more or less elasticity and may be readily twisted into the preferred loose rove-like condition. This may be accomplished by any suitable machinery, and the means of performing the operation described form no part of my invention.

The next part of my invention consists in first dampening paper insulation to be applied to a conductor, then winding it on or otherwise applying it to the conductor in any desired manner, and then drying the insulation, whereby it is caused to contract and take a firm hold upon the conductor.

In the accompanying drawings, Figure 1 is a view of a section of electrical conductor insulated according to my invention; Fig. 2, a cross-section of a cable of such insulated conductors; Fig. 3, a perspective sectional view showing the end of an insulated electric-light or power conductor. Fig. 4 is a view showing the paper insulation applied in the form of a cord; Fig. 5, a similar view, the applica-

tion of the cord being slightly modified; and Fig. 6, a perspective view of the end of a conductor provided with such paper-cord insulation.

Referring first to Figs. 1, 2, and 3, A indicates the electrical conductor, and B a series of paper ribbons—four being shown—applied thereto. As stated, these ribbons are preferably dampened and are loosely twisted, as indicated in the drawings, before being wound around the conductor. The twisting is preferably not carried to such an extent as to form a hard paper cord, but is, on the contrary, only carried sufficiently far to form a loose twisted body. The conductor thus insulated would by preference and as is commonly practiced be passed through a die to more or less compact the paper upon the wire and give it a uniform cross-section. The twisting of the paper materially increases the tensile strength of the ribbon, and liability of breakage is therefore reduced. In the subsequent drying of the insulation the paper will contract more or less; but this is in some respects an advantage, as it causes the paper to take a firm hold of the central conductor. The paper being applied more or less loosely for the purpose of providing air-spaces, and being pressed into position by the die, the different ribbons or twists are more or less interlocked, and when dry tend to remain in position around the conductor and do not readily become disengaged therefrom when the wire is cut, so as to leave a free end. As is well understood the object sought in providing the air-spaces is to reduce the inductive capacity of the insulated conductor, this being specially desirable in cables of telephone-conductors.

To complete the insulation thus far described I prefer to wind a flat untwisted ribbon of paper around it in overlapping spirals, as indicated by C. The conductor may then be passed through a bath of insulating, sealing, and waterproofing compound, (indicated by D.) Where the wires are laid up in cables, the individual wires may be first so treated, or the bundle or cable of wires may be passed through the insulating compound.

Where the insulation is applied to an electric-light or power conductor, a lead sheath E

may be placed around it. Such a conductor is indicated in Fig. 3. The more or less loosely-twisted paper insulation is indicated at D. The exterior flat ribbon covering is shown at C, the insulating compound at D, and the lead sheath at E. A lead sheath would also by preference be placed around the cable of conductors, as indicated in Fig. 2.

In Fig. 4 I have shown the paper insulation applied in the form of a paper cord—that is to say, the twisting is carried to such an extent as to form a comparatively hard body or cord. The cord *b* may be wound around the conductor in a closed or solid spiral, as in this figure, or in an open spiral, as seen in Fig. 5, and over that winding a series of paper cords *b'* may be braided, as at *b*². I apply the spiral winding first in cases where the conductor is too small to properly receive the braiding, and also in cases where it is desired to provide air-spaces. In Fig. 6, the wire *A* being larger, the paper is braided directly thereon. This paper insulation, however applied, is first dampened, and the covered wire is subsequently dried, and in drying the paper by its contraction draws down tight upon the wire. Further, the paper being damp in passing through the dies it is readily compacted to the desired extent and reduced to uniform cross-section.

I claim as my invention—

1. The combination, substantially as set forth, of an electrical conductor and loosely-twisted ribbons of paper wound around the same.
2. The combination, substantially as set

forth, of an electrical conductor and loosely-twisted ribbons of paper wound directly upon the conductor and an exterior wrapping that binds said insulation in place.

3. The combination, substantially as set forth, of an electrical conductor, loosely-twisted ribbons of paper wound directly upon the conductor, a flat ribbon of paper wound over the twisted paper, an insulating, sealing, and waterproofing compound applied outside of the flat ribbon, and a lead sheath.

4. The combination, substantially as set forth, of an electric conductor and insulation consisting of twisted paper wound spirally directly upon and in contact with the conductor.

5. The combination, substantially as set forth, of an electric conductor, insulation consisting of twisted paper wound spirally directly upon and in contact with the conductor, and insulating material applied outside of the twisted paper to hold it in position.

6. The herein-described method of applying paper insulation spirally around electrical conductors, which consists in first dampening the paper, then winding it on the conductor, and then drying the paper, whereby it is caused to contract and firmly embrace the conductor.

In testimony whereof I have hereunto subscribed my name.

EDWIN D. McCracken.

Witnesses:

FRANK S. OBER,
EDWARD C. DAVIDSON.