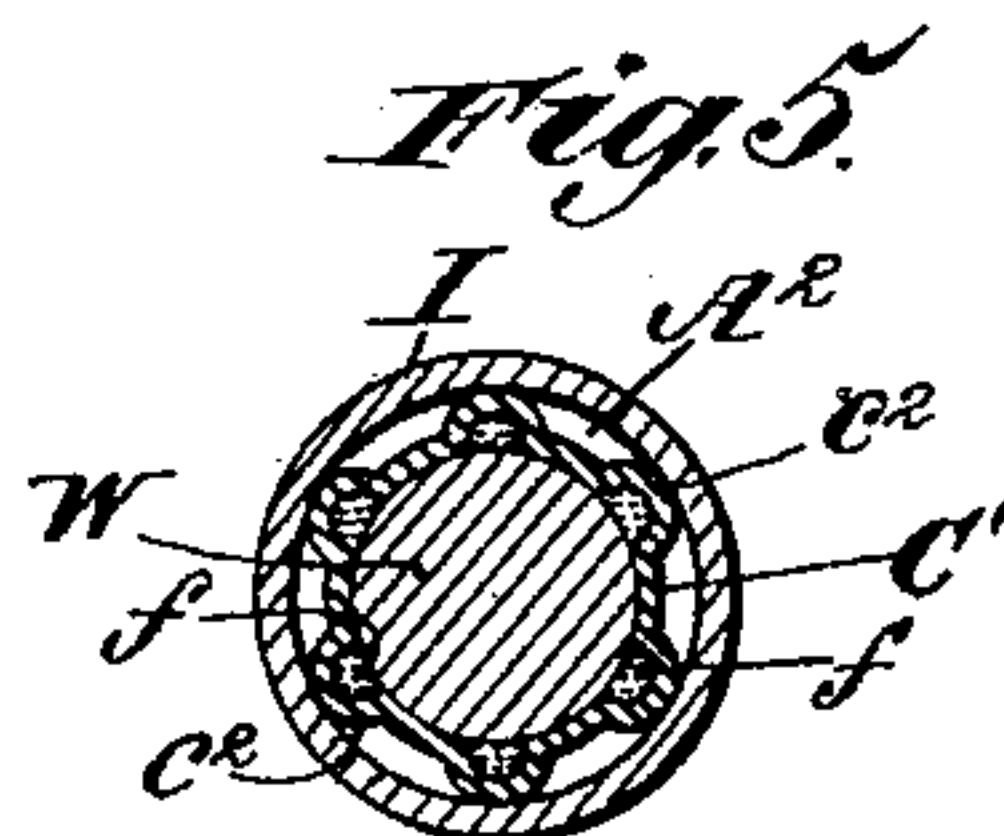
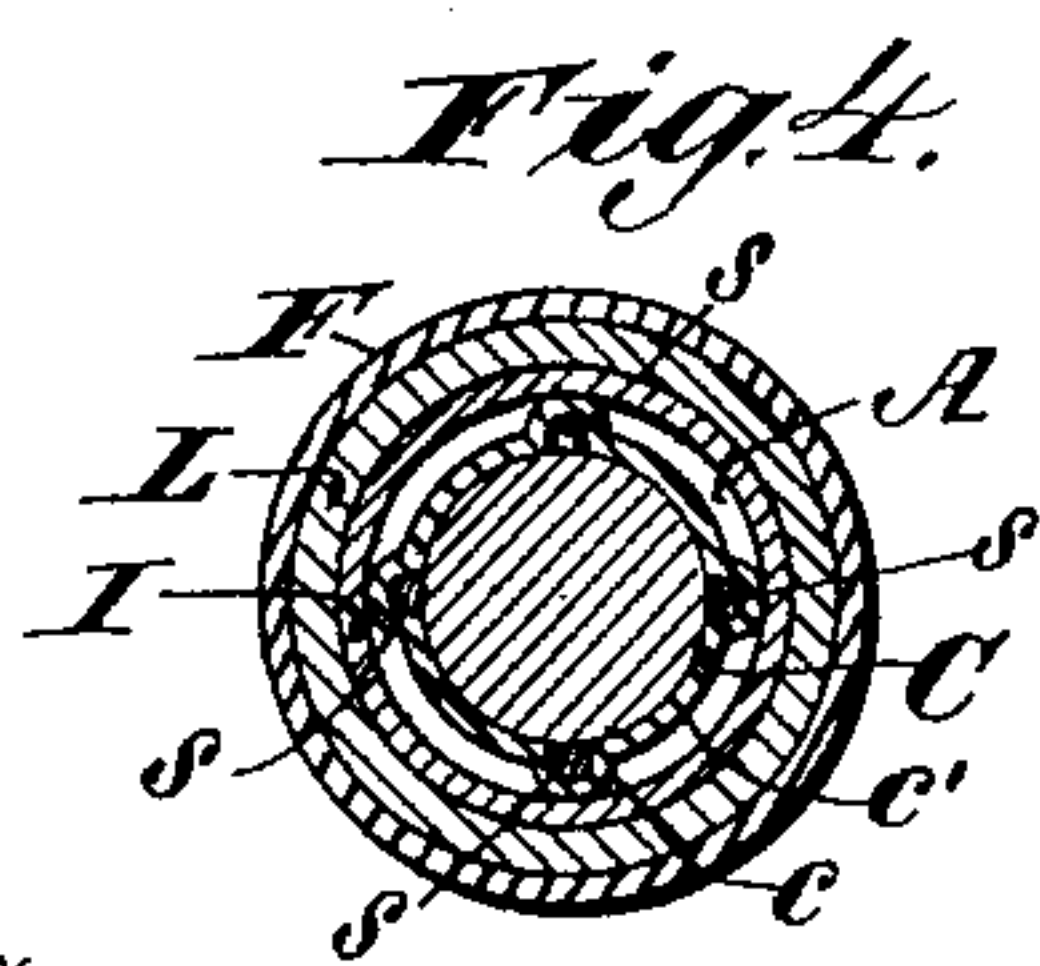
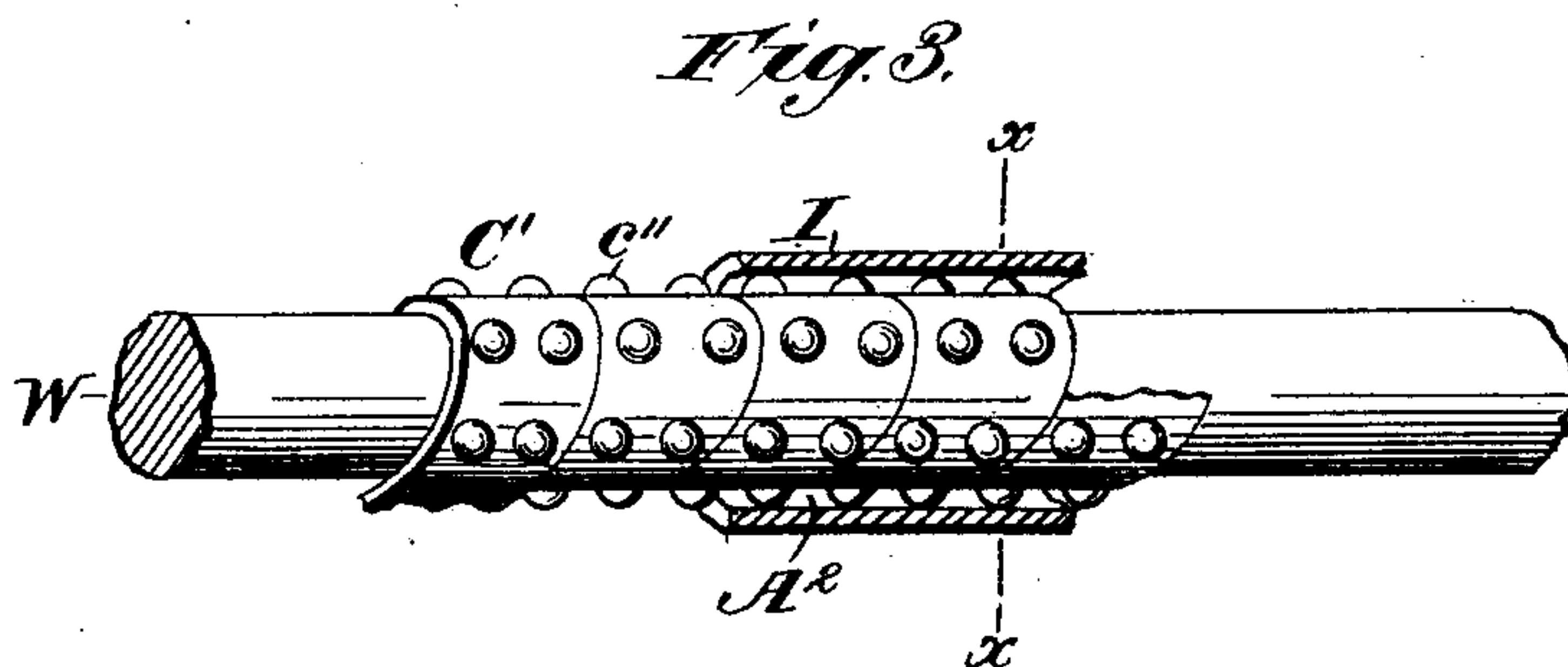
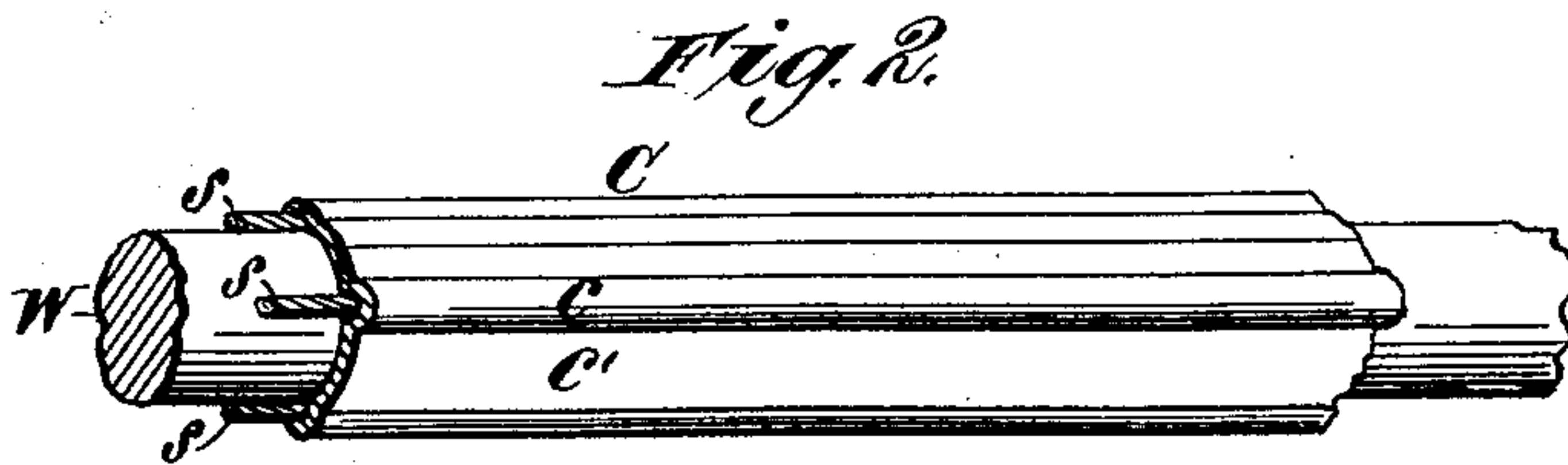
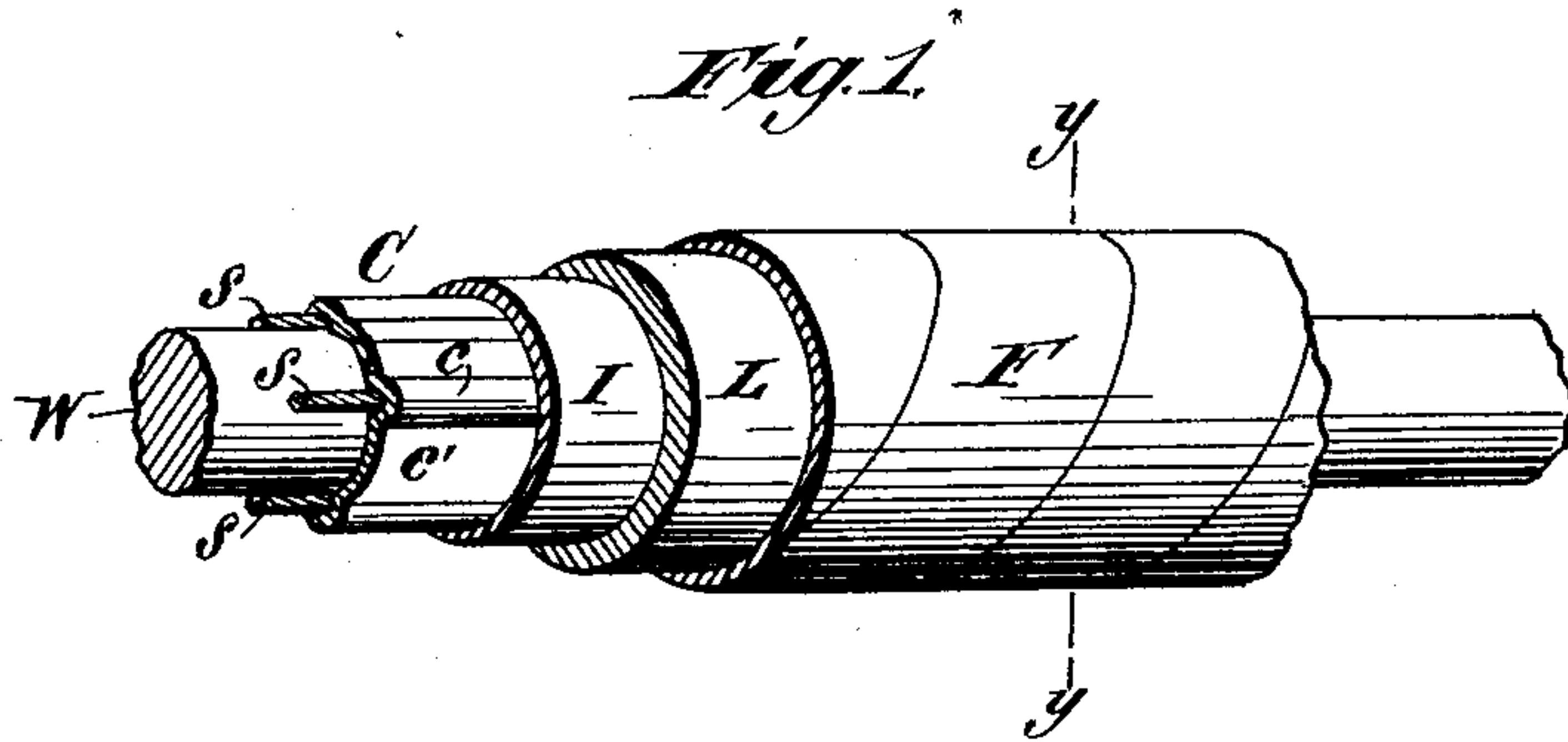


(No Model.)

J. B. WILLIAMS.
INSULATED ELECTRIC CONDUCTOR.

No. 452,510.

Patented May 19, 1891.



Witnesses,

Wm. M. Sloan

Wm. M. Ernst

Inventor:
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By *William R. Dard*
Atty

UNITED STATES PATENT OFFICE.

JAMES B. WILLIAMS, OF OAKLAND, CALIFORNIA.

INSULATED ELECTRIC CONDUCTOR.

SPECIFICATION forming part of Letters Patent No. 452,510, dated May 19, 1891.

Application filed November 12, 1890. Serial No. 371,167. (No model.)

To all whom it may concern:

Be it known that I, JAMES B. WILLIAMS, a citizen of the United States, residing at Oakland, Alameda county, California, have invented certain new and useful Improvements in Insulated Electric Conductors; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters marked thereon, which form part of this specification.

The object of my invention is to produce an insulated electric conductor which shall have a higher insulation resistance and a lower electrostatic capacity than insulated conductors made in the manner now usually employed—*i. e.*, by placing the insulating-layer or dielectric in direct contact with the conductor or in contact with a layer of fibrous material closely wrapped around the conductor, the size of the conductor, the thickness of the dielectric, and the kind of material used and the conditions of use being the same in both cases.

The novelty of my invention consists in the means employed to attain this object and in the construction and adaptation of the parts; and it consists, primarily, in interposing between the dielectric and the conductor air-spaces, together with certain intermediate and supplementary aids to insulation, whereby its efficiency is materially increased.

In an application for Letters Patent of the United States heretofore made by me, filed July 10, 1890, Serial No. 358,268, I have described and claimed an invention consisting, in brief, of the combination, with an electric conductor and exterior insulating-layer or dielectric, of a separating device consisting of an intermediate covering secured to the surface of the conductor and having projecting portions whereby air-spaces are formed between the conductor and the dielectric, and I describe two forms of this device, one in which the projecting portions consist of longitudinal corrugations and another in which the device is made in strips wound around the surface of the conductor and provided with bosses or projections. The conditions of its use demand that however this device

be formed its outermost surfaces shall be substantially equidistant from the axis of the conductor and symmetrically disposed, and that they shall be in contact with the interior surface of the insulating-layer or dielectric.

Under certain conditions of manufacture and use external pressure is apt to be exerted upon the insulating-layer, tending to force its interior surface into the air-spaces, and when the raised portions of the separating device are hollow underneath such pressure tends to cause them to collapse and to reduce the efficiency of the device; and the object of the invention which is the subject of the present application is to provide the means of strengthening and re-enforcing the separating device, so that it may successfully resist the action of such external pressure.

When the intermediate covering or separating device is composed of corrugated materials, the lines of the corrugations being parallel to the axis of the conductor or placed around it spirally with a long pitch, I accomplish my purpose by placing within the corrugations a filling for the same, as cords, which are suitably secured in place by cement. This is a cheap and efficient agent, and tightly-twisted cord serves admirably, and this specific form of my invention will be made the subject of a separate application for Letters Patent of the United States.

When the projecting portions of the device are in the forms of bosses, I accomplish my purpose by filling their hollows with some plastic material which will in course of time become hard, the only limit to the kind of material being that it shall not materially interfere with the primary functions of the intermediate covering or separating device. I may also fill the corrugations above referred to with such plastic material. In any case the necessity of the intermediate covering possessing sufficient flexibility to permit of its proper application to the exterior surface of the conductor must be kept in mind.

In the drawings, Figure 1 is a perspective view of the conductor and its successive layers, showing portions of the materials cut away so as to show their relative positions. Fig. 2 is a similar view of the conductor with its surrounding covering having the corrugations re-enforced with cords. Fig. 3 is a simi-

lar view of the conductor provided with the form of my separating device in which the raised portions consist of bosses or projections. Fig. 4 is a central transverse section on the plane of the line $y y$ in Fig. 1, and Fig. 5 is a similar section on the plane of the line $x x$ in Fig. 3.

In the drawings, W represents the central metallic conductor, and C is the intermediate covering or separating device placed between it and the insulating-layer or dielectric I. Its purposes are fourfold: first, to prevent the conductor from coming into direct contact with the dielectric; second, to provide air-spaces between them; third, to support the dielectric and keep it concentric with the conductor, and, fourth, to furnish comparatively few paths by which the electric current can escape from the conductor. It may consist of any suitable material possessing insulating properties and which remains more or less flexible under ordinary conditions of manufacture and use.

When the device is made in the form illustrated in Figs. 2 and 4, it is provided with corrugations c , the outer edges of which are substantially equidistant from the axis of the conductor and symmetrically disposed about the same, and which serve to support the dielectric and to keep it away from those portions of the device c' which are directly in contact with the conductor, forming between the dielectric and the conductor air-spaces A, which in the form shown are substantially parallel to the axis of the conductor. In this form I provide the device with the cords s , which I place within the corrugations on their under side. These cords prevent the corrugations from collapsing and the dielectric in consequence from being flattened.

In Figs. 3 and 5 I have illustrated the second form of my device. In these figures, W is the conductor, and C' is the intermediate covering, made of strips previously prepared and wound around the conductor and provided with bosses or projections c'' , which serve the same purpose as the corrugations in the first form of my device above described. In this form I fill the spaces under the bosses c'' , when they are to be used under conditions

requiring additional support, with some plastic material f , which becomes hard and solid in course of time, and I may fill the spaces under the corrugations c in the same manner under the same conditions of use.

In the case of both forms of device the dielectric or insulating-layer I is made to surround the intermediate covering-touching only the outer surfaces thereof, and made sufficiently stiff to prevent of its collapsing under usual conditions, and thus destroying the integrity of the air-spaces formed between it and the conductor.

Wide modifications in detail may be made in my invention without departing from its essential principles. In addition to the cords and filling of plastic material which I have described, other equivalents wholly within the range of the ordinary expedients adopted by skillful workmen will readily occur; but

What I claim as new is—

1. The combination, with an electric conductor provided with a surrounding dielectric and an intermediate separating device, whereby air-spaces are formed between them, of means whereby the raised portions of said intermediate separating device are re-enforced on their under side, whereby they are prevented from being flattened against the conductor by external pressure, as set forth.

2. The combination, with an electric conductor provided with a surrounding dielectric and an intermediate covering, whereby air-spaces are formed between them, and which covering has raised portions or projections, of a filling for the same, whereby they are prevented from being flattened against the conductor by external pressure, as set forth.

3. The combination, with an electric conductor and its exterior insulating-layer, of the intermediate covering C' , provided with bosses c'' , the under surfaces of which are filled with plastic material, as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES B. WILLIAMS.

Witnesses:

WM. RAIMOND BAIRD,
JAS. P. DOWNS.