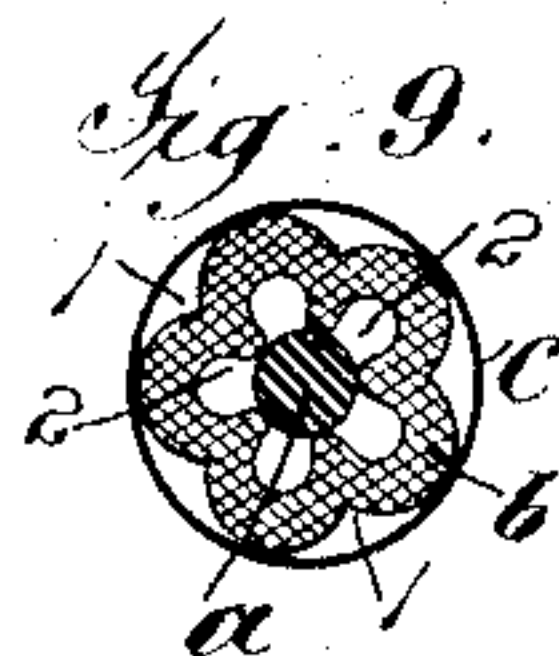
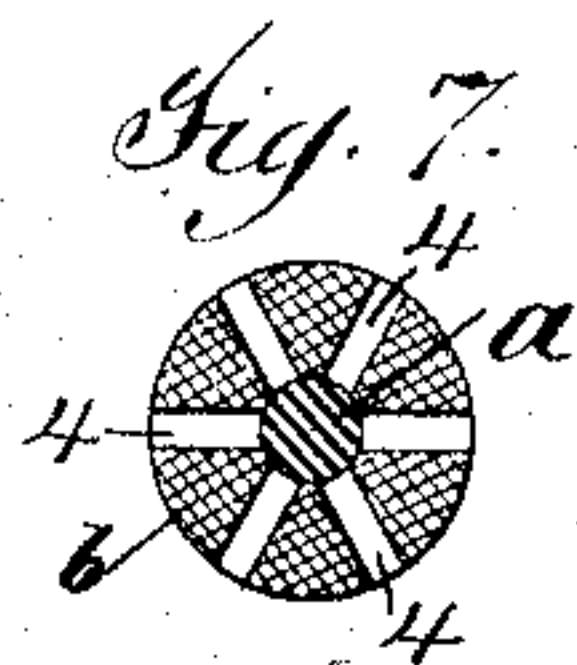
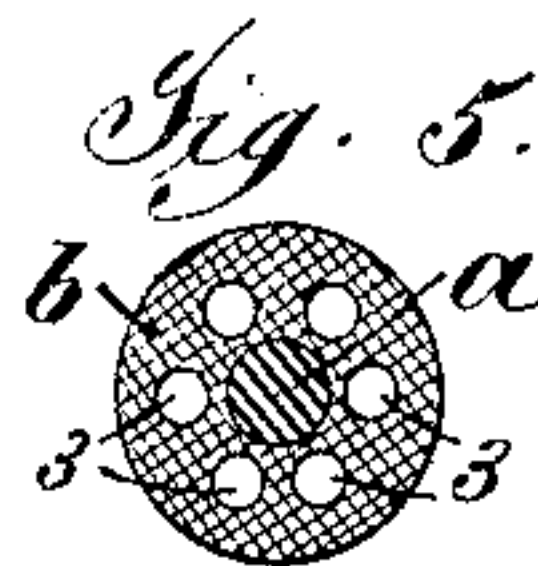
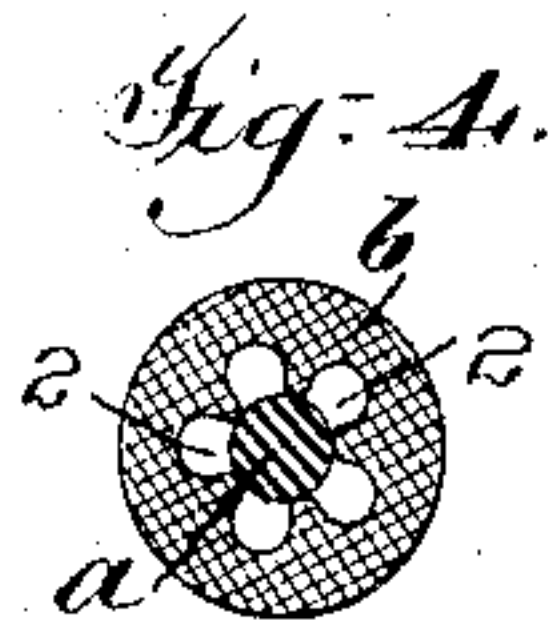
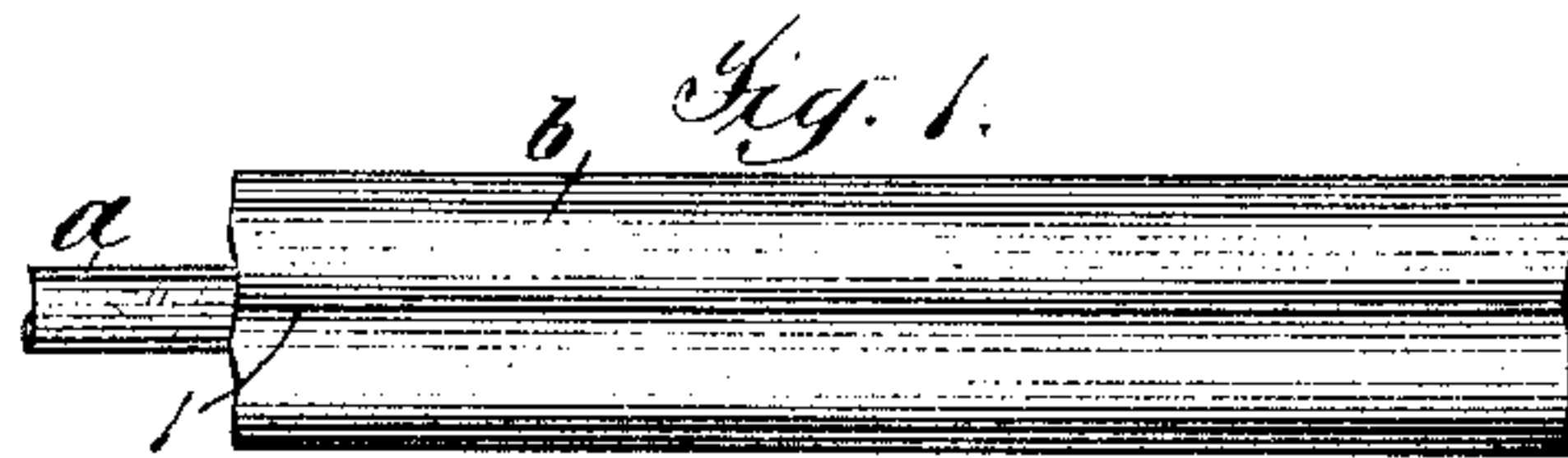


(No Model.)

J. W. MARSH.
ELECTRIC CONDUCTOR.

No. 504,397.

Patented Sept. 5, 1893.



Attest:
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by
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UNITED STATES PATENT OFFICE.

JOSEPH W. MARSH, OF PITTSBURG, PENNSYLVANIA.

ELECTRIC CONDUCTOR.

SPECIFICATION forming part of Letters Patent No. 504,397, dated September 5, 1893.

Application filed August 8, 1892. Serial No. 442,422. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH W. MARSH, a citizen of the United States, residing at Pittsburg, county of Allegheny, and State of Pennsylvania, have invented certain new and useful Improvements in Electric Conductors, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

10 This invention relates to electric conductors and cables formed of such conductors, its object being to provide a simple, cheap, and efficient construction of insulated conductor providing air spaces for air or gas insulation to reduce the static capacity of the conductor and cable.

15 I attain the desired result by forming upon the conductor a covering of paper, applied as paper pulp or in any other moldable form so as to be molded upon the conductor, and providing this molded covering with air spaces, either in the outer surface of the covering or within the covering, or both, these air spaces preferably extending longitudinally of the conductor. This insulated conductor may be used alone or a plurality grouped to form a cable, and either with or without a protecting covering, but I prefer to apply outside the molded covering a protective covering, which may be of any suitable material, such as woven or braided material, rubber, paper, or lead.

20 In the accompanying drawings:—Figure 1 is a side view of a conductor insulated in accordance with my invention and provided with air spaces formed in the outer surface of the molded covering, and between it and the conductor. Fig. 2 is a cross section of the same. Fig. 3 is a cross section showing a modification omitting the air spaces next the conductor. Fig. 4 is a cross section showing a modification omitting the air spaces in the outer surface of the covering. Fig. 5 is a cross section of a conductor having air spaces formed within the body of the covering and extending longitudinally of the conductor. Fig. 6 is a broken side view of a conductor having air spaces in the covering extending transversely to the conductor. Fig. 7 is a cross section of the same. Fig. 8 is a broken plan of a conductor similar to Fig. 1,

with a woven protective covering. Fig. 9 is a cross section of the same.

Referring to said drawings, *a* is the conductor and *b* the covering formed of a body of moldable paper or paper pulp molded upon the conductor. In Figs. 1 and 2 showing the construction in the preferred form, the covering *b* is formed with grooves or corrugations 1 in its outer surface and air spaces 2 inside the covering about the conductor. It will be seen that the grooves or corrugations 1 also form air spaces between conductors when the latter are grouped to form a cable, or between the molded covering and the protective covering when the latter is used on a single conductor. It is evident, however, that the conductor may be used with only one series of these air spaces, either one being omitted, and in Figs. 3 and 4 I have shown such constructions.

In Fig. 5 I have shown a construction in which air spaces 3 extending longitudinally of the conductor are formed within the body of the covering *b*, so that the covering is in contact with the conductor at all points. The construction shown in Figs. 2 to 4 in which the air spaces are next the conductor, is preferred, however.

In Figs. 6 and 7, I have shown a construction in which air spaces 4 extending transversely to the conductor are used, these air spaces preferably extending entirely through the covering *b* to the conductor, as shown.

As stated above, the conductors with the coverings *b* may be used, either alone or grouped, without other covering, but I prefer to apply outside the covering *b* a protective covering, preferably of cotton, or similar woven or braided material, or of rubber, although other material may be used, and the common lead sheath will form such a protective covering, if applied to a single conductor. In Figs. 8 and 9, I have shown such a construction in which the protective covering *c* is shown as of woven material.

The molded covering may be applied to the conductor and the air spaces formed therein in any suitable manner, but it will be found preferable to form the air spaces 1, 2, and 3, during the process of molding. The paper is preferably applied in the form of paper pulp

formed by the usual process of paper manufacture. A good Manila rope stock is preferably used and a binding material, such as glue, mucilage or dextrine, added to it. Any
 5 suitable means may be used for molding the paper pulp upon the conductors, but it will probably be found preferable to use a machine of the class now in common use for covering wires and cables with rubber or lead
 10 and for making tubing from similar material, the cone and die being so constructed as to form the air spaces. It will be understood, however, that in place of paper pulp, paper in any other form may be used, so long as it
 15 is moldable to form a seamless covering, and that it may be applied to and molded upon the conductor in any suitable manner. The air spaces 4 will preferably be formed in the covering after it is applied to the conductor,
 20 by rolls or pressure plates having punches to form the perforations, and the air spaces 1 in the outer surface of the covering may readily be formed by pressure rollers, if desired.

It will be understood that modifications may
 25 be made in the location and arrangement of the air spaces without departing from my invention, and I am not to be limited to the specific construction shown.

While the paper is shown as molded upon
 30 the naked conductor, it is evident that it may be molded upon a covering of other material previously applied upon the conductor, if desired for any reason, and such a construction is intended to be included within the claims
 35 defining the paper as molded on the conductor.

What I claim is—

1. An electric conductor having a covering of paper molded thereon with air spaces formed in said covering, substantially as described.

2. An electric conductor having a covering 4c of paper molded thereon with air spaces formed in said covering and extending longitudinally of the conductor, substantially as described.

3. An electric conductor having a covering of paper molded thereon with air spaces within 45 the covering and grooves forming air spaces in its outer surface, substantially as described.

4. An electric conductor having a covering of paper molded thereon with air spaces within the covering extending longitudinally of the 50 conductor, and longitudinal grooves forming air spaces in the outer surface of the covering, substantially as described.

5. An electric conductor having a covering of paper molded thereon with grooves in its 55 outer surface, substantially as described.

6. An electric conductor having a covering of paper molded thereon with air spaces between the covering and conductor, substantially 60 as described.

7. An electric conductor having a covering of paper molded thereon with air spaces between the conductor and covering extending 65 longitudinally of the conductor, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JOSEPH W. MARSH.

Witnesses:

F. A. RINEHART,
 O. ROBT. EBEL.