

(No Model.)

J. W. MARSH.
ELECTRIC CONDUCTOR.

No. 504,398.

Patented Sept. 5, 1893.

Fig. 2.



Fig. 1.

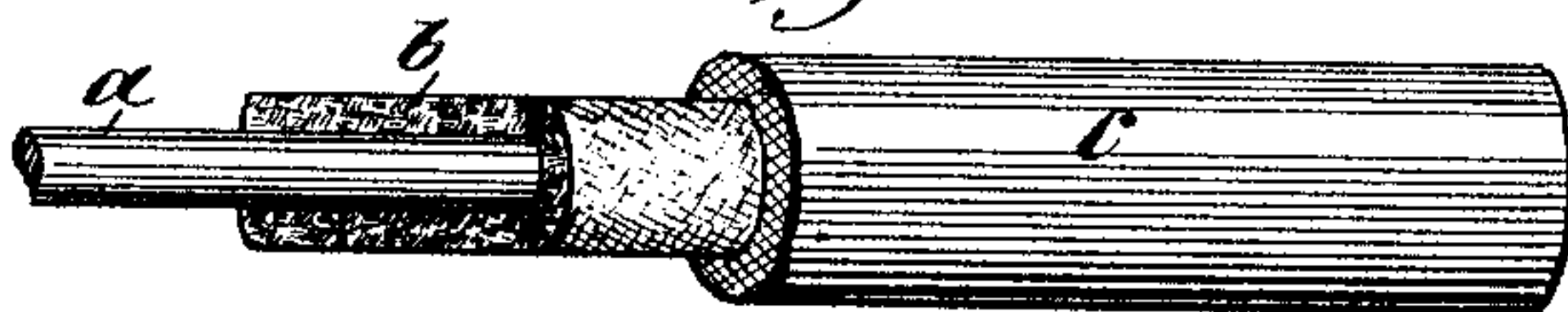


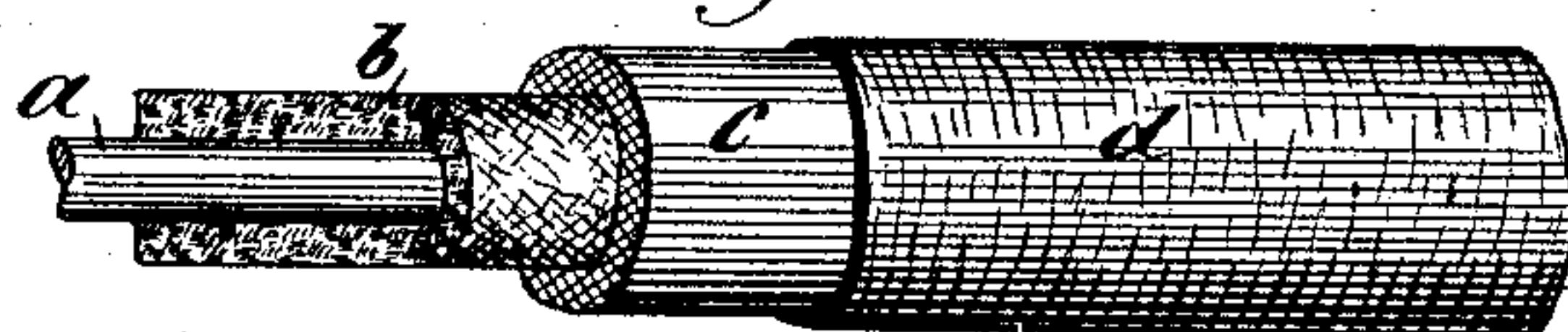
Fig. 4.



Fig. 3.



Fig. 5.



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UNITED STATES PATENT OFFICE.

JOSEPH W. MARSH, OF PITTSBURG, PENNSYLVANIA.

ELECTRIC CONDUCTOR.

SPECIFICATION forming part of Letters Patent No. 504,398, dated September 5, 1893.

Application filed August 8, 1892. Serial No. 442,421. (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 Insulated 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 insulated electric conductors, the object being to provide a paper insulated conductor which shall be more efficient and durable than those heretofore in use. A common form of insulated electric
15 conductor consists of a wire covered with a considerable number of layers of paper tape wound closely upon the wire so as to form a thick insulating covering of paper thereon. It has been found in practice, however, that
20 the stiff covering thus formed is liable to crack or break open on bending the wire conductor, which is objectionable in all cases, and especially so in electric light cables where air spaces must be avoided. It has also been
25 suggested that a paper insulation be applied by molding a mass of paper pulp or other moldable paper upon the conductor, but it is evident that, while this covering is cheap, light and seamless, it is especially liable to
30 the above objection of cracking or breaking open on bending.

The object of my invention is to provide a construction of paper insulated conductor by which the tendency of the paper to break or
35 crack open shall be prevented or lessened, and especially to provide a construction by which the cracking or breaking open of a molded paper covering on bending shall be prevented. I attain this object by the use
40 of a cushion next the conductor upon which is applied the insulating covering, consisting of a comparatively thick covering of paper tape wound thereon, or a covering of paper molded thereon, this cushion being constructed
45 so as to yield slightly upon bending of the wire and prevent the cracking of the paper covering. This cushion may be formed of any suitable material and applied in any suitable manner, but it preferably consists of a
50 fibrous covering which is preferably of a soft or loose nature and may be formed of paper, jute, cotton, or other fiber.

In telephone and other uses in which air spaces are desired to reduce the static capacity of the conductor, this cushion may be
55 used unsaturated, thus forming a low capacity conductor with air spaces about the conductor, but for electric light purposes for which this conductor is especially designed, the cushion will preferably be saturated with
60 a material which will remain semi-fluid under all ordinary conditions of temperature, all air spaces in the cushion being thus filled up, while at the same time the special function of the cushion in connection with the paper
65 covering is retained. For this saturating material, any of the filling compounds now in common use in cable construction may be employed, but I prefer to use a compound formed of two products of hydrocarbon dis-
70 tillation, one hard and the other soft, mixed in suitable proportions. The conductor thus covered, with the cover either saturated or unsaturated, may be used without other coverings, but I prefer to apply outside the pa-
75 per covering a protective covering which may be of woven or braided material, rubber, paper, or other suitable material, or the common lead sheath will serve as such protective covering, if applied to a single conductor.
80

The conductor embodying my invention may be used alone or with another conductor to form a pair, or a group of single conductors or pairs may be combined into a cable
85 and provided with the usual lead sheath for underground or aerial use.

Referring to the accompanying drawings:—
Figure 1 is a broken side view of a conductor embodying my invention, having a cushion
90 of loose fibrous material and a molded paper covering. Fig. 2 is a cross section of the same. Fig. 3 is a view similar to Fig. 1, showing a low capacity conductor with a braided cushion forming air spaces. Fig. 4 is a cross
95 section of the same. Fig. 5 shows the conductor of Fig. 1 with a protective covering of cotton or similar woven material.

Referring to said drawings, *a* is the conductor, *b* the cushion, and *c* the paper insulating covering.
100

In Figs. 1 and 2, showing my invention as applied to a conductor for use in electric light construction, the cushion *b* consists of a mass of loose fibrous material such as cotton, or

jute, which is preferably saturated with a filling compound as above described. The paper covering *c* is placed upon this cushion and consists in the form shown of a body of mold-
 5 able paper or paper pulp molded upon the cushioned conductor. It will be understood, however, as above described, that a covering consisting of a considerable number of layers of paper or paper tape wound upon the cushioned conductor to form insulation may be
 10 used in place of the molded covering and still be within my invention, considered broadly, but the molded paper covering in connection with the cushion in itself forms a part of the invention. If the conductor is intended for
 15 telephone or other uses where air spaces are desirable, the cushion *b* of Figs. 1 and 2 may be left unsaturated.

The form of the cushion may be varied
 20 widely and any material having the necessary qualities may be used and applied in any suitable manner. Thus in Figs. 3 and 4 I have shown a construction in which the cushion is formed of strands of fibrous material braided upon the conductor, this cushion
 25 being saturated or unsaturated, as described in connection with the construction shown in Figs. 1 and 2. The conductors thus covered may be used either alone or with other conductors without other covering, but I prefer
 30 to apply outside the paper covering *c*, a protective covering which may be of cotton or other braided material, tape, rubber, or any other suitable material. In Fig. 5, I have
 35 shown a conductor having such a protective covering *d* of braided material.

The molded material is preferably applied in the form of paper pulp formed by the usual processes 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 suitable means may be used for molding the paper pulp upon the cushioned 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, and for making tubing from similar material. It will be understood however, that in place of paper pulp, paper
 50 in any other form may be used, so long as it is moldable to form a seamless covering, and that it may be applied to and molded upon the conductor in any suitable manner.

What I claim is—

1. An insulated electric conductor having its insulating covering of paper supported by a cushion on the conductor, substantially as described. 55
2. An insulated electric conductor having its insulating covering of paper supported by a cushion of fibrous material on the conductor, substantially as described. 60
3. An insulated electric conductor having, its insulating covering of paper supported by a fibrous cushion saturated with a semi-fluid material, substantially as described. 65
4. An electric conductor having a cushion thereon and a covering of paper molded upon said cushion, substantially as described. 70
5. An electric conductor having a cushion of fibrous material thereon and a paper covering molded on said fibrous material, substantially as described.
6. An electric conductor having a cushion of fibrous material thereon saturated with a semi-fluid material, and a paper covering molded on said fibrous covering, substantially as described. 75
7. An electric conductor having a cushion thereon, a paper covering molded on said cushion, and a protective covering outside said paper covering, substantially as described. 80

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

JOSEPH W. MARSH.

Witnesses:

F. A. RINEHART,
 O. ROBERT EBEL.