(No Model.)

H. O. PHILLIPS.

INSULATED ELECTRIC CONDUCTOR.

No. 287,776. Patented Oct. 30, 1883.

Fig. 1.

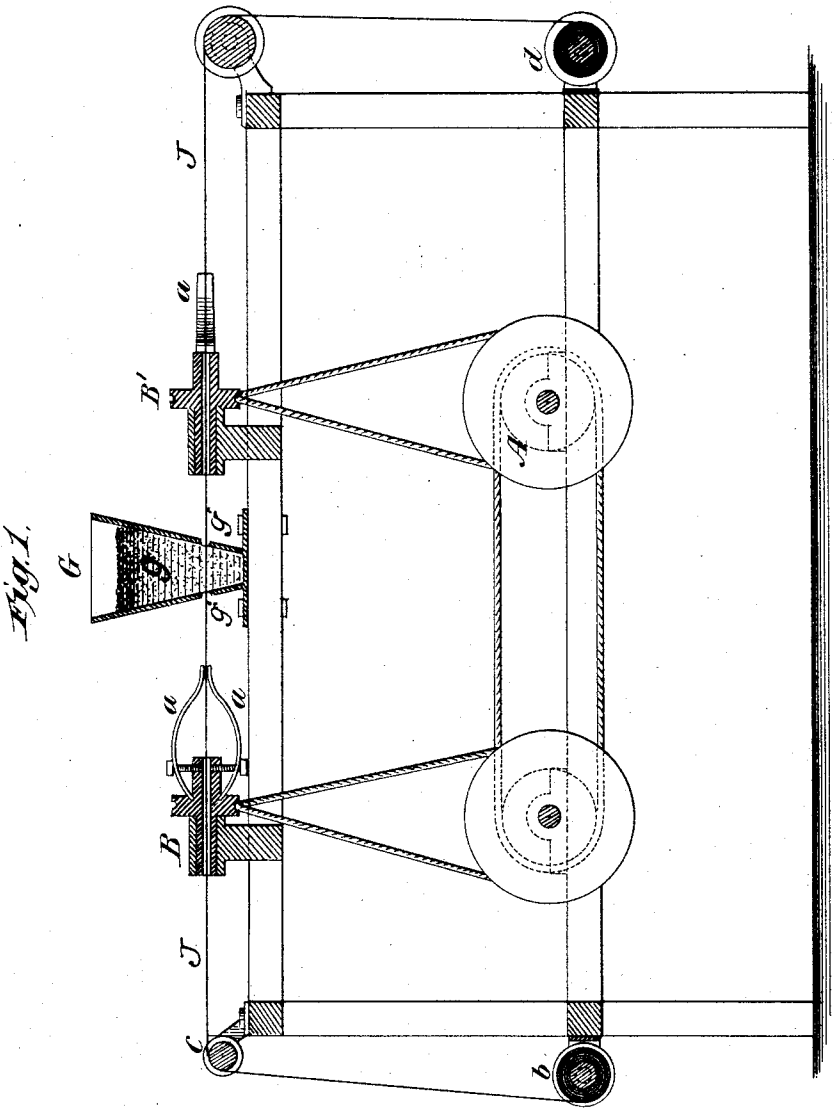


Fig. 2.



WITNESSES:

Gustave Dieterich

Jos. L. Coombs

INVENTOR

Herbert O. Phillips,

BY J. J. Coombs,

ATTORNEY

N. PETERS. Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

HERBERT O. PHILLIPS, OF WATERBURY, CONNECTICUT, ASSIGNOR TO HOLMES, BOOTH & HAYDENS, OF SAME PLACE.

INSULATED ELECTRIC CONDUCTOR.

SPECIFICATION forming part of Letters Patent No. 287,776, dated October 30, 1883.

Application filed September 4, 1883. (No model.)

To all whom it may concern:

Be it known that I, HERBERT O. PHILLIPS, of Waterbury, in the county of New Haven and State of Connecticut, have invented a new and useful Improvement in Insulated Electric Conductors, and also a new and useful improvement in machines for compressing jacketed wires covered with fibrous and insulating material, to adapt them to applying the improvement first herein claimed, of which the following is a specification.

My invention relates to that class of insulated electric conductors in the insulating of which a continuous jacketing of fibrous material is used, either wound or braided upon the wire, and treated with insulating material; and it has for its object giving to such insulated conductors a uniform diameter, an even compact calendered surface, formed so as to protect and better the insulation and assist in shedding rain and moisture therefrom, and also facilitating the handling and manipulation of the conductor.

My invention consists, first, in treating the insulated conductor, after the last or outside coating of insulating material has been applied, with silicic acid in a state of fine powder, substantially free from grit or other mineral powder substantially insoluble in water, in a like state of fine powder, free from grit, which will adhere to the surface of the insulating material, and will calender hard and smooth upon said surface under the action of revolving compressors, as hereinafter described. I prefer to use silicic acid for this purpose; but other mineral powders which are insoluble in water may be used with similar effect.

In carrying out my invention I use a machine similar in operation to those used for compressing jacketed bonnet-wire treated with starchy compounds, and jacketed telegraph-wires treated with insulating material. Preferably a machine for the latter purpose, made after the pattern of that patented to Frank S. Mead by United States Letters Patent No. 176,978, of May 2, 1876, consisting of the combination, with suitable wire-feeding mechanism, of a co-operative series of two or more compressing-heads provided with axial openings and compressing clamps or springs mounted successively in a line which corresponds with their several axes, and connected with mechanism which revolves some of said heads in one direction and others in the opposite direction, whereby a wire jacketed with the fibrous material and heated with insulating matter may be continuously passed longitudinally through all of said heads, receive peripherical compression from the springs of each, and have the rotative strain on the wire exerted by the heads which revolve in one direction counteracted or balanced by the strain of those which revolve in the opposite direction; and I provide such a machine with receptacles or vessels, preferably of a V shape, for holding silicic acid or other analogous material, and secure such vessels to the machine or connect them with it in such manner that they will occupy a position between each pair of its co-operative series of compressing-heads. The lower part of each of these vessels is provided with openings corresponding with the axial openings of the compressing-heads, between which they are placed, so that the jacketed wire in passing from one compressing-head to the other will pass through the acid-vessel and its contents.

In the accompanying drawings, making part of this specification, in Figure 1 a longitudinal vertical section of the machine is shown, taken on a line with the axes of one set of revolving compressing-heads, the heads being shown in different positions of revolution.

A denotes the main driving-shaft. B B′ denotes in each instance a revolving compressing-head, composed, preferably, of iron or steel. Each has an axial opening throughout its length and a groove at its rear end for receiving a driving cord or belt. Each head is also provided with a clamp composed of two flat springs, *a a*, secured, respectively, to the head by a screw, so arranged with relation to the bearings of the spring on the head that the outer ends of the spring can be deflected to any desired extent and made to compress the wire when it is interposed between the coincident flat or curved faces of the outer ends of each pair of springs.

G represents the acid-holding vessel, secured in position on the machine between the revolving compressing-heads B B′.

g represents the acid, and *g' g'* represent the openings in the acid-vessel, through which the jacketed insulated wire *j* passes in receiving its acid treatment.

The covered insulated wire is fed to the compressing-head B from the reel *b*, thence through the acid-vessel G and the silicic acid contained therein, thence to the compressing-head B', and thence to reel *d*. In this passage the compressing-head B exerts its compressing force peripherically upon the insulating covering of the conductor in one direction, smoothing down all inequalities or roughness of its surface, and imparting to it by friction an amount of heat sufficient to soften its insulating matter to a degree to enable it to readily receive and take up a certain quantity of the silicic acid, through which it passes on its way to the compressing-head B', which, revolving in an opposite direction, compresses and calenders the acid into the insulating material, filling up all the interstices of its surface and fibrous jacketing, and gives to the article the compact, even, calendered, and polished surface before described. Additional coats of insulating material and fibrous jackets or covers treated with the same may be put on over the surface of an insulated conductor treated with silicic acid, as I propose, and similar acid treatment applied over all, without avoiding my invention, as such would only be an aggregation of the same.

Fig. 2 represents a section of insulated wire coated according to my invention. D represents the conducting-wire; *e* and *e'*, coatings of insulating material; *f*, fibrous jacket, and *g* a final coating of silicic acid calendered and polished, as herein described.

My invention further consists in adding to a machine for compressing jacketed wire, substantially such as herein set forth, an acid-vessel, G, as and for the purpose herein described.

I do not claim as an outside coating for insulated electric conductors "sand, reduced granite, rock, iron dust or filings," or "powdered glass," named in English provisional specification No. 329, of 1859, as suitable materials for coating the strands of telegraphic ropes or cables, as none of said materials will receive the smooth calendered polish which it is a prime object of my invention to produce on the surface of insulated electric conductors for electric lights and other similar uses; but

What I claim as my invention is—

1. An insulated electric conductor, consisting of a wire covered with one or more coatings of fibrous material and one or more coatings of insulating material, (the latter being the outermost of said coatings,) and treated with a final coating of silicic acid or other equivalent mineral powder, and smoothly calendered and polished, substantially as herein described.

2. The combination, in a machine for compressing jacketed wire covered with fibrous and insulating material, (substantially such as is herein described,) of the acid-holding vessel G (one or more) with two or more compressing-heads, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HERBERT O. PHILLIPS.

Witnesses:
GEO. H. BENHAM,
H. H. WALKER.

Correction in Letters Patent No. 287,776.

It is hereby certified that in Letters Patent No. 287,776, granted October 30, 1883, upon the application of Herbert O. Phillips, of Waterbury, Connecticut, for an improvement in "Insulated Electric Conductors," an error was committed requiring the following correction, viz: The word "heated" in line 57, page 1, of the printed specification, should be read *treated;* and that the specification should be read with this correction therein to make it conform with the record of the case in the Patent Office.

Signed, countersigned, and sealed this 6th day of November, A. D. 1883.

[SEAL.]

M. L. JOSLYN,
Acting Secretary of the Interior.

Countersigned:
BENJ. BUTTERWORTH,
Commissioner of Patents.