

(No Model.)

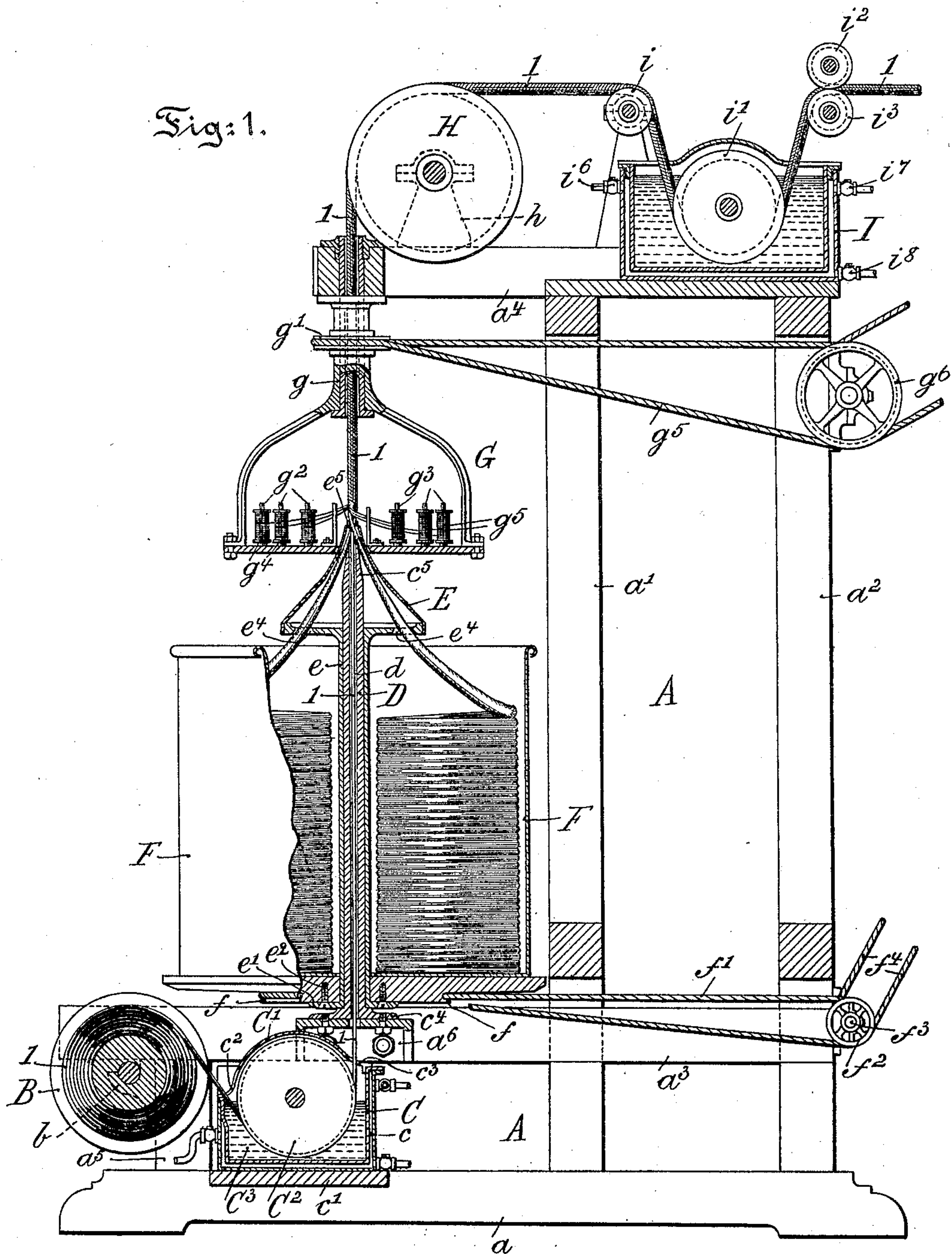
2 Sheets—Sheet 1.

J. ROBINSON.

MANUFACTURE OF ELECTRIC CONDUCTORS.

No. 529,411.

Patented Nov. 20, 1894.



Witnesses:  
Richard C. Maxwell.  
Thomas M. Smith.

Inventor.  
John Robinson,  
By J. Walter Douglass.  
Attorney.

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2 Sheets—Sheet 2.

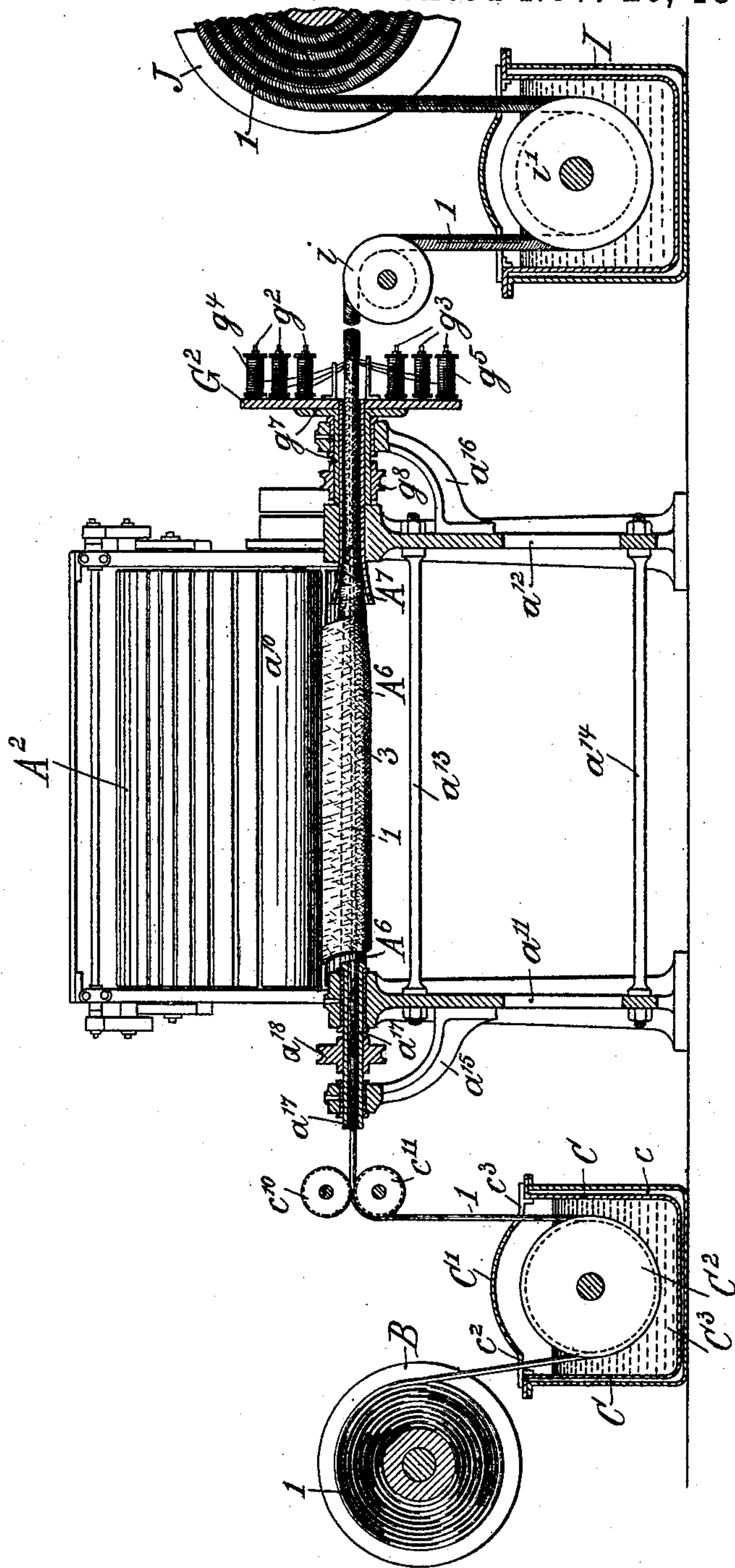
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Fig. 2.



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# UNITED STATES PATENT OFFICE.

JOHN ROBINSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO WILLIAM J. CHANINEL, OF SAME PLACE.

## MANUFACTURE OF ELECTRIC CONDUCTORS.

SPECIFICATION forming part of Letters Patent No. 529,411, dated November 20, 1894.

Application filed February 16, 1894. Serial No. 500,341. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN ROBINSON, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in the Manufacture of Electric Conductors, of which the following is a specification.

My invention has relation to the construction of electric conductors; and more particularly to the method of and appliances for covering, cording and insulating the same.

The principal objects of my invention are first, to provide a comparatively simple, economical and efficient method of applying fibrous material, such as cotton in a raw or similar state, to an insulated wire and cause it to readily adhere thereto so as to permit of the application of a cord or thread to the covered wire and subjecting to a bath of insulating material to constitute an insulated electric conductor; second, to provide an economical method of insulating a wire, applying and compacting cotton or the like thereto, cording the covered wire and thoroughly insulating and laying up the same for use; and third, to provide suitable apparatus for carrying into effect the method of my invention.

My invention stated in general terms, consists of the method of applying to an insulated wire, while in a moist or wet state or condition, fibrous material, such as cotton or the like, then applying a cord or thread thereto and then subjecting the covered and cored wire to an insulating bath and thoroughly saturating the same therewith to produce an insulating electric conductor; and my invention further consists of the improvements in apparatus for the conduct of the method of my invention hereinafter described and claimed.

The nature and general features of my invention will be more fully understood from the following description taken in connection with the accompanying drawings forming part hereof, and in which—

Figure 1, is a view partly in elevation and partly in section of a plant adapted for the conduct of the method of my invention; and Fig. 2, is a similar view of a modified form

of apparatus for carrying into effect my said method.

Referring to the drawings with reference to Fig. 1 A, is a frame-work comprising a base  $a$ , standards  $a'$  and  $a^2$  and cross-beams  $a^3$  and  $a^4$ . B, is a reel detachably supported to the brackets  $b$ , which are secured to uprights  $a^5$ , extending vertically from the base  $a$ , of the structure. The wire 1, is coiled around the reel B, and is drawn therefrom through a bath to be presently explained. C, is a tank provided with a surrounding steam coil or jacket  $c$ , mounted on a slab  $c'$ , which is secured into the base  $a$ , and provided with a cover  $C'$ , having openings  $c^2$  and  $c^3$ , therein for the passage of the wire 1, from the reel B, around a traveling roll or drum  $C^2$ , immersed in a bath of molten insulating material  $C^3$ , in the tank C. D, is a hollow spindle secured to a support  $a^6$ , which is applied to the cross-beam  $a^3$ , and said spindle having a central opening  $d$ , extending therethrough, the base  $a^4$ , and support  $a^6$ , therefor. The upper end of the spindle D, is formed tapering at  $c^5$ , for guiding fibrous material through the opening of a device to be presently fully explained. E, is a cone-shaped nozzle or feeding device provided with an integral tubular stem  $e$ , fitting the hollow spindle D, and having a flanged or circular base  $e'$  which fits snugly against the base of a drum or can F, which is grooved to form a pulley  $f$ , and secured into said base by means of screws or the like  $e^2$ , for holding said nozzle or feeding device firmly to position in contact with the drum or can F, and in order to permit of the same being rotated therewith. The nozzle or feeding tube E, is provided with radial openings  $e^4$ , in the bottom and with a tapering opening  $e^5$ , in the apex of the same for a purpose to be presently fully described. The drum or can F, and the nozzle E, therewith are rotated by means of a belt  $f'$ , engaging the grooved pulley  $f$ , and the double grooved pulley  $f^2$ , which is mounted on a shaft  $f^3$ , engaged by a belt  $f^4$ , and which latter receives its motion from any suitable source of power. Not shown. The rotatable drum or can F, is adapted to contain fibrous material, such as cotton in a raw or other preferred state, which is lead therefrom through



the nozzle or feeding tube E, to the moist, wet or sticky insulated wire, drawn from the bath C<sup>3</sup>, of the tank C, in an upward direction, through the opening in the support a<sup>6</sup>, base c<sup>4</sup>, and hollow spindle D, by suitable power not shown, and caused to contact and adhere to the wire 1, in such manner as to form a continuous smooth surface of the said material on the wire in the drawing thereof and just beyond the point of contact and adherence of the fibrous material with the still moist or wet insulated wire, is provided a whirler G, which is supported to position by means of a hanger g, from the cross-beam a<sup>4</sup>, of the structure and carrying a grooved pulley g', which is adapted to lay a single or series of cords or threads uniformly onto the covered wire 1. This whirler G, is provided with a series of spindles g<sup>2</sup> and g<sup>3</sup>, adapted for the reception of spools, bobbins or cops g<sup>4</sup> and g<sup>5</sup>. The whirler G, by means of a cord or belt g<sup>5</sup>, passing around the pulley g', and the double grooved pulley g<sup>6</sup>, having motion imparted thereto from any suitable source of power, is thereby rotated and the threads or cords as illustrated in Fig. 1, are laid onto the covered wire 1, which is drawn under proper tension and required speed in a vertical direction over a drum H, supported to standards h, mounted on the cross-beam a<sup>4</sup>, of the structure and from this drum the covered and corded wire 1, is conducted over a guide i, and then downward through a bath of suitable insulating material contained in a steam heated or jacketed tank I, provided with inlet and outlet cocks i<sup>6</sup> and i<sup>7</sup>, and a wastecock i<sup>8</sup>, and around a roll i', journaled to the walls of the tank I, and then upward and forward between pressure rolls i<sup>2</sup> and i<sup>3</sup>, and therefrom the same is conducted onto a reel, not shown, whereon the thoroughly covered, corded and insulated wire is adapted to be laid up for subsequent use as an insulated electric conductor.

It will thus be observed from the foregoing description of the apparatus for the carrying of my invention into effect, that the process is continuous. It may be here remarked that due regard must be given to the tension of the wire and to the speed of rotation of certain of the parts, that is to say, of the drum or can F, and the appliances or devices rotating therewith.

With reference to Fig. 2, A<sup>2</sup>, represents a carding engine of any suitable construction provided with a wiper or roll a<sup>10</sup>, for conducting the fibrous or flaky material to and around a rotatable cone A<sup>6</sup>, journaled to standards a<sup>11</sup> and a<sup>12</sup>. These standards are held in proper position by means of distance-rods a<sup>13</sup> and a<sup>14</sup>. a<sup>15</sup> and a<sup>16</sup>, are curved brackets secured to the standards a<sup>11</sup> and a<sup>12</sup>. The standard a<sup>11</sup>, and the bracket a<sup>15</sup>, support the integral hollow spindle a<sup>17</sup>, of the cone A<sup>6</sup>, and mounted thereon is a pulley a<sup>18</sup>, adapted to be engaged by a belt, not shown, for rotating the cone A<sup>6</sup>, at the required speed with respect to the wire 1, adapted to be drawn through

the spindle and cone thereof. A<sup>7</sup>, is a funnel shaped nozzle supported in the standard a<sup>12</sup>, and the bracket a<sup>16</sup>, and engaging the sleeve g<sup>7</sup>, of a whirler G<sup>2</sup>, having spindles g<sup>2</sup> and g<sup>3</sup>, carrying cops or bobbins g<sup>4</sup> and g<sup>5</sup>, adapted to contain thread or cord, whereby in the revolution of the whirler by means of a pulley g<sup>8</sup>, secured to the sleeve g<sup>7</sup>, of the whirler, the thread or cord in regular sequence is wound around the covered wire 1, and preparatory to the conduct of the same through a bath of insulating material in the tank I, thoroughly saturated thereby and prior to being laid up onto a rotatable reel J for subsequent use as an insulated electric conductor. The reel J, it may be here remarked, is operated by means of a hand-crank applied to one of the journals thereof or by means of a belt and pulley connection from a suitable source of power. Not shown.

In other respects the apparatus of Fig. 2, is the same as that of Fig. 1, for the carrying into effect of the method of my invention of applying a fibrous material, such as cotton in a raw or somewhat similar state to a wire after the same has been saturated with an insulating material and while in a moist or wet condition and in such manner as that at or about the point of contact of such material with the coated wire the fibrous material will be caused to assume a position thereon so as to present a perfectly smooth surface throughout in the drawing of the wire, and held thereto so as to permit of the winding of cord or thread around the same and preparatory to the conduct thereof through the bath of molten insulating material for effecting the thorough insulation of the same.

With respect to the operation of the apparatus of Fig. 2, it may be here remarked and as will be observed by reference to the drawings, that the cotton or other fibrous material in its travel around the cone A<sup>6</sup>, is in a certain direction until it arrives at the mouth of the funnel shaped nozzle A<sup>7</sup>, whereat in the continuous drawn action of the wire 1, from the reel B, through the tank C, between the guide rolls c<sup>10</sup> and c<sup>11</sup>, hollow spindle a<sup>17</sup> and the cone A<sup>6</sup>, the fibrous material 3, will be taken up and caused to adhere to the moist, wet or sticky insulated wire 1, in an opposite direction to that of its travel around the cone A<sup>6</sup>, in such manner as to present a uniform surface prior to the application thereto of the cord or thread from the whirler or flier G<sup>2</sup>, and preparatory to the saturation of the covered and corded wire with an insulating material in the passage of the same through the tank I, as illustrated in Fig. 2, for subsequent use as an insulated electric conductor.

It may be here remarked that the wire is continuously drawn through the members constituting the apparatus of Fig. 2, at such relative rate of speed with respect to the delivery of the cotton or similar material from the carding engine to the cone A<sup>6</sup>, as to afford



the necessary clearance in the nozzle  $a^7$ , so as to prevent any accumulation of such material at that point in the laying up of the same so as to present a uniform surface onto the still wet insulated wire traveling in the path thereof by the revolution of the reel J, by means of a hand-crank or in any other preferred manner.

I am aware that it is not new to provide a cable with successive layers of bitumen separated and maintained by spiral bands of bitumenized paper and consolidated by coils of bitumenized twine or yarn, and the whole, when necessary, protected by an outer covering of metallic wire, but my invention differs essentially therefrom in that according thereto is produced an electric conductor by subjecting a wire to a bath of insulating material and before the insulating material becomes dry on the wire is applied fibrous material, such as cotton or the like to form a smooth surfaced covering therefor and then winding around the covered wire a cord or thread to conceal the fibrous material thereof and the thus covered and corded wire is then subjected to an insulating bath to thoroughly saturate the entire body of the same and to produce when dry a most efficient insulated electric conductor.

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The herein described method of producing an insulated electric conductor, which consists in continuously drawing a wire through a bath of insulating material and successively feeding under required tension and applying in regulated quantity cotton or the like to said wire while said insulating material is still wet so as to firmly adhere thereto and present a smooth and uniform surface, laying threads or cords over the fibrous covering of said wire and conducting said wire through a bath of insulating material so as to thoroughly saturate the entire body of the conductor, substantially as and for the purposes set forth.

2. An apparatus for producing an insulated

electric conductor, comprising a reel, a jacketed tank provided with a rotatable roll with a removable cover having openings therein, means, as described, for feeding under required tension and applying in regulated quantity fibrous material to a wire adapted to be moved continuously in the path thereof and so as to firmly adhere thereto and so as to present a smooth exterior surface, a whirler or flier, a traveler drum, a jacketed tank provided with an internal roll, a reel, and means for actuating said movable parts of the apparatus, substantially as and for the purposes set forth.

3. An apparatus for producing an insulated electric conductor, comprising a carding-engine with a wiper or roll, a rotatable cone-shaped drum, a reel, a jacketed tank provided with a revoluble roll, a nozzle, a rotatable whirler, a tank for containing insulating material, and a winding-reel, substantially as and for the purposes set forth.

4. An apparatus for producing an insulated electric conductor, comprising a carding engine, a rotatable cone located adjacent thereto and provided with a hollow spindle, a funnel shaped feeding device, a whirler, tanks adapted to contain insulating material and rotatable reels adapted to contain the wire and resultant product, substantially as and for the purposes set forth.

5. An apparatus for producing an insulated electric conductor, comprising a carding engine having a delivery roll or rolls, a rotatable cone located adjacent thereto, a funnel shaped nozzle partially surrounding one portion of said cone, a rotatable whirler, a reel, tanks adapted to contain insulating material and a rotatable reel, substantially as and for the purposes set forth.

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

JOHN ROBINSON.

Witnesses:

THOMAS M. SMITH,  
RICHARD C. MAXWELL.