

(No Model.)

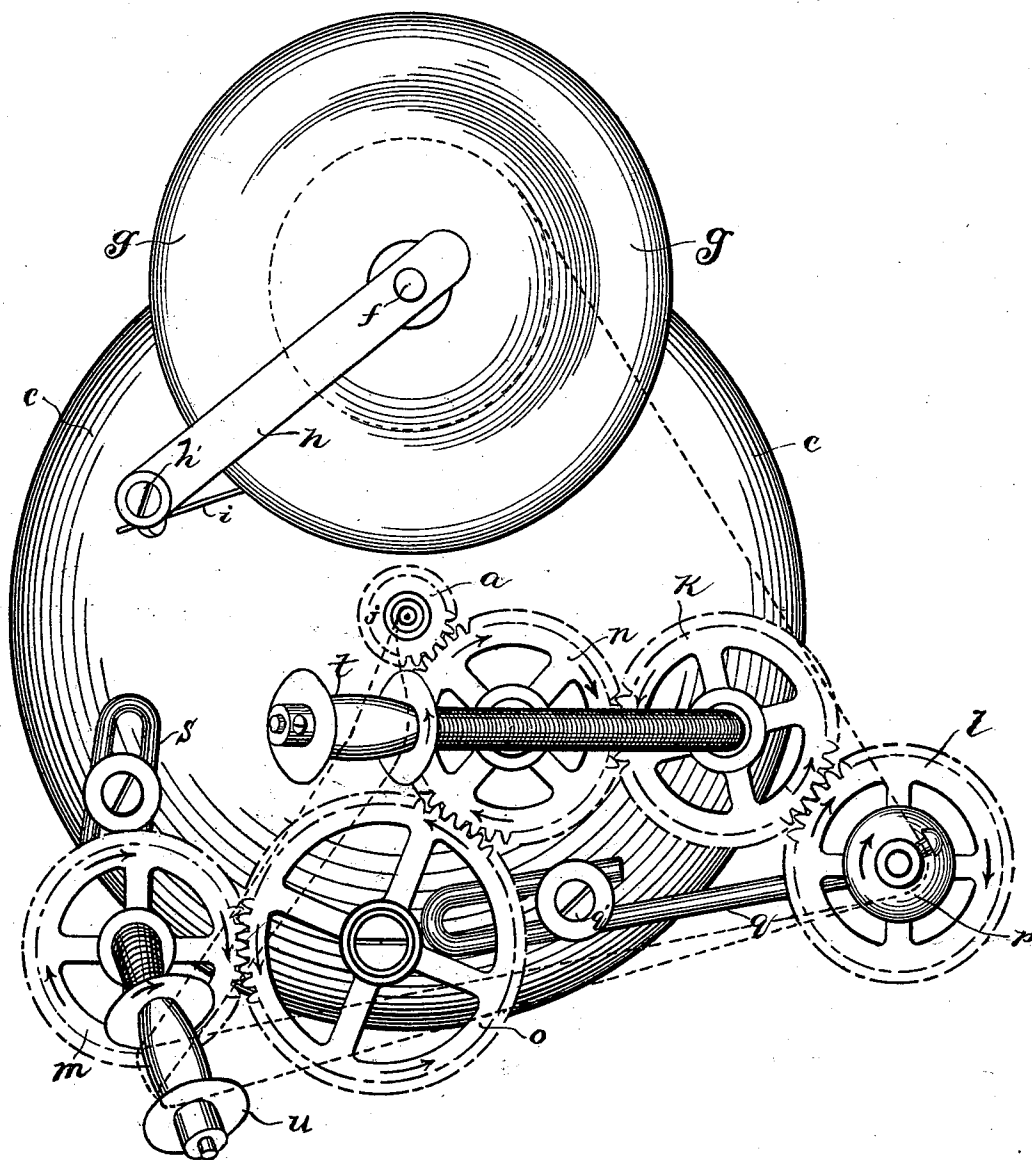
4 Sheets—Sheet 1.

T. N. HALLANGER.
APPARATUS FOR INSULATING WIRE.

No. 544,530.

Patented Aug. 13, 1895.

Fig. 1.



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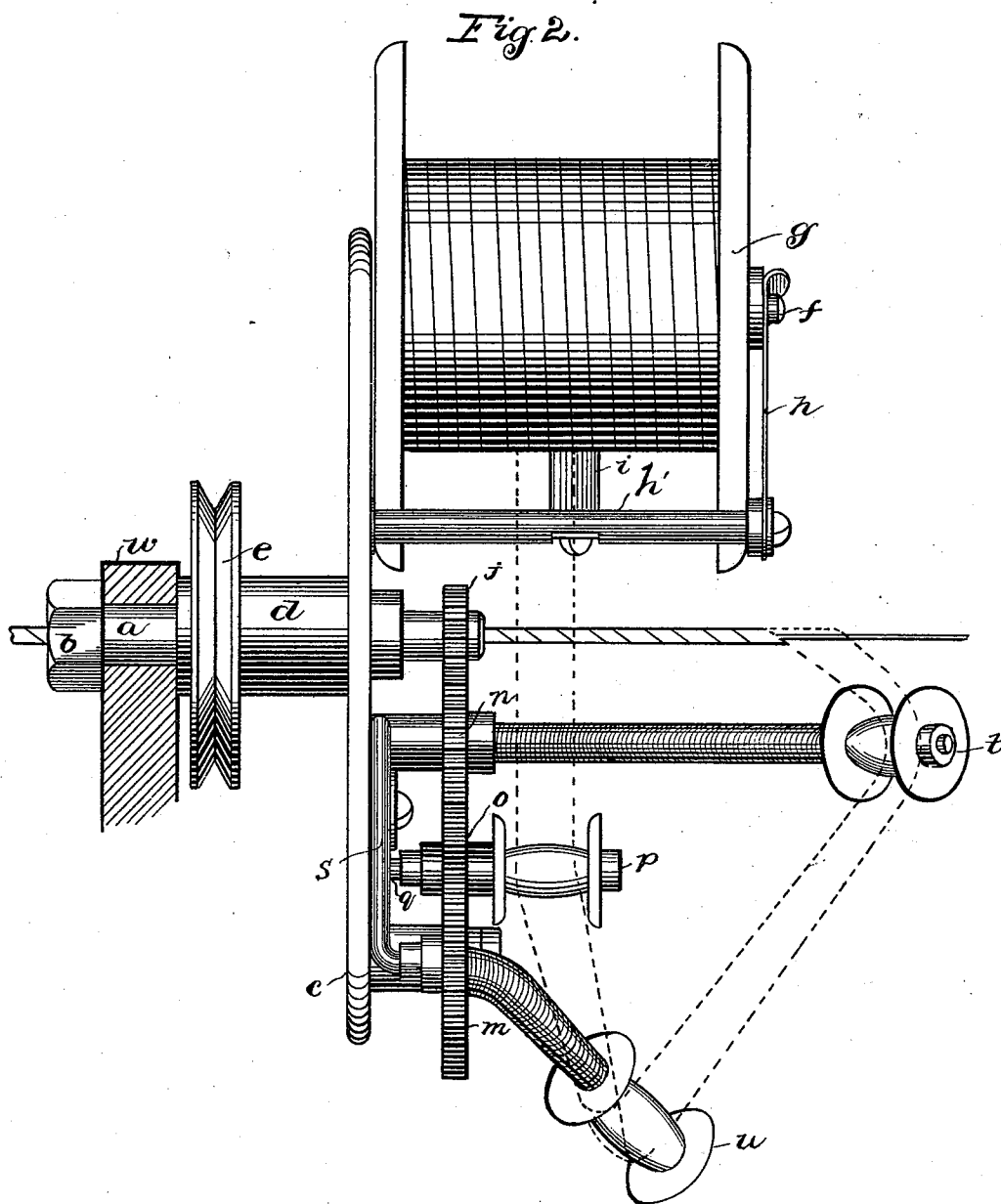
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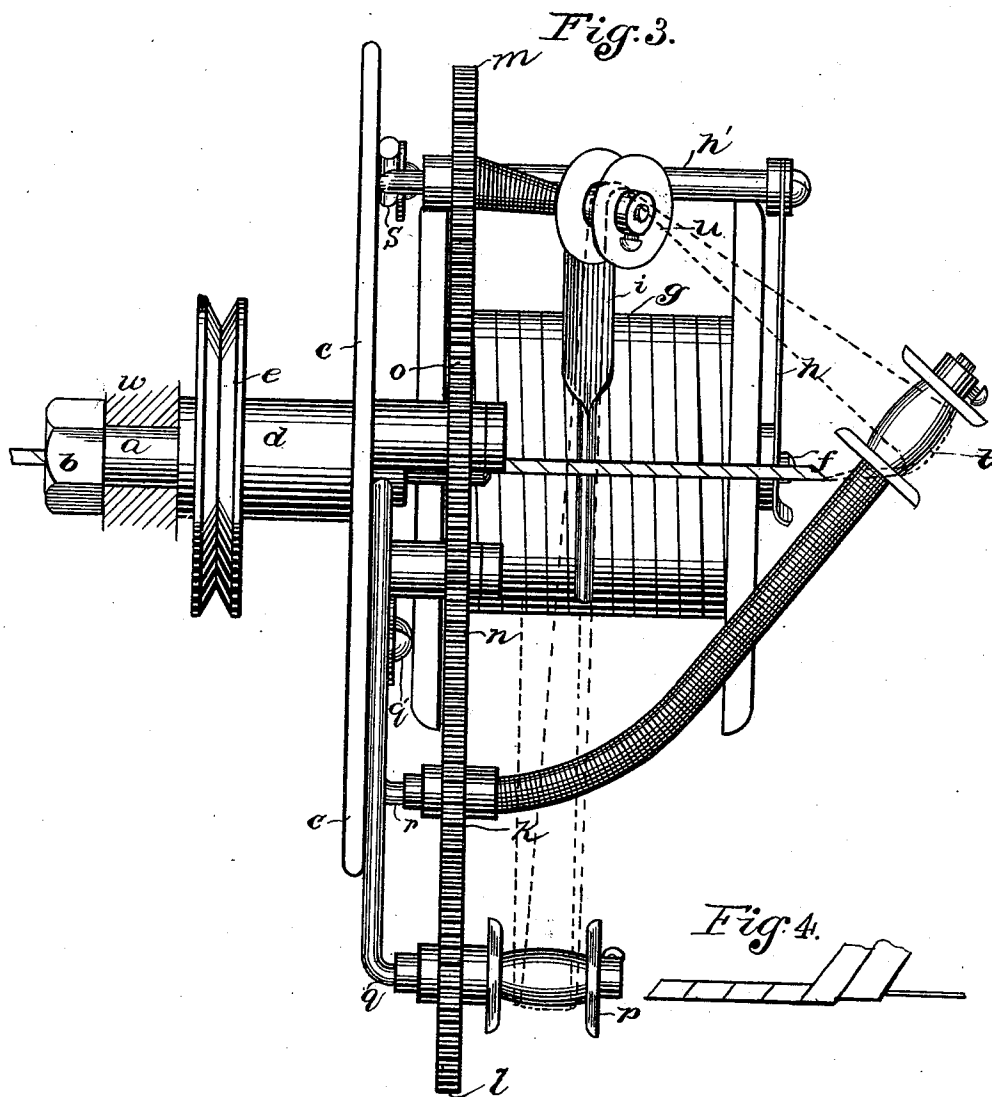
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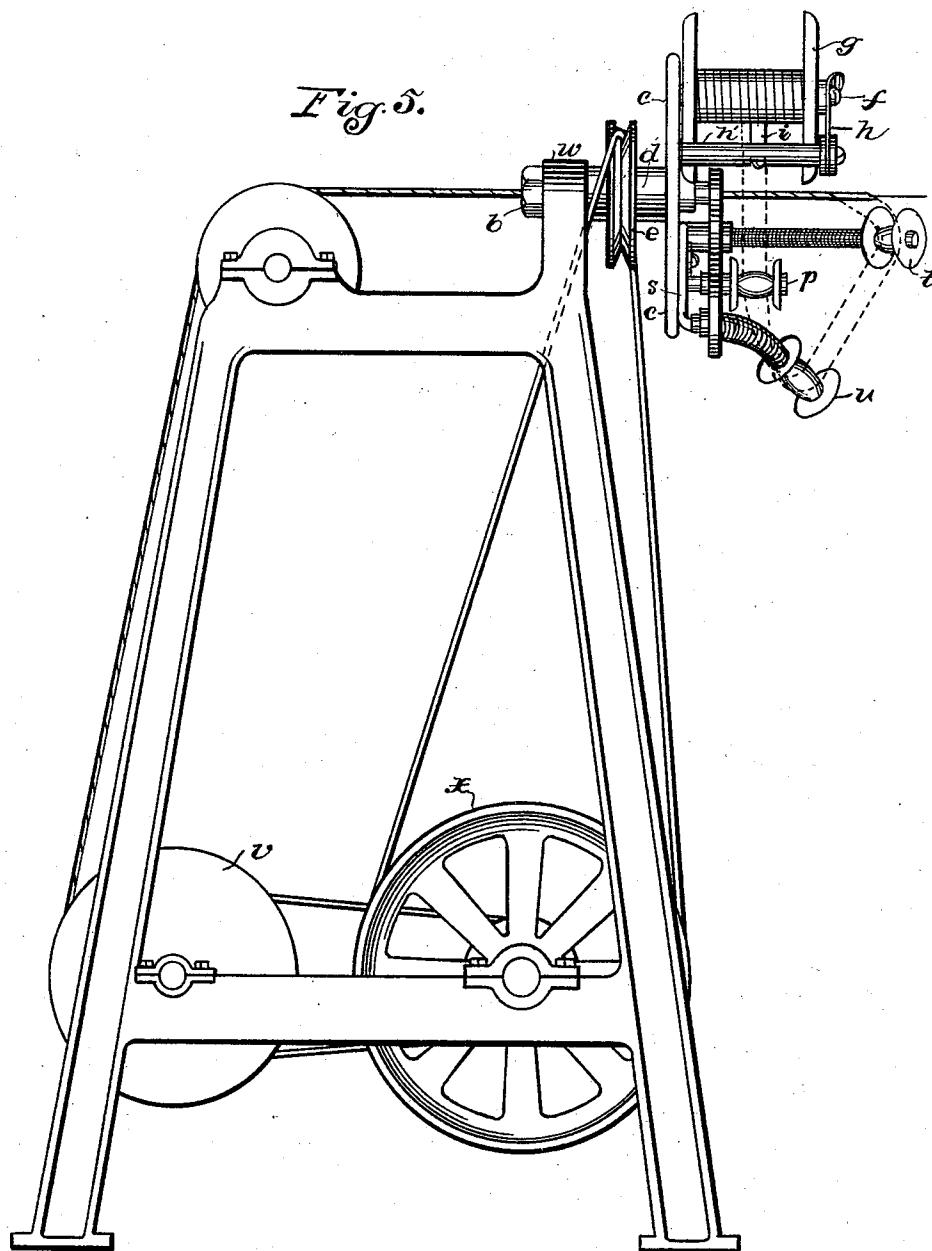
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UNITED STATES PATENT OFFICE.

TOBIAS N. HALLANGER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE WESTERN ELECTRIC COMPANY, OF SAME PLACE.

APPARATUS FOR INSULATING WIRE.

SPECIFICATION forming part of Letters Patent No. 544,530, dated August 13, 1895.

Application filed November 14, 1891. Serial No. 411,848. (No model.)

To all whom it may concern:

Be it known that I, TOBIAS N. HALLANGER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Apparatus for Insulating Wire, (Case No. 1,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to insulating conductors for electric cables. Its object is to provide a continuous tube or envelope of fibrous insulating material loosely surrounding the conductor.

Heretofore it has been common to wind insulating-coverings of fibrous material upon electrical conductors, said covering tightly inclosing the conductor; but it is found that by winding the covering loosely upon the conductor, allowing an air-space between the insulating material and the conductor, the insulation of the conductor is increased, while the capacity thereof is decreased.

My invention, speaking generally, consists in feeding a flat tape of said insulating material in an oblique direction to a fixed point from a source of supply revolving around said fixed point, whereby each successive convolution is wound upon the preceding convolution. The completed convolutions are given a progressive motion, whereby the coil is drawn out into a spirally-wound tube having a diameter depending upon the speed of feeding of the tape. The conductor to be insulated is held centrally in the tube and is drawn along continuously with the formation thereof.

My invention possesses the additional advantage that, since the tape is fed at a fixed rate independent of the circumference of the wire, no tension is put upon either the wire or the tape. The wire is thus not bent and the tape is not torn or broken.

My invention is therefore especially useful in insulating conductors with paper tape; but it may be used also in insulating with cotton or other fibrous material, the threads of insulating material being laid parallel in a tape on the spool in the usual manner.

The means for carrying out my invention is illustrated in the accompanying drawings.

In the drawings, Figure 1 is a plan view of the winding-head adapted to use with a wire-covering machine of ordinary construction. Fig. 2 is a side elevation thereof. Fig. 3 is another side elevation thereof from a direction at right angles to Fig. 2; and Fig. 4 is a view of a piece of wire inclosed in a double-wound tube, the tapes forming the tube being partially unwound to disclose the structure. Fig. 5 is a side elevation of an insulating-machine provided with my improved covering-head, showing the reels for drawing the conductor to be covered through the head.

Referring to Figs. 1, 2, and 3, *a* is a spindle adapted to be secured by means of the nut *b* to the frame *w* of a wire-covering machine in the ordinary manner and as shown in Fig. 5. The spindle is perforated centrally lengthwise to allow the passage of the wire and covering through it. Upon the spindle *a* is journaled the face-plate *c*, provided with a hub *d* carrying pulley *e*, whereby it may be rotated by a belt from a driving-pulley *x*, Fig. 5, in the usual manner. A pin *f* upon the face-plate *c* carries a spool *g* containing the insulating-tape. The spool is kept in place upon the pin *f* by means of a flat spring *h*, secured at one end to a standard *h'* and having at the other end a collar encircling the pin *f*. This device allows of the easy removal of the spool to refill. A tension-spring *i* bears upon the spool *g* and prevents too rapid unwinding of the tape. That end of the spindle *a* which projects from the face-plate *c* carries a pinion *j*. Upon the face of plate *c* are mounted the gear-wheels *k l m* and the intermediate gears *n o* meshing therewith.

The pinion *j* meshes with the intermediate gear *n*, which meshes with gear *k*, which in turn meshes with gear *l*. The intermediate gear *n* also meshes with a second intermediate gear *o*, which meshes with wheel *m*. Thus when the face-plate *c* carrying said gears is revolved, the pinion *j* being held stationary, all the gear-wheels are caused to rotate.

The gear *l* is fixed upon a sleeve, which is provided with a flanged roller *p*. Said sleeve rotates upon a spindle *q*, which is secured to

the face-plate *c* by means of a screw *q'*, whereby the position of the roller *p* is made in a slight degree adjustable. The gears *k* and *m* rotate likewise upon spindles *r* and *s*, one of which *s* is made adjustable in the same manner as *q*. Both of the spindles *r* and *s* carry rollers *t u* at their outer extremities and are bent, as shown in the drawings, so as to carry the rollers obliquely. Motion is communicated from the gear-wheels *k* and *m* to the rollers *t* and *u*, respectively, by means of spiral springs, one end of a spring being connected to the gear-wheel and the other to the roller. These spiral springs surround and are guided by the spindles carrying the rollers. The rollers are set in oblique directions in order to guide and feed the tape properly without producing any considerable twist in any small length of the paper. The last roller or guide is set at such an angle and in such a position that the tape after leaving said roller will not be twisted in passing to the position around the wire, but will remain continually parallel to the axis of the wire and will move in planes parallel to said axis. The conductor to be insulated is shown in position in the drawings. Suitable reels *v* (shown in Fig. 5) draw the conductor along through the spindle *a* in the usual manner. The path of the insulating-tape is shown in dotted lines in the drawings. The tape is led from the spool *g* around the perpendicular roller *p*, then around the oblique roller *u*, then around the other oblique roller *t*, and thence passes to and is wound about the conductor, which then passes through the opening in the spindle *a*.

The operation of my invention will now be readily understood. As the face-plate *c* rotates, the rollers *p t u* are caused to rotate, as described, and feed off the tape from spool *g* toward the center of revolution—the spindle *a*—tending to make a spiral coil of tape at that point; but the inner convolutions of the coil are continually drawn through the spindle *a* along with the wire, so that a spirally-wound tube is formed. The edge of each turn of the tube serves as a mandrel upon which the succeeding turn is wound, whereby all strain upon the wire is avoided. It will be seen that the diameter of the inclosing tube can be varied by simply changing the rate of feeding of the tape. A conductor may be covered with two or more concentric tubes wound in the same or in different directions, when desired. This may be accomplished by successive operations, or, as in the ordinary practice, by providing two heads adapted to

form two tubes about the conductor at the same time.

The tube formed by my improved process possesses such rigidity of structure that it may be burnished by a suitable burnisher attached to the head in the same manner as with coverings wound directly upon the conductor.

I do not limit myself to any particular mechanism for feeding the tape forward at the suitable rate of speed. I have sometimes used a belt to rotate rollers *p t u* in place of the gears shown.

Having thus described my invention and the operation thereof, I claim as new and desire to secure by Letters Patent—

1. In a wire covering machine the combination with the plate *c* adapted to be rotated about the center *a* through which the wire to be covered is passed, of a support adapted to carry a spool from which the insulating material is drawn, and rollers mounted upon spindles rotating with said plate *c* about the center *a* and being inclined with reference to each other, whereby they are adapted to guide the insulating material helically about said wire and to be positively rotated in a forward direction, substantially as described.

2. The combination with the rotating plate *c* of the fixed spindle *a*, the rotating guides *p, u, t*, carried upon said plate *c* by spindles which are relatively inclined to each other, said rollers being adapted to rotate about the fixed spindle *a* and to direct the insulating material helically about a wire, the pinion *j* upon said fixed spindle *a* and the gears *k, l, m, n, o*, meshing with said pinion *j* and adapted to give guides *p, u, t*, a forward rotary motion, substantially as described.

3. The combination with a spool support of the plate *c* carrying said spool support, plate *c* being journaled at *a* and provided with suitable means whereby it may be rotated, rotating guides *p, t, u* journaled upon bearings secured to said plate inclined relatively to each other and adapted to direct the insulating material upon the wire as they revolve about the center *a*, and mechanism adapted to rotate said guides in a forward direction whereby the insulating material is wound loosely upon the wire, substantially as described.

In witness whereof I hereunto subscribe my name this 28th day of October, A.D. 1891.

TOBIAS N. HALLANGER.

Witnesses:

M. JEANE TALLETT,
GEORGE L. CRAGG.