No. 768,754. PATENTED AUG. 30, 1904.

I. KITSEE.

INSULATING ELECTRIC CONDUCTOR.

APPLICATION FILED APR. 26, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

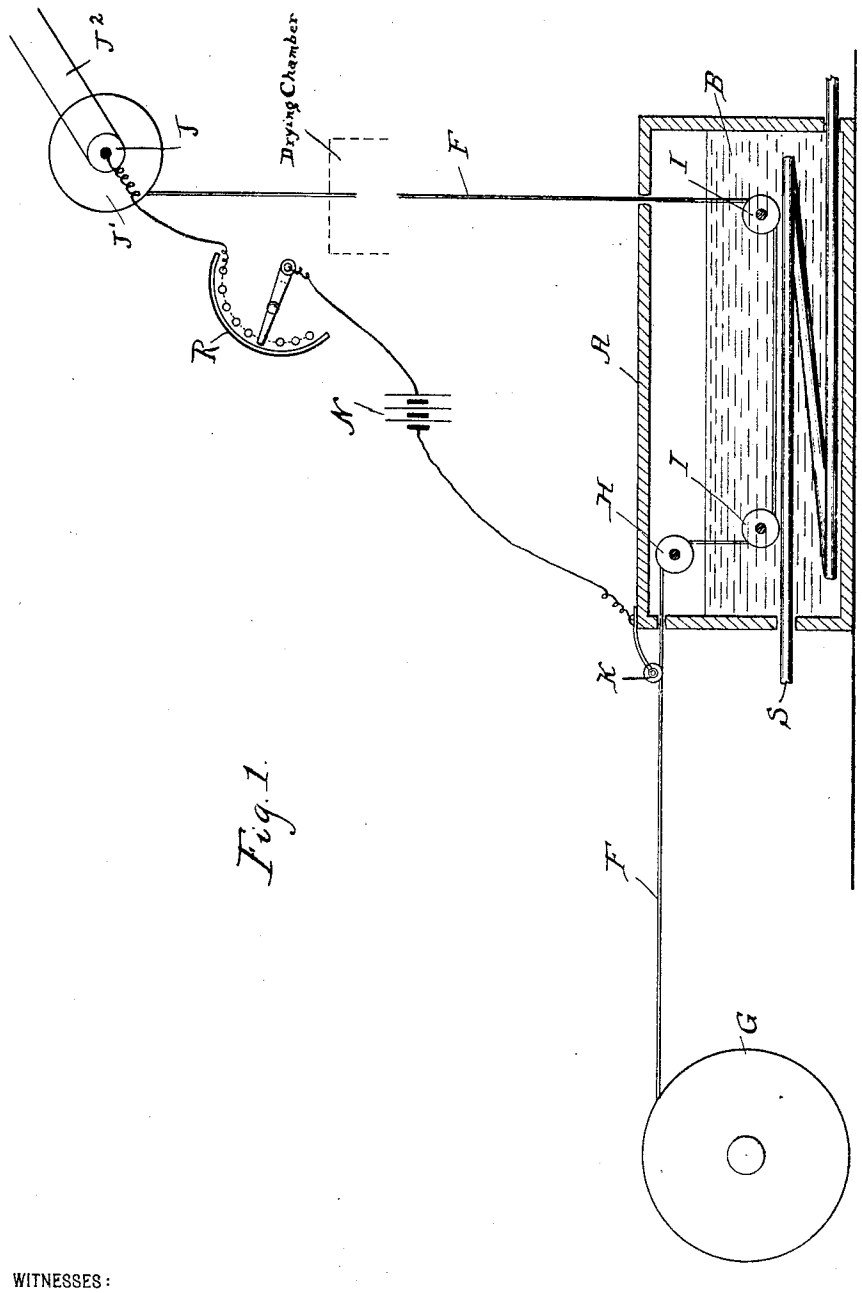


Fig. 1.

WITNESSES:

Edith R. Stilley

H. B. Hallock

INVENTOR

Isidor Kitsee

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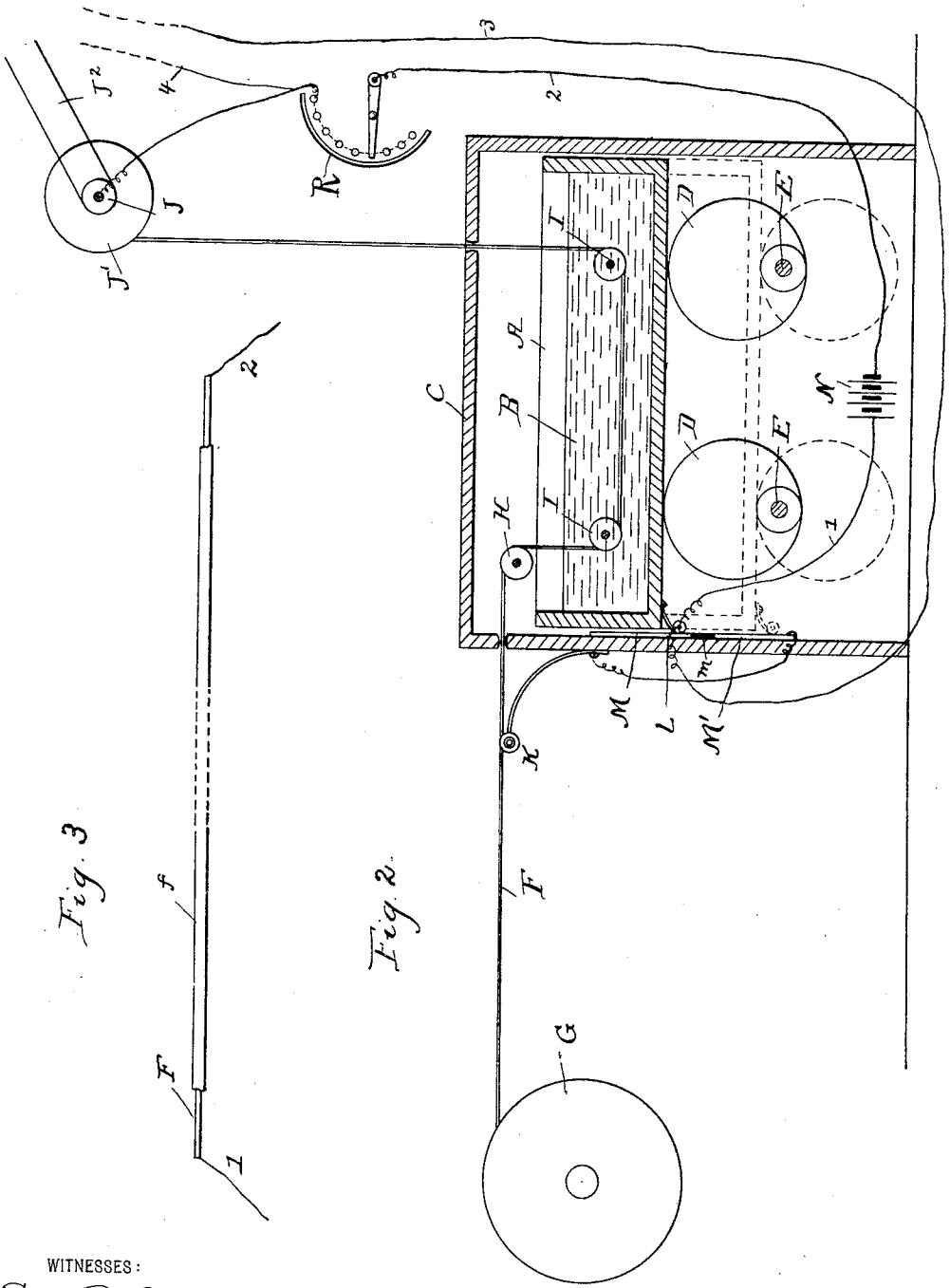


Fig. 2.

Fig. 3.

WITNESSES:

Edith R. Stilley

H. B. Hallock.

INVENTOR

Isidor Kitsee

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UNITED STATES PATENT OFFICE.

ISIDOR KITSEE, OF PHILADELPHIA, PENNSYLVANIA.

INSULATING ELECTRIC CONDUCTOR.

SPECIFICATION forming part of Letters Patent No. 768,754, dated August 30, 1904.

Application filed April 26, 1902. Serial No. 104,833. (No model.)

To all whom it may concern:

Be it known that I, ISIDOR KITSEE, of the city and county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Insulating Electric Conductors, (Case No. 125,) of which the following is a specification.

My invention relates to an improvement in insulating electric conductors, and has more special reference to the drying or curing (vulcanizing) such insulation.

Its object is to facilitate the drying out of the moist insulation or the curing or vulcanizing of said insulation where curing or vulcanizing is desired.

In cases where the conductor is covered with an insulating material in its moist state the drying of that part of the material exposed to the air greatly retards the drying out of the whole mass, for the reason that the part exposed to the air forms a film which prevents the effectual evaporation of the solvent in the layers below the film. More so is this the case where the insulation is of considerable thickness, and this disadvantage is invariably met in the process of insulating wires with a solution containing amorphous cellulose. Again, in some cases—as, for instance, where the cellulose is intermixed with sulfur and has to be cured or vulcanized with the aid of heat or where the insulation consists of caoutchouc or rubber to be cured or vulcanized with the aid of heat—it is always preferable that this heat should be applied to both surfaces of the insulation, and the aim of my invention is to overcome the disadvantage of applying heat only to the outer surface and to apply the heat from within as well as without.

In the drawings I have illustrated my invention as applied to insulating-wires, but it is obvious that other conductors can be substituted therefor. I have also illustrated in the drawings my improved form of applying heat through the conductor to the inner surface of the insulation in different manners. The one illustrated in Figure 1 may be preferred where the solvent is not too inflammable or where the conductor has to be raised to too high a temperature, and the second (illustrated in Fig. 2) may be preferred where the high inflammability of the fluid is a bar against high temperature. In Fig. 3 the application of the electric current is illustrated after the entire wire has been insulated. This figure illustrates the method of curing or vulcanizing an insulation consisting of caoutchouc, rubber, or like materials, and under the word "curing" I include also the process of vulcanizing. Therefore wherever in this specification or in the claims following this specification the word "curing" appears the process of curing or vulcanizing is understood thereby.

Referring to the drawings, Fig. 1 represents a vertical longitudinal section of the device wherein the conductor is continuously heated. Fig. 2 is a longitudinal section of the intermittent apparatus. Fig. 3 is a diagrammatic plan view of an insulated wire and the current-carrying circuit attached thereto.

In Fig. 1, A represents the reservoir containing the insulating solution B. F is the wire to be insulated. This wire is drawn off from the reel G into the reservoir over the guide-rollers H and I, which guide-rollers I are submerged in the solution, and the wire is then drawn upward out of the reservoir to the desired height, then over the pulley J with the attached reel J'. This pulley is actuated through the means J^2 by any suitable device such as are well known in reeling electric wires. K is a spring-trolley always in contact with the wire before it is insulated. This trolley is electrically connected with the source of energy N, which is illustrated as a battery, the other pole of which is connected through the conducting-pulley with the interposition of the variable resistance R, with one terminal of the wire on the reel. S represents a cooling-coil, through which ammonia or any other cooling solution may pass to keep down the temperature of the insulating material.

In Fig. 2, A represents the reservoir containing the solution B. C is the casing surrounding said reservoir and the operating parts. D represents cams upon which the resrevoir rests, these cams being secured to the continuously-rotating shafts E. F is the

wire passing from the reel G into the casing C over the guide-roller H into the reservoir containing the solution B, then passes from the same over the guide-rollers I, then out of the casing to the desired height over the pulley J with its attached reel J′. This pulley and reel are actuated through the means J^2 by any suitable device, such as are well known in insulating electric wires. The movement of this device should be controlled by an electromagnet connected through wires 3 and 4 to the source of current N. K is a spring-trolley always in contact with the uninsulated part of the wire F. This trolley is in electrical contact with the stationary contact-plate M′. To the movable reservoir is secured the spring-trolley L in electrical connection through wire 1 with one pole of the source of electricity N, the other pole of which is connected to the wire 2 and conducting part of the pulley with one terminal of the wire F. To the casing C is also secured the stationary contact-plate M. These two contact-plates M and M′ are electrically disconnected from each other through the insulating material *m*.

In Fig. 3, F is the wire, and *f* the insulation for same, and 1 and 2 are the circuit-wires adapted to connect the wire F to the source of current.

In all these figures the drying-chambers are omitted; but it is obvious that the wire may be carried to any of the well-known drying-chambers if so required before being placed on the reel.

I will first describe the *modus operandi* of my invention, as illustrated in Fig. 1. The wire to be insulated is carried through the insulating solution, or is otherwise provided with the insulating-covering, and at the same time that part of the wire not yet insulated is electrically connected with one pole of a source of electricity, the other pole of which is connected with the conducting terminal of said wire. The current will therefore flow from the source of electricity through that part of the wire already insulated, through that part of the wire undergoing the process of insulation, and through a small part of the wire which has not yet received the insulating covering. It is obvious that the amount of current to be transmitted through the conductor should be of the necessary volume (amperage) so as to heat the conductor to the required degree. It is also obvious that with the aid of the rheostat or variable resistance R this flow of the current can be regulated at will. These parts are so well known by persons versed in the art that it is unnecessary for me to go more into detail of same. As the passage of the current will heat also that part of the wire which is in the process of insulating, it is necessary that if the insulating material consists of a solution contained in a reservoir, as illustrated, this solution should be cooled continuously, and for that purpose the cooling-pipe S is placed in the receptacle; but this pipe may be replaced by other means. I have illustrated in the drawings the source of current as to consist of batteries; but it is understood that the current may be drawn direct from the dynamo or from converting-coils, if this current is an alternating or phase one.

In Fig. 2, with a device as illustrated, the operation is as follows: As long as the reservoir will remain in the position as illustrated the current flow will be from the source of electricity N, through wire 1, trolley L, conducting-plate M, wire 3, electromagnetic device for actuating the reel, (the device is not shown in the drawings,) back through wire 4, wire 2, to the source of current N. This electromagnetic device is adapted to stop the mechanism which actuates the reel J′ and the winding of the wire on said reel will cease. When the reservoir A is lowered, through the movement of the cams D, the trolley L will be brought out of contact with the conducting-plate M, thereby demagnetizing the electromagnetic device, which will estop the movement of the reel J′ and will come in contact with the plate M′, thereby sending the current from the source of electricity N through wire 1, trolley L, stationary contact M′, trolley K, through a part of wire F which has already undergone the process of insulation, and the current will then return through wire 2 to the source of electricity. At the same time this part of the wire will be reeled on J′, and if through the continuous movement of the cams D the reservoir A is again lifted to the desired height a part of the wire not yet insulated will be immersed in said reservoir, and at the same time the movement of the reel will again cease.

Fig. 3 simply illustrates a wire provided with an insulation and provided also with the terminals of an electric circuit adapted to heat this wire through the passage of a current of electricity for the purpose of drying out this insulation or curing (whereby is also understood "vulcanizing") the insulation.

I have illustrated some of the apparatus used with my invention, but it is understood that any other means may be substituted therefor and that the insulating material may be in a solid, semisolid, or fluid state, provided that said insulation requires a high temperature for the purpose of drying out or curing (vulcanizing) the same.

In experimenting to find out how far the heating of the conductor, substantially as illustrated in Fig. 1, can be carried out without detrimental effect on the solvent I have, besides others, used cellulose dissolved in amyl acetate—a highly-volatile solvent. The wire to be insulated was connected to a one-hundred-and-ten-volt circuit and eight amperes sent through same. The temperature of the wire was raised to about 200°. The wire was carried through the insulating fluid at

this temperature and it was noticed that the film remaining on the same after the evaporation of the liquid was far thicker than the film remaining on the wire carried through the liquid in a cold state. This advantage alone would justify the process of heating the conductor during the period of insulation. It was also noticed that after the wire had left the fluid the solvent evaporated so quickly that the fumes issuing from the insulation could easily be distinguished. At the beginning of the experiment the rise in temperature of the insulating-bath was not very noticeable, but later it was necessary to cool this bath and the fluid was kept in motion, so as to prevent a too-high rise of temperature at one particular point.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The process of applying insulation to an electric conductor and drying said insulation thereon, which consists in passing the conductor through a body of the insulation, passing a current of electricity through said conductor simultaneously with its passage through the insulation to deposit the insulation upon the conductor, and continuing the passage of the current through the conductor after the latter has emerged from the body of insulation to dry the insulation upon the conductor.

2. The process of insulating an electric conductor with a material dissolved in its solvent, and drying said insulating material upon the conductor, which consists in passing the conductor through said material while the latter is in a moist state, simultaneously therewith raising the temperature of the conductor by the passage of an electric current therethrough to deposit the material upon the conductor, and continuing the passage of the current through the conductor after the latter has emerged from the body of insulation to dry the insulation upon the conductor.

3. The process of insulating an electric conductor with an amorphous cellulose dissolved in its solvent, and drying said cellulose upon the conductor, which consists in passing the conductor through a bath containing the cellulose, passing a current of electricity through said conductor simultaneously with its passage through the bath to deposit the cellulose upon the conductor, and drying said insulation upon the conductor with the aid of the electric current.

4. The process of insulating a metallic wire, which consists in passing the wire through a bath consisting of the insulator proper and a solvent wherein said insulator is dissolved to coat portions of the wire successively introduced into the bath, heating said wire by the passage of electric currents through the same to cause the insulating material to adhere to the wire, and continuing the passage of the electric currents for drying the insulation upon the wire.

In testimony whereof I hereby sign my name, in the presence of two subscribing witnesses, this 25th day of April, A. D. 1902.

ISIDOR KITSEE.

Witnesses:
H. B. HALLOCK,
EDITH P. STILLEY.