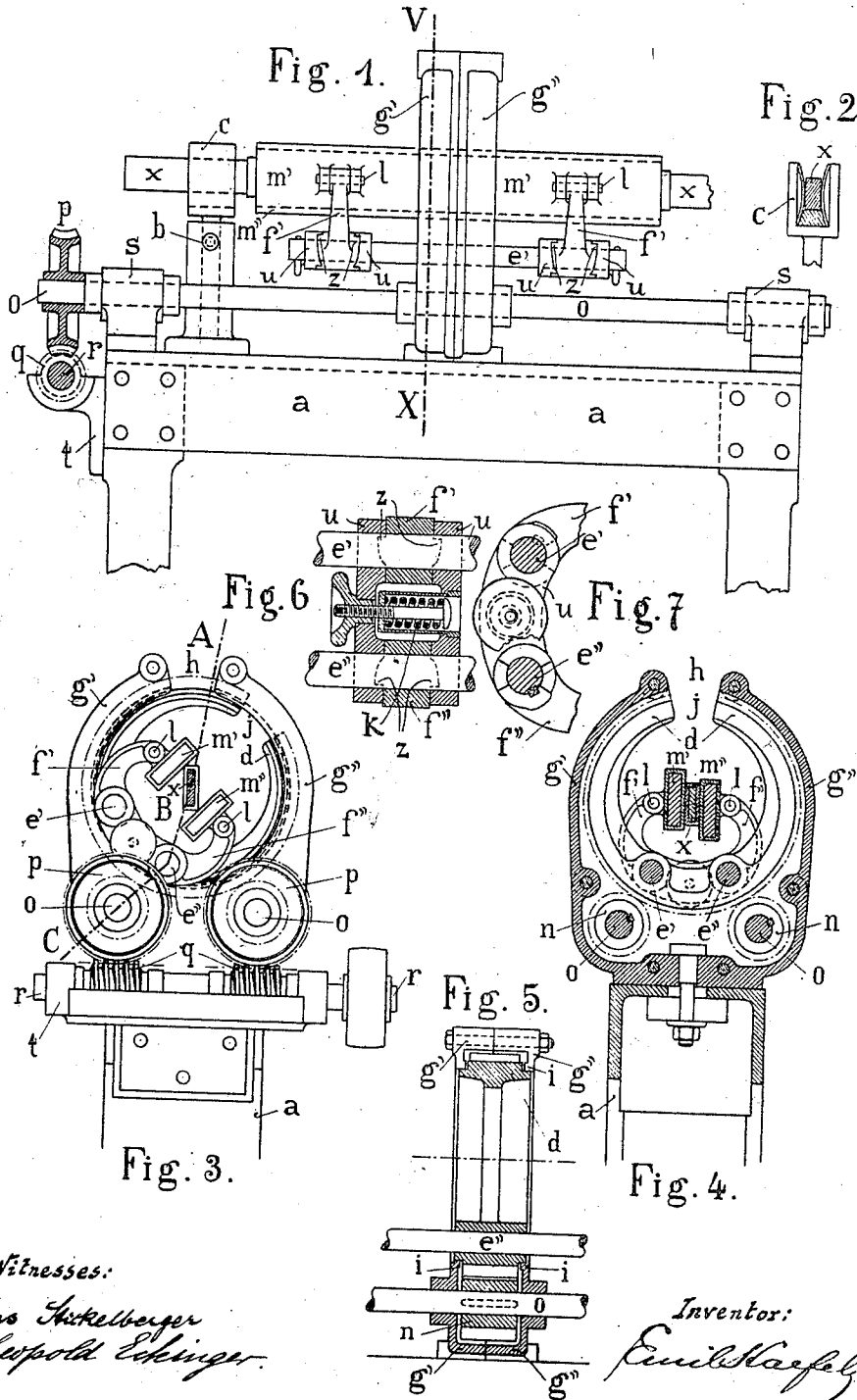


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COIL INSULATING MACHINE.
APPLICATION FILED APR. 20, 1911.

1,090,394.

Patented Mar. 17, 1914.



Witnesses:

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COIL-INSULATING MACHINE.

1,090,394.

Specification of Letters Patent.

Patented Mar. 17, 1914.

Application filed April 20, 1911. Serial No. 622,388.

To all whom it may concern:

Be it known that I, EMIL HAEFELY, a citizen of the Swiss Republic, residing at 29 Bundesstrasse, Basel, in Switzerland, have invented certain new and useful Improvements in Coil-Insulating Machines, of which the following is a specification.

My invention relates to apparatus for applying wrappings or coverings of fabric to rods or bars, and it has special reference to apparatus which is adapted to apply insulating fabric to the coils of dynamo-electric machines and other types of electric apparatus.

The object of my invention is to provide a relatively simple machine by which particularly desirable insulating wrappings or coverings may readily be applied to coils of the class above indicated after they are bent into final form.

Another object of my invention is to so construct and equip the machine just referred to as to minimize the employment of manual labor and, at the same time, to improve the quality of the insulation.

In my co-pending application, Serial No. 507,003, filed July 10, 1909, apparatus is shown and described which has the same general purpose as that herein set forth but which requires the expenditure of a considerable amount of manual labor and the constant attention of an operator.

According to my present invention, I provide an automatic machine which may operate without any attention for a considerable period of time and produce uniform results, the insulating fabric being closely wrapped about the portion of the coil on which the machine is operating. The insulating material, when complete, constitutes a solid mass which is practically impervious to moisture and is capable of withstanding relatively high voltages.

In the accompanying drawing, Figure 1 is a side elevation of the apparatus; Fig. 2 is a front elevation of a holder for the work; Fig. 3 is a front elevation of the apparatus without the holder shown in Fig. 2; Fig. 4 is a section on the line V—X of Fig. 1, and Fig. 5 is a section on the broken line A—B—C of Fig. 3. Figs. 6 and 7 are fragmentary detail views of certain of the parts shown in the preceding figures.

For supporting a mandrel to be wound or one already wound with insulating mate-

rial, holders *b* are secured to the frame *a* and are provided with bifurcated heads *c* padded on the inner sides of the fork branches (Fig. 2). Between the two holders, of which Fig. 1 shows only that on the left hand side of the frame, is adjustably mounted a casing consisting of two halves *g'*, *g''* that are bolted together and are provided at the top with an opening *h*. The inner wall of each half of the casing is provided with a circularly curved recess, and between the edges *i* of the walls of the said recesses, is rotatably mounted a spur wheel rim *d* provided with an opening *j*. While in Fig. 4 the recess *j* of the toothed rim *d* coincides with the recess *h* of the casing, it is shifted relatively to the latter to the extent of about 45° in Fig. 3. In the toothed rim *d* are mounted two spindles *e'*, *e''*, one of which is provided with two arms *f'*, and the other with two oppositely disposed arms *f''*. An ironing bar *m'* is pivoted to the ends of the two arms *f'* by means of a pin *l* and a similar bar *m''* is pivoted to the ends of arms *f''*. The two ironing bars are hollow, in order that hot bars may be inserted into them. The ironing bars *m'*, *m''* are forced toward each other by springs *k* that are located between and parallel to the spindles *e'*, *e''*. Each spring *k* is held in working position by two collar-plates *u* that are mounted loosely upon the spindles *e'* and *e''*. As shown in Figs. 6 and 7, the two eyes of each collar-plate *u* are provided with recesses with which engage coupling clutches *z* having a parabolic or other convenient shape of working face and provided on the two front sides of the hubs of the arms *f'*, *f''* opposite one another. The said hubs are keyed on the spindles *e'*, *e''*, thus transporting a relative movement of the two arms *f'*, *f''*, one in respect to the other, on the spindles and pushing away the collar-plates *u* from each other, so that the springs *k* are strained more or less according as the said relative movement of the arms *f'*, *f''* is greater or less and as is, consequently, the measure of rotative movement of the spindles *e'*, *e''*.

With the toothed rim *d* engage two toothed pinions *n* of equal size that are secured to spindles *o* each of which is provided with a worm wheel *p*. With the worm wheels *p* engage worms *q* of equal pitch that are secured to a spindle *r*. The

spindles *o* and *r* are rotatably mounted in bearings *s* and *t*, respectively.

When the device *x*, to be wound or one already wound with insulating material, has been secured in the heads *c* of the holders *b* and fixed between the two ironing bars *m'*, *m''* which can be pushed away from each other by means of keys, or other convenient mechanical devices, the spindle *r* is continuously rotated, preferably by means of a mechanical driving gear. The rotation is transmitted through the worms *q*, worm wheels *p*, spindles *o* and the toothed pinions *n*, to the toothed rim *d* which carries the spindles *e'*, *e''*, the arms *f'* and *f''* and the ironing bars *m'* and *m''*. The insulating material, which may consist of paper coated with a glue such as shellac, either alone or combined with flakes of mica, is pressed hard against the mandrel by the ironing bars *m'* and *m''*, and the coating is melted by the heat of the ironing bars, preferably obtained by introducing hot rods into them, so that after the cooling and solidifying of the coating, the layers of insulating material adhere to each other and constitute a compact insulating sheath.

The object of the openings *h* of the casing *g'*, *g''* and *j* of the toothed rim *d* is to permit of the insertion of one side of a coil comprising one or a plurality of complete turns of a suitable conductor in order that the straight portions may be wound with insulating material or in order that insulating material already wound on said portions may be made more compact. The compacting is effected by the ironing bars which are revolved in contact with the work.

Having now described my invention, I declare what I claim is:

1. A device for applying a covering or wrapping to stationary bodies comprising a hollow rotatable body having a pair of pressure members mounted therein and means tending to yieldingly force said members toward each other.

2. A device for applying insulation to an electric conductor comprising a pair of co-operating pressure members adapted to engage opposite surfaces of the conductor, means for continuously exerting a force tending to move the pressure members toward each other, a hollow cylindrical member within which said pressure members are mounted, and means for rotating said cylindrical member to effect revolution of the pressure members around the conductor.

3. A device for applying insulation to electric conductors comprising a rotatively supported hollow cylindrical member, a pair of co-operating pressure members disposed within the cylindrical member and operatively associated therewith and means for continuously rotating the cylindrical member.

4. A machine for applying insulation to electric conductors comprising a rotatable hollow member having a pair of internal pivoted arms, pressure members secured to the extremities of the arms and located near the axis of the rotatable member and means for yieldingly forcing the pressure members toward each other.

5. A machine for applying insulation to electric conductors comprising a rotatable member having a pair of pivoted arms, pressure members secured to the ends of the arms and located near the center of rotation of the rotatable member, means for yieldingly forcing the pressure members toward each other, a pair of cam members acting on the arms and connected by an adjustable spring.

6. A machine for applying insulation to electric conductors comprising a rotatable member having a pair of pivoted arms, pressure members secured to the ends of the arms and located near the center of rotation of the rotatable member, means for yieldingly forcing the pressure members toward each other, and a pair of yieldingly connected cam members acting on the arms.

7. A machine for applying insulation to electric conductors comprising a rotatable member having a pair of longitudinally disposed parallel shafts, a pair of arms correspondingly mounted on the shafts, co-operating pressure members secured to the arms near the axis of rotation of the rotatable member and means for yieldingly forcing the pressure members toward each other.

8. A machine for applying insulation to electric conductors comprising a rotatable member having a pair of longitudinally disposed parallel shafts, a pair of arms correspondingly mounted on the shafts, co-operating pressure members secured to the arms near the axis of rotation of the rotatable member and comprising a pair of yieldingly connected cam blocks mounted on the shafts and located at the respective sides of the arms.

9. A machine for applying insulation to electric conductors comprising a rotatively supported hollow cylindrical member having a longitudinal side opening, bearing members located at the respective ends of the cylindrical member and having alined side openings corresponding to the side opening in said cylindrical member, and co-operating pressure members carried within the cylindrical member and yieldingly forced toward each other.

10. A machine for applying insulation to electric conductors comprising a rotatively supported hollow cylindrical member having a longitudinal side opening, bearing members located at the respective ends of the cylindrical member and having alined side openings corresponding to the side opening

in said cylindrical member, cooperating pressure members carried within the cylindrical member and yieldingly forced toward each other, and means for continuously rotating the hollow cylindrical member.

11. A machine for applying insulation to electric conductors comprising a rotatively supported hollow cylindrical member having a longitudinal side opening, bearing members located at the respective ends of the cylindrical member and having aligned side opening corresponding to the longitudinal side opening of the cylindrical member, a pair of longitudinal shafts rotatively supported within the hollow cylindrical member relatively close together and near the inner cylindrical surface diametrically opposite the longitudinal side opening, arms secured to the shafts opposite each other, longitudinal pressure members pivotally secured to the inner ends of the arms which terminate near the axis of the cylindrical member, means for yieldingly forcing the pressure members toward each other, and a driving means operatively connected to the cylindrical member.

12. A device for applying a covering or

wrapping to stationary rods or bars comprising a rotatable hollow cylindrical body having external gear teeth and a longitudinal side opening, pressure members supported near the axis of the cylindrical body, means tending to yieldingly force the pressure members toward each other, and spaced pinions meshing with said gear teeth for continuously rotating the cylindrical body.

13. A device for applying insulation to electric conductors comprising a hollow segmental cylindrical body having external gear teeth, segmental ring bearing members in which the segmental cylindrical body is rotatively supported, cooperating pressure members mounted within the body, a pair of spaced pinions, one of which is always in mesh with said gear teeth, and means for synchronously operating the pinions.

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

EMIL HAEFELY.

Witnesses:

HANS HICKELBERGER,
GEORGE GIFFORD.