(No Model.)

E. THOMSON.

DYNAMO ELECTRIC MOTOR OR GENERATOR.

No. 447,384. Patented Mar. 3, 1891.

FIG. 1.

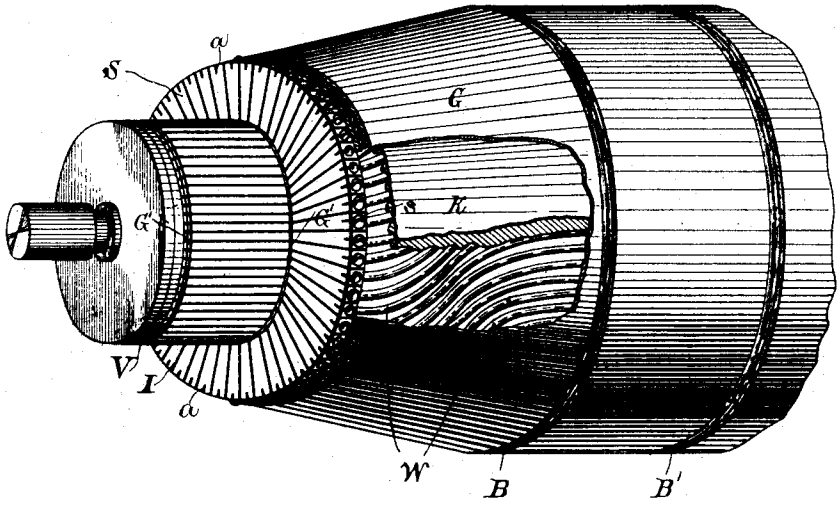


FIG. 3.

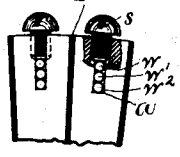


FIG. 2.

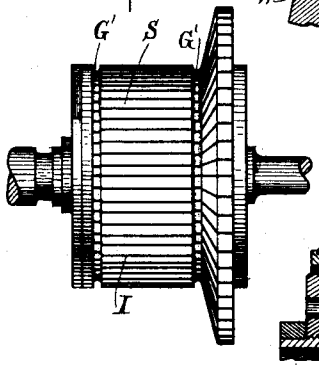


FIG. 4.

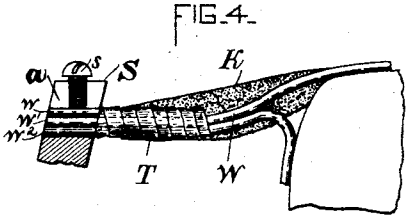
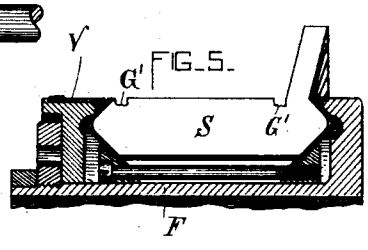


FIG. 5.



WITNESSES.

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ELIHU THOMSON, OF SWAMPSCOTT, MASSACHUSETTS.

DYNAMO-ELECTRIC MOTOR OR GENERATOR.

SPECIFICATION forming part of Letters Patent No. 447,384, dated March 3, 1891.

Application filed October 20, 1890. Serial No. 368,665. (No model.)

To all whom it may concern:

Be it known that I, ELIHU THOMSON, a citizen of the United States, residing at Swampscott, county of Essex, and State of Massachusetts, have invented a certain new and useful Improvement in Dynamo-Electric Motors or Generators, of which the following is a specification.

My present invention relates to dynamo-electric motors or generators, and will be found particularly useful in the construction of motors for use in railway service.

It comprises improvements in the means for connecting the armature-wires with the commutator-segments, and in means for binding together the projecting ends of the armature-windings into one fairly-rigid mass with the armature-body, and thus preventing the breaking of such wires by the vibrations, which necessarily arise when the motor is subjected to the enormous shocks and strains met with in railway work.

My improvements are illustrated in the accompanying drawings, wherein—

Figure 1 is a perspective view showing the end of an armature with certain parts broken away. Fig. 2 is a front view of the commutator. Fig. 3 is a detail end view, upon an enlarged scale, of a portion of the commutator. Fig. 4 is a sectional view showing the armature-wires wrapped and bound together, and Fig. 5 is a longitudinal sectional view of a portion of the commutator.

It has been found in running dynamo-electric machines, and particularly motors used for street-railway service, that the armature-wires, where they are led out to the commutator-segments, are frequently broken. This is largely due to the great jars and shocks to which the motor is subjected, and which cause more or less independent motion between the commutator and the armature, thereby necessarily producing brittleness of the copper wires and eventually rupturing them. It is my purpose to avoid this breakage by filling in and around the wires with a composition which binds the wires all together into one fairly-rigid whole, and this prevents this independence of movement. This is done in the following manner: The space between and around the wires is filled in with a composition K made of heat-resisting material, and one which binds the wires into a comparatively solid mass with the armature-body, though still allowing a slight degree of elasticity and flexibility. A composition admirably adapted for this purpose I have found to be one consisting of paper-pulp mixed with a certain amount of glue or like agglomerating material, which mixture will be applied to the wires in a plastic state, but on drying and solidifying forms a tough and heat-resisting substance which will not soften under the natural heat of the armature. Before applying this filling the wires will ordinarily be secured together by a wrapping of tape, as at T. To prevent damage from moisture, the composition may be coated with varnish and then covered by a water-proof shield G, around which are the bands B B′ for binding the body of the armature together.

In Fig. 4 the projecting ends of the armature-wires leading to one of the commutator-segments are shown at w w^2, and wrapped up with them is a third steel wire w', which extends part of the way to the armature. This third wire adds still further rigidity to the connections and is found to prevent breakage near the segments.

The commutator consists of a form or holder F, of iron or other strong metal, which is of the usual construction, and insulated segments S, which are set around in a circle and have outwardly-extending parts at their inner ends to which the armature-wires are fastened. For this purpose I form a radial slit in each segment, as at a, in which the wires are laid, and in a screw-tapped hole communicating with the slit is seated a screw or other plug s, holding the wires firmly in place. By entering the screw in this way there is gained a spring-nut or split-nut effect, whereby the screw when once firmly in place does not jar out.

In order to allow for the turning down of the commutator, a groove G′ is formed around the circumference of the commutator on each side of the wearing-surface upon which the brushes rest. A considerable amount of copper may then be worn away without interfering with the ends of the segments or their extensions.

In addition to the ordinary insulation I, which separates electrically the segments

from one another and from the metal form or holder, I guard against the formation of leaks or short circuits from the end faces of the segments by providing a surface-insulation V of considerable length around the holder, as shown. The insulation may be a band of shellac or mica or a band of other insulation thoroughly shellaced or varnished; or, in fact, anything of an insulating and water-proof nature which will effectively prevent the formation of electrical connections between the segments and frame of the machine at this point.

In Fig. 5 a portion of the surface of the holder is cut away and the band V is let in substantially flush therewith.

Having thus described my various improvements, what I claim as new, and desire to secure by Letters Patent, is—

1. An armature for a dynamo-electric motor or generator, having the wires leading from the armature to the commutator-segments bound together, and to the armature by an intermediate filling, as described.

2. An armature for a dynamo-electric motor or generator, having its wires leading to the commutator-segments bound together into a fairly rigid mass with the armature-body by a filling of a heat-resisting material applied in a plastic state.

3. An armature for a dynamo-electric motor or generator, having its wires leading to the commutator-segments bound together by a filling of paper-pulp and an agglomerating material, as glue, for the purpose set forth.

4. An armature for a dynamo-electric motor or generator, having the wires leading from the armature to the commutator bound together by a filling comprising paper-pulp and an agglomerating material, as glue, and a covering of water-proof material protecting such filling from moisture.

5. An armature for a dynamo-electric motor or generator, having a wrapping around the projecting ends of the armature-wires, which are led to the commutator-segments, and an insulating-filling around and between the said wires and wrappings.

6. An armature for a dynamo-electric motor or generator, having an auxiliary wire or wires joined with the projecting ends of the ordinary armature-wires leading to the commutator-segments, and thereby adding rigidity thereto, as described.

7. An armature for a dynamo-electric motor or generator, having an auxiliary steel wire wrapped together with the ends of the armature-wires where the latter are led to the commutator-segments, and a filling of heat-resisting material around and between said wires and wrappings.

8. A commutator composed of segments having radial slits, in which the armature-wires are laid, and plugs extending into holes communicating with the slits, and thereby holding the wires in place, as set forth.

9. A commutator composed of segments having radial slits, and screw-tapped holes communicating with the slits, in combination with the armature-wires laid in the respective slits, and the screw-plugs holding the said wires in place.

In testimony whereof I have hereunto set my hand this 17th day of October, 1890.

ELIHU THOMSON.

Witnesses:
J. W. GIBBONEY,
DUGALD MCKILLOP.