No. 842,829. PATENTED JAN. 29, 1907.

T. DUNCAN.

PROCESS OF MAKING COMMUTATORS.

APPLICATION FILED JAN. 23, 1905.

Fig. 1

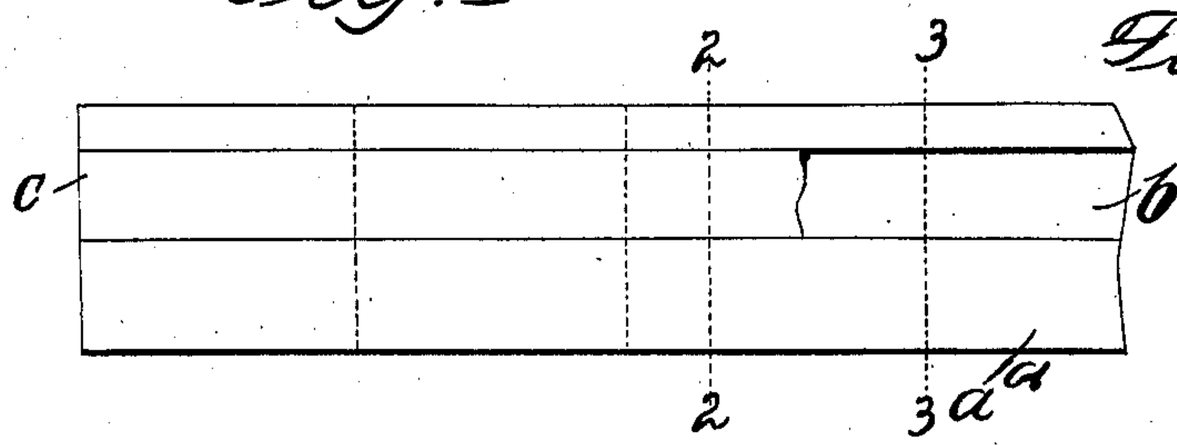
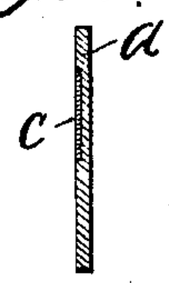


Fig. 2



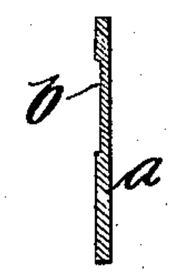


Fig. 3

Fig. 4.

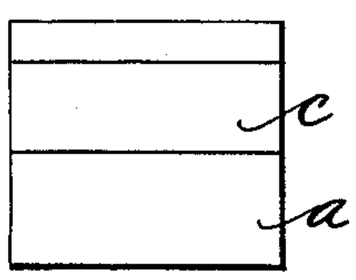


Fig. 5

Fig. 6.

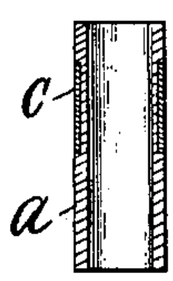


Fig. 7.

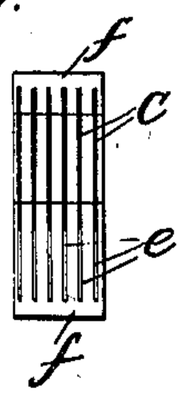


Fig. 8.

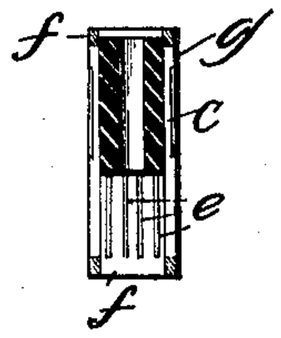


Fig. 9.

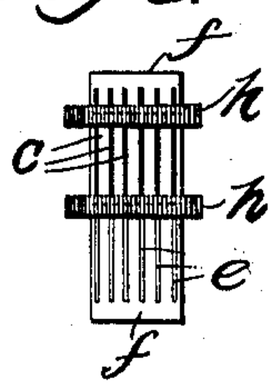
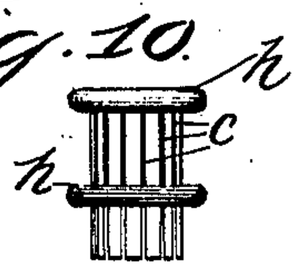


Fig. 10.



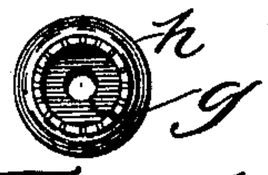
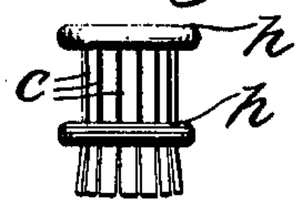


Fig. 11.

Fig. 12.



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UNITED STATES PATENT OFFICE.

THOMAS DUNCAN, OF LA FAYETTE, INDIANA, ASSIGNOR TO DUNCAN ELECTRIC MANUFACTURING COMPANY, OF LA FAYETTE, INDIANA, A CORPORATION OF ILLINOIS.

PROCESS OF MAKING COMMUTATORS.

No. 842,829. Specification of Letters Patent. Patented Jan. 29, 1907.

Original application filed March 14, 1904, Serial No. 197,913. Divided and this application filed January 23, 1905. Serial No. 242,410.

To all whom it may concern:

Be it known that I, THOMAS DUNCAN, a citizen of the United States, residing at La Fayette, in the county of Tippecanoe and State of Indiana, have invented a certain new and useful Improvement in Processes of Making Commutators, (being a division of my application, Serial No. 197,913, filed March 14, 1904,) 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 electric-motor meters, and has for its object an improvement in the method of constructing commutators that may have metal in their formation having great conductivity and to make the commutators inexpensive.

The present application for patent relates to the process disclosed in my copending application, Serial No. 197,913, filed March 14, 1904, of which this application is a division.

The metal of superior conductivity in quality that preferably enters into the construction of the commutator is silver that preferably is unalloyed. The commutator made by the process of the invention, generally speaking, may be described as one whose segments are of composite formation, each segment comprising a body portion of baser metal, as copper, and a facing of precious metal, as silver, the facings being designed to be engaged by the commutator-brushes of the meter. In making these commutators I superpose a tube of precious metal about a tube of baser metal, brazing or soldering the two tubes together, whereafter the composite tube is slotted to form the segments, which are secured in place, preferably by means of a core of insulating material, within the slotted tube and rings of insulating material around the segments and holding the same upon the core of insulating material. In the initial formation of the commutator the slots desirably extend beyond the core of insulating material and the binding-rings of insulating material, the slots desirably not extending to the ends of the tubes, so that the segments of the commutator to be are held in proper relative positions until said core of insulating material and until said binding-rings of insulating material are placed in position, whereafter the unslotted ends of the tube are cut off. The portions of the precious metal are preferably not coextensive in length with the entire commutator-segments, such lengths of precious metal being desirably restricted to the space between the rings of insulating material or to substantially this space, the portions of the commutator-segments that extend below the lower ring being desirably of the same base metal and preferably fanned out for the purpose of attaching armature-wires thereto. The composite tubes are desirably formed by first taking a strip of the baser metal, as copper, forming or rolling a groove therein, and filling this groove with the precious metal, as silver, which may be brazed or soldered to the baser part. The composite strip of metal thus formed is cut into sections which when rolled will form a tube of the diameter that the commutator is to be, which tube is put through the process above described.

I will explain my invention more fully by reference to the accompanying drawings, in which—

Figure 1 illustrates a composite sheet of baser and precious metal. Fig. 2 is a cross-sectional view on line 2 2 of Fig. 1. Fig. 3 is a cross-sectional view on line 3 3 of Fig. 1. Fig. 4 is a view of a section of the composite sheet metal of a size sufficient to form the commutator. Fig. 5 indicates the sheet shown in Fig. 4 rolled into a tube. Fig. 6 is a longitudinal section of the composite tube shown in Fig. 5. Fig. 7 shows the tube of Fig. 5 slotted. Fig. 8 is a longitudinal sectional view of the slotted tube shown in Fig. 7 with a plug or core of insulating material added. Fig. 9 shows the tubes of Figs. 7 and 8 with binding insulation-rings added. Fig. 10 is a view similar to Fig. 9, showing the rings, however, rounded off and the unslotted ends of the composite tube removed. Fig. 11 is a plan view of the structure shown in Fig. 10. Fig. 12 is a view similar to Fig. 10, showing the segments fanned out for purpose of connection with armature-terminals.

Like parts are indicated by similar characters of reference throughout the different figures.

In carrying out my invention I employ a strip of baser metal *a*, desirably of copper, and preferably form therein a groove *b* of a width slightly in excess of the contact or brush-engaging zone of the commutator and place within said groove the strip of metal *c* of superior conductivity, as silver, gold,

platinum, or other such metal, it being preferably secured in position by brazing or soldering. The strip *a* is preferably rolled separably from the strip *c*, and the composite strip *a* and *c* is again rolled after said strip *c* has been inserted to make the surfaces smooth and parallel. After this is done the composite strip is quite smooth and so far as mechanical and electrical conditions are concerned is a homogeneous structure. The composite strip is afterward cut up into lengths, as indicated in Fig. 1, a single section being indicated in Fig. 4. Each section (indicated in Fig. 4) is then turned into a cylinder, as indicated in Figs. 5 and 6, the cylinders all having the same diameter. The meeting edges of the strip (indicated at the line *d*) are preferably soldered or brazed, after which the tubes are slotted nearly their entire lengths, as indicated at *e*, Figs 7, 8, and 9. The first saw-cut is desirably along the meeting edges *d* to obliterate traces of solder. The continuous ends *f* of the tube are preferably in place until after the core or cylinder *g*, of insulating material, has been inserted and until the binding-rings *h* have been forced over the tube to secure firm engagement between the tube-segments and the insulating core or sleeve *g*. The insulating binding-rings *h* may be rounded, if preferred, as indicated in Figs. 10, 11, and 12. After the firm mechanical engagement between the slotted portions of the tube, the insulating-sleeve *g*, and the insulating-rings *h* has been effected the upper end of the tube is preferably cut away along the upper plane of the upper ring *h*, and lower end of the tube is cut away a slight distance below the lower plane of the lower ring *h*, after which the segments are preferably fanned at their lower ends to facilitate the connection of armature-coils therewith.

This method of making commutators for meters reduces the cost very materially in view of the fact that the strip or contact portion *c* may be made from expensive metal, as silver or gold, while the balance of the commutator-strip may be made from copper, brass, or other similar metal. When silver is employed in the construction of commutators, my invention enables the reduction in cost over the old method of about sixty per cent., the product being in every way as strong and serviceable as if made from the solid tube.

While I have herein shown and particularly described the preferred way of making the commutator of my invention, I do not wish to be limited to the precise details shown; but,

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

1. The process of making commutators for meter-motors, which consists in fastening a strip of precious metal upon a strip of inferior metal to form a composite strip, dividing said composite strip into lengths which, when rolled, will form tubes of the diameter to be made, rolling said lengths into such tubes, slotting and separating said tube into commutator-segments, and holding the commutator-segments in fixed mechanical relation, substantially as described.

2. The process of making commutators for meter-motors, which consists in forming a groove in a strip of inferior metal, placing a strip of precious metal in said groove and fastening said strip of precious metal to its companion strip to form a composite strip and dividing said composite strip into lengths which, when rolled, will form tubes of the diameter of the commutators that are to be made, rolling said lengths into a tube, slotting and separating said tube into commutator-segments, and holding the commutator-segments in fixed mechanical relation, substantially as described.

3. The process of making commutators for meter-motors, which consists in forming a groove in a strip of inferior metal, placing a strip of silver in said groove and fastening said strip of silver to its companion strip to form a composite strip and dividing said composite strip into lengths which, when rolled, will form tubes of the diameter of the commutators that are to be made, rolling said lengths into a tube, slotting and separating said tube into commutator-segments, and holding the commutator-segments in fixed mechanical relation, substantially as described.

4. The process of making commutators for meter-motors, which consists in establishing a groove in a body of metal, inserting a body of precious metal in said groove, and subdividing the composite body of metals into commutator-segments.

In witness whereof I hereunto subscribe my name this 9th day of January, A. D. 1905.

THOMAS DUNCAN.

Witnesses:
LINN C. ROSS,
SADIE E. ELY.