

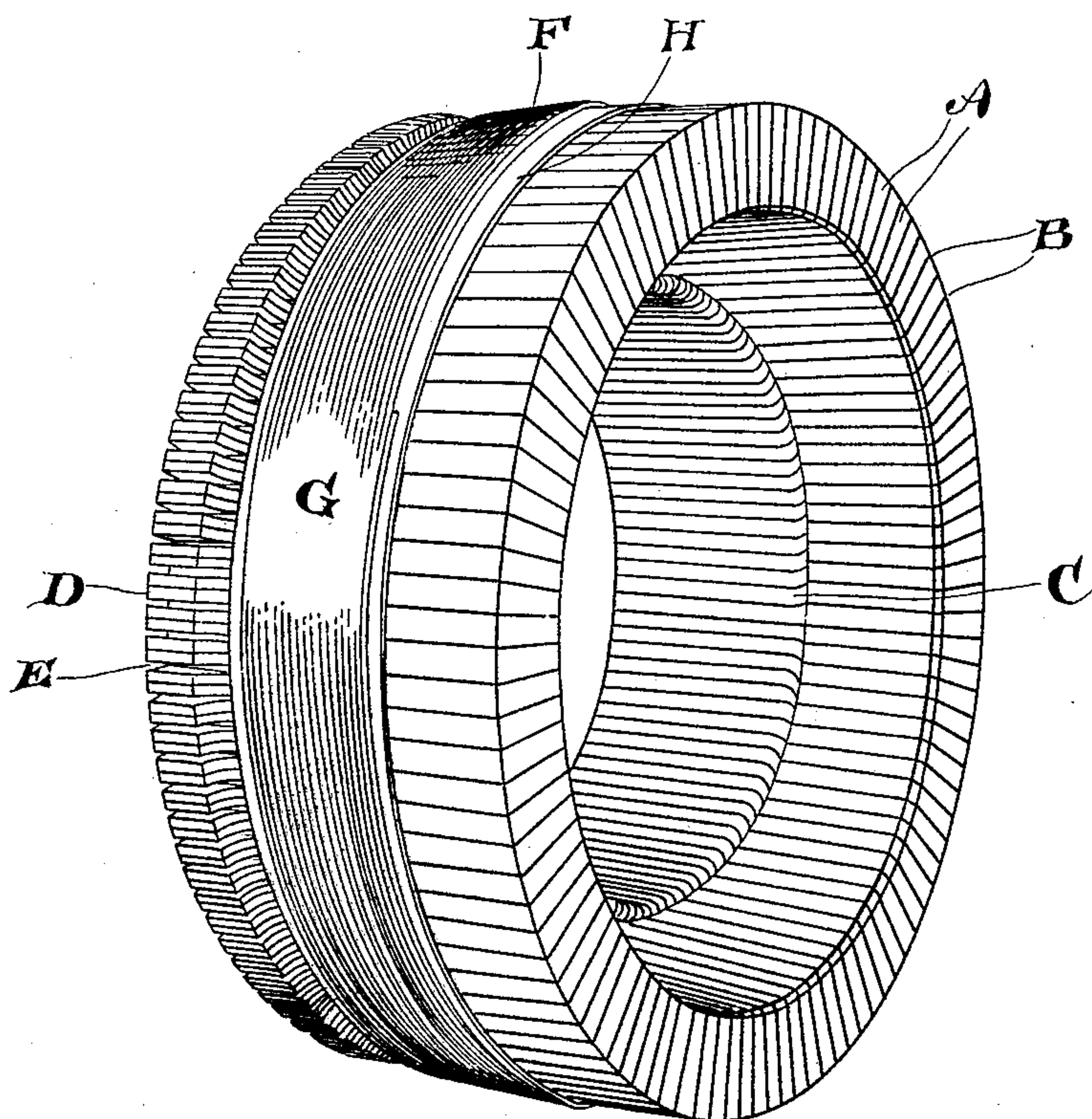
No. 614,462.

Patented Nov. 22, 1898.

J. R. GRINDROD.  
COMMUTATOR.

(Application filed Feb. 6, 1897.)

(No Model.)



WITNESSES  
*Henry Westendark*  
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# UNITED STATES PATENT OFFICE.

JOHN R. GRINDROD, OF LYNN, MASSACHUSETTS, ASSIGNOR TO THE  
GENERAL ELECTRIC COMPANY, OF NEW YORK.

## COMMUTATOR.

SPECIFICATION forming part of Letters Patent No. 614,462, dated November 22, 1898.

Application filed February 6, 1897. Serial No. 622,263. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN R. GRINDROD, a subject of the Queen of Great Britain, residing in Lynn, county of Essex, and Commonwealth of Massachusetts, have invented certain new and useful Improvements in Commutators, (Case No. 504,) of which the following is a specification.

In electric railways where the wear and tear on the motor-commutators are very severe it is necessary to renew them. Heretofore it has been customary to sell the copper segments and insulation in lots to suit, or a finished commutator was sent provided with the usual shell and retaining-clamps. These methods of procedure are both objectionable. In the former case the fact that only the larger roads are provided with suitable tools for manufacturing the commutators after the segments and insulation are received limits their usefulness to a certain class, and a further disadvantage is presented by the difficulty in obtaining workmen who can make commutators which are satisfactory from an electrical and mechanical standpoint. In the second case a shell and clamping-rings must be sent with each commutator, which necessitates that each user shall have a number of extra shells which can be sent away to the commutator-manufacturer, or the machine must remain idle while the shell is sent to be filled. A further objection to this method is that it increases the trouble of keeping accounts, and also increases the cost of shipments by express, an item which cannot be ignored.

This invention has for its object to overcome the objections above pointed out and to provide a commutator which can be properly machined and sent as a whole to the user without an internal shell and clamping ring or rings and in such shape that it can be mounted on the old shell and connected to the winding and without machining other than perhaps a light finishing cut, which can be made by the ordinary tool used for this purpose while the armature is in the motor, be ready for active service, or, as a preferred alternative, having the clamping-surfaces and outer surface finished with the excep-

tion of the actual wearing or brush-bearing portion, which latter surface may be dressed accurately after the commutator has been secured in position upon the motor.

In carrying out my invention I prefer to utilize the method of manufacture pointed out in the patent to Asa F. Batchelder, No. 539,022, dated May 14, 1895. By this means I am enabled, first, to finish the inner beveled portion of the segments, which are adapted to be engaged by the clamping-ring and bevel portion of the shell, and by inserting a "dummy" shell, which is uninsulated and consequently somewhat larger than the regular shell, I am enabled to finish the outer periphery or wearing portion of the commutator and at the same time slot and tin the bars preparatory to receiving the commutator-leads. After the necessary machine-work has been done a clamping device is applied externally to bind the segments in place, after which the dummy shell is removed, the wedge shape of the segments preventing the commutator from falling apart, and it is then ready for shipment.

In practice it has been found that a wrapping of wire forms the most satisfactory clamp; but it is within the scope of the invention to use any form of external clamp for the purpose of shipping the commutator.

In the accompanying drawing attached to and made a part of this specification is shown a commutator prepared in accordance with my invention.

The segments A are made of any desired width and thickness and separated from each other by means of strips of mica B. On the inside of the commutator is a beveled clamping portion C, adapted to engage with the shell and clamping-ring, which are secured to the armature-axle. Each segment is provided with an ear D or other device, to which the commutator-leads can be secured. In the present instance each ear is provided with a slot E, in which the lead can be placed and soldered in position. To hold the commutator-segments in place, a band F is provided composed of a number of turns of wire soldered together at one or more points G for the purpose of holding them in position. The



method of securing the turns of wire by soldering is particularly desirable, as it practically unites all of the wires into a single mass, so that if the outside wires become injured in any way the remaining wires will still serve to hold the commutator-segments in place, whereas if the ends of the wire were held together by means of a clip or other joint, and the joint should give way, the commutator-segments would all separate. Between the band F and the commutator-segments is inserted the fiber strip H, which serves to protect the surface of the commutator from the solder, which is applied at G. In addition to protecting the surface of the commutator the fiber strip H insulates the wire band F from the segment, so that the insulation of the commutator may be tested in the usual manner by a magneto. Without this insulating-strip it is impossible to test the commutator until after it is mounted on its permanent supporting-shell, and if the insulation is then found to be defective it is necessary to remove the commutator, thereby causing additional expense.

The commutator is first assembled in the manner outlined in the Batchelder patent already referred to and the beveled clamping part C turned to the required dimensions. In the present instance this clamp is shown as being on the inner periphery of the commutator; but its position is immaterial. It might be made on the outer or front face. After the commutator has been turned on the inside a dummy shell is inserted in place, which is of sufficient size to hold the segments without the use of insulation, and the outer surfaces are turned to the proper dimensions. The ears D may be slotted after the commutator has been assembled, or this may be done beforehand. After the segments have been turned true or, as preferred, have been given a rough finish and the ears slotted and tinned preparatory to receiving the commutator-leads the piece H is applied to the outer periphery and the wire band F wound in the position shown and soldered, as at G. The dummy shell is now removed, the band F tending to compress the wedge-shaped segments A and hold the commutator together. The commutator as a whole may now be shipped, and in assembling it on the motor the commutator-shell and clamping-ring are suitably insulated, the commutator inserted in place, and the whole clamped together, after which the band F may be removed by cutting the wires.

By this construction I am enabled to send out a commutator which is accurately made and one which may readily be applied to the old commutator-shell and without necessarily

removing the latter from its position on the armature-shaft.

While the invention has been shown and described particularly in connection with railway-motor commutators, it is within the scope of my invention to apply it to any desired type.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. As an article of manufacture, a commutator composed of a number of segments separated from each other by insulation, and provided with means whereby they may be secured to the shell, a finished, or partly-finished outer periphery for making contact with brushes, and means for securing the segments in place during transit and mounting, but which is removed before the commutator is used.

2. As an article of manufacture, a commutator composed of a number of segments separated from each other by insulation, and provided with internal projections whereby they may be secured to the shell, a finished, or partly-finished, outer periphery, and an external temporary clamp composed of a number of turns of wire which serve to compress the segments equally toward the center and thereby hold them in place while the commutator is being mounted on its internal shell.

3. As an article of manufacture, a commutator comprising a number of finished insulated segments, each segment being provided with an internal beveled projection by which it can be secured to the shell, and an ear to which the commutator-lead is secured, and a temporary binding band or clamp composed of a number of turns of wire tending to force the segments equally toward the center of the commutator, the turns of wire being soldered together.

4. As an article of manufacture, a commutator composed of a number of segments separated from each other by insulation, means whereby the segments may be secured to the supporting-shell, a finished, or partially-finished outer periphery to contact with the brushes, a clamp for securing the segments in place during transit and mounting, but which is removed before the commutator is used, and a body of insulating material between the surface of the commutator and the clamp, whereby the insulation of the segments may be tested before the commutator is mounted on its support.

In witness whereof I have hereunto set my hand this 4th day of February, 1897.

JOHN R. GRINDROD.

Witnesses:

ELIHU THOMSON,  
JOHN W. GIBBONEY.