(No Model.)

R. LUNDELL.

COMMUTATOR CYLINDER AND METHOD OF MAKING THE SAME.

No. 459,368. Patented Sept. 8, 1891.

Fig. 1.

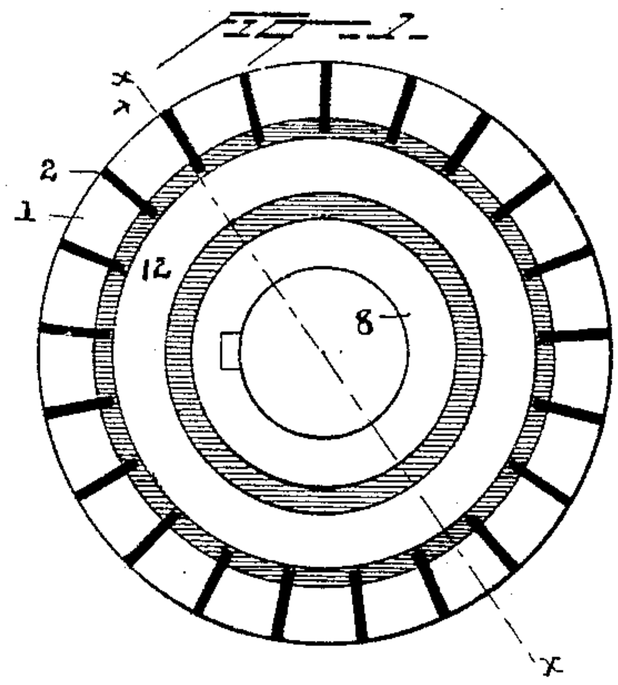


Fig. 2.

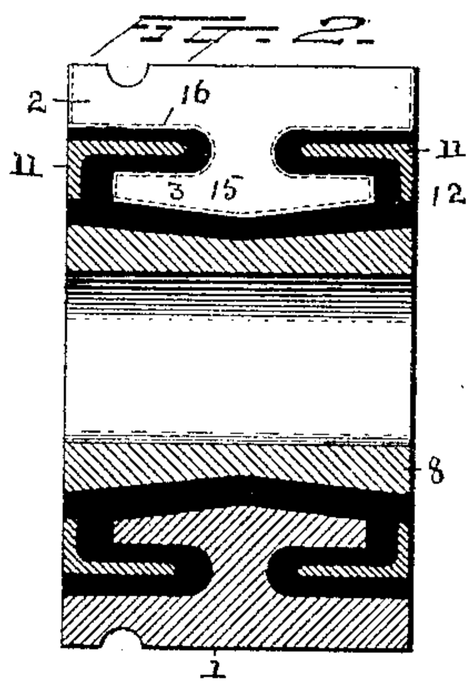


Fig. 3.

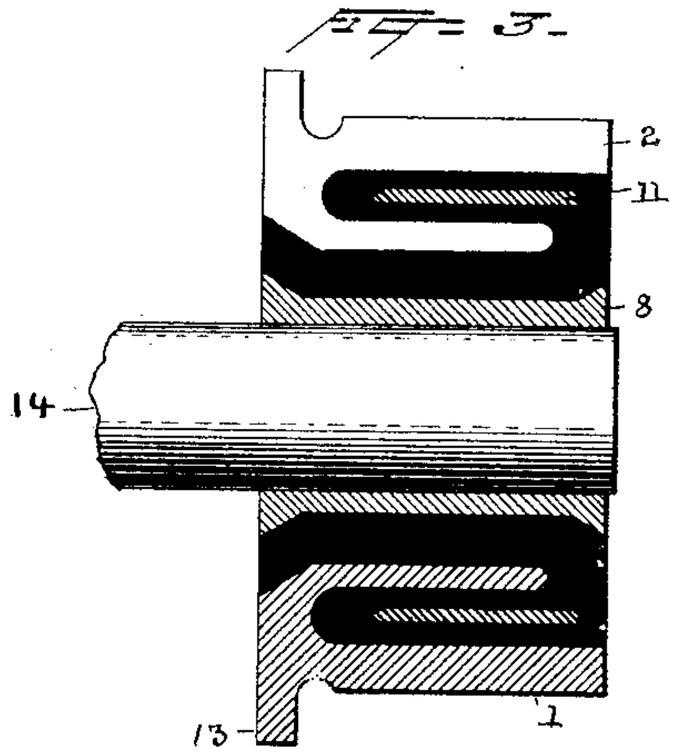
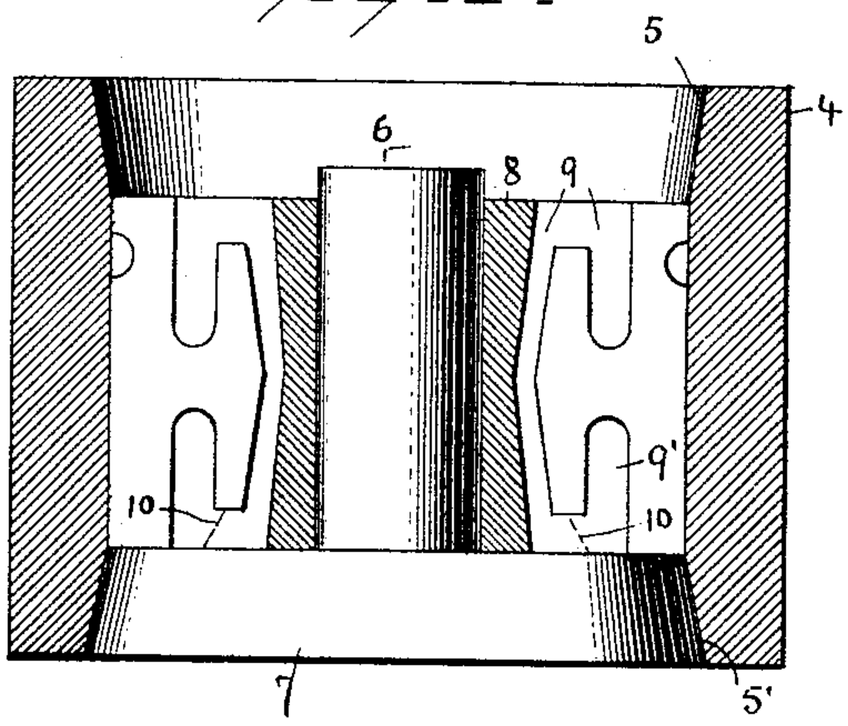


Fig. 4.



Witnesses
Morris A. Clark
M. F. Oberlin

Inventor
R. Lundell,
By his Attorneys
Dyer & Seely.

UNITED STATES PATENT OFFICE.

ROBERT LUNDELL, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO EDWARD H. JOHNSON, OF SAME PLACE.

COMMUTATOR-CYLINDER AND METHOD OF MAKING THE SAME.

SPECIFICATION forming part of Letters Patent No. 459,368, dated September 8, 1891.

Application filed April 4, 1891. Serial No. 387,607. (No model.)

To all whom it may concern:

Be it known that I, ROBERT LUNDELL, a citizen of the United States, residing at New York city, in the county and State of New York, have invented a certain new and useful Improvement in Commutator-Cylinders, (Case D,) of which the following is a specification.

The present invention relates to commutator-cylinders and to the mode of making them; and the main objects are to provide a commutator which shall be strong and shall retain an even bearing-surface for the commutator-brushes and which shall be easy to manufacture; and the invention consists in the several combinations hereinafter described and claimed, and in the improved mode of forming the commutator-cylinder.

In the accompanying drawings, Figure 1 is an end view of the commutator. Fig. 2 is a cross-section on line *x x* of Fig. 1, looking in the direction of the arrow. Fig. 3 is a section of a modified form, and Fig. 4 is a section through a commutator and a holder and is designed to illustrate the mode of forming the cylinder.

In commutators which have heretofore been made by arranging conducting-segments alternately with insulating segments or strips and supporting the cylinder thus formed on the motor-shaft by means of interposed insulating material the construction has been such that the strain incident to use of the commutator has caused the segments to work loose slightly and to thereby give an untrue bearing-surface for the brushes. The effect of this is to cause sparking and consequent injury to the brushes and to the segments. The weakness of the old commutator-cylinders was due partly to the form of segments and partly to the fact that all the force of the strain on any particular segment came directly on a small portion of the insulating material. I provide an improved arrangement by which the objections mentioned are overcome.

In making my commutator I first form a suitable number of conducting-segments 1, preferably of the shape shown in Fig. 2. If a large number of segments are to be used, they are made of comparatively thin metal and are stamped; but if the segments are large, as indicated in Fig. 1, they may be cast. I also form sections 2 of insulating material, preferably mica, which are the same shape as the metal segments, but are slightly larger. This is indicated at the upper part of Fig. 2, where the outline of a metal segment is dotted behind the insulating-plate 2. It is also indicated in Fig. 1, in which the insulating-sections are shown as wider than the metal segments.

It will be seen that both the metal and insulating sections or segments are substantially H-shaped, there being a notch or slot 3 in each side. When the sections are put together, therefore, in the form of a ring or cylinder, two annular grooves are formed by said notches, one at each end of the cylinder. When the segments are placed together as just described, I place the ring or cylinder with one end resting in the enlarged upper end of the holder or former 4, and then by suitable means force the cylinder down into said holder. This, on account of the beveled face 5, presses the metal and insulating segments of the cylinder compactly together. I then place at the center of the holder a spindle 6, equal in size to the motor-shaft with which the commutator-cylinder is to be used and having at its lower end a round plate or disk 7, with a beveled edge adapted to fit the corresponding edge 5′ of the holder. Over the spindle I place a metal sleeve 8, the surface of which is preferably inclined in two directions, as shown. Having thus arranged the several parts, I pour into the annular space 9 a suitable insulating material, which, on cooling or drying, becomes hard. This material, unless it is very thin, will not entirely fill the space, but at the bottom will stop approximately at the line 10. Before the insulating material becomes hardened a metal ring 11, which may have a flange 12, is driven into it, so that the ring is embedded in the insulating material within the annular groove heretofore described. The ring may be put in place before the upper part of the space 9 is entirely filled with insulating material, and then insulating material may be put above the ring. This arrangement is indicated in Fig. 3. The next step in the mode of making

the cylinder is to remove the spindle 6 and plate 7 and to insert the same from the opposite end of the holder, inverting said holder and cylinder, and then to fill the annular space 9′ with insulating material and to embed a second ring 11. The cylinder is then removed from the holder, put into a lathe, and turned down to give it a perfectly smooth and even bearing-surface for the commutator-brushes.

The modification illustrated in Fig. 3 differs from that already described, in that the segments 1 2 have only one notch each, and consequently the cylinder has but one annular groove for the reception of the insulating material and for the reception of a strengthening-ring 11. The mode of making it is the same as above described, except that it is unnecessary to reverse the cylinder to introduce insulating material from both ends. The holder would also require to be of slightly different shape to accommodate the flange formed by the projections 13, and the commutator-cylinder would necessarily be inserted into the ring from the same side as the end disk 7.

14 is the shaft of a motor on which the commutator is to be used.

With the construction described it is practically impossible for any one of the segmenis to work loose and get out of line with the other segments, since the ring or rings 11 are so embedded in the insulating material that any strain which would tend to move a segment of the commutator or to cause it to work loose is not borne by the insulating material alone, but is borne by said rings. The faces 15 15 of the annular grooves are parallel with the faces of the ring or rings. By making the insulating-sections larger than the conducting-sections it is rendered impossible for the metal rings to be so placed as to touch the conducting-segments.

What I claim is—

1. A commutator-cylinder composed of alternate conducting and insulating sections, a filling of insulating material between the cylinder and a sleeve or shaft on which it is mounted, and a strengthening-ring embedded in said insulating material, substantially as described.

2. A commutator-cylinder composed of alternate conducting and insulating sections, the latter being wider than the former and projecting toward the center, a filling of insulating material between the cylinder and a sleeve or shaft on which it is mounted, and a metal ring embedded in said insulating material, substantially as described.

3. A commutator-cylinder composed of alternate conducting and insulating sections, a filling of insulating material between the cylinder and a sleeve or shaft on which it is mounted, and two strengthening-rings embedded in said insulating material, one at each end of the cylinder, substantially as described.

4. A commutator-cylinder composed of alternate conducting and insulating sections, said sections being formed with one or more notches, whereby when the cylinder is built up one or more annular grooves are formed, a filling of insulating material between the cylinder and a sleeve or shaft on which it is mounted, and a ring or rings embedded in the insulating material and extending into said groove or grooves, substantially as described.

5. A commutator-cylinder composed of alternate conducting and insulating sections, said sections being formed with one or more notches with straight sides, whereby when the cylinder is built up one or more annular grooves with straight bearing-faces are formed, a filling of insulating material between the cylinder and a sleeve or shaft on which it is mounted, and a ring or rings embedded in the insulating material and extending into said groove or grooves, substantially as described.

6. A commutator-cylinder composed of alternate conducting and insulating H-shaped pieces, a central sleeve adapted to be mounted on a shaft, an interposed filling of insulating material, and strengthening-rings embedded in the insulating material, substantially as described.

7. The combination, in a commutator, of a series of conducting and insulating sections arranged to form a cylinder, a sleeve or shaft on which the cylinder is mounted, insulating material between the cylinder and sleeve or shaft, and a strengthening-ring in the insulating material, substantially as described.

8. A holder or former for use in the manufacture of commutators, consisting of a ring or cylinder the internal diameter of which is equal to the diameter of the commutator-cylinder to be made, open at both ends and beveled, in combination with a beveled plate or disk having a central stud adapted to fit in either end of the holder, substantially as described.

9. A holder for use in the manufacture of commutators, consisting of a ring or cylinder the internal diameter of which is equal to the diameter of the commutator to be made, said ring having an open beveled end, in combination with a central stud or spindle supported by a bottom plate, substantially as described.

10. The improvement in the mode of making commutator-cylinders, which consists in assembling conducting and insulating sections alternately to form a cylinder, pressing said parts together by forcing them into a suitable holder, placing a sleeve or stud at the center of the cylinder, pouring a soft insulating material into the space between the cylinder and sleeve, and then forcing a strengthening-ring into said insulating material, substantially as described.

11. The improvement in the mode of making commutators, which consists in assem-

bling conducting and insulating sections alternately to form a ring or cylinder, pressing said parts together by forcing them into a suitable holder, placing a sleeve or stud at the center of the ring, pouring a soft insulating material into the space between the ring and sleeve at one end, forcing a strengthening-ring into said insulating material, reversing the cylinder and filling the other end with insulating material, and forcing in a second strengthening-ring, substantially as described.

This specification signed and witnessed this 28th day or March, 1891.

ROBERT LUNDELL.

Witnesses:

CHARLES M. CATLIN,

AUGS. HAVILAND.