(No Model.) 2 Sheets—Sheet 1.

C. J. VAN DEPOELE.

CARBON COMMUTATOR BRUSH AND HOLDER.

No. 422,265. Patented Feb. 25, 1890.

Fig. 1.

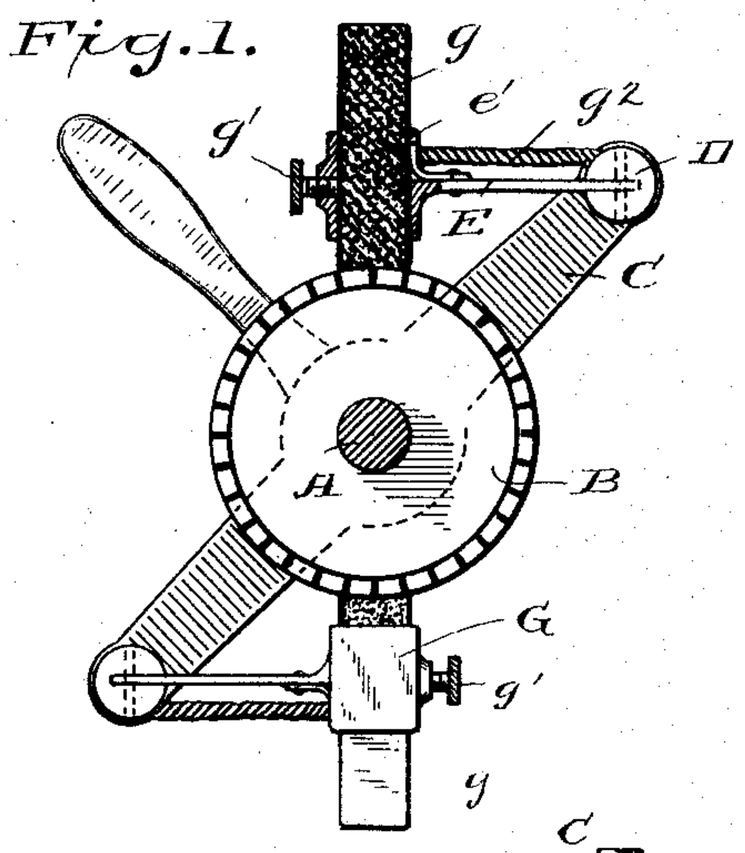


Fig. 2.

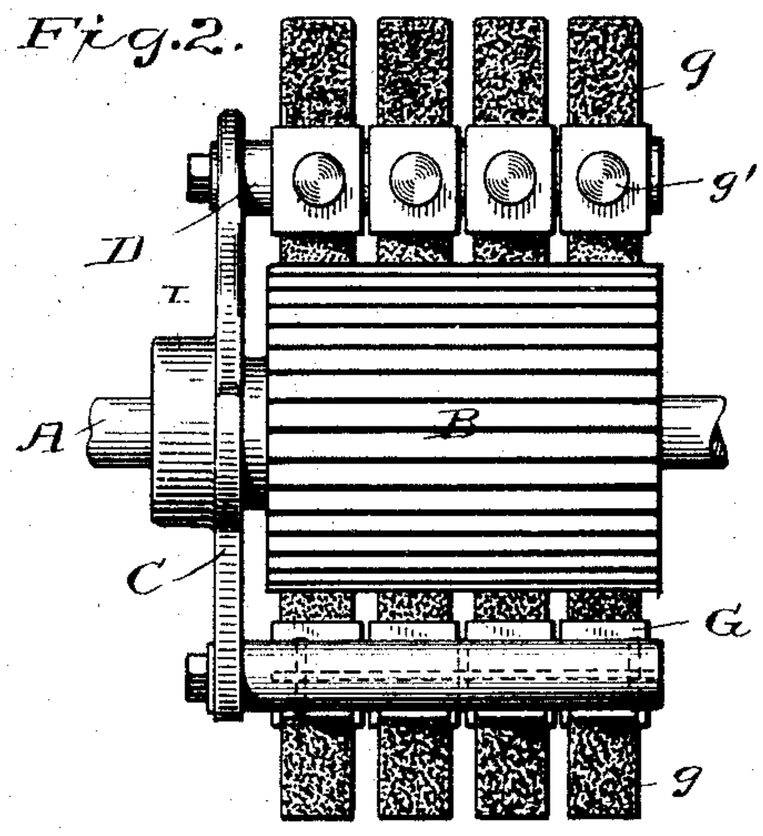


Fig. 3.

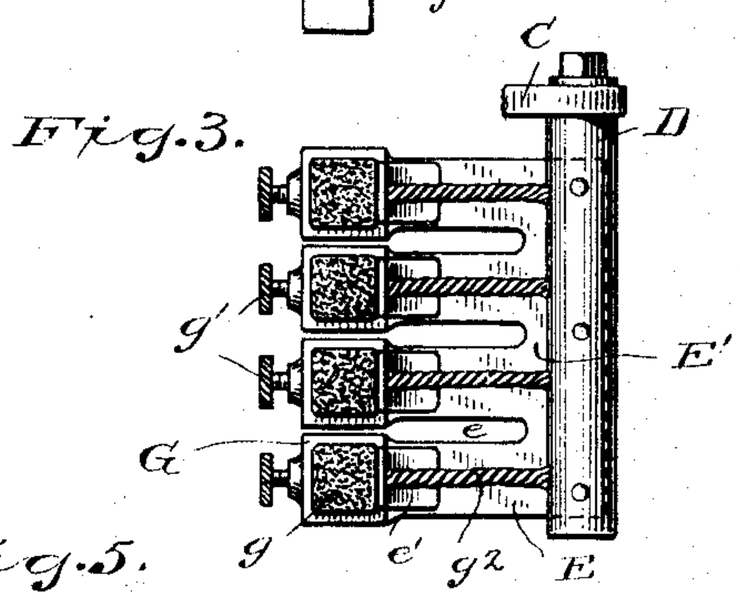


Fig. 6.

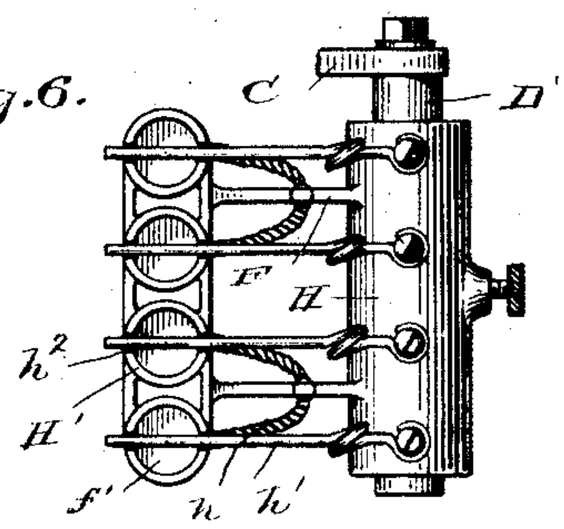


Fig. 5.

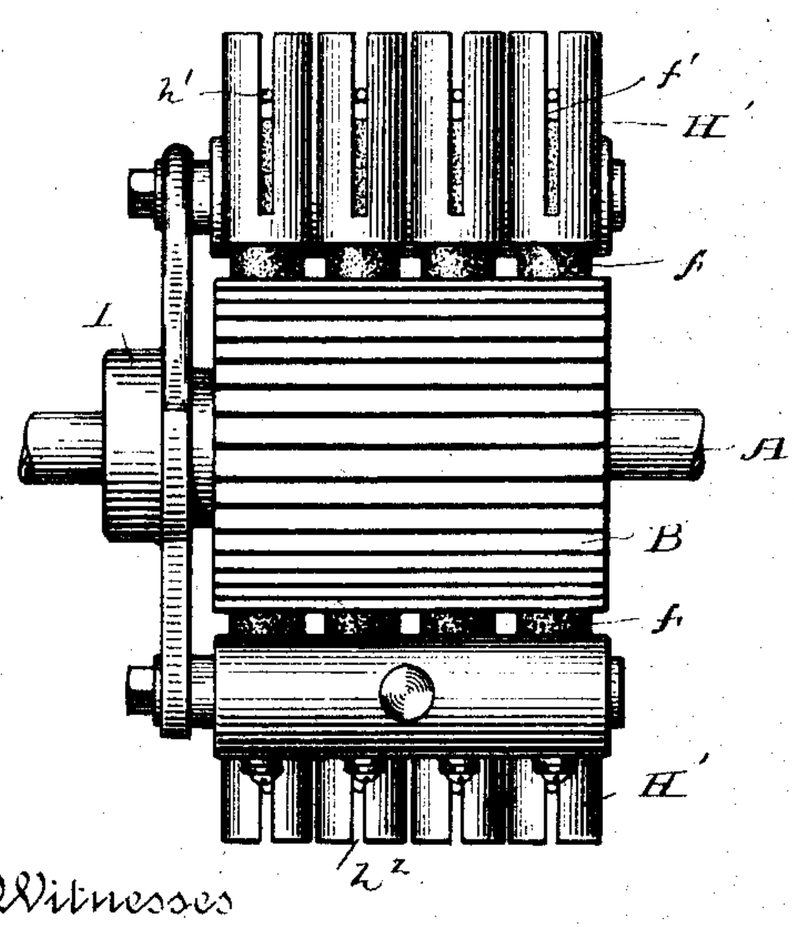
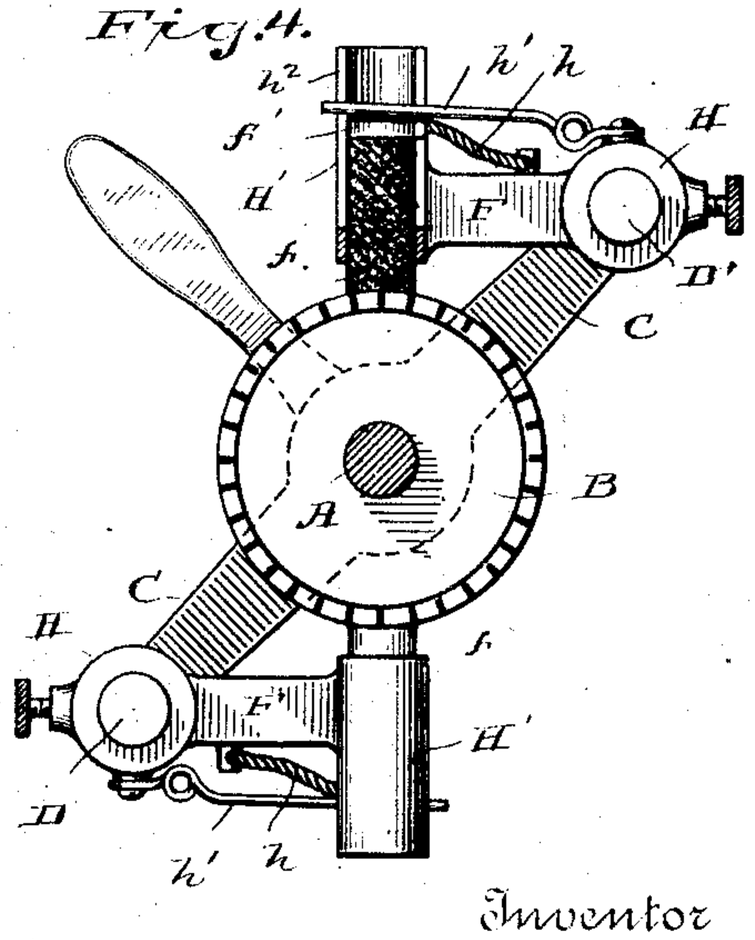


Fig. 4.



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(No Model.) 2 Sheets—Sheet 2.

C. J. VAN DEPOELE.

CARBON COMMUTATOR BRUSH AND HOLDER.

No. 422,265. Patented Feb. 25, 1890.

Fig. 7.

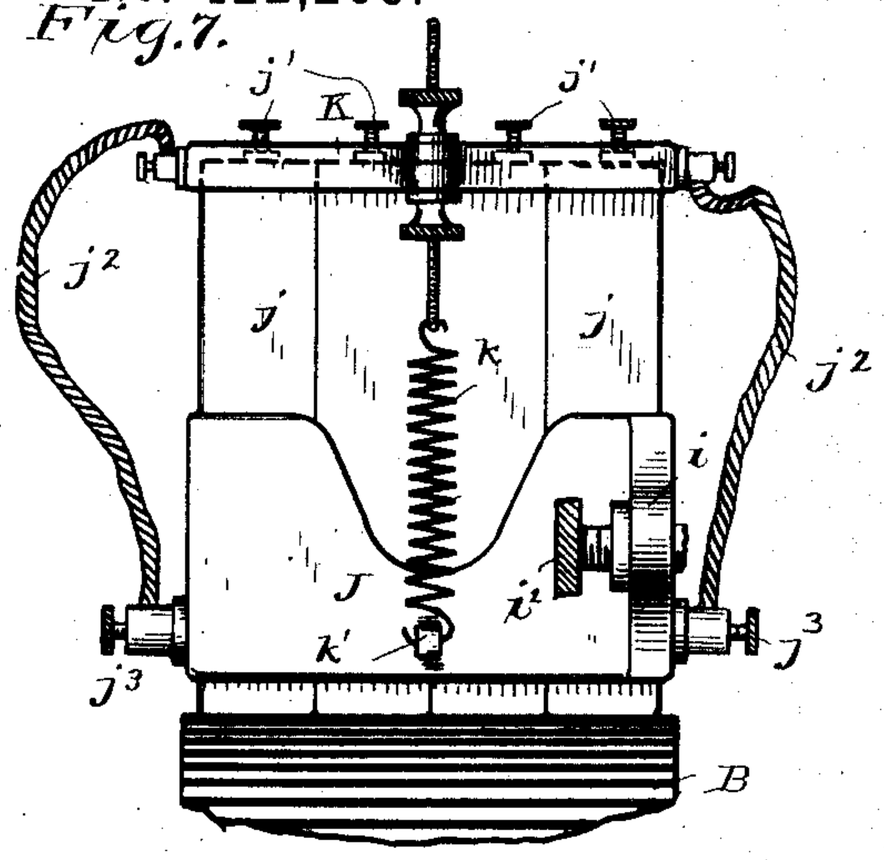


Fig. 8.

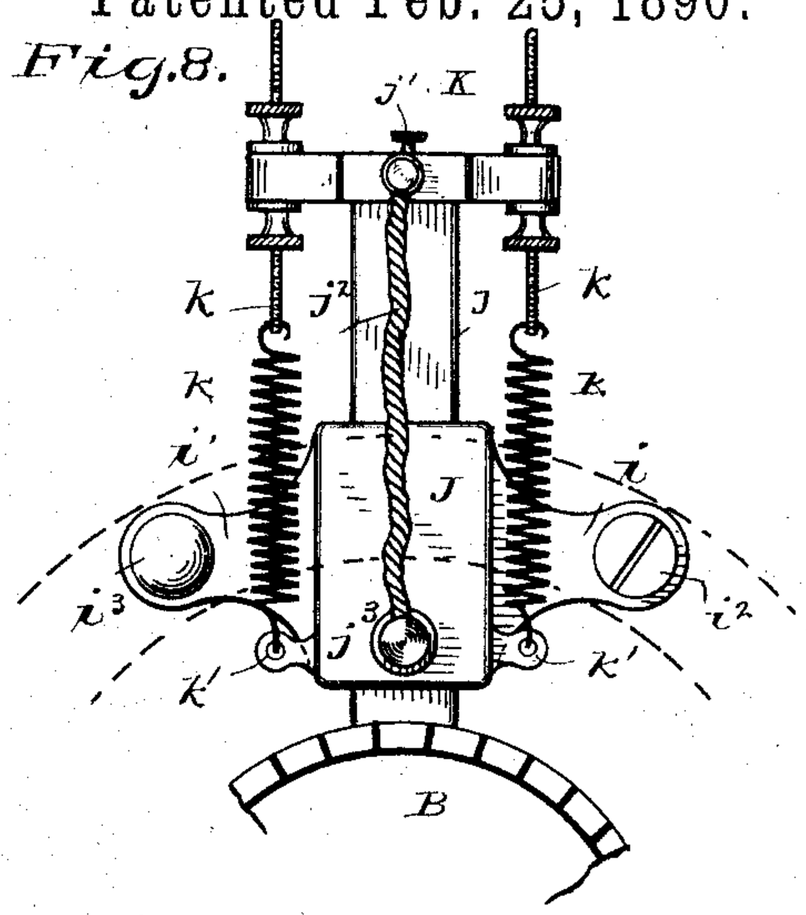


Fig. 9.

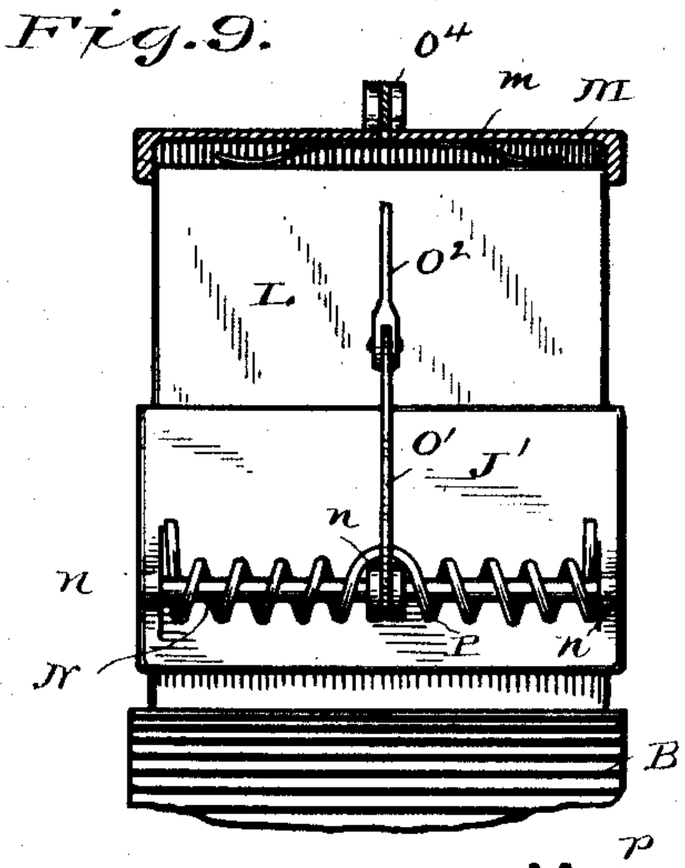


Fig. 10.

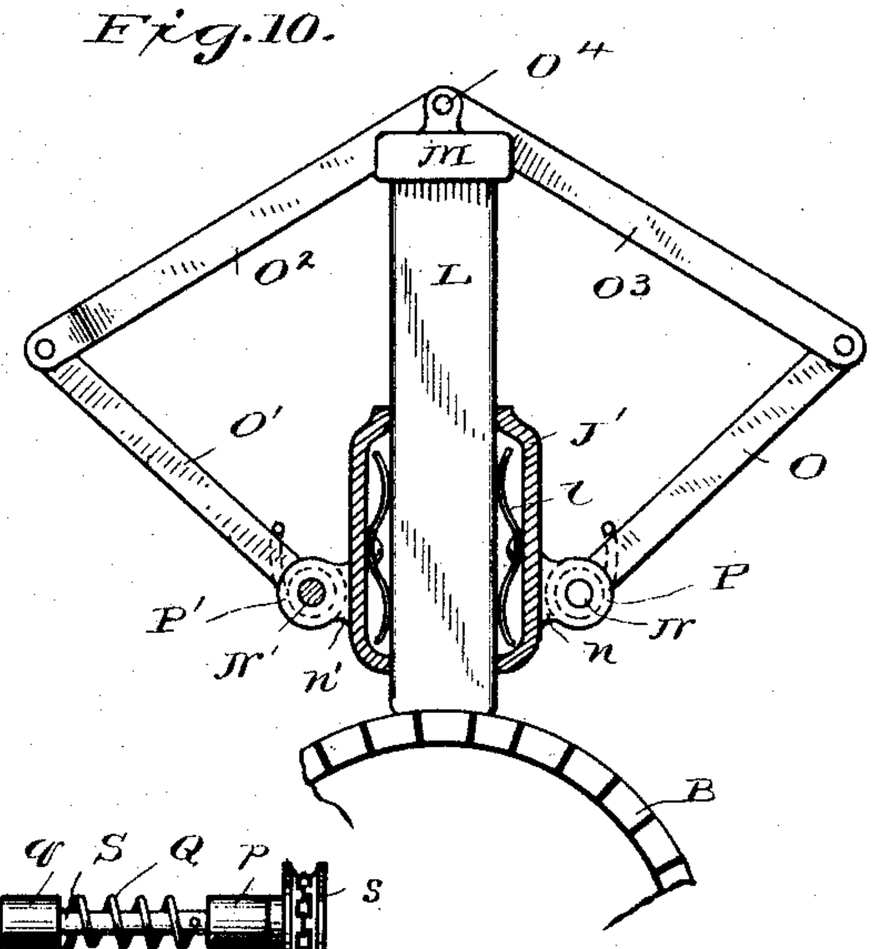
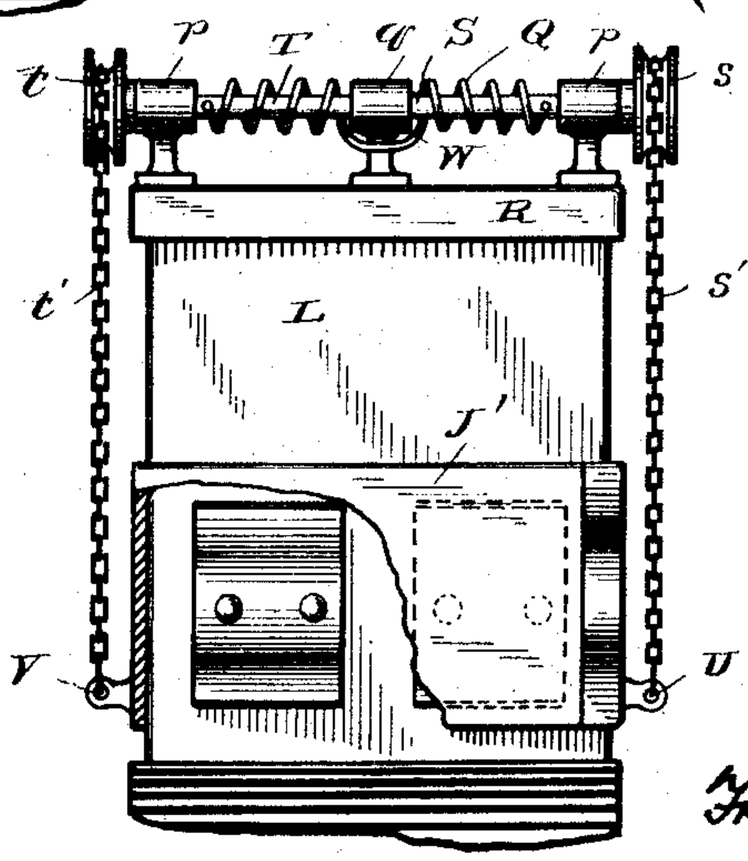


Fig. 11.



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UNITED STATES PATENT OFFICE.

CHARLES J. VAN DEPOELE, OF LYNN, MASSACHUSETTS.

CARBON COMMUTATOR-BRUSH AND HOLDER.

SPECIFICATION forming part of Letters Patent No. 422,265, dated February 25, 1890.

Application filed March 23, 1889. Serial No. 304,545. (No model.)

To all whom it may concern:

Be it known that I, CHARLES J. VAN DEPOELE, a citizen of the United States, residing at Lynn, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Carbon Commutator-Brush and Holder, (Case "C,") of which the following is a description, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My invention relates to improvements in commutator-brushes and brush-holding devices for dynamo-electric generators and motors.

Some of the principal objects of the invention are to provide means for utilizing long pieces of carbon, so that the same may be fed downward to working position or adjusted and less frequently renewed. Furthermore, brushes of carbon or similar material being of higher resistance than metallic brushes, I provide more extended electrical connection between the several forms of brushes used and the electric circuits with which they are connected.

A further object is to provide means for imparting a suitable pressure to the carbons to keep them in proper operative relation to the commutator-cylinder.

The various details of construction and arrangement of a number of forms of devices embodying the invention will be hereinafter fully described, and referred to in the appended claims.

In the drawings, Figure 1 is an elevation, partly in section, showing an armature-shaft, commutator, and commutator-brushes and supporting devices. Fig. 2 is a side elevation of the parts seen in Fig. 1. Fig. 3 is a top plan view of the carbon brushes and their supporting devices. Fig. 4 is an end elevation, partly in section, showing a somewhat different construction of parts, such as shown in Fig. 1. Fig. 5 is a side elevation of the commutator and commutator-brushes and supporting devices seen in Fig. 4. Fig. 6 is a top plan view of the commutator-brushes and supporting devices seen in Figs. 4 and 5. Fig. 7 is a side elevation, and Fig. 8 an end view, of a somewhat differently constructed commutator-brush holder. Figs. 9 and 10 are, respectively, side and end elevations of another form of carbon commutator-brush holder and tension device. Fig. 11 is a side elevation of a modified form of tension device applied to a carbon commutator-brush holder embodying my invention.

As indicated in the drawings, A is the armature-shaft of an electric machine, and B is the commutator-cylinder, which may be constructed in any known or desired manner.

C is a brush-holder rotatively mounted in suitable supports concentric with the armature-shaft. In each extremity of the brush-holder C is secured a clamp D, which extends at right angles from the said holder C and parallel with the commutator-cylinder D. The clamps D are longitudinally slitted or recessed to receive contact-carrying springs E, by which they are connected at their outer extremities to carbon-holding collars or short tubes G. Within the tubes G are placed carbon sticks, blocks, or pieces g, which are thus held in position and presented endwise to the commutator. The springs E are desirably formed by cutting slits e in a single resilient plate E', for convenience in handling, although the springs E may be entirely independent, if preferred. The collars G might be formed by striking up a portion of the metal of the springs E, or they may be light castings subsequently secured to the said springs. With either construction the collars G are adapted to receive and hold a piece of carbon, which is further clamped in position by a set-screw g', with which each collar is provided.

The carbons g may be rectangular in cross-section, and should be coated with copper or other good conducting metal to effect and insure good electrical connection with their supporting devices, from which current is connected to line.

As indicated in Figs. 1 and 3, a contact-spring e' may be attached to each collar or to the supporting-spring E and be arranged to bear against the carbon g, and in order to prevent overheating of the springs E the said springs are bridged by conductors g^2, extending between the contact-springs e' and the brush-supports D. With this construction, as that portion of the carbon projecting below the collars G is worn away, the set-screws g' are loosened, and the carbons pushed through

the collars, and then secured by setting up the screws g'. In this manner long sticks of carbon can be used—sufficient in many cases for weeks or months of constant use. The resiliency of the springs E will impart to the carbons a yielding pressure upon the commutator, which may readily be adjusted by moving the clamps D in their support or by slightly raising the springs E, while the set-screws g' are loosened to allow the carbon to be pushed downward and then tightened.

In Figs. 4, 5, and 6 the springs E are dispensed with and a rigid arm or arms F employed in their stead. In the form shown a sleeve H is secured upon an arm D', extending at right angles from the extremity of the brush-holder carrier C. The sleeve H has two arms F, to the extremities of which are secured a number of tubular carbon-holders H', four being shown by way of illustration, in each of which is placed a carbon f, which is thereby sustained in position to bear endwise upon the commutator-cylinder. Each carbon is desirably provided with a cap or washer f' of good conducting metal, which is placed upon its upper extremity, and the current passing through the carbons is conveyed to the arms F, and thence by suitable connections to the circuit by large flexible conductors h. The carbons are spring-held upon the commutator by suitable springs h', secured upon sleeve H and bearing upon the caps f', being adapted to move vertically with the carbons through slits h^2 in the carbon-holders H'. In order to avoid overheating and consequent injury to the spring h', the caps f' may be provided with insulation upon their upper sides. To insert new carbons, the springs h' may be raised out of their grooves or slits h^2 and the caps f' withdrawn, or the sleeve H may be loosened and turned upon its support, when the carbons can be inserted from below without removing the springs. With the forms just described small metal-coated sticks of carbon about the size of electric-light carbons may be used; but where more extensive and desirably continuous contact-surfaces are preferred or required I may construct the holders as indicated in Figs. 7 and 8.

As indicated, the front of the generator or motor is provided with a rotatable support, which may be a ring attached to the frame of the machine, as indicated at I. To the ring I is secured a carbon-holder in the form of a metallic box or frame J, which is desirably provided with lugs i i', secured rigidly in operative positions by screws i^2 i^3. The screw i^3 is desirably provided with a milled head to admit of its being readily removed by hand, and the carbon-holder J turned over upon the screw i^2 as an axis to allow the insertion of new carbons from what, when in operative position, is the lower end of the holder J. When recharged, the holder is returned to its upright position and secured by the insertion of the screw i^3. A number of carbons j, desirably in the form of square sticks of a size capable of moving vertically in the box J, are arranged side by side, completely filling the box and projecting through its under side into endwise contact with the commutator-cylinder. The carbons j may be of any desired width, so that more or fewer thereof may be used to fill the box J. They are, however, cut of equal lengths, and when in position are spring-pressed upon the commutator by a metallic cap K, to which are secured springs k k, secured at their other extremity to lugs or projections k' k' upon the box J. In case any of the carbons j should, by reason of defective manufacture or differences in density, be disposed to wear away faster than the rest, I provide adjusting-screws j', passing through screw-threaded apertures in the cap K and bearing against the ends of the several carbons, so that in case one of the carbons wears faster than its neighbors their contact upon the commutator may be kept uniform by adjusting one or other of the screws j'. It will be understood, however, that where a single block of carbon is employed the adjusting-screw j' can be dispensed with. Conductors j^2 j^2 extend between the caps K, box J, and suitable binding-posts j^3.

In Figs. 9 and 10 a somewhat different form of tension device is shown, comprising a box or frame J', extending across the face of the commutator, for receiving and supporting a plate L or a number of pieces of carbon. The box J' is desirably recessed on its inner side to contain leaf-springs l, between which the carbon L may be vertically moved, but which will prevent it from vibrating within its support and also serve to effect a good electrical connection between the carbons and the box J'. The upper end of the carbon L is provided with a cap M, which may be provided with a spring m at its under side. Shafts N N' are secured to the projecting lugs n n' at the ends of the box J', and upon said shafts are pivotally mounted arms O O', the outer extremities of which are hinged to two similar arms O^2 O^3, their outer extremities being hinged to a projection O^4 upon the cap M, forming what is known as "lazy-tongs." Spiral springs P P' are wound upon the shafts N N', engaging the arms O O' in position to force them outwardly and apart, and thereby pull upon the arms O^2 O^3 and exert a downward pressure upon the cap M and carbon L. This is a very light and convenient form of arrangement and very desirable under most circumstances, since the lazy-tongs will admit of a great range of movement at practically constant pressure. Furthermore, the lazy-tongs can be raised high enough to permit of the carbon being renewed from the upper end of the box J'.

A modification of the foregoing is illustrated in Fig. 11, in which the carbon-supporting frame or box J' is substantially the same as just described; but instead of providing the lazy-tongs I utilize the action of a single

double-acting torsional spring Q in a somewhat different manner. Upon the cap R, which corresponds in other respects to the cap M, are provided supports *p q p*, within which are rotatively mounted shafts S T, upon the outer extremity of each of which is secured a wheel or drum *s t*. Chains or other flexible connections *s' t'* extend from the peripheries of the pulleys *s t*, and are connected to projections U V upon the box J'. A spring W is placed about the central support *q* and coiled upon the shaft S T, one of its extremities being secured to each of said shafts, so that when under tension the spring W will impart torsion to both said shafts, tending to rotate the pulleys *s t* in a direction to wind up the chains *s' t'* and press the carbon L downward through the box or holder J' against the commutator-cylinder.

I do not limit myself to the precise details of construction and arrangement described, since the same may be varied in many matters of detail without departing from the invention.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A carbon commutator-brush holder comprising a support within which the carbon is movable, contact devices bearing against the carbon, electrical connections extending from the contact devices, and a spring for holding the carbon against the commutator, substantially as described.

2. The combination of one or more carbon contacts, supports therefor within which the carbon is vertically moved, a contact device bearing upon the carbons, electrical connections between said contact and the working-circuit, and a spring for holding the carbons against the commutator, substantially as described.

3. In an electric commutator, a brush composed of a series of carbon blocks held in position in a suitable retaining box or receptacle in which they are free to slide up and down independently of one another.

4. A carbon commutator-brush holder comprising a support within which a plurality of carbons are held endwise upon a commutator-cylinder, and a spring or springs acting against each of said carbons, substantially as described.

5. The combination, with one or more carbon contacts, of a holder therefor, springs for feeding the carbons downward, and contact-springs bearing against the exterior surfaces of said contacts, substantially as described.

6. The combination of one or more carbon contacts, a commutator, a holder for sustaining the said carbons in endwise contact therewith and through which the carbons are movable, and springs for preventing vibration of the carbons, substantially as described.

7. The combination, with one or more carbon contacts, of a box for holding the same and through which the contacts are movable, a spring-pressed follower for feeding the carbons endwise through the box to the commutator, a contact-surface between the spring and the carbon, and a conductor connected with the contact and carrying the current around the spring, substantially as described

8. The combination of one or more carbon contacts, a commutator, a box for holding the lower ends of the carbons and through which they are movable into endwise contact upon the commutator, an extensible spring-pressed follower for feeding the carbons through the box, a metal cap between the carbons and the spring, and conductors connected with the metal cap for carrying the current around the spring, substantially as described.

9. The combination of a commutator, two or more carbon contacts therefor, a box or frame for sustaining the lower portions of said carbons and within which they are movable, a metal cap or follower acting against the ends of the carbons, and adjustable tension-springs connected to the follower and to the box, whereby the carbons may be pressed endwise against the commutator with the desired tension, substantially as described.

10. The combination of a commutator, one or more carbon contacts therefor, a box or holder through which the carbons are movable endwise against the commutator, a follower upon the free ends of the carbons, and a spring-actuated lazy-tongs connected to the box and to the follower for maintaining contact between the carbons and the commutator, substantially as described.

In testimony whereof I hereto affix my signature in presence of two witnesses.

CHARLES J. VAN DEPOELE.

Witnesses:
J. W. GIBBONEY,
CHAS. L. OECHSNER.