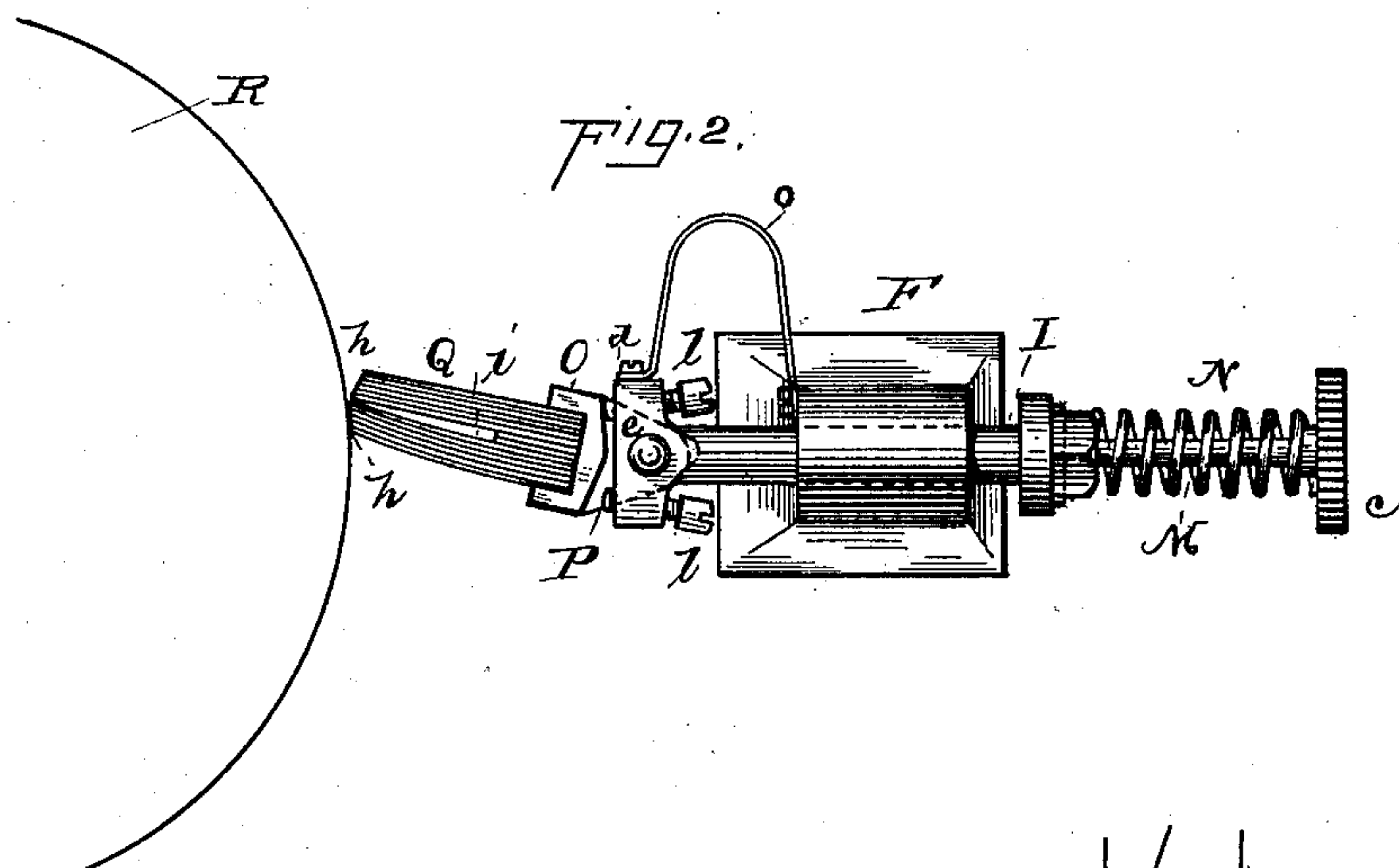
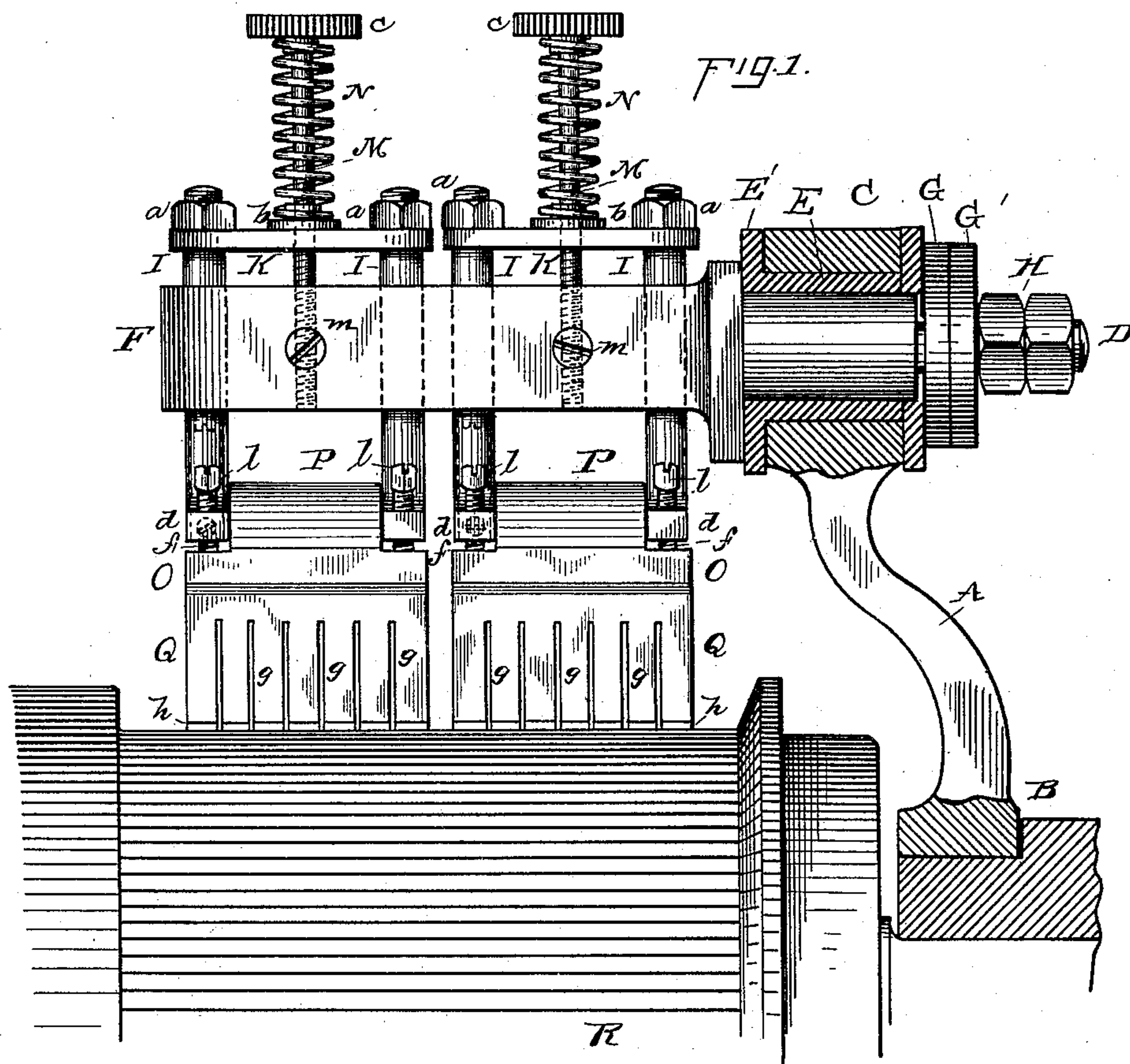


(No Model.)

F. J. SPRAGUE.  
COMMUTATOR BRUSH AND HOLDER FOR DYNAMO ELECTRIC MACHINES  
AND MOTORS.

No. 466,448.

Patented Jan. 5, 1892.



ATTEST:  
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# UNITED STATES PATENT OFFICE.

FRANK J. SPRAGUE, OF NEW YORK, N. Y., ASSIGNOR TO THE EDISON  
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COMMUTATOR-BRUSH AND HOLDER FOR DYNAMO-ELECTRIC MACHINES AND MOTORS.

SPECIFICATION forming part of Letters Patent No. 466,448, dated January 5, 1892.

Application filed December 10, 1886. Serial No. 221,175. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK J. SPRAGUE, of New York city, in the county and State of New York, have invented certain new and  
5 useful Improvements in Dynamo-Electric Machines, (Case MM,) of which the following is a specification.

My invention relates to the commutator-brushes and holders therefor in dynamo-electric machines and electro-dynamic motors,  
10 my principal object being to so arrange the brushes that the armature may run readily in either direction, and also to produce a simple and efficient construction for the brushes  
15 and brush-holders.

My invention consists in the novel devices and combinations of devices employed by me in accomplishing the above-named objects, as hereinafter set forth and claimed.

20 My invention is illustrated in the accompanying drawings, in which—

Figure 1 is a view in elevation of a brush-holder embodying my invention, with a portion of the commutator-cylinder; and Fig. 2,  
25 an end view of the same.

Only one side of the commutator and one set of brushes are shown. The other set of brushes is constructed and arranged in precisely the same way.

30 Each brush-holder is carried by an arm A, extending from a collar B, sleeved upon the armature-shaft or upon the journal-box. At the outer end of arm A is formed a collar C, and held in this collar is a spindle D, separated from the metal arm by the insulating-sleeve E, which has a flange E'. From the spindle extends the brush-carrying box or  
35 frame F, and the whole is secured together by insulating-washer G, metal washer G',  
40 and nuts H on the screw-threaded end of the cylinder.

The frame F, as shown, supports two commutator-brushes. One or any larger number of brushes may be so carried on each side of the commutator-cylinder, according to the  
45 size of the machine and the current to be collected or conveyed. Since the two brushes shown are in all respects alike, I will describe one of them in detail.

50 Through apertures in the frame F pass two rods I I, which are bridged outside of the

frame by a metal plate K and secured by nuts  
a a, placed upon their screw-threaded ends. Midway between the rods I I an aperture extends through the frame, which is entered by  
55 a rod or spindle M, extending up some distance above the bridge-plate K, passing through a collar b, resting on the bridge-plate and terminating in a milled head c for turning the spindle. Upon the spindle M, be-  
60 tween the collar b and the head c, is coiled a spiral spring N. The lower ends d d of rods I I are enlarged and are joined by a cylindrical pin e, passing through apertures in these enlarged ends. The brush is inserted  
65 and held in a metal head O, having a curved back P and shoulders f f. The pin e passes loosely through the back P, forming a pivot on which the brush may rock in either direction.

70 The brush itself consists of a number of thin flat metal strips Q, placed together and having a number of slits g g, extending back to near the back of the brush. The end of the brush has opposite bevels at h h, and I  
75 prefer to form in it also a slot i in the direction of its width, which gives flexibility in the direction of revolution of the commutator-cylinder.

R is the commutator-cylinder, made up, as  
80 usual, of a number of metal bars separated by insulation. The brushes bear upon the cylinder in the manner shown most clearly in Fig. 2. It will be seen that it is an "end-on"  
85 brush—that is, one placed perpendicular to the cylinder, as distinguished from the usual form, in which the planes of the brushes are at an angle to the plane of the axis of the cylinder; but being pivoted it is able to rock in the direction in which the commutator re-  
90 volves, and when the direction of revolution is changed the brush rocks over accordingly, resting on its opposite bevel. The brush or brushes on the opposite side of the commutator are, as stated, arranged in the same man-  
95 ner and also rock over in the direction of revolution.

By means of the set-screws l l, passing through the enlarged ends d d and setting against the shoulders f f, the extent of move-  
100 ment of the brushes may be limited and adjusted.



When the machine is started, the brushes are forced back against the spiral springs a suitable distance, as shown, and therefore as the ends wear the brushes are continually fed forward by the springs in a direction perpendicular to the commutator-cylinder and practically without increasing the angle of displacement. The tension of the springs is adjusted and regulated by turning the spindles K in or out of the frame F, and to assist in maintaining them at the right tension the set-screws *m m*, setting against the spindles, may be provided.

To make an electrical connection other than that of the sliding rods, a flat spring *o* or other flexible connection may extend between the frame F and the enlarged ends of the rods.

My invention is especially adapted for use with electro-dynamic motors which are required to run in either direction, since the brushes immediately adapt themselves to the changes in direction, while maintaining substantially the same positions upon the cylinder.

The brushes may be readily removed from contact with the cylinder by loosening the nuts upon the end of spindle D.

What I claim is—

1. The combination, with a commutator-cylinder, of an end-on commutator-brush having its end beveled in two directions, substantially as set forth.

2. The combination, with a commutator-cylinder, of an end-on commutator-brush having its end beveled in two directions and adapted to rock on either side of a center, substantially as set forth.

3. The combination, with the stationary brush-holding frame, of the rods passing through said frame and the brush carried by said rods and bearing on the commutator-cylinder perpendicular thereto, substantially as set forth.

4. The combination, with the stationary brush-holding frame, of the rods passing through the same and the end-on brush pivoted upon said rods, substantially as set forth.

5. The combination, with the stationary brush-holding frame, of the rods passing through the same, the brush carried thereby, the spindle entering said frame, the bridge connecting said rods, and the spring on said spindle between said bridge and the head of said spindle, substantially as set forth.

6. An end-on commutator-brush adapted to rock in either direction and having a slot in the direction of its width, substantially as set forth.

This specification signed and witnessed this 6th day of December, 1886.

FRANK J. SPRAGUE.

Witnesses:

I. F. S. BRAUTH,  
C. N. DEVER.