No. 690,516. Patented Jan. 7, 1902.

C. G. CURTIS.

COMMUTATOR BRUSH.

(Application filed May 12, 1900.)

(No Model.)

Fig. 1.

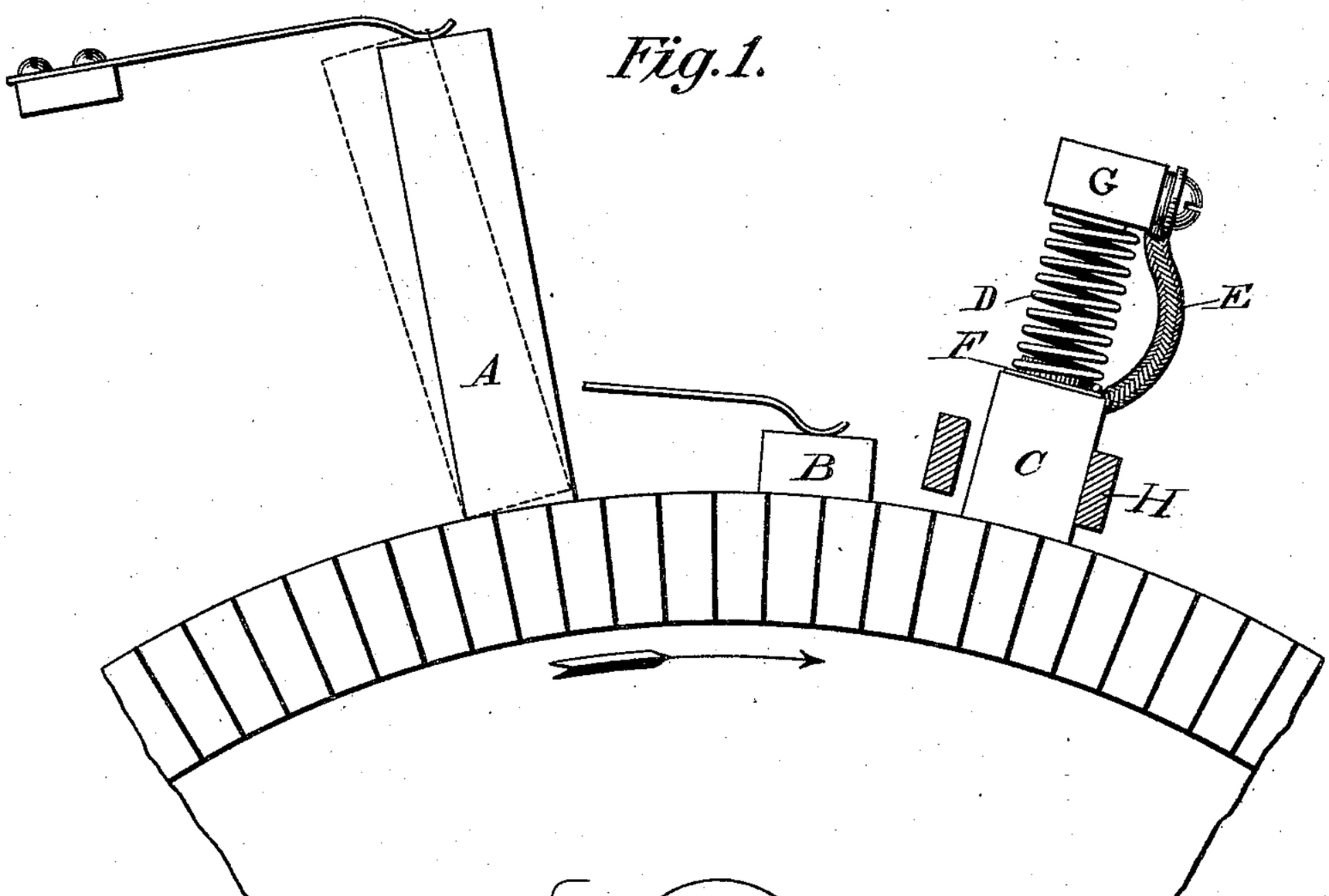
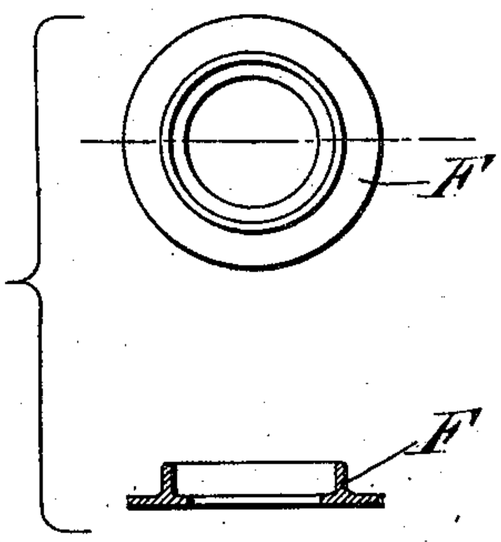


Fig. 2.



WITNESSES:

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UNITED STATES PATENT OFFICE.

CHARLES G. CURTIS, OF NEW YORK, N. Y.

COMMUTATOR-BRUSH.

SPECIFICATION forming part of Letters Patent No. 690,516, dated January 7, 1902.

Application filed May 12, 1900. Serial No. 16,411. (No model.)

To all whom it may concern:

Be it known that I, CHARLES G. CURTIS, a citizen of the United States, residing in the borough of Manhattan, city of New York, State of New York, have invented a certain new and useful Improvement in Commutator-Brushes, of which the following is a specification.

It has been found that the present types of carbon commutator-brushes, which give good results on low-speed commutators, give very unsatisfactory results when applied to commutators having comparatively high peripheral speeds, and the commutator soon begins to spark and becomes so rough as to require frequent sandpapering and re-turning. This difficulty has been so serious that it has been found virtually impracticable in commercial work to operate commutators above quite a limited speed. I have discovered that this arcing and rapid roughening of the commutator-surface is mainly due to the imperfection of contact between the face of the carbon brush and the copper, resulting either from the change of angle or tilting of the brush or from the failure of the brush to follow the irregularities of the commutator-surface due to its inertia.

I have devised a new form of brush which I have found overcomes these difficulties and gives highly-satisfactory results at high speeds, which is based upon the principle that by making the brush sufficiently short compared with its width tilting will be prevented and the brush necessarily seats itself truly against the commutator-surface, and at the same time its weight and inertia become so much reduced that with a given spring-pressure the block of carbon follows the commutator-surface and remains in constant contact with it.

Figure 1 represents an end view of a commutator, showing one of the present types of brushes and also my improved brush applied to it. Fig. 2 represents views of one of the details of my improved brush.

In Fig. 1, A illustrates the present type of carbon commutator-brush having the usual proportions. B is a similar very short brush or thin block of carbon, and C illustrates my improved carbon brush.

It is evident on studying the forces at work that in the case of a brush like A, whose length is several times as great as its width, it is quite possible for the brush in vibrating to change its angle or tilt, as shown in dotted lines, whereas in the case B, where the depth or length of the brush is very small compared to its width, tilting becomes impossible, and the spring-pressure necessarily insures the constant seating of the brush against the commutator-face.

In my improved brush C, I have found that by using a brush having a length approximately one and one-half times its width (the spring being a spiral one, as shown) there was no tendency to tilt, and the action is so perfect and the commutator-surface became so smooth and polished by the action of the brush that a brush of this character will last longer than a long brush of the old type.

It will be understood that the width of the brush perpendicular to the surface illustrated in the drawings (or parallel with the commutator-bars) is greater than the width of the surface shown and may be as great or even greater than the length of the brush. A brush having a length approximately one and one-half times or less than its width perpendicular to the commutator-bars I call a "short" brush, and in using the definition "short" in the claims hereinafter made I mean a brush of this character—*i. e.*, one which relative to its width is short enough to prevent tilting.

I prefer to use a spiral spring D with the end touching the brush free, so as to avoid all lateral friction on the brush and leave it free to assume the position which maintains its face in full contact with the commutator-surface. By using a spiral spring of considerable diameter, provided with a shoe F where it presses against the brush, the spring will tend to preserve the angle between the brush and the commutator, even though the brush should tend to wear a little faster on one side than on the other. The spiral spring bears against the back-yoke G, forming part of the brush-holder, which brush-holder also includes a suitable channel or recess for loosely guiding the carbon block and including a bearing-bar H, against which the block is pressed by the movement of the commutator and which restrains it from following that movement, but permits a free rocking move-

ment of the block, so that it can follow the irregularities of the commutator. The carbon block is copper-plated, as usual, and a flexible conductor E, soldered to the metallic coating of the block, is carried back to a stationary part of the brush-holder, as to the back-yoke G.

Of course the spring-pressure may be made adjustable and the brush-holder may be set so as to make the brush stand at an angle instead of normal to the commutator-face, if desired.

By my improved form of brush I am enabled not only to obtain a much more perfect and constant contact with the copper, but also to employ a greater spring tension, and still have a very superior commutator action and moderate heating.

What I claim is—

1. A commutator-brush composed of a short carbon block, in combination with a holder in which said block is held loosely so as to be unrestrained in following the irregularities of the commutator, and a spring pressing said block against the commutator and permitting freedom of motion of the block, substantially as set forth.

2. A commutator-brush composed of a short carbon block, in combination with a holder in which said block is held loosely so as to be unrestrained in following the irregularities of the commutator, and a spiral spring pressing said block against the commutator and permitting freedom of motion of the block, substantially as set forth.

3. A commutator-brush composed of a short carbon block, in combination with a holder in which said block is held loosely so as to be unrestrained in following the irregularities of the commutator, a spring pressing said block against the commutator and permitting freedom of motion of the block, and a flexible conducting connection between said block and the holder, substantially as set forth.

4. A commutator-brush composed of a short carbon block, in combination with a holder in which said block is held loosely so as to be unrestrained in following the irregularities of the commutator, a spiral spring pressing said block against the commutator and permitting freedom of motion of the block, and a flexible conducting connection between said block and the holder, substantially as set forth.

This specification signed and witnessed this 10th day of May, 1900.

CHARLES G. CURTIS.

Witnesses:
ARCHIBALD G. REESE,
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