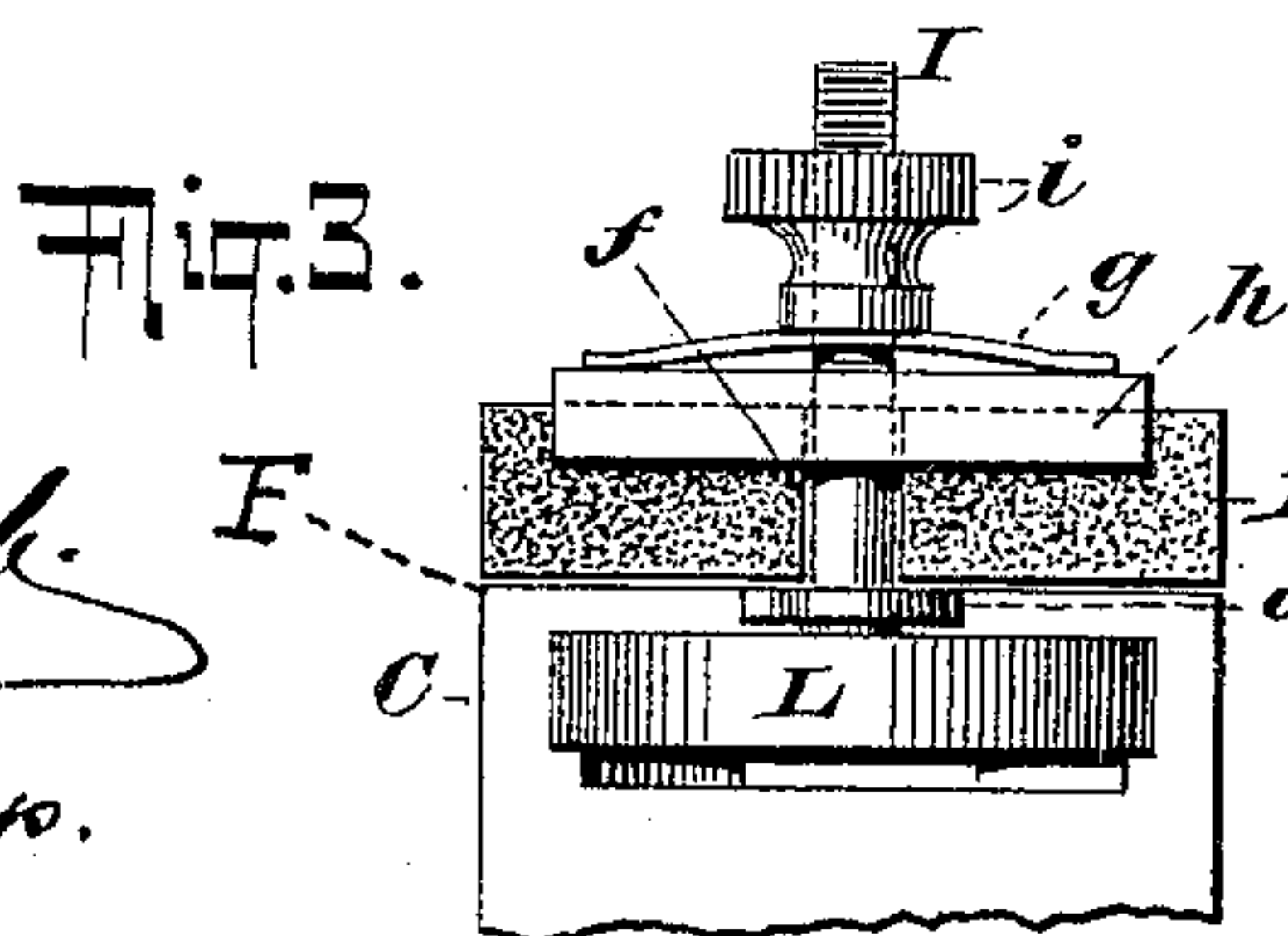
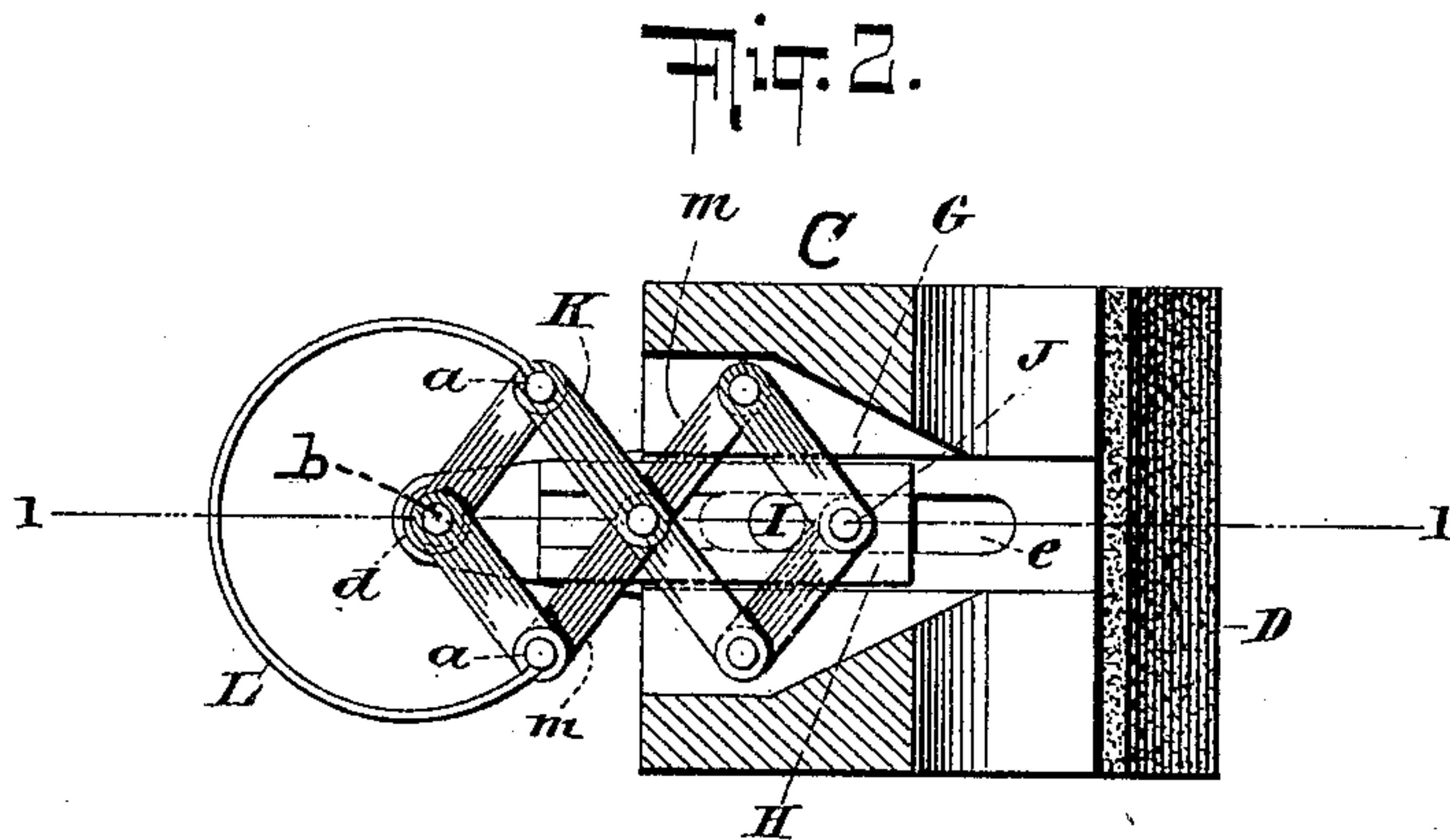
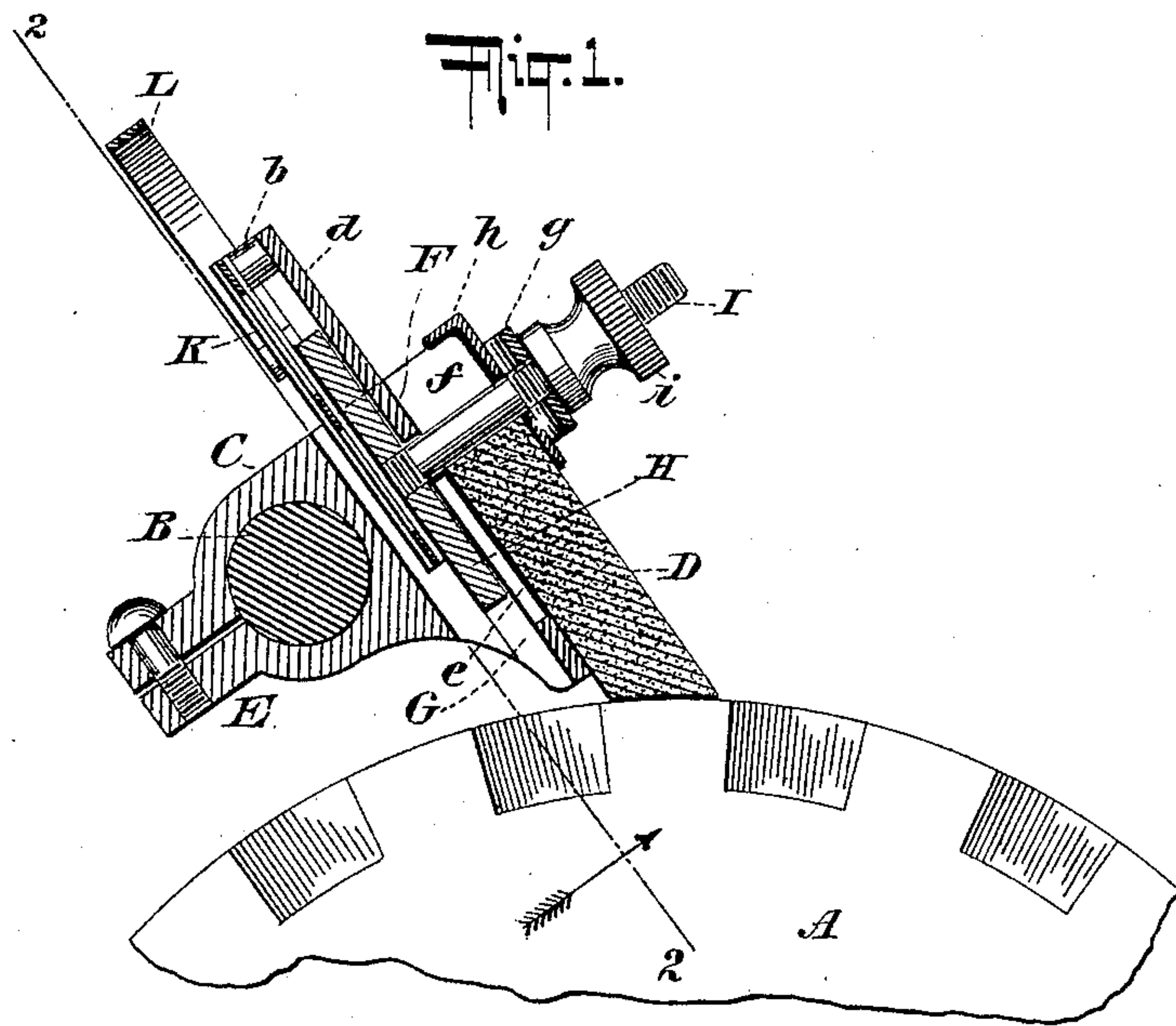


(No Model.)

W. B. STULL.  
COMMUTATOR BRUSH HOLDER.

No. 604,220.

Patented May 17, 1898.



WITNESSES:  
*Gustave Dietrich.*  
*E. Jos. Belknap.*

INVENTOR  
*William B. Stull*  
BY  
*Chas. C. Gill*  
ATTORNEY.



# UNITED STATES PATENT OFFICE.

WILLIAM B. STULL, OF BAYONNE, NEW JERSEY.

## COMMUTATOR-BRUSH HOLDER.

SPECIFICATION forming part of Letters Patent No. 604,220, dated May 17, 1898.

Application filed February 12, 1898. Serial No. 670,039. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM B. STULL, a citizen of the United States, and a resident of Bayonne, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Commutator-Brush Holders, of which the following is a specification.

The invention relates to improvements in commutator-brush holders, and comprises the means hereinafter described and claimed whereby the brush may be given a uniform tension toward the commutator, this tension being produced and exerted against the brush by means which enable said brush to bear against the commutator with a yielding but always uniform pressure.

In accordance with the present invention the brush is mounted against a plate and subjected to the downward action of a follower, which is given a downward tension by means of a spring, combined with a system of levers, whereby during the downward motion of the brush and the relaxation of the spring the levers will assume such relation to the follower that they will compensate for the decrease of force in the spring and thereby preserve uniform the degree of downward pressure exerted against the brush. When the brush is of full length and the tension of the spring is greatest, the position of the levers is such that they then exert only the same force upon the brush as they afterward exert when the spring has relaxed and their position with respect to the follower has changed.

The invention will be fully understood from the detailed description hereinafter presented, reference being had to the accompanying drawings, in which—

Figure 1 is a central vertical longitudinal section through the brush and its holder shown in relation to a commutator, a portion only of the latter being illustrated, said section being on the dotted line 1 1 of Fig. 2. Fig. 2 is a vertical transverse section of same on the dotted line 2 2 of Fig. 1, and Fig. 3 is a top end view, partly broken away, of same.

In the drawings, A designates a portion of any usual or suitable commutator; B, the brush-holder shaft; C, the brush-holder as a whole, and D the brush, which in the present

instance is of carbon and has its lower end upon the surface of the commutator A.

The commutator A and shaft B are of usual construction. The holder C is in the form of a casting having a sleeve E to be clasped upon the shaft B and provided with a substantially smooth front face F, against which the carbon brush D is placed and upon which said brush has its movement. Within the holder C, intermediate the shaft B and the front face F, is formed a guide G in the form of a groove to receive the plate-follower H, which is connected with the screw I, as shown by full lines in Fig. 1, and at the point J is riveted to the lower end of the lazy-tong levers K. The plate-follower H is adapted to have a reciprocating movement within the guide-groove G under the influence of the said levers K and the spring L, which, as illustrated in Fig. 2, at its ends engages said levers at the lateral points *a a* and presses inward against said levers in order to put the same under a normal tension, operating to elongate the levers and drive the follower H toward the lower end of the groove or guide G. The upper end of the lazy-tong levers K is at the point *b* secured to the upward extension *d* of the front face F of the brush-holder C, and hence said levers K at their upper end are rigidly connected to the brush-holder at the point *b*, while at their lower end said levers are connected with the follower H and are free to drive said follower downward under the influence of the spring L.

The front face F of the holder C is slotted, as at *e*, in order that the downward motion of the follower H, with the screw I, may not be interrupted, the said slot *e* permitting the screw I to travel with said follower H. The downward motion of the screw I, with the follower H, is utilized for the purpose of depressing the brush D against the commutator, and, as shown in Fig. 1, the upper portion of the brush D is slotted, as at *f*, to receive the screw I, the base of the slot forming a suitable bearing against which the screw I may exert its force to effect the downward motion of the brush D.

The brush D is held with some degree of tension against the front surface F of the holder C by means of a plate-spring *g*, through which



the screw I passes and which bears against the plate *h*, applied upon the upper outer portions of the brush D. The screw I passes through both the plate *h* and the plate-spring *g*, and said plate and spring are held against the brush D by means of the nut *i*, applied upon said screw. The nut *i* may be so adjusted as to increase or diminish the tension of the spring *g* against the brush D, and hence the resistance that the brush D may offer to the downward force of the spring L and levers K may be regulated at will. The brush D may be pushed upward by hand at any time and secured in its upward position by tightening the nut *i*. Since the brush D is provided with the slot *f* to pass upon the screw I it will not be necessary in applying the brush D to the holder C to remove the nut *i*, spring *g*, and plate *h*, since by loosening the nut *i* the upper portion of the brush D may be slipped upward beneath the plate *h*, and likewise upon the removal of a worn brush D it will be unnecessary to detach the nut *i*, spring *g*, and plate *h*, since upon the loosening of the nut *i* the brush D may be slipped downward from the holder C.

The brush D and holder C are shown in operative position in Fig. 1, and when in this position the spring L, acting to elongate the lazy-tong levers K, creates a downward tension to the follower H and screw I, and thereby causes the latter to directly exert a normal downward force upon the brush D, retaining the latter at its lower end against the commutator A. During the revolving motion of the commutator A the carbon brush D will become worn at its lower end, and hence it is necessary that the said brush be kept up against or constantly fed toward the commutator, and this result in accordance with the present invention is accomplished by means of the spring L, which as the lower end of the brush is worn gradually elongates the system of lazy-tong levers K, and thereby causes the follower H and screw I to move downward to effect the gradual but constant motion of the brush D to compensate for the wear at the lower end of the latter.

One of the most important features accomplished by the present invention is that the downward pressure exerted upon the brush D is substantially uniform at all times, and this result is obtained by the use of the lazy-tong levers K, whose members *m m* gradually move toward a parallel position with respect to the follower H as the latter travels downward toward the commutator, and thus during the wear of the brush D and the contracting of the spring L the movement of the members *m* of the levers K is such that said members may exert a more direct force against the follower H than they could when in their upper position and more nearly extended transversely across said follower. When the brush D is new and about in the condition and position illustrated in Fig. 1, the spring L will have its maximum expansion and the

levers K will be at their upper position, and while under this condition the spring L will exert its greatest force against the levers. The fact is that in view of the position of the members *m m* of said levers the force of said spring will not be exerted to produce any greater tension upon the follower H and brush D than will be exerted by said spring L, when by reason of the wear upon said brush D the follower H and screw I are moved downward to keep the brush against the commutator, and this is due to the fact that when the levers K are in their upper position the members *m m* thereof are in a more angular relation to the follower H than they are when said follower has traveled downward and the spring L has relaxed some of its force. The relaxation of the spring L during the downward motion of the follower H is compensated for by the movement of the members *m* of the levers K to a position more nearly parallel with said follower and enabling them to exert a more direct force against the follower. Thus the brush D is given a uniform downward pressure against the commutator at all times by means of the spring L and levers K and is held with a proper tension against the face F of the brush-holder C by means of the plate *h*, plate-spring *g*, and nut *i*.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The commutator-brush holder, comprising the follower connected with the brush and the lazy-tong levers at one end connected with the follower and at the other end to the holder, combined with means for exerting spring-pressure laterally against the sides of said levers; substantially as set forth.

2. The commutator-brush holder, comprising the follower and the lazy-tong levers at one end connected with said follower and at the other end to said holder, combined with the spring L bearing against said levers at points *a, a*, substantially as set forth.

3. The commutator-brush holder having the front plate provided with the slot *e* and against which the brush is placed, combined with the follower, the levers K connected at one end with said follower and at the other end with said holder, means for exerting spring-pressure laterally against said levers, the screw connected with said follower, and extending through the slot in said front plate and engaging said brush, the plate *h* at the upper end of said brush, the adjusting-nut *i* upon said screw and the spring *g* intermediate said nut and said plate *h*; substantially as set forth.

4. The commutator-brush holder C having the front plate F provided with the slot *e* and guiding-groove G, combined with the follower in said guiding-groove, the lazy-tong levers connected at one end with said follower and at the other end to said holder, the spring exerting a tension against said levers to elongate the same, the brush D against said front plate and having the slot *f*, the screw I con-



5 nected with said follower and thence passing through the slot *e* in said front plate and the slot *f* in said brush, the plate *h* and spring *g* upon said screw and the nut *i* upon said screw for pressing said spring *g* and plate *h* against said brush; substantially as set forth.

10 5. In a commutator-brush holder, the follower, and means connecting the follower with the brush, combined with the pivoted levers connected at one end with the follower and restrained at the other end, and a spring whose force is exerted to elongate said levers and move said follower and brush toward the commutator; substantially as set forth.

15 6. In a commutator-brush holder, the pivoted levers *K*, means connecting one end of said levers with the brush, and means restraining the other end of said levers, combined with a spring whose force is exerted to elongate said levers and move said follower and brush toward the commutator; substantially as set forth.

20 7. In a commutator-brush holder, the front plate having the slot *e*, the brush having the slot *f*, and the screw passing through said slots and having the nut, combined with the plate *h* and spring *g* on said screw and held against the brush by said nut, the spring *L*,

and the pivoted levers intermediate said spring and said screw for transmitting the force of said spring to said screw and thereby to move said brush toward said commutator; substantially as set forth. 30

8. In a commutator-brush holder, the spring to drive the brush toward the commutator, and a pivoted lever operatively connected with said brush and spring, said lever normally extending transversely with respect to the brush when the spring is exerting its greatest force and pivoted to turn toward a parallel position with respect to the brush as the latter moves toward the commutator and the spring expends its force, whereby the lever by its changing position compensates for the decreasing force of the spring and renders the pressure of the spring on the brush substantially uniform during the shortening, by wear, of the brush; substantially as and for the purposes set forth. 40

Signed at New York, in the county of New York, and State of New York, this 10th day of February, A. D. 1898. 50

WILLIAM B. STULL.

Witnesses:

CHAS. C. GILL,  
E. JOS. BELKNAP.