No. 884,049. PATENTED APR. 7, 1908.

C. W. SPEIRS.

PNEUMATIC HOLDER FOR COMMUTATOR BRUSHES.

APPLICATION FILED FEB. 23, 1907.

2 SHEETS—SHEET 1.

Fig. 1.

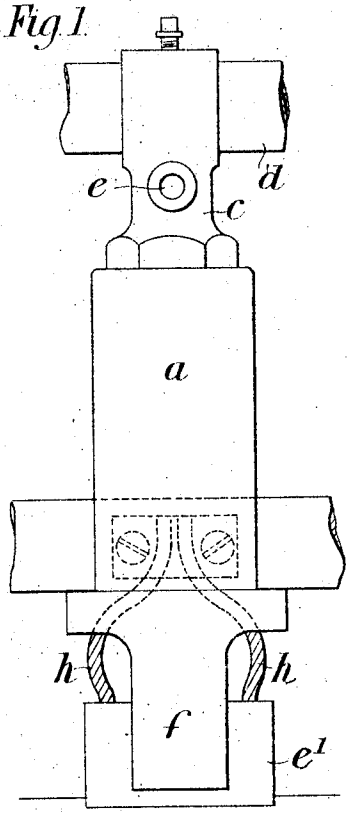


Fig. 2.

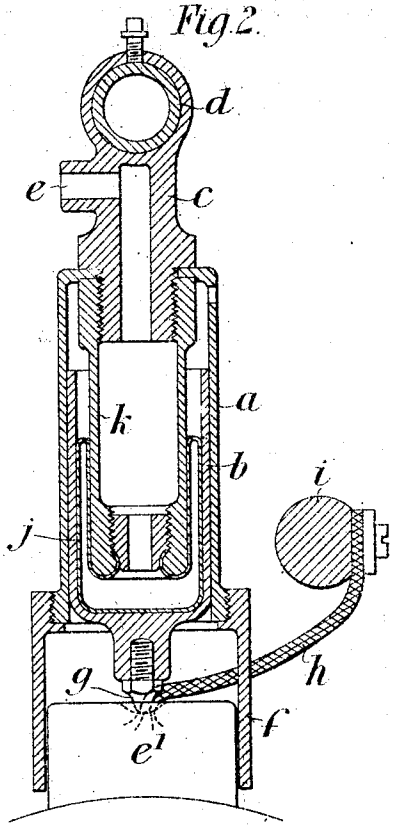


Fig. 3.

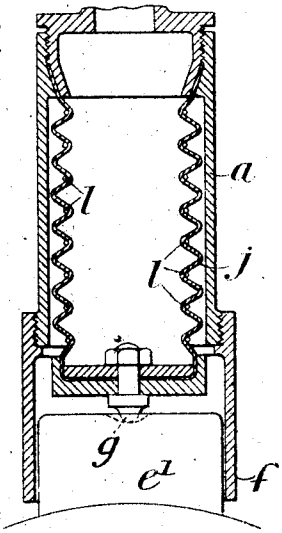
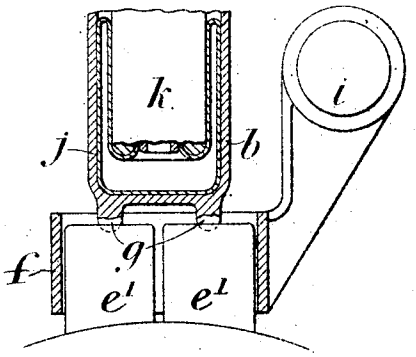


Fig. 4.



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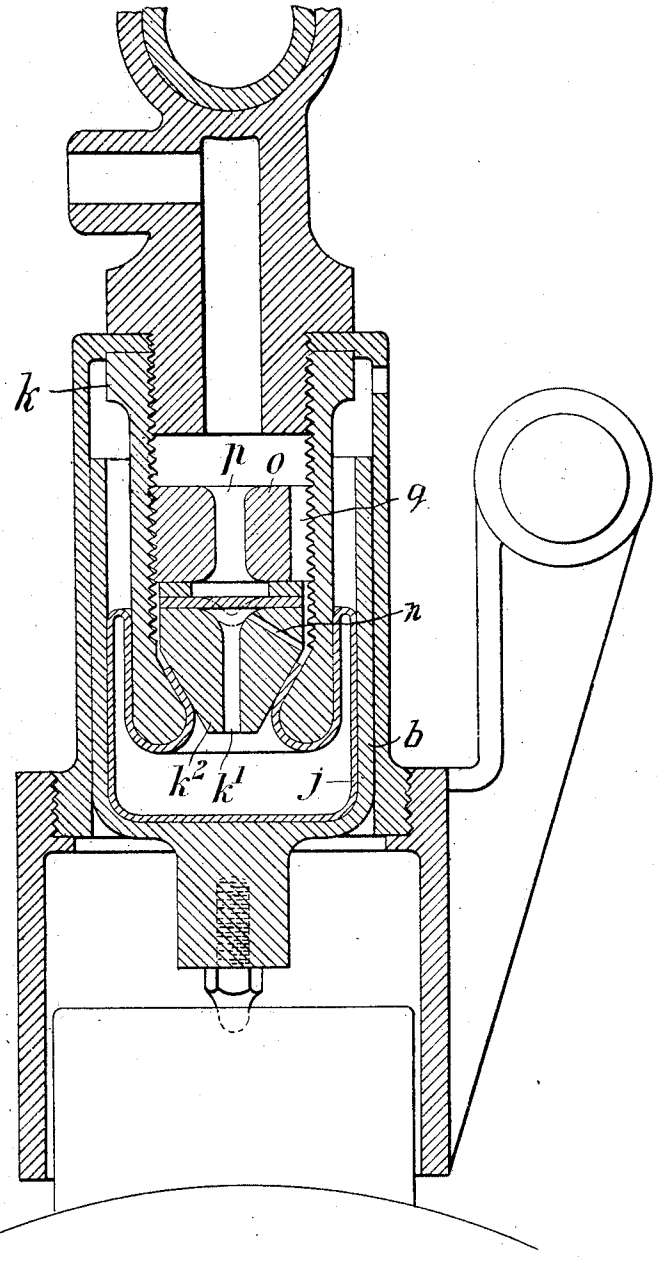
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2 SHEETS—SHEET 2.

Fig. 5.



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PNEUMATIC HOLDER FOR COMMUTATOR-BRUSHES.

No. 884,049. Specification of Letters Patent. Patented April 7, 1908.

Application filed February 23, 1907. Serial No. 358,985.

To all whom it may concern:

Be it known that I, CHARLES WILLIAM SPEIRS, a subject of the King of Great Britain, residing at Battersea Works, Battersea, London, England, have invented new and useful Improvements in Pneumatic Holders for Commutator-Brushes, of which the following is a specification.

This invention relates to holders for commutator brushes and especially to holders of the kind wherein the brushes are maintained in contact with the commutator by the pressure of a fluid preferably air.

Holders of this kind as hitherto constructed are provided with a cylinder in which the brush, or a piston to which the brush is connected, is adapted to slide. In either case, however, a certain amount of leakage of air or other fluid always takes place between the cylinder and the brush or the piston sliding therein, which leakage necessitates the employment of means, such as a pump, for maintaining the required pressure.

The object of this invention is to provide means whereby a constant fluid pressure can be maintained upon the brush without leakage so that the employment of a constantly operating pump or the like is rendered unnecessary.

According to my invention I provide a closed bellows, or other suitable collapsible and extensible chamber, which is fixed at one end and adapted with the other end to bear upon the brush, the said bellows or chamber being in connection with a closed reservoir or accumulator which can be pumped up to any desired pressure and from which practically no leakage will take place.

In the accompanying drawing:—Figure 1 is a side view of a pneumatic brush holder constructed according to my invention, and Fig. 2 is a sectional front view of the same, Fig. 3 is a vertical section illustrating a modification, and Fig. 4 is a sectional elevation of the lower part of a double brush holder. Fig. 5 is a vertical section to an enlarged scale illustrating a modification.

In the arrangement of my invention shown in Figs. 1 and 2, two tubes *a*, *b*, forming between them a box, are adapted to slide one within the other, the outer tube *a* having connected to it a fitting *c*, suspended from a bar *d* and provided with an aperture *e* for the admission of air under pressure from an accumulator.

The inner tube *b* is guided in its movement by the outer tube *a*, and is provided with a part engaging the brush *e'* which is arranged in the housing *f* at the lower part of the holder. As shown, the tube *b* is provided at its lower end with a nipple *g* which bears upon the top of the brush, the said brush being represented as being provided with a metal cap to which the flexible leads *h*, *h* connected to the collecting bar *i* can be soldered or otherwise attached. It is to be understood, however, that our invention can be used in conjunction with any form of brush.

Inside the inner tube *b* I provide a lining or bag *j* of indiarubber or other suitable material, the said lining being attached to the lower end of a spigot *k* fixed to the fitting *c* in such a manner that the compressed air which enters the said fitting *c* will pass through the spigot *k* and into the bag, the pressure in which will serve to press the inner tube *b* downwards against the brush in the desired manner. A space is left between the outside of the spigot *k* and the tube *b* to allow of the movements of the bag without injuring the same. The flexible chamber is prevented from expanding laterally by the inner tube *b*.

If it is not desired to give the tube *b* a positive or guided vertical motion the tube *a* can be dispensed withas indicated in Fig. 4. In this case the housing *f* can be carried from the collecting bar *i* or from any other convenient support.

In the modification of my invention shown in Fig. 3 the inner tube *b* is dispensed with and the air bag itself forms an inner expansible tube or bellows provided at its lower end with a nipple as hereinbefore described for acting upon the brush. As shown, the said bag is provided with external rings *l*, *l* which prevent the bag from expanding laterally and wedging in the tube *a* and force it to expand longitudinally.

In both the foregoing arrangements the holder is represented as being independent of the extensible chamber. It is to be understood, however, that if desired the holder may be directly connected to the said chamber.

In an arrangement of this kind shown in Figs. 1 and 2 the nipple *g* can be replaced by any form of holder which will grip and carry the brush *e'* thus dispensing with the housing *f*. It will also be understood that the ex-

tensible chamber may be arranged to act upon two or more brushes simultaneously, for instance, in the manner indicated in Fig. 4. In this case the air bag *j* must not be positively guided in its movement but must be free to tilt as shown in Fig. 4 or as in Fig. 3 to maintain equal pressure on both brushes in case one brush should wear faster than the other.

With the arrangement hereinbefore described, when the chamber or accumulator from which air is supplied to the extensible chamber has been pumped up to the desired extent a constant and uniform pressure of the brush upon the commutator can be maintained.

In the arrangement shown in Fig. 5 the main passage *k'* in the plug k^2 which clamps the bag *j* to the spigot *k* is stopped by a piece of sheet rubber or the like *m* and a small channel *n* is formed in the said plug leading from the exterior thereof to the said passage *k'*, the plug being a loose fit within the spigot and held in place together with the rubber *m* by a screwed block *o* having a hole *p* and a groove *q* whereby the fluid can obtain access to the rubber *m* and passage *n* respectively. If therefore the bag *j* should burst the rubber *m* will be caused by the pressure of the fluid above it to assume the position indicated by the dotted lines and seal the channel *n* and prevent the escape of the fluid from the reservoir and other brush holders connected therewith.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed I declare that what I claim is:—

1. The combination with a commutator brush movable toward the commutator, of a flexible and extensible chamber, means for continuously supplying fluid under pressure to said chamber, said chamber being operatively connected with said commutator brush to maintain it in contact with the commutator and compensate for wear, whereby leakage of the pressure fluid is prevented, substantially as described.

2. The combination with a commutator brush movable toward the commutator, of a flexible and extensible chamber, means for continuously supplying fluid under pressure to said chamber, means for preventing lateral expansion of said chamber, said chamber having a part operatively connected therewith engaging said commutator brush to compensate for the wear thereof and maintain it in contact with the commutator, whereby leakage of the pressure fluid is prevented, substantially as described.

3. The combination with a commutator brush movable toward the commutator, of a guiding member, a longitudinally movable member slidingly mounted in said guiding member, said sliding member having a part engaging said commutator brush, a flexible and extensible chamber having a part engaging said sliding member and means for continuously supplying fluid under pressure to said chamber, whereby said chamber forces said sliding member and said brush toward the commutator and maintains said brush in contact therewith, substantially as described.

4. The combination with a commutator brush movable toward the commutator, of a stationary guide for said brush, of a flexible and extensible chamber, means for continuously supplying fluid under pressure to said chamber, means for preventing lateral expansion of said chamber, said chamber having a part movable therewith engaging said brush to compensate for the wear thereof and maintain it in contact with the commutator, whereby leakage of the pressure fluid is prevented, substantially as described.

5. The combination with a commutator brush movable toward the commutator, of a pair of tubes one sliding within the other and one of said tubes being stationary, said sliding tube having a part engaging said brush, a flexible and extensible chamber within said tubes, and means for continuously supplying fluid under pressure to said chamber, whereby said chamber will compensate for the wear of said brush and maintain it in contact with the commutator, substantially as described.

6. The combination with a commutator brush movable toward the commutator, of a guide for said brush, of a pair of tubes, one sliding within the other and one of said tubes being stationary, a flexible and extensible chamber within said tubes and means for continuously supplying fluid under pressure to said chamber, whereby said chamber will compensate for the wear of said brush and maintain it in contact with the commutator, substantially as described.

7. The combination with a commutator brush movable toward the commutator, of a pair of tubes one sliding within the other and the outside tube being stationary, a flexible and expansible chamber within said inner tube, said inner tube preventing lateral expansion of said chamber and frictional contact with said stationary tube, said sliding tube having a part movable therewith engaging said brush, and means for continuously supplying fluid under pressure to said chamber, to maintain said brush in contact with the commutator and compensate for the wear thereof, substantially as described.

8. The combination with a commutator brush movable toward the commutator, of a flexible and extensible chamber, means for continuously supplying fluid under pressure to said chamber, said chamber having a part movable therewith engaging said brush to compensate for the wear thereof and maintain it in contact with the commutator and

means for automatically cutting off the supply of fluid to said chamber in case of leakage of the fluid therefrom, substantially as described.

9. The combination with a commutator brush movable toward the commutator, of a flexible and expansible chamber having a part movable therewith engaging said brush, means for continuously supplying fluid under pressure to said chamber, said means including a spigot having a main passage extending therethrough, and a branch passage in communication with said main passage, and a valve in said main passage adjacent to the entrance of said branch passage into said main passage, said valve closing said main passage and being adapted to close said branch passage when the pressure in the spigot is greater than the pressure in said chamber, substantially as described.

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