

(No Model.)

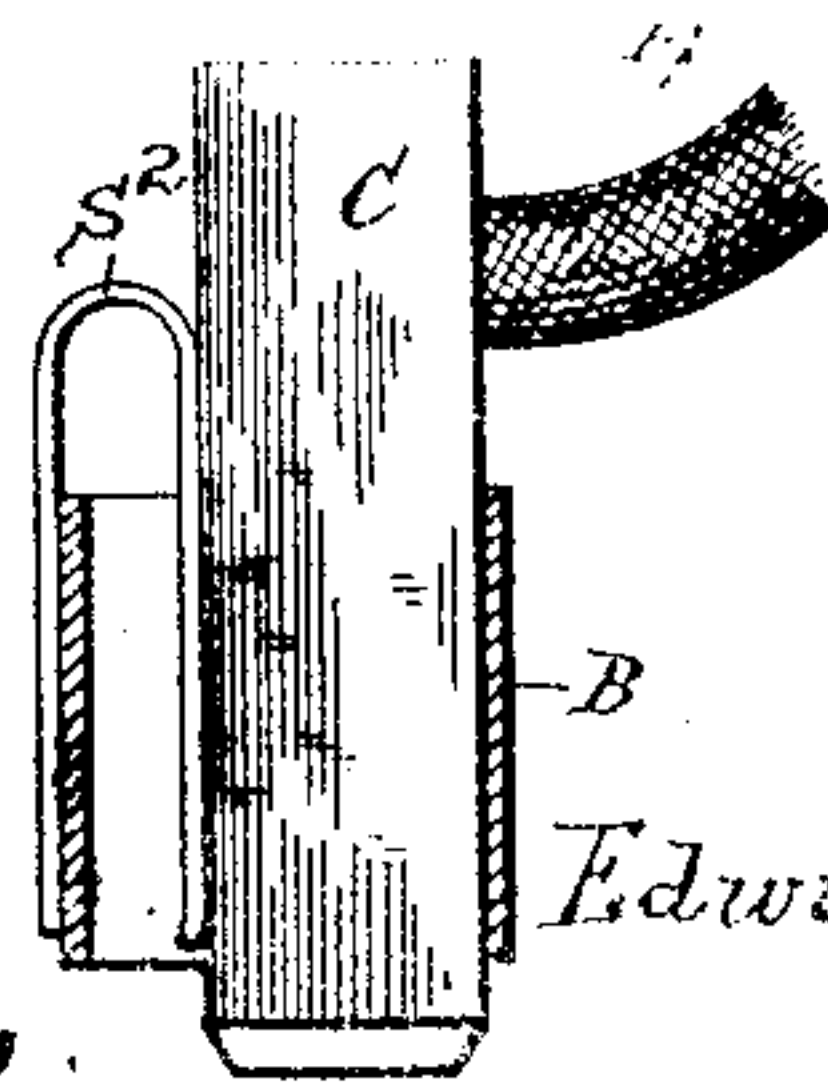
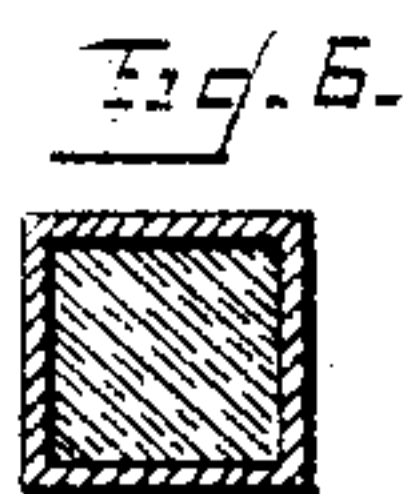
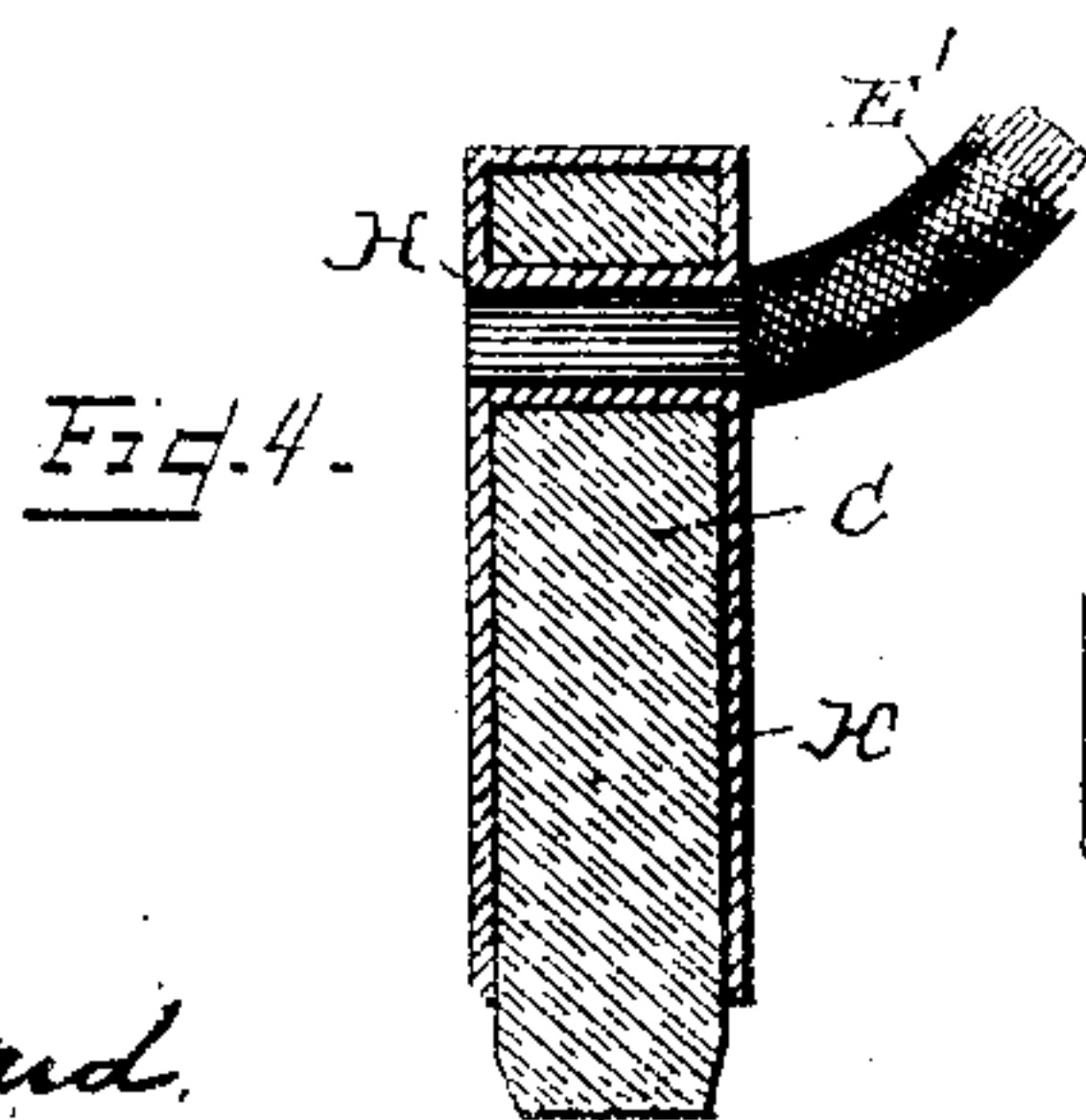
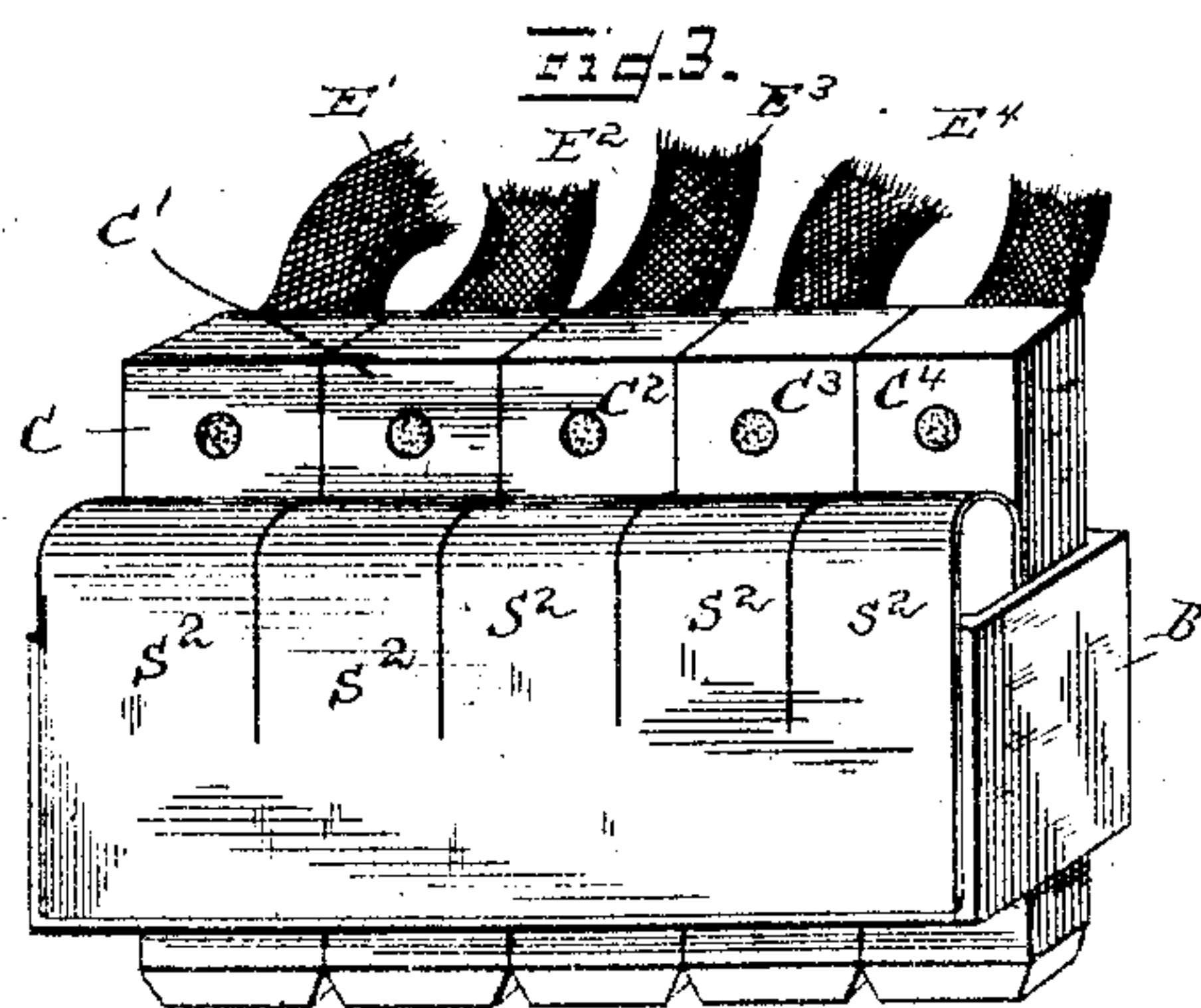
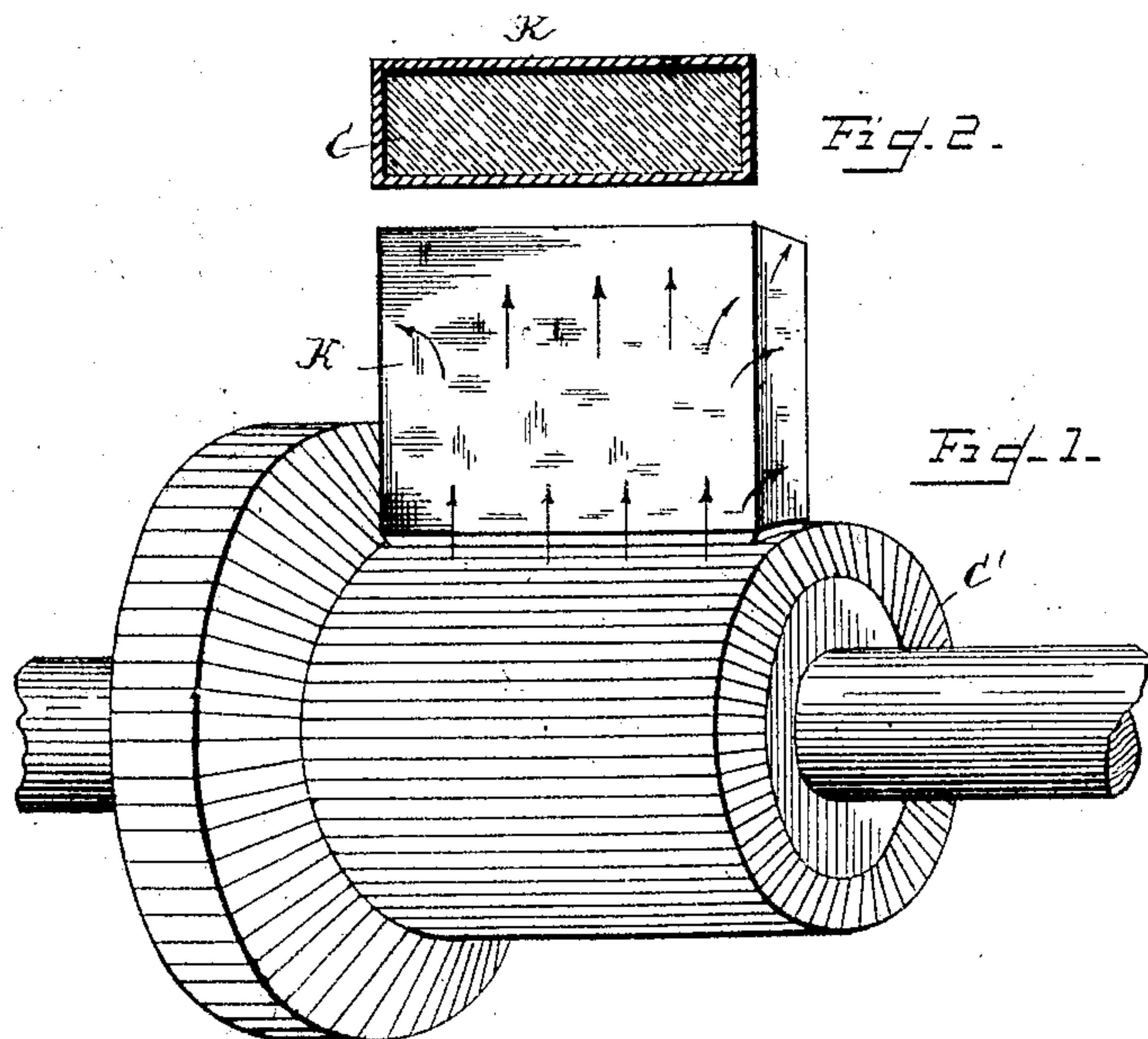
2 Sheets—Sheet 1.

E. W. RICE, Jr.

BRUSH AND HOLDER FOR ELECTRICAL MACHINES.

No. 426,471.

Patented Apr. 29, 1890.



Witnesses
Jas P. Steward.
Jas H. Leavelle.

Inventor
Edwin Wilbur Rice, Jr.
By his Attorney
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(No Model.)

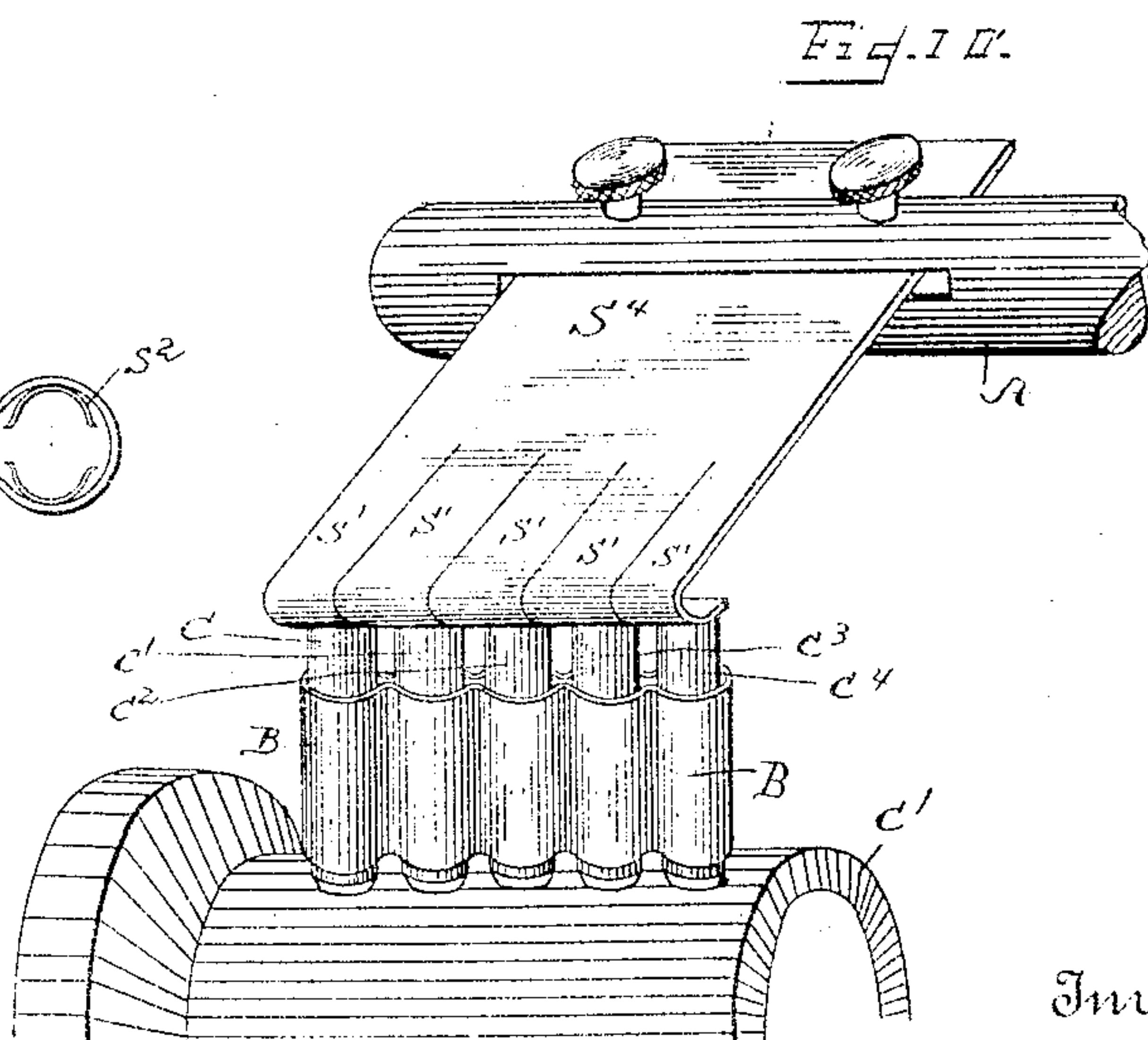
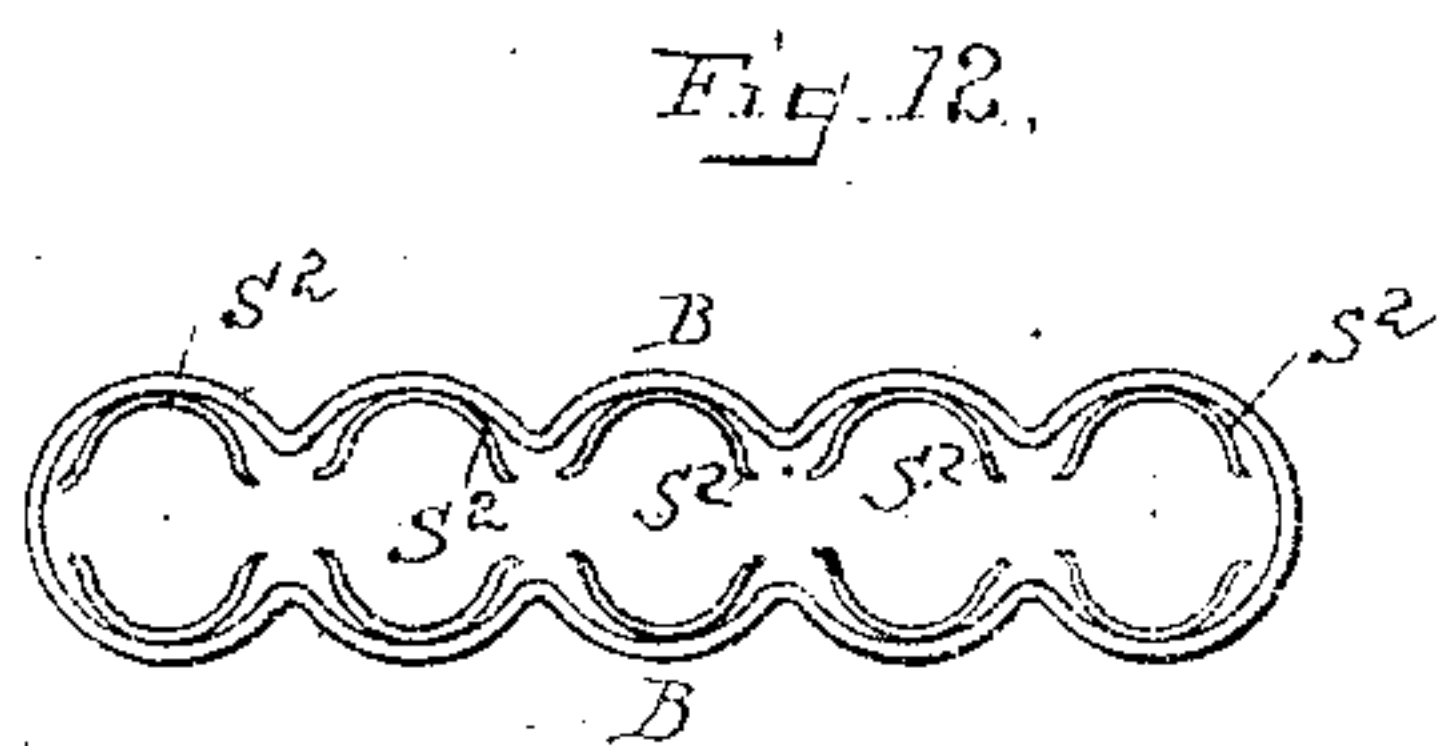
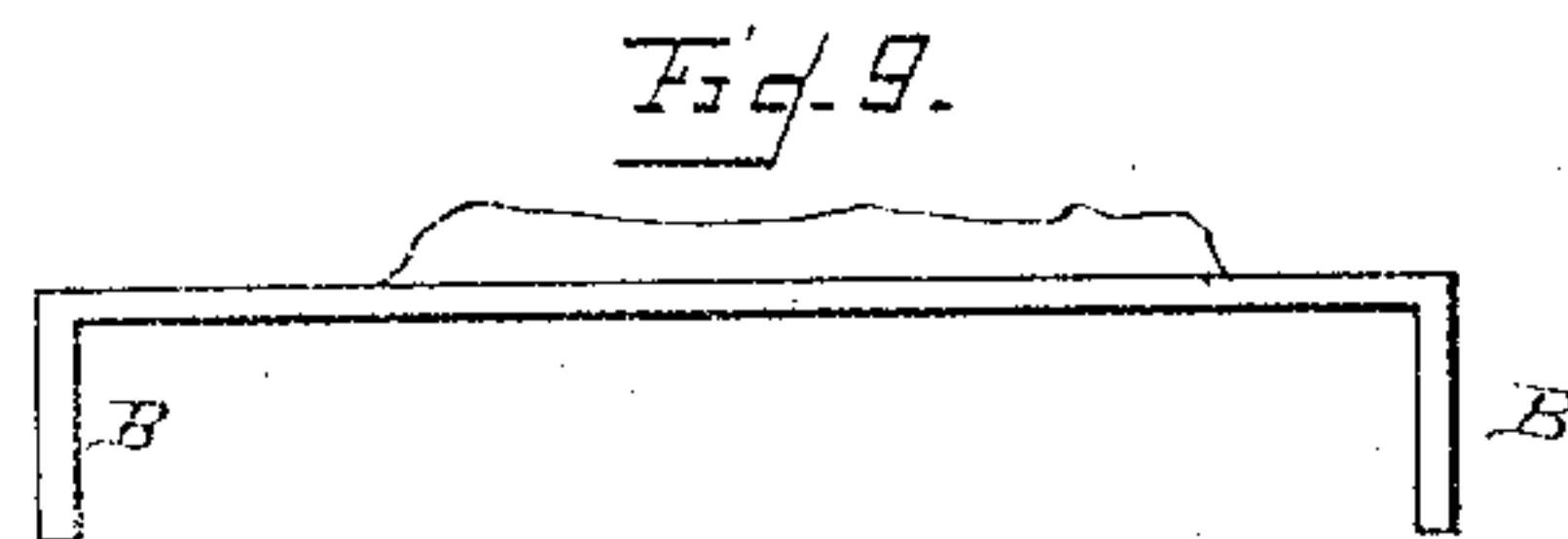
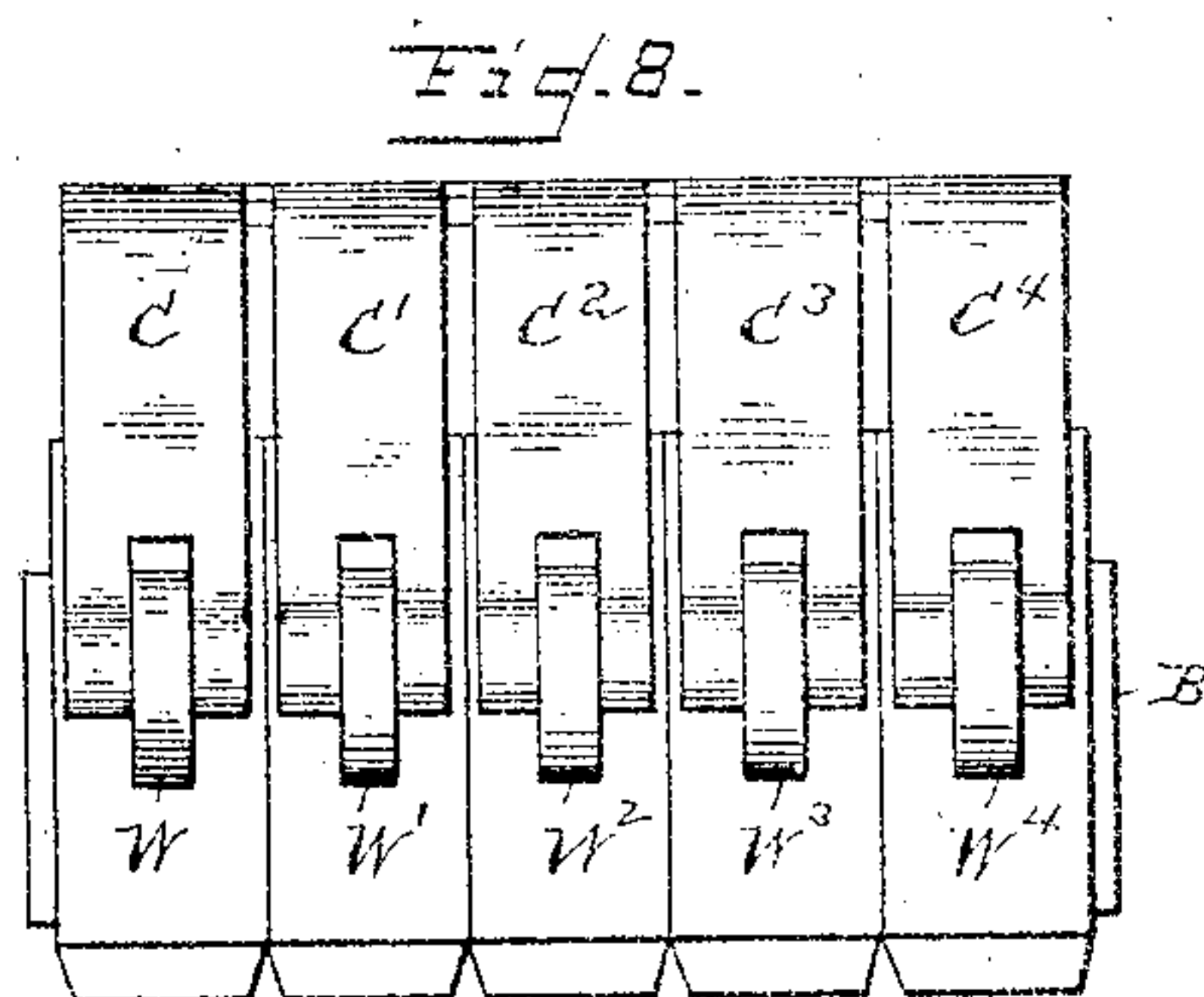
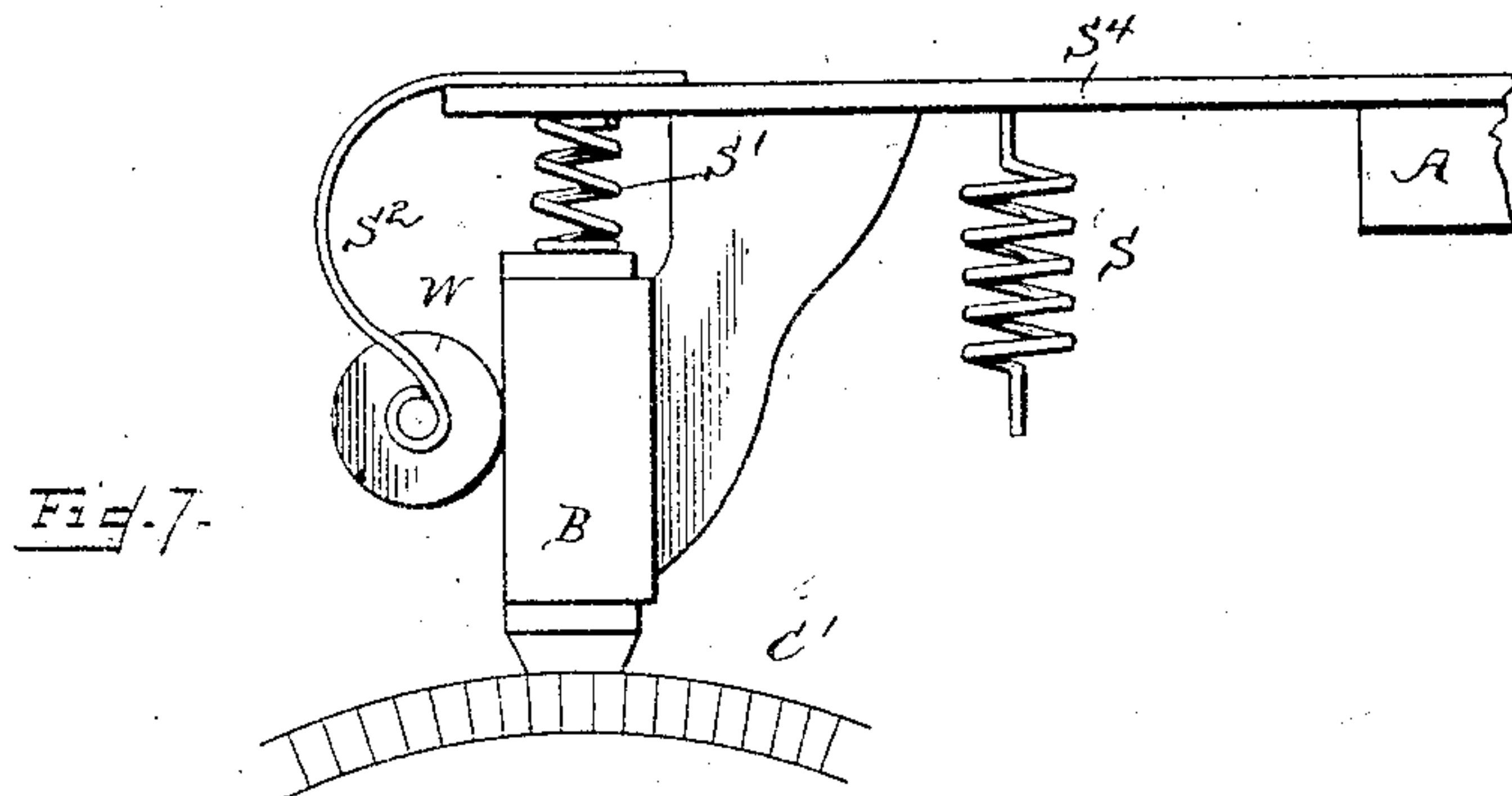
2 Sheets—Sheet 2.

E. W. RICE, Jr.

BRUSH AND HOLDER FOR ELECTRICAL MACHINES.

No. 426,471.

Patented Apr. 29, 1890



Witnesses
Chas. R. Steward
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UNITED STATES PATENT OFFICE.

EDWIN WILBUR RICE, JR., OF LYNN, MASSACHUSETTS.

BRUSH AND HOLDER FOR ELECTRICAL MACHINES.

SPECIFICATION forming part of Letters Patent No. 428,471, dated April 29, 1890.

Application filed March 30, 1889. Serial No. 305,427. (No model.)

To all whom it may concern:

Be it known that I, EDWIN WILBUR RICE, Jr., a citizen of the United States, and a resident of Lynn, in the county of Essex and State of Massachusetts, have invented certain new and useful Brushes and Holders Therefor for Electrical Machines, of which the following is a specification.

My invention relates to electric commutating or collecting devices used with dynamo-electric machines or motors or other electric apparatus.

My invention relates especially to devices of this character in which blocks or pieces of carbon are employed in place of copper as the conducting-pieces, between which and another conducting body or bodies sliding electric contact is made. Such blocks or pieces of carbon are usually employed as a substitute for the brushes of commutators.

My invention is applicable, however, to blocks of carbon employed as any part of a commutating or collecting device and forming a conducting body having a sliding contact-surface.

I shall hereinafter, for the sake of illustration only, describe my invention as applied to the carbon brush for a commutator, but do not wish to be understood as limiting myself to the use of the invention with such a carbon block, the invention being equally applicable to a conducting-block of any description used as a sliding contact-body—as, for instance, a commutator-cylinder block made of carbon instead of copper.

My invention consists in brush-holding arrangements whereby there is secured at all times a good electrical connection between the line and brush, while at the same time the brush is free to play up and down should it be necessary for it to do so on account of irregularities or roughness of the commutator.

My invention consists, also, in the general and detail features hereinafter more specifically claimed.

I have herein described and shown my invention as carried out in connection with a carbon contact brush or block having a thick or heavy coating of copper, forming a mechanical re-enforcing and heat-dissipating envelope; but a brush or contact so constructed forms the subject of claims in another appli-

cation for patent filed by me February 7, 1890, Serial No. 339,525.

In the accompanying drawings, Figure 1 is a perspective view of a carbon brush in its position upon the commutator. Fig. 2 is an end section of the carbon brush or block. Fig. 3 shows the means of establishing connection between the brush and line, and also the elastic supports for the carbon blocks. Fig. 4 is a vertical section of one of the carbon pieces, Fig. 3. Fig. 5 is a side view of the brush, showing how it is held by an elastic support. Fig. 6 is a cross-section of a square brush. Fig. 7 shows in side elevation a modified means of supporting the brush and making electrical connection with the same. Fig. 8 is an end elevation of Fig. 7. Fig. 9 shows the box-support, Fig. 8. Fig. 10 illustrates in perspective a further modification of the brush and its supporting appliances. Fig. 11 is a cross-section of one of the carbon pieces of the brush, Fig. 10. Fig. 12 shows in plan the holder for this form of brush.

In Fig. 2, C is a block of carbon firmly compressed into shape in molds by hydraulic pressure, or other suitable pressure, and so made into a dense homogeneous mass.

K is a coating or covering of copper. This coating may be plated on by electric deposition, or it may be a copper box or tube of suitable dimensions forced onto the carbon by mechanical pressure.

Fig. 1 shows such a block in its position upon a commutator C'. When the commutator revolves at high speed, some heat is generated by the friction between it and the carbon brush. The heavy copper coating or covering will, however, rapidly conduct the heat away from the commutator, as indicated by the arrows, and thus prevent undue heating of the same, and will also help to convey heavy currents to or from the commutator.

Fig. 3 shows how, instead of a single carbon block K, Fig. 1, there may be employed a number of pieces C' C', &c., placed side by side in a receptacle, cage, or box B, and elastically supported in position by springs S' S', &c. The blocks or pieces are free to slide up and down in the box or receptacle.

Fig. 5 shows more clearly this method of supporting the carbon pieces in position. Con-

nection may be made between the line and carbon blocks or pieces by flexible cables or conductors E' , E'' , &c. In this instance a hole II is made through the carbon, as shown in Fig. 4, into which the end of the cable E' , previously bared of any insulation, is inserted and then soldered securely or otherwise fastened. The interior surface of the hole II is preferably plated with copper, as shown. It is not necessary, of course, to solder the cable E in position into the hole II, as it may be permanently attached to the box or holder B, and reliance placed upon the copper springs S^2 , &c., and the contact of the blocks or pieces with the box B to convey the current.

Figs. 7 and 8 illustrate modified means of supporting the brushes.

B is a box or receptacle closed on three sides, but open on the other. The carbon piece or pieces are held in position in this receptacle by the springs S^2 , which are provided at their free ends with rollers W, pressing against the blocks at their exposed side and holding them upright in the box. Springs S' press downward upon the blocks so as to hold them against the commutator-surface with which they are to make contact. Case B and springs S' , S^2 are carried by an arm or lever S^3 , to which is applied a spring S, tending to move the whole system downward toward the commutator-cylinder. The spring S' is auxiliary to the spring S, and is made of wire of a smaller diameter than the spring S, enabling it to follow irregularities of surface in the commutator C' , to which the stronger spring S would not readily respond. The receptacle B is shown in plan in Fig. 9.

Fig. 8 shows a number of carbon pieces C, C' , &c., mounted in a holder B, and acted upon independently by spring-supported wheels W, W', &c.

It will of course be understood that the box or receptacle B, Fig. 3, is to be supported in any desired way, preferably in the manner shown in Fig. 7. In Fig. 3 the weight of the blocks in the receptacle may be depended on to keep them down upon the cylinder, or springs S' , as just described, may be used for the purpose.

The box or receptacle is preferably of a metal like copper for the double purpose of helping to maintain electrical connection between the blocks and the outside conductor, and of conducting away and dissipating heat developed in the blocks by the electric current or by friction at their sliding contact-surfaces.

Fig. 10 illustrates another modification of the form of brush and holder for the same. The brushes are in this case made circular in cross-section, similar to an arc-light carbon, and of suitable length. The receptacle or box B is made to conform to this shape and the carbon pieces are elastically supported in position by springs S^2 , Fig. 12.

The holder B may be supported from the rod A in any suitable manner. The holder

may be carried by a piece of hard-drawn copper S^4 . In this case the elasticity of the arm S^4 itself supplies the spring effect obtained by spring S, Fig. 7.

The end of the spring S' is slit and the ends bent under, as shown, so as to press down with a yielding or spring pressure upon the blocks or pieces, permitting them to slide up and down in the box B independently of any action of S^4 . In this case an auxiliary pressure downward independent of that which tends to move the supporting-arm for box B is supplied, as before, to permit the blocks to follow slight irregularities of the commutator. The same independent auxiliary pressure is supplied in Fig. 7 by spiral springs S' , and in Fig. 3 by the weights of the blocks themselves.

What I claim as my invention is—

1. In an electric commutator, a carbon contact-block having a copper envelope, in combination with a box or receptacle of copper in which the block slides up and down, and a laterally-pressing spring bearing against the block to hold it in position.

2. In an electric commutator, the combination, with a carbon contact-block, of a box or receptacle in which it is retained in position, a spring tending to move said box toward the opposite contact-surface with which the block makes connection, and an auxiliary spring pressing upon the carbon block itself, as and for the purpose described.

3. An electric commutator-brush composed of a series of blocks supported independently of one another in a cage or box in which they are free to slide up and down, in combination with laterally-pressing springs bearing against the side of said blocks, and springs, one for each block, tending to move the same in the cage toward the commutator-surface upon which the brush bears.

4. In an electric commutator, a carbon contact-block having a coating of copper and supported in position in a cage or receptacle of good conducting material, in which it is free to move up and down, in combination with a laterally-pressing spring, as and for the purpose described.

5. In an electric commutator, a carbon contact-block supported in a cage or receptacle in which it is free to move up and down, in combination with a flexible conductor fastened to said block and making electrical connection to or from the same.

6. The combination, with the carbon contact-block free to slide in its cage or box, of the flexible conductor fastened in a socket or hole in said block.

7. In a commutator, a carbon contact-brush or block having a socket or hole provided with a copper or other plating, in combination with a conductor inserted and fastened in said hole.

8. In an electric commutator, a compound brush consisting of two or more contact-blocks free to move up and down in a cage or box and each provided with a separate attached

flexible conductor, as and for the purpose described:

9. The combination, with the carbon contact-block, of the cage or receptacle in which it may move up and down, a spring pressing downward upon the block, and a laterally-pressing spring provided with a contact-roller.

Signed at Lynn, in the county of Essex and State of Massachusetts, this 27th day of March, A. D. 1889.

EDWIN WILBUR RICE, JR.

Witnesses:

J. W. GIBBONNY.

ROBERT SHAND.