

W. E. SAWYER & A. MAN.  
Electric Switch.

No. 229,476.

Patented June 29, 1880.

FIG. 1.

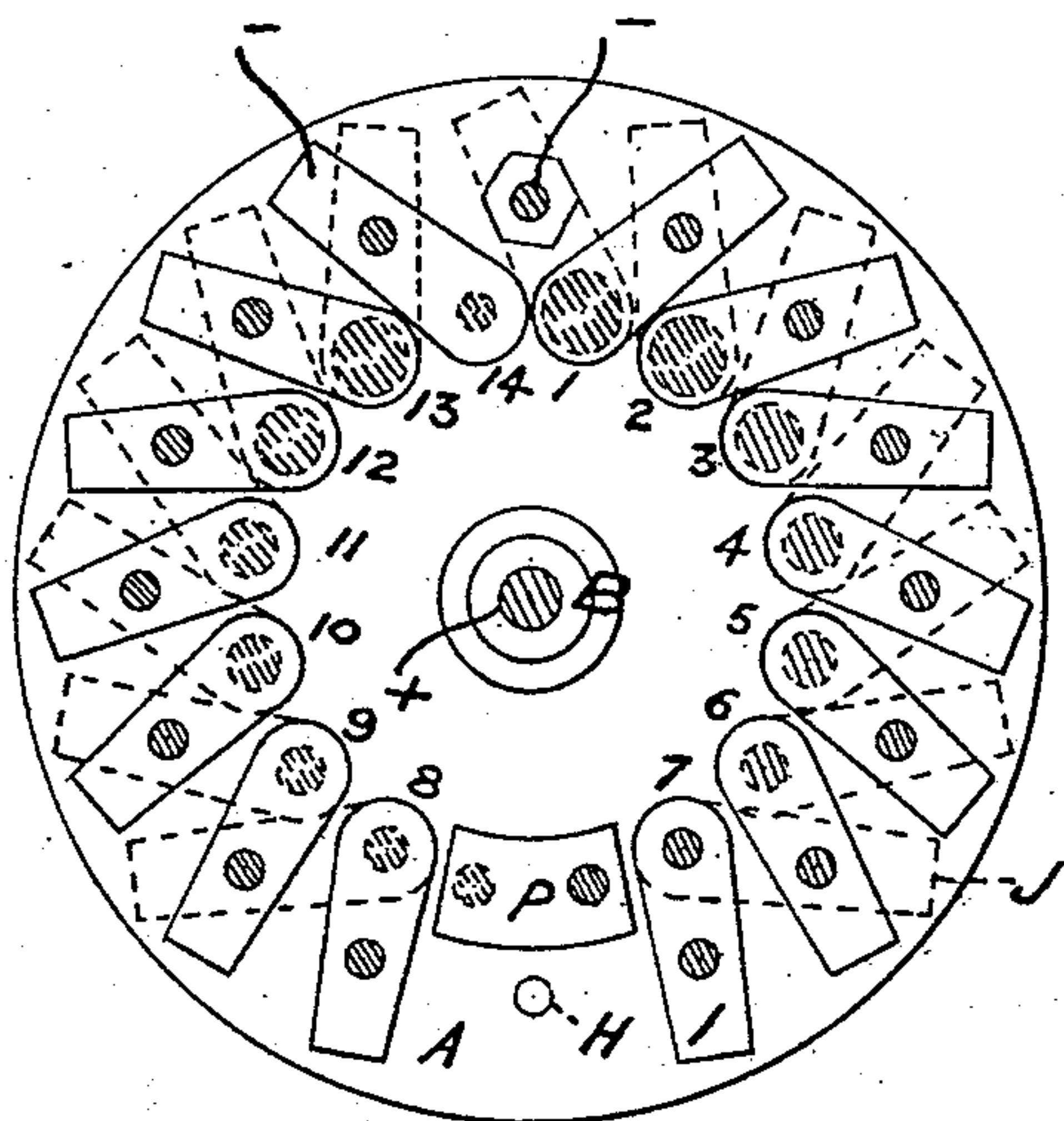


FIG. 2.

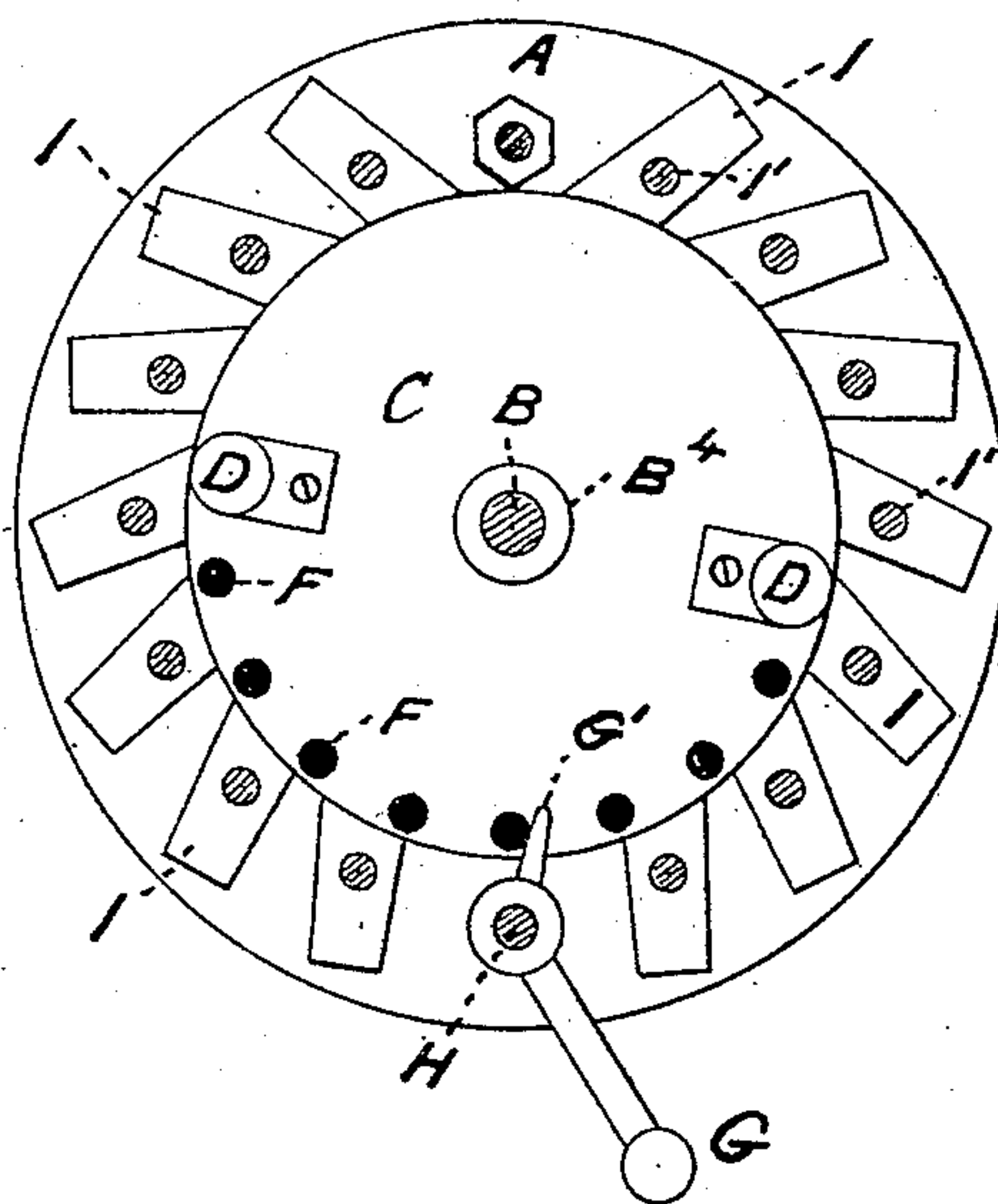


FIG. 3.

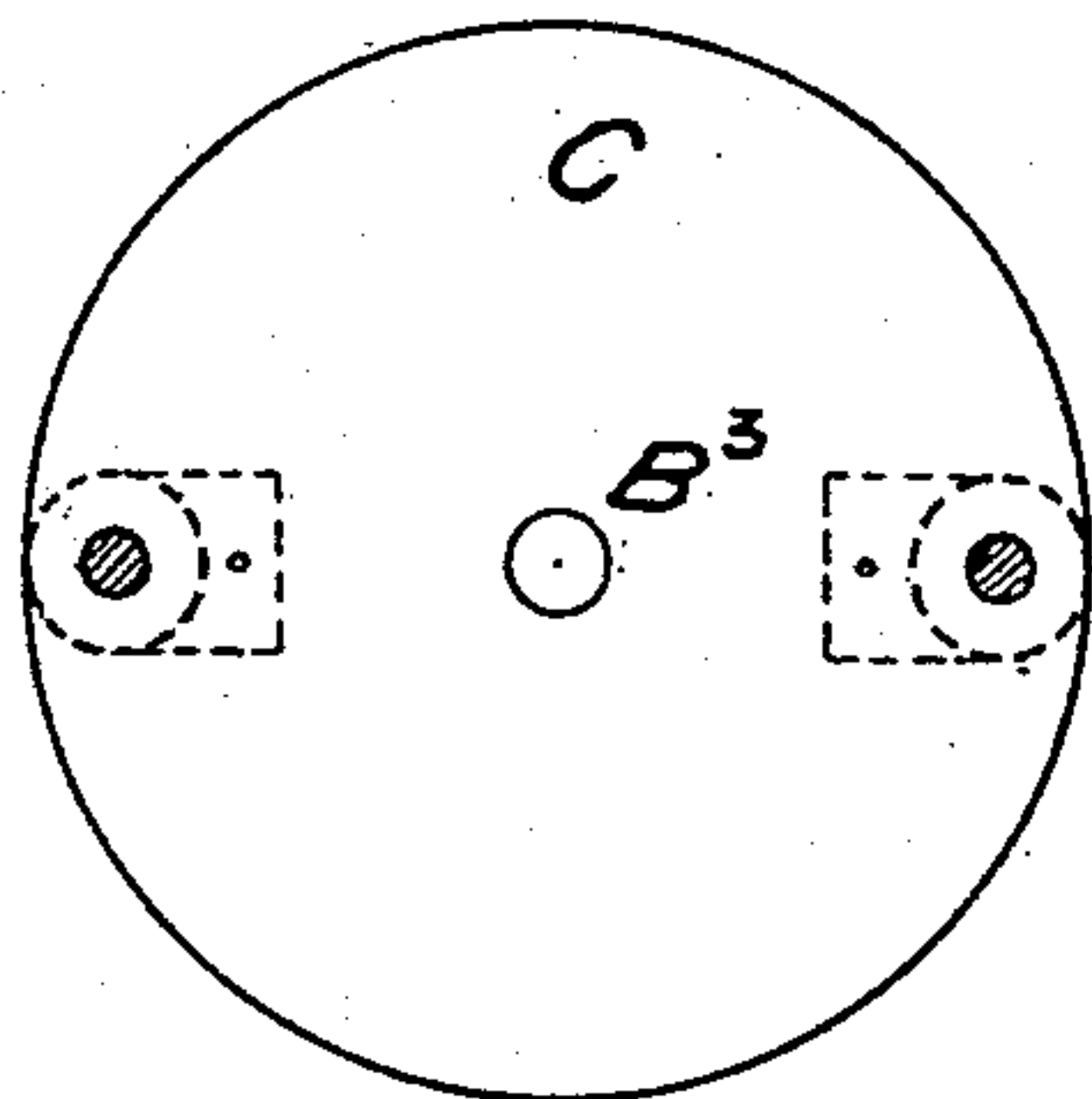


FIG. 4.

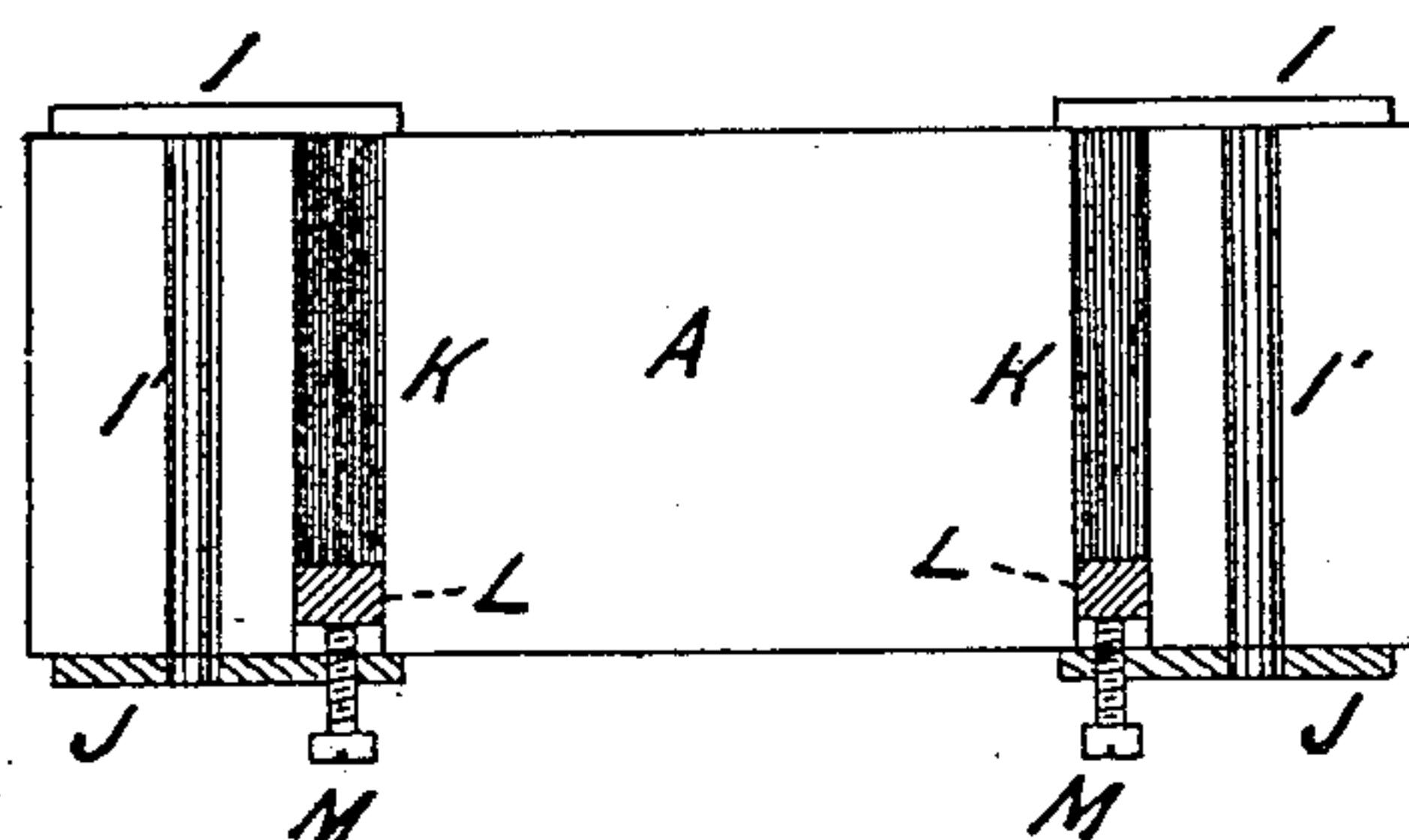
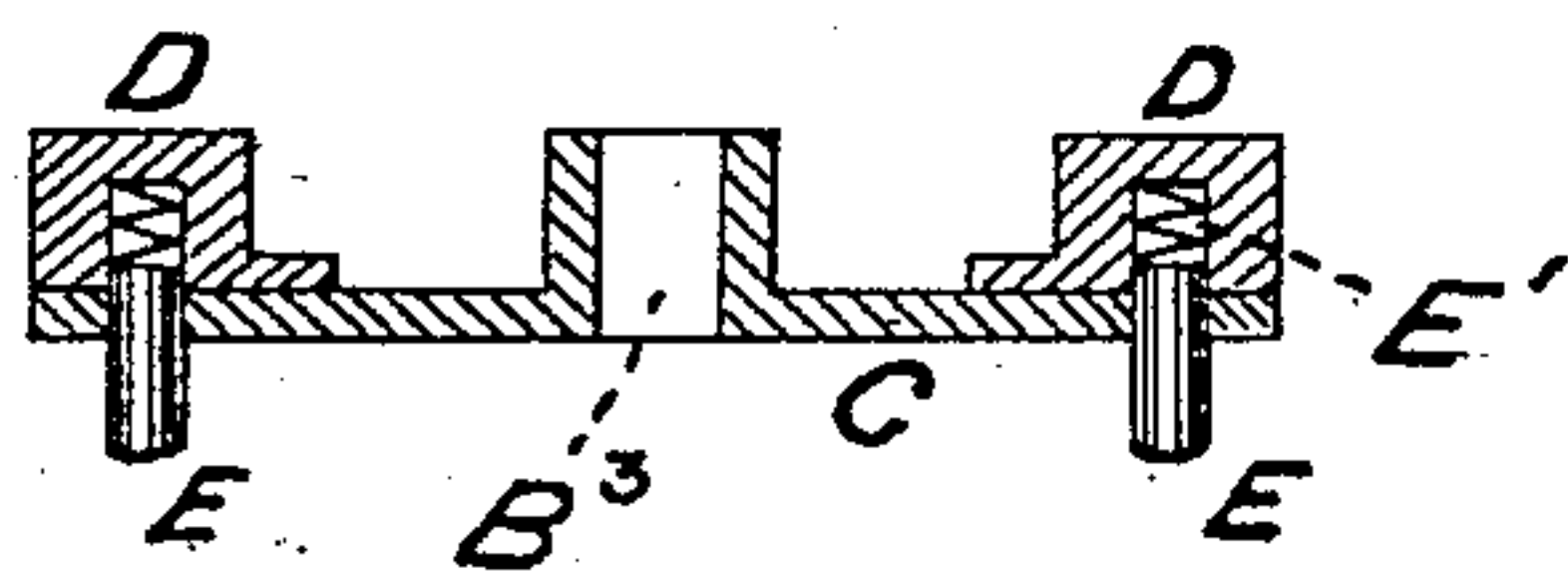


FIG. 5.



WITNESSES.

*F. S. Miller Jr*  
*Wm. H. Broadway*

INVENTORS.

*William E. Sawyer*  
*Albon Man By*  
*Amos Broadway*  
*Atty*

2 Sheets—Sheet 2.

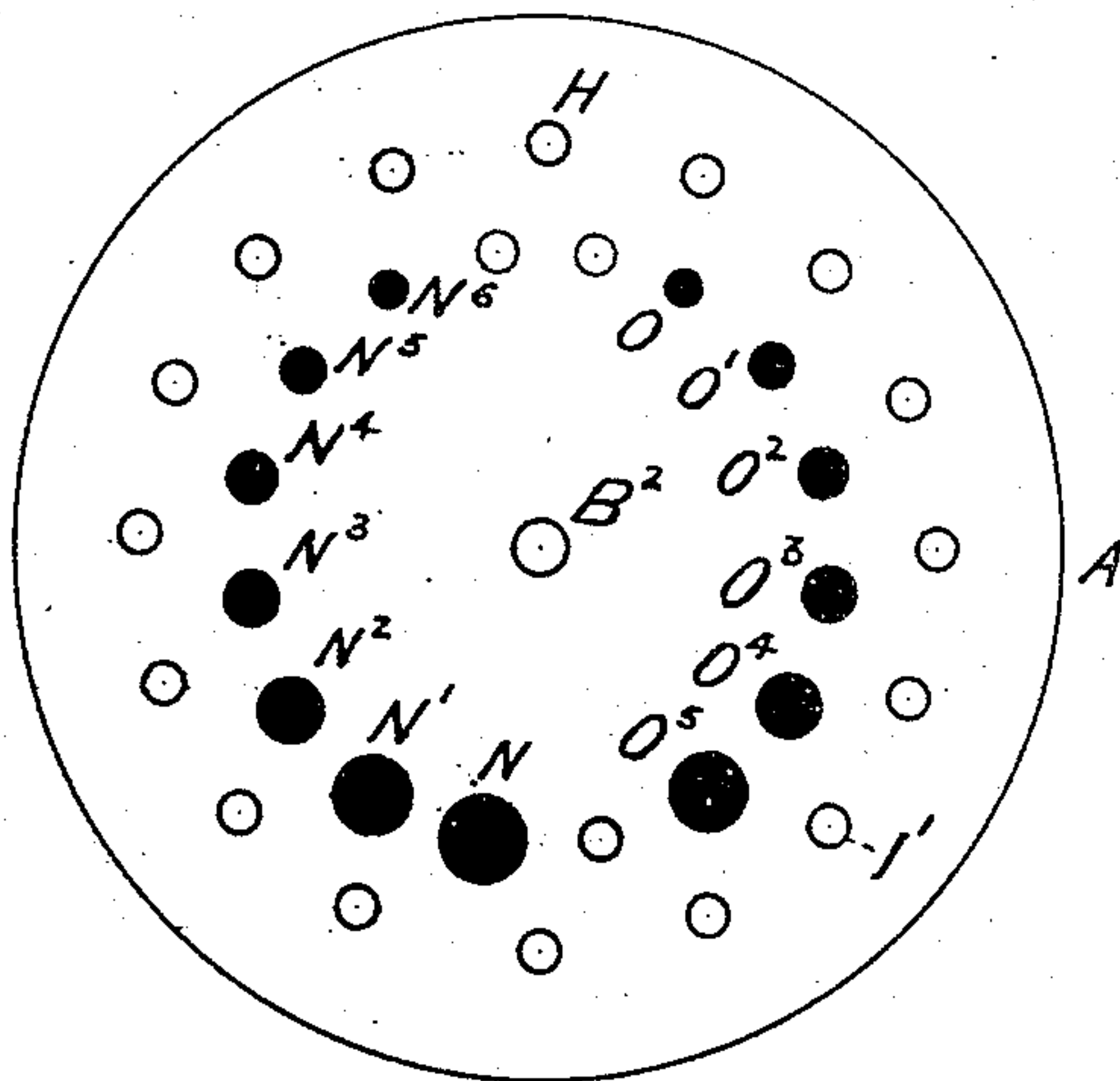
W. E. SAWYER & A. MAN.

# Electric Switch.

No. 229,476.

Patented June 29, 1880.

**FIG. 6.**



**FIG. 7.**

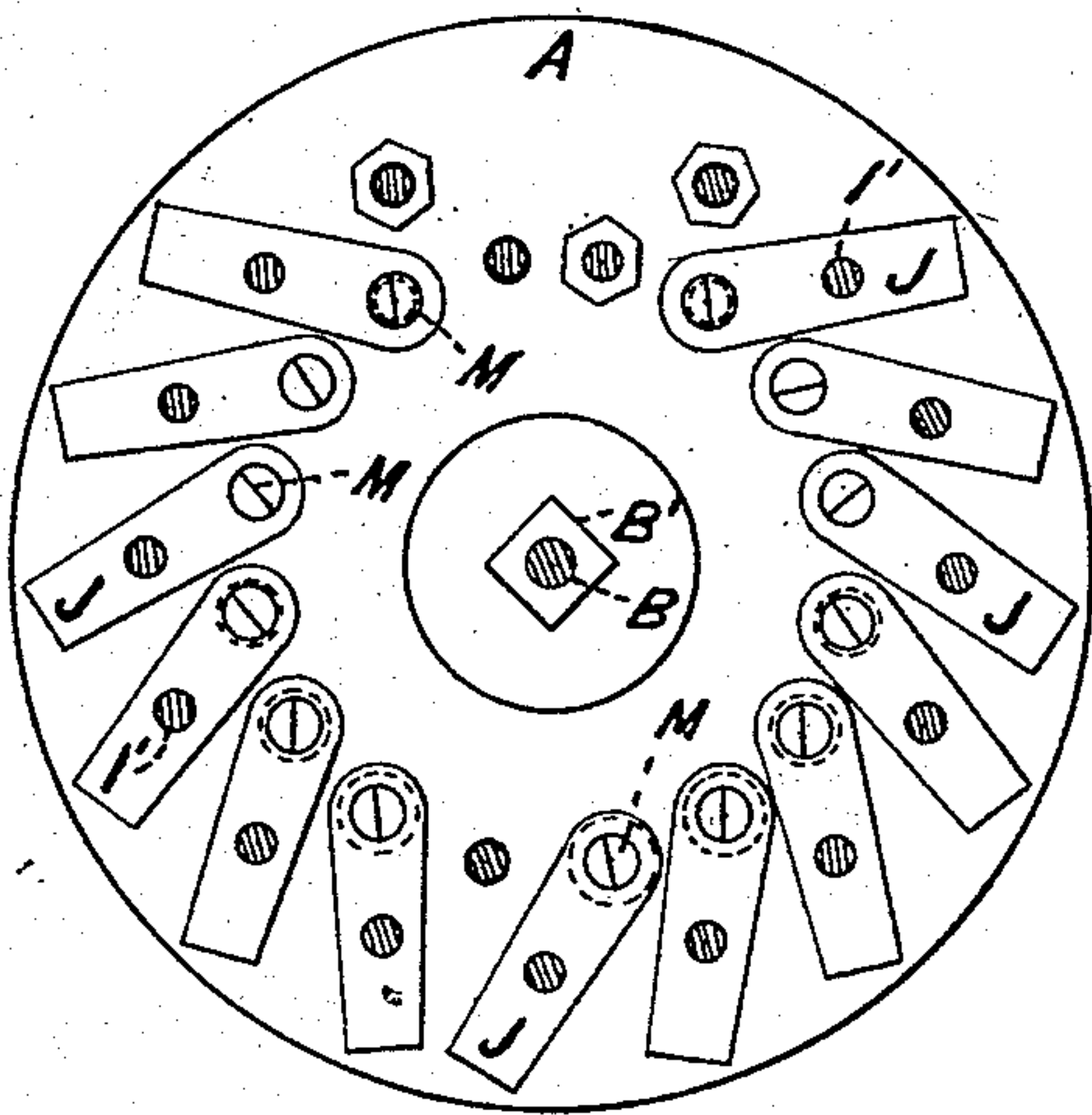
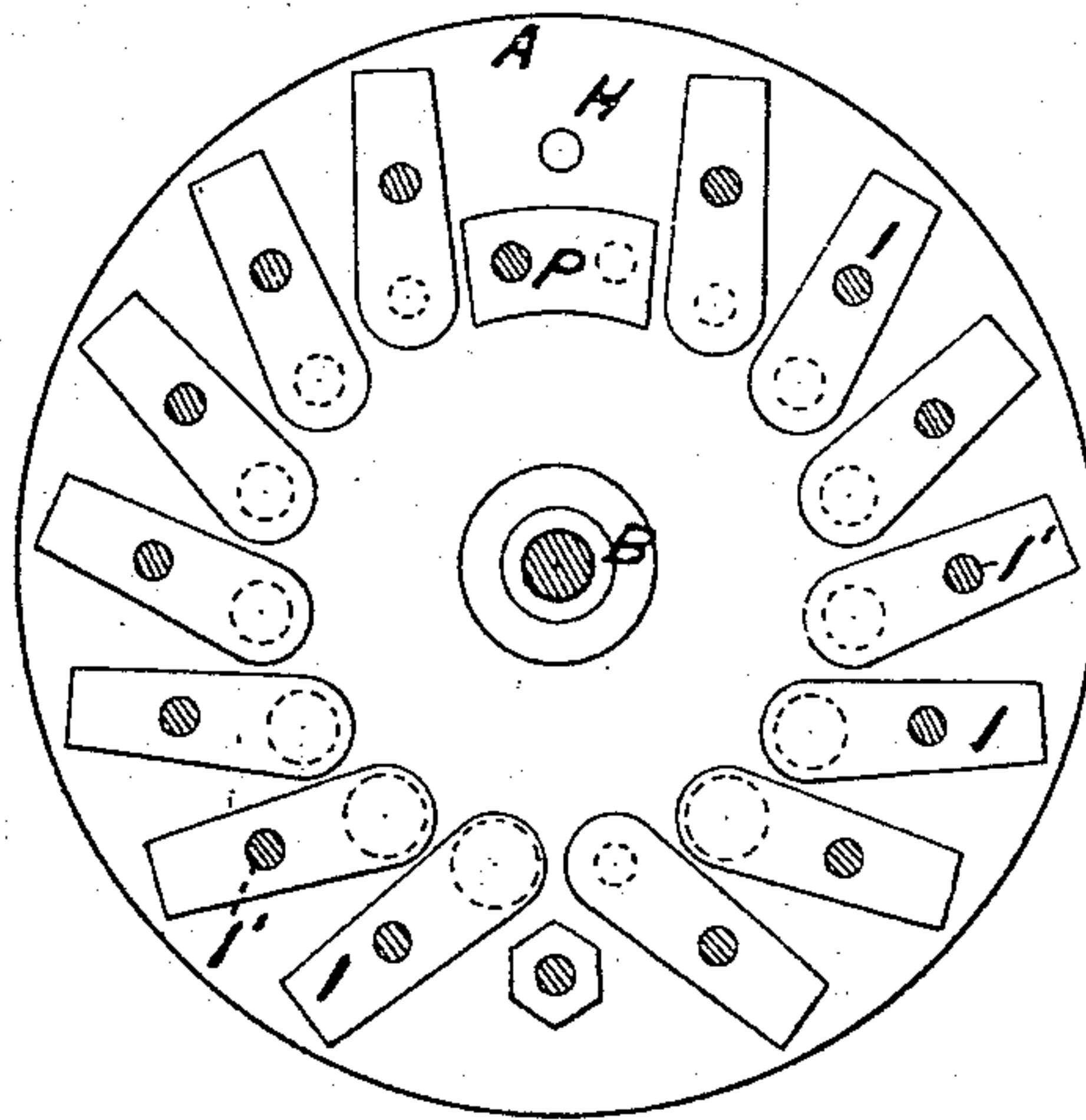


FIG. 8.



WITNESSES.

F. S. Miller, Jr.  
William H. Broadnax

*INVENTORS.*

William E. Sawyer  
Albion Man By  
Amos Broadhead City



## UNITED STATES PATENT OFFICE.

WILLIAM E. SAWYER, OF NEW YORK, AND ALBON MAN, OF BROOKLYN,  
N. Y., ASSIGNORS TO ELECTRO DYNAMIC LIGHT COMPANY.

## ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 229,476, dated June 29, 1880.

Application filed December 5, 1878.

*To all whom it may concern:*

Be it known that we, WILLIAM EDWARD SAWYER, of the city, county, and State of New York, and ALBON MAN, of Brooklyn, county of Kings, and State aforesaid, have jointly invented certain new and useful Improvements in Electric Switches for Dividing and Regulating the Application of Electric Currents to Electric Lamps; and we do hereby declare the following to be a description of our invention, and of the manner and process of making, constructing, and using the same, in such full, clear, concise, and exact terms as to enable any person skilled in the art or science to which it appertains, or with which it is most nearly connected, to make, construct, and use the same, reference being had to the accompanying drawings, making part of this specification, and to the figures and letters of reference marked thereon, and also to Letters Patent allowed to us for switches for electric lights, November 15, 1878.

In this switch the mode of operation in its relation to the lamp is substantially the same as that of the Letters Patent allowed to us as aforesaid; but this switch differs from that in its mechanical construction and in the material of which it is constructed, by which all danger or inconvenience arising from the heat of the current is avoided.

The frame of this switch is composed of soapstone or other non-conductor of heat that can be readily worked in the desired form, and instead of resistances formed of metallic conductors, as in the patent above referred to, we employ either broken or powdered carbon or carbon rods packed in tubes formed or set in the frame of the switch.

Reference being had to the drawings, A is a disk of plaster-of-paris, soapstone, or other heat-resisting material, perforated, as shown in Fig. 6, the black circles being those which are filled with carbon, the others being for the rods and connections by which the several parts are clamped together.

On the top side of the disk are set fourteen metallic pieces, I, and on the bottom side thirteen similar pieces, J. These pieces are arranged as shown, and drawn firmly together and down upon the disk A by screw-rods I',

the position they hold with respect to each other being clearly shown in Fig. 1, wherein the full lines represent the pieces I upon the top of the disk and the dotted lines the pieces J upon the under side of the disk. The enlarged ends of the pieces I J cover the holes N O through the disk, the pieces I acting as a stopper to the upper end of the hole. The hole being packed with carbon K, Fig. 4, the plunger L is put into the lower end, and by means of screw M in pieces J the plunger L is caused to exert any required pressure upon the carbon, thus making perfect connection with the carbon and enabling its resistance to be changed, if desired.

Through hole B<sup>2</sup> passes a stud, B, drawn down upon the disk A by nut B' on the under side of the disk, and turning upon this stud is a metallic disk, C, Figs. 2 and 3, through the hole B<sup>3</sup> of which the stud passes, the disk C being secured in place by nut B<sup>4</sup>, Fig. 2, on the upper end of stud B.

On the disk C are two brackets, D D, drilled partly through from the under side of the disk. In the circular cavities thus made, actuated by spiral springs E', work the two plungers E, which, as the disk is turned, make connection with the faces of the pieces I. The disk is further provided with eight pins, F, in which the pin G' of crank-key G, working on stud H, engages, precisely the same as in the Letters Patent referred to. Referring to those Letters Patent, the current, as shown in Fig. 1, enters from the + side at the stud B, and thence through disk C and its plunger E, and when the lamp is not in circuit it passes outward by way of piece I (numbered 1) and the carbon resistance N, which has the same resistance as that of the lamp. When the lamp is fully lighted the current passes outward by way of piece I, (numbered 14,) and through the lamp.

The object of the piece P is merely to keep the plungers E from dropping out of place. Supposing the resistance of the lamp is .95 ohm, the resistance N, Fig. 6, corresponding to piece I, No. 1, of Fig. 1, is .95 ohm. When the lamp is completely out of the circuit one of the studs E is bearing upon piece I, No. 1, and the other stud E is bearing upon the blank piece P, with which there is no con-



nection. A single turn of the crank brings the studs upon pieces I, Nos. 2 and 8, and the current divides, three-fourths of it flowing, by way of pieces 2, carbon resistance N', of .31 $\frac{2}{3}$  ohm, piece J, and bolt I', to piece I, No. 1, and resistance N, of .95 ohm, outward, and one-fourth of it flowing, by way of piece 8, carbon resistance O, of 1.9 ohm, and thence by piece J and bolt I' to piece 9; thence through carbon resistance O', of .38 ohm, and so on through carbon resistances O<sup>2</sup>, of .25 $\frac{1}{3}$  ohm, O<sup>3</sup>, of .18 $\frac{2}{3}$  ohm, O<sup>4</sup>, of .07 $\frac{5}{6}$  ohm, and O<sup>5</sup>, of .06 $\frac{1}{3}$  ohm, and thence, through piece J and bolt I', to piece 14 and the lamp. The total resistance of the first or shunt circuit is therefore 1.26 $\frac{2}{3}$  ohm, and that of the lamp-circuit, including the lamp, is 3.8 ohms, making the joint resistance .95 ohm. The resistance of N<sup>2</sup> is .63 $\frac{1}{3}$  ohm, N<sup>3</sup> .63 $\frac{1}{3}$  ohm, N<sup>4</sup> 1.26 $\frac{2}{3}$  ohm, N<sup>5</sup> 3.8 ohms, and N<sup>6</sup> 7.6 ohms, making a sum total of resistances on the shunt side of 15.2 ohms.

Without following out the various changes, which are fully set forth in the Letters Patent referred to, suffice it to say that when one plunger E is bearing upon piece I, No. 1, the other plunger is bearing upon blank piece P, and that the plungers thereafter take position

as follows: upon 2 and 8, 3 and 9, 4 and 10, 5 and 11, 6 and 12, 7 and 13, and lastly blank piece P and 14; when the entire current is directed through the lamp.

Having thus fully described our invention, we claim and desire to secure by Letters Patent—

1. An electric switch consisting of a frame composed of soapstone or plaster, or other insulating material, also suitable to resist the transmission of heat, fitted with carbon resistances and combined with metal contact-joints and conductors arranged in relation to each other to regulate the application and division of the current to the lamp, as set forth, and at the same time avoid danger or inconvenience from the heat of the current.

2. A circular disk, A, fitted with packed carbon resistances, as set forth.

3. A disk, A, fitted with pieces I and J, clamped to the disk, as set forth.

WILLIAM EDWARD SAWYER.  
ALBON MAN.

Witnesses:

THOS. CROCKER,  
GEO. W. SAWYER.