

(No Model.)

3 Sheets—Sheet 1.

W. K. FREEMAN.  
ELECTRIC SWITCH.

No. 452,937.

Patented May 26, 1891.

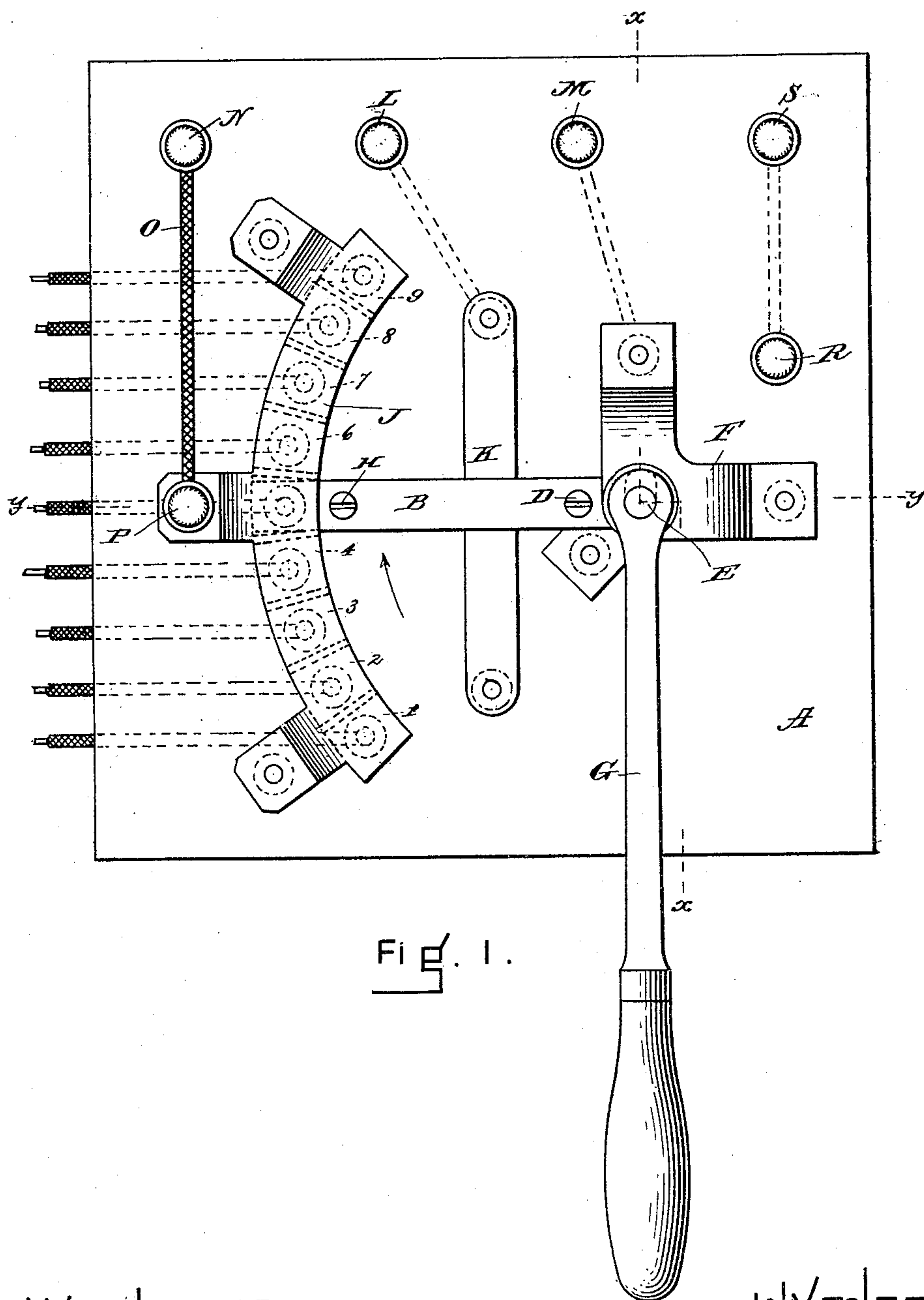


Fig. 1.

WITNESSES

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His Attorneys

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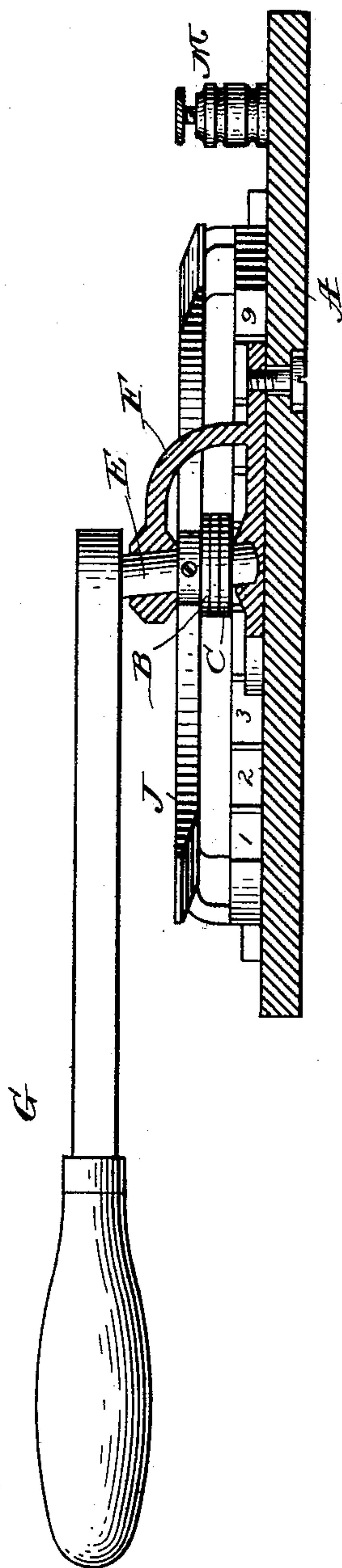


FIG. 2.

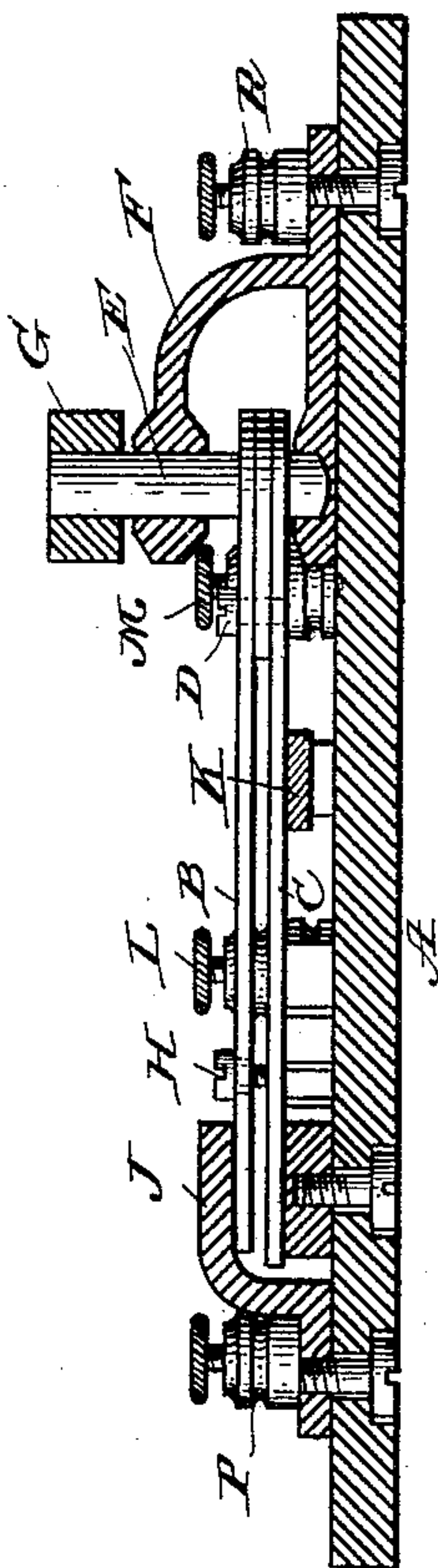


FIG. 3.

WITNESSES

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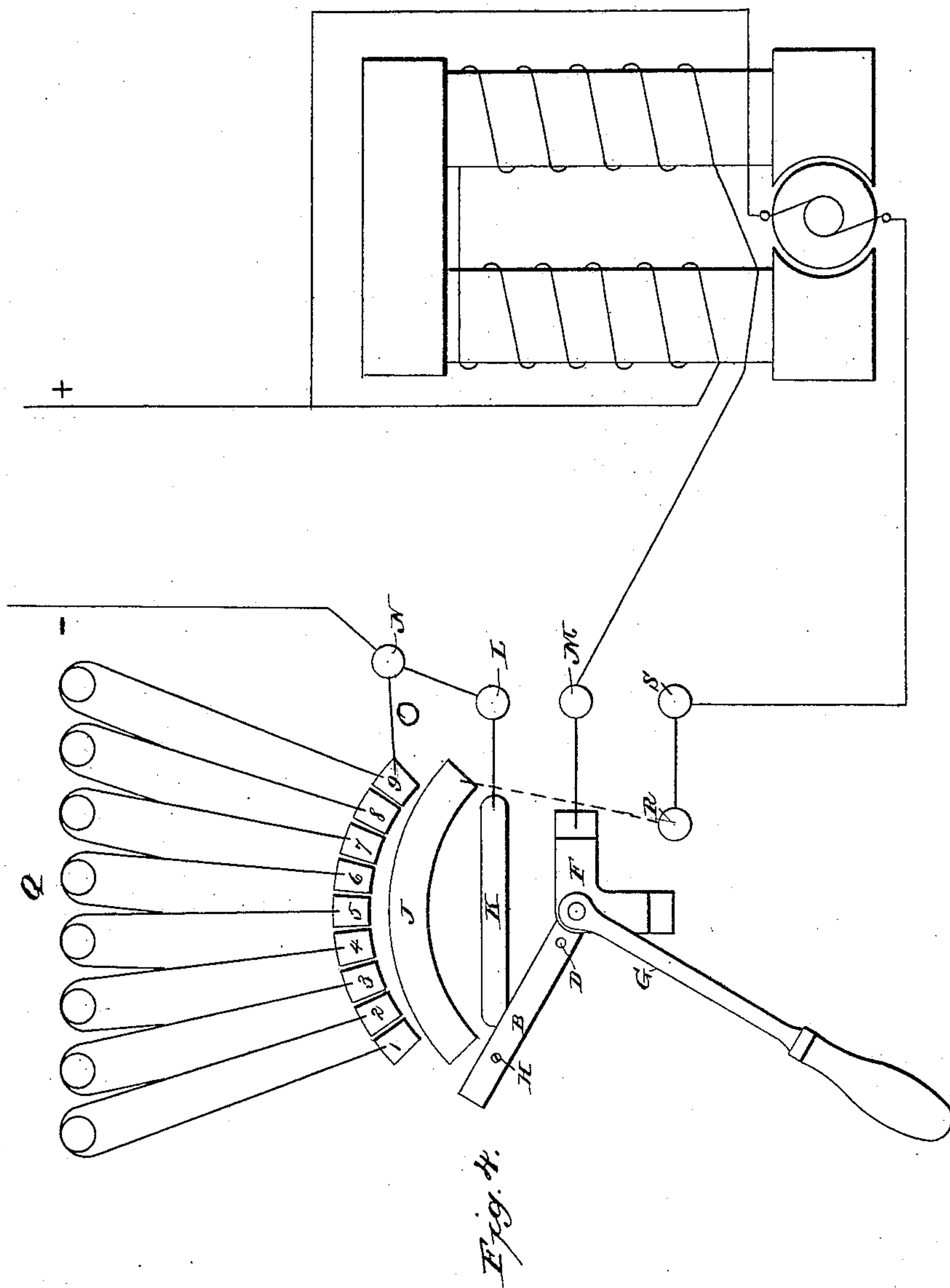
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# UNITED STATES PATENT OFFICE.

WALTER K. FREEMAN, OF BROOKLYN, NEW YORK, ASSIGNOR TO WILLIAM S. HADAWAY, JR., TRUSTEE, OF BOSTON, MASSACHUSETTS.

## ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 452,937, dated May 26, 1891.

Application filed January 15, 1891. Serial No. 377,860. (No model.)

*To all whom it may concern:*

Be it known that I, WALTER K. FREEMAN, of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Electric Switches; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the figures and letters of reference marked thereon.

My invention has for its object to provide an improved switch adapted particularly for use in connection with electric motors; and it consists in a novel construction and combination of parts, which I will now proceed to describe.

Referring to the accompanying drawings, Figure 1 represents a plan view of a switch constructed in accordance with my invention. Fig. 2 is a sectional view of the same, taken on the line *x x*, Fig. 1. Fig. 3 is a similar view taken on the line *y y*, Fig. 1; and Fig. 4 is a diagrammatic view showing the switch and its various circuit-connections.

Similar letters and numerals of reference in the several figures indicate the same parts.

The letter A indicates the base of my switch, composed, preferably, of slate or some other suitable non-conducting material.

B and C are two metallic arms, connected together at their inner ends by a screw D, or otherwise, and firmly secured in any suitable manner to a stud or pivot E, having its bearings in a bracket F and having a handle G rigidly secured to its upper end, as shown. The outer ends of the arms B and C are springy and have a tendency to separate, but are restrained from so doing by means of a screw H, which passes through an aperture in one of them and is tapped into the other one, as shown in Fig. 3.

1 2 3 4 5 6 7 8 9 are a series of contact-pieces, connected by suitable conductors to a series of resistance-coils, such as are indicated diagrammatically in Fig. 4. Above the contact-pieces, which are disposed in an arc of a circle, as indicated in Fig. 1, is arranged a metallic segment J. The outer ends of the arms B C are adapted to pass between the metallic segment J and the contact-pieces 1 2

3, &c., the upper arm B making contact with the segment and the lower arm C making contact with one or the other of the series of contact-pieces, as shown in Fig. 3.

The stud or pin E, to which the arms B and C are secured, instead of being set vertically is arranged and maintained in an inclined position, as shown in Figs. 1 and 2, and the result is that when by the operation of the hand-lever G said arms are caused to travel in the direction indicated by the arrow in Fig. 1 they have a tendency to rise, which tendency is restrained by the metallic segment J until the arms pass beyond the segment, when they immediately spring up to a position above the segment. Upon their movement in the opposite direction they continue above the segment until they reach the end of the same, whereupon they spring down in position to pass between the segment and series of contacts again when moved forward.

Beneath the arm C is a contact-plate K, which is in electrical connection with a binding-post L, that is in turn connected to the branch circuit in which the coils of the field of the motor are interposed. The said arm C is likewise in electrical connection through pin E, bracket F, and binding-post M to the same branch circuit. This is best illustrated in the diagrammatic view, Fig. 4.

The course of another branch circuit is as follows: Entering at the binding-post N, it proceeds thence over conductor O to contact-piece 9, through one or more resistance-coils Q to one or the other of the contact-pieces 1 2 3, &c., through arms B C, to segment J, to binding-post R, to binding-post S, and through armature of motor to line again.

In switching in the motor the arm C is first brought in contact with a plate K for the purpose of completing the circuit through the field of the motor. Then by further turning the handle G so as to cause the arms B and C to make contact, respectively, with the segment J and contact-piece 1, the circuit is completed through the armature of the motor and through all of the resistance-coils, thus starting up the motor at minimum speed. To increase the speed, the arms B C are caused by the manipulation of the handle G to advance, so as to complete the circuit through the con



tact-pieces 2 3 4, &c., successively, the maximum speed of the motor being reached when the circuit is completed through contact 9, as will be readily understood. If it is desired to gradually reduce the speed of the motor, the arms B C can of course be caused to travel back beneath the segment J and over the contacts 8 7 6, &c.; but if it is desired to cut out the motor entirely when running at maximum speed it is only necessary to move the arms C D till they pass from beneath the segment J, whereupon, owing to the compression to which they have been subjected because of the inclination of their supporting pivot or stud E, they will spring up above the segment J, thereby rendering it necessary, in order to start the motor again, to move the said arms B C back to first position and introduce first the field-coils and then the armature through the graduated resistance, as before explained.

It will be seen that by the use of my improved switch it is rendered impossible to subject the motor at once to the action of the full strength of current, and damage to the motor is consequently prevented.

I claim as my invention—

1. In the herein-described electric switch, the combination, with the series of contact-pieces, the segment in proximity thereto, the

swinging arms adapted to make contact with said segment and series of contact-pieces, respectively, and the inclined stud or pin upon which said arms are mounted, substantially as described.

2. In the herein-described electric switch, the combination, with the series of contact-pieces leading to the resistance-coils, of the metallic segment arranged above said contact-pieces, the movable arms, the inclined stud or pivot to which they are connected, and the operating-handle, substantially as described.

3. In the herein-described electric switch, the combination of the series of contact-pieces, the metallic segment arranged above the same, the spring contact-arms, connected as described, the inclined stud or pin upon which said arms are mounted, and the operating-handle.

4. The combination of the contact-plate K, spring-arms B C, inclined stud or pin E, and bracket F, with the contact-pieces 1 2 3, &c., the metallic segment arranged above said contact-pieces, and the various circuit connections, substantially as described.

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Witnesses:

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