

J. B. LINN.  
CONTROLLER.

APPLICATION FILED AUG. 4, 1902.

NO MODEL.

FIG 1

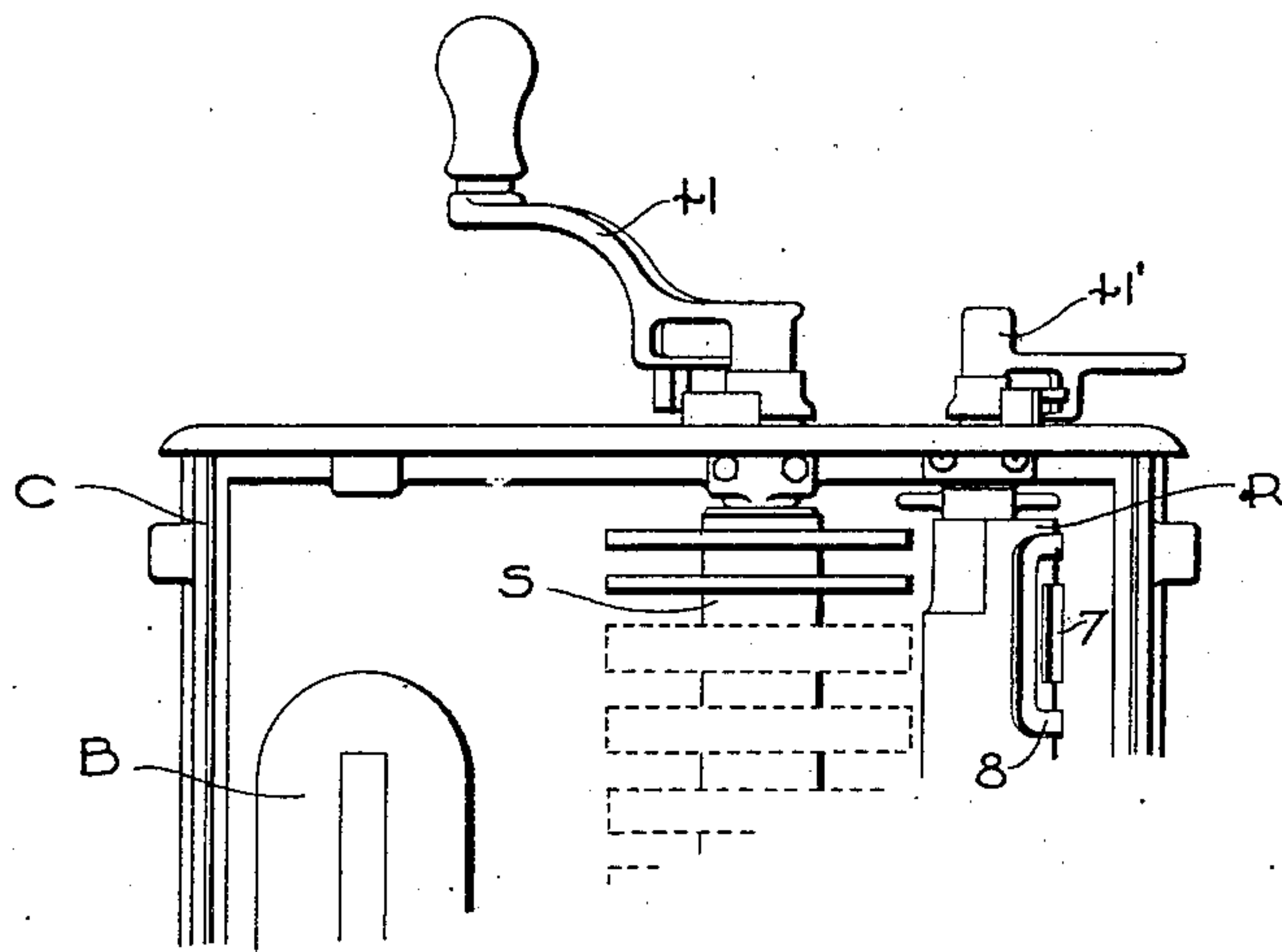


FIG. 2.

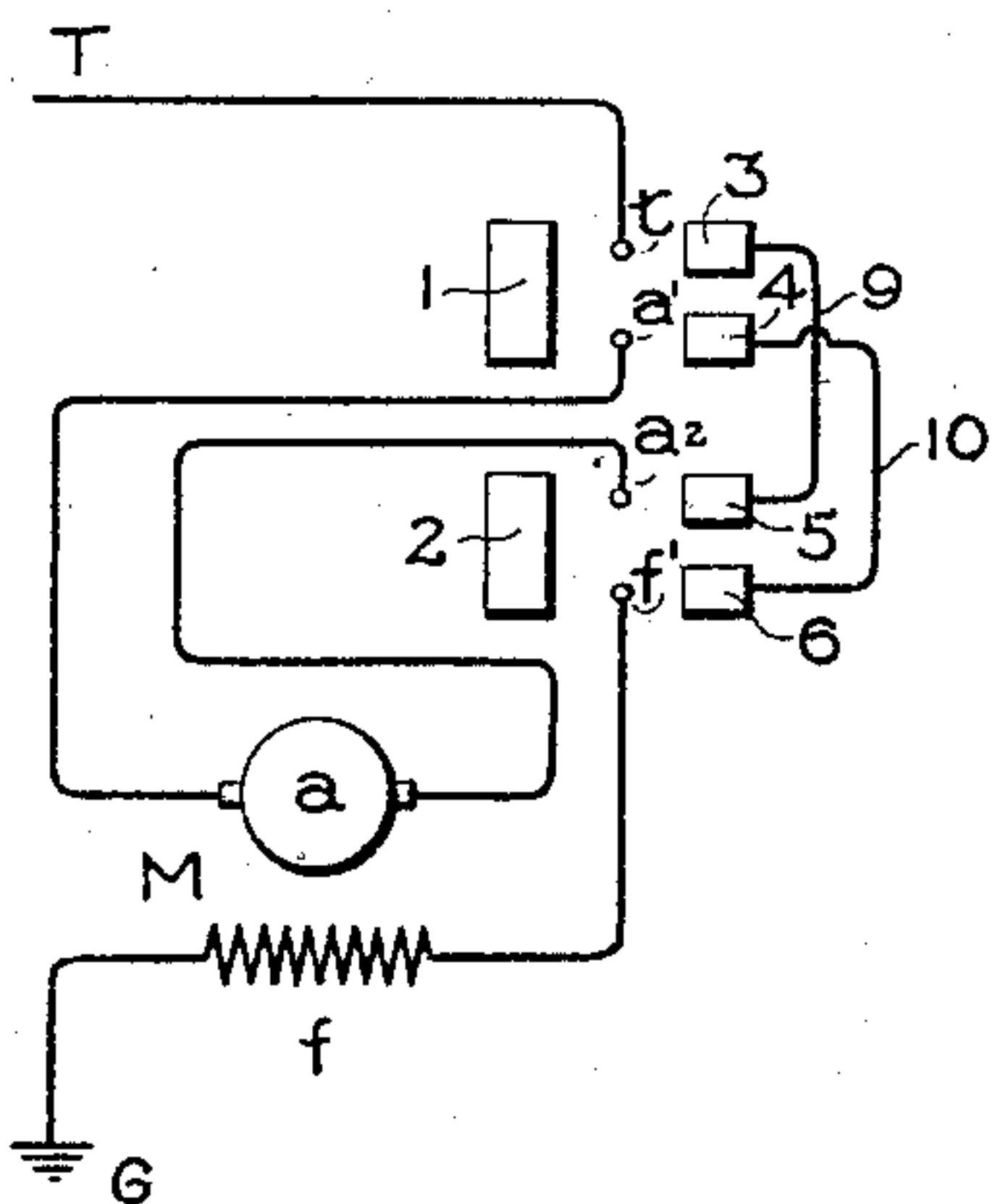
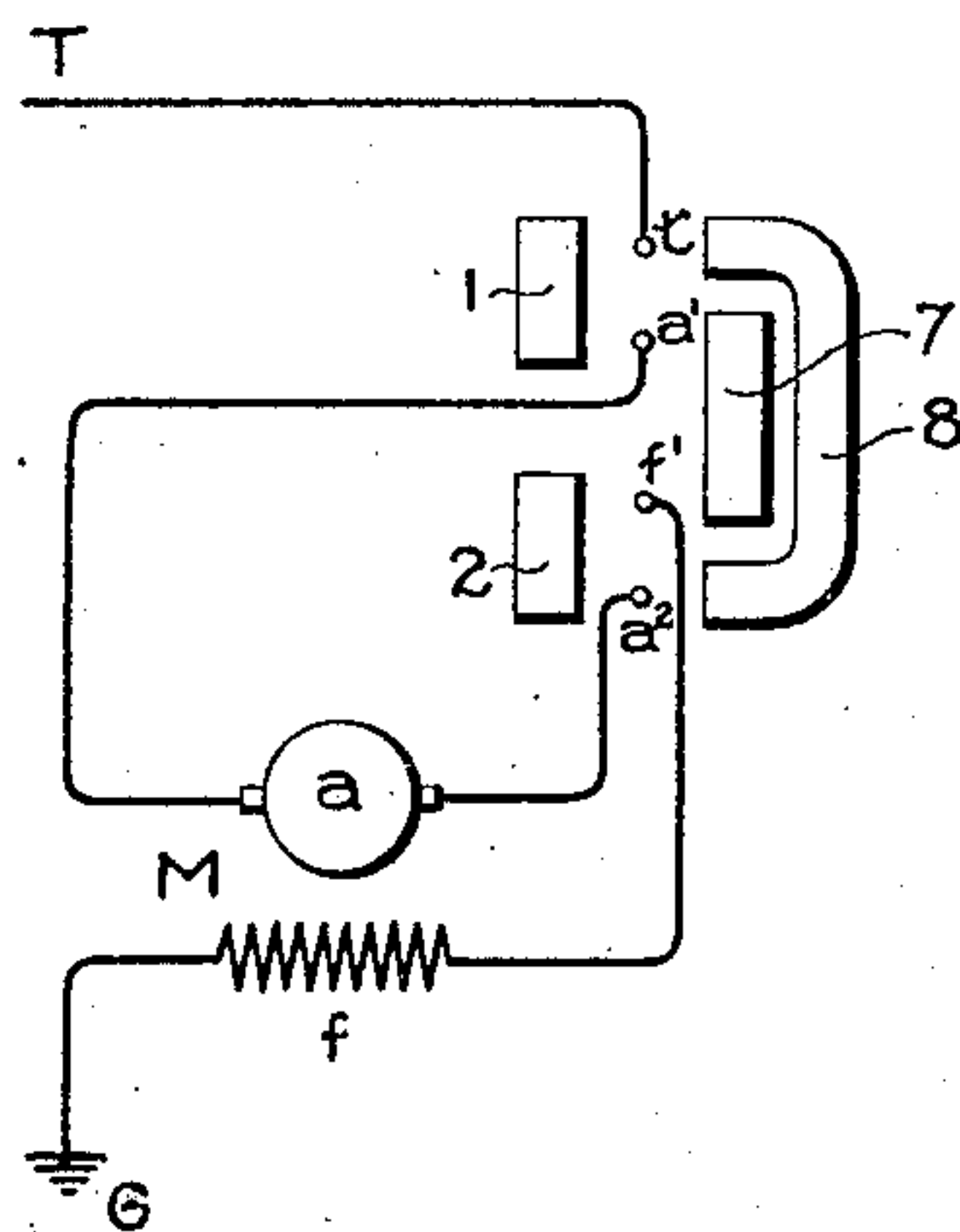


FIG. 3.



WITNESSES:

*Nancy S. Pilden*  
*Helen W. Ford*

INVENTOR:

John B. Linn.  
by *Alvin B. Davis*  
att'y

# UNITED STATES PATENT OFFICE.

JOHN B. LINN, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

## CONTROLLER.

SPECIFICATION forming part of Letters Patent No. 725,730, dated April 21, 1903.

Application filed August 4, 1902. Serial No. 118,275. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN B. LINN, a citizen of the United States, residing at Schenectady, in the county of Schenectady, State of New York, have invented certain new and useful Improvements in Controllers, (Case No. 1,883,) of which the following is a specification.

My invention relates to controllers designed especially for electric-railway use, and has for its object to provide a reversing-switch having great simplicity of construction and one which shall be very efficient in operation.

In the accompanying drawings, Figure 1 is a view in elevation of the upper part of a controller with the front of the casing removed, showing my improved reversing-switch. Fig. 2 is a diagrammatic representation of the ordinary type of reversing-switch contacts and the connections thereto. Fig. 3 is a diagrammatic view of a reversing-switch with the contacts and connections constructed and arranged in accordance with my invention.

Referring now to the drawings, S represents the cylinder or drum of a railway-controller, which is contained within the case C and is operated by the handle H. R represents the cylindrical body or drum of the reversing-switch, which is operated by the handle H'. The terminals or contact-fingers which are adapted to engage the conducting-segments carried by said cylinders or drums have been omitted from Fig. 1 for the sake of clearness. The coil of the magnetic blow-out ordinarily used with this type of controller is designated by B.

It is customary in the construction of reversing-switches to be used in connection with controllers adapted especially for electric-railway work to form the rotatable switch-body R of a solid cylinder of wood or other insulating material. This body carries suitable segments of conducting material which have been heretofore constructed and arranged as shown in Fig. 2. In the arrangement shown in this figure segments 1, 2, 3, 4, 5, and 6 co-operate with suitable contact-fingers  $t$ ,  $a'$ ,  $a^2$ , and  $f'$ , whereby a partial rotation of the body R will reverse the motor. To connect the motor M for operation in one direction, the cylindrical body R is turned so that the seg-

ments 1 and 2 will be brought into engagement with the contact-fingers  $t$ ,  $a'$ ,  $a^2$ , and  $f'$ , thereby completing the circuit through the motor M, Fig. 2, as follows: from trolley T through contact-finger  $t$ , segment 1, contact-finger  $a'$ , armature  $a$  of the motor M, contact-finger  $a^2$ , contact-finger  $f'$ , and field  $f$  of the motor M, to ground at G. To reverse the motor, the cylindrical body R is turned so that the segments 3, 4, 5, and 6 (which are connected together as shown in Fig. 2) will engage the contact-fingers  $t$ ,  $a'$ ,  $a^2$ , and  $f'$ , thereby completing the circuit through the motor as follows: from trolley T through contact-finger  $t$ , segment 3, lead 9 and segment 5, contact-finger  $a^2$ , armature  $a$  of motor M, contact-finger  $a'$ , segment 4, lead 10 and segment 6, contact-finger  $f'$ , field  $f$  of motor M, to ground at G.

In the construction of such a switch as above described it is necessary to connect the alternate segments 3 and 5 and 4 and 6 by means of leads 9 and 10, which are soldered, brazed, or otherwise connected to the segments. Such leads and soldered connections are the source of continual trouble and annoyance in switches containing them. It is the object of my invention to do away with the use of such a great number of conducting segments, leads, and soldered joints between the segments and the leads, and I have accomplished this result by changing the relative arrangement of the contact-fingers so that two of them are transposed in position. With the arrangement which I have devised the contact-segments for the two intermediate contact-fingers may be formed in a single piece, thus leaving only the two end contact-segments to be connected together. These end segments are preferably connected by a conducting-strip formed integral therewith, so that there are really only four separate contact-pieces on the reversing-switch cylinder in place of the six contact-pieces heretofore used. By my present invention the switch construction is simplified and cheapened and the troubles arising from the breaking of soldered joints are done away with. The invention is especially useful in the construction of switches having a large carrying capacity, in which the crossing of



the conductors heretofore employed in connecting the segments is especially objectionable on account of their large size.

The circuit through the switch-contacts and the windings of the motor when these contacts are rearranged in accordance with my present invention may be traced in Fig. 3, as follows: Starting from the trolley T, the circuit leads through the contact-finger *t*, the integral strip or segment 8, contact-finger *a*<sup>2</sup>, the armature *a* of motor M, contact-finger *a*', segment 7, contact-finger *f*', the field *f* of the motor, and to ground at G. The arrangement of contacts shown is for reversing a single motor; but evidently the switch can be modified to reverse any number of motors by a simple duplication of the arrangement of contacts shown.

Although I have shown and described my invention as applied to a reversing-switch for a controller, I do not intend to so limit its application, as the invention is equally applicable to other forms of reversing-switches.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a reversing-switch for an electric motor, segments for one position comprising two contact-pieces each adapted to connect two adjacent contact-fingers, and segments for the other position comprising an intermediate contact-piece adapted to connect two adjacent contact-fingers and two end segments electrically connected together and adapted to connect the two outside contact-fingers.

2. In a reversing-switch for an electric motor, segments for one position comprising two contact-pieces each adapted to connect two adjacent contact-fingers, and segments for the other position comprising an intermediate

contact-piece adapted to connect two adjacent contact-fingers and a second contact-piece having portions adjacent to the two outside contact-fingers.

3. In a reversing-switch for an electric motor, a cylinder of insulating material, segments of conducting material mounted thereon, and contact-fingers with which the segments are adapted to engage, said segments for both the forward and reverse position of the said switch being formed of integral strips of conducting material so constructed and arranged on the surface of said cylinder that one strip does not cross or overlap another.

4. A reversing-switch for an electric motor, comprising four contact-fingers, two segments for connecting said fingers together to complete the circuit through the motor for operation in one direction, and two segments for connecting said fingers together to complete the circuit through the motor for operation in the opposite direction.

5. A reversing-switch for electric motors, comprising four contact-fingers and four strips of conducting material carried by the movable member of said switch, two of said strips being adapted to contact with said fingers to complete the circuit through the motors for operation in one direction, the two other strips being adapted to complete the circuit through the motors for operation in the opposite direction.

In witness whereof I have hereunto set my hand this 31st day of July, 1902.

JOHN B. LINN.

Witnesses:

BENJAMIN B. HULL,  
EDWARD WILLIAMS, Jr.