

No. 660,054.

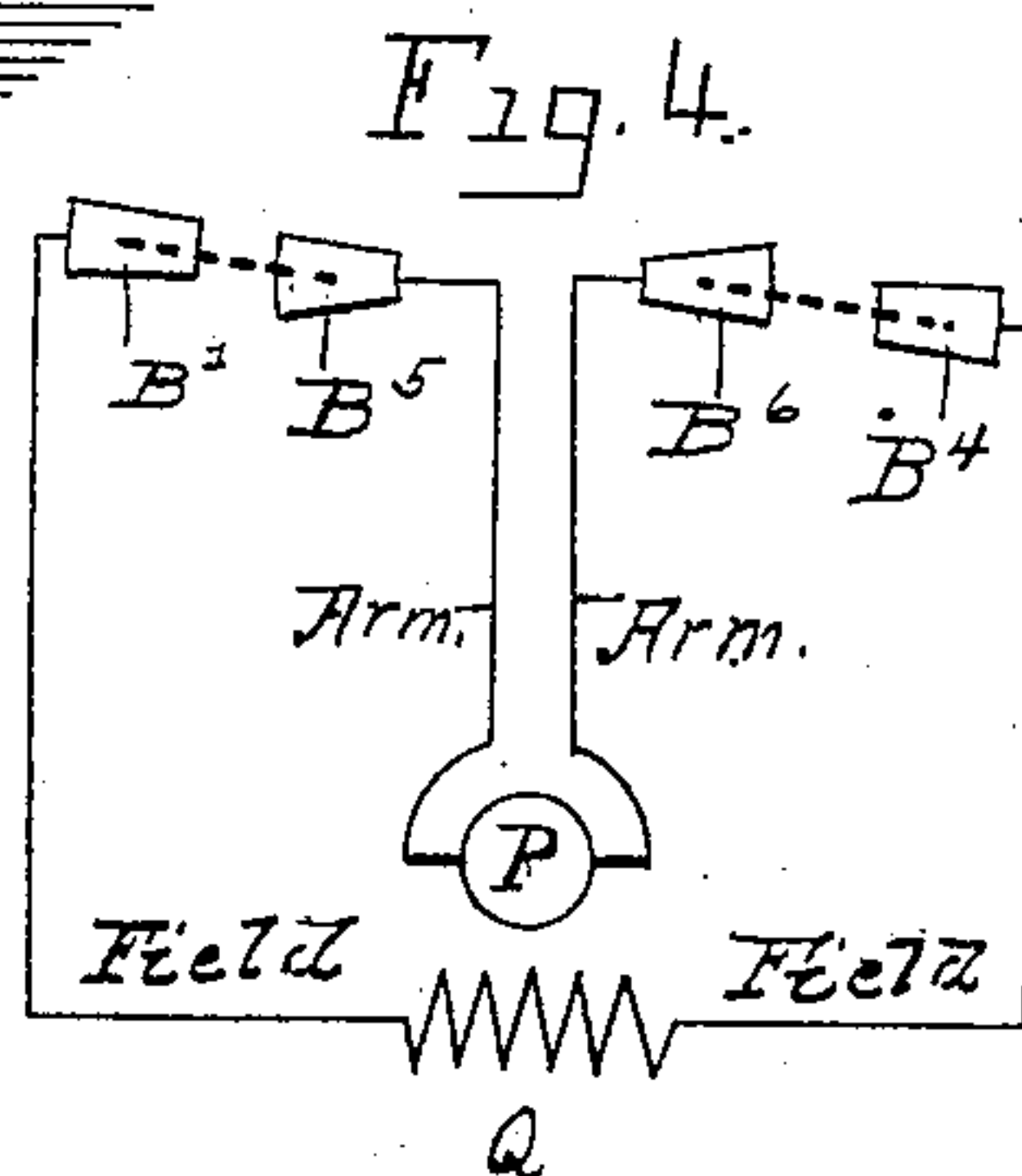
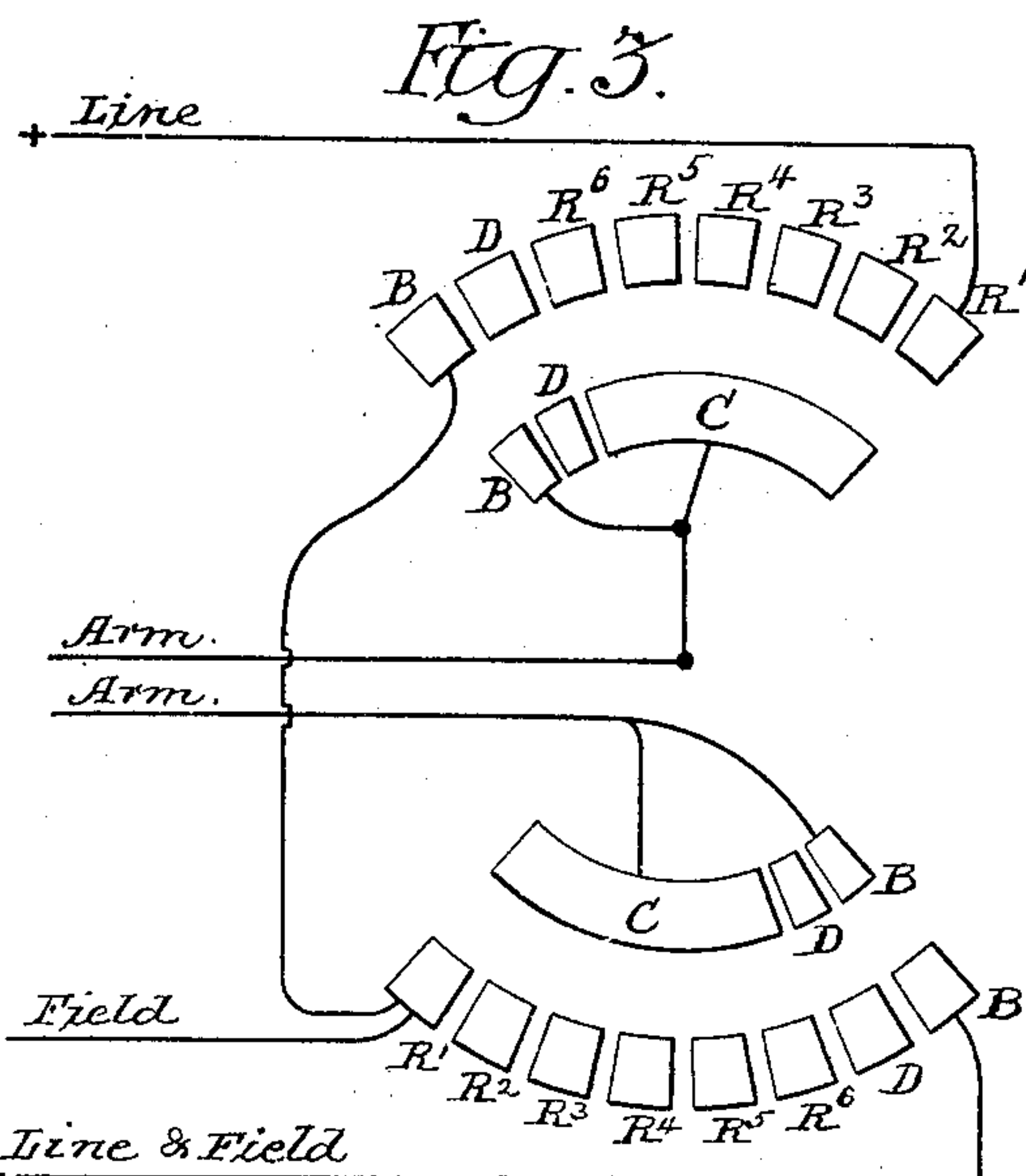
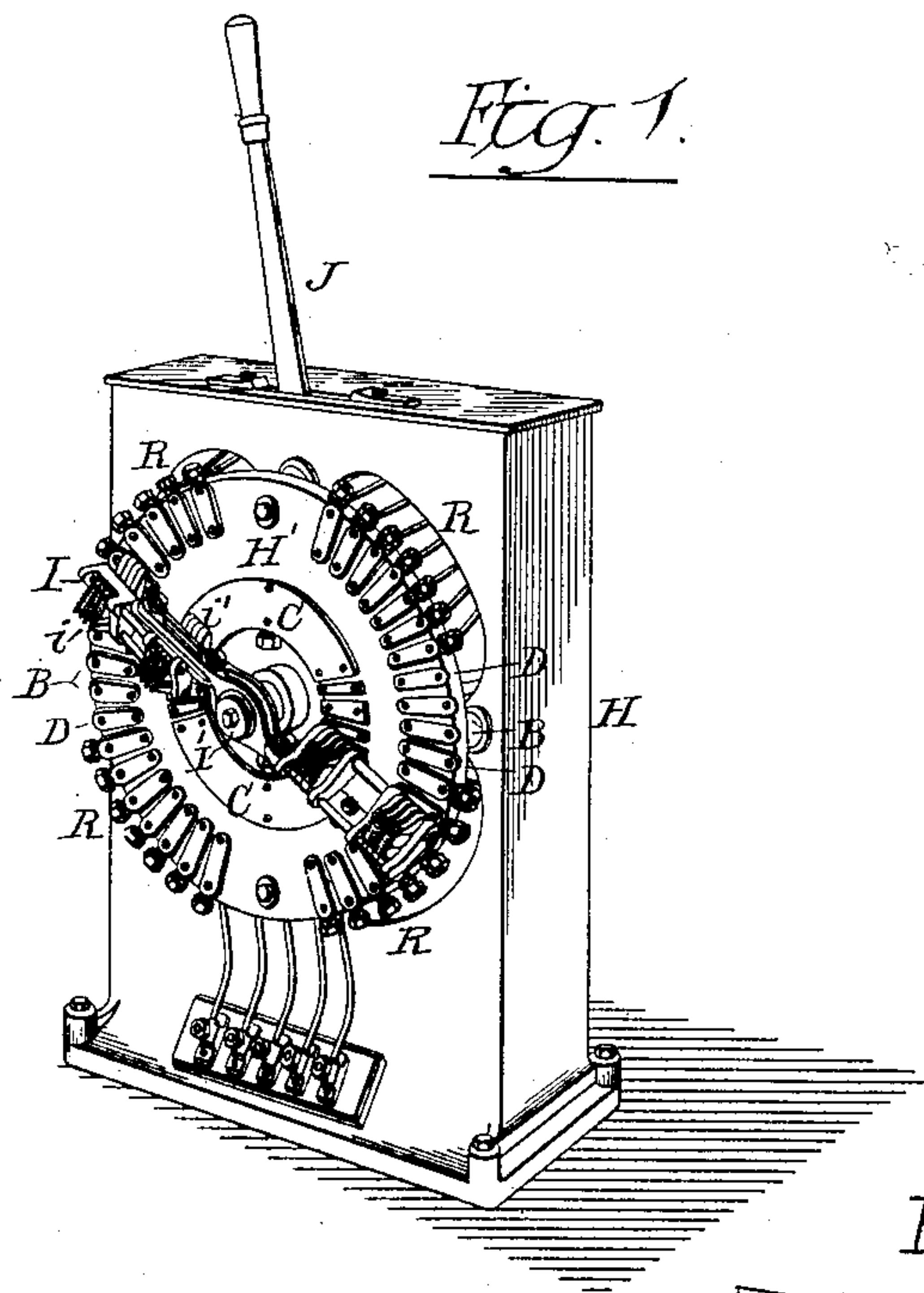
Patented Oct. 16, 1900.

A. C. EASTWOOD.
CONTROLLING BRAKE FOR MOTORS.

(Application filed May 14, 1900.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:-
M. H. Miles.
A. C. Eastwood.

Inventor:-
Arthur C. Eastwood.
by His Attorneys:-
Hornum & Hornum

No. 660,054.

Patented Oct. 16, 1900.

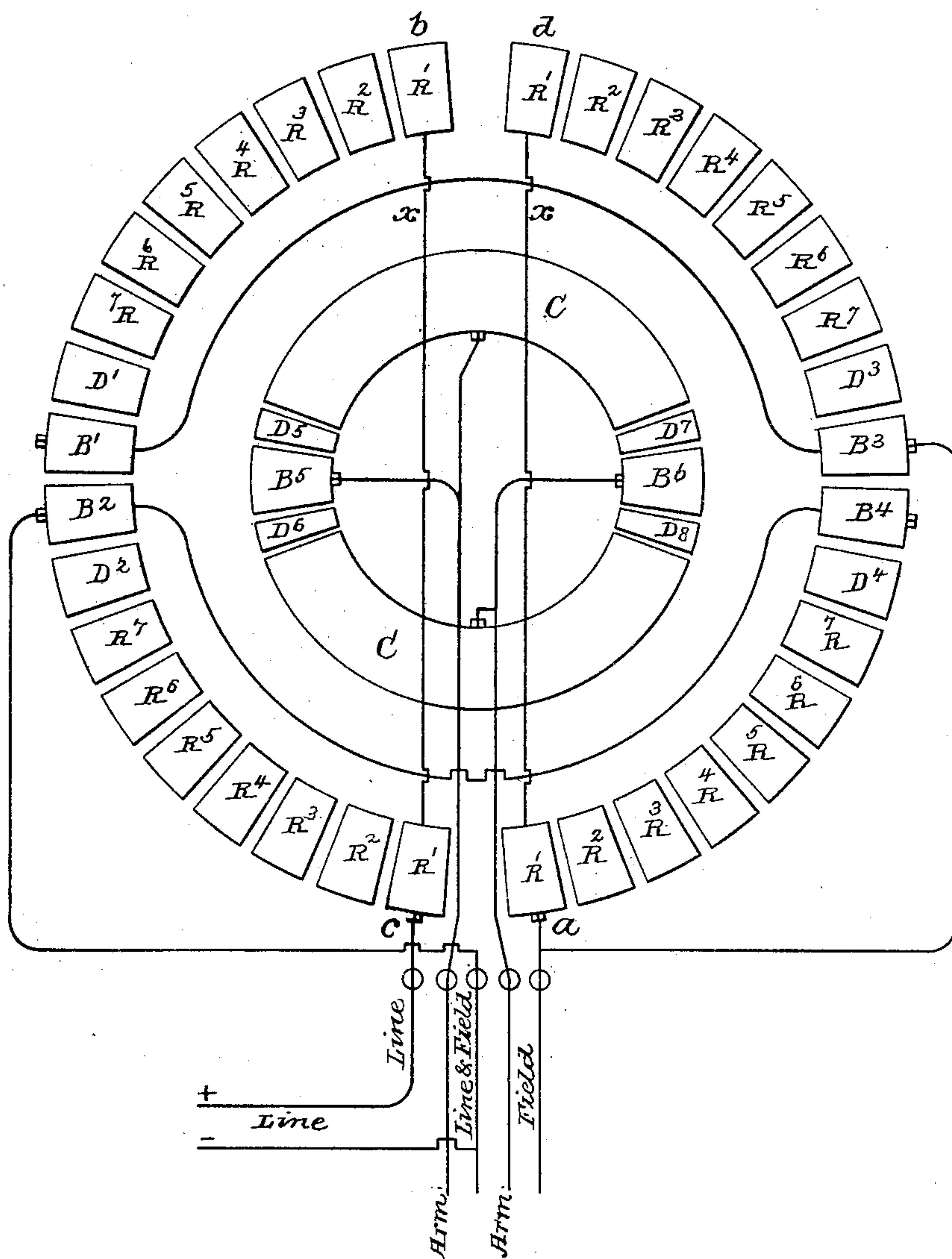
A. C. EASTWOOD.
CONTROLLING BRAKE FOR MOTORS.

(Application filed May 14, 1900.)

(No Model.)

2 Sheets—Sheet 2.

Fig. 2.



Witnesses:-

M. A. Miles
John H. H. H. H. H.

Inventor:-

Arthur C. Eastwood.

by his Attorneys:-

Harmon & Harmon

UNITED STATES PATENT OFFICE.

ARTHUR C. EASTWOOD, OF ENSLEY, ALABAMA, ASSIGNOR TO THE ELECTRIC
CONTROLLER AND SUPPLY COMPANY, OF CLEVELAND, OHIO.

CONTROLLING-BRAKE FOR MOTORS.

SPECIFICATION forming part of Letters Patent No. 660,054, dated October 16, 1900.

Application filed May 14, 1900. Serial No. 16,635. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR C. EASTWOOD, a citizen of the United States, and a resident of Ensley, Alabama, have invented certain
5 Improvements in Controlling-Brakes for Motors, of which the following is a specification.

My invention relates to certain improvements in controllers for electric motors.

I have shown my invention applied to the
10 controller for which a patent was granted to A. C. Dinkey on July 7, 1896, No. 563,575.

The object of the invention is to apply a braking force to a motor by means of connections on a controller which will make the
15 motor act as a generator, the speed being controlled by varying the resistance in circuit.

Referring to the accompanying drawings, Figure 1 is a perspective view of my improved
20 controller. Fig. 2 is a diagram view showing the wiring when my invention is used in connection with a Dinkey controller. Fig. 3 is a diagram view of a modification. Fig. 4 is a view showing diagrammatically the circuits
25 through the controller and motor when the controller-handle is so thrown as to change the motor to a generator.

H is the frame of the controller, having a cylindrical slate tablet H', to which the con-
30 tact-plates are secured.

I is the contact-arm, mounted on the shaft I', having its bearings in the frame, and this shaft is geared to an operating-lever J in a manner similar to that described in the
35 Dinkey patent, above referred to. There are two series of concentric contact plates or blocks, one mounted within the other, and on the arm are contact-fingers i i', which make contact with the plates or blocks.

40 B', B², B³, and B⁴ of the outer circle and B⁵ and B⁶ of the inner circle are the segments which are required by the brake. The necessary connections between these segments are made by the fingers of the controller-arm. No change in or addition to these fingers is made necessary by the addition of my improved brake mechanism to the controller.

The blocks R' to R⁷, inclusive, represent
50 the resistance-blocks found on the Dinkey type of controller, while the blocks D' D² D³

D⁴ of the outer series and the blocks D⁵ D⁶ D⁷ D⁸ of the inner series are dead-blocks—that is, when the fingers of the controller-arm are on these blocks the motor is receiving no
55 current and can “coast” under its own momentum. The plates C C are contact-plates, upon which the fingers of the contact-arm rest when covering any pair of the resistance-blocks. If, for instance, the controller-arm is
60 in the extreme position *a b* when it is desired to stop, resistance is cut in through the resistance-segments R' R², &c. When the segments D', D⁴, D⁵, and D⁸ are reached by the fingers of the contact-arm, the motor receives no cur-
65 rent, as mentioned above, and coasts under its own momentum. As it moves into the next position B' is connected to B⁵ and B⁴ to B⁶, as shown diagrammatically in Fig. 4. This connects the motor as a series generator, the con-
70 nections being such that the current generated tends to “build up” the residual magnetism of the fields. This throws a load on the armature, and it comes to rest immediately or gradually as it is allowed to generate more
75 or less current. Following the controller-arm from the other extreme position *c d* to the horizontal position, it will be seen that B² is now connected to B⁵ and B³ to B⁶. This reverses the connections of the armature and fields; 80
80 but since the armature is traveling in the opposite direction the electromotive force is also reversed, and hence the current traverses the field-coils in the same direction as before and the machine builds up as a generator. 85

For regulating the current generated, and hence the braking force, in the case of the trolley or hoist of a crane, where the momen-
90 tum of the load is never very great, in place of connecting B³ to *a* it may be connected to any of the resistance-segments R² R³, &c., thus throwing more or less resistance in the circuit.

I have found by experiment that the current generated in the above cases is so small
95 and of such short duration that the controller resistance is not perceptibly heated. Hence the whole arrangement can be made self-contained on the controller without the addition of separate resistance. 100

In the case of the bridge travel, where both the speed and the momentum are high, a shunt

is automatically connected across the field-terminals. By varying the resistance of this shunt the fields are more or less highly excited and the current thus controlled. This shunt is connected between D' and D^3 , and by connecting D' and D^2 and D^3 and D^4 the same shunt can be used going in either direction. In this case the segments are so designed that in one position of the arm the fingers make contact on both D' and B' on one side and D^4 and B^4 on the other side and in the other position contact is made on B^2 and D^2 and B^3 and D^3 . This is easily accomplished by chamfering the adjoining edges of the segments in such a way that the fingers drop into the groove thus formed. Thus it is seen that the energy due to the momentum of the armature and the load to which it is attached form, primarily, the braking force. Hence no useful power is expended in making the stop. The braking force is applied directly to the armature, where it has the greatest advantage, and is applied without the intervention of solenoids, brake-bands, or friction devices.

The device for applying the brake can be applied directly to the controller or starting-box by means of which the motor is operated. The motor is thus under the complete control of one lever. No additional wires are necessary between the motor and the controller.

In the case of a reversing-motor the segments and contact-fingers are arranged in such a way that the armature is brought to a stop before the current can be reversed through it. Thus the possibility of "plugging" the motor is precluded. By "plugging" is meant the sudden reversal of the current in the armature. The heavy rush of the current due to this and its consequent bad effect upon the armature is well known. This alone is an extremely-valuable advantage which the device possesses. Its use as a brake in connection with the controller puts the motor under complete control, which, for instance, in crane-service is of great value.

Equipped with my improvement the trolley can be run out all the way at full speed, the

current shut off, and the trolley brought to a full stop at the point desired.

In the case of a hoist where a solenoid and brake-band are used it is impossible to make a quick positive stop owing to the air which the brake-band entrains between itself and the brake-wheel. With the "controller-brake" the stop can be made as quick and decisive as desired.

When my invention is applied to a motor running in one direction only, I design the controller as shown in the diagram Fig. 3.

I claim as my invention—

1. The combination in a motor-controller, of two series of concentrically-placed resistance-blocks, a contact-arm having four sets of fingers thereon constructed to bear on said blocks, two series of brake-blocks placed similarly to the resistance-blocks in the path of the contact-arm, connected to the motor-circuit and disconnected from the line, whereby the motor is made to act as a series generator when running under its own momentum, thus retarding the motion of the armature without using current from the line, substantially as described.

2. The combination in a motor-controller of two concentrically-arranged series of contact-pieces, a contact-arm and two sets of contact-fingers thereon, movable over the contact-pieces, said pieces consisting of resistance points or blocks, brake-blocks and dead-blocks, the dead-blocks intervening between the resistance and the brake blocks and the brake-blocks being connected to the motor-circuit and not to the line, thereby short-circuiting the motor on itself when the said contact-arm rests on the brake-blocks, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ARTHUR C. EASTWOOD.

Witnesses:

J. A. OBENCHAIN,
H. S. CHILES.