

No. 697,734.

Patented Apr. 15, 1902.

F. MACKINTOSH.
SAFETY DEVICE FOR CIRCUIT CLOSERS.

(Application filed Aug. 26, 1901.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

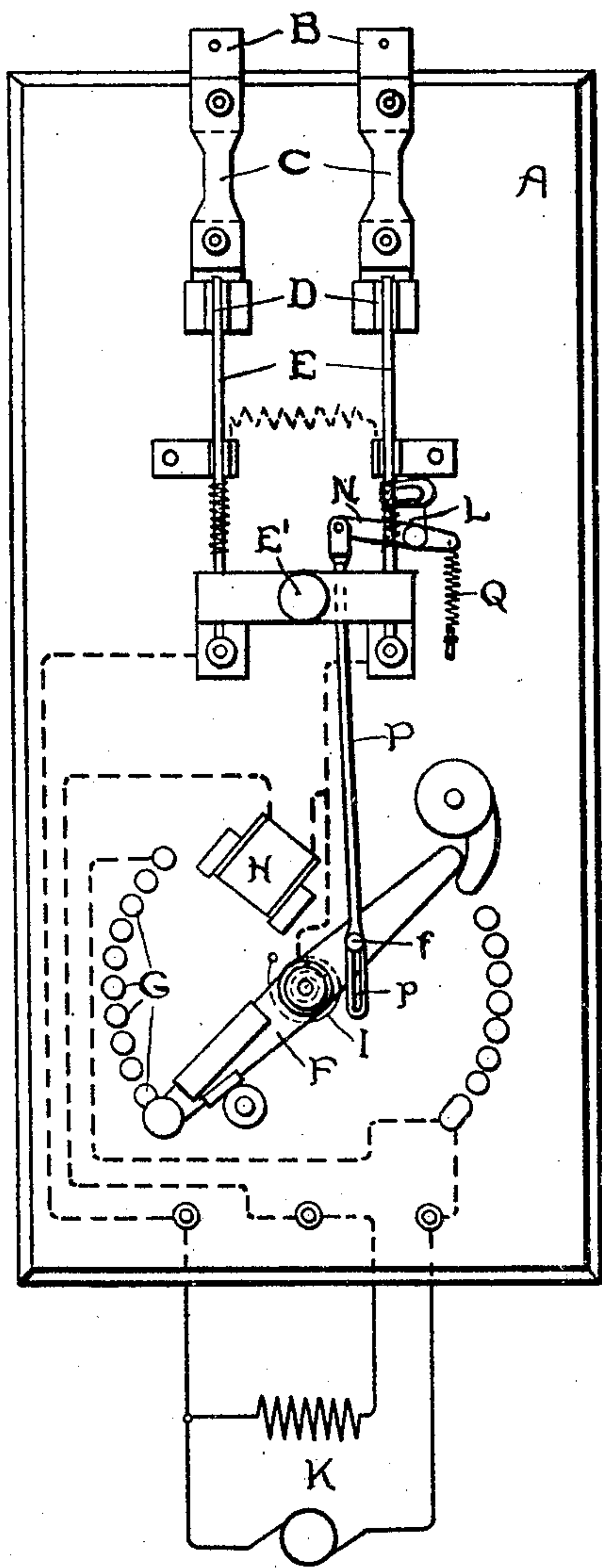
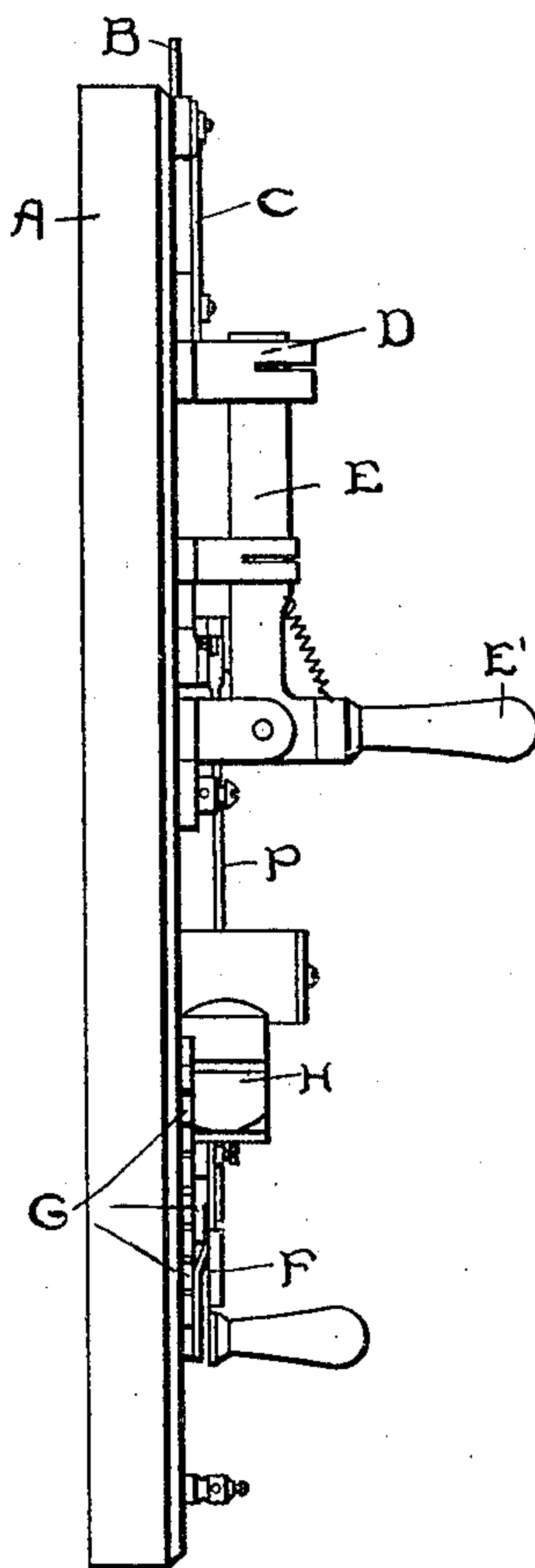


Fig. 2.



Witnesses.

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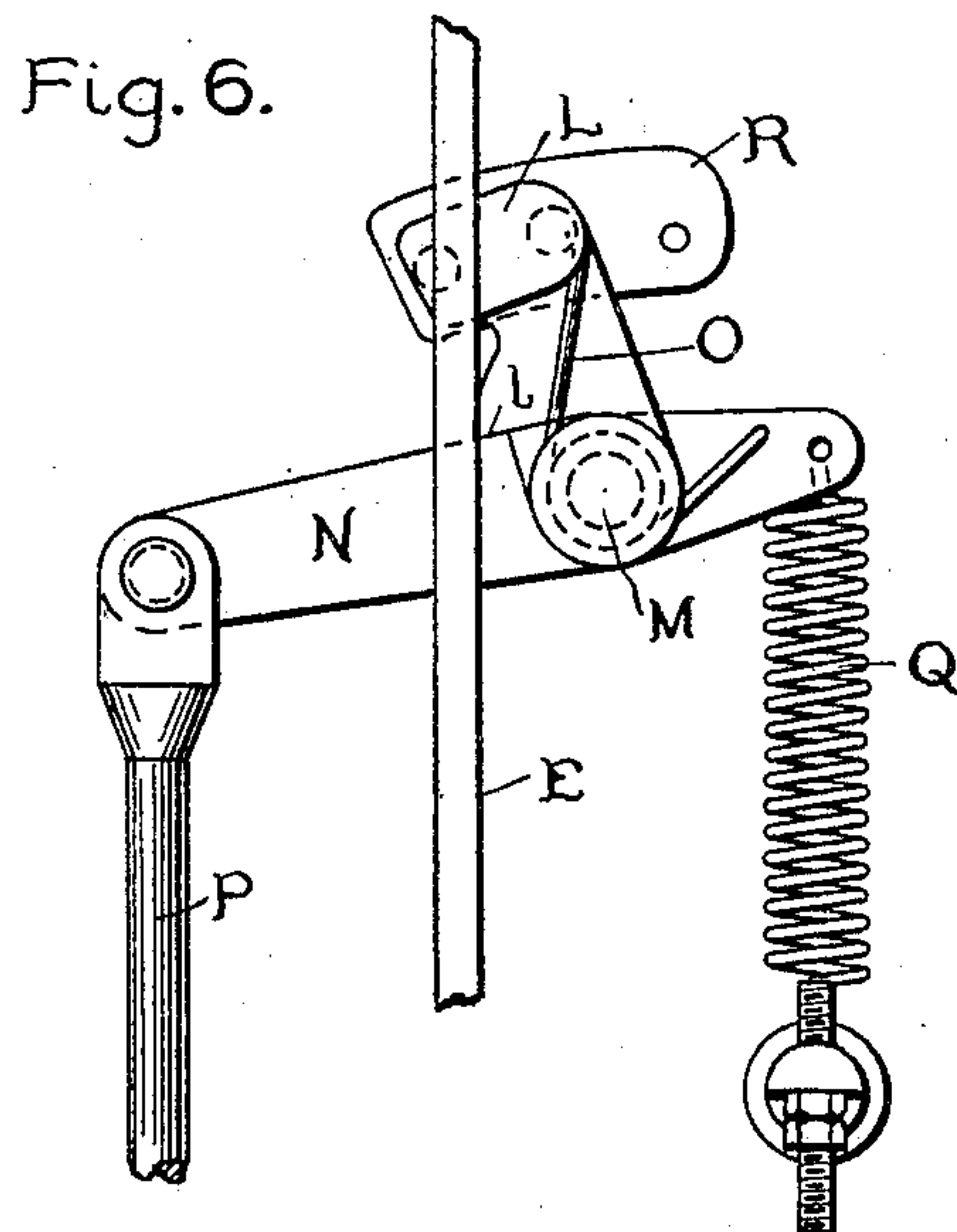
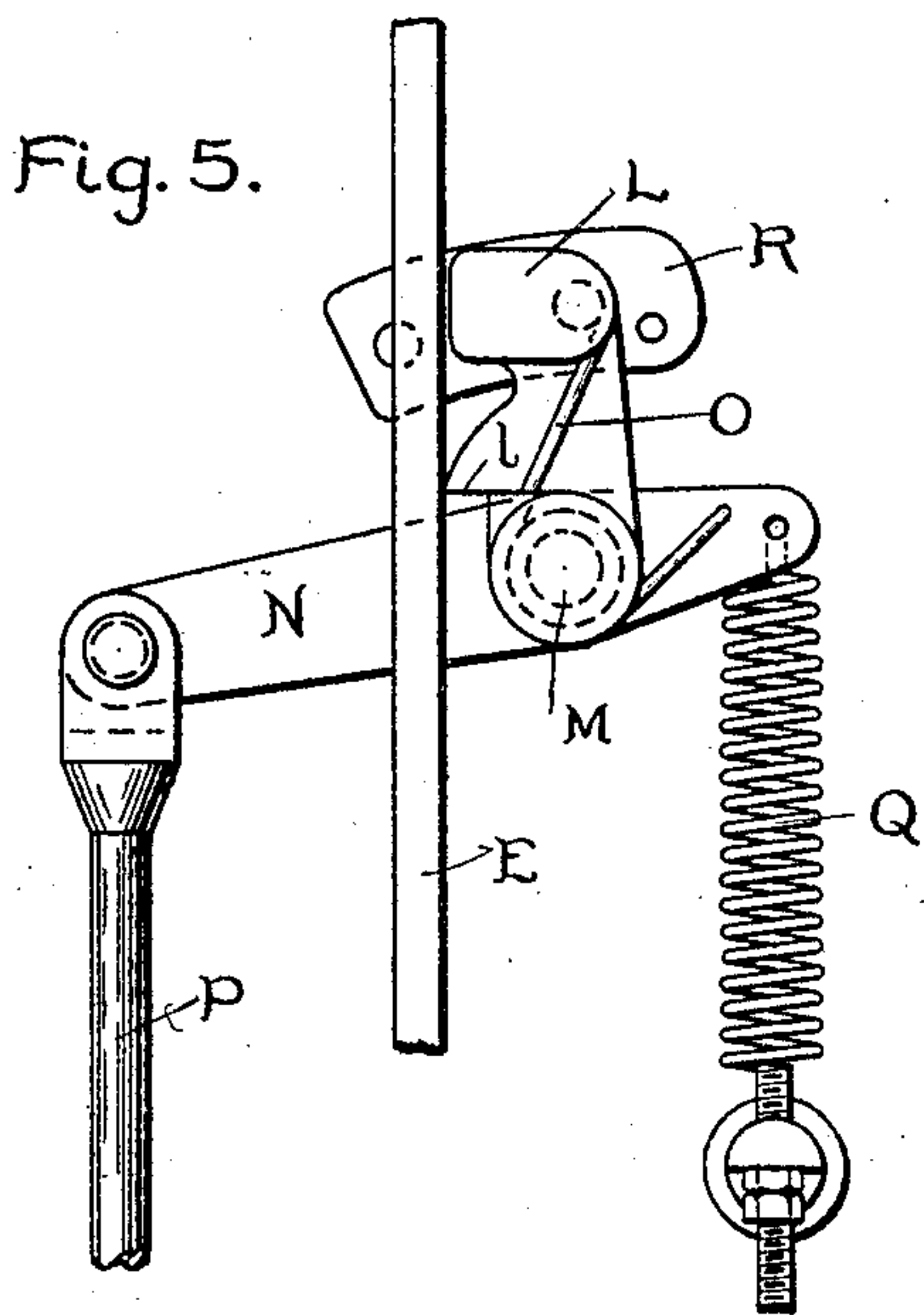
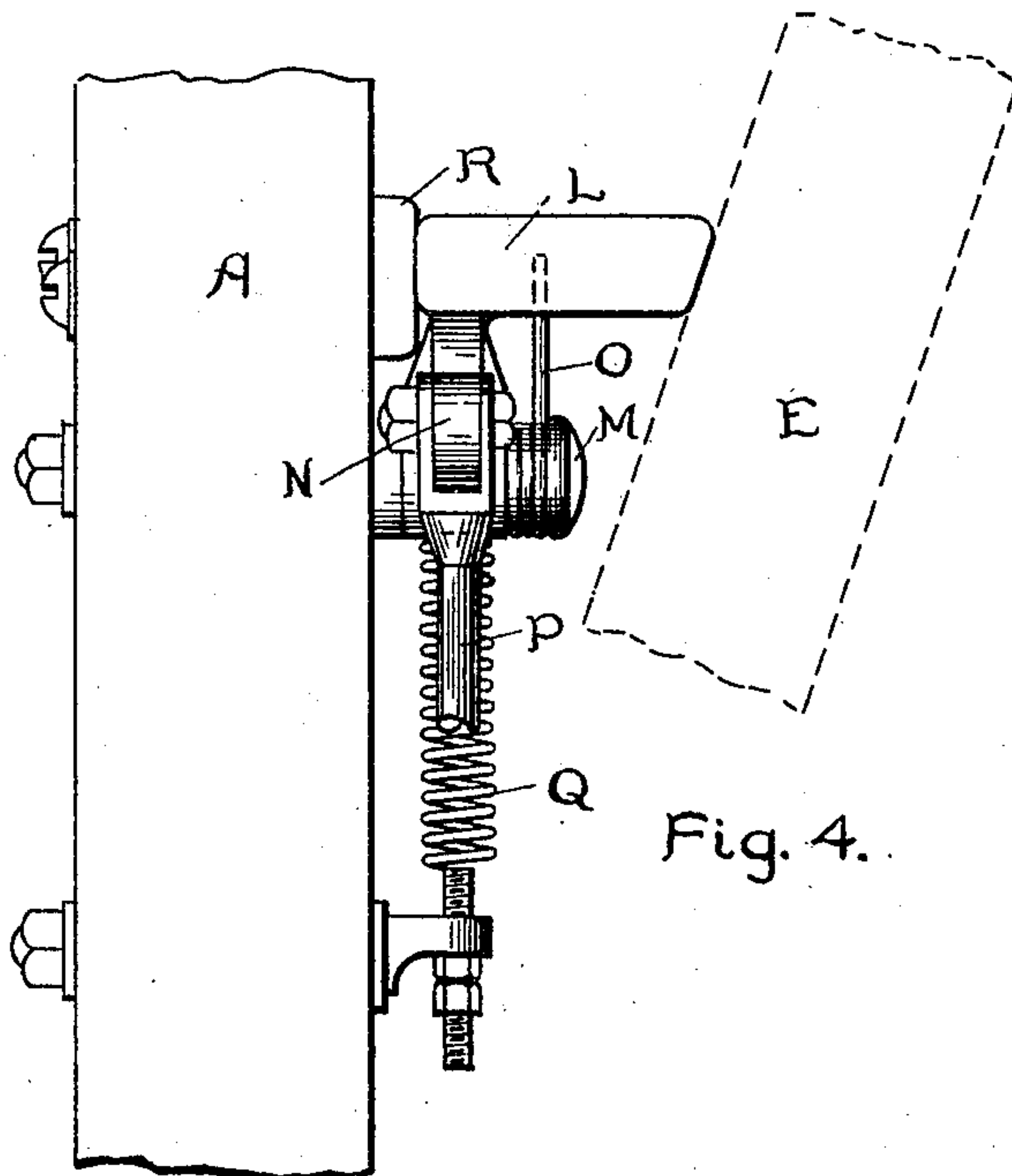
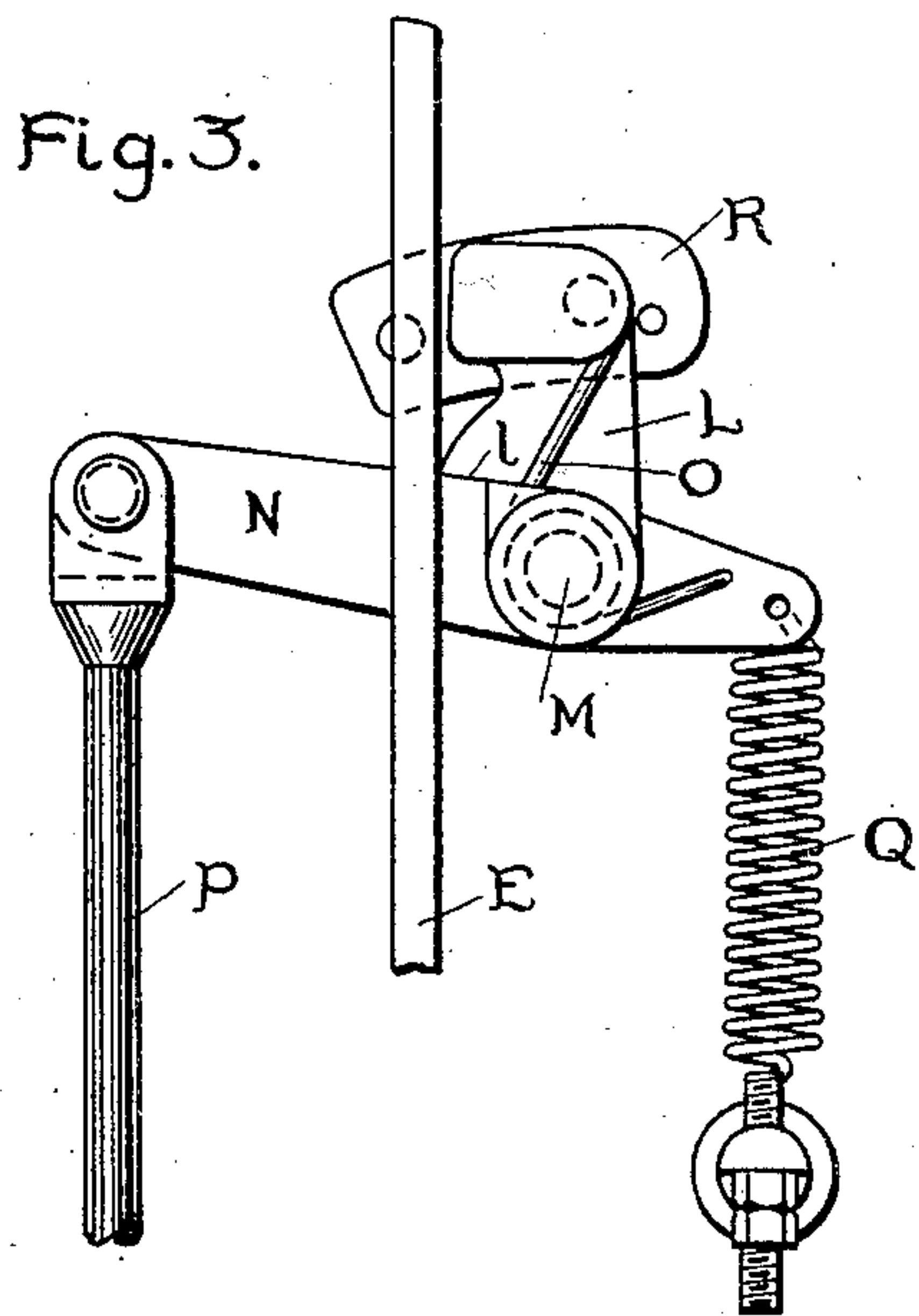
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UNITED STATES PATENT OFFICE.

FREDERICK MACKINTOSH, OF SCHENECTADY, NEW YORK, ASSIGNOR TO
GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

SAFETY DEVICE FOR CIRCUIT-CLOSERS.

SPECIFICATION forming part of Letters Patent No. 697,734, dated April 15, 1902.

Application filed August 26, 1901. Serial No. 73,240. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK MACKINTOSH, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Safety Devices for Circuit-Closers, (Case No. 2,142,) of which the following is a specification.

This invention relates to apparatus for controlling electric circuits; and its object is to prevent injury to a motor or other translating device by closing the circuit without including a protective resistance. In operating electric motors it is customary to use a rheostat whose switch-arm is so placed as to include all the resistance-coils in circuit when the motor is started, the coils being successively cut out as the motor speeds up. In addition to the rheostat the circuit includes a single or double pole line-switch whose function is simply to make and break the circuit. Now suppose this line-switch to be opened when the motor is running, thus breaking the circuit and stopping the motor. Then if the switch is closed again without first moving the rheostat-arm to include the resistance-coils the sudden rush of current is liable to burn out the motor. Again, if a careless attendant moves the rheostat-arm and cuts out the resistance before closing the line-switch the same result follows. My invention aims to obviate this danger and render it impossible for the line-switch to be closed unless the resistance-coils are in circuit.

To this end the invention consists in a locking device arranged to coöperate with the line-switch and controlled by the rheostat-arm, so that it is released when the arm stands in the starting or "off" position, but is set for operation when the arm is moved to cut out the resistance-coils.

In the accompanying drawings, Figure 1 is a front elevation of a rheostat, line-switch, and safety locking device, showing also the circuit connections. Fig. 2 is an edge view of the same. Fig. 3 is a view of the locking device on a larger scale. Fig. 4 is an edge view of the same. Fig. 5 shows the locking device set for action. Fig. 6 shows the device in its operative position.

The several pieces of apparatus are con-

veniently mounted on a panel A of slate or other insulation. The line-wires connect with binding-posts B, which are preferably connected by fuses C with the contact-clips D, into which enter the blades E of the double-pole line-switch, which has a handle E'. The switch is in circuit with a starting-rheostat of usual construction having a rotatable arm F, making contact with the points G and retained in its final or running position by the electromagnet H. A spring I, coiled on the hub of the arm F, returns it automatically to the starting position when the circuit is opened, and the magnet H is thereby deenergized. The resistance-coils of the rheostat are in series with the armature of the motor K, while the magnet H is in series with the shunt field-coil of said motor. The circuits are all as usual and can be easily traced in Fig. 1 of the drawings.

My improved safety locking device comprises a pivoted dog L, adapted to move in behind one of the switch-blades and prevent it from being closed until the dog is moved away, together with connections between said dog and the rheostat-arm, whereby the latter will actuate the dog at the proper time. While many different modifications of the same idea can be devised, yet I prefer the one shown in the drawings, in which the dog L is pivoted on a stud M, projecting from the panel A. On the same stud is fulcrumed a lever N. A spring O is coiled around the stud, with one end fastened to the dog and the other to the lever, so that the tension of the spring tends to throw the dog forward—that is, to the left in Figs. 1, 3, 5, and 6. It is evident that a weight may take the place of the spring O, if desired. A stop l on the dog abuts on the lever N and limits its forward movement. The left-hand end of the lever is pivoted to a rod P, whose lower end has a longitudinal slot p engaging with a pin f on the rheostat-arm F. The right-hand end of this lever is attached to one end of a spring Q, whose other end is secured to the panel A. A wear-plate R is placed back of the dog.

When the switch-blade E is closed, the dog stands adjacent thereto, as shown in Figs. 1, 2, 3. As the rheostat-arm F is turned to cut out the resistance-coils and start the motor

the pin *f* soon reaches the lower end of the slot *p* and pulls down the rod *P*, tilting the lever *N* into the position shown in Fig. 5. The dog is restrained from movement by the blade *E*, so that the tilting of the lever increases the tension of the spring *O*. Now if the line-switch *E* is opened the dog will be thrown forward by the spring *O* until it is stopped by the stop *l* in a position behind the blade *E*, as shown in Fig. 6 and in dotted lines in Fig. 4. The switch-blade is thus locked in its open position and cannot be closed until the rheostat-arm has moved back to the off position, allowing the spring *Q* to restore the lever *N* and dog *L* to the position shown in Fig. 3.

As the rheostat-arm is automatically released by the magnet *H* and returned to off position by the spring *I* whenever the circuit is opened, the locking action of the dog is usually only momentary; but if for any reason the rheostat-arm should fail to turn off the lock will protect the motor from any attempt to close the line-switch again without first turning off the rheostat by hand. Moreover, if a careless attendant should turn on the rheostat and hold it there before closing the line-switch the dog will be pulled forward into its locking position, and thus call attention to the error. The invention in this way serves to compel the line-switch and rheostat to be operated in a certain definite order.

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

1. The combination with a line-switch and a starting-rheostat, of a spring-actuated locking device for said switch, and means operatively connected with the movable arm of said rheostat for putting a tension on said spring.
2. The combination with a line-switch and a starting-rheostat, of a locking device for said switch comprising a pivoted dog adapted

to move into the path of said switch, and means operatively connected with the arm of said rheostat for returning said dog to an inoperative position.

3. The combination with a line-switch and a starting-rheostat, of a locking device for said switch comprising a pivoted spring-actuated dog adapted to move into the path of said switch, and a rod operatively connected with the arm of said rheostat for putting a tension on said spring, and returning said dog to an inoperative position.

4. The combination with a line-switch and a starting-rheostat, of a locking device for said switch, comprising a pivoted dog adjacent to said switch, a lever engaging with said dog, and a rod pivoted to the lever and connected with the rheostat-arm.

5. The combination with a line-switch and a starting-rheostat, of a locking device for said switch, comprising a pivoted dog to enter into the path of said switch, means for exerting a forward pressure on said dog, a lever on which said dog rests, a rod connected with the lever and with the rheostat-arm, and a spring to return the lever to a normal position.

6. The combination with a line-switch and a starting-rheostat, of a locking device for said switch, comprising a pivoted dog to enter into the path of said switch, means for causing said dog to press against the switch-blade when closed, a lever on which the dog rests, a rod pivoted to the lever and having a longitudinal slot, and a pin on the rheostat-arm engaging with said slot.

In witness whereof I have hereunto set my hand this 23d day of August, 1901.

FREDERICK MACKINTOSH.

Witnesses:

EDWARD WILLIAMS, Sr.,
MABEL H. EMERSON.