

T. J. JOHNSTON.  
CIRCUIT BREAKER.

(Application filed Feb. 1, 1899.)

(No Model.)

FIG. 1.

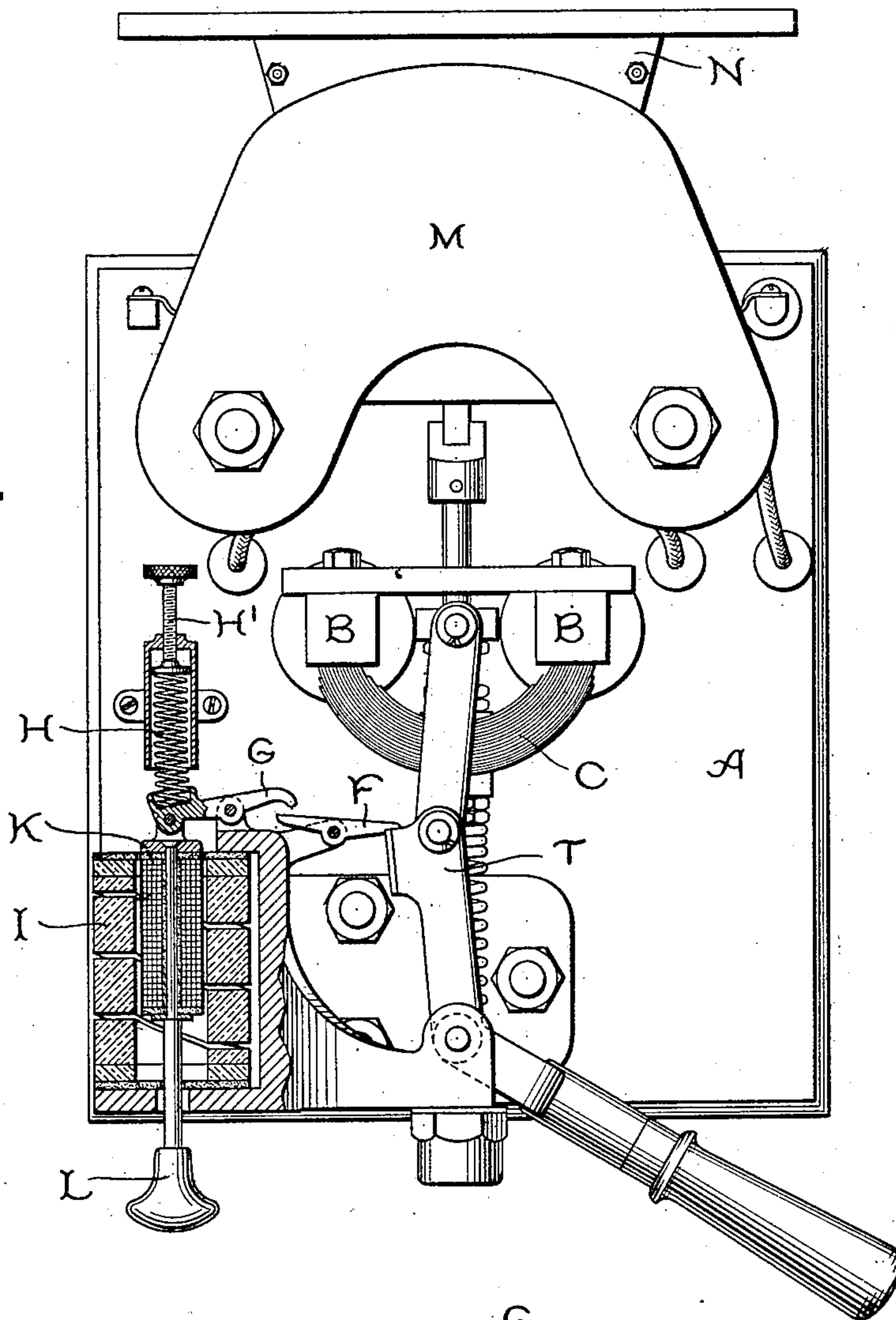
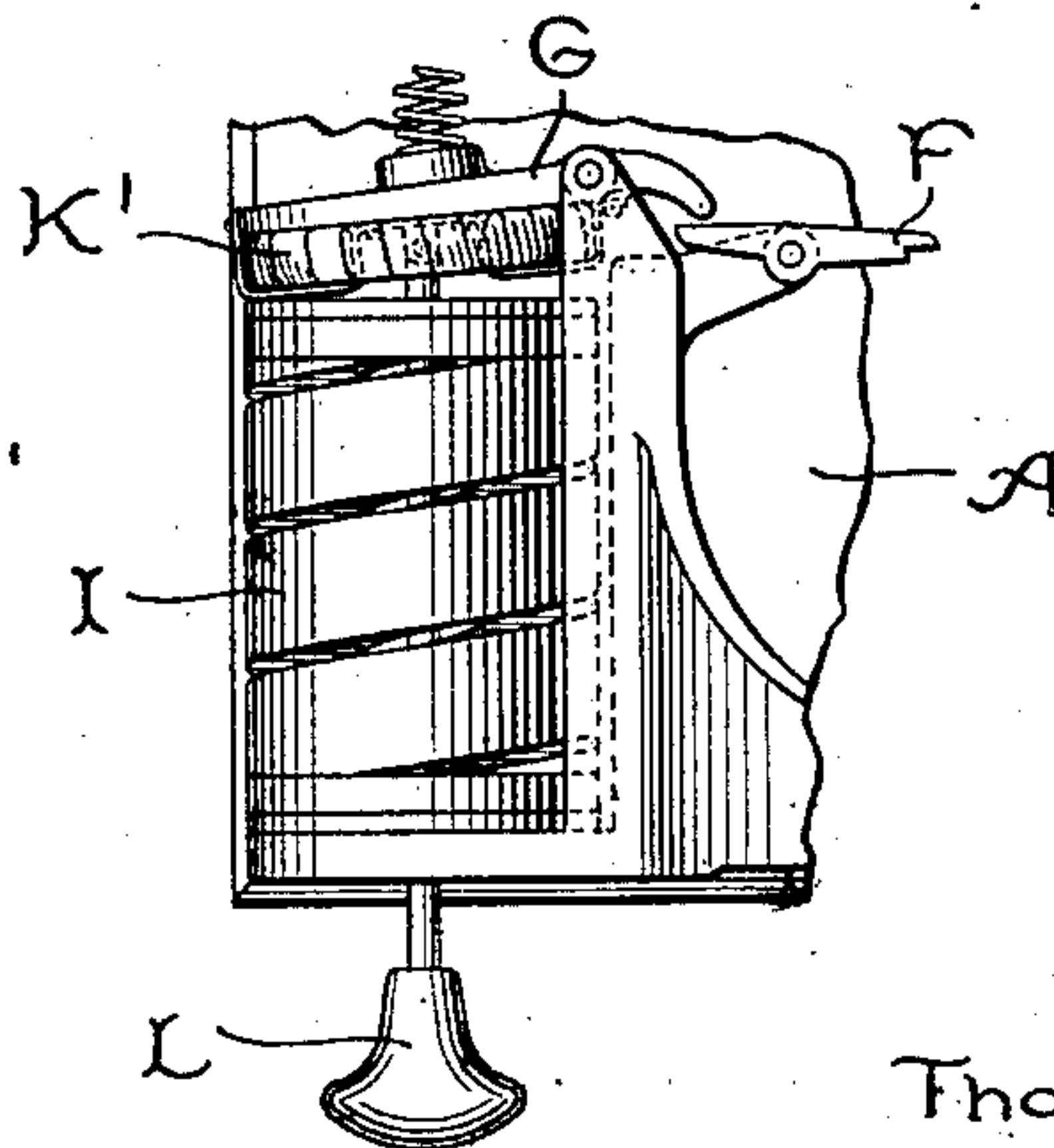


FIG. 2.



WITNESSES:

A. H. Abell.

*W. B. H. H. H.*

INVENTOR:

Thomas J. Johnston,

by *Albert H. Davis*  
Atty.



# UNITED STATES PATENT OFFICE.

THOMAS J. JOHNSTON, OF SCHENECTADY, NEW YORK, ASSIGNOR TO THE  
GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

## CIRCUIT-BREAKER.

SPECIFICATION forming part of Letters Patent No. 713,887, dated November 18, 1902.

Application filed February 1, 1899. Serial No. 704,077. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS J. JOHNSTON, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Circuit-Breakers, (Case No. 1,023,) of which the following is a specification.

In the application of circuit-breakers to alternating currents it is found that the inductive component of resistance in the series coil may amount at times to considerable loss. The ohmic resistance of these coils is practically negligible because of their very large section. While they are designed to carry large currents, the amount of metal is so great that the drop is very small. However, the larger the current the greater the inductive component of the coil's impedance, and increase of the metal section does not avoid the difficulty, which is a function of the ampere-turns. I have sought to obviate this trouble, or at least in some degree to compensate for it, by using instead of the ordinary iron armature which operates the trip of the circuit-breaker, a closed-circuited coil through which the magnetic circuit of the series coil is closed and which acts to cut down the self-induction and to diminish the loss in the coil.

The accompanying drawings show an arrangement within the invention.

In the drawings, Figure 1 shows in front elevation, with parts in section, a circuit-breaker of an ordinary type to which the invention is applied, while Fig. 2 is a modified form.

In Fig. 1, A is the base of the instrument. B B are the circuit-terminals spanned by the bridge C. The latter is closed by the toggle T against the force of the spring, and the toggle is held in position by a latch F. M is a blow-out magnet, and N is a chute housing the shunting-terminals, which are not illustrated. All of these parts are of the ordinary type now well known. I is the series coil, and K is a closed-circuited coil wound to act as a core to the solenoid formed by the coil I. The coil K is mounted on a rod and of course is insulated from the coil I. The usual handle L to the rod may be employed to open the circuit manually. G is a lever

attached to the upper end of the rod, which when moved opens the latch or trip F, permitting the circuit-breaker to open. The motion of the coil K is opposed by a spring H, with which the usual calibrating-screw H' coöperates to determine the current-flow at which the circuit-breaker will open.

In Fig. 2 I show a modified form of coil. In this figure the parts are as before, except that the coil K', of flat or "pancake" form, as it is commonly called, is disposed in place of the usual armature, the action being the same as in the former case.

The operation of the illustrated parts is as follows: When the current in the coil I rises to a determined maximum, regulated by the tension of the spring H, it induces sufficient current in the coil K to overcome the spring. The repulsive action of the two alternating currents—one flowing in the coil I and the other in the closed-circuited coil K or K', as the case may be—is sufficient to force the movable coil away from the other, operating the lever G, opening the trip, and permitting the circuit-breaker to open.

The size of wire and number of turns in the closed coil K will be selected to give the repulsion desired. Where only a small induction is needed, a fine wire of considerable resistance may be used, for larger currents a wire of greater gage. These things are too well understood in the art to require further elucidation.

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

1. A circuit carrying currents of relatively large amperage combined with a circuit-breaker for opening said circuit composed of contacts to be opened or closed, an actuating-coil, and a closed-circuit coil or conductor within the field of the actuating-coil and connected to the circuit-breaking contacts, whereby, when the closed conductor is repelled by the stationary coil it operates to open the contacts.

2. A circuit carrying currents of relatively large amperage combined with a circuit-breaker for opening said circuit composed of contacts to be opened or closed, a stationary series coil, and a closed-circuited coil or conductor within the field of the stationary coil

and connected to the circuit-breaking contacts, whereby, when the closed conductor is repelled by the stationary coil it operates to open the contacts.

5 3. In a system of distribution carrying currents of relatively large amperage, the combination of a circuit-breaker, contacts to be opened or closed, a trip, and a series coil with a closed-circuited coil or conductor connected  
10 to the trip so that the repulsive effect between the series coil and the closed-circuited coil shall actuate the trip and open the circuit-breaker.

15 4. In a system of distribution carrying currents of relatively large amperage, the combination of a circuit-breaker, a trip for the same, a series coil, and a closed-circuited coil

acting by repulsion to open the trip, with a calibrating-spring for determining the current at which the trip shall be opened. 20

5. In a system of distribution carrying currents of relatively large amperage, the combination of a circuit-breaker, a trip, a series coil, and a closed-circuited conductor formed into a core for the series coil, with a spring 25 for determining the point at which the trip shall act.

In witness whereof I have hereunto set my hand this 21st day of January, 1899.

THOMAS J. JOHNSTON.

Witnesses:

B. B. HULL,

M. H. EMERSON.