No. 620,930. Patented Mar. 14, 1899.

T. J. JOHNSTON.

CIRCUIT BREAKER.

(Application filed Oct. 19, 1898.)

(No Model.)

FIG. 1.

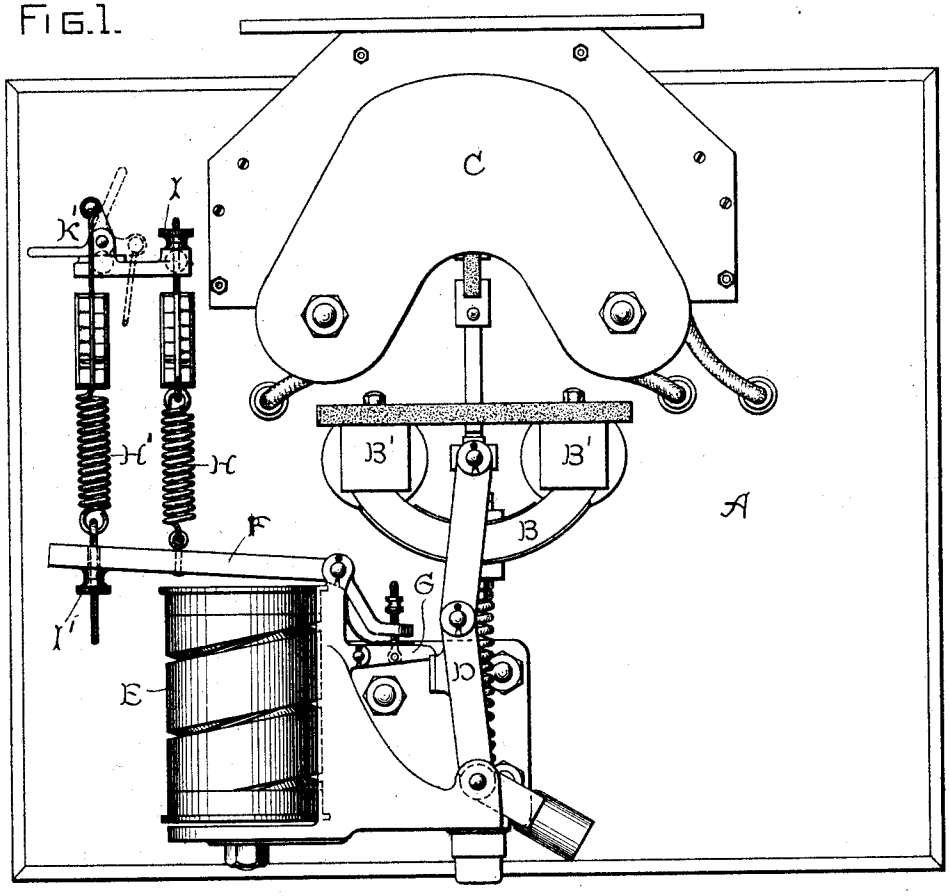


FIG. 2.

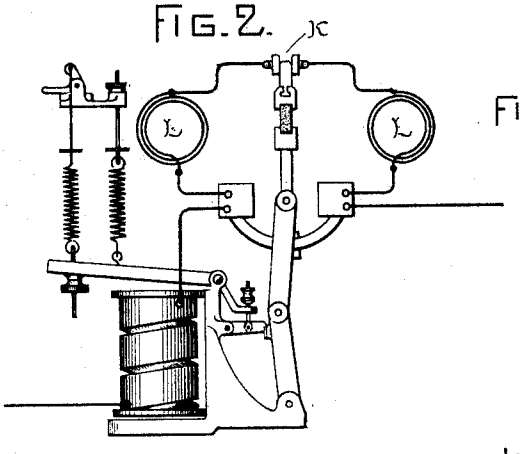
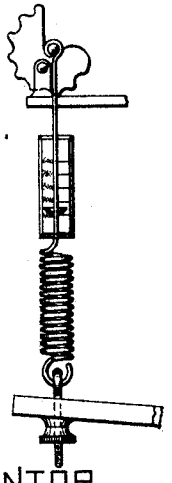


FIG. 3.



WITNESSES.

A. Ernst Altenpohl

A. F. Macdonald.

INVENTOR.

Thomas J. Johnston.

by Albert G. Davis
Atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

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

CIRCUIT-BREAKER.

SPECIFICATION forming part of Letters Patent No. 620,930, dated March 14, 1899.

Application filed October 19, 1898. Serial No. 693,954. (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, in the county of Schenectady, State of New York, have invented certain new and useful Improvements in Circuit-Breakers, (Case No. 918,) of which the following is a specification.

The present invention relates to circuit-breaking apparatus, and is particularly adapted to circuit-breakers of large capacity. Under certain circumstances it is desirable to have circuit-breakers capable of acting under wide variations of load. It may occur, for instance, that a number of generators will feed in multiple a single set of bus-bars and that a single feeder may carry the entire current from the bus-bars to some particular part of the distribution system. Under these conditions if the load is light a single generator will carry it all, when necessarily its heat limit will be such that its circuit must be opened at a certain definite flow of current. As the load comes on and the different generators are added the capacity of the circuit-breaker must be increased until it will only open at a certain maximum load, generally somewhat in excess of the normal full load on the station. With this arrangement the circuit-breaker should be capable of ready and practically instantaneous adjustment to the different current capacities in its range. The ordinary calibrating spring and screw is insufficient, inasmuch as it requires considerable manipulation to adjust. I have therefore devised the present invention, which consists in furnishing to the armature of the series coil more than one calibrating-spring, and with each or for any desired number of the springs certain means for throwing it instantly into or out of action, as may be required. It is manifest that it is also desirable to have in addition to this instantaneously-acting means the usual adjusting device for proportioning the tension of the spring to any effect desired. If desired, this tension-adjusting screw might be substituted for the instantaneous adjustment to which I have referred; but this is not so good a form. For the instantaneous adjustment I prefer a cam or eccentric which in one position will entirely relax the spring and in the other position will immediately adjust it to the desired tension for the precise load at which the circuit-breaker should operate. With this arrangement as each machine is thrown in it is only necessary to throw a small lever on the circuit-breaker in order to connect a new spring in addition to those already in action, when the circuit-breaker will be adjusted without further attention to the new current requirements of the feeder.

In a modified form of the device I may employ a single spring and a cam which will adjust incrementally or by steps or aliquot portions the opposition to the pull of the series coil; but I do not regard this as so good a form of the device, because of the non-uniformity of the spring under different conditions of tension. Nevertheless it may be usefully employed.

The accompanying drawings show an embodiment of the invention, Figure 1 being a front elevation of a circuit-breaker with the invention applied to it. Fig. 2 is a diagram of the circuits, and Fig. 3 is the modified form referred to in the statement of invention.

It is unnecessary to enter into a minute description of the circuit-breaker, inasmuch as these devices are now well known in the art and the invention may be applied to any convenient form. I have, however, shown a form which is well understood, consisting, in general, of a base A, main terminals B′ B′, a bridging contact B, and a supplementary contact K (see Fig. 2) in shunt to the main contacts. It is understood that the supplementary contact is in a circuit of high resistance, and blow-out magnet-coils L L are provided (see Fig. 2) to energize the pole-pieces C C, only one of which is illustrated in Fig. 1. A toggle D closes the bridging contact and is held in its extended position by the trip G, operated by the armature-lever F, the latter being under the influence of the series coil E. All of these parts are well known.

The lever F is held in its illustrated position by the springs H H′, coacting to oppose the pull of the series coil upon the armature. These springs are provided with adjusting devices, the spring H at its upper end with a set-nut I, and the spring H′ with a similar nut

I′ at its lower end. At K′ is illustrated the cam or eccentric movement, the operation of which will be readily apparent. When in its illustrated position, the spring H′ is under the desired tension for which it is set by the nut I′. When in its dotted-line position, the spring is entirely relaxed and has no effect in opposing the motion of the armature F.

It is manifest that the invention here set out may take many different forms, all of which it is unnecessary to describe. It is further manifest that without invention and without the necessity for detailed description one skilled in the art may extend the application of the present invention to any desired degree. All such formal changes I aim to embrace in the claims.

In ordinary practice the best way of applying the invention will be to adjust one of the springs to the desired minimum overload adapted, say, to a single generator and provide the others with the cam arrangement for throwing them instantaneously into or out of action; but this is manifestly not the only method which may be employed.

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

1. In a circuit-breaker, a switch, a trip, an electromagnet and armature for operating the trip, and a device for altering by steps or aliquot portions the pull necessary to actuate the armature and trip and open the switch.

2. The combination with a circuit-breaker, of a plurality of calibrating-springs, coacting in the same direction upon a common armature, with means for throwing them into or out of action, and a current-measuring coil acting upon the armature against the pull of the springs.

3. The combination with a circuit-breaker, of a plurality of calibrating-springs, any desired part of which is furnished with tension devices having two positions, in one of which the spring is under tension, and in the other relaxed, with a coil, an armature, and a trip operated by the armature against the pull of the springs.

4. The combination with the coil, the armature and the trip of a circuit-breaker, of a plurality of calibrating-springs, one at least of which is set to minimum overload within the capacity of the circuit-breaker, and others of which are provided with means for throwing them into or out of action as may be desired.

5. The combination with the coil, the armature and the trip of a circuit-breaker, of a number of calibrating-springs any desired part of which is provided with cam devices for instantaneously putting the spring under tension or releasing it as may be desired.

In witness whereof I have hereunto set my hand this 17th day of October, 1898.

THOMAS J. JOHNSTON.

Witnesses:
B. B. HULL,
C. B. N. HULL.