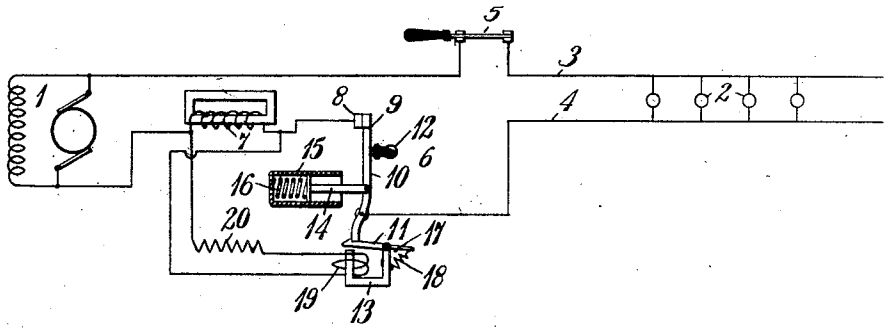
C. LE G. FORTESCUE.

ELECTRIC CIRCUIT INTERRUPTER.

APPLICATION FILED JUNE 21, 1912.

**1,184,845.** Patented May 30, 1916.




WITNESSES:

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## ELECTRIC-CIRCUIT INTERRUPTER.

1,184,845. Specification of Letters Patent. Patented May 30, 1916.

Application filed June 21, 1912. Serial No. 705,016.

*To all whom it may concern:*

Be it known that I, CHARLES LE G. FORTESCUE, a subject of the King of Great Britain, and a resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Electric-Circuit Interrupters, of which the following is a specification.

My invention relates to means for automatically interrupting electric circuits under predetermined conditions and to systems of electric current distribution and control embodying such means.

One object of my invention is to provide an automatic circuit interrupter which shall act in anticipation of current disturbances on the circuit with which it is associated to interrupt the circuit before the current has sufficent time to attain a dangerous or destructive value.

Another object of my invention is to provide a circuit interrupter having the above-named characteristics which shall automatically interrupt the circuit with which it is associated under overload conditions, although there is no short circuit or other serious disturbance upon the circuit.

In my co-pending application, Serial No. 700,011, filed May 27, 1912, I have set forth and described a circuit interrupter which is adapted to so act as to interrupt an electric circuit very quickly, in case of a short circuit or other similar condition which involves a very sudden electrical change in the circuit. This circuit breaker, however, is not adapted to interrupt the circuit under ordinary overload conditions when the current exceeds a predetermined amount. Consequently, in order to provide full protection, it has hitherto been necessary to utilize not only a circuit breaker having the characteristics of that shown in my co-pending application above referred to, but also an overload circuit breaker of some well known type.

According to my present invention, I provide a single circuit interrupter which is adapted to act either when the current in the circuit exceeds a predetermined amount or when a sudden voltage fluctuation or electrical change occurs in the circuit.

The single figure of the accompanying drawings is a diagrammatic view of a system of distribution embodying my invention.

Referring to the drawings, direct current energy is supplied from a generator 1 to a plurality of translating devices 2, through circuit conductors 3 and 4, a switch 5 and a circuit interrupter 6. An inductance device 7 is connected in circuit between one terminal of the generator 1 and a stationary contact member 8 of the circuit breaker 6.

The circuit interrupter comprises, in addition to the stationary contact member, a movable contact member 9, a pivoted arm or lever 10 to which it is secured, a latch 11 which is adapted to hold the circuit breaker in its closed position, when set, a handle 12 which is attached to the lever 10, a tripping magnet 13 and a spring-pressed plunger 14. The plunger operates in a cylinder or box 15 and holds a relatively powerful spring 16 under compression when the breaker is closed.

The latch 11 is pivotally mounted on one arm of the magnet 13 which is substantially U-shaped and is normally held against a stop 17 by a spring 18. The release magnet is provided with a coil 19 which is connected in series with a resistor 20 in shunt circuit relation to the inductance device 7. The coil 19, when sufficiently energized, releases the latch 11 in opposition to the spring 18 and permits the circuit breaker to be very rapidly moved to its open position by the action of the spring 16.

The operation of the circuit breaker under ordinary overload conditions is as follows: Assuming that the breaker occupies its closed position, the current supplied through the resistor 20 to the coil 19 will depend upon the relative ohmic resistance of the inductance device 7 and the combined resistance of the coil 19 and the resistor 20. Since the ohmic resistance of the inductance device 7 is relatively small, only sufficient current will be supplied to the coil 19 to release the latch 11 when the current in the distributing circuit exceeds a predetermined value. If, however, the distributing circuit is short circuited, there will be a very sudden electrical change in the circuit which will render the inductance device extremely active in opposing a flow of current and instantly force a comparatively large amount

of current through the resistor 20 and the coil 19. In this way, the latch may be released and the circuit breaker opened in anticipation of a large increase in current and before the current has an opportunity to reach a dangerous value, in case of serious disturbance such as a short circuit on the system. At the same time, the circuit is not only protected against such extreme conditions as obtain in the case of a short circuit, but is also protected against ordinary overload conditions.

My invention is not limited to any specific circuit breaker structure or the arrangement of circuits illustrated, and I desire that only such limitations be imposed as are indicated in the appended claims.

I claim as my invention:

1. An interrupter for an electric circuit comprising relatively movable contact members, and means operatively connected to the electric circuit for tripping the interrupter either upon the occurrence of a predetermined load or in anticipation of a predetermined relatively quick electrical change in the circuit.

2. An interrupter for an electric circuit comprising relatively movable contact members, a reactor, and a trip coil circuit only connected in shunt relation to the said reactor for tripping the circuit upon a predetermined sudden electrical change in the circuit and when a predetermined current traverses the circuit.

3. An interrupter for an electric circuit comprising relatively movable contact members, a reactor, and a trip coil circuit only connected in shunt relation to the said reactor for instantly tripping the circuit in anticipation of a predetermined sudden electrical change in the circuit and when a predetermined current traverses the circuit.

4. An interrupter for an electric circuit comprising relatively movable contact members, an inductance device included in the circuit, a resistor and a trip coil connected in series, said resistor and trip coil only connected in shunt-circuit relation to the inductance device for separating the contact members in anticipation of an overload or a predetermined rate of electrical change in the said circuit.

5. A system of distribution comprising a direct current source of energy, a distributing circuit, an inductance device in said circuit, a circuit interrupter, a latch for locking the interrupter in its closed circuit position, means tending to forcibly open the interrupter, and a trip coil connected in shunt circuit relation to the inductance device, the shunt circuit that includes said trip coil having a large ohmic resistance relative to the ohmic resistance of the inductance device whereby the trip coil acts in anticipation of a predetermined electrical change in the distributing circuit.

6. A system of distribution comprising a source of energy, a distributing circuit, a reactor of relatively low ohmic resistance in the said circuit, a circuit interrupter, and a trip coil for the said circuit interrupter connected in shunt relation to the said reactor, the circuit including the said trip coil having a relatively high ohmic resistance and the relation of the said reactor to the said circuit including the trip coil being such that the trip coil acts in anticipation of a predetermined electrical change in the distributing circuit.

7. An interrupter for an electric circuit comprising relatively movable contact members, and means for instantly interrupting the circuit when there is either a predetermined relatively quick change of current in the circuit or a current in the circuit above a predetermined value.

8. A system of distribution comprising a source of energy, a distributing circuit, an inductance device in said circuit, a circuit interrupter, means for holding the circuit interrupter closed, and a trip coil circuit only connected in shunt circuit relation to the inductance device for releasing the circuit interrupter in anticipation of a predetermined electrical change in the distributing circuit.

In testimony whereof, I have hereunto subscribed my name this 18th day of June, 1912.

CHARLES LE G. FORTESCUE.

Witnesses:
OTTO S. SCHOIRER,
B. B. HINES.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."