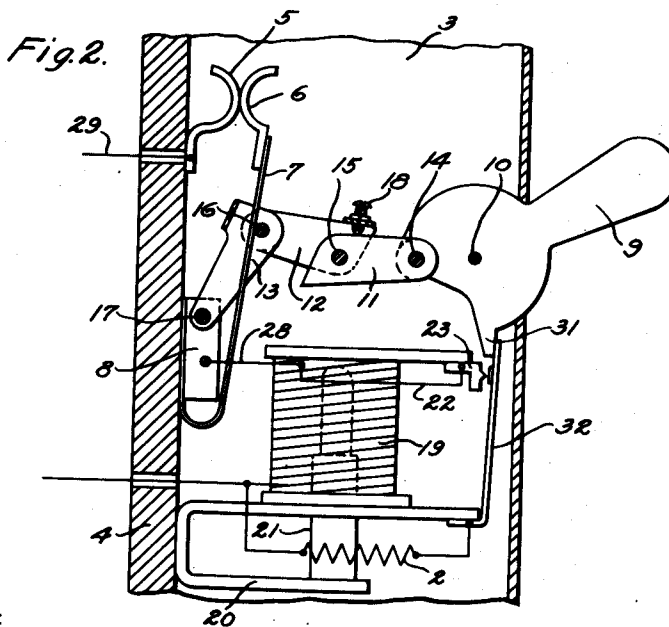
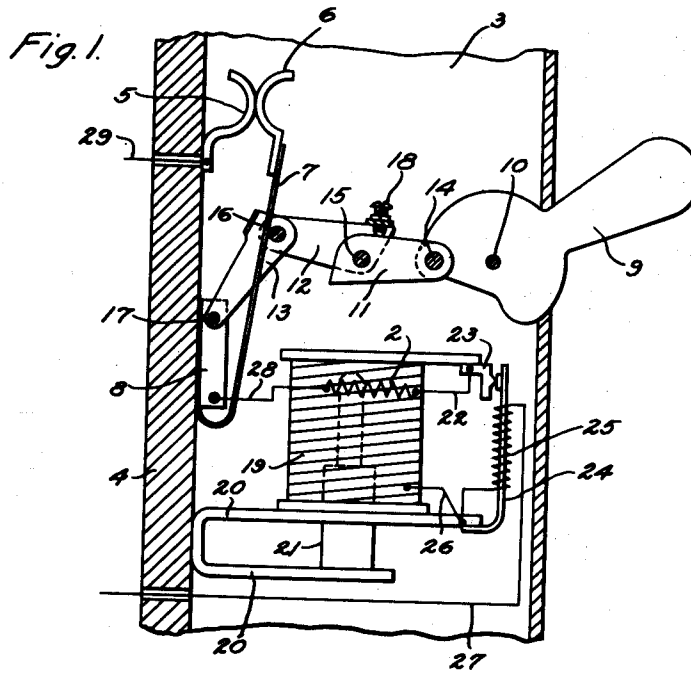


June 10, 1930.

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CIRCUIT BREAKER

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WITNESSES:

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CIRCUIT BREAKER

Application filed July 23, 1925, Serial No. 45,522, and in Germany June 30, 1924.

My invention relates to circuit breakers and particularly to circuit breakers for controlling circuits, wherein alternating current induction motors and electric lamps having metal filaments are connected.

It is well known that the current required for starting an alternating current induction motor or for starting the illumination of metal filament lamps is considerably more than is required for normal operation of the motors or lamps.

It is an object of my invention to provide an automatic circuit breaker wherein the circuit is caused to be interrupted when the current in the circuit is slightly above the normal current requirements, but which will not open the circuit in response to the excessive current required for starting the motors or lamps.

Another object of my invention is to provide a circuit breaker having a current responsive trip coil which is provided with a circuit connected in parallel for the purpose of carrying the excess starting current and which is caused to be opened within a predetermined time after the circuit breaker has been closed, or to be opened manually a short interval after the circuit breaker is closed.

Another object of my invention is to provide a circuit breaker having the above noted characteristic that is simple in construction and which requires but a few parts that may be inexpensively manufactured.

These and other objects that will be made apparent throughout the further description of my invention are attained by means of the circuit breaker apparatus hereinafter described and illustrated in the accompanying drawings, wherein;

Fig. 1 is an elevational view of the circuit breaker apparatus shown mounted in a housing that is illustrated in section, and

Fig. 2 is an elevational view similar to that of Fig. 1 and showing a modified form

of tripping mechanism for the circuit breaker.

Referring to the drawings, the circuit breaker includes a housing 3, having a base member 4 and within which the circuit breaker is mounted. The circuit breaker comprises a stationary contact member 5 secured to the base member and a movable contact member 6 that is mounted upon a flexible conductor member 7 which is secured to the terminal device 8.

The movable contact or switch member 6 is actuated by means of an operating handle 9 that is pivoted to a shaft 10 mounted on the side walls of the housing. The operating handle operates the contact member 6 through the medium of the toggle links 11, 12 and 13 that are pivotally connected to the handle and to one another by pivot shafts 14, 15 and 16 and to the housing by means of a pivot shaft 17, as indicated in Fig. 1.

The shaft 16 engages the flexible member 7 and serves to retain the contact member 6 in closed position when the links 11 and 12 are in the over-center position shown in Fig. 1. The adjustment of the relative position of the links 11 and 12 when in the over center position, is accomplished by means of the adjusting screw 18.

When the operating handle is moved in a clockwise direction, the toggle links 11 and 12 collapse and permit the flexible member 7 to move the contact member 6 to open position.

In order to trip the circuit breaker to open position under short circuit and overload conditions, a trip coil 19 is provided which is mounted upon a supporting member 20. The coil is connected in series with the circuit breaker contacts and is provided with a movable armature 21 that is moved upwardly into engagement with the knee of the toggle links 11 and 12 and which trips the toggle and circuit breaker to open position.

tion in response to an abnormal overload current or a short circuit.

In order to prevent abnormal starting current from causing the trip coil to open the breaker, a circuit is provided that is connected in parallel to the trip coil. This circuit comprises a resistance element 2, conductor 22, stationary switch terminal contact 23, a bimetal thermal switch element 24 and conductor 26. The element 24 is mounted upon the supporting member 20 and constitutes a switch for controlling the parallel circuit. The bimetal element is normally biased in engagement with the contact member 23 and is heated by a heating coil 25 that is connected in series with the trip coil 19 by means of the conductors 27 and 26. The resistance in the parallel circuit is less than that of the trip coil and consequently so long as the thermal switch element 24 is in engagement with the contact 23, the major portion of the starting current will pass through the parallel circuit and the current then traversing the coil 19 is insufficient to trip the circuit breaker.

The operation of the circuit breaker is as follows; assuming that the circuit breaker has just been moved to closed position, current enters through the feed conductor 27 and passes through the heating coil 25, conductor 26, coil 19, conductor 28, terminal 8, flexible switch member 7, contact member 6, stationary contact member 5 and to the feed conductor 29. At such time, the parallel circuit is closed and current passes through both the trip coil and the parallel circuit until the bimetal is moved to open position by reason of the heating action of the coil 25. The conductor 29 may be the feed conductor in which event this coil and parallel circuit will not be energized when the circuit breaker is open. As it takes a few seconds for the motor to come up to normal speed or the lamps to be heated to their normal incandescence, it is necessary to retain the terminal element 24 in engagement with the contact member 23 a corresponding period of time, after which normal current conditions are restored and all current may then be permitted to pass through the coil.

It will be seen from the foregoing that the circuit breaker will not open under the starting current conditions and will open the circuit under overload or short circuit conditions.

A modified form of circuit breaker is illustrated in Fig. 2 wherein the circuit breaker mechanism is similar to the mechanism shown in Fig. 1 with the exception that the operating handle 9 is provided with an extension 31 which engages a flexible switch member 32 which corresponds to the thermal element 24 of the device previously described. The flexible switch member 32

serves to close a parallel circuit connected in parallel to the trip coil 19, as indicated in Fig. 2.

When the operating lever 9 is in the position shown in Fig. 2, the circuit breaker contacts 5 and 6 are maintained in closed position and the extension 31 holds the switch element 32 in open position. The extension 31 is so disposed on the operating handle that it engages the switch element 32 and moves it to open position just after the contact members 5 and 6 have been moved into engagement by the counterclockwise closing movement of the operating handle. In this construction it is necessary for the operator to arrest the final movement of the operating lever for a few seconds after the contacts 5 and 6 have closed the circuit.

As the operating handle is retained in closed position by the toggle links, it will be seen that the switch member 32 is normally retained in open position, and that all of the current passing through the circuit breaker traverses the trip coil which then serves to open the circuit breaker under overload or short circuit conditions.

While I have described and illustrated but two embodiments of my invention, it will be apparent to those skilled in the art that various changes, modifications, substitutions, additions and omissions may be made in the apparatus illustrated without departing from the spirit and scope of my invention, as set forth in the appended claims.

I claim as my invention:

1. The combination with a circuit breaker having a current responsive trip device for releasing the circuit breaker to open position under predetermined current conditions, of a normally closed circuit connected in parallel to the trip device, a thermal responsive switch element for opening the said circuit and a heating coil for the said element connected in series with the said coil for maintaining the switch element at a temperature under normal current conditions sufficient to maintain the element in open position.

2. A circuit breaker comprising a movable switch member, means for releasably retaining the switch member in closed position, a trip coil for releasing the said means in response to predetermined current conditions, a circuit connected in parallel with the trip coil and a current responsive switch element for controlling the said circuit normally biased in closed position and movable to open position in response to predetermined current conditions, the said element being adapted to remain in open position under normal current conditions.

3. A circuit breaker comprising a movable switch member, means for releasably

retaining the switch member in closed position, a trip coil for releasing the said means in response to predetermined current conditions, a circuit connected in parallel with the trip coil and a current responsive switch element for controlling the said circuit normally biased to closed position and retained in open position under normal current conditions.

10 In testimony whereof, I have hereunto subscribed my name this 18th day of June, 1925.

GOTTLIEB SPEISER.

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