Aug. 31, 1948. H. B. ADAMS 2,448,166

CIRCUIT INTERRUPTER INDICATOR

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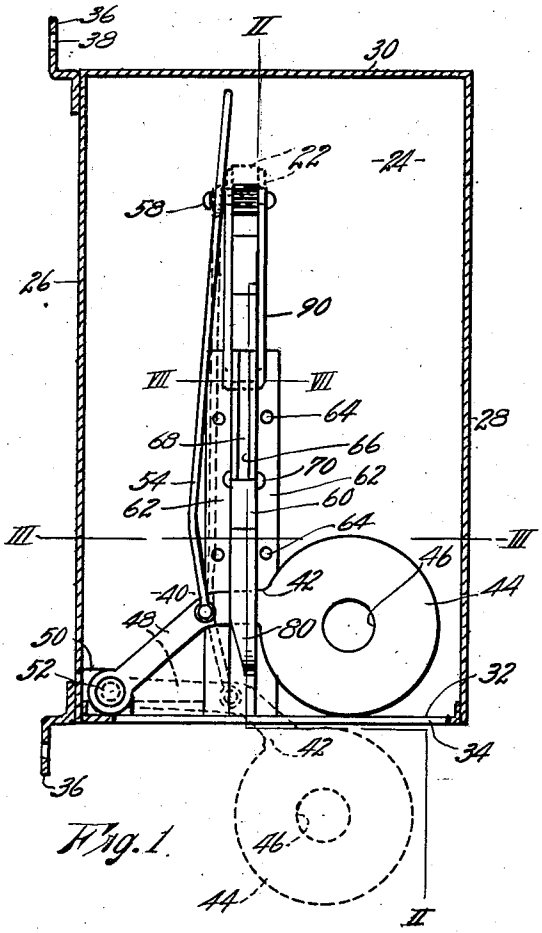

Fig. 1.

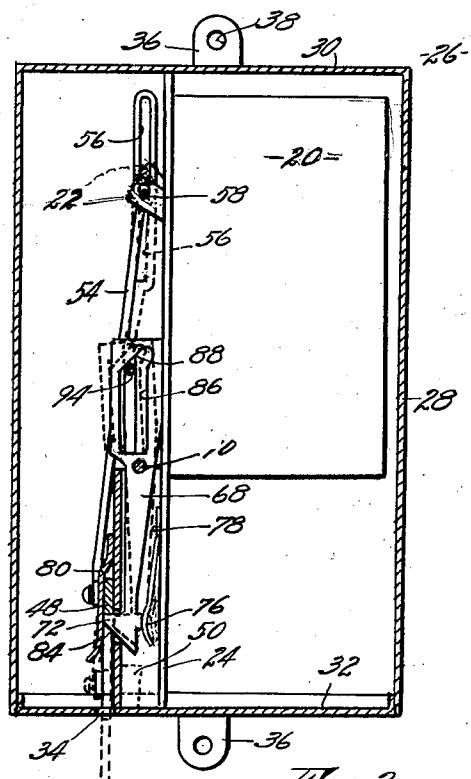

Fig. 2

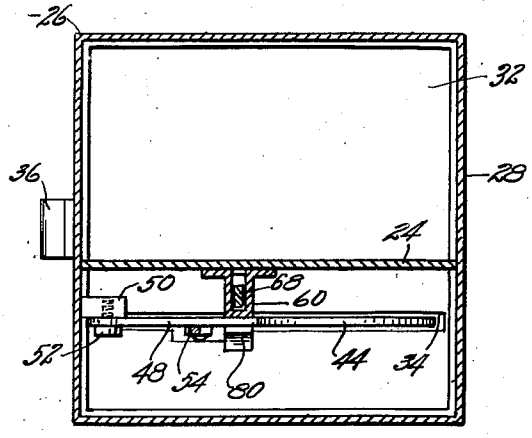

Fig. 3

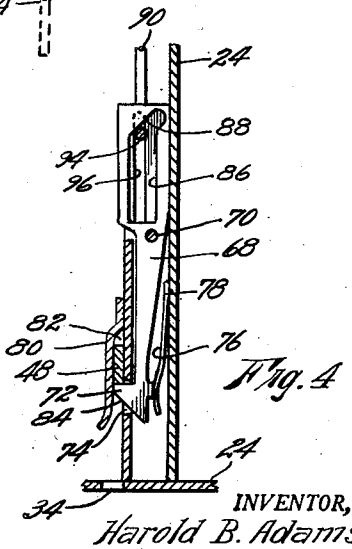

Fig. 4

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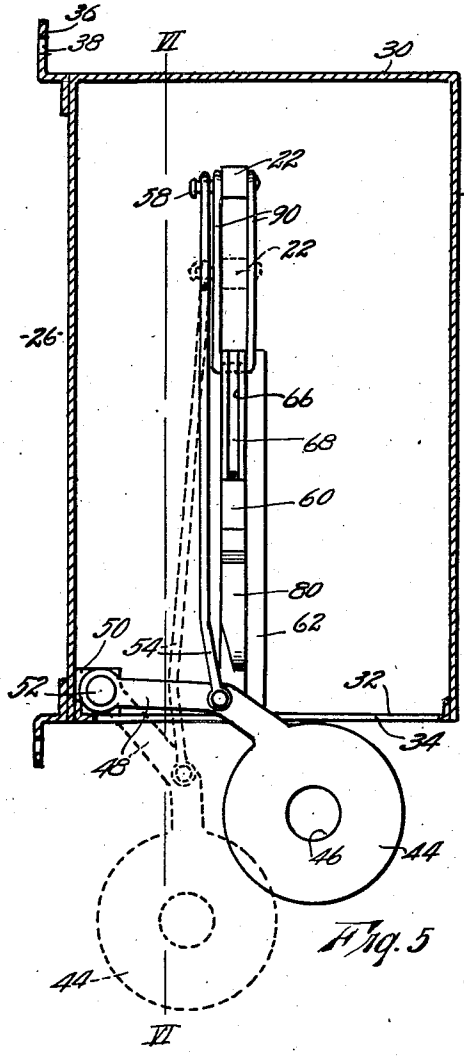
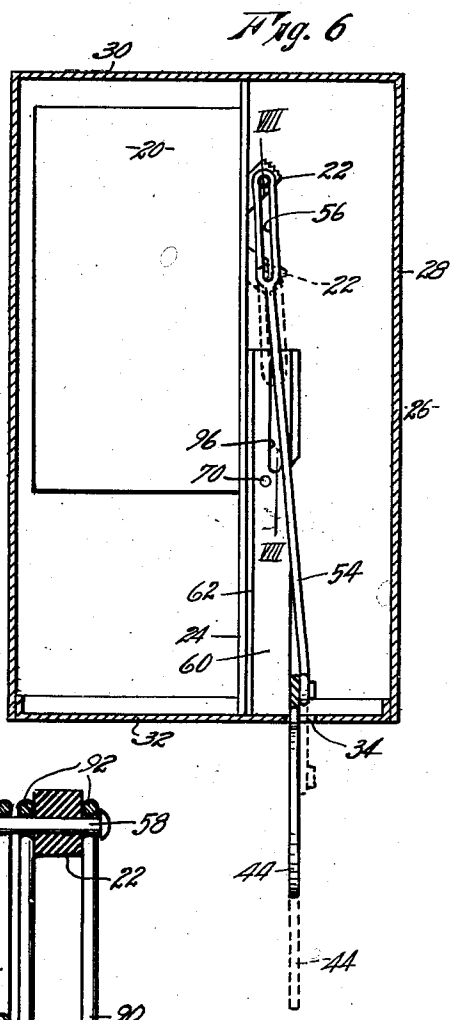


Fig. 5



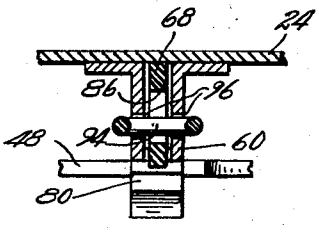


Fig. 7

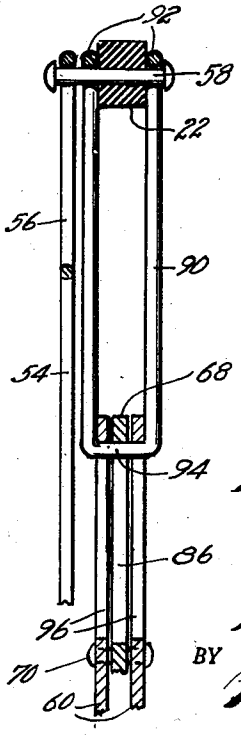


Fig. 8

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Fig. 9

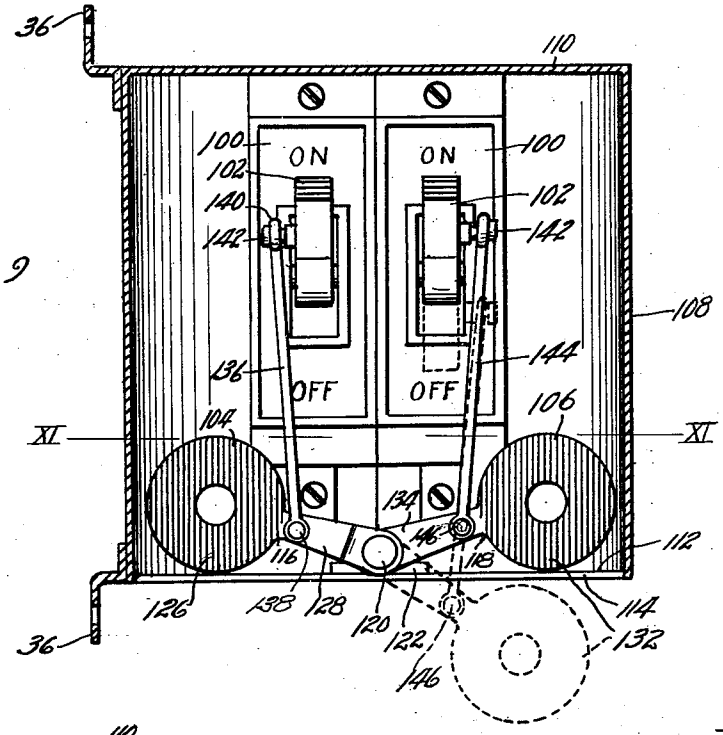


Fig. 10

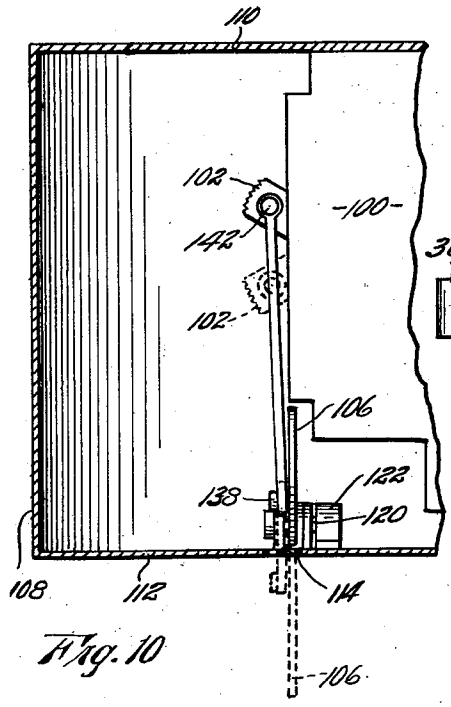
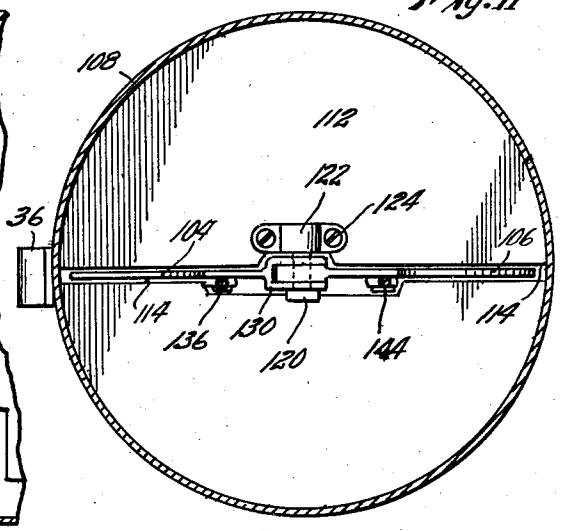


Fig. 11



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CIRCUIT INTERRUPTER INDICATOR

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Application December 18, 1944, Serial No. 568,735

4 Claims. (Cl. 200—167)

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This invention relates to improvements in a circuit interrupter indicator and has particular reference to a semaphore controlled by moving parts of the circuit interrupter to indicate the various operations thereof.

The principal object of the present invention is the provision of an improved, simple and reliable means for giving indication clearly and readily from a distance, of the operation of the circuit interrupter or circuit breaker.

Another object is the provision of a housed circuit breaker having movable parts operable to control the dropping of a semaphore to indicate the trip position of the circuit breaker, said semaphore being manually movable from outside said housing to reset said circuit breaker.

A further object of the present invention is the combination with a circuit interrupter of a housing enclosing said circuit interrupter and also normally housing a semaphore which is caused to drop as said circuit interrupter is tripped and which is adapted to be manually operated to reset said circuit breaker.

Other objects are simplicity and economy of construction, ease and efficiency of operation and adaptability for use with the various types of circuit breakers having manually operable setting levers.

With these objects in view, as well as other objects which will appear during the course of the specification, reference will now be had to the drawings, wherein:

Figure 1 is a front elevation of a circuit interrupter indicator embodying this invention with parts in section and with the interrupter in the closed position and dotted in the tripped position.

Fig. 2 is a sectional view taken on irregular line II—II of Fig. 1 with a circuit breaker shown in the set position in solid lines and in the tripped position in dotted lines.

Fig. 3 is a horizontal, sectional view taken on line III—III of Fig. 1.

Fig. 4 is a fragmentary, sectional view of some of the parts shown in Fig. 2.

Fig. 5 is a view similar to that shown in Fig. 1 with the circuit breaker in the tripped position in solid lines in the reset position in dotted lines.

Fig. 6 is a sectional view taken on line VI—VI of Fig. 5.

Fig. 7 is an enlarged sectional view taken on line VII—VII of Fig. 1.

Fig. 8 is a fragmentary, sectional view taken on line VIII—VIII of Fig. 6.

Fig. 9 is an elevational view of a modified form

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of the circuit interrupter indicator with parts in section.

Fig. 10 is a fragmentary side view of the circuit interrupter indicator shown in Fig. 9 with parts in section.

Fig. 11 is a horizontal sectional view taken on line XI—XI of Fig. 9.

Throughout the several views like reference characters refer to similar parts and the numeral **20** designates a circuit breaker or interrupter such as that shown in United States Patent No. 2,132,626 which is characterized by having a manually setting lever **22** which has three positions including an "on" position, a "trip" position and a "reset" position. When the lever **22** is in the position shown in solid lines in Fig. 1, it is in the "on" position and the circuit is closed. This is the normal operating position of the lever. When an overload trips the circuit breaker, the lever moves upwardly to the position shown in dotted lines in Fig. 1 and the circuit is open. The "reset" position of the lever **22** is shown in dotted lines in Fig. 5.

Circuit breaker **20** has a face plate **24** through which the manually operable setting lever **22** extends and this plate also serves to secure the circuit breaker in position in the housing **28**. This housing **26** comprises an elongated tubular member **28** having a closed top **30** and a closed bottom **32** provided with an elongated slot opening **34**. Brackets **36** secured to one side of the tubular member are provided with screw holes **38** through which screws or rivets are extended to engage the housing to a suitable supporting element.

The semaphore structure **40** includes an indicating member **42** comprising a disk head **44** having a central opening **46**. This disk head is carried by an arm **48** pivotally mounted on block **50** carried by housing **26** by means of pin **52**. This indicating member **42** is so positioned relative to slot opening **34** that it may pass freely therethrough to expose the disk head below housing **26**. Pivoted to arm **48** is rod **54** which is slotted at its upper end at **56** to receive a pin **58** which extends through the outer end portion of setting lever **22**. It will be noted that when the indicating member **42** is in the raised position within the housing and the setting lever is in the "set" or "on" position, the pin will be at the lower end of slot **56** as clearly shown in Fig. 2.

Securely mounted on face plate **24** and in vertical alignment below setting lever **22** is a channel member **60** having out-turned side flanges **62** which are secured to face plate **24** by means of

rivets 64. The upper front wall of channel member 60 is cut away at 66 to receive the upper end of trip lever 68 which is pivoted intermediate its ends by pin 70 to the side walls of channel member 60. The lower end portion of trip lever 68 extends downwardly into channel 60 and is provided adjacent its lower end with a latch detent 72 which extends through an opening 74 formed through the front wall of channel 60.

A spring member 76 secured at 78 to face plate 24 is formed to engage the rear side of latch detent 72 to force it outwardly through opening 74 into the path of travel of arm 48 as clearly shown in Fig. 2. A guard member 80 secured at its upper end to the outer face of channel 60 is spaced apart from channel 60 at its lower portion to form a recess 82 to receive the arm 48. Latch detent 72 is provided at its lower extremity with a downwardly and inwardly inclined surface 84 against which arm 48 moves when the indicating member 42 is returned from the dropped position to the "set" or "on" position so as to force the trip lever against spring 76 and move it on its pivot to permit the positioning of arm 48 thereabove as clearly shown in Fig. 4. When the arm 48 has moved above the latch detent 72, the spring 76 will automatically force the trip arm forwardly to engage and maintain the indicating member 42 in the raised position. The upper end portion of trip arm 68 is provided with a vertically elongated opening 86 which terminates at its upper end in an upwardly and rearwardly inclined cam face 88. It will be noted that the opening 86 is sufficiently wide to permit the automatic latching of the arm 48 as just described. For the purpose of releasing the indicating member 42 to permit the drop to the indicating position as shown in Fig. 1 when the circuit breaker is tripped and the setting lever 22 moves upwardly to the position shown in dotted lines in Figs. 1 and 2, the following mechanism is provided.

A U-shaped member 90 formed at its free ends to present eyes 92 which engage on pin 58 is a cross bar portion 94 which extends through slots 96 formed through the side walls of channel 60 and also through the opening 86 of trip arm 68. Referring to Fig. 4, it will be noted that this cross bar 94 rests against cam face 88 when the setting lever 22 is in the "set" or "on" position. It is quite apparent that as the cross bar 94 is moved upwardly in slots 96 and against cam face 88, the trip arm will be oscillated on its pivot pin 70 and latch detent 72 will be moved inwardly so as to release arm 48 to permit the dropping by gravity of the indicator member 42. When this tripping action occurs and the indicating member 42 drops, the rod 54 will be so positioned that the upper end of slot 56 formed therein will substantially rest on pin 58. The disk 44 is now in a position so that it is readily visible and will indicate to the operator that the circuit breaker is in the "open" or tripped position.

For reclosing the circuit breaker, the operator engages the indicator member 42, moves it downwardly to the position shown in dotted lines in Fig. 5, and then moves it upwardly on its pivot 52 to force the setting lever upwardly until it automatically snaps to the "set" or "on" position. The apparatus is now in position to handle the current in the regular way until it is again overloaded to cause a tripping of the circuit breaker.

Reference will now be had to Figs. 9, 10 and 11 wherein is shown a modified form of the circuit breaker indicator. This form is especially adapted for use with a simple circuit breaker 100 having a manually operable setting lever 102 which has an "on" and "off" position only. Since in many instances, it is necessary to use two of these circuit breakers to properly control the circuit being used, two independently operable semaphores 104 and 106 are provided. These switches are securely mounted in a tubular housing 108 having a closed top 110 and a closed bottom 112 which is provided with a transverse slot 114. Semaphore indicating members 116 and 118 are pivotally mounted on a common trunnion 120 which in turn is mounted in a block 122 secured to bottom member 112 by screws 124. Semaphore 104 has a display disk 126 mounted on an arm 128 which is bifurcated at 130 and perforated to pivot on trunnion 120.

Indicating member 118 of semaphore 106 is provided with a display disk 132 mounted on an arm 134 which is adapted to fit between the bifurcated ends of arm 128 and to receive trunnion 120 for oscillatory movement thereon. Rod 136 pivoted to arm 128 by pin 138 is provided at its upper end with an eyelet 140 to receive pin 142 which in turn is rigidly attached to setting lever 102. In like manner, rod 144 pivoted to arm 134 by pin 146 is connected with pin 142 carried by the setting lever of the other circuit breaker, thus each of the circuit breakers is provided with a semaphore which operates to indicate the "off" position of the circuit breaker.

In this type of circuit breaker, an overload on the circuit will cause setting lever 102 to throw to the "off" position as indicated in dotted lines in Figs. 9 and 10. The indicating members 116 and 118 are adapted to pass through slot 114 when the setting lever is in the "off" position so that the disks 126 and 132 will indicate to the operator that the circuits are "off." The operator by simply pressing upwardly on the dropped indicating member, may force it upwardly thereby moving the setting lever back to the setting position. In this type of circuit breaker, as well as in the other breaker shown, the setting levers, when moved to a certain intermediate position, will automatically flip to the desired position, thus insuring that the indicating members will always be moved to the proper position within the housing when the circuit is closed.

In both forms of the invention, the structures are so made and operated that the operator may readily detect all circuits that have been tripped and may easily reset the semaphore arm outside the housing in which the circuit breakers are mounted. The positioning of the operating parts within a substantially closed housing precludes the entrance of objectionable birds or insects from the movable parts and also maintains the parts in good condition for proper operation.

Having thus described the invention, what I claim is:

1. In a device of the character described a circuit interrupter having a manually operable setting lever, a housing for said circuit interrupter having a bottom opening, and a semaphore pivotally mounted in said housing and interconnected with said setting lever whereby when said setting lever is tripped said semaphore is caused to drop through said bottom opening and project below said housing, and to be manually operable downwardly from outside said housing to reset the circuit interrupter to the closed position.

2. In a device of the character described a circuit breaker having a setting lever having an

on-position, a trip-position, and a reset-position, a semaphore having a pivoted indicating arm, latch means to normally secure said indicating arm in position to indicate the on-position of the setting lever, means operable by said setting lever as it moves from the on-position to the trip-position to release said latch means whereby the indicating arm is permitted to drop by gravity, and means interconnecting said setting lever with said indicating arm whereby the indicating arm may be manually operated to move said setting lever to the reset-position and then to the on-position.

3. In a device of the character described a circuit breaker having a setting lever adjustable to an on-position, a tripped-position and a reset-position, a semaphore having a pivoted indicating arm, latch means to normally hold said indicating arm in the raised position, means operable by said setting lever as it is automatically moved from the on-position to the tripped position to release said latch means and permit said indicating arm to drop by gravity, and means interconnecting said indicating arm with said setting lever whereby the indicating arm may be manually operated to move said setting lever to the reset position and to the on-position.

4. In a device of the character described a circuit breaker having a setting lever adjustable

to an on-position, a tripped-position and a reset-position, a housing enclosing said circuit breaker, a semaphore having an indicating arm pivoted to said housing, latch means to normally hold said indicating arm in the raised position in said housing, means operable by said setting lever as it is automatically moved from the on-position to the tripped-position to release said latch means and permit said indicating arm to drop by gravity to extend from said housing and means interconnecting said indicating arm with said setting lever whereby the indicating arm may be manually operated to move said setting lever to the reset position and to the on-position.

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