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E. G. WISE

2,192,060

LOCKING DEVICE

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Fig. 1.

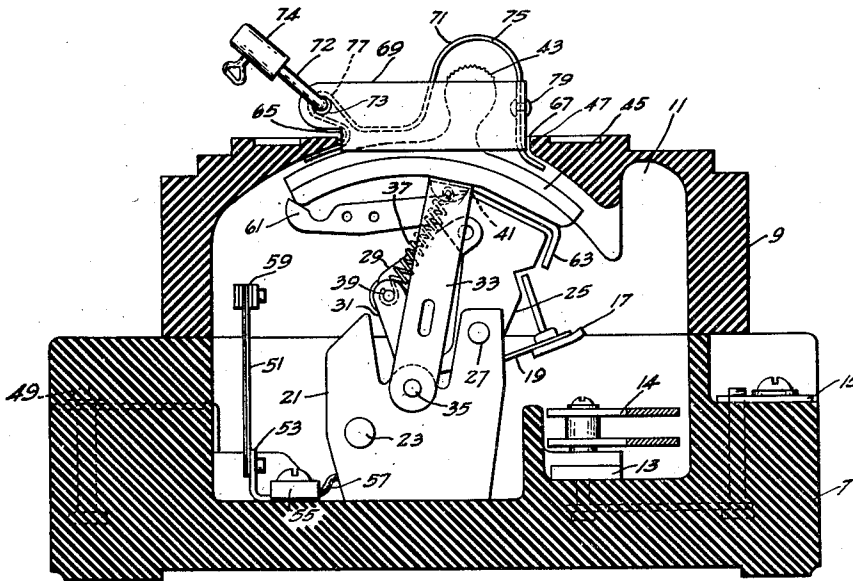


Fig. 2.

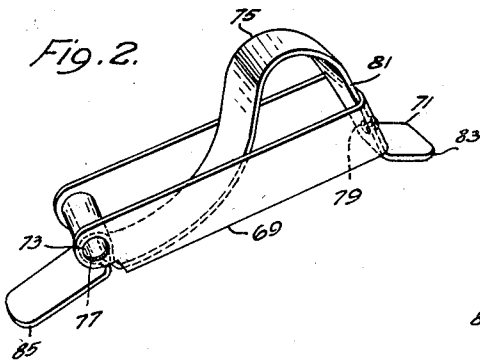


Fig. 3.

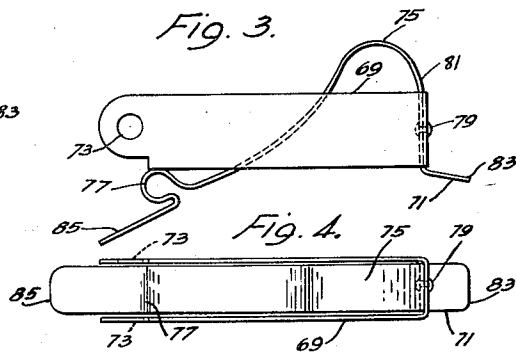


Fig. 4.

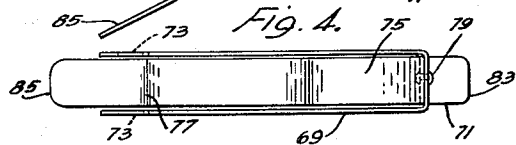
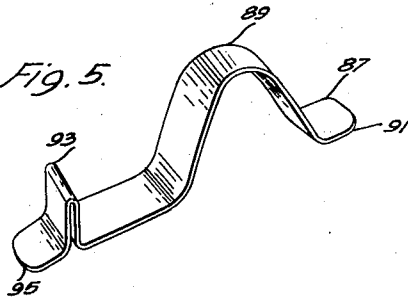


Fig. 5.



WITNESSES:

Michael Stark
Jordan S. Parker

INVENTOR

Ernest G. Wise.

BY

F. W. Lyle.
ATTORNEY

UNITED STATES PATENT OFFICE

2,192,060

LOCKING DEVICE

Ernest G. Wise, Chicago, Ill., assignor to Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., a corporation of Pennsylvania

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20 Claims. (Cl. 200—42)

My invention relates to circuit breakers and more particularly to locking devices for circuit breakers.

In circuit breaker installations in general and particularly in panelboard and load center installations, it is often desired or imperative that the setting of a particular breaker or group of breakers remain undisturbed. Situations often occur in which a breaker or group of breakers have been set in "on" or "off" position with some important purpose in mind, and some unauthorized person either purposefully or inadvertently changes the settings of the breaker or group of breakers. Situations of this nature may result in annoying interruptions to service or operations, and may even cause serious damage to apparatus and injury to persons who may be relying on the setting of the breaker or group of breakers.

Heretofore in certain instances circuit breakers mounted in metal enclosures have been provided with a locking means for locking the breakers in set position. The form of locking means consisted of walls formed integral with the cover of the metal box enclosing the breaker and surrounding the slot provided in the cover for the manual operating member. Oppositely disposed openings were provided in the side walls to form staples for receiving the bow of a padlock.

Since it could not be accurately foreseen whether any particular breaker would require a locking means, it was necessary to provide the metal box of each of a line of breakers with the locking means described above.

In panelboard installations involving a plurality of breakers, it has not been possible heretofore to prevent movement of the operating handle of any particular breaker except by providing a cover for the entire board and locking the cover in closed position.

Accordingly, the primary object of my invention is to provide an improved form of a device for preventing movement of a circuit breaker control handle.

Another object of my invention is to provide an improved form of a device for preventing movement of the operating member of a circuit breaker, which is capable of being quickly and easily attached to or detached from the circuit breaker structure.

Another object of my invention is to provide an improved form of attachment for preventing movement of the operating member of a circuit breaker which is adapted for use with many types of existing circuit breaker structures.

Another object of my invention is to provide a

locking device for attachment to a circuit breaker structure for preventing substantial movement of the operating handle thereof in which means are provided for preventing detachment of the device from the breaker structure.

Another object of the invention is the provision of a portable device of unitary structure for preventing substantial movement of the operating member of a circuit breaker.

A still further object of my invention is the provision of a device for preventing substantial movement of the operating handle of a circuit breaker in which the device is provided with means for quick attachment to or removal from the circuit breaker structure and in which locking means are provided for preventing removal of the device from the circuit breaker structure.

A still further object of the invention is to provide a device which may be removably attached to a circuit breaker structure for preventing substantial movement of the operating member thereof and which functions as an indicator to indicate that the setting of the breaker is not to be disturbed.

A still further object of my invention is to provide a device attachable to a circuit breaker structure for preventing substantial movement of the operating member thereof, which is of simple and rugged construction and which can be manufactured and sold at a relatively low cost.

Generally, my invention consists of a spring clip or strip of relatively resilient material which is adapted to be sprung in position in the opening provided in the circuit breaker casing through which the operating member of the breaker extends. The clip, when mounted in position in the opening, resiliently engages the edges of the opening and is provided with a portion for receiving the operating handle of the breaker to prevent substantial movement of the same. The position of the clip may be reversed so that the operating handle of the breaker may be held either in its open or closed circuit position. Locking means are also provided in one form of my invention to prevent removal of the clip from its position in the opening.

The above stated objects and others ancillary thereto as well as the preferred method of carrying out the invention will be made more apparent by the following detailed description, when taken with reference to the accompanying drawing wherein are shown views of the structural details of devices utilizing the principle of my invention.

Referring to the drawing:

Figure 1 is a vertical sectional view of a circuit

breaker structure of the current responsive type with one form of my invention shown attached thereto.

Fig. 2 is a perspective view of the form of locking device which is shown applied to the circuit breaker in Fig. 1.

Fig. 3 is a side elevational view of the locking device shown in Fig. 2 with the spring clip thereof in flexed position for insertion in the slot of the breaker casing.

Fig. 4 is a top plan view of the locking device illustrated in Fig. 2, and

Fig. 5 is a perspective view of a modified form of my invention.

The devices embodying the features of my invention may be attached to many standard forms of circuit breaker structure. In Fig. 1, my improved form of locking device is shown attached to a circuit breaker of the thermal release type. The circuit breaker illustrated in Fig. 1 is of the same general type as is disclosed in Patent No. 1,802,758 to H. D. Dorfman, issued on April 28, 1931, and assigned to the assignee of this invention. The details of the circuit breaker shown in Fig. 1 are not an essential part of this invention, but are merely shown by way of example. The circuit breaker illustrated in Fig. 1 comprises a base 7 to which is secured a cover or casing member 9. The casing and base are of molded insulating material and are formed to provide a chamber 11 in which is mounted the circuit breaker contact means, the operating means therefor, and a current responsive trip element. A stationary contact 13 is mounted on the base at the forward end of the compartment. The stationary contact is electrically connected to a terminal 15 secured in one end of the base. A movable contact 17 is secured to a contact carrying arm 19 at one end thereof. The other end of the contact carrying arm is secured to a channel shaped contact supporting frame (not shown) which is pivotally mounted between the side walls of a main frame 21 by means of a pin 23. A cradle member 25 is pivotally mounted at one end thereof on a pin 27 carried at the forward end of the main frame between the side walls thereof. Toggle links 29 and 31 interconnect the cradle member with the movable contact carrying frame. A U-shaped operating member 33 has the lower ends of its legs pivotally secured to the side walls of the main frame as indicated at 35. An overcenter spring 37 has one end thereof connected to the knee pivot 39 of the toggle linkage 29, 31, and its other end secured to a lug 41 formed on the underside of the bight portion of said operating member. An operating handle 43 of insulating material is provided with a curved closure portion 45 which is secured to the top of the bight portion of the operating member. The operating handle and a part of its curved portion extend through an elongated slot 47 provided in the cover or casing 9. A second terminal 49 is secured to the base at the end thereof opposite the terminal 15. This terminal is electrically connected to one end of a U-shaped bimetallic trip element 51. The other end of the bimetallic trip element is connected through a metallic supporting base 53 for the trip element, and a terminal 55, with a flexible conductor 57. The conductor 57 is electrically connected to the movable contact carrying arm 19. The upper end of the bimetallic trip element is provided with a latch portion 59 which is adapted to engage and hold a latch nose 61 formed on the free end of the

cradle member 25. An angle piece 63 is secured to the underside of the curved portion of the operating handle 43 for engaging and moving the cradle member in a counter-clockwise direction about its pivot point 27 to reset the circuit breaker. For aiding in the extinction of the arcs which are formed incident to the opening of the circuit controlled by the breaker, an arc extinguishing device 14 of the spaced plate type is provided. The features of this extinguisher are not an important part of my invention and any suitable structure may be utilized.

The operation of the circuit breaker described above is briefly as follows: The circuit breaker is shown in the tripped position, and the operating handle must be moved to open position to reset the mechanism before the breaker can be closed from this position. Movement of the operating handle 43 toward the left to its open position in which it is adjacent the edge 65 of the opening 47 in the casing causes the angle piece 63 of the handle 43 to engage and move the cradle 25 in a counter-clockwise direction to a position in which the latch nose 61 is engaged and held by the latched portion 59 of the bimetallic trip element. In this position of the parts described, the movable contact is in its open circuit position. If the operating handle 43 is now moved to the right, to a position in which it is adjacent the edge 67 of the opening 47 in the casing, the overcenter spring will move the toggle linkage 29 and 31 to an extended position to cause the movable contact to move with a snap action into engagement with the stationary contact 13. Movement of the operating handle to its open circuit position in which it is adjacent the edge 65 of the opening will cause the overcenter spring to break the toggle linkage 29, 31 and thus move the movable contact 17 to an open circuit position with a snap action. With the movable contact 17 in its closed circuit position and the nose 61 of the cradle engaged and held by the bimetallic trip element, if an overload occurs on the circuit in which the contacts 17 and 13 are connected, the bimetallic trip element 51 will be heated by the overload current and bend in a direction away from the nose 61 of the cradle member to release the same. The release of the cradle member 61 causes the overcenter spring to break the toggle linkage and thus move the contact 17 to an open circuit position. This last operation takes place irrespective of the position of the operating handle 43. The release of the cradle 61 in response to an overload also effects movement of the operating handle 43 to an intermediate indicating position as shown in Fig. 1 to indicate that the breaker has been tripped open.

One form of the locking device of the present invention is illustrated in Fig. 2 and consists of a relatively rigid U-shaped metal strip 69 and a spring clip 71 of relatively resilient metallic material. The U-shaped member 69 is provided with openings 73 at the end of each leg thereof. The metallic clip 71 consists of a strip of metal having an arched portion 75 bent therein adjacent one end thereof, and a projection forming a sleeve portion 77 formed adjacent the other end thereof. The spring clip is secured between the legs of the U-shaped member by means of a rivet 79 passing through the U-shaped member and a wall 81 of the arched portion of the strip. The rivet holds the metallic strip or clip in a position between the legs of the U-shaped member with the sleeve portion 77 in alignment with

the openings 73. The U-shaped member 69 and the strip 75 may be constructed of any suitable metallic material preferably of bronze or steel.

The locking device described above may be attached to the breaker structure in the following manner. The end 83 of the strip 71 is inserted under the edge of the opening 67. The strip 75 is then flexed as shown in Fig. 3 so that the other end 85 thereof may be positioned under the edge 65 of the opening provided in the casing. The strip is then released and expands so that the sleeve portion 77 aligns with the opening 73 in the U-shaped member 69. The U-shaped member 69 lies within the opening 47 with its marginal edges in closely spaced relation to the edges of the opening. The operating handle of the breaker projects within the arched portion 75 of the spring strip and is held against substantial movement by the same. The locking device may be removed by flexing the strip 71 to disengage the end 85 from engagement with the edge 65 of the opening.

The locking device may be inserted in the opening either in the position shown in Fig. 1 or in reverse position so that the operating handle may be held against substantial movement in either its closed circuit position or open circuit position, whichever is desired. In Fig. 1, the breaker is shown in tripped condition with the movable contact 17 in the open position.

The locking device when mounted in position in the opening thus effectively prevents any substantial movement of the operating handle. If desired, the bow 72 of a padlock 74 may be passed through the openings 73 and the sleeve 77 to prevent removal of the locking device from the opening as shown in Fig. 1. In this manner, the operating handle may be locked against movement by any one other than the person who has possession of the key to the padlock. It is not essential that the bow of the lock be passed through the sleeve and openings. Various other locking schemes may be associated with the sleeve and openings to lock the device in position.

Another form of my invention is illustrated in Fig. 5. It consists of a flat metallic strip 87 of relatively resilient material. The strip is provided with an arched portion 89 bent therein adjacent the end 91 of the strip. A projection or crimp 93 is formed in the strip adjacent the other end 95 thereof. The projection 93 may be formed as an integral part of the strip by bending the strip outwardly and back upon itself, as illustrated in Fig. 5. The projection might also be formed as a separate element secured to the strip. The strip 87 functions in substantially the same manner as the locking device illustrated in Fig. 2. It is applied to the breaker structure by inserting the end 91 under one edge of the opening 47, and flexing the strip so that the other end 95 thereof may be engaged under the opposite edge 65 of the opening in the breaker casing. After the strip has been released the projection 93 engages the edge 65. The strip 87 may be positioned with the arched portion adjacent either edge of the opening by merely reversing the position of the strip before the insertion in the opening. The strip of this form of my invention may be constructed of any suitable resilient material such as bronze or steel.

It will be noted that in both of the above described embodiments of the invention the bowed portion 75 of the device has been described as functioning to prevent "substantial movement" of the operating handle 43 when the device is in

mounted position. By the term "substantial movement" is meant such amount of movement of the operating handle as would cause the contacts to be opened or closed. In other words the bowed portion 75 of the device in each embodiment of the invention functions to limit movement of the operating handle 43 so that the handle cannot be moved a sufficient amount to cause the overcenter spring to move the movable contact 17 to either open or to closed circuit position as the case may be. In both embodiments however the size of the bowed portion 75 is sufficient to permit the operating handle 43 to be moved to its intermediate tripped indicating position as shown in Fig. 1 whenever the cradle is released in response to an overload. Thus either embodiment of the locking device permits the operating handle to be moved to its intermediate indicating position so as to indicate that the breaker has been tripped.

Either of the modifications of the devices described above may be used with many standard lines of switches either of the current responsive or noncurrent responsive type. The devices may be manufactured in different sizes for use with different lines of breakers. They may either be sold as a unit for use with breakers now in commercial use or as an attachment for new lines of breakers as a part of the same.

It will thus be seen that my invention provides an efficient form of device for preventing substantial movement of the operating member of a circuit breaker, which is of simple and rugged construction and which can be manufactured and sold at a relatively low cost. Either form of device when positioned within the opening of the breaker, may function as an indicator to indicate that the setting of the breaker is not to be disturbed.

While in accordance with the patent statutes, I have disclosed the foregoing details of two principal embodiments of my invention, it is to be understood that the broad principles disclosed are capable of much wider application and that many of the details thereof may be changed without departing from the spirit of my invention. I desire, therefore, that the language of the accompanying claims shall be accorded the broadest reasonable construction, and that my invention will be limited only by what is expressly stated therein and by the prior art.

I claim as my invention:

1. The combination with a circuit controlling device having a movable operating member and a casing provided with an opening in which said member is movable, of a relatively resilient means removably positioned in said opening for preventing substantial movement of said operating member.

2. The combination with a control device having a movable operating member and a casing provided with an opening in which said member is movable, of a portable device removably positioned in said opening for preventing substantial movement of said operating member, said device including resilient means for engaging at least one of the edges of said opening.

3. The combination with a circuit interrupter having an oscillatable operating member and a casing provided with an opening in which said member is movable, of a relatively resilient locking element removably mounted on said casing at said opening for preventing substantial movement of said operating member, said element

having provision for quick attachment to and detachment from said casing.

4. The combination with a circuit controlling device having a movable operating member and a casing provided with an opening in which said member is movable, of a device removably mounted on said casing for preventing substantial movement of said operating member, said device comprising a resilient member having means for resiliently engaging at least one of the edges of said opening and a portion for preventing substantial movement of said operating member.

5. The combination with a circuit breaker having a manual operating member which is manually movable to an open and to a closed circuit position to open and to close the circuit and which is automatically moved to a tripped indicating position in response to an overload, and a casing having an opening in which said operating member is movable; of a clip removably mounted in said opening for preventing manual operation of said operating member to open or close the circuit, and which will permit movement of the operating member to its tripped indicating position, said clip having a relatively resilient portion by means of which it is removably mounted in said opening.

6. The combination with a circuit breaker having a manual operating member which is manually movable to an open and to a closed circuit position to open and to close the circuit and which is automatically moved to a tripped indicating position in response to an overload, and a casing having an opening in which said operating member is movable; of a device removably mounted on said casing at said opening for preventing manual operation of said operating member to open or close the circuit, and which will permit movement of the operating member to its tripped indicating position, said device including a member at least partially resilient having portions adapted to be slipped under the edges of said opening to mount the device and a portion for limiting the movement of the operating member.

7. The combination with a circuit breaker having a manual operating member movable to an open and to a closed circuit position to open and to close the circuit and to a tripped indicating position in response to an overload and a casing having an opening in which said operating member is movable; of a device removably mounted on said casing at said opening for preventing manual operation of said operating member to open or close the circuit, and which will permit movement of the operating member to its tripped indicating position, said device including a member at least partially resilient having portions adapted to be slipped under the edges of said opening to mount the device and a portion for limiting the movement of the operating member, and locking means cooperating with said member to prevent removal of said device from said casing.

8. A device for preventing movement of a control member, comprising a relatively resilient spring clip having an arched portion bent therein adjacent one end, and a projection carried by the clip adjacent the other end thereof.

9. A device for preventing movement of a control member comprising a relatively resilient metallic strip having an arch portion bent therein adjacent one end thereof, and an extended portion at each end thereof for securing the device in place.

10. A device for preventing movement of a control member comprising a relatively resilient metal strip provided with an arched portion adjacent one end and a projecting crimp adjacent the other end thereof.

11. A device for preventing movement of a control member, comprising a U-shaped member, having an opening provided in each leg adjacent the end thereof, a relatively resilient metallic strip having an arched portion bent therein adjacent one end, and a projecting portion forming a sleeve adjacent the other end, one side of the arch portion of the strip being secured to the bight of the U-shaped member so as to position the strip between the legs of the U-shaped member with the sleeve portion of the strip in alignment with the openings in the U-shaped member.

12. A control member movable to a plurality of controlling positions, a casing having an opening through which said control member projects, a device for preventing substantial movement of said control member, said device having means including a relatively resilient portion by which it is removably mountable in said opening.

13. A control member movable to a plurality of controlling positions, a casing having an opening through which said control member projects, a device having means removably positioning it in said opening for preventing substantial movement of said control member, said device comprising a relatively resilient strip having a portion for engaging said control member to prevent substantial movement thereof.

14. The combination with a circuit breaker having a movable operating member and a casing provided with an opening in which said member is movable, of a device to be removably mounted on said casing at said opening for preventing substantial movement of said operating member comprising a single member at least partially resilient and having portions movable relative to each other adapted to be slipped under the edges of said opening to mount the device, and a portion for limiting movement of said operating member.

15. The combination with a circuit breaker having a movable operating member and a casing provided with an opening in which said member is movable, of a device to be removably mounted on said casing at said opening for preventing substantial movement of said operating member comprising a single member at least partially resilient and having portions movable relative to each other adapted to be slipped under the edges of said opening to mount the device, a portion for limiting movement of said operating member, and locking means cooperating with said member to prevent removal of said device from said casing.

16. The combination with a circuit breaker having a movable operating member and a casing provided with an opening in which said operating member is movable, of a means to be removably mounted in said casing adjacent said opening for preventing substantial movement of said operating member, said means comprising a rigid member, and a relatively resilient member having portions movable relative to each other cooperating with said casing to mount the means, and a portion for preventing substantial movement of said operating member, and means for locking said member having the relatively movable portions to said rigid member to prevent relative

movement of said portions and removal of said means from said casing.

5 17. The combination with a control device provided with a casing having an opening and a manually movable control member access to which may be had through said opening, of a relatively resilient means removably mounted in said opening for preventing access to be had to said control member for manually operating the
10 device.

15 18. The combination with a control device provided with a casing having an opening and a manually movable control member access to which may be had through said opening, of a relatively resilient element removably mounted in said opening for preventing access to be had to said control member for manually operating the device, and locking means engageable with said

element only for preventing removal of said element from said casing.

19. A portable device for preventing substantial movement of a control member comprising a relatively resilient metal element having a portion 5 for blocking movement of the control member when the device is in place, and having a portion at one end adapted to engage a fixed support for holding the device in place.

20. The combination with a circuit interrupter 10 having an oscillatable operating handle movable back and forth in a single plane to "on" and "off" positions and having a casing provided with a slot in which said handle is movable, of a device removably mountable in said slot in either of two 15 opposite positions for locking said handle in either its "on" or "off" position.

ERNEST G. WISE.