April 29, 1958 E. W. LANDMEIER 2,832,857

LOCKING PLATE FOR CIRCUIT BREAKERS, SWITCHES AND THE LIKE

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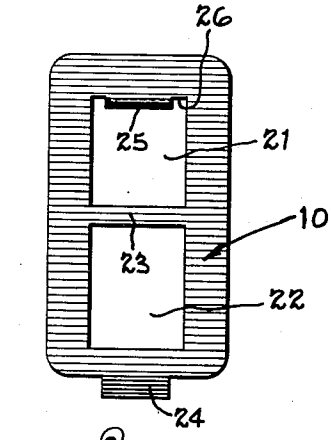


Fig. 1

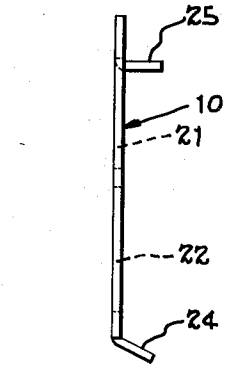


Fig. 2

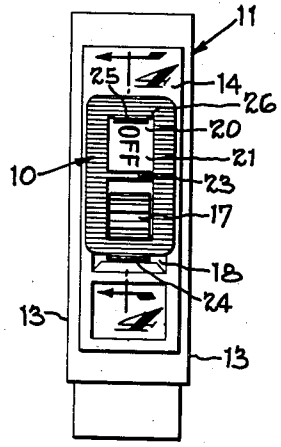


Fig. 3

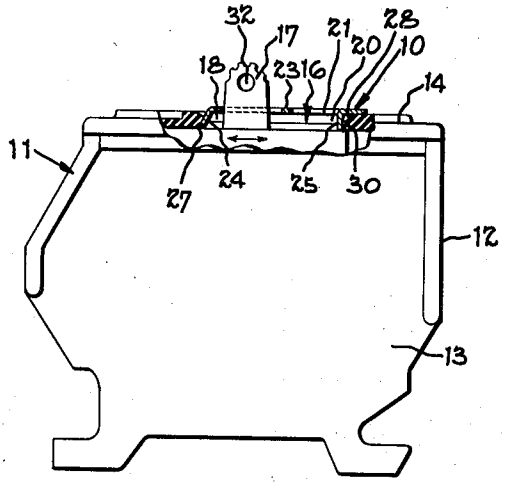


Fig. 4

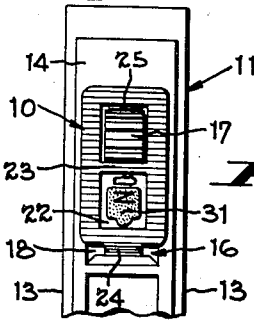


Fig. 5

INVENTOR.
Edwin W. Landmeier
BY
Wood, Herron & Evans
ATTORNEYS.

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LOCKING PLATE FOR CIRCUIT BREAKERS, SWITCHES AND THE LIKE

Edwin W. Landmeier, Covington, Ky., assignor to Wadsworth Electric Manufacturing Company, Inc., a corporation of Kentucky

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2 Claims. (Cl. 200—42)

The present invention relates to circuit breakers, switches and similar devices, and is particularly directed to a plate for locking the operating handle of such a device in a predetermined position to prevent its inadvertent manipulation.

There are many electrical circuits in homes, offices and factories, which include a controlling or protective circuit element in the form of a switch or circuit breaker. Frequently a switch and circuit breaker are combined to form a single unit which functions both to provide a means for manually opening and closing a circuit and also to provide a means for automatically interrupting the circuit in response to predetermined overload conditions. The locking plate of the present invention will be discussed primarily in conjunction with a combination switch and circuit breaker of this type. However, it will be readily apparent that such locking plates can also be used advantageously in conjunction with other types of devices, such as ordinary toggle switches, and circuit breakers.

One form of device with which the present locking plate is particularly adapted for use includes a housing enclosing a circuit breaker and switch mechanism, which is operated by means of a handle protruding through an elongated slot in the front face of the housing. The operating handle is shiftable to either of two positions disposed at opposite ends of the slot, corresponding respectively to the open and closed positions of manually operable switch contacts. When the handle is in the open position, the switch contacts are separated, and when the switch handle is in the opposite position the contacts are normally closed, but are adapted to be opened by the circuit breaker mechanism in response to a circuit overload. The handle is not shifted by the tripping of the circuit breaker mechanism, but in order to reset the circuit breaker, the handle must be moved to the off position and then returned to the on position.

The principal object of the present invention is to provide a simple means for securing an operating handle in either its open or its closed position, to prevent inadvertent operation of the circuit breaker and switch. There are many circumstances in which it is desirable to prevent such operation. For example, if the circuit breaker has been tripped, it is frequently desirable to prevent its being reset until the short or other faulty condition causing the circuit overload has been located and corrected. Similarly, if an interruption in the operation of a particular piece of equipment would cause damage to other apparatus or material, it is advantageous to minimize the likelihood of such damage by preventing the accidental opening of the switch controlling the circuit.

The present invention is predicated upon the concept of providing a small locking plate adapted to fit over a portion of the front face of the circuit breaker, adjacent to the handle receiving slot. The plate includes tangs for frictionally supporting the plate in the slot, and a transverse segment for engaging the operating handle

to prevent its being shifted from one portion of the slot to another.

More specifically, the present invention contemplates the provision of a light locking plate, which in the preferred embodiment is placed over the front face of a circuit breaker surrouding the handle slot. The plate preferably is of a generally rectangular configuration and includes two spaced apertures separated by a narrow transverse band, or stop member. The apertures are larger than the cross-section of the handle and are disposed for registry with opposite ends of the housing slot. One end of the plate is provided with an angularly extending tang adapted to engage an undercut portion of the housing at one end of the slot. A second tang is provided adjacent to the opposite end of the plate and is disposed for abutment with the opposite edge of the slot.

In order to lock an operating handle in place by means of such a plate, the handle is shifted to its desired position and a locking plate is placed over the housing slot, the handle protruding through the aperture in the locking plate corresponding to the desired handle position. The angular tang is slipped beneath an undercut portion of the housing face and the other tang is forced into abutment with the opposite edge of the slot. With the locking plate in place, the operating handle is constrained against movement toward the other end of the slot by the transverse band, which extends transversely across the center of the slot.

The locking plate is frictionally held in position by the engagement of the tangs with opposite ends of the slot so that it will not become dislodged due to vibration or jarring of the housing. However, despite the fact that it is firmly held in place, the locking plate can readily be removed to permit actuation of the operating handle. Should it be desired to shift the operating handle to actuate the switch or reset the circuit breaker, the locking plate can readily be removed, without the aid of tools, by prying it outwardly. After the handle has been shifted to its new position it can be locked in place by reinserting the tangs of the plate in the slot and passing the handle through the proper aperture in the plate.

One of the principal advantages of the present locking plate is that it provides an extremely simple means for preventing inadvertent manipulation of a circuit breaker, switch, or the like. The locking plate can readily be inserted and removed from engagement with the switch without the use of any tools. It requires only a few seconds to remove a locking plate, shift the operating handle of the device, and secure the handle in its new position by replacing the locking plate.

A further advantage of the present locking plate is that it is extremely economical to produce. The plate itself can readily be stamped from any thin gauge metal or can easily be molded from a plastic material such as Lucite. In addition, the use of a locking plate does not require any alteration of the circuit breaker housing, nor does it require any other members to hold it in position.

Another advantage of the present locking plate is that it is extremely compact and consequently, even if several circuit breakers are ganged together in side by side relationship, a locking plate mounted on one circuit braeker will not in any way interfere with the manipulation of adjacent devices.

An additional advantage of the present locking plate is that it can also be used to render a circuit breaker relatively tamper-proof. When a locking plate is used for this purpose, the operating handle of the circuit breaker is provided with a transverse bore for receiving a small lock or similar element. The lock extends across the outer face of the locking plate so that the plate cannot

be withdrawn and the handle cannot be shifted until the lock is removed.

These and other advantages will be more readily apparent from a consideration of the following detailed description of the drawings illustrating a preferred embodiment of the invention.

In the drawings:

Figure 1 is a front elevational view of a locking plate constructed in accordance with the present invention.

Figure 2 is a side elevational view of the locking plate.

Figure 3 is a front elevational view of a circuit breaker with a locking plate inserted over the slot, the switch handle being shown in the "off" position.

Figure 4 is a side elevational view of the switch shown in Figure 3, the switch housing being partially broken away to show the manner in which the locking plate is held in the slot.

Figure 5 is a front elevational view of a switch and locking plate, showing the handle in the "on" position.

Figure 1 shows a locking plate 10 which is particularly adapted for use with circuit controlling and protecting devices such as the combination circuit breaker and switch of the type shown in Figure 4. As explained above however, the utility of the stop plate is not limited to use in connection with combination switches and circuit breakers, but rather it can also be used with plain toggle action switches and ordinary circuit breakers of the type having a small operating handle. The manner in which a stop plate is used with such devices will be readily apparent from the following detailed description of the use of the plate with a combination switch and circuit breaker.

As shown in Figure 4, one form of circuit breaker and switch 11 with which a locking plate of this invention can be used, comprises a housing 12 constructed of a molded insulator material including side walls 13 and a front face 14. The front face is configurated to form an elongated slot 16 through which an operating handle 17 extends from the interior of the housing to its exterior.

The circuit breaker and switch mechanism may be of any desired construction; one suitable form in common use comprises a pair of switch contacts, a toggle mechanism for manually opening and closing the contacts, a thermally responsive element for automatically opening the contacts in response to a prolonged moderate circuit overload and electromagnetic means for automatically opening the contacts in response to a sudden heavy overload. Since this mechanism constitutes no part of the present invention it will not be described in detail.

The operating handle 17 functions to manually open and close the switch contacts and in addition provides a means for resetting the contacts after they have been opened by either the magnetic or thermal circuit breaking elements. In the embodiment shown, when handle 17 is disposed adjacent to end 18 of the slot, the switch contacts are held open and when the handle is disposed adjacent to end 20 of the slot, the switch contacts are closed and are under control of the circuit breaking mechanism. Once switch handle 17 has been moved to the "on" position 20, it remains stationary until it is manually shifted; the circuit breaker mechanism can be tripped by an overload to open the circuit without shifting the handle.

As shown in Figures 1 and 2, one preferred form of locking plate 10 is stamped from a thin sheet of metal or is molded of a plastic material such as Lucite. The locking plate is of generally rectangular shape and is configurated to form two handle receiving apertures 21 and 22, which are separated from one another by means of a transverse band 23. Each of the apertures 21 and 22 is slightly larger than the cross sectional area of operating handle 17 so that the operating handle

may readily be inserted through either of the apertures. The plate is preferably slightly wider than slot 16 and of substantially the same length as the slot. Apertures 21 and 22 are disposed for registry with opposite ends 18 and 20 of the slot to front face 14 of the housing when plate 10 is placed over the slot.

The plate is also configurated to form members such as tangs 24 and 25 for frictionally engaging the edges of the slot to hold the locking plate in position as shown in Figures 3, 4 and 5. In the embodiment shown, tang 24 is formed on one end of the plate and is bent at an angle with the plate as best shown in Figure 2. The second tang 25 is formed adjacent to the remote edge 26 of the opposite aperture 21. This tang is bent substantially perpendicular to the main portion of the plate on the same side thereof as tang 24.

In order to lock operating handle 17 in either its "on" position 20 or its "off" position 18, the handle is first shifted to the desired end of the slot and plate 10 is inserted over the slot with the handle passing through either aperture 21 or 22, whichever is in registry with the desired handle position. Tang 24 is slipped beneath undercut portion 27 of front face 14, while tang 25 is cammed by sloping face 28 at the opposite end of the slot into engagement with edge 30 thereof. The tangs form a relatively tight fit so that the plate is held firmly in place. When the plate is thus positioned, operating handle 17 is restrained against movement toward the opposite end of the slot by means of band 23, which extends transversely across the central portion of the slot and is disposed for engagement with the advanced side of the handle. Thus, handle 17 can be effectively locked in either the "off" position, as shown in Figure 3, or the "on" position as shown in Figure 5.

If it should be desired to shift handle 17, locking plate can readily be removed by prying it upwardly adjacent to tang 25. This can be done rapidly without employing any tools. After plate 10 has been removed, the operating handle can be shifted to its new position and again secured in place by means of locking plate 10. To do this, the locking plate is placed over the slot, handle 17 projecting through the aperture in the locking plate in registry with the handle position. Tang 24 is inserted beneath undercut portion 27 and tang 25 is forced against edge 30 as explained above.

This construction is particularly advantageous for use with combination circuit breakers and switches of the type in which operating handle 17 is not shifted by the operation of the circuit breaking mechanism. Thus the handle may be locked in either the "on" or "off" position without impairing the function of the circuit breaker. Moreover, as shown in Figure 5, circuit breakers of this type are often provided with a trip indicator 31 for indicating when the circuit breaker mechanism has been actuated and the circuit is open. As shown in Figure 5, this indicator is in the form of a lug, which is projected outwardly toward the tip of the handle whenever the circuit breaker mechanism has been actuated. Locking plate 10 in no way interferes with the operation of such a trip indicator and the position of the indicator is readily observable through aperture 22, which is in registry with the indicator when the operating handle is in the "on" position.

From the foregoing discussion of the general principles of my invention and the detailed description of a preferred embodiment, those skilled in the art will readily comprehend the various modifications to which my invention is susceptible. For example, if it is desired to render a circuit breaker or other device tamper resistant, handle 17 can be bored as at 32 to provide an opening for receiving a lock or other transverse element (not shown). The lock extends across the face of plate 10 to prevent withdrawal of the plate from

engagement with the slot and operating handle unless the lock is first removed from handle 17.

Also, while in the preferred embodiment locking plate **10** is provided with two spaced apertures, it is contemplated that in a modified embodiment one of the apertures can be omitted. In this modification the locking plate engages the operating handle and is mounted over the slot by means of tangs in the same manner as in the preferred embodiment. However, the plate must be reversed end for end when it is desired to lock the operating handle in a position opposite to that in which it was previously locked. When a single aperture plate is to be used in conjunction with a circuit breaker having a trip indicator, the plate is preferably formed from a clear phenol resin material such as Lucite so that the position of the trip indicator can readily be observed when the operating handle is locked in the "on" position.

Having described my invention I claim:

1. A locking plate for use with an electric device having a housing including a front face configurated to form an elongated slot, said electrical device including an operating handle shiftable within said slot and being adapted for movement to opposite ends thereof, and an indicator lug adapted for outward movement when the breaker is tripped, said locking plate comprising a flat plate member configurated to form a plurality of spaced tangs, said tangs being disposed at an angle relative to said plate for engagement with the opposite ends of said slot, said plate also being configurated to form two apertures, each of said apertures being adapted to receive said handle, said apertures being spaced relative to said tangs so that when the tangs are in engagement with the slot said apertures are disposed in registry with the endwise portions of the slot, said apertures being separated by a member extending transversely across said slot for engagement with said handle to prevent movement thereof from one end of the slot to the other, the aperture disposed on the opposite side of said member from the aperture receiving said handle being adapted to provide a view of said indicator lug.

2. The combination of an electric circuit breaker and switch comprising a housing including a front face configurated to form an elongated slot, switch contacts disposed within said housing, means for opening said contacts in response to predetermined circuit overload conditions, an operating handle for manually opening and closing said contacts and resetting said contact opening means, said operating handle being shiftable within said slot and being adapted for movement to opposite ends thereof, an indicator lug adapted to be projected outwardly when the circuit breaker is tripped, and a locking plate, said locking plate comprising a flat plate member configurated to form a plurality of spaced tangs, said tangs being disposed at an angle relative to said plate for engagement with the opposite ends of said slot, said plate also being configurated to form two apertures, each of said apertures being adapted to receive said handle, said apertures being spaced relative to said tangs so that when the tangs are in enagement with the slot said apertures are disposed in registry with the endwise portions of the slot, said apertures being separated by a member extending transversely across said slot for engagement with said handle to prevent movement thereof from one end of the slot to the other, said indicator lug being visible through the aperture in the locking plate on the side of said member remote from the aperture receiving said handle.

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