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P. M. CHRISTENSEN

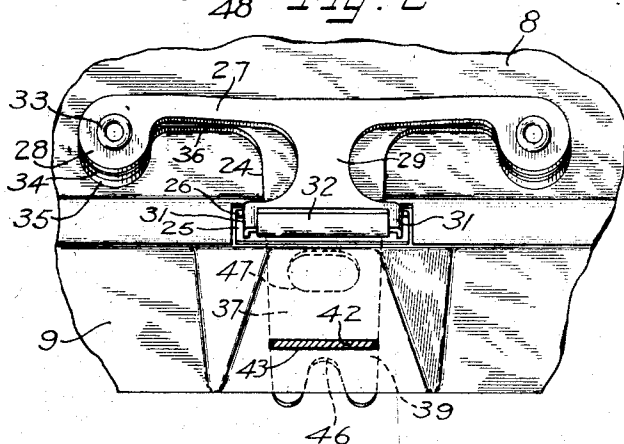
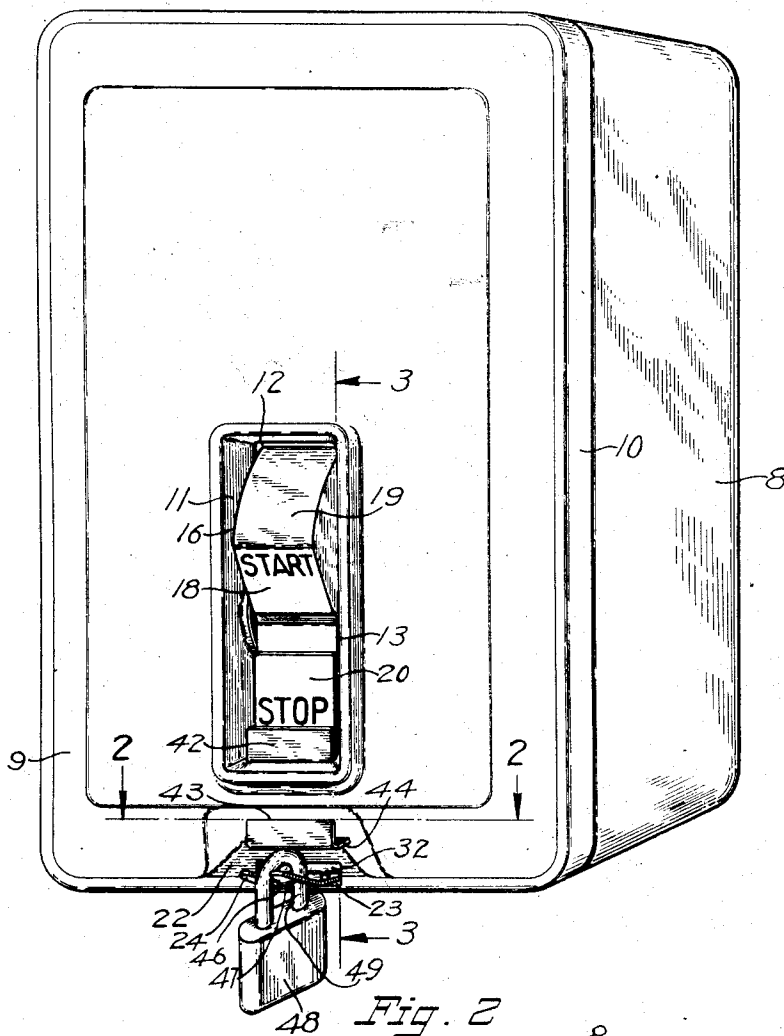
2,300,102

COVER INTERLOCK FOR ELECTRICAL CASINGS

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2 Sheets-Sheet 1

Fig. 1



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COVER INTERLOCK FOR ELECTRICAL CASINGS

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The present invention relates to cover interlocks for casings of electrical apparatus, and the general object of the invention is to provide latching means for the cover or closure of a casing containing electrical apparatus to normally maintain the cover in closed position on the casing but operable manually to permit opening or removal of the cover, together with means engageable with the operating member of circuit controlling mechanism when in its "on" position to prevent movement of the latching means to release the cover.

More specifically, the invention resides in the provision of the aforesaid latching means comprising elements on the cover and casing which automatically interengage to latch the cover in closed position on the casing when the cover is moved into closed position regardless of the position of the operating member of the circuit controlling mechanism; and a latch releasing member mounted on the casing, and manually operable to release said elements from latching engagement to permit opening or removal of the cover when desired.

Another feature of the invention resides in the provision of means constructed and arranged to positively prevent the latch releasing member from effecting disengagement of the latching elements when the operating member of the circuit controlling mechanism is in "on" position by presenting an obstruction between the operating member and latch releasing means locking releasing movement of the latch releasing member but permitting movement of the operating member to "off" position.

Another feature of the invention resides in an arrangement whereby the cover of the casing can be padlocked against removal from the casing in two different ways, namely, to permit free operation of the operating member of the circuit controlling member, and also to maintain the operating member against movement from its "off" position. This is accomplished by constructing the latch releasing member to receive the padlock in different positions relative to the means controlling the operation of the latch releasing means.

The foregoing and other objects and advantages of the invention will become more apparent and will be pointed out in detail during the course of the following description of the accompanying drawings.

In the accompanying drawings I have shown the now preferred embodiment of the invention, 55

but it will be understood that the drawings are intended for illustrative purposes only and are not to be construed as defining or limiting the scope of the invention, the claims forming a part of this specification being relied upon for that purpose.

In the drawings:

Fig. 1 is a perspective view of an electric motor starter casing and cover with the operating member for the circuit controlling mechanism held against movement from "off" position in accordance with the present invention, and the cover latch release blocked against movement by a padlock also preventing removal of the cover.

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary sectional view taken on the line 3—3 of Fig. 1;

Fig. 4 is a view similar to Fig. 3 showing the padlock engaged with the cover latch release so as to permit operation of the operating member for the circuit controlling mechanism, but preventing removal of the casing cover;

Fig. 5 is a view similar to Fig. 3 with the padlock removed and the cover latch release blocked against releasing movement by the operating member for the circuit controlling mechanism which is in "on" position; and

Fig. 6 is a view similar to Fig. 5 showing the operating member for the circuit controlling mechanism in "off" position, and the cover latch release disengaging the latching elements.

Referring to Fig. 1 of the drawings, the numeral 8 designates the casing of an electric motor starter, in connection with which the invention is illustrated, and 9 is the cover which has a flange 10 fitting the reduced upper ends of the walls of the casing. The cover may be movable to open and closed positions on the casing or completely removable. A depression 11 is formed in the top of the cover and is open at its bottom as indicated by the numeral 12 to receive the switch operating handle 13 to manually operate a suitable electric switch mechanism, not shown since it forms no part of the present invention. The handle or switch operating member 13 is pivotally mounted on a pin 14 supported by up- 50 rights 15 which may conveniently be the sides of the housing for the switch mechanism. The handle or switch operating member 13 is a block of insulating material provided with "start" and "stop" finger engageable projections 16 and 17, respectively. The projection 16 has a flat sur-

face 18 and a curved surface 19, and the projection 17 has similar surfaces 20 and 21. As will be noted in Figs. 3-6 inclusive, the said surfaces 18 and 19, 20 and 21 on each of the projections are arranged at substantially right angles to each other, while the flat surfaces 18 and 20 are arranged at an angle of substantially 135° with respect to each other so that when pressure is applied to surface 20 sufficient to move the switch to "off" position the said surface 20 is disposed in the plane of the cover and base of the casing and just above opening 12 (Figs. 3, 4 and 6). However, when pressure is applied to surface 18 sufficient to move the switch to "on" position, the surfaces 20 and 21 are both substantially above the opening 12 and at angles intersecting the plane of the cover. The cover can be established in closed position on the casing regardless of the position of the handle 13.

The lower end of the cover is indented above the flange 10 to provide a recess 22, and the part of the cover at the base of the recess is provided with an opening 23 through which extends the arm 24 of the cover latch releasing means, hereinafter described in detail. The arm 24 is movable in said opening 23 and recess 22.

To releasably hold the cover in closed position on the casing, a keeper in the nature of a rigid metal plate or strip 25 is suitably secured to the inner surface of the lower flange 10 of the cover. The plate 25 is cut away along its lower edge a distance slightly greater than the length of the opening 23, and the ends of the strip are bent inwardly to form lugs 26 beyond the ends of the opening 23. The latch to engage the keeper is mounted on the interior of the casing and comprises a resilient but strong metal plate formed with relatively long narrow arms 27 terminating in enlarged ends 28. Projecting forwardly on the latch plate is a centrally located arm 29, having its corners cut out so that the lateral ends may be bent outwardly in alignment with the lugs 26 of the keeper to provide ears 31, while the central portion of the end of the arm 29 is bent inwardly forming a lip 32. The latch plate is rockably mounted on the lower casing wall in operative position to the latch releasing means by rivets 33 which extend therethrough and through the ends 34 of the latch releasing means, the casing wall, and buttons or washers 35 having curved surfaces disposed against the casing wall.

The latch releasing means comprises a strong but resilient metal plate having elongated narrow arms 36 terminating in the enlarged ends 34 already mentioned, and a relatively long wide central arm 37. The arms 27 of the latch overlie the arms 36 of the latch release, and both sets of arms are maintained in spaced relation to the casing wall by the buttons or washers 35, whereby they are movable relative to the casing wall. The arm 37 is offset at 38 just above the top of the casing wall, and the outer end 39 is inclined slightly upward to engage and extend through opening 23 in the cover when the cover is in closed position. It will be noted that the ears 31 have their outer edges beveled as indicated at 40 providing inclined surfaces along which the lugs 26 move when the cover is being closed. The construction, arrangement and relative proportions of the lugs 26 and ears 31 is such that a cam action results from movement of the cover relative to the casing, the lugs 26 moving the resiliently mounted latch inward until they reach the inner ends of the inclined

surfaces 40 at which time the latch, due to its resiliency, springs forwardly and the lugs 26 are engaged under the ears 31, as shown in Fig. 5, to detachably hold the cover on the casing.

Obviously, the latching and releasing mechanism thus far described would be sufficient to detachably hold a cover on a casing, but the invention, as previously stated, also provides means to positively prevent the latch releasing means from effecting disengagement of the latching elements when the handle of the switch is in position maintaining the switch in "on" position. Furthermore, the invention provides means in connection with the releasing mechanism and handle of the switch for positively locking the handle in "off" position from which it cannot be moved to "on" position until the positive locking means has been removed to permit operation of the latching mechanism.

To the attainment of the aforesaid locking features in connection with the releasing mechanism I provide a slidable plate 42 which is mounted through openings in the lower wall defining a part of the depression 11 and the wall 43 at the top of the recess 22. The outer or lower end of the plate 42 is bent inwardly to form a lip 44 engageable by the upper portion 39 of the arm of the releasing member. Intermediate its ends the plate 42 has a tongue 45 punched-up to constitute a stop engageable with the wall 43 when the cover is removed to maintain the plate 42 in its established operating position on the cover. It will be noted that the plate 42 is arranged between the handle 13 and the outer end 39 of the operating arm of the latch releasing member and in alignment with both. Furthermore, the length of the plate 42 is so proportioned relative to the distance between the surface 21 of the handle and the outer end 39 of the latch releasing arm, and proportionate to the length of the lugs 26 relative to the ears 31 as to engage the surface 21 when the handle is in the "on" position of Fig. 5, and block releasing movement of the arm of the releasing member to prevent disengagement of the latching elements 26 and 31 so long as the handle remains in the "on" position. This arrangement effectively provides for safety, since the operator must move the handle 13 to the "off" position of Fig. 6 before the releasing member may be positioned inwardly or upwardly to move the plate 42 partially over the surface 20 of the handle to effect disengagement of the latching elements 26 and 31 as clearly illustrated in Fig. 6.

Referring again to Figs. 1 and 2, it will be noted that the upper portion 39 of the arm 24 of the releasing member is provided in its top with a notch 46 of sufficient depth and width to receive the shackle of a standard padlock. It will be also noted that this notch is located above the plane of the plate 42, and that the portion 39 of the arm 24 is provided with an opening 47 adjacent the top of the flange 10 of the cover and below the plane of the plate 42. The purpose for which the notch 46 and opening 47 are provided and so located is best illustrated in Figs. 3 and 4. Referring to Fig. 3, a padlock 48 is shown applied to the releasing arm 37 with its shackle 49 disposed in the notch 46 and through the opening 47 with the padlock in vertical position. The padlock may be so applied to the releasing member only when the switch is in "off" position at which time the surface 20 is parallel to the opening 12 and slightly therebelow so that the end of the plate 42 can overlie the end of the surface

20. With the parts in this position and the padlock applied as shown in Fig. 3 the end of the shackle 49 is disposed between the upper portion 39 of the arm 37 of the latch releasing member and constitutes a positive barrier to releasing movement of the arm 37 relative to the latching elements 26 and 31. Thus the switch may be positively locked in "off" position and the cover also positively locked on the casing against opening movement relative thereto until the padlock has been removed. When the padlock is removed the plate 42 will assume the position of Fig. 4, that is, drop clear of the handle 13 so that the switch may be moved to "on" position, at which time the parts will be established in the relative position of Fig. 5 with the surface 21 of the handle presenting a barrier to movement of the plate 42 and consequently preventing releasing movement of the arm 37 relative to the latching elements.

In Fig. 4 the padlock is shown applied to the releasing member with the shackle 49 engaged only through the opening 47. In this position the shackle is arranged horizontally with respect to the cover and casing and is disposed below the plate 42 and the lip 44 serving only to prevent removal of the cover from the casing until the padlock has been removed. Obviously, under the arrangement of Fig. 4 the arm 37 of the latch releasing member can be freely operated since the opening 47 permits the arm 37 and particularly the upper portion 39 thereof to have sliding movement along the shackle so that the handle 13 may be freely operated to establish it in "on" or "off" positions and yet the cover is positively locked on the casing by the padlock.

What I claim is:

1. In an electric motor starter including a casing, a cover for the casing, and a manually movable operating member for the circuit controlling mechanism of the motor starter operable from the exterior of the cover, the combination of elements on the interior of the cover and casing interengageable when the cover is moved to closed position to latch the cover in closed position, means on the casing manually operable from the exterior thereof to unlatch said elements to permit opening of the cover, and means movably mounted on the cover between the operating member for the circuit controlling mechanism and said means for unlatching the cover when the operating member is in "on" position and constituting a barrier to operation of the means for unlatching the cover until the operating member is moved to "off" position.

2. In an electric motor starter including a casing, a cover for the casing, and a manually movable operating member for the circuit controlling mechanism of the motor starter operable from the exterior of the cover, said cover being closable on the casing regardless of the position of the operating member, the combination of elements on the interior of the cover and casing interengageable when the cover is moved to closed position to latch the cover in closed position, means on the casing manually operable from the exterior thereof to unlatch said elements to permit opening of the cover, and means movably mounted on the cover between the operating member for the circuit controlling mechanism and said means for unlatching the cover when the operating member is in "on" position and constituting a barrier to operation of the means for unlatching the cover until the operating member is moved to "off" position.

3. In an electric motor starter including a casing, a cover for the casing, and a manually movable operating member for the circuit controlling mechanism of the motor starter operable from the exterior of the cover, said cover being closable on the casing regardless of the position of the operating member, the combination of latching elements on the cover and casing automatically engageable to latch the cover on the casing when it is established in closed position, means on the casing independent of the latching elements operable to disengage them from latching relation to permit opening movement of the cover, and a slide disposed in the path of movement of said means and engageable with said operating member when in "on" position whereby said means is inoperative to disengage said latching elements until said operating member is moved to "off" position.

4. In an electric motor starter including a casing, a cover for the casing, and a manually movable operating member for the circuit controlling mechanism of the motor starter operable from the exterior of the cover, said cover being closable on the casing regardless of the position of the operating member, the combination of latching elements on the cover and casing automatically engageable to latch the cover on the casing when it is established in closed position, means on the casing independent of the latching elements operable to disengage them from latching relation to permit removal of the cover, and a slide disposed in the path of movement of said means and engageable with said operating member when in "on" position whereby said means is inoperative to disengage said latching elements until said operating member is moved to "off" position, said slide being also positionable to engage with said operating member when in "off" position to prevent movement thereof to "on" position, and means retained in position between the latch releasing means and slide to hold said slide in said second position.

5. A cover interlock for an electrical device including a casing and a cover for the casing comprising, a resiliently mounted latch in the casing, a keeper in the cover engageable with the latch to hold the cover in closed position, and a releasing member mounted on the casing adjacent the latch and extending through the cover and positioned for actuation by pressure on its portion located outside of the cover to force said latch from engagement with the keeper whereby the cover may be opened.

6. A cover interlock for an electrical device including a casing and a cover for the casing and a manually operable switch handle operable from the exterior of the cover comprising, a resiliently mounted latch in the casing, a keeper in the cover engageable with the latch to hold the cover in closed position, and a releasing member mounted on the casing adjacent the latch and extending through the cover and positioned for actuation by pressure on its portion located outside of the cover to force said latch from engagement with the keeper whereby the cover may be opened, and means between the switch handle and releasing means blocking movement of the releasing member when the switch handle is in "on" position.

7. A cover interlock for an electrical device including a casing and a cover for the casing and a manually operable switch handle operable from the exterior of the cover comprising, a resiliently mounted latch in the casing, a keeper in

the cover engageable with the latch to hold the cover in closed position, and a releasing member mounted on the casing adjacent the latch and extending through the cover and positioned for actuation by pressure on its portion located outside of the cover to force said latch from engagement with the keeper whereby the cover may be opened, and means between the switch handle and releasing means blocking movement of the releasing member when the switch handle is in "on" position, said means being also positionable with respect to the switch handle to prevent movement thereof from "off" to "on" position so long as the cover is latched on the casing.

8. A cover interlock for an electrical device including a casing, a cover for the casing, and a manually operable switch handle operable from the exterior of the cover, comprising elements on the casing and cover interengageable upon closing of the cover to latch it on the casing, a releasing member independent of said elements mounted on the casing and extending through the cover operable to disengage said elements and unlatch the cover, means movably mounted in said cover between said switch handle and releasing member effective in one position to prevent operation of said releasing member when the switch handle is in "on" position and in another position to prevent movement of the switch handle from "off" to "on" position, said releasing means being adapted to receive and support a padlock in selected positions to prevent removal of the cover from the casing, in one position the padlock maintaining said means against movement from its position in which it prevents movement of the switch handle from "off" to "on" position.

9. A cover interlock for an electrical device including a casing and a flanged cover for the casing, comprising a resiliently mounted latch in the casing adjacent the top of one of the casing walls, a keeper in the cover on said flange and engageable by said latch when the cover is moved into closed position to hold it on the casing, an opening in the cover above said keeper, a releasing member extending through said opening in the cover and located between the casing wall and the resiliently mounted latch, said releasing member being movable with said latch when pressure is exerted against its end extending through the opening in the cover to disengage the latch and keeper to permit opening of the cover.

10. A cover interlock for an electrical device including a casing and a flanged cover for the casing, comprising a resiliently mounted latch in the casing adjacent the top of one of the casing walls, a keeper in the cover on said flange and engageable by said latch when the cover is moved into closed position to hold it on the casing, an opening in the cover above said keeper, a releasing member extending through said opening in the cover and located between the casing wall and the resiliently mounted latch, said releasing member being movable with said latch when pressure is exerted against its end extending through the opening in the cover to disengage the latch and keeper to permit opening of the cover, a manually operable switch handle operable

through the cover, and means engaging said switch handle in its "on" position and blocking operation of the releasing member until the switch handle is moved to "off" position.

11. A cover interlock for an electrical device including a casing and a flanged cover for the casing, comprising a resiliently mounted latch in the casing adjacent the top of one of the casing walls, a keeper in the cover on said flange and engageable by said latch when the cover is moved into closed position to hold it on the casing, an opening in the cover above said keeper, a releasing member extending through said opening in the cover and located between the casing wall and the resiliently mounted latch, said releasing member being movable with said latch when pressure is exerted against its end extending through the opening in the cover to disengage the latch and keeper to permit opening of the cover, a manually operable switch handle operable through the cover, and a blocking device slidably mounted in the cover between the releasing member and switch handle arranged to prevent movement of the releasing member while the switch handle is in "on" position.

12. A cover interlock for an electrical device including a casing, a cover for the casing, and a manually operable switch handle located in an opening in the cover for oscillating movement, a latching member on the casing, a keeper on the cover engageable with the latching member when the cover is in closed position to hold the cover in closed position, a releasing member mounted on the casing in spaced relation to the switch handle and movable toward the switch handle to effect disengagement of the latching member and keeper to permit removal of the cover, a slide having guided movement in the cover between the switch handle and the releasing member, said switch handle having a finger engageable element with converging surfaces, one of said surfaces being arranged in a plane common to but spaced from the plane in which said slide moves when the switch handle is in "off" position so that the slide may be moved thereover, and the other surface intersecting said planes when the switch handle is in "on" position to block movement of the slide and releasing member.

13. The structure of claim 12 wherein the releasing member has an operating arm extending through the cover of the casing provided with an opening below the slide to receive the shackle of a padlock to prevent removal of the cover but permitting operation of the releasing member, and is provided also with a notch above the slide whereby the shackle of the padlock may be engaged in said notch and through said opening to locate it between the slide and releasing member preventing removal of the cover and to maintain the switch handle in "off" position by maintaining said slide over said one surface of the switch handle blocking oscillation thereof.

14. The structure of claim 12 wherein the releasing member is adapted to receive the shackle of a padlock in two different positions relative to the slide, in one of said positions the slide being freely movable and in the other being held in locking relation to the switch handle preventing oscillation thereof.

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CERTIFICATE OF CORRECTION.

Patent No. 2,300,102.

October 27, 1942.

PAUL M. CHRISTENSEN.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, first column, line 32, for "locking" read --blocking--; page 3, second column, lines 47 and 60, claims 5 and 6, for "in the" read --inside the--; page 4, first column, line 36, claim 8, for "which its" read --which it--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 2nd day of February, A. D. 1943.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.

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