ABSTRACT

An operating handle is provided for use with a switch apparatus enclosed in an enclosure with a door having an aperture. The handle is securable to the door and the switch apparatus has a control shaft extending through the aperture and revolvable to set the switch apparatus between on and off positions. The shaft has a transverse pin at its end portion extending through the aperture. The handle has a housing and a locking lever movably mounted in the housing between locking and non-locking positions for blocking a swiveling of the operating handle. The handle also has a latching plate movable in the housing and having an opening penetrable by the end portion of the shaft when the switch apparatus is in the off position. A control member is connected between the lever and the plate for displacing the plate in response to a movement of the lever to the locking position, the plate being displaced transverse of the end portion of the shaft to prevent the latter from being withdrawable through the opening. There is also a spring connected between the housing and the plate for likewise displacing the plate transverse of the end portion to prevent the latter from being withdrawable through the opening when the switch is in the on position. In addition, a stop securable to the door is provided for holding the plate when the switch apparatus is in the off position, the plate being held by the stop so that the opening is in alignment with the end portion of the shaft.

7 Claims, 11 Drawing Figures
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OPERATING HANDLE FOR USE WITH ENCLOSED SWITCHING APPARATUS

Our invention relates to an operating handle for enclosed switching apparatus. The operating handle is provided with a latching means between the fixedly positioned shaft of the switching apparatus and the operating handle secured to the door of the switch enclosure. Also provided are a check lever for blocking the swiveling action of the actuating handle, whereby a latching mechanism is disposed so as to be dependent upon the position of the switching apparatus and the position of the check lever.

Typified of the known operating handles of the above-mentioned type is the one taught in U.S. Pat. No. 2,950,363. In such operating handles there are a number of swively borne levers and slidably guided plungers, whereby the latching of the operating handle with the switching apparatus is achieved with jaw-shaped extensions provided on the levers. These extensions reach into an opening of the switching apparatus, the latter being configured as a flat metal portion. Aside from the fact that this kind of an arrangement of the switching apparatus shaft can only be poorly sealed, there is also the disadvantage that there must be provided a bearing and guidance of a relatively large number of detail parts in the operating handle.

It is an object of our invention to provide an operating handle that is of simpler construction compared to that of the known operating handle arrangements.

It is another object of our invention to provide an operating handle that affords improved sealing possibilities for the operating handle with respect to the enclosure of the switching apparatus.

As in the known operating handles, the operating handle according to the invention provides a latching of the operating handle with the switching apparatus in dependence upon a locking lever and the switching position of the switching apparatus. In addition, when the locking lever is actuated, a swiveling of the operating handle is precluded; this and the latching action are obtained in a simple manner with the handle of the invention.

The operating handle of the invention is intended for use with a switch apparatus enclosed in a door having an aperture. The handle is sealable to the door and the switch apparatus has a control shaft extending through the aperture and is releasable to set the switch apparatus between on and off positions. In addition, the shaft has a transverse pin at its end portion extending through the aperture.

According to a feature of the invention, a locking lever is movably mounted in the housing of the handle between locking and non-locking positions for blocking a swiveling of the operating handle. The latching plate is movable in the housing and has an opening penetrable by the end portion of the shaft when the switch apparatus is in the off position. In addition, a control member is connected between the lever and the plate for displacing the plate in response to a movement of the lever to the locking position, the plate being displaced transverse of the end portion of the shaft to prevent the latter from being withdrawable through the opening. Also provided are a spring connected between the housing and the plate as well as a stop that is sealable to the door of the switch enclosure. The spring likewise displaces the plate transverse to the end portion of the shaft to prevent the latter from being withdrawable through the opening in the plate when the switch is in the on position. The stop holds the plate when the switch apparatus is in the off position so that the opening in the plate is in alignment with the end portion of the shaft.

For using the locking lever for preventing the movement of the operation handle also when the door is opened, a simple possibility arises if the locking lever is provided with a pin defining a pivot axis about which the locking lever can rotate. Also, an additional spring acts on the locking lever so that the latter presses directly or indirectly against the end of the shaft of the switching apparatus.

The operating handle according to the invention can be produced in a simple manner when the locking lever is configured so as to define two arms extending in mutually opposite directions from the pivot axis. Also, a blocking plate connected to one of the arms is provided for blocking the lever at the on and off positions of the switch when the lever is in the locking position. The control member is connected to the other arm of the locking lever for the displacing the latching plate in response to rotation of the lever to the locking position.

The position dependent blocking plate can be used to block the operating handle when the door is open. The handle is provided with an abutment disposed outside of the region between the control member and the blocking plate, the abutment serving to stop the rotation of the lever when the locking lever is in the non-locking position. Also, respective stop openings are provided at the on and off position of the switching apparatus for receiving the blocking plate when the lever is in the locking position. In addition, the additional spring is arranged to act on the control member and is directly connected thereto so that the additional spring applies a force to the lever in the direction for urging the blocking plate into the openings when the lever is in the non-locking position.

In this way it is possible to construct an operational handle with only a single spring provided for the locking lever. If, as in the known arrangements of operating handles, the latching mechanism is to be made circumventable in the closed position of the switching apparatus, or more specifically, if the latching mechanism is to be configured so as to be releasable by means of a work tool so that the door of the enclosure containing the switch apparatus in the switch-on position can be opened by a workman, then it is advantageous to achieve this effect by providing the operating handle according to the invention with an opening in the housing which communicates with the latching plate. The opening should be dimensioned so as to be penetrable by a work tool for manually moving the latching plate when the switch apparatus is in the on position, so that the opening of the latching plate is brought into alignment with the end portion of the shaft.

To prevent a circumvention of the latching mechanism when the switch apparatus is locked, it is possible without any additional cost, to select the point of application of the spring on the latching plate so as to be between the point where the latching plate connects with the control member and a location on the latching plate where the rotation of the plate is limited by abutting against an abutting means, so that one end of the latching plate lies against the abutting or blocking means when the control member has moved the latching plate in response to a movement by the locking lever into the locking position.

An important simplification of the assembly of operating handle according to the invention is provided when the blocking plate and control member are each provided with openings for connection to the respective arms of the locking lever. Also to facilitate a simplification of assembly, it is advantageous to provide the handle housing with a bottom opening through which are insertable the locking lever, control member, blocking plate, latching plate and the springs. A bearing means is provided for closing the bottom opening and for rendering the handle sealable to the door of the enclosure of the switch apparatus.

The invention will now be described with reference to the drawings wherein:

FIG. 1 is an elevation view, partially in section, of the operating handle according to the invention depicting the position of the handle parts when the switch apparatus to which the handle is connectable is in the off position. The locking lever of the handle is shown in the unlocked position.

FIG. 2 is a full section view of the operating handle illustrated in FIG. 1 taken at line II—II;

FIG. 3 is a sectional view of the operating handle according to FIG. 1 taken at line III—III;

FIG. 4 is a plan view of the operating handle illustrated in FIG. 1;
FIG. 5 illustrates a position of the latching plate of the handle according to the invention when the switching apparatus is in the on position and illustrates the latched condition obtaining between the shaft of the switch apparatus and the operating handle;

FIG. 6 illustrates blocking openings which are provided in a door of the enclosure housing the switching apparatus, the operating handle of the invention being secured to the door;

FIG. 7 is an elevation view, partially in section, of the operating handle wherein the position of the handle corresponds to the off position of the switching apparatus. The locking lever is shown in the locked position;

FIG. 8 illustrates the position of the latching plate corresponding to the position of the operating handle and the locking lever as shown in FIG. 7;

FIG. 9 illustrates the position of the latching plate when the switch apparatus is in the on position and the locking lever is in its locking position, so that the lock cannot be opened with a tool such as the screwdriver illustrated.

FIG. 10 illustrates a position of the locking lever and associated parts when the door of the switch apparatus enclosure is in the open position; and

FIG. 11 illustrates an exploded view of the operating handle in perspective illustration.

The operating handle according to the invention comprises a housing part 1 in which a locking lever 2 is movably borne by a bolt 3. The locking lever 2 is operationally joined with a blocking plate 4 as well as a control slider 5. The control slider 5 actuates a latching plate 6 that locks the operating handle with the end of the shaft 7 of the switch apparatus. For this purpose, a cross rod 8 is provided in the end of the shaft 7. The operating handle is secured to a plate 9 by means of a bearing portion 10. The plate 9 likewise can constitute part of the door of an enclosure that houses the switch apparatus. The switch apparatus actuated by the illustrated embodiment of the operating handle is not illustrated.

One end of a spring 11 holds the control slider 5 and the other end of the spring 11 lies in a recess of the housing portion 1. An additional spring 12 likewise lies on the housing portion 1 and is tangentially joined with its other end to the latching plate 6. The configuration of the control opening 13 of the control slider 5 is seen in FIG. 3. An extension 14 of the latching plate 6 extends into the control opening 13 to engage the latching plate 6 movable or swivelable via this extension. The control opening 13 performs its functions when the locking lever 2 is pulled up from the housing portion 1 of the operating handle. The blocking plate 4 is borne in a manner such that an appendage 15 of the latching plate 6 lies against the blocking plate 4. This appendage extends out from the plane of the plate portion of the latching plate 6, so that in the off position of the switch apparatus, the plate 6 lies against a stop 16. The corresponding position of the operating handle is seen in FIG. 4. In this way, the latching plate 6 is held against the force of the spring 12 in the unlocked position.

The shaft 7 is provided with the cross rod 8 and can be pulled out from the latching plate 6, because the corresponding opening 17 is free, that is, the latching mechanism between the shaft 7 and the operating handle is not operational in the off position when the locking lever 2 is not actuated. However, if the operating handle is turned 90° as shown in FIG. 5, the appendage 15 of the latching plate 6 moves away from the stop 16, so that a swiveling of the latching plate 6 about the extension 14 is caused by spring 12. The cross rod 8 is thereby disposed behind the latching plate 6, so that it is no longer possible to open the door. As long as the locking lever 2 is not actuated, a screwdriver or similar tool is insertable via the opening 18 in the housing 1 of the actuating handle. In this manner the screwdriver can be brought into contact with the appendage 15 of the latching plate 6, so that the latter can be positioned relative to the shaft 7 as shown in FIG. 4.

In the closed position of the locking lever 2, the latter or more precisely, the opening 19 therein, is exposed by project-
2. An operating handle according to claim 1, said locking lever having a pin movably mounted in said housing and defining a pivot axis for rotating said lever thereabout between said locking and non-locking positions, and an additional spring acting on said locking lever for pressing said lever against the end of said shaft at the region of said pivot axis.

3. An operating handle according to claim 2, said locking lever defining two arms extending in mutually opposite directions from said pivot axis, a blocking plate connected to one of said arms for engaging said blocking means for holding said lever at said on and off positions of said switch apparatus when said lever is in said locking position, said control member being connected to the other one of said arms for displacing said plate in response to a rotation of said lever to said locking position.

4. An operating handle according to claim 3, comprising abutment means disposed outside of the region intermediate said control member and said blocking plate for stopping the rotation of said lever when said locking lever is in said non-locking position, and said blocking means including receiving means for receiving said blocking plate when said lever is in said locking position, said additional spring acting on said control member and being connected thereto so that said additional spring applies a force to said lever in a direction for urging said blocking plate into said receiving means when said lever is in said non-locking position.

5. An operating handle according to claim 1, said housing having an opening communicating with said latching plate, said opening being penetrable by a tool for manually moving said latching plate when said switch apparatus is in said on position, so that said opening of the latter is brought into alignment with said transverse pin of the end portion of said shaft.

6. An operating handle according to claim 3, said blocking plate having an opening, said one arm of said lever penetrating said opening of said blocking plate for holding the latter, said control member having an opening, said other one of said arms of said lever penetrating said opening of said control member for holding the latter, said housing having a bottom opening through which said lever, said control member, said blocking plate, said latching plate and said springs are insertable into the interior of said housing, and bearing means for closing said bottom opening and with which said handle is securable to the door of the enclosure of said switch apparatus.

7. An operating handle according to claim 1, said control member having an elongated opening of which one portion is linear and the remaining portion is non-linear, said latching plate having an extension penetrating said elongated opening to connect said latching plate with said control member, said extension being in said linear portion when said lever is in said non-locking position and being moved to said non-linear portion when said lever is moved to said locking position.

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