Feb. 22, 1955 W. A. DE SMIDT 2,702,845

HOUSING FOR MANUALLY ACTUATED SWITCHES

Filed May 24, 1951

2 Sheets-Sheet 1

Fig. 1

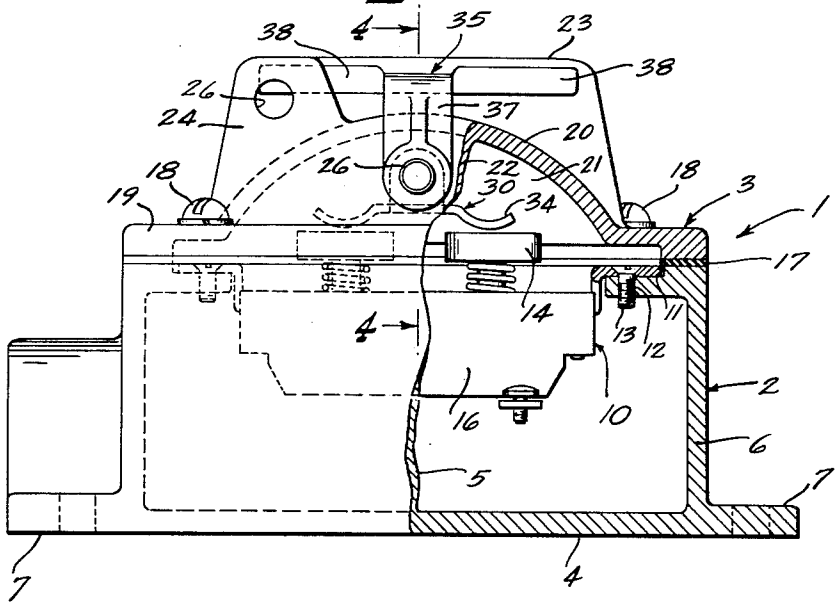
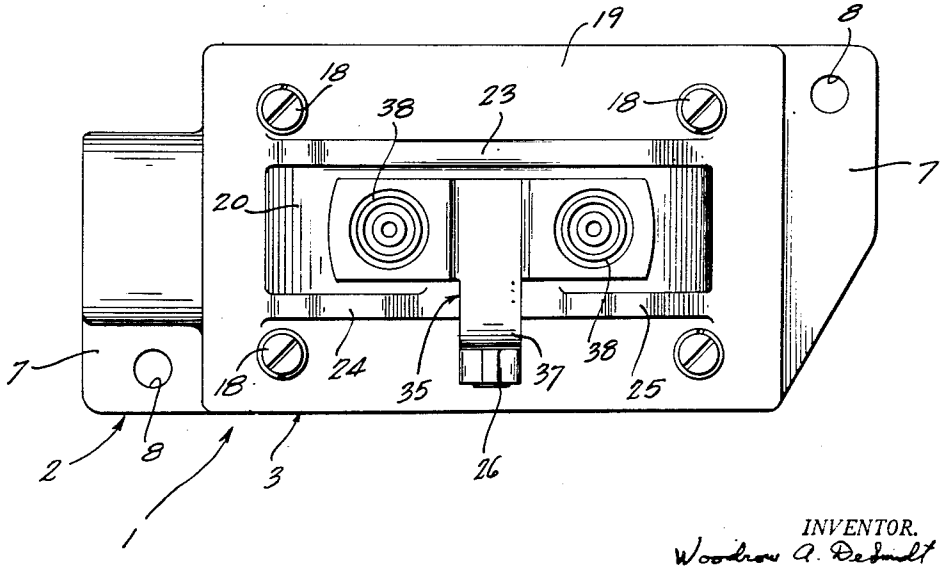


Fig. 2



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Fig. 3

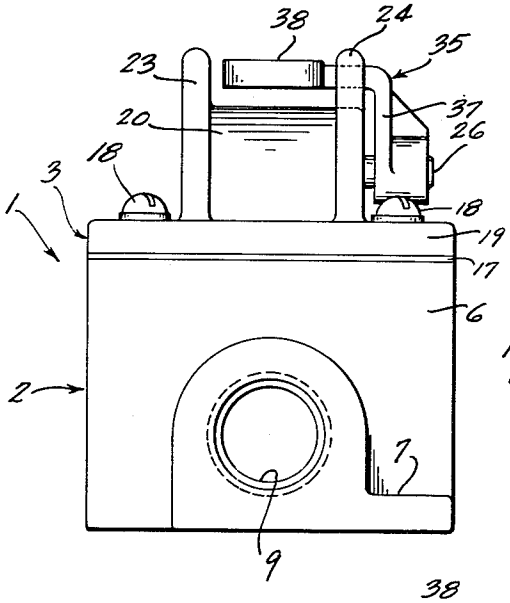


Fig. 4

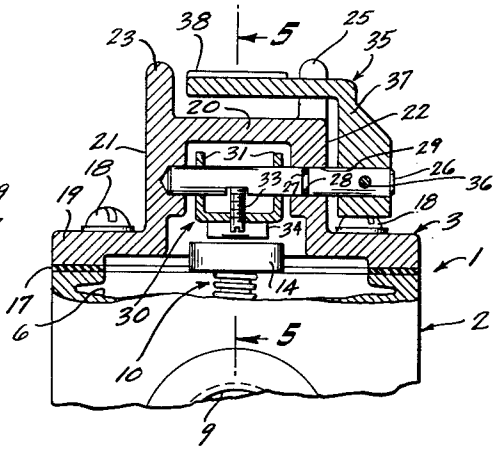
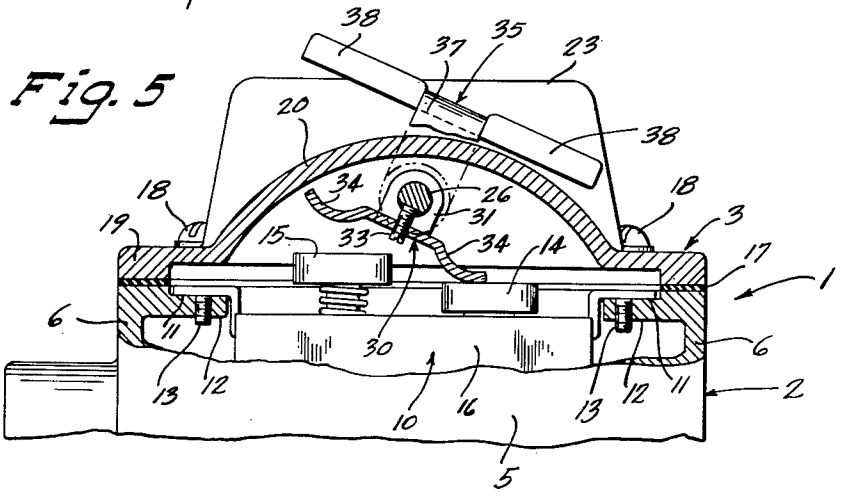


Fig. 5



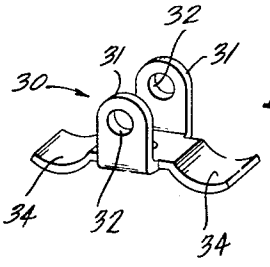


Fig. 6

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HOUSING FOR MANUALLY ACTUATED SWITCHES

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Application May 24, 1951, Serial No. 227,998

5 Claims. (Cl. 200—172)

This invention relates to manually operated housed switches and it resides more specifically in a combination of an actuating means for a housed switch with an outward extension of the switch housing, in which combination and operating shaft projects from the interior of the housing to the exterior thereof through a side surface of the outward extension of the wall, on the exterior portion of which shaft there is mounted a manually actuatable lever having an operating portion bent backwardly with respect to the shaft to overlay an arcuate outer surface of the wall extension in closely spaced relation thereto throughout the scope of movement of the lever, so that the lever cannot be deflected by an abnormally large operating force without being reinforced by contact with said outward extension.

Electrical switches such as push button stations that are used in hazardous locations must be fully enclosed within housings that effectively seal the electrical contacts from the ambient surroundings. Such hazardous surroundings may comprise dust locations as encountered in grain elevators and flour mills, or locations such as in filling stations, dry cleaning establishments, petroleum refineries and distilleries. For satisfactory protection in such locations care must be exercised in providing dust or gas tight switch compartments. Besides use in hazardous locations, there are other switch applications requiring water tight housings or housings that exclude oil products, dirt and dusts to a greater degree than standard switch enclosures.

To meet these requirements resort has heretofore been had to enclosed switches having operating shafts projecting from within to which external manually operated actuators are secured. One type of such enclosure is arranged for thumb lever operation by providing a shaft projecting from the enclosure to which there is attached a tiltable lever for thumb engagement. The lever overhangs beyond the point of exit of the shaft making it possible to permanently bend the shaft by application of an abnormally large actuating force. The lever furthermore is awkwardly at the side of the housing instead of at the center.

It is an object of this invention to position the engageable portions of the manually actuated lever of a housed switch, of the type with which this invention is concerned, in a central relation with the housing, so as to require less space for installation.

It is a further object of this invention to enhance the stress resisting properties of the exposed actuator mechanism of a housed switch to minimize the possibility of permanent deformation and breakage.

These and other objects and advantages will appear in the description to follow. Reference is made in the description to the accompanying drawings which form a part hereof and in which there is shown by way of illustration and not of limitation one specific form in which this invention may be embodied.

In the drawings:

Fig. 1 is a side view in elevation with parts broken away and in section of a switch housing enclosing a switch and having an actuating means constructed in accordance with this invention,

Fig. 2 is a plan view of the switch housing shown in Fig. 1,

Fig. 3 is an end view in elevation of the switch housing shown in Fig. 1,

Fig. 4 is a fragmentary end view with parts broken away and in section of the switch housing shown in Fig. 1, viewed through the plane 4—4,

Fig. 5 is a fragmentary side view with parts broken away and in section of the switch shown in Fig. 1 with the actuating means in a position rotated clockwise from that shown in Fig. 1, and

Fig. 6 is a view in perspective of the switch engaging member of the actuating means forming a part of the housing shown in Fig. 1.

Referring now to the drawings, there is shown in Figs. 1, 2 and 3 a switch housing generally designated by the numeral **1** having a recessed base **2** and a cover **3**. The base **2** has a floor **4** from which upwardly extends side walls **5** and end walls **6** to form an enclosure open at the top. Mounting flanges **7** form an extension of the floor **4**, and holes **8** therein provide means for suitably mounting the base **2**. A circular outlet opening **9** leads from one of the end walls **6** and is tapped to provide for a threaded connection to a conduit fitting, not shown, from which wiring may be led through the opening **9** to the interior of the base **2** for connection with the switch **10** mounted therein.

From the ends of the switch **10** extend mounting brackets **11** that rest upon flanges **12** extending inwardly from the upper ends of the end walls **6** of the base **2**. Screws **13** passing through the brackets **11** and into threaded engagement with the flanges **12** rigidly secure the switch **10** in the position shown.

As shown in the drawings the switch **10** is of the conventional push button type wherein an axial movement of either of the push buttons **14** and **15** acts to operate contacts within the switch body **16**. In such a switch axial downward movement of the push button **14** may cause the closure of associated contacts, and a like axial movement of the push button **15** may cause the opening of associated contacts to provide, for example, a conventional "stop and start" control station for a motor. The particular contact arrangement of the push buttons **14** and **15** does not form a part of this invention and is noted herein only to illustrate one instance of a suitable environment for the invention. It is contemplated, therefore, that the push buttons **14** and **15** may be replaced by other axially or rotationally responding switch means and the contact arrangements may be varied to suit particular needs.

Fitted over the upwardly facing edges of the side walls **5** and the end walls **6** is a gasket **17** upon which the cover **3** is placed to complete the enclosure of the switch **10**. Four screws **18** hold the cover **3** in position. The gasket **17** provides for complete enclosure provided all other openings are properly sealed. The switch **10** may thereby be separated from the ambient atmosphere and may be operated to make and break electrical contacts without dangers which might be caused by the state of the ambient atmosphere.

The cover **3** comprises a main horizontal wall portion **19** from which an arcuate wall section **20** rises as shown. The arcuate wall section **20** is centrally positioned with respect to the push buttons **14** and **15** and disposed in relation to the wall **19** to provide a symmetrical arrangement, as is more clearly shown in Fig. 2. Extending vertically from the wall **19** to the arcuate wall **20** are side wall partitions **21** and **22**. Formed as a continuation or outward extension of the side wall partition **21** is a guard rib **23** and similarly formed as continuations or outward extensions of the side wall partition **22** are spaced guard ribs **24** and **25**. An opening **26** of a diameter suitable to receive the shank of a padlock or similar locking means extends through the guard rib **24** for purposes to be described.

The space encompassed by the arcuate wall **20** and the side wall partitions **21** and **22** opens upon the interior of the base **2** and comprises a portion of the enclosure within the housing **1** that is separated from the external atmosphere. As shown in Fig. 4 a rotatable actuating shaft **26** projects from the exterior through a journal opening in the wall **22** to a closed journal seat in the wall **21**. A circumferential groove **27** on the shaft **26** forms a seat for a rubber sealing ring or other suitable seal **28** that bears against the opening surface **29**.

A switch actuating lever **30**, shown in perspective in

Fig. 6, disposed between the partition walls 21 and 22, and having a pair of upwardly turned bracket ears 31, with aligned shaft receiving openings 32, is secured to the shaft 26 by a set screw 33 so as to rotate therewith. A pair of arms 34 formed as a part of the lever 30 extend transversely with respect to the shaft 26 and are positioned above the push buttons 14 and 15. The arms 34 may be alternately tilted downward, so as to depress either of the push buttons 14 and 15, upon a rotation of the shaft 26, as is shown in Fig. 5, wherein a clockwise rotation of the shaft 26, causing depression of the button 14, is illustrated.

Mounted on the exterior portion of the shaft 26 is a manually engageable lever 35 secured thereto by a pin 36. A shank portion 37 of the lever 35 extends upwardly parallel to the wall 22. The lever 35 then bends backwardly, with respect to the run of the shaft 26, over the arcuate wall 20 in a position overlying shaft 26. Two finger seat arms 38 forming an integral part of the lever 35 extend laterally from the backwardly bent part of the lever 35 to form a T-shaped arrangement so disposed that a force applied to either of the finger seats 38 will cause rotation of the shaft 26.

The finger seats 38 of the actuating lever 35 are thus medially disposed with respect to the housing 1, in conformity with conventional "stop and start" switch construction. Thus, the operator of the switch, acquainted with the usual push button switch arrangement, need not grope for the operating button arms 38 when his visual attention may be in part diverted to other portions of the particular machinery under the control of the switch.

Medial positioning of the manually engageable lever 35, as described, also provides for a more compact switch requiring less space for installation. Adequate guards 23, 24 and 25 may be placed to both sides of the finger seats 38, while heretofore the operating lever disposed to one side of the housing has not made it feasible to provide a guard at the outer side of the lever without increasing the space required for the switch.

As previously noted the guard rib 24 has a circular opening 26. Depression of the finger seat 38 that acts to depress push button 15 permits a lock or other similar device to be passed through the opening 26 to hold the button 15 in depressed position. Such an opening may also be had in either of the guards 23 and 25, or may be omitted from the apparatus if desired.

Application of an actuating force to either of the finger seats 38 causes rotation of the shaft 26 and moves the manually engageable lever 35 from the position shown in Figs. 1–4 to a position of tilt, as is illustrated in Fig. 5. As the lever 35 is moved the finger seat 38, to which the actuating force is applied, travels a path that remains spaced but a short distance from the arcuate wall 20.

An abusive force acting upon the lever 35, however, will cause the finger seats 38 to yield, without destructive bending of shaft 26, until engagement with the arcuate wall 20 takes place. Further yielding of the finger seats 38 is then arrested and the lever 35 is reinforced by reason of the support furnished by the wall 20. Breakage of the actuating parts of the apparatus is thereby reduced to those few instances of extreme abusive use.

It is to be understood that the use of this invention is not limited to application with push button type switches alone. Other mechanisms, such as toggle operated snap action switches, may be actuated by the apparatus of this invention. The particular form of the switch engaging lever 30 may then be altered so as to provide for suitable actuation of the switch enclosed within the housing.

I claim:

1. In an enclosed switch an enclosure and an actuating means therefor comprising in combination a housing, an outwardly projecting wall portion forming a part of said housing having an outwardly convex face, a rotatable operating shaft extending through said outwardly projecting wall portion having an internal portion within said housing and an external portion without said housing, a switch operating lever mounted on said internal portion of said shaft adapted to operatively engage a switch mounted within said housing, and a manually engageable member mounted upon said external portion of said shaft having a shank portion extending backwardly to overlie said outwardly convex face and the internal portion of said shaft and a pair of finger seat arms extending laterally with respect to said shaft from opposite sides of the backwardly overlying shank portion overhanging a major area portion of said convex face adapted to be alternately moved inwardly toward said convex face whereby rotation of said operating shaft is effected and each finger seat arm being disposed in close facing relationship to said convex face and normally spaced therefrom and deflectable into supporting engagement therewith upon application of abnormal operating force thereto.

2. In an enclosed switch an enclosure and an actuating means therefor comprising in combination a housing, an outwardly projecting wall portion in said housing having an outwardly convex face and a side face, a rotatable operating shaft extending through said side face having an internal portion within said housing and an external portion without said housing; a switch operating lever mounted upon said internal portion of said shaft adapted to operatively engage a switch mounted within said housing; and a manually engageable member mounted upon said external portion of said shaft having a shank portion extending backwardly to overlie said outwardly convex face and the internal portion of said shaft and a pair of finger seat arms extending laterally with respect to said shaft from opposite sides of the backwardly overlying shank portion overhanging a major area portion of said convex face adapted to be alternately moved inwardly toward said convex face whereby rotation of said operating shaft is effected and each finger seat arm being disposed in close facing relationship to said outwardly convex face and normally spaced therefrom and deflectable into supporting engagement therewith upon application of abnormal operating force thereto.

3. In an enclosed switch a housing and actuating means therefor comprising in combination a housing having a cover with an outwardly projecting wall portion, said projecting wall portion having an outwardly convex face centrally disposed with respect to said cover and a pair of oppositely disposed side faces with guard ribs projecting outwardly as integral extensions of said side faces that extend outwardly of said convex face and bracket the same, a rotatable operating shaft extending through one of said side faces having an internal portion within said housing and an external portion without said housing, a switch operating lever mounted on said internal portion of said shaft adapted to operatively engage a switch mounted within said housing, and a manually operable member secured to the external portion of said shaft having a shank portion extending backwardly to overlie said convex face and internal portion of said shaft and a pair of finger seat arms extending transversely with respect to said shaft from opposite sides of said shank portion in a position between said guard ribs with the side edges thereof closely spaced from the ribs that is centered with respect to said cover and above said convex face adapted to be alternately moved inwardly toward said convex face to cause rotation of said shaft, each finger seat arm being normally disposed in close facing relationship to said convex face and deflectable into supporting engagement therewith upon application of abnormal operating force thereto.

4. In an enclosed switch an enclosure and an actuating means therefor comprising in combination a housing, a projecting wall portion in said housing having an outwardly facing surface and a pair of oppositely disposed side faces with guard ribs projecting outwardly from said side faces that extend outwardly of said outwardly facing surface and bracket the same, a rotatable operating shaft extending through one of said side faces having an internal portion within said housing and an external portion without said housing, a switch operating lever mounted upon said internal portion of said shaft adapted to operatively engage a switch mounted within said housing, and a manually engageable member mounted upon said external portion of said shaft having a shank portion extending backwardly to overlie said outwardly facing surface and the internal portion of said shaft in a position above said operating lever and a pair of finger seat arms extending laterally with respect to said shaft from opposite sides of the backwardly overlying shank portion overhanging a major area portion of said outwardly facing surface of said projecting wall portion adapted to be alternately moved inwardly whereby rotation of said operating shaft is effected and each finger seat arm being in facing relationship to said outwardly facing surface and normally spaced therefrom and deflectable upon

application of abnormal operating force thereto into supporting engagement therewith upon movement to the terminus of the range of rotatable motion thereof, each of said finger seat arms being protectively disposed between said guard ribs projecting from said side faces with the side edges of said finger seat arms being closely spaced from the ribs.

5. In an enclosed switch an enclosure and an actuating means therefor comprising in combination a housing, an outwardly projecting wall portion forming a part of said housing having an outwardly convex face defining a cavity within said housing, a rotatable operating shaft disposed parallel to the axis of said convex face extending through said outwardly projecting wall portion having an internal portion within said housing and an external portion without said housing, a switch operating lever mounted on said internal portion of said operating shaft disposed within said defined cavity within said housing adapted to operatively engage a switch mounted within said housing, and a manually engageable member mounted upon said external portion of said shaft having

an arm portion extending radially upward from said shaft of length less than the radius of curvature of said convex face and turning backwardly to overlie said shaft and a finger seat portion extending transversely of said shaft from opposite sides of the backwardly turning arm portion disposed in close facing relationship to said convex face to strike the same and be supported thereby upon application of abnormal operating force thereto and rotation of said shaft to the terminus of the rotatable movement thereof.

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