Dec. 5, 1967 M. G. ZAVERTNIK ET AL 3,356,819

SWITCH OPERATOR AND BRACKET

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Fig. 1.

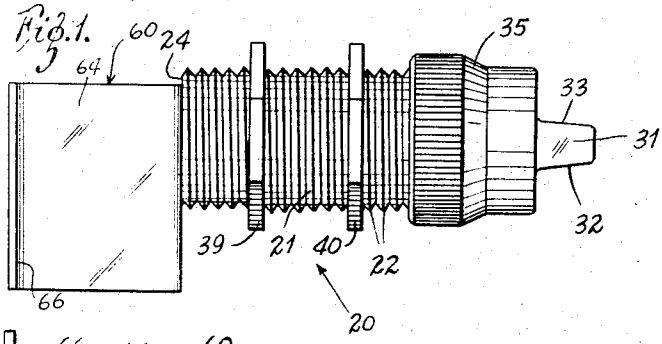


Fig. 6.

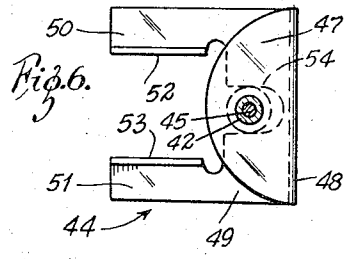


Fig. 2.

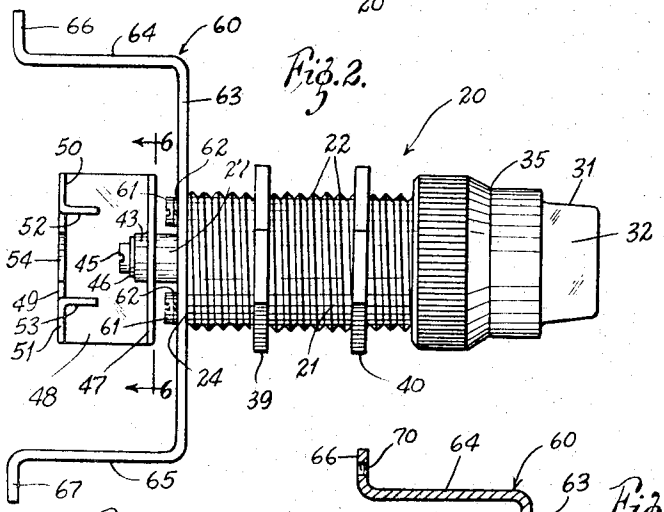


Fig. 4.

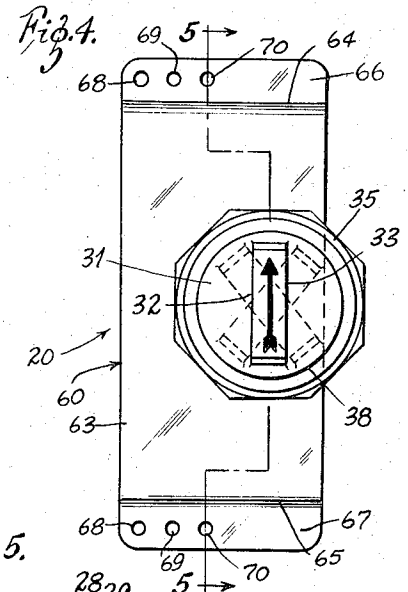


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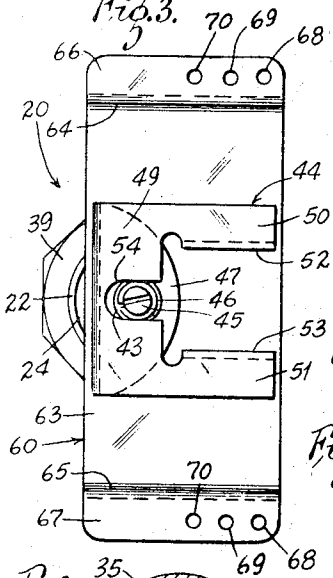


Fig. 5.

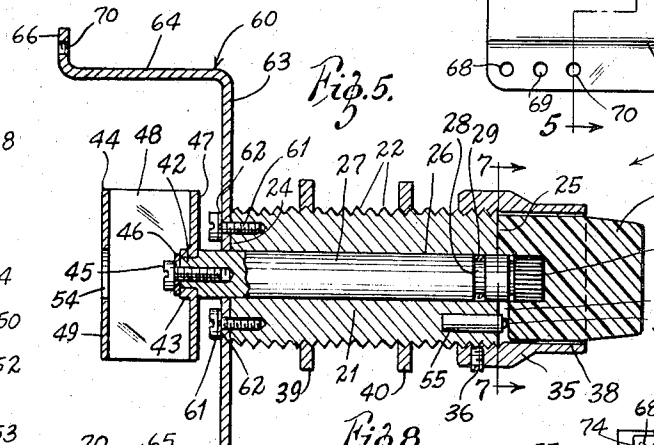


Fig. 10.

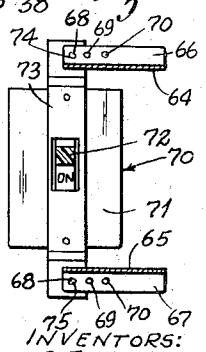


Fig. 8.

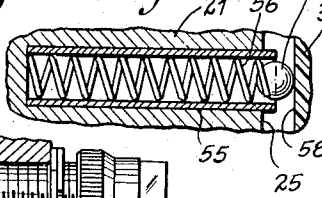
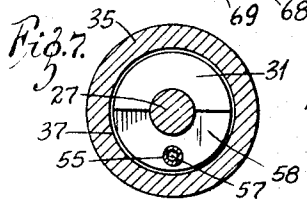


Fig. 9.

Fig. 7.



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Fig. 11.

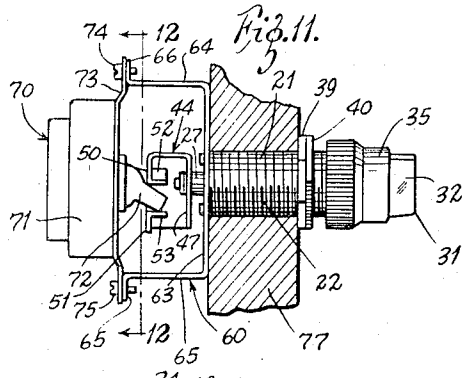


Fig. 12.

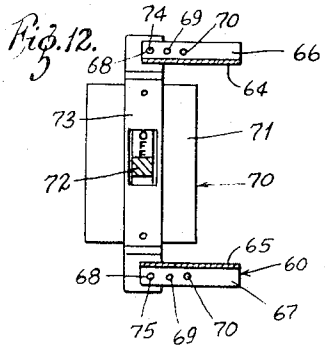


Fig. 13.

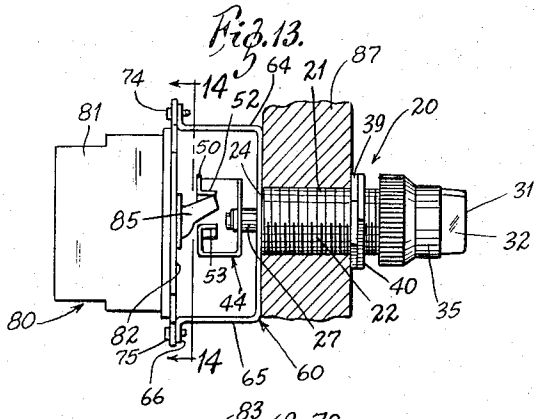


Fig. 14.

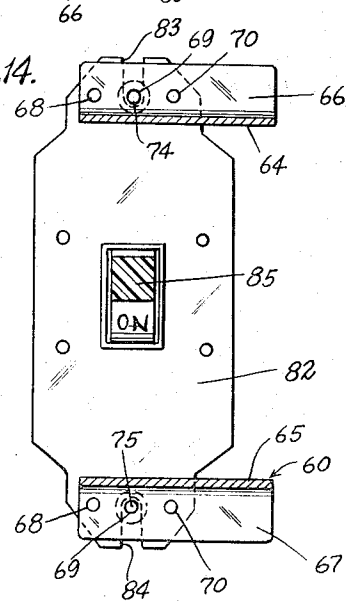


Fig. 15.

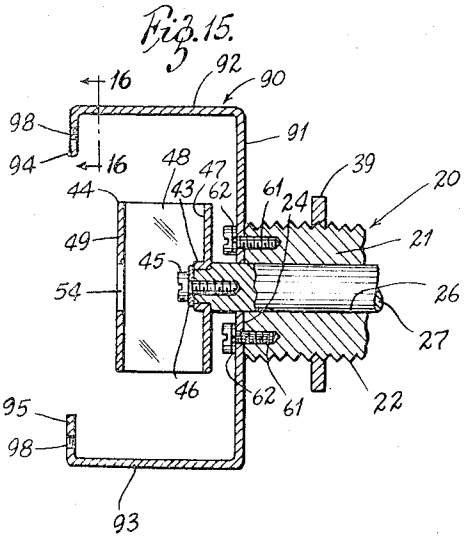
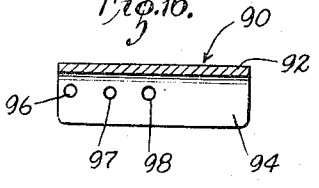


Fig. 16.



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SWITCH OPERATOR AND BRACKET

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ABSTRACT OF THE DISCLOSURE

A switch operator mountable in a wall separating a hazardous from a non-hazardous location with a bracket attached to the switch operator for supporting a toggle switch to be operated by the switch operator. The bracket is designed to support any one of several different kinds of toggle switches, thereby providing versatility in the functions of selective operation and support of a switch and illumination of a separate switch mounting structure.

Summary of the invention

The switch operator is designed to be installed for use in hazardous and weatherproof locations of explosive dust and gases. For this purpose, the switch operator mounts in a wall separating a hazardous from a non-hazardous location. A shaft is rotatably supported by the body of the switch operator with a carriage mounted on one end of the shaft on one side of the wall and a knob mounted on the other end of the shaft on the other side of the wall. The carriage has arms which alternately switch the toggle between various positions when the shaft is rotated by the knob.

The switch mounting bracket has opposed arms and flanges with rows of tapped holes in the flanges. The different kinds of toggle switches have mounting plates differing in some respects, but for many switches the mounting plates have identically spaced holes or slots for receiving mounting screws. To mount one of these switches, a selected pair of holes in the mounting bracket are aligned with the holes or slots of the switch mounting plate according to relationship between the carriage and the toggle, and the parts are fastened together by small screws. Accordingly, the bracket comprises a generally universal mount for the switch to enable its operation by the switch operator without requiring separate mounting of the switch on a wall or other support.

The general object of this invention is to provide a switch operator and bracket which have the foregoing features and advantages, and particularly it is an object to provide a switch operator with a bracket construction of generally universal utility to support different kinds of toggle switches.

Other objects and advantages will be apparent to those skilled in the art.

In the drawings:

FIGURE 1 is a side elevation view of the snap switch operator and one form of bracket;

FIGURE 2 is a top plan view of the snap switch operator and bracket of FIGURE 1;

FIGURE 3 is an end elevation view of the snap switch operator and bracket as viewed from the left side of FIGURE 2;

FIGURE 4 is an end elevation view of the snap switch operator and bracket as viewed from the right side of FIGURE 2;

FIGURE 5 is a view in section taken along the line 5—5 of FIGURE 4;

FIGURE 6 is a view in section taken along the line 6—6 of FIGURE 2;

FIGURE 7 is a view in section taken along the line 7—7 of FIGURE 5;

FIGURE 8 is an enlarged fragmentary view in longitudinal medial section through the friction pin;

FIGURE 9 is a reduced scale side elevation view of the toggle switch operator shown mounted in a wall with a conventional starter switch positioned in "on" position;

FIGURE 10 is a view in section taken along the line 10—10 of FIGURE 9;

FIGURE 11 is a side elevation view similar to that of FIGURE 9, but showing the switch in "off" position;

FIGURE 12 is a view in section taken along the line 12—12 of FIGURE 11;

FIGURE 13 is a side elevation view on a reduced scale showing the snap switch operator and bracket mounted in a wall and attached to another kind of switch which is shown in the "on" position;

FIGURE 14 is an enlarged view in section taken along the line 14—14 of FIGURE 13;

FIGURE 15 is a fragmentary side elevation view of the snap switch operator showing a different bracket attached to it which may be used for supporting and operating similar but smaller switches; and

FIGURE 16 is a view in section taken along the line 16—16 of FIGURE 15.

As shown in FIGURES 1–5, the snap switch operator 20 has a body 21 with external threads 22 extending between its end faces 24 and 25. There is a cylindrical bore 26 through the body 21. A shaft 27 extends through the body 21 and is rotatable therein. The shaft 27 has an annular groove 28 in it which receives an O-ring 29 and has a splined head 30 on its outer end. An operating knob 31 is permanently molded onto the head 30 of the shaft 27. The knob 31 has flattened sides 32 and 33 to facilitate rotation of it and the shaft 27.

A guard 35 is threaded onto the body 21 and is locked in place by a setscrew 36. The guard has a bore 38 through it through which the operating knob 31 extends. There are also a pair of lock nuts 39 and 40 for threading onto the body 21.

The shaft 27 has a reduced diameter end 42 onto which the hub 43 of a carriage 44 is mounted and held in place by a bolt 45 and lock washer 46. The carriage 44 has a base 47, a side wall 48 and a forward wall 49 having spaced arms 50 and 51 with backwardly extending flanges 52 and 53. The arms 50 and 51 carrying the flanges 52 and 53 swing as the knob 31 and shaft 27 are rotated. There is a slot 54 in the wall 49 to provide access to the head of the bolt 45.

A recess 55 in the end 25 of the body 21 receives a compression spring 56 and a ball member 57. The spring 56 biases the ball member 57 toward the operating knob 31, and the operating knob 31 has a cutaway portion 58 against which the ball 57 bears. The ball 57 maintains friction contact with the knob 31 to provide some resistance to rotation of the knob.

A bracket 60 is mounted to the end 24 of the body 21 by a pair of bolts 61 and lock washers 62. The bracket 60 has a wall 63 extending laterally from the body 21, forwardly extending arms 64 and 65, and laterally outwardly extending flanges 66 and 67. There is a row of tapped holes 68, 69, and 70 in each flange 66 and 67.

The versatility of the bracket 60 is illustrated particularly in FIGURES 9–14. A conventional starter switch 70 is shown in outline in FIGURES 9, 10, 11 and 12. This switch 70 has a body 71, a toggle 72 that is movable between "on" position as shown in FIGURE 10, and "off" position as shown in FIGURE 12, and a mounting plate 73 which conventionally has holes in it for receiving mounting screws 74 and 75. The design of the bracket 60 is such that a selected two of the holes 68, 69, and 70 are selectively aligned with the holes in

the plate 73 so that the screws 74 and 75 can be threaded into the tapped holes selected in the bracket 60. The holes 68–70 selected are those which will align the carriage 44 with the toggle 72. In the example of FIGURE 9, the screws 74 and 75 are threaded into the holes 68. Thus, when the switch operator 20 is mounted in a wall 77 that separates a hazardous location from a non-hazardous location, with the lock nuts 39 and 40 tightened against a side of the wall, the bracket 60 supports the switch 70 without further required mounting for the switch. The switch can be quickly and easily operated by rotation of the knob 31 to move the toggle 72 between the "on" position illustrated in FIGURES 9 and 10, and the "off" position illustrated in FIGURES 11 and 12.

In FIGURES 13 and 14, another kind of conventional switch 80, such as a circuit breaker switch, is shown mounted on the bracket 60. The switch 80 has a body 81 and a mounting plate 82 having slots 83 and 84 in its ends. A toggle 85 is movable between "on" and "off" positions. The switch 80 is conventional and is usually mounted in a wall with screws extending into the slots 83. However, the design of the bracket 64 is such that it will not only support the switch 70 but will also support the switch 80 and other switches, such as a standard 110 volt light switch. For the switch 80, the holes 69 rather than the holes 68 receive the screws 74 and 75 because, for the switch 80, the carriage 48 works better in relation to the toggle 85 when the switch is thus mounted. Again the switch operator 20 is installed in a wall 87 which separates a hazardous area from a non-hazardous area and supports the switch 80 so that operation of the toggle 85 is accomplished by simply rotating the knob 31.

FIGURE 15 shows another kind of bracket 90 for use to operate smaller sized despard mount switches, although the bracket 60 could be revised to provide inturned instead of outturned flanges 66 and 67. The bracket 90 has a wall 91 that is mounted to the body 21 by the screws 61 and lock washers 62 with arms 92 and 93 extending forwardly from the wall 91 and inturned flanges 94 and 95. Each flange 94 and 95 has a row of tapped holes 96, 97, and 98 in it.

The bracket 90 supports a switch (not shown) in the same way as the bracket 60 supports either the switch 70 or the switch 80 or another similar switch having a mounting plate with holes spaced appropriately. The bracket 15 is particularly useful for supporting switches which are smaller than the switches 70 and 80. The inturned flanges 94 and 95 provide the proper spacing between the rows of holes 96–98 for mounting the switch and still provide adequate space between the arms 92 and 93 to accommodate the carriage 44 and toggle for proper operation without interference.

The detailed operation of this switch operator and bracket may be described in conjunction with the embodiment shown in FIGURES 1–12. It can be seen that the switch operator is readily installed in a wall by threading the housing 21 through a tapped hole provided in the wall 77 before the lock nuts 39 and 40 or the guard 35 are installed. (The outer diameter of the knob 31 is less than the diameter of the housing 21.) Then, the lock nuts 39 and 40 are tightened against the wall 77 and the guard 35 is installed and locked in place by tightening the setscrew 39.

The switch 70 is easily installed on the bracket 60 by

fastening the mounting plate 73 to the flanges 66 and 67 of the mounting bracket 60, using the screws 74 and 75. This automatically positions the carriage 44 so that the opposing flanges 52 and 53 on the arms 50 and 51 are on opposite sides of the toggle 72, the proper selection of holes from among the rows of holes 68, 69, and 70 having been made. Now the switch can be operated upon rotation of the knob 31 in a clockwise direction to swing the toggle 72 to the "on" position as illustrated in FIGURES 9 and 10, or alternatively in a counterclockwise position to swing the toggle to the "off" position as shown in FIGURES 11 and 12.

The operation of the embodiments shown in FIGURES 13 and 14 and in FIGURES 15 and 16 is similar and need not be described.

Various changes and modifications may be made within the purview of this invention as will be readily apparent to those skilled in the art. Such changes and modifications are within the scope and teaching of this invention as defined by the claims appended hereto.

What is claimed is:

1. A switch operator and bracket therefor comprising a switch operator body having external threads for extending through and being threaded within an opening in a wall separating a hazardous area from a non-hazardous area, a shaft extending through the body and adapted to move therein, an operating knob on one end of the shaft, a guard surrounding the knob and threaded onto the body, a switch operating carriage on the other end of the shaft, a switch supporting bracket attached to the aforesaid other end of the body and comprising spaced arms and opposing flanges, the flanges being adapted to have a switch mounting plate placed against it and fastened to it by screws, the flanges having rows of holes in them spaced to selectively align with holes in the switch mounting bracket with screws extending through the aligned holes, the carriage comprising a pair of spaced arms for engaging opposite sides of a switch toggle to operate the toggle in opposite directions upon rotation of the knob and shaft, the arms having opposing flanges perpendicular to the direction of movement of the carriage with rotation of the knob, and a spring biased ball mounted in the body and biased against the knob to provide frictional resistance to rotation of the knob.

2. The switch operator and bracket of claim 1 wherein the flanges on the bracket extend in relatively diverging directions.

3. The switch operator and bracket of claim 1 wherein the flanges on the bracket extend in relatively converging directions.

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