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SAFETY SWITCH

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Fig. 1

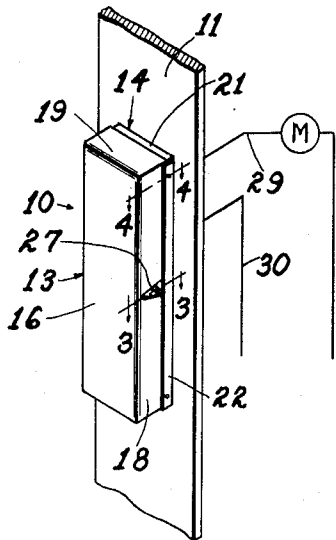


Fig. 2

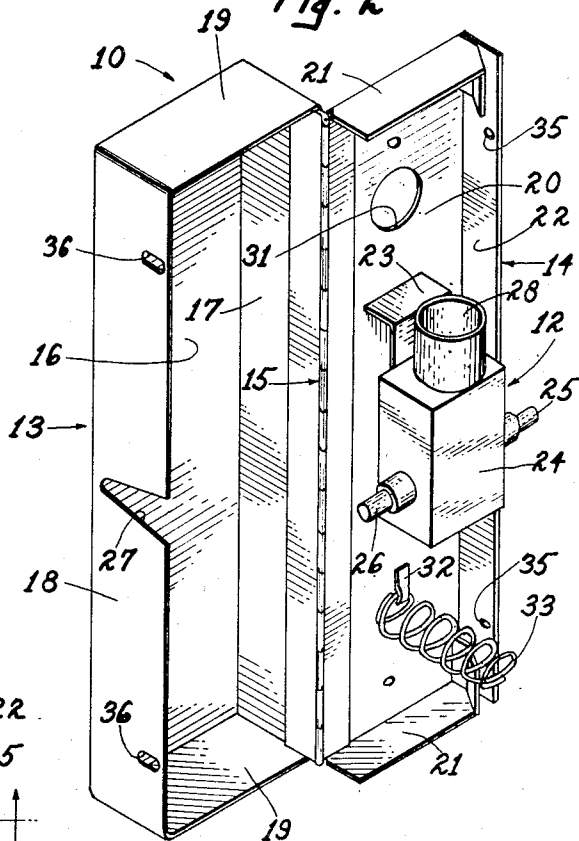


Fig. 3

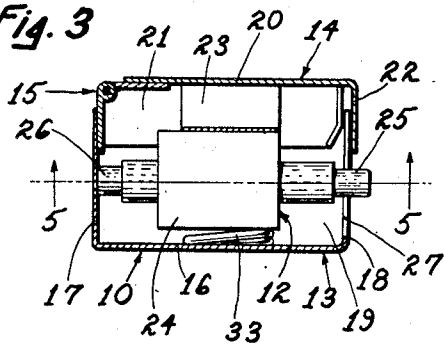


Fig. 4

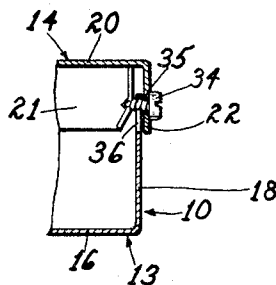
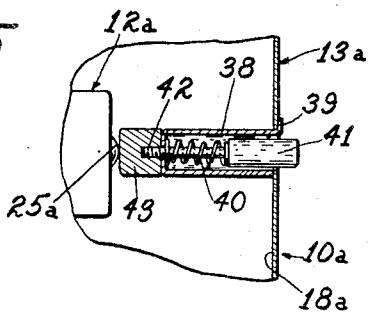


Fig. 5



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SAFETY SWITCH

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4 Claims. (Cl. 200—172)

The present invention relates to a safety device, more particularly to a safety switch for controlling operation of various work performing apparatus, and the principal object of the invention is to provide new and improved devices of the character described.

The most common device presently used to control operation of work performing apparatus is an electric switch having a pair of push buttons in side-by-side relation, one button energizing the apparatus being controlled and the other button deenergizing or stopping the apparatus. For many uses, these ordinary control switches are satisfactory; however, in situations when the apparatus must be shut down with a minimum of delay, as in the case of accident or other emergency, these switches are not completely satisfactory since the operator of the apparatus, under the stress of circumstances, may fail to press the stop button or may simultaneously press the stop and start buttons.

The present invention provides a control device which is foolproof in operation since the respective stop and start controls are so spaced apart that it is virtually impossible for an operator to mistake one control for the other or, under conditions of stress, to fail to properly actuate the stop control. Further, the present device is simple and inexpensive to manufacture and is easily mounted wherein it will be readily accessible to the operator. These and other advantages will readily become apparent from a study of the following description and from the appended drawing.

In the drawing accompanying this specification and forming a part of this application there are shown, for purpose of illustration, embodiments which the invention may assume, and in this drawing:

Figure 1 is a perspective view of a preferred embodiment of the device attached to a suitable supporting wall and schematically illustrating a simple electric circuit in which it is interposed.

Figure 2 is an enlarged perspective view of the device shown in Figure 1, the device being opened to illustrate the interior construction and arrangement of parts.

Figure 3 is an enlarged sectional view generally corresponding to the line 3—3 of Figure 1,

Figure 4 is an enlarged, fragmentary sectional view generally corresponding to the line 4—4 of Figure 1, and

Figure 5 is an enlarged fragmentary sectional view generally corresponding to the line 5—5 of Figure 3 but of a modified construction.

As best seen in Figures 1, 2 and 3, the device provided by the present invention comprises a housing 10 secured to a suitable supporting wall 11 (Figure 1) and enclosing switch means 12 (Figures 2 and 3). Although support 11 is herein shown to be a wall, the device can be secured to any other convenient body; for example, the device may be secured, if desired, to some part of the structure of the apparatus which the device is adapted to control. Housing 10 may be of any suitable shape and size; however, it has been found that an oblong hous-

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ing approximately ten inches long and three inches wide serves the purpose admirably well.

The housing comprises relatively movable portions 13, 14 connected together by means of a hinge 15 having respective hinge members welded or otherwise secured to respective adjoining housing portions. Housing portion 13 comprises an outer wall 16 structurally integral with side walls 17, 18 and end walls 19, whereas housing portion 14 comprises a wall 20, end walls 21, and a side wall 22. With the housing closed, as shown in Figures 1 and 3, walls 16, 20 are in spaced, generally parallel relation, whereas respective adjoining end walls 19, 21 and side walls 18, 22 are disposed in overlapping relation.

Secured to the inside of wall 20 of housing portion 14 by means of a suitable bracket 23 is the previously mentioned switch means 12. Switch means 12 is a commercially available item and comprises a case 24 which houses the usual relatively movable switch contacts (not shown) or their equivalent and a pair of operating members 25, 26 which extend outwardly from opposite sides of the switch case 24. The switch is of the type wherein inward axial pressure on operating member 25 closes the contacts within the switch case, whereas inward axial pressure upon member 26 opens such contacts. It is to be understood that the contacts within the case remain in the position to which they are moved by inward pressure on one of the members until such time as the other member is pressed inwardly.

For a purpose to be disclosed, operating member 25 is adapted to extend outwardly of the closed housing 10 through a slot 27 formed in side wall 18, whereas operating member 26 is adapted to engage an adjoining portion of side wall 17 of housing portion 13 when the housing is closed (see Figure 3).

As seen in Figure 2, a boss 28 protrudes from switch casing 24 and suitable leads 29, 30 (see Figure 1) extend from the switch contacts within the case 24, through the opening in the boss, and outwardly of housing 10 through an aperture 31 formed in wall 20. Leads 29, 30 are adapted to be connected in a suitable electric circuit which includes the apparatus to be controlled, the latter being diagrammatically indicated in Figure 1 by an electric motor.

Referring again to Figure 2, the inside of wall 20 carries a bracket 32 which supports one end of a compression spring 33. The other end of spring 33 is adapted to abut and press against the inside of wall 16 of housing portion 13 when the housing is closed. Means are provided for holding the housing closed despite the urging of spring 33 and such means comprises a pair of sheet metal screws 34 threaded into respective apertures 35 formed in wall 22 adjacent its respective ends. With the housing closed, screws 34 pass through enlarged apertures 36 in wall 18 which are elongated, as shown, for a purpose to become clear.

Assuming that housing 10 is suitably secured to wall 11 (or other support) by any suitable means, such as by means of screws (not shown) which pass through apertures 37 in wall 20 of housing portion 14 and which are threaded into wall 11, and further assuming that the housing is being maintained in closed assembled relation by screws 34 and that leads 29 and 30 are suitably connected with the apparatus to be controlled, operation will be as follows:

When it is desired to initiate operation of the apparatus being controlled, the operator will press operating member 25 of switch means 12 in an axial direction. This will close the contacts enclosed in switch case 24 and thus energize the apparatus being controlled.

When it is desired to stop the apparatus, the operator need only press momentarily upon wall 16 of housing 10. Pressure upon this wall will cause it and its associated

parts forming housing portion 13 to pivot about hinge 15 to move toward housing portion 14 against the resiliency of spring 33. Note that the elongation of apertures 36 permits the aforesaid movement of housing portion 13. Since operating member 26 of switch means 12 is engaged with wall 17 of housing portion 13, movement of this housing portion in the manner disclosed will effect axial movement of operating member 26 to open the circuit controlled by the switch means and thus de-energize the controlled apparatus. Releasing the pressure applied to wall 16 of housing portion 13 will permit spring 33 to return the housing portion to its previous position (shown in Figures 3 and 4); however, the control circuit will remain open until such time as operating member 25 is once again pressed by the operator.

It will now be apparent the present device comprises an electric switch having two actuators, one actuator being member 25 and the other actuator, in effect, being shiftable housing portion 13 which is engaged with member 26 of the switch and which effects operation thereof.

It is an important feature that housing portion 13 (and more particularly wall 16 thereof) presents a relatively large area so that the operator may easily apply pressure thereto and stop the apparatus even under the stress of an emergency. If the operator's hands are occupied, he can press the housing portion with his arm, shoulder, or other part of his body.

It is also an important feature that one of the switch actuators, in part represented by wall 16 of the movable housing portion, is so spaced from the other actuator, represented by member 25 of the switch, that even under the stress of an emergency, it would be virtually impossible for the operator to inadvertently press the wrong actuator. The advantage of the actuators being spaced is even further enhanced by the fact that such actuators are operated by forces applied in entirely different directions.

Figure 5 discloses a slightly different embodiment of the invention and parts similar to those hereinbefore described are identified by the same reference characters but with the suffix "a" added. In this embodiment a switch 12a, similar to switch 12, but instead having a short operating member 25a instead of the relatively long operating member 25, is employed. In this embodiment, an extension must be provided to permit operation of member 25a from outside the switch housing. For this purpose, a sleeve 33 is secured to wall 18a of housing portion 13a.

The sleeve 33 extends inwardly of the housing in alignment with switch operating member 25a (when the housing is closed, of course) and is secured by any suitable means such as by tabs 39 formed in the sleeve and which pass through an aperture formed in the wall 13a and which are bent to overlie the latter. The inner end of sleeve 33 is closed to provide a seat for one end of a compression spring 40 and the other end of such spring seats against a button 41 which is slidable in the sleeve and which projects through the aforementioned aperture in the wall 13a to a position exteriorly of the housing where it is readily accessible to the operator of the apparatus.

A stud 42 extends axially from button 41 through spring 40 and through an aperture formed in the closed end of the sleeve and is anchored in a body 43 which normally is held in abutting relation with the inner end of the sleeve by means of spring 40. As illustrated, body 43 is engaged with, or under certain circumstances may be slightly spaced from, member 25a of the switch.

The effect of movement of operating member 25a by the operator of the apparatus should readily be apparent from the foregoing description. The operator will merely press button 41 axially against the urging of spring 40 and this will effect a corresponding movement of body 43 away from the inner end of sleeve 33 to depress switch operating member 25a. When pressure is removed from

button 41, spring 40 will return the button and body 43 to the respective positions shown. It will readily be apparent that while the embodiment disclosed in Figure 5 employs a switch having but one short operating member, the construction disclosed in this embodiment could also be employed with a switch having two short operating members.

In view of the foregoing it will be apparent to those skilled in the art that I have accomplished at least the principal object of my invention and it will also be apparent to those skilled in the art that the embodiments herein described may be variously changed and modified, without departing from the spirit of the invention, and that the invention is capable of uses and has advantages not herein specifically described, hence it will be appreciated that the herein disclosed embodiments are illustrative only, and that my invention is not limited thereto.

I claim:

1. A safety device for controlling operation of work performing apparatus, comprising electric switch means shiftable to one position wherein it closes an electric circuit in which it is connected and to another position wherein it opens such circuit, a pair of actuators adapted to be moved by an operator of the apparatus to shift said switch means to each of said positions, said switch means being shifted from one position to another position solely by movement of one of said actuators in one direction and said switch means being shifted from said other position to said one position solely by movement of the other of said actuators in one direction, and means providing a housing totally enclosing said switch means and having a wall at least in part forming one of said actuators and movable generally flatwise, said movable housing wall being readily accessible to the operator of the apparatus and being relatively large to insure ease of operation in case of emergency and said other actuator being spaced from said wall and movable in a direction transversely of the direction of movement of said wall to reduce the possibility of inadvertent movement of the wrong actuator by the operator.

2. A safety device for controlling operation of work performing apparatus, comprising electric switch means shiftable to one position wherein it closes an electric circuit in which it is connected and to another position wherein it opens such circuit, a pair of actuators adapted to be moved by an operator of the apparatus to shift said switch means to each of said positions, said switch means being shifted from one position to another position solely by movement of one of said actuators in one direction and said switch means being shifted from said other position to said one position solely by movement of the other of said actuators in one direction, and a housing enclosing said switch means and having a wall mounted for generally flatwise movement and readily accessible to the operator of the apparatus and relatively large to insure ease of operation in case of emergency, one of said actuators being coordinated with said movable housing wall to shift said switch means upon movement of said wall and the other of said actuators being independent of said movable housing wall, said other actuator extending outwardly of said housing through an opening formed therein and being movable in a direction generally edge-wise of said housing wall to reduce the possibility of inadvertent movement of the wrong actuator by the operator.

3. A safety device for controlling operation of work performing apparatus, comprising electric switch means shiftable to one position wherein it closes an electric circuit in which it is connected and to another position wherein it opens such circuit, a pair of actuators adapted to be moved by an operator of the apparatus to shift said switch means to each of said positions, said switch means being shifted from said closed position to said open position solely by movement of said one actuator in one direction and said switch means being shifted

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from said open position to said closed position solely by movement of said other actuator in one direction, and a housing enclosing said switch means and having a wall mounted for generally flatwise movement and readily accessible to the operator of the apparatus and relatively large to insure ease of operation in case of emergency, said one actuator being coordinated with said movable housing wall to shift said switch means from said closed to said open position upon movement of said wall and said other actuator being independent of said movable housing wall, said other actuator extending outwardly of said housing through an opening formed therein and being movable in a direction generally edgewise of said housing wall to reduce the possibility of inadvertent movement of the wrong actuator by the operator.

4. A safety device for controlling operation of work performing apparatus, comprising electric switch means shiftable to one position wherein it closes an electric circuit in which it is connected and to another position wherein it opens such circuit, a pair of actuators adapted to be moved by an operator of the apparatus to shift said switch means to each of said positions, said switch

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means being shifted from said closed position to said open position solely by movement of said one actuator in one direction and said switch means being shifted from said open position to said closed position solely by movement of said other actuator in one direction, and a housing enclosing said switch means and having a portion providing a wall mounted for generally flatwise movement and readily accessible to the operator of the apparatus and relatively large to insure ease of operation in case of emergency, said one actuator being engaged with said housing portion to shift said switch means from said closed to said open position upon movement of said wall and said other actuator being independent of said housing portion, said other actuator extending outwardly of said housing through an opening formed therein and being movable in a direction generally edgewise of said housing wall to reduce the possibility of inadvertent movement of the wrong actuator by the operator.

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