United States Patent

[11] **3,576,408**

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[54] **SWITCH ACTUATOR FOR VACUUM CLEANER**
10 Claims, 7 Drawing Figs.

[52] **U.S. Cl.** **200/52,**
200/172, 200/5
[51] **Int. Cl.** **H01h 35/00,**
H01h 3/02
[50] **Field of Search** ..... 200/5 (E),
52, 172 (A), 172, 5, 61.7

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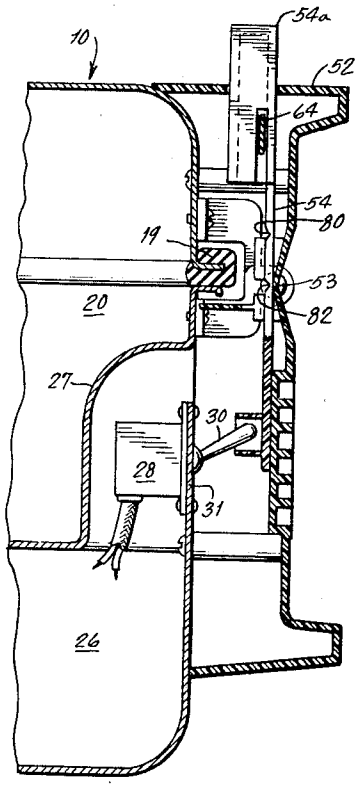
ABSTRACT: A switch actuator especially adapted for use in canister-type vacuum cleaners for effecting the movement of a motor switch which is required to be disposed in one part of a canister, the control of which is manipulatable from the other part. The switch actuator is so constructed as to allow for facile and damage-proof operation, pushbutton control being provided on one part of the canister which is hinged to swing away from the other part.



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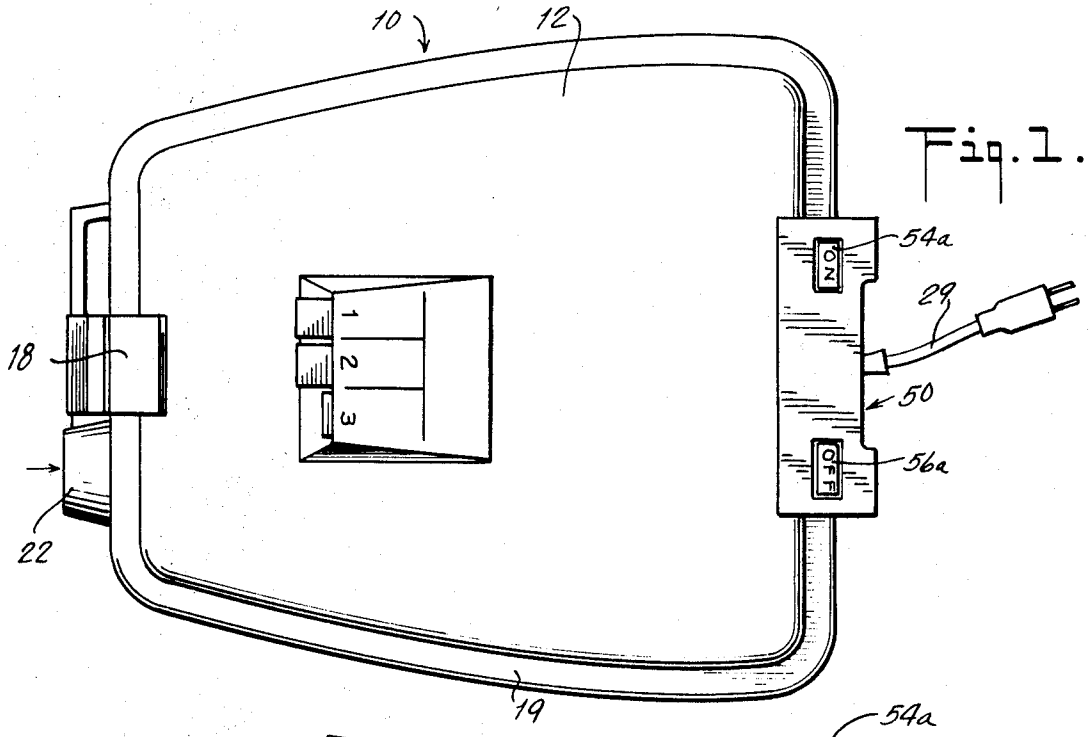

Fig. 1.

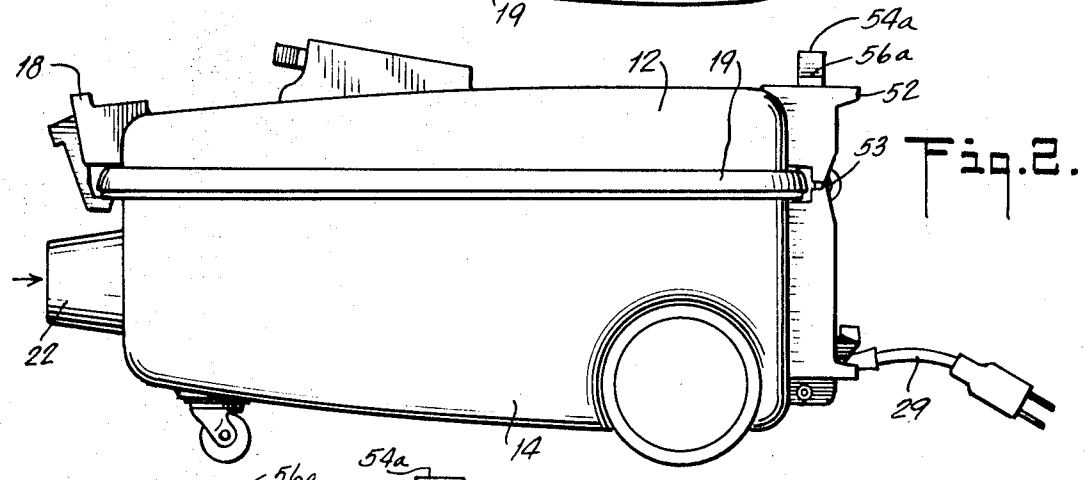

Fig. 2.

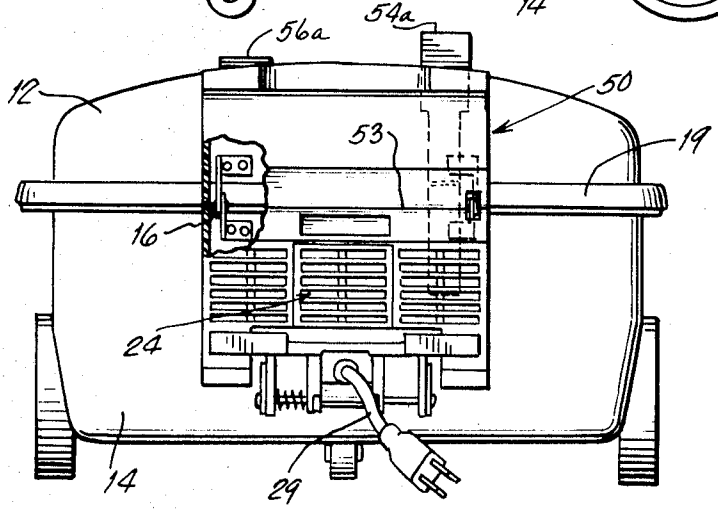

Fig. 3.

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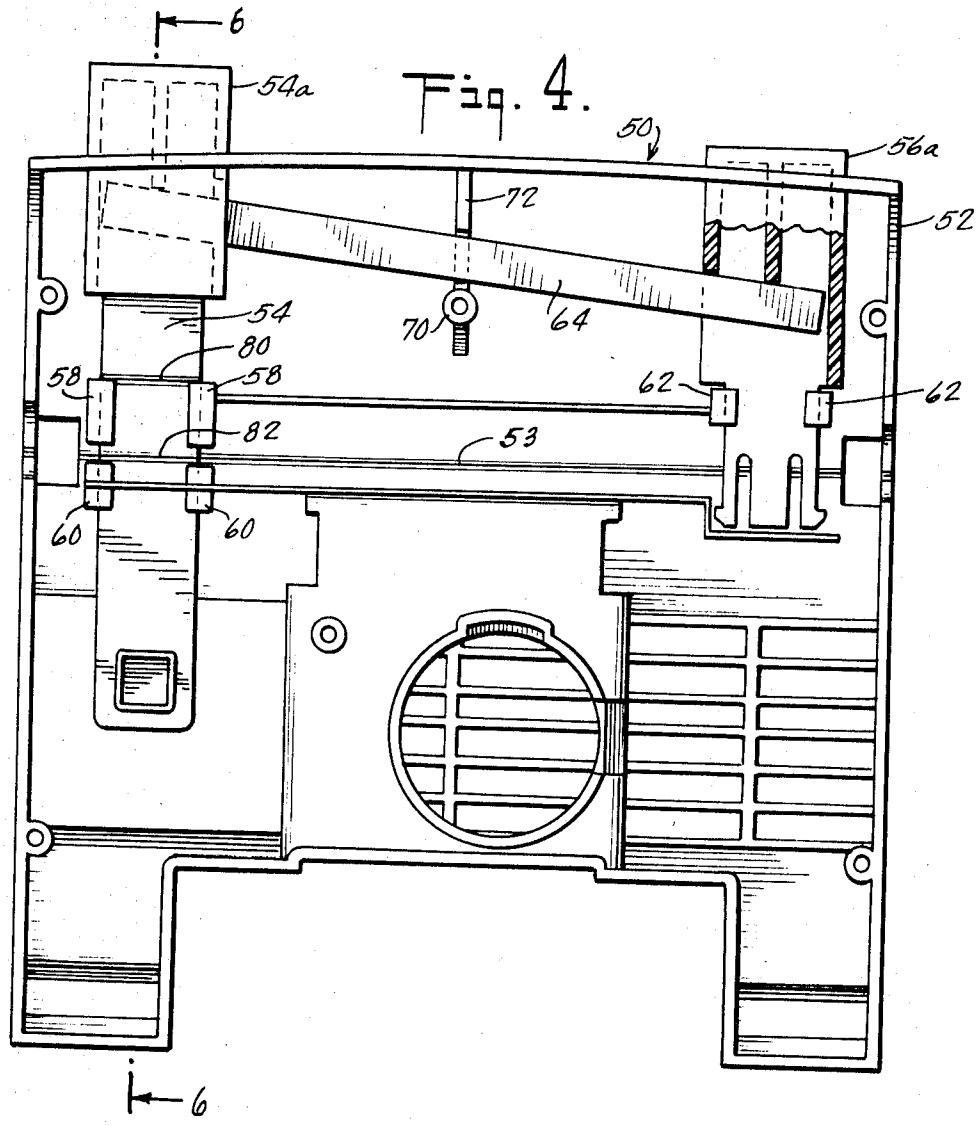

Fig. 4.

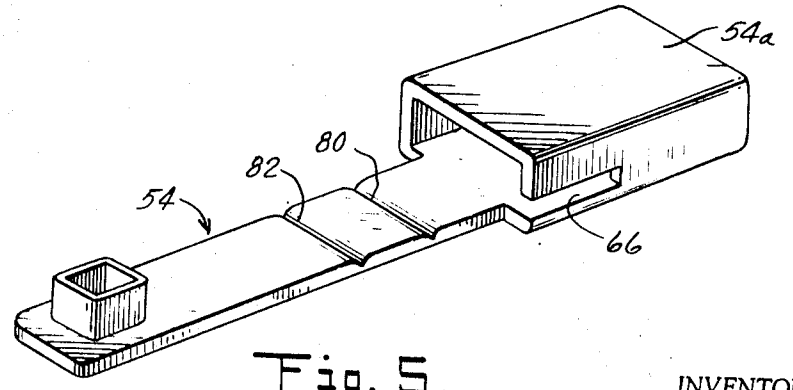

Fig. 5.

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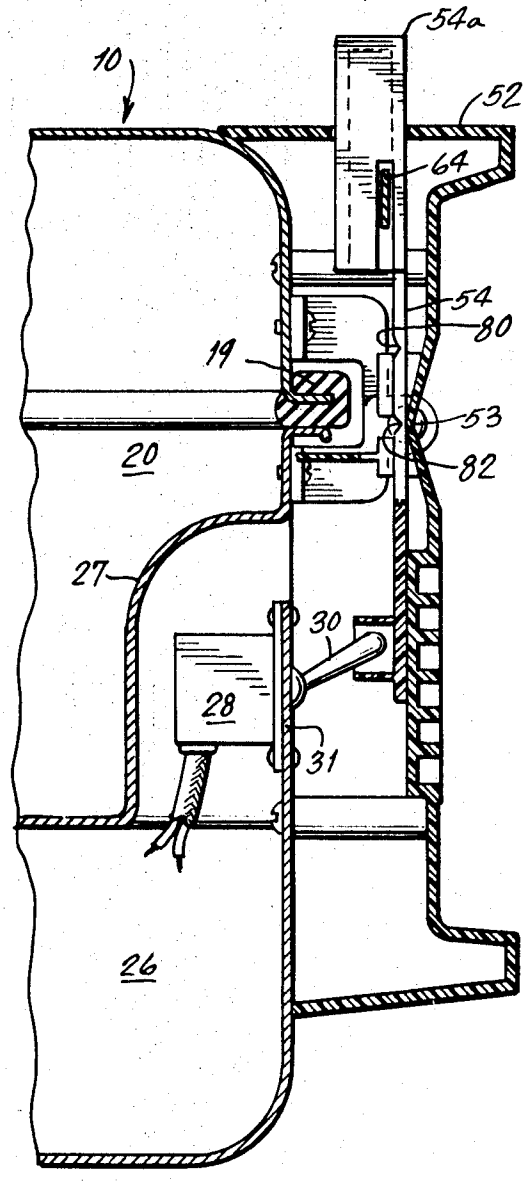

Fig. 6.

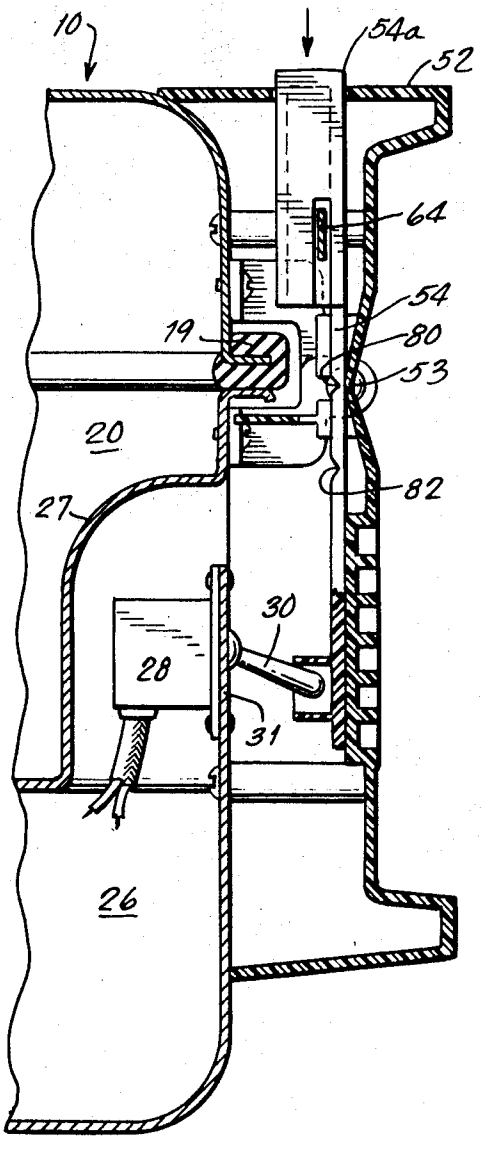

Fig. 7.

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SWITCH ACTUATOR FOR VACUUM CLEANER

BACKGROUND, OBJECTS AND SUMMARY OF THE INVENTION

This invention relates to an improved switch actuator, and in particular, to a switch actuator intended for use in, but not necessarily limited to, a vacuum cleaner of the canister type.

The design of a typical canister vacuum cleaner is such that an upper and lower part are provided and the two parts are hinged to permit ready access to the interior. It is a highly desired objective that the switch be located in the same part of the canister as the motor. One reason for this is that the power cord or wires do not then have to flex with the hinge and are not exposed to possible damage. A further reason for this location is that it is much preferred to have the switch mounted in an atmospheric environment, to eliminate the necessity for airtight sealing.

An expedient that has been adopted in the prior art for achieving the above noted objective is to have the control lever or toggle for the switch protruding from the wall of the lower part of the canister. But due to the shape and bulk of the canister, it is highly inconvenient to locate the lever close to the bottom of the canister, because it is then difficult for the user to trip the lever in two directions with her foot. Moreover, the protrusion of the lever in this manner readily allows for accidental tripping. Also, the switch is subject to rough usage because of its manner of actuation directly by the foot.

As noted, since the canister is in two parts the problem is how to achieve a facile but damage-proof actuation by means of a prominently located, easily seen and manipulated actuator of a switch which is located in the lower part.

It is therefore a primary object of the present invention to provide the answer to the problem outlined above and in the process to uniquely provide a switch actuator suitable for other purposes beyond the answer to the immediate problem presented in the given context.

The switch actuator of the present invention is so constructed that it simplifies the control of the switch and yet allows for swinging the top of the canister open with impunity, whether the switch is in the "on" or "off" position. This latter point will become clear as the description proceeds.

The switch actuator in essential structure comprises a hinged housing for carrying or supporting the actuator, said housing being integrally formed but having two hinged sections, one of which is affixed to the upper canister part, and the other section being secured to the lower canister part. Two pushbuttons are prominently mounted so that they may be readily manipulated. The two pushbuttons are connected by a pivotally mounted beam such that when one button, the "on" button, is pushed in, a slide actuator integral with the button is moved so as to effect movement of a toggle or lever on a conventional switch, the toggle being located in the lower section of the actuator housing. Movement of the "on" button in one direction is such as to place the switch in the "on" state. When the other button, i.e., the "off" button, is pushed in the force exerted thereon acts by dint of the pivotal beam to move the "on" button and the associated slide actuator in the reverse direction. Desirable overcenter "snap action" is provided by the spring which is an integral part of the toggle switch.

The slide actuator associated with the "on" button is made of relatively inflexible plastic material, except that flexibility is provided at two self-hinged portions, such portions being adapted to correspond with the hinge on the actuator housing. As a consequence, one of the self-hinged portions will correspond or align with the hinge in the actuator housing in either position of the slide actuator. Therefore, regardless of the position of the actuator, that is, whether the "on" or "off" button has been depressed, the top part of the canister can be swung away from the lower part without causing damage to the relatively inflexible slide actuator.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a plan view of a canister vacuum cleaner, illustrating the switch actuator of the present invention used therewith.

FIG. 2 is a side view of the canister vacuum cleaner.

FIG. 3 is an end view of the canister vacuum cleaner.

FIG. 4 is an elevation view of the switch actuator and the housing therefor.

FIG. 5 is a perspective view of an integral pushbutton slide actuator of the present invention.

FIG. 6 is a section view taken along the line 6–6 of FIG. 4, illustrating one position for the switch actuator.

FIG. 7 is the same sectional view illustrating the other position for the switch actuator.

DESCRIPTION OF PREFERRED EMBODIMENT

Referring now to the drawings and in particular to FIGS. 1—3, there will be seen a canister vacuum cleaner **10**, suitably mounted on wheels, and having an upper part **12** and a lower part **14**. The upper and lower parts are hinged together by means of the hinge **16** and are latched together by latching mechanism **18**. The parts are sealed tightly when in use by sealing means **19**. In accordance with well-known construction, a vacuum or chamber compartment **20** is provided at the interior of the canister, the vacuum required being generated by a conventional fan motor, not shown. The intake to the vacuum chamber is indicated at **22** and the discharge from the canister at **24**. An atmospheric chamber or compartment **26** is defined within the lower part **14** by partition **27**. A motor switch **28** is located within the atmospheric compartment **26** (see FIG. **6**). The switch **28** is connected to a power cord **29** and is connected to the fan motor which is advantageously located in compartment **26**. As has already been mentioned, this location for the switch is highly desirable but, as also noted previously, it introduces difficulties in regard to actuation of the switch. As can clearly be seen in FIG. **6**, for example, the toggle or lever **30** is at an undesirably low level as it extends beyond the outside wall **31** of compartment **26**.

Referring now particularly to FIGS. **4**—**7**, the switch actuator of the present invention is shown mounted by suitable screws on the outer wall of the canister **10** at the hinged end thereof. The switch actuator is designated **50** and comprises a hinged plastic housing **52** contoured to fit the contours of canister **10** and being integrally formed in two sections of a relatively hard but resilient plastic, such as polypropylene or the like. The hinge **53** for the housing **52** is provided in the molding process for making this part and consists of a region of reduced thickness which has been scored or lined. As a result, the housing **52** is "self-hinged", as are other parts which will be described. It should be noted that self-hinge **53** is located on the same center as pivotal hinge **16**. Two oblong slide actuators **54** and **56** are provided and each includes an integral pushbutton **54***a* and **56***a* respectively, at one end. The actuator **54** is guided in its path of travel by the pair of guideways **58** located on one side of the hinge **53** and the pair of guideways **60** on the other side of the hinge **53**. In similar manner, the actuator **56** is provided with a pair of guideways **62**. The actuators **54** and **56** are coupled together by a pivotally mounted beam **64**, received at either end in the respective pushbuttons **54***a* and **56***a* by suitably disposed slots, such as the slot **66** in pushbutton **54***a*. The beam **58** is arranged for pivotal movement by being confined between the mounting stud **70** and an auxiliary stud **72** formed in the housing **52**.

It will be noted that actuator **56** does not extend into the lower part of the housing **52**, whereas activator **54** does so extend and is provided with a cup-shaped portion **60** at its lower end. The purpose of this cup-shaped portion is to engage with the toggle **30** of the switch **28**.

As will be apparent, when the pushbutton **54***a* is pushed inwardly the cup-shaped portion **60** of the actuator **54** will function to place the switch **28** in the "on" state (see FIG. **7**). On

the other hand, when pushbutton **56***a* is pushed inwardly, the actuator **54** will be moved in the reverse direction, thereby turning off switch **28**. It will be noted that when the pushbutton **54***a* is pushed inwardly, a limit to its movement is provided by the upper end of the guideways **58** so that only the minimum force required to produce tripping of the toggle **30** is applied by reason of the pushbutton operation. In similar manner, operation of pushbutton **56***a* is such that its movement is stopped by the upper end of its guideways **62**.

Referring now to FIG. **5**, there will clearly be seen the two hinged portions **80** and **82** extending transversely with respect to the length of the actuator **54**. These "self-hinges" in the molded plastic actuator are so located that they are adapted to correspond respectively with one or the other of the selected positions for the switch actuator, that is, to either the "on" or the "off" position. As a result when the top part of the canister **12** is swung away from the bottom part **14** so that access may be gained to the interior of the canister, the top section of the switch actuator housing **52** will then be flexed. Were it not for the suitably disposed self-hinges **80** and **82** the plastic slide actuator **54** would be damaged. However, due to this arrangement of the two hinged portions **80** and **82**, two possible contingencies in operation are covered: the normal contingency where the vacuum cleaner motor has been deenergized by depressing the "off" button in which case the actuator **54** is in the upper position shown in FIG. **4** with the hinge portion **82** in correspondence with the hinge **53**; the other contingency is the case where the "on" button has been depressed, then power has been removed such as by pulling the plug and then the top part of the canister is swung open. Again, no damage will occur to the actuator **54** because, in this event, the hinge portion **80** corresponds with the hinge **53** of the housing **52**.

It will be appreciated that what has been disclosed is a switch actuator especially adapted for use with canister vacuum cleaners, but capable of use in other environments. The actuator is so constructed as to allow for facile, damage-proof operation of a switch remotely located from pushbuttons forming part of the actuator.

I claim:

1. A switch actuator for a canister vacuum cleaner for actuating a motor switch which is disposed in one part of said canister from another part of the canister, the two parts being hinged together, comprising:

a hinged housing mounted on said canister; a pair of pushbuttons mounted in one section of said housing; said pushbuttons being connected by a pivotally mounted beam, one of said pushbuttons including a slide actuator, extending into another section of said hinged housing, and having a portion at one end for actuating a switch; said slide actuator having at least one traverse flexible portion for corresponding with the hinge of said housing so as to enable flexure of said slide actuator when said housing is flexed.

2. A switch actuator as defined in claim **1** in which one of said pushbuttons and said slide actuator are integrally formed of hard plastic material.

3. A switch actuator as defined in claim **1**, further comprising another transverse flexible portion of said slide actuator serving as a hinge, said other portion being spaced from said first flexible portion for corresponding with the hinge in said housing for flexure therewith when said one pushbutton is in another position.

4. A switch actuator as defined in claim **3**, further including a pair of spaced guideways on either side of said slide actuator and carried by said one section of said hinged housing, and another pair of spaced guideways carried by the other section of said housing, one end of said first pair of guideways acting to limit the movement inwardly of said one pushbutton.

5. A switch actuator as defined in claim **4**, in which said slide actuator includes a cup-shaped portion at one end thereof for engaging the toggle of said switch.

6. A switch actuator comprising a hinged housing; a pair of pushbuttons mounted in one section of said housing; said pushbuttons being connected by a pivotally mounted beam, one of said pushbuttons including a slide actuator, extending into another section of said housing, and having a portion at one end for actuating a switch, said slide actuator having at least one transverse flexible portion for corresponding with the hinge of said housing so as to enable flexure of said slide actuator when said housing is flexed.

7. A switch actuator as defined in claim **6** in which one of said pushbuttons and said slide actuator are integrally formed of hard plastic material.

8. A switch actuator as defined in claim **6**, further comprising another transverse flexible portion of said slide actuator serving as a hinge, said other portion being spaced from said first flexible portion for corresponding with the hinge in said housing for flexure therewith when said one pushbutton is in another position.

9. A switch actuator as defined in claim **8**, including a pair of spaced guideways on either side of said slide actuator and carried by said one section of said hinged housing and another pair of spaced guideways carried by the other section of said housing, one end of said first pair of guideways acting to limit the movement inwardly of said one pushbutton.

10. A switch actuator as defined in claim **9**, in which said slide actuator includes a cup-shaped portion at one end thereof for engaging the toggle of said switch.