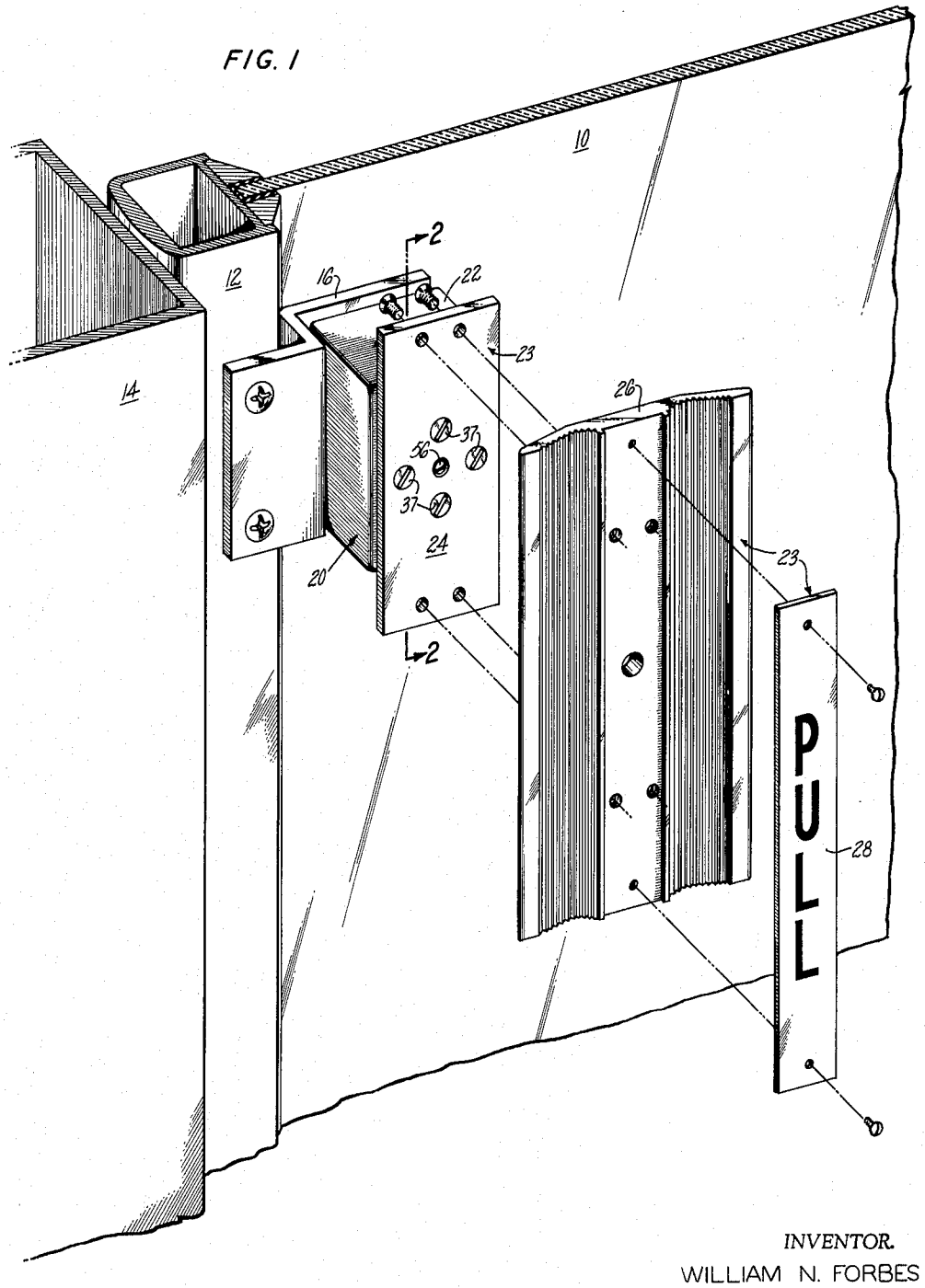
June 21, 1966 W. N. FORBES 3,257,520

SWITCH ASSEMBLY FOR USE WITH A POWER ACTUATED DOOR

Filed May 15, 1964 3 Sheets-Sheet 1

FIG. 1




INVENTOR.
WILLIAM N. FORBES
BY Lindsey, Pentzman and Hayes
ATTORNEYS

June 21, 1966 W. N. FORBES 3,257,520

SWITCH ASSEMBLY FOR USE WITH A POWER ACTUATED DOOR

Filed May 15, 1964 3 Sheets-Sheet 2

FIG. 2

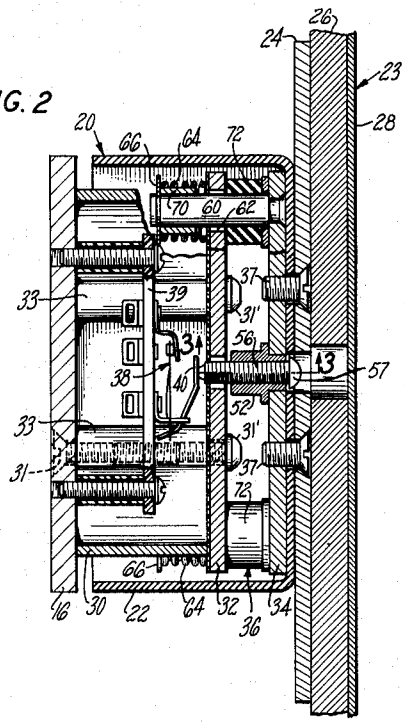
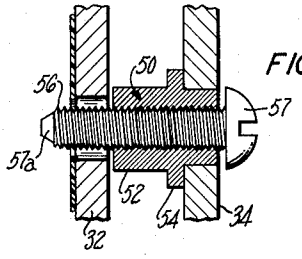



FIG. 3



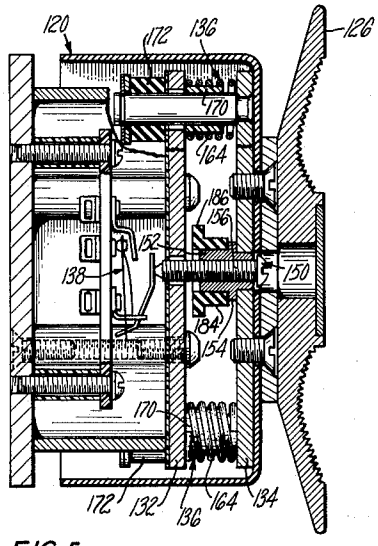




FIG. 5

INVENTOR.
WILLIAM N. FORBES

BY Lindsey, Prutzman and Hayes

ATTORNEYS

June 21, 1966 W. N. FORBES 3,257,520

SWITCH ASSEMBLY FOR USE WITH A POWER ACTUATED DOOR

Filed May 15, 1964 3 Sheets-Sheet 3

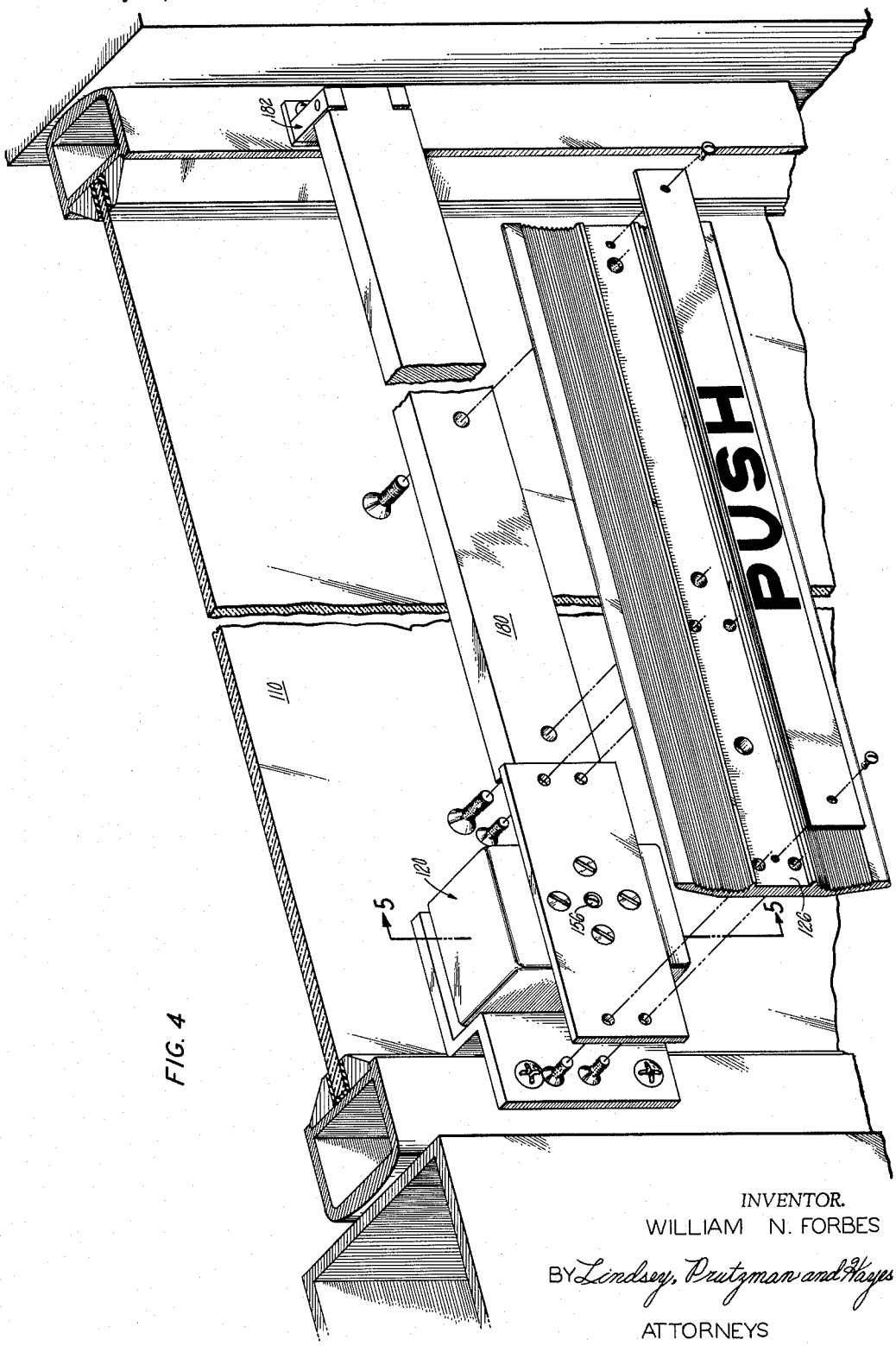



FIG. 4

INVENTOR.
WILLIAM N. FORBES
BY Lindsey, Pratzman and Hayes
ATTORNEYS

United States Patent Office 3,257,520 Patented June 21, 1966



3,257,520

# SWITCH ASSEMBLY FOR USE WITH A POWER ACTUATED DOOR

William N. Forbes, Southington, Conn., assignor to The Stanley Works, New Britain, Conn., a corporation of Connecticut

Filed May 15, 1964, Ser. No. 367,842
7 Claims. (Cl. 200—61.62)

This invention relates generally to an improvement in switch assemblies for what are commonly called "automatic" doors and more particularly to an improvement in a door-mounted electric switch assembly for a power actuated door.

The principal aim of this invention is to provide an improved switch assembly of the type referred to which is capable of providing reliable operation while being subjected to continuous, often rugged, use and yet is sufficiently sensitive to be immediately responsive to a light touch so that even a small child can readily open the door. Included in this aim is the object of providing a switch assembly having a minimum number of moving parts and which possesses a touch control which can be easily adjusted even after installation without danger of damage to the delicate switch mechanism.

Another aim of this invention is to provide an improved door-mounted switch assembly which is designed to virtually eliminate noise despite the fact that the door acts as a sounding board for noise resulting from the operation of the switch assembly.

A further aim of this invention is the provision of an improved door-mounted switch assembly which can be used in a natural manner for either push or pull operation so that after the switch assembly is initially manually actuated the door is power operated immediately without further effort by a pedestrian. Included in this aim is the object of providing a switch assembly which is adapted to be manually actuated at a substantial angle from the horizontal, particularly for the convenience of children, as well as in the normal straightforward manner.

A still further aim of this invention is the provision of an improved switch assembly which is compact and economical to manufacture and which is virtually free from maintenance requirements.

Other objects will be in part obvious and in part pointed out more in detail hereinafter.

The invention accordingly consists in the features of construction, combination of elements and arrangement of parts which is exemplified in the construction hereafter set forth, and the scope of the invention is indicated in the appended claims.

In the drawings:

FIG. 1 is a fragmentary perspective view of a door-mounted switch assembly, partly exploded, constructed in accordance with the present invention;

FIG. 2 is an enlarged cross-sectional view, partly broken away, taken along line 2—2 of FIG. 1 showing the switch assembly in an assembled relationship;

FIG. 3 is an enlarged fragmentary cross-sectional view, taken along line 3—3 of FIG. 2;

FIG. 4 is a fragmentary perspective view of another embodiment of a door-mounted switch assembly, partly exploded, according to the present invention; and

FIG. 5 is an enlarged cross-sectional view, partly broken away, taken along line 5—5 of FIG. 4 showing the switch assembly in an assembled position.

Referring first to that form of the invention illustrated in FIGS. 1–3, inclusive, a door **10** is shown with its leading or swinging edge in a closed position and having a frame member **12** adjacent a doorway jamb **14**, the door and doorway jamb being fragmentarily shown. It



will be understood that a mechanical operator (not shown) is utilized to power the door **10** in the conventional manner during the door opening and door closing movements. A stepped bracket **16**, shown as being fixed to the frame member **12**, is provided to rigidly secure a switch assembly, generally designated **20**, to a face of door **10** adjacent frame member **12**. The switch assembly **20** is substantially encased in a box-like cover **22** having mounted on its top wall a handle assembly **23**. The latter includes an adapter plate **24** fixed to the outer face of the top wall of cover **22** and a vertical hand plate **26** mounted on the adapter plate **24**, the hand plate **26** having an appropriately marked central overlay **28** detachably secured thereto by threaded fasteners.

The details of the switch assembly **20** are best seen in FIG. 2 wherein the base of a generally rectangular housing **30** is mounted to the bracket **16** by machine screws **31** engaging bosses **33** which extend longitudinally of the walls of housing **30** for receiving fasteners **31'** affixing a cover plate **32** to the other end of housing **30**. Superposed on the fixed guide or cover plate **32** is a movable operating plate **34** maintained in spaced relationship thereto by a plurality of mounts **36**, both the cover plate **32** and the operating plate **34** being rectangular and generally coextensive with one another. The top wall of the cover **22** is interposed for attachment between the operating plate **34** and the adapter plate **24** of the handle assembly **23**, the adapter plate **24** being secured preferably by machine screws **37** extending through cover **22** to the operating plate **34**.

A conventional microswitch **38** accommodated within housing **30** is shown as being mounted on a raised platform **39** fixed by fasteners engaging bracket **16**. An arm **40** of switch **38** is biased outwardly toward cover plate **32**, is being understood that upon actuation of the arm **40** the switch **38** will be closed to energize the door operator causing door **10** to be operated.

For actuating switch **38** a floating switch operator, generally designated **50**, is centrally positioned in alignment with arm **40** of switch **38**. As best seen in FIG. 3, a sleeve **52**, preferably formed from a metallic material, is fixedly mounted on operating plate **34** with a ringlike portion **54** contiguous to the inner surface of operating plate **34** whereby the main body of sleeve **52** is generally disposed between opposing surfaces of the operating plate **34** and cover plate **32**. An adjusting screw **56** is threadedly engaged in a central aperture of sleeve **52** and projected through an opening formed in cover plate **32** for engaging arm **40** of the switch **38**. The end of the screw **56** is provided with an insulating surface **57***a* to electrically isolate the switch **38** from the hand plate **26**, it being understood that an insulating covering could alternatively be provided for switch arm **40**. It will be noted that both the adapter plate **24** and the hand plate **26** provide apertures aligned with the adjusting screw **56** whereby, upon removal of the overlay **28**, the head **57** of adjusting screw **56** is readily accessible for adjusting the "touch" of hand plate **26** by moving screw **56** relative to the sleeve **52**.

So that the floating switch operator **50** is adapted to be responsive to even the lightest touch, the mounts **36** are shown as being spring-mounted at each of the four corners of the switch assembly **20**. A mounting or retaining pin **60**, desirably of the type commonly called a "grease pin," is fixed to operating plate **34** and has a free end portion extending through an aperture **62**, formed in the corner of cover plate **32**, and alongside the walls of the housing **30**. The retaining pin **60** is loosely fit for tilting movement within aperture **62** whereby the hand plate **26** can be actuated, even at an angle of approximately 45° from the horizontal, and the pin **60** will still be moved smoothly without binding. A notably compact assembly is provided by forming the walls of housing **30** inwardly of the

free end portions of mounts **36** thereby eliminating the customary square corners of the housing and considerably reducing the size of the entire assembly.

Springs **64**, preferably of the helical type, are retained on the free end portion of pins **60** between circular retaining rings **66**, received in annular slots formed near the free ends of pins **60**, and the inner surface of cover plate **32**, spring **64** encircling spacers **70** for limiting relative movement of plates **32**, **34**. Spacers **70** may be formed from a phenolic material providing sufficient rigidity to stop the outward movement of operating plate **34** and additionally serve as a support and prevent permanent deformation of springs **64** if the hand plate **26** is pulled outwardly with excess force. Upon the release of hand plate **26**, stout, ringlike bumpers **72** disposed about pins **60** between plates **32**, **34** serve as stops. It has been found that by forming bumper **72** from a resilient rubberlike material such as natural rubber, neoprene or the like, having a durometer hardness of approximately 95, the noise due to the impact of the operating plate **34** is virtually eliminated. This feature is particularly important in a switch assembly rigidly secured to a door, for the latter normally acts as a sounding board whereby the vibrations caused by the movement of parts is amplified and the entire door reverberates.

Although the cover **22** projects beyond the furthest extension of mounts **36**, cover **22** does not extend over the entire assembly in its normal position but rather is terminated adjacent support bracket **16** to prevent any possibility of contact therebetween or binding which would impair operation of the assembly.

Thus, in this embodiment of the invention, the loose fit of the retaining pins **60** enables a pedestrian to pull hand plate **26** directly away from door **10** and also at a substantial angle from the horizontal to draw the operating plate **34** away from housing **30** to actuate switch **38**, the movement of the parts being limited by spacers **70**. When the hand plate **26** is released, the springs **64** will immediately retract the movable parts in a notably quiet return due to the rubberlike bumpers **72**. In the event of an adjustment of the "touch," the switch **38** is protected by the head **57** of the adjusting screw **56** which will bottom against operating plate **34** to prevent damage to the switch, thereby enabling even an unskilled workman to safely make the touch adjustment even though he cannot actually see the switch **38** contained within housing **30** nor hear the "click" of the switch actuation as in a noisy environment.

In the form of the invention shown in FIGS. 4 and 5, like numerals prefixed by the numeral 1 indicate like parts. In general, switch assembly **120** is similar to that described in connection with the first embodiment and similarly assembled. However, in this embodiment it will be noted that hand plate **126** is in a horizontal position and a bar **180** is shown for illustrative purposes as being fixed to hand plate **126** and extends laterally across the face of door **110** at a convenient height to a hinge assembly **182** mounted at the opposite edge of door **110**. The switch mechanism **138** is shown in open position, and adjusting screw **156** of the floating switch operator **150** is correspondingly dimensioned to effect unimpaired actuation. The positions of spring and spacer members **164**, **170** of each mount **136** are interchanged with the positions of bumper **72** of the previous embodiment, with the spring and spacer members **164**, **170** positioned between cover plate **132** and operating plate **134**, and bumpers **172** on the opposite side of the cover plate **132** of the free end portion of mount **136**. In this embodiment, the hand plate **126** is pushed inwardly to actuate the switch **138**. To assure that switch **138** will not be smashed by the switch operator **150** through the use of excess force by a pedestrian, a bumper or bushing **184** is provided on the main body of sleeve **152** so as to be snugly abutting the ringlike portion **154** and coaxially extending beyond the termination of sleeve **152** to a preselected position adjacent cover plate **132**. The bushing **184** is formed from a rubberlike material substantially identical to that of the bumpers **72** in the previously described embodiment. To assure that bushing **184** will effectively bottom against the cover plate **132**, an end portion **186** of increased diameter is formed adjacent the cover plate.

The embodiment shown in FIGS. 4 and 5 has certain advantages from the standpoint of providing a door **110** which can be manually actuated at any point along the horizontal bar **180** in a direction opposite to that described in the previous embodiment, and also provides somewhat increased strength and rigidity of the assembly. Although as illustrated the hand plate **126** must be pushed directly inwardly, it is apparent that by using a ball and socket joint of hinge assembly **182**, or by eliminating the horizontal bar entirely, the hand plate **126** may be tilted to actuate the switch **138** as well as being actuated by a straightforward push.

The switch assembly of the present invention may be used with doors of various dimensions serving a variety of purposes. When assembled, the switch assembly has a pleasing appearance and is particularly compact and virtually free from maintenance problems. If it is desired to adjust the touch control, even an unskilled workman can do so without danger of damage to the switch and complete dismantlement is unnecessary, for upon removal of one plate the assembly can be readily adjusted. In addition to being economical to use, the assembly has been designed for low-cost manufacture with a maximum number of extruded parts. The noise problem associated with a rigidly secured door-mounted switch assembly has been eliminated by the use of a minimum number of moving parts adapted for noise-proof operation. The assembled unit is held in place with sufficient strength so as to permit strenuous usage without failure under ordinary conditions, and yet is a highly sensitive device so as to be immediately operable even at an angle from the horizontal, under the light touch of a child.

As will be apparent to persons skilled in the art, various modifications and adaptations of the structure above described will become readily apparent without departure from the spirit and scope of the invention, the scope of which is defined in the appended claims.

I claim:

**1.** A switch assembly adapted to be mounted on a door comprising, a concealed switch, a support mounting the switch on the door, an operating plate resiliently mounted for movement on the support, and a switch operator fixed on the operating plate for actuating the switch, one end of the operator engaging the switch and the opposite end of the operator being received in an aperture in the operating plate for selectively regulating the amount of force required to actuate the switch, a head on the operator overlapping the periphery of the aperture to bottom against the operating plate to prevent damage to the concealed switch during adjustment thereof.

**2.** A switch assembly adapted to be mounted on a door comprising: a housing; a support member mounting the housing on the door; a manually operable switch mounted within the housing, the switch having a movable arm; a cover plate fixed to the housing; an operating plate mounted for movement on the cover plate; a plurality of mounts maintaining the cover plate and the operating plate in spaced relationship, each of the mounts including a bumper to serve as a stop for limiting movement of the operating plate during the opening of the switch, the bumpers being formed of a rubberlike material to silence the noise normally resulting from the operation of the switch assembly; a sleeve fixed to the operating plate and having a threaded aperture therethrough in alignment with the switch arm; and a screw received within the aperture of the sleeve and extending through the cover plate, one end of the screw engaging the switch arm for closing and opening the switch upon manual actuation of the operating plate.

3. A switch assembly as recited in claim 2 wherein each of the mounts includes a spring engaging the cover plate and biased to oppose movement of the operating plate during the manual actuation thereof in closing the switch, and the screw being adjustable and including an abutment on the end opposite the end engaging the switch arm, the abutment engaging the sleeve to limit the adjustment of the screw to prevent damage to the switch.

4. A switch assembly as recited in claim 2 wherein a bushing is fixed to the sleeve to bottom against the cover plate for limiting movement of the sleeve during the closing of the switch if excess force is exerted in the manual actuation of the operating plate.

5. A switch assembly adapted to be mounted on a door comprising: a switch; a support for mounting the switch on a door; a manually operable switch operator for actuating the switch; a guide plate rigidly fixed to the support between the switch and the switch operator, the guide plate having an aperture formed therein; a mounting pin extending through the aperture of the guide plate, said mounting pin being fixed to the switch operator and secured to the guide plate for movement relative thereto, said mounting pin further being of reduced cross section with respect to the aperture to provide a peripheral clearance therebetween whereby, upon actuating the switch operator to tilt the mounting pin relative to the guide plate, the mounting pin moves freely within its aperture.

6. A switch assembly as recited in claim 5 including stop means for limiting movement of the switch operator during the opening and closing of the switch, the stop means including an annular bumper secured to the mounting pin for engaging the guide plate, the bumper being formed of rubberlike material to muffle a noise source susceptible to being amplified by the door acting as a sounding board.



7. A switch assembly as recited in claim 5 wherein the mounting pin has one end fixed to the switch operator and extends through the aperture of the guide plate to an opposite free end on the opposing side of the guide plate; and wherein an annular bumper is secured to the mounting pin for engaging one side of the guide plate to serve as a stop for limiting movement of the switch operator in one direction, and a coil spring is retained on the mounting pin in engagement with an opposite side of the guide plate, the coil spring being biased to oppose movement of the switch operator in the direction opposite said one direction.


**References Cited by the Examiner**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 1,052,920 | 2/1913 | Hinckley | 200—163 |
| 2,740,023 | 3/1956 | Kryder | 200—159 X |
| 2,921,159 | 1/1960 | Elderton et al. | 200—159 X |
| 2,952,754 | 9/1960 | Tomlinson et al. | 200—159 X |

FOREIGN PATENTS

| | | |
|---|---|---|
| 510,988 | 1/1955 | Italy. |



BERNARD A. GILHEANY, *Primary Examiner.*

J. J. BAKER, *Assistant Examiner.*