

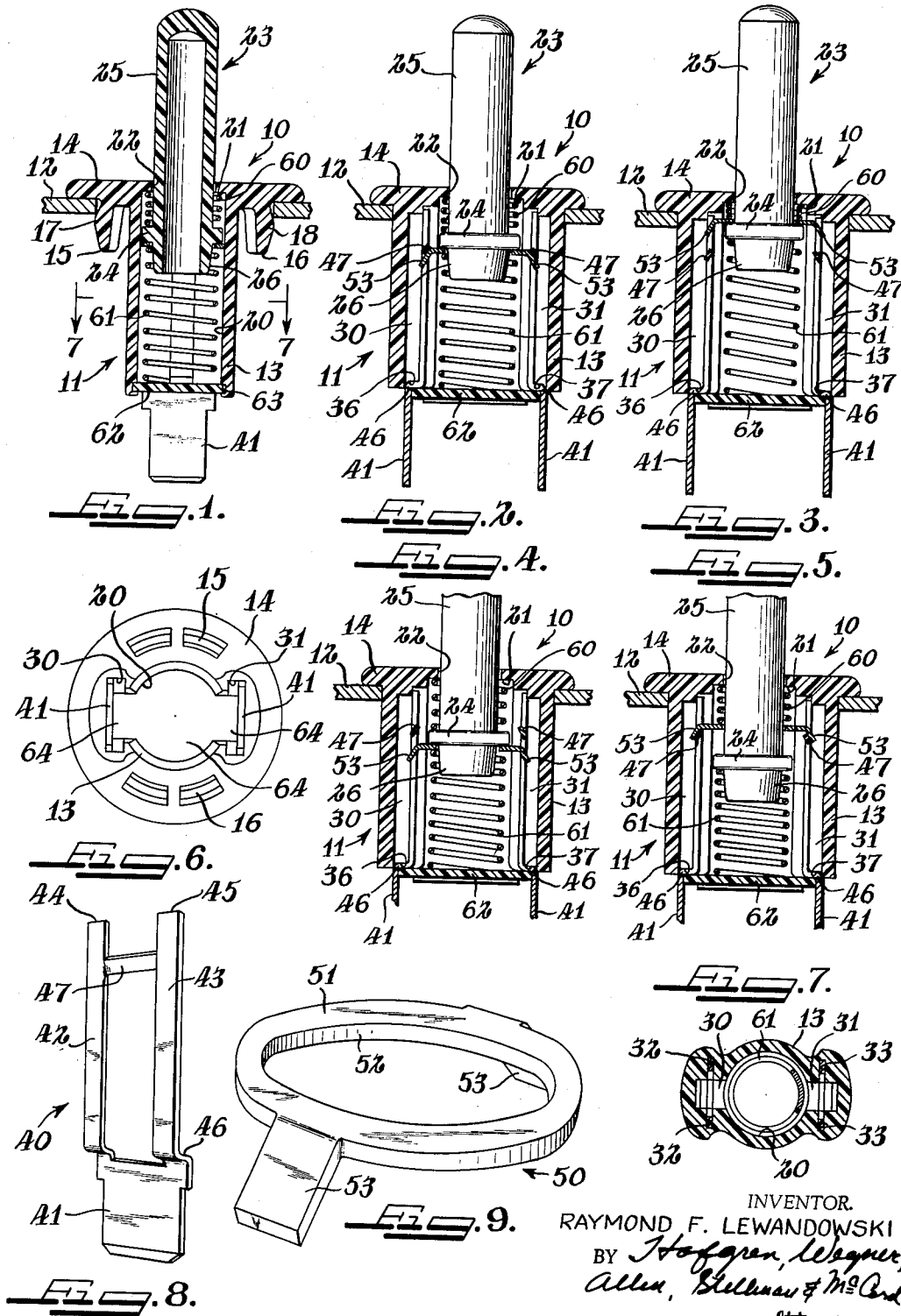
Dec. 14, 1965

R. F. LEWANDOWSKI

3,223,813

PLUNGER SWITCH HAVING CONTACTS READILY CONVERTIBLE BETWEEN
NORMALLY OPEN AND NORMALLY CLOSED POSITIONS

Filed July 2, 1963



INVENTOR.
RAYMOND F. LEWANDOWSKI
BY *Hoffman, Lechner,*
Allen, Sullivan & McLeod
Attys.

1

2

3,223,813

PLUNGER SWITCH HAVING CONTACTS READILY CONVERTIBLE BETWEEN NORMALLY OPEN AND NORMALLY CLOSED POSITIONS

Raymond F. Lewandowski, Cary, Ill., assignor to Oak Manufacturing Co., a corporation of Delaware
Filed July 2, 1963, Ser. No. 292,266
5 Claims. (Cl. 200—159)

This invention relates in general to switches, and more particularly to a plunger switch.

In the past, it has been conventional for a switch manufacturer to make one line of switches which were normally open and a second line of switches which were normally closed. In carrying out the manufacture of such switches, similar parts have been used. However, due to the different function of the two switch types, the parts have usually not been interchangeable from one switch type to the other. Accordingly, the general purpose of the present invention is to provide a switch which may be assembled of identical parts as either a normally open switch or a normally closed switch.

An object of the present invention is the provision of an improved plunger type electrical switch.

Another object of the invention is the provision of a switch in which the elements may be used as either a normally open switch or as a normally closed switch.

A further object of the invention is the provision of a switch as described in the previous paragraph wherein the normally open switch differs from the normally closed switch in the mere change of position of a single part.

Still a further object of the invention is to provide a switch as described in the previous paragraph which is simple in construction, efficient in operation, while adapted for its intended purposes, and relatively inexpensive to manufacture and maintain.

These and other objects of the invention will hereinafter become more fully apparent from an examination of the following specification and drawing, wherein:

FIGURE 1 is a central sectional view showing a preferred embodiment of the switch as a normally closed switch;

FIGURE 2 is a partial central sectional view taken at right angles to the view of FIGURE 1, showing the normally closed switch in the closed position;

FIGURE 3 is a view similar to FIGURE 2 showing the switch as a normally open switch in the open position;

FIGURE 4 is a view similar to FIGURE 2 showing the normally closed switch in the open position;

FIGURE 5 is a view similar to FIGURE 3 showing the normally open switch in the closed position;

FIGURE 6 is a bottom view of the structure illustrated in FIGURES 1-5;

FIGURE 7 is a sectional view, taken substantially as shown along line 7-7 of FIGURE 1;

FIGURE 8 is a perspective view on an enlarged scale of a switch terminal; and

FIGURE 9 is a perspective view on an enlarged scale of a contact bar of the present invention.

While this invention is susceptible to embodiment in many different forms, there is shown in the drawings and will herein be described in detail one specific embodiment, with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the invention to the embodiment illustrated. The scope of the invention will be pointed out in the appended claims.

Referring now to the drawing, wherein like reference characters designate like or corresponding parts throughout the several views, the preferred switch embodiment is indicated in its entirety by reference numeral 10. Switch

10 includes a housing or casing 11 which is adapted to be mounted in an apertured support 12. Housing 11 comprises an elongate body 13 and a base 14 normal to the axis of body 13. Base 14 is generally circular in shape and is substantially larger than the opening in support 12, so as to dispose the planar undersurface of base 14 in face abutting relation with the outer surface of support 12. A pair of arcuate lugs 15 and 16 are provided on the undersurface of base 14, and each lug has an outwardly bowed face, shown at 17 and 18, by which housing 11 is mounted in support 12 with a snap action.

A longitudinally extending central bore 20 is formed in body 13 and terminates in an annular shoulder 21 which surrounds an axial opening 22 through base 14. A generally cylindrically shaped plunger 23 is reciprocally mounted in bore 20, and is provided with an annular shoulder 24 adjacent one end thereof which divides plunger 23 into first and second plunger portions 25 and 26. Plunger portion 25 is substantially longer than plunger portion 26, and is adapted to pass outwardly through opening 22.

Body 13 further includes a pair of channels 30 and 31 positioned on opposed sides of and communicating with bore 20. Axially extending grooves 32 and 33 are provided on opposite sides of channel 30 and 31, respectively, and are adapted to receive the switch terminals, as will hereinafter become more fully apparent. Seating means are provided in channels 30 and 31 for the switch terminals, and take the form of shoulders 36 and 37 at the end of the switch body remote from base 14.

The construction of terminals 40 will be best understood from a consideration of FIGURE 8. Each terminal 40 includes a connector portion 41 which extends outwardly from switch body 13, and a pair of spaced apart legs 42 and 43 having end portions 44 and 45, respectively. Legs 42 and 43 are laterally offset from connector portion 41, and are joined thereto by a right angularly disposed portion 46. From an examination of FIGURES 2-5, it will be readily apparent that terminal portions 46 are seated against switch shoulders 36 and 37. Terminals 40 further include contact portions 47 which span legs 42 and 43 and are angularly disposed with respect thereto.

A contact bar 50 is mounted in switch body 13, and is actuated in response to movement of plunger 23 in the switch body. Contact bar 50 includes an annular ring 51 having planar top and bottom surfaces, and an internal diameter 52 which is slightly larger than the outer diameter of plunger sections 25 and 26, so as to allow the contact bar 50 to be slidably mounted upon the plunger 23. Contact bar 50 further includes a pair of diametrically opposed fingers 53 which are angularly inclined with respect to rings 51, the angle of inclination corresponding to the inclination of terminal contact portions 47.

A first spring 60 surrounds plunger portion 25 and is biased between seat 21 and plunger shoulder 24. A second spring 61 surrounds plunger portion 26 and is biased between plunger shoulder 24 and a closure member 62 that has a generally circular central portion seated against a shoulder 63 provided in bore 20. As is best seen in FIGURE 6, closure member 62 also includes outwardly extending fingers 64 which are wedged between terminal connector portions 41. Spring 61 is substantially longer and stronger than spring 60, and thus the switch parts are urged into the positions shown in FIGURES 1-3.

As is best seen in FIGURES 1, 2 and 4, in the normally closed switch, contact bar 50 surrounds plunger portion 26 on the side of the terminal contact portions 47 remote from base 14, and fingers 53 are held against terminal contact portions 47 by spring 61. When plunger 23 is depressed from the position shown in FIGURE 2 to the position shown in FIGURE 4, plunger shoulder 24 en-

gages contact bar ring 51 and moves the contact bar 50 axially in bore 20 to shift fingers 53 out of engagement with terminal contact portions 47. When the depressing force is released from plunger 23, spring 61 will return the switch parts to the position shown in FIGURE 2.

The normally open switch shown in FIGURES 3 and 5, differs from the normally closed switch shown in FIGURES 1, 2 and 4, merely in placing contact bar 50 on the plunger portion 25 of plunger 23 and on the side of terminal contact portions 47 adjacent base 14. As illustrated in FIGURE 3, spring 61 engages the plunger shoulder 24 to hold the contact fingers 53 out of engagement with the terminal contact portions 47. When plunger 23 is depressed, spring 60 will shift contact bar 50 axially in bore 20 so that contact fingers 53 will be engaging terminal contact portions 47. When the depressing force is released from plunger 23, spring 61 will return the switch part to the normally open position shown in FIGURE 3.

I claim:

1. A plunger switch adapted to be mounted in a support having an aperture, said switch comprising: a housing having a longitudinally extending body adapted to pass through said support aperture and a circular base adapted to be positioned in face abutting relation with said support, locking means on said base engageable with said support to retain said housing against movement relative to said support, a central axially extending bore in said body, said bore having an axially open end at the end of said body remote from said base and a partially closed end at the end of said body adjacent said base, said partially close bore end defining a shoulder which surrounds an axially extending opening through said base; a pair of channels in said body and positioned on opposite sides of and communicating with said bore, said channels each having an axially open end at the end of said body remote from said base and a closed end at the end of said body adjacent said base, a shoulder in each channel positioned inwardly from the channel open end and defining stop means; a terminal positioned in each channel, each terminal having an angularly disposed portion positioned against said stop means, each terminal also having a connector portion extending outwardly of said body from said open channel end, each terminal further having an inclined contact portion adjacent said closed channel end, said inclined contact portion being accessible from both said closed channel end and said open channel end; a generally cylindrical plunger reciprocally mounted in said bore and extending outwardly of said housing through said base opening, an annular shoulder on said plunger dividing said plunger into first and second plunger portions; a closure member positioned in and closing the open end of said bore; a first spring surrounding said first plunger portion and extending between said bore shoulder and one side of said plunger shoulder; a second spring surrounding said second plunger portion and extending between said closure member and the other side

of said plunger shoulder, said second spring being substantially stronger than said first spring and continuously urging said plunger outwardly of said housing; and a contact bar having an annular ring portion surrounding said plunger, and held against said plunger shoulder by one of said springs, there being inclined fingers extending outwardly from diametrically opposed sides of said ring portion into said channels, the inclination of said fingers corresponding to the inclination of said terminal contact portions, said contact bar being actuated by reciprocation of said plunger in said bore to shift said contact bar fingers into and out of engagement with said terminal contact portions.

2. The switch defined in claim 1 wherein said locking means comprises arcuate lugs positioned on diametrically opposed sides of said body, said lugs each having an outwardly bowed surface cooperable with said support aperture.

3. The switch defined in claim 1 wherein said terminals each have a pair of spaced apart parallel legs, each of said terminal contact portions extending between said legs.

4. The switch defined in claim 1 wherein said contact bar is positioned around said second plunger portion on the side of said terminal contact portions remote from said base, said contact bar fingers being urged into releasable engagement with said terminal contact portions by said second spring to comprise a normally closed switch, said plunger shoulder engaging said contact bar ring portion upon movement of said plunger into said housing to shift said contact bar fingers out of engagement with said terminal contact portions.

5. The switch defined in claim 1 wherein said contact bar is positioned around said first plunger portion on the side of said terminal contact portions adjacent said base, said contact bar fingers being urged to a position out of engagement with said terminal contact portions by said second spring to comprise a normally open switch, said first spring urging said contact bar fingers into engagement with said terminal contact portions upon movement of said plunger into said housing.

References Cited by the Examiner

UNITED STATES PATENTS

525,266	8/1894	Geary	200—159
648,432	5/1900	Prentiss	200—166
820,041	5/1906	Ferdinand	200—159
2,065,904	12/1936	Meuer	200—159
2,605,375	7/1952	Ellithorpe	200—159
2,897,327	7/1959	De Smidt et al.	200—159
2,924,685	2/1960	Burch	200—166
3,164,707	1/1965	Fink	200—159

KATHLEEN H. CLAFFY, *Primary Examiner.*

BERNARD A. GILHEANY, *Examiner.*