Feb. 20, 1951 M. L. JEFFREY 2,542,531

NEUTRAL POSITION SWITCH

Filed April 19, 1947

Fig. 1

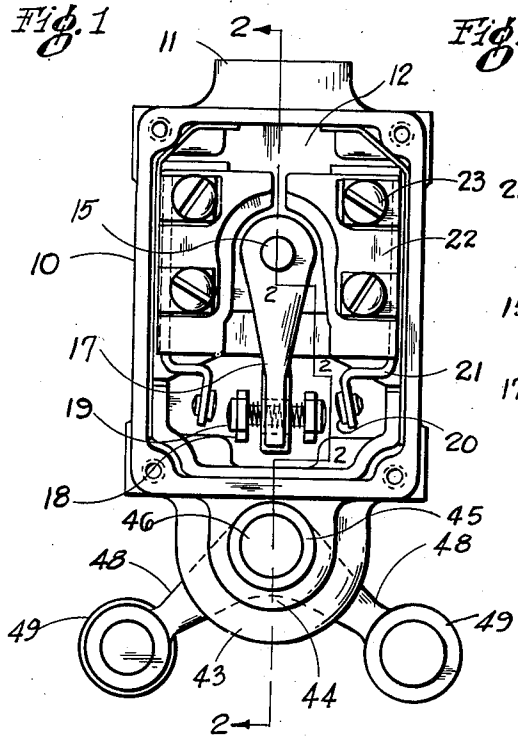


Fig. 2

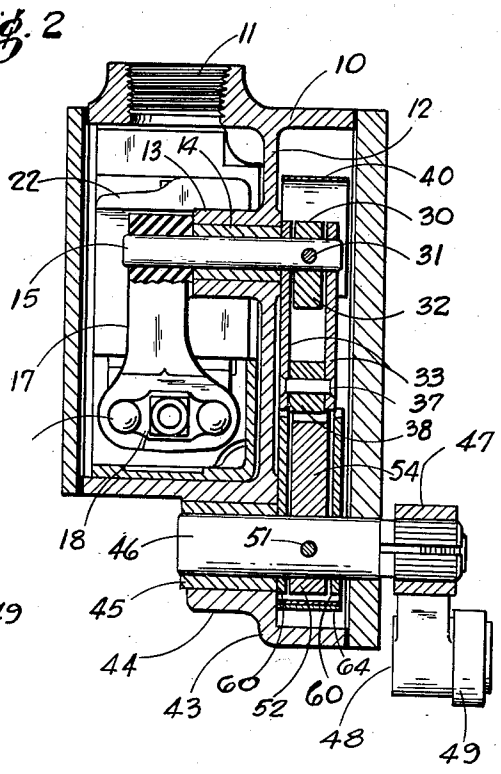
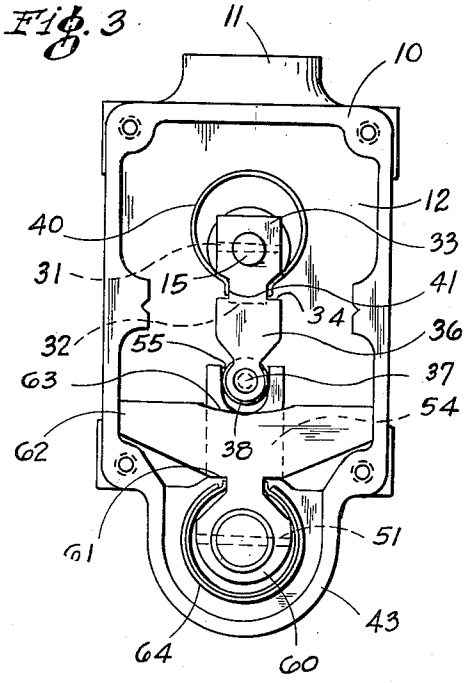


Fig. 3



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NEUTRAL POSITION SWITCH

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3 Claims. (Cl. 74—470)

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This invention relates to switches, and more particularly to a switch wherein the movable contacts are held in a normally neutral position out of contact with fixed contacts.

The invention includes among its objects to provide a switch wherein the operating lever is enabled to travel farther than is necessary in order to effect its operation.

A further advantage resides in providing a connection for the switch contact lever which limits the amount of pressure with which the contacts are closed thus reducing breakage.

Still another advantage resides in the provision of a mechanism wherein the operating contacts are always returned to an open position.

Another object is to provide a switch wherein a small travel of the operating lever in either direction causes the closing of contacts.

Still other advantages of the invention, and the invention itself will become more apparent from the following description of an embodiment thereof, which description is illustrated by the accompanying drawings and forms a part of this specification.

In the drawings:

Fig. 1 is an elevational view of a switch embodying my invention, with the cover plate removed;

Fig. 2 is a section taken on the line 2—2 of Fig. 1; and

Fig. 3 is a view from the other side to that of Fig. 1.

Referring now to the drawings, throughout which like parts are designated by like reference characters, there is provided a housing 10 which may be of generally rectangular formation and is provided with a threaded hollow boss 11 to which a tubular conduit, not shown, may be connected and through which the connecting wires may extend.

The interior of the housing is divided by a longitudinally extending partition 12 which is provided with a boss 13, having a bore therethrough, providing a support for a bearing bushing 14.

A shaft 15 is rotatably journalled in the bushing 14 and has secured thereto, on one end, an arm or contact carrying lever 17 of insulating material which carries on its end contact bars 18 which in turn support the movable contacts 19. Fixed contacts 20 are carried by contact strips 21 secured to a block of insulating material 22 so positioned that the movable contacts may be swung alternately into engagement with the fixed contacts. Screws 23 on the strips pro-

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vide means for connecting the wires, not shown, to the fixed contacts.

The contact carrying lever 17 is swingable, on the shaft 15, to bring the movable contacts into connecting engagement with the sets of fixed contacts 20, which sets are disposed on opposite sides of the housing, by an operating mechanism disposed on the other side of the partition 12. It will be understood that there may be at least two fixed contacts on each side of the housing, and that bars 18 with its contacts are adapted to provide a connection between the contacts of each set when swung into contact therewith.

The operating mechanism is similar to that disclosed in my copending application, Ser. No. 602,035, filed June 28, 1945, Patent No. 2,459,077. It comprises a driven lever 30 having a circular body secured to the shaft by a pin 31 and provided with a downwardly extending portion or neck 32.

A driving lever of composite structure is provided and includes plates 33, rotatably journalled on the shaft and having necked in portions 34, the sides of which are coplanar with those of neck 32 of the driven lever. A further extension for the drive lever is provided in that the plates extend downward beyond the driven lever at 36, and are secured together in spaced relation adjacent the ends, by a headed pin 37, a roller 38 being rotatably journalled on the pin.

The plates are tapered inwardly toward the roller 38 so that the roller may extend beyond the sides of the plate.

A C-shaped spring, which may comprise one or more leaves 40, surrounds the shaft engaging portion of the levers and has out curved ends 41 which rest against the coplanar surfaces on the necks of the two levers, holding them in alignment and providing a resilient driving coupling between them.

The lower end of the housing is provided with a semi-circular portion 43 including a boss 44 at the left as viewed in Fig. 2, in which is disposed a bearing bushing 45 that rotatably supports a driving shaft 46. The shaft 46 extends through the chamber formed by the part 43 and which chamber is a continuation of that above which houses the mechanism just described, and extends through the front plate. The end of the shaft has secured thereto an operating handle comprising a hub 47 having a pair of diverging arms 48, the ends of which carry rollers 49.

Interiorly of the housing, secured on the shaft 46 by a pin 51 is an operating lever. The operating lever includes a generally ring shaped por-

tion 52 surrounding the shaft and through which the pin 51 extends. A neck extends above the ring and connects to a body portion 54, the end of which is bifurcated to provide a fork, the walls 55 of which have tangential engagement with the roller 38.

Also disposed in the housing is a position member which includes the ring shaped portions 60 of the same conformation as the ring 52, which rings are disposed around the shaft 46 that is rotatably journalled therein.

The position member is likewise provided with neck portions 61, and the body above the neck portions is provided with a pair of laterally extending parts 62 which engage with the wall of the housing and hold the same against movement. The central portion of the member is relieved slightly at 63 to provide ample clearance for the roller 38.

A C-shaped spring 64, in this instance shown as two laminations engages the necks of the lever and the position member holding the lever in alignment therewith.

In its normal position, the contact lever is midway between the fixed contacts, and the operating lever 52 is held in a neutral position by the spring 64. If either one of the arms 48 is moved as by having a moving part or cam on a machine engage one of the rollers 49, the shaft is rotated and the lever 52—54 moves out of alignment with the position member 60—62 forcing apart the ends of the spring 64. This movement causes the forked part of the lever to move the lever 33 and through the spring 40, the lever 30, and thence the shaft 15. This swings the contact lever 17 with its movable contacts into engagement with one or the other of the sets of fixed contacts. When the progress of the lever 17 is impeded by the engagement of the contacts with the fixed contacts, further movement of the lever 30 is prevented, and the levers 33 and 30 move out of alignment causing the ends of the spring 40 to be forced apart. This eliminates the possibility of breakage due to over travel of the operating levers.

When the cam, or whatever is moving the lever 48, is removed from engagement therewith, the spring 64 swings the lever 52—54 back into alignment with the position member, causing the other parts to assume their normal position as shown in the figures. Thus after each operation, the parts return to a neutral position.

It will thus be noted that I have provided a switch wherein the parts are normally maintained in a neutral position. Furthermore, that even though considerable overtravel may be experienced because of its construction, no damage is done to the working parts.

It will also be apparent that the apparatus is simple and inexpensive to manufacture.

Having thus described my invention, I am aware that numerous and extensive departures may be made therefrom without departing from the spirit or scope of the appended claims.

I claim:

1. Means for moving a contact carrying member supported on a shaft for swinging movement between fixed contacts, comprising a driving and a driven lever on said shaft, the driven lever being secured on the shaft and the driving lever movably disposed on the shaft, spring means drivingly connecting the driving and driven levers, said driving lever having a roller on its end, an operating lever having portions for tangential engagement with the roller and spring means for engagement with said operating lever to hold it in a neutral position.

2. Means for moving a contact carrying member disposed on a shaft and swingable between fixed contacts, comprising a driven lever secured on the shaft, a driving lever rotatably disposed on the shaft and spring means connecting them, a roller carried by the driving lever, an operating shaft, and an operating handle carried thereby, an operating lever carried by the operating shaft, a position member juxtaposed to said last mentioned operating lever and spring means engaging the position member and the operating lever on the operating shaft to hold said operating lever in a neutral position.

3. In a switch having a contact carrying member which member is disposed on a shaft rotatably journalled in a wall of a housing and has a movable contact carrying lever secured thereto and having fixed contacts supported within the housing on opposite sides of the movable contact carrying member for alternate contact with the contacts of the movable contact member, means for moving said contact carrying member comprising a driven lever secured to said shaft and a driving lever rotatably carried by said shaft, spring means connecting said levers in driving relation, said driving lever having an end portion with a roller thereon, an operating lever having a forked end in tangential engagement with the roller on opposite sides, shaft means journalled in said housing for supporting and swinging the operating lever, a position member including portions disposed around said shaft on opposite sides of the operating lever, said position member and the operating lever each having necked in portions the lateral edges of which are coplanar, spring means engaging the edges of said operating lever and position member on said coplanar surface to hold them in alignment.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,893,564	Robb	Jan. 10, 1933
2,270,866	Cotesworth	Jan. 27, 1942
2,270,951	Jeffry	Jan. 27, 1942
2,294,559	Jeffrey	Sept. 1, 1942
2,336,425	Shenton	Dec. 7, 1943
2,339,117	Staples	Jan. 11, 1944
2,390,365	Goff	Dec. 4, 1945

FOREIGN PATENTS

Number	Country	Date
573,352	France	Mar. 8, 1942