United States Patent

[11] 3,609,256

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[54] **DUAL SWITCHING DEVICE**
8 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** ..... **200/5 E,** 200/50 C
[51] **Int. Cl.** **H01h 9/26**
[50] **Field of Search** ..... 200/5 R, 5 A, 5 B, 5 C, 5 D, 5 E, 5 F, 50 C

[56] **References Cited**

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ABSTRACT: A dual switching device is provided with a pair of switches individually actuatable by a tripedal actuating level rockable about either one of a pair of plungers by the other, each switch being actuated mutually exclusive of the other by a respective plunger, neither switch being actuated by both plungers operating in mutual conjunction.

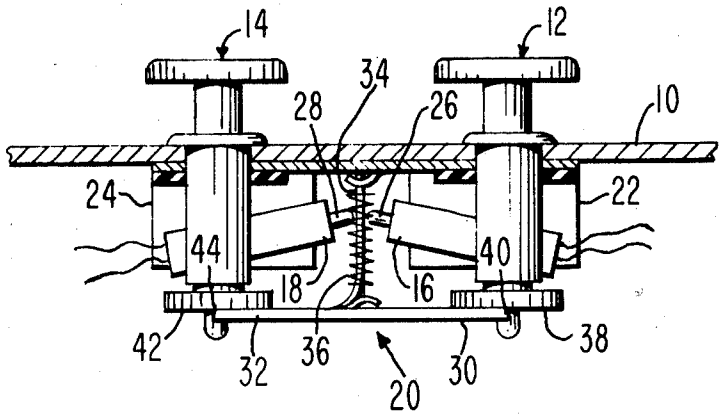


FIG. 1.

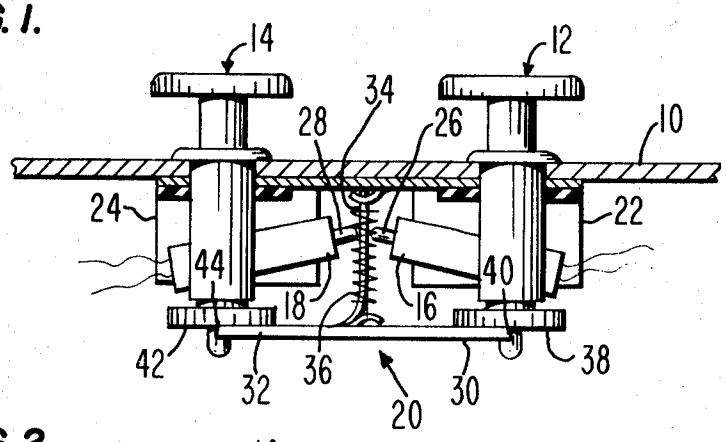


FIG. 2.

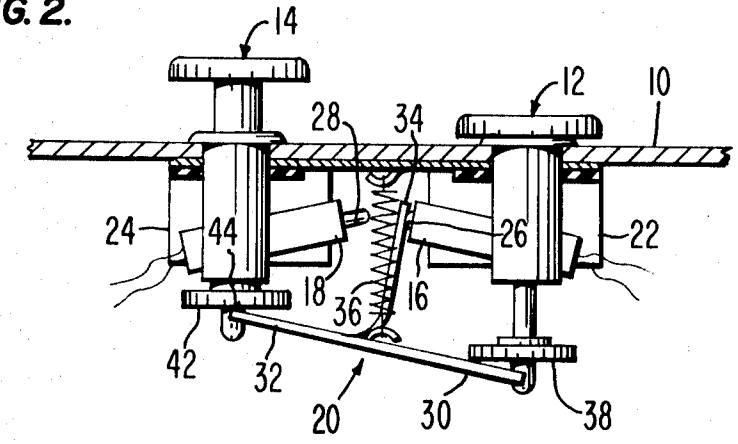
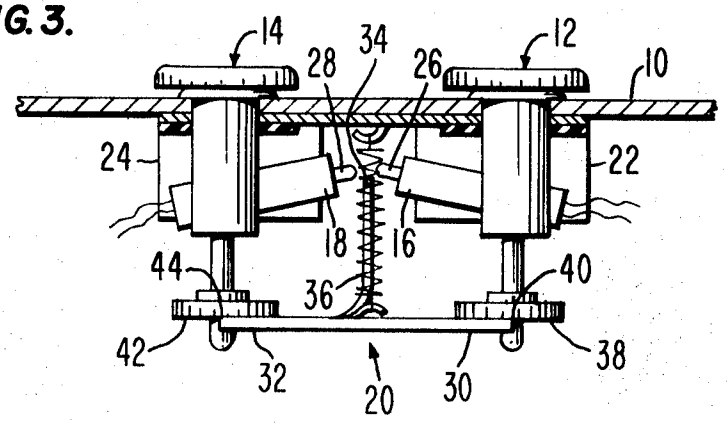


FIG. 3.



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DUAL SWITCHING DEVICE

BACKGROUND OF THE INVENTION

This invention relates to switching devices used to control two systems mutually exclusive of each other.

Prior art discloses switching devices used for the above purpose such as single-plunger-type switches that alternately open one of two sets of contacts while closing the other with each successive operation of the plunger. The sequence of operation is predetermined in that successive operations of the plunger will always open the set of contacts then closed and close the set of contact then open. When the plunger is released, one set of contacts will always remain closed and the other open.

Other typical plunger-type switches employed to control two systems use two plungers. Each plunger operates to close one of two sets of contacts and open the other These switch devices are also limited to a predetermined sequence of operation in that the operation of one plunger will open the set of closed contacts and close the set of open contacts. Here, as with the single-plunger-type switches, one set of contacts will always remain closed and the other open.

Often used in a two-system control device are two separate, momentary transfer, plunger-type switches. Although this configuration provides certain advantages over the device of the first two examples, exclusivity is not guaranteed. Both plungers could be operated simultaneously, resulting in the contacts of both switches transferring.

SUMMARY OF THE INVENTION

The invention resides in the provision of a tripedal actuator rockable by either one of a pair of plungers about a fulcrum formed by the other plunger to exclusively actuate one of a pair of switches.

Accordingly, it is an object of the present invention to provide a switching device having no predetermined sequence of operation so that a particular operation may be repeated consecutively and need not be alternated with another.

It is another object of the invention to provide a switching device wherein no contacts remain transferred after the completion of an operation.

Another object of the invention is to provide a switching device actuated by two plungers wherein no contacts transfer upon the simultaneous operation of both plungers.

An important aspect of the invention is the use of a rockable, tripedal actuating lever as a means for operatively coupling a pair of plungers to a respective pair of switches, either plunger functioning as a fulcrum as the other plunger rocks the actuating lever to activate its associated switch, such switch responding to one of the three arms of the actuating lever during the latter's rocking movement.

Another important aspect of the invention is the provision of means permitting the actuating lever to linearly translate when both plungers are actuated in mutual conjunction, thereby preventing either switch from actuating.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects, aspects and advantages of the invention will be more clearly understood from the following description when read in conjunction with the accompanying drawings, in which:

FIG. 1 is a side elevation of a switching device embodying features of the invention;

FIG. 2 is a view similar to that of FIG. 1 wherein the elements of the embodiment are shown in a first state with one of the pushbuttons depressed and one of the switches actuated; and

FIG. 3 is a view similar to that of FIG. 1 wherein the elements of the embodiment are shown in a second state with both pushbuttons depressed and neither switch actuated.

DETAILED DESCRIPTION OF THE INVENTION

The invention resides in the arrangement of a pair of pushbutton-type switch actuators on a keyboard panel or the like and the provision of control means responsive to the depressible manipulation of either or both pushbutton actuators to close or transfer one of the switches when its corresponding pushbutton actuator is depressed and to prevent the closing or transfer of either switch when both pushbutton actuators are depressed. In the preferred embodiment of the invention, a pair of plunger-operated switches are disposed in contiguous relationship to their corresponding pushbutton actuators with the plungers thereof facing one another in minimal spaced-apart relationship on a common plane. The control means of such preferred embodiment comprises a biased tripedal actuating member operatively coupling the extremities of the pair of pushbutton actuators by means of a pair of opposing axially disposed arms thereof, and operatively occupying the space between the plungers of the plunger-operated switches by means of a perpendicular arm fixed to the unitary intersection of the pair of opposing, axially disposed arms. As a consequence of the bias and pushbutton-coupling characteristics of this control means, depression of one pushbutton-type switch actuator will effectively and rockably actuate the switch plunger of its corresponding switch, and the coincidental depression of both pushbutton-type switch actuators will translatably displace the control means without actuating either of the switch plungers, the result thereof being failure to close or to transfer either switch.

Referring now to the drawings, the dual switching device shown includes a support member or frame **10**, a first and second switch actuator or plunger **12** and **14** operatively disposed in corresponding apertures formed in the support member **10**, a first switch **16** associated with the first plunger **12**, a second switch **18** associated with the second plunger **14**, and a tripedal actuating member **20** operatively coupling the first and second plungers. The first and second plungers **12** and **14** are arranged in spaced-apart relationship on the frame **10**, and the first and second switches **16** and **18** are each disposed in predetermined contiguous relationship with their respective plungers. The actuating member **20** is effectively positioned between the first plunger **12** and first switch **16** and the second plunger **14** and second switch **18**.

The first and second plungers **12** and **14** are effectively spring-return pushbuttons extending through corresponding apertures in the frame **10** and having spaced-apart and parallel paths of translation.

A first bracket **22** depending from the frame **10** adjacent the first plunger **12** provides mounting support for the switching **16** and a second bracket **24** also depending from the frame **10** adjacent the second plunger **14** provides mounting support for the switch **18**. The first switch **16** is provided with a first switch plunger **26** extending toward the second switch **18**, which in turn is provided with a second switch plunger **28** extending toward the first switch **16**.

The tripedal actuating member **20** is comprised of a first arm **30** effectively contacting the first plunger **12**, an integral second arm **32** extending axially from the first arm **30** and effectively contacting the second plunger **14**, and an integral third arm **34** extending perpendicularly from a point central to the first and second arms **30** and **32** and normally disposed in an effective position between the first and second switch plungers **26** and **28**. The first and second arms **30** and **32** are resiliently urged by a spring **36** into contact with the first and second plungers **12** and **14**, respectively, and toward the frame **10**, the spring **36** being connected in any suitable fashion to the actuating member **20** and to the frame **10**.

The free end of the first arm **30** is provided with a slot (not shown) to receive the outermost extremity of the first plunger **12**, the latter extremity being fitted with a first collect **38** disposed anteriorly of the first arm **30** to provide a first fulcrum **40** therefore. The free end of the second arm **32** is also provided with a slot (not shown) to receive the outermost ex-

tremity of the second plunger **14**, such extremity being fitted with a second collet **42** disposed anteriorly of the second arm **32** to provide a second fulcrum **44** therefor.

OPERATION OF THE INVENTION

With reference to FIG. **1**, the device is therein shown in its normal or rest state. The first and second plungers **12** and **14** are shown in their retracted positions; and the tripedal lever **20** is held by the spring **36** in its normal position wherein its third arm **34** is centered inoperatively between the first and second switch plungers **26** and **28** so that the contacts of neither the first nor the second switches **16** or **18** are transferred.

With reference to FIG. **2**, the device is therein shown with the first plunger **12** in its actuated state. The plunger may be assumed to have been operated manually, although it should be understood that any suitable actuating means could be used for this purpose. It should be apparent that when the first plunger **12** is operated, the first collet **38** is forced downwardly to effectively rock the lever **20** in a clockwise direction about the second fulcrum **44** formed by the second collet **42**, such rocking movement being effectuated by the collet **38** against and in conjunction with the bias of the spring **36**. It should be noted that the collet **38**, having a larger diameter than the plunger **12** serves to rockingly increase the effect of the plunger's travel upon the tripedal lever **20**. As the lever **20** is so rocked in a clockwise direction, its third arm **34** rotates to the right and into actuating contact with the first switch plunger **26**, thereby actuating or transferring the first switch **16**.

Upon release of the first plunger **12**, both the plunger **12** and the tripedal lever **20** will return to their respective positions shown in FIG. **1**, as influenced by the spring **36**. During such return, the lever **20** is rocked about the second fulcrum **44** in a counterclockwise direction, thereby rotating the third arm **34** to the left and away from the first switch plunger **26**, the contacts of the first switch **16** being accordingly restorably transferred.

Depressible actuation of the second plunger **14** will have a similar effect in closably transferring the switch **18**. The second collet **42** would in this case be forced downwardly to effectively rock the tripedal lever **20** in a counterclockwise direction about the first fulcrum **40**, and the third arm **34** of the lever **20** would be rotated to the left into actuating contact with the second switch plunger **28**, thereby actuating or transferring the second switch **18**. Upon the release of the second plunger **14**, both the plunger **14** and the tripedal lever **20** will return to their respective positions shown in FIG. **1**, as influenced by the spring **36**, the third arm **34** being rotated to the right and away from the second switch plunger **28** to permit the restorable transfer of the second switch **18**.

With reference to FIG. **3**, the device is shown with both plungers **12** and **14** depressibly actuated and with the first and second collets **38** and **42** located in their lowermost downwardly forced positions. The tripedal sever **20** is shown in its lowered horizontal position with its third arm **34** centrally and inoperatively positioned between the plungers **26** and **28**, the third arm **34** having been lowered linearly without actuatably contacting the first or second switch plungers **26** and **28** and without transferring the switches **16** or **18**. Upon release of the plungers **12** and **14**, the plungers and the tripedal lever **20** are returned by the spring **36** to their respective normal positions as shown in FIG. **1** without having transferably actuated either of the switches **16** or **18**.

While a preferred embodiment of the switching device has been shown and described in considerable detail, it should be understood that other embodiments thereof and other arrangements of the elements thereof are possible and may be made by one skilled in the art without departing from the true spirit and scope of the invention.

What is claimed is:

1. A dual switching device comprising a support member, a first actuating plunger mounted on said support member, a second actuating plunger mounted on said support member spaced apart from said first actuating plunger, said plungers being capable of the same maximum ravel upon separate or collective actuation, a first transferable switch member mounted on said support member adjacent and associated with said first actuating plunger, a second transferable switch member mounted on said support member adjacent transferable switch member mounted on said support member adjacent and associated with said second actuating plunger, and control means operatively coupling said first and said second actuating plungers, said control means being separately responsive to the actuating movement of either said first or said second actuating plungers to effectively and separately transfer their said associated transferable switch first or said second actuating plungers to effectively and separately transfer their said associated transferable switch members and being also collectively responsive to the actuating movement of both of said actuating plungers throughout their entire travel to prevent the transfer of either of said transferable switch members.

2. The dual switching device as defined by claim **1** wherein said control means comprises an actuating member of tripedal configuration and resilient means effectively biasing said actuating member into contact with said first and said second actuating plungers.

The duai switching device defined in claim **2** wherein said resilient means comprises a spring connected to a central point along the linear dimension of said actuating member and to said support member at a point intermediate said first and said second actuating plungers.

4. The dual switching device as defined by claim **3** wherein said actuating member comprises a first and a second arm effectively contacting said first and said second actuating plungers and a third arm extending perpendicularly to said first and said second arms and in interposed relationship between said first and said second transferable switch members.

5. The dual switching device as defined by claim **4** wherein said actuating member is linearly translatable in response to the collective actuation of both of said actuating plungers.

6. The dual switching device as defined by claim **5** wherein said actuating member is rockably translatable in response to the separate actuation of either of said first or said second actuating plungers.

7. The dual switching device as defined by claim **6** wherein said third arm of said actuating member selectively actuates one of said transferable switch members upon said rockable translation of said actuating member by a respective one of said actuating plungers.

8. The dual switching device as defined by claim **7** and additionally comprising a first collet disposed approximate one end of said first actuating plunger and a second collet disposed approximate one end of said second actuating plunger, said first collet in cooperation with said resilient means effectively coupling said first arm of said actuating member with said first actuating plunger and said second colet in cooperation with said resilient means effectively coupling said second arm of said actuating member with said second actuating plunger.

PO-1050
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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,609,256 Dated 9/28/71

Inventor(s) Hilliard R. DiVeto

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Col. 2, line 51, change "the switching 16" to --the switch 16--.
2, line 72, change "first collect 38" to --first collet 38--.
Col. 3, line 55, change "the tripedal sever" to --the tripedal lever--.
Col. 4, line 11, change "maximum ravel upon" to --maximum travel upon--.
4, lines 15 and 16, delete "on said support member adjacent transferable switch member mounted".
4, lines 20 and 22, delete "first or said second actuating plungers to effectively and separately transfer their said associated transferable switch".
4, line 33, insert before "The dual" the number indicating Claim 3 --3.--.
4, line 62, change "second colet in" to --second collet in--.

Signed and sealed this 21st day of March 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents