

Dec. 11, 1945.

T. OBSZARNY  
HAND GRIP CONTROL SWITCH

2,390,846

Filed Nov. 29, 1943

2 Sheets-Sheet 1

Fig. 1.

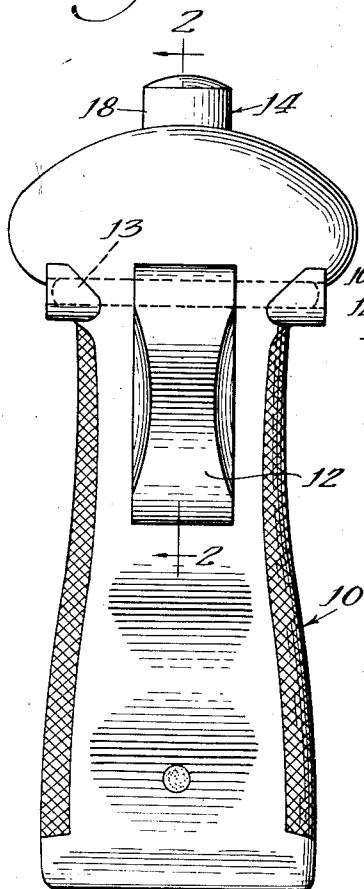


Fig. 2.

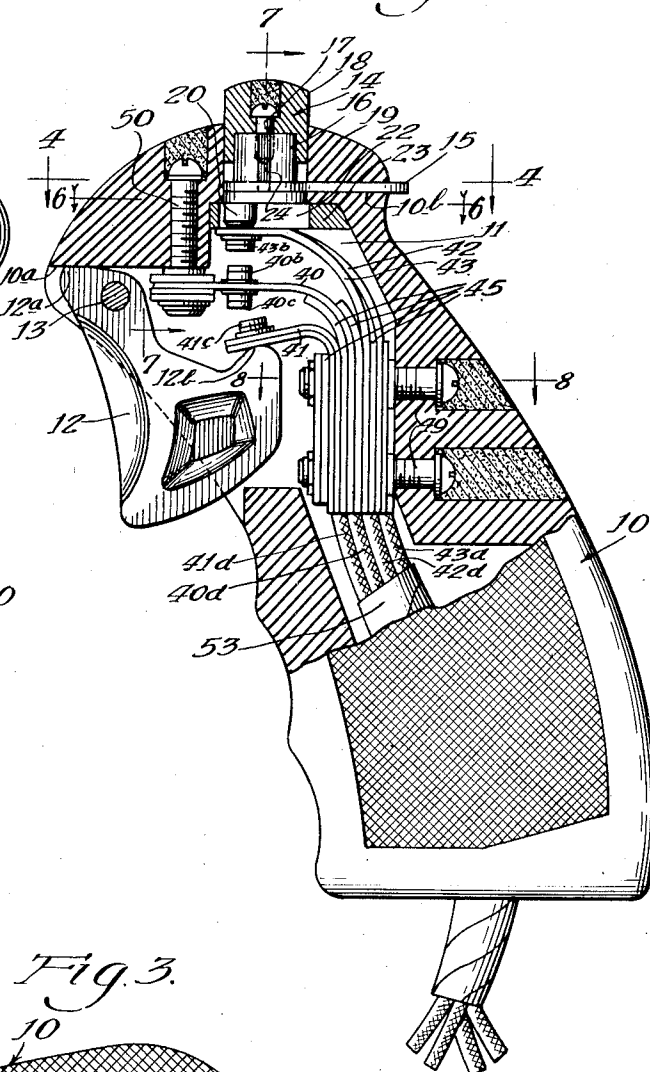
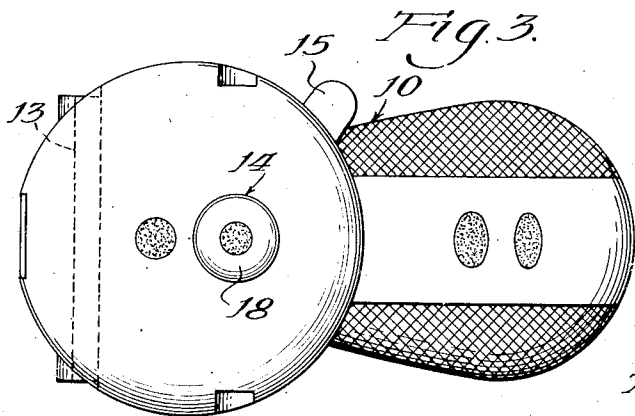


Fig. 3.



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Fig. 4.

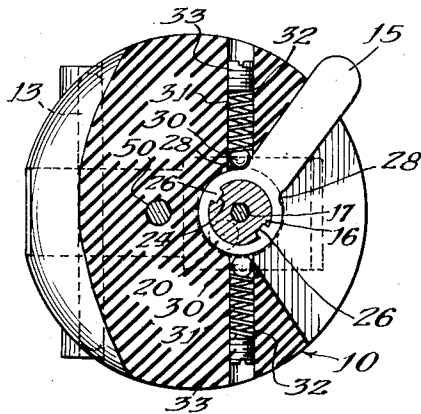


Fig. 5.

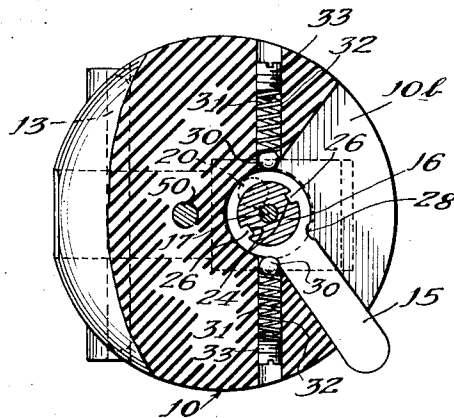


Fig. 6.

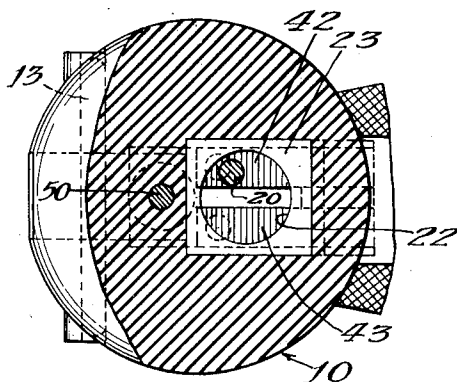


Fig. 8.

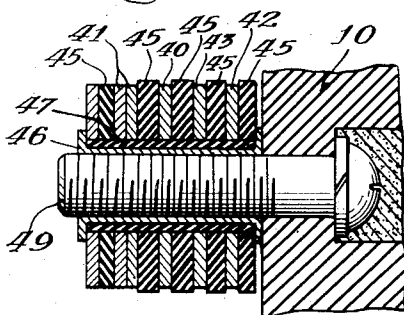
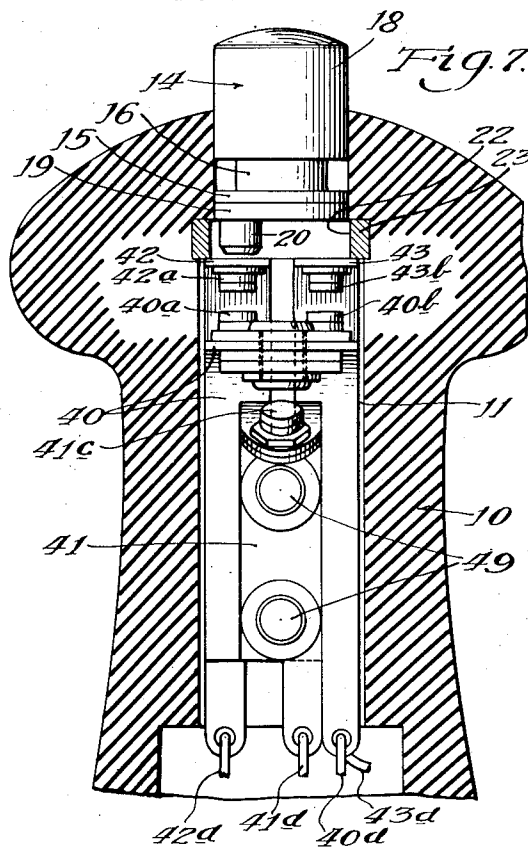


Fig. 7.



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## UNITED STATES PATENT OFFICE

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## HANDGRIP CONTROL SWITCH

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Application November 29, 1943, Serial No. 512,178

3 Claims. (Cl. 200—157)

This is a continuation in part of my co-pending application, Serial No. 378,180, filed February 10, 1941.

The present invention relates to certain novel improvements in hand grip control switches, wherein there is provided one or more operating members adapted to be engaged by the finger and/or the thumb of the operator, for actuating a multiplicity of separate switches. Switch devices of this type are adapted to a relatively wide field of use, and are especially suitable for use in connection with the "control stick" of an airplane so that the pilot, without the necessity of removal of the hand from the stick, may conveniently actuate the switch devices to make or break one or more different electrical circuits, such as may be employed to control the operation of the landing gear, landing lights, radio, and various other devices and mechanisms.

In military planes, such a control switch device may be employed in various arrangements, and may also be used for controlling the operation of various armaments while affording maximum safety to the pilot in maintaining proper control of the plane by eliminating the necessity of removal of the hand of the pilot from the "control stick."

One of the objects of this invention is to provide a novel and improved control switch device of the character indicated, by virtue of which a multiplicity of different electrical circuits may be readily made or broken.

Another object is to provide an improved switch device of the character indicated, wherein selective adjustment means is provided for quick and easy manipulation for selectively controlling the make or break of certain electrical circuits for operating different apparatus.

A further object is to provide an improved switch device of the character indicated, wherein the switch proper is constructed and arranged so as to be conveniently pre-assembled as a unitary device for easy mounting in or removal from a support in the form of a hand grip.

Still another object is to provide an improved switch device of the character indicated, which is durable, reliable and capable of economical manufacture.

Other objects and advantages of this invention will be apparent from the following description taken in connection with the accompanying drawings, in which:

Fig. 1 is a front elevational view of the hand grip provided with a switch mechanism embodying the present invention.

Fig. 2 is a view, part in section and part in elevation, showing the switch structure and operating members in detail, and taken substantially as indicated at line 2—2 on Fig. 1.

Fig. 3 is a top plan view of a hand grip provided with the switch structure embodying the present invention.

Fig. 4 is a horizontal sectional view of the upper portion of the hand grip and switch operating mechanism, taken substantially as indicated at line 4—4 on Fig. 2, showing the selective adjustment lever in one operating position of adjustment.

Fig. 5 is a view similar to Fig. 4 showing the selective adjustment lever in its other operating position of adjustment.

Fig. 6 is a horizontal sectional view through the upper portion of the hand grip, taken substantially as indicated at line 6—6 on Fig. 2.

Fig. 7 is an enlarged, staggered, vertical section, taken as indicated at line 7—7 on Fig. 2, showing the switch mechanism in front elevation.

Fig. 8 is a detailed sectional view through one of the points of anchorage of the switch mechanism, taken substantially as indicated at line 8—8 on Fig. 2.

In the drawings, the hand grip indicated at 10 is of suitable contour to provide the maximum convenience in gripping by an operator. The lower portion of the hand grip, it is to be understood, is formed so as to permit securement to the upper end of a conventional "control stick" of an airplane or a lever of any other suitable apparatus, wherein an operating member is adapted to be moved and is provided with a portion to be gripped by the hand of the operator. The upper portion of the hand grip is provided with a cavity 11, opening to the forward side thereof. As will hereinafter be described, a pre-assembled switch structure is inserted through the opening at forward side of the hand grip and secured in position in the cavity. A finger trigger operating member 12 is pivotally mounted at its upper end on a pin 13, in the cavity opening as seen in Fig. 2. The upper end of the trigger, as indicated at 12<sup>a</sup>, constitutes an abutment, and is adapted in one position of adjustment to abut against a shoulder 10<sup>a</sup>, forming the upper wall of the opening of the cavity, to limit the outward movement of the trigger. The inner portion of the trigger is provided with an abutment or nose 12<sup>b</sup> for actuating a portion of the switch mechanism.

Mounted in the top of the head of the hand

grip is a depressible plug or plunger member 14 with which coacts a selective adjustment lever 15 which projects laterally through an arcuate slot 10<sup>b</sup>, formed in the head of the hand grip, as may be seen in the drawings. The depressible plunger 14 includes a cylindrical body member 16, the upper end of which is rigidly attached as by a screw 17, to a cap member 18, the upper end of which projects a short distance above the top of the head of said hand grip. The lower portion of the body member 16 of the plunger is provided with an outwardly projecting annular flange 19, from the under surface of which depends a nubbin 20. Said nubbin extends downwardly into a circular opening 22 formed in a spacer block 23 which is firmly seated in the upper end of the cavity 11 of the hand grip. The body 16 of the plunger, at diametrically opposite sides thereof above flange 19, is provided with key-ways 24. The adjustment lever 15 terminates at its inner end in an annulus surrounding said body 16, above the flange 19, and is provided with a pair of inwardly extending keys 26, cooperating with the key-ways in said body. By virtue of the keyed connection of the annulus of the lever to the body of the plunger, said plunger is adapted to be moved axially with respect to said lever, and said body is adapted to be rotated by lateral movement of said lever. When the plunger is depressed from the position seen in Fig. 2 of the drawings, the body member 16 moves partially through the annulus of the adjustment lever, and thereby projects the nubbin 20 downwardly for actuating switch mechanism, as will hereinafter be described.

The selective adjustment lever 15 is adapted to be moved to either of two operating positions of adjustment, as represented in Figs. 4 and 5 of the drawings, and is releasably retained at either of said positions. For this purpose, the adjustment lever is provided with a pair of recesses or seats, as indicated at 28, at the junction of the annulus and the arm of the lever, as clearly seen in Figs. 4 and 5. Adapted for cooperative engagement with said seats at opposite sides of the plunger assembly, are balls 30 yieldingly urged inwardly by springs 31 disposed in laterally extending aligned ducts 32, formed in the upper portion of the head of the hand grip. The springs are maintained under proper tension by screws 33, recessed into the head of the hand grip, as clearly seen in Figs. 4 and 5.

The switch assembly, for convenience in mounting within the cavity of the hand grip or removal therefrom for repairs or replacement, is preferably formed as a unitary device. The switch assembly comprises an elongated, stationary switch finger 40, including a vertical portion and a horizontally extending portion. The stationary switch finger is of substantial width, as may be clearly seen in Fig. 7 of the drawings, and is provided on the upper face of the horizontally extending portion with a pair of transversely, spaced apart contact buttons 40<sup>a</sup> and 40<sup>b</sup>. Projecting downwardly from the underside of the horizontal portion of the stationary finger 40, substantially centrally between the contact buttons on the upper face, is a single contact button 40<sup>c</sup>. The switch assembly also includes an elongated, flexible switch finger 41, having a vertical portion and a substantially horizontally extending portion, normally disposed below and in spaced apart relation to the horizontally extending portion of the stationary finger. The upper face of the horizontal portion of the flexible

finger 41 is provided with a contact button 41<sup>c</sup>, adapted to cooperate with the contact button 40<sup>c</sup> of the stationary finger. The outer free end portion of the flexible finger 41 is normally formed so as to engage the nose portion 12<sup>b</sup> of the trigger member to yieldingly maintain it in the outwardly disposed position shown in Fig. 2 of the drawings. When the trigger member is drawn inwardly by finger pressure, the flexible finger 41 is moved upwardly to dispose its contact button 41<sup>c</sup> in cooperative relation with the contact button 40<sup>c</sup> of the stationary finger 40.

The switch assembly also includes a pair of transversely spaced apart, elongated, flexible switch fingers 42 and 43 which include vertical portions continuing upwardly into horizontal portions, normally abutting at their extreme outer ends against the underside of the spacer member 23, as seen in Fig. 2 of the drawings. Projecting downwardly from the under faces of the horizontal portions of the flexible fingers 42 and 43 are contact buttons 42<sup>a</sup> and 43<sup>b</sup>, respectively, disposed in a position of vertical spaced apart alignment with the contact buttons 40<sup>a</sup> and 40<sup>b</sup>, respectively, of the stationary finger 40. The vertical portions of the flexible fingers 42 and 43 are mounted in offset relation, as clearly seen in Fig. 2 of the drawings.

The vertical portions of all of the switch fingers are rigidly connected together in an assembled insulated relation to each other. As may be seen in Fig. 8 of the drawings, there is disposed on opposite sides of the respective switch fingers, a strip of insulating material, as indicated at 45, and the fingers together with the insulation are rigidly connected together by a flanged metallic sleeve 46, and the switch fingers are insulated from said flanged sleeve by a tubular sleeve 47 of insulating material, thus forming a unitary switch assembly. The vertical portions of the switch fingers and insulating strips are rigidly connected at two vertically spaced apart points in the cavity 11 by screws 49, extending through the rear wall of the hand grip mounting body 10, and threaded into the flanged metallic sleeves 46. After the switch assembly has been thus mounted in position, the extreme outer end of the horizontal portion of the stationary switch finger 40 is rigidly attached to the upper wall of the cavity 11 by a screw 50, extending down through the top of the head of the mounting 11, which screw, it may be understood, is likewise threaded into a metallic flanged sleeve insulated with respect to the stationary finger 40. Thus the stationary finger 40 is rigidly anchored in position at opposite ends thereof.

In the assembly of the switch device and the operating members in the hand grip, the plunger assembly 14 and the selective adjustment lever 15 are first mounted in place. The unitary switch assembly is then fixed in position within the cavity, and the trigger member 12 is pivotally mounted in the slot at the open end of the cavity 11, and anchored in place by the pivot pin 13. In order to conveniently inspect the switch assembly, or to repair or replace it, the trigger member may be conveniently removed by driving the pivot pin 13 through the trigger member so as to permit removal of said member, and then by removal of the wax, or other compound, covering screws 49 and 50 said screws may be removed to permit total withdrawal of the entire switch assembly from the cavity of the hand grip. For convenience in replacement, it is preferred that the switch assembly together with conductor

wires attached thereto be totally removed and a new assembly, together with conductor wires, be substituted in lieu thereof.

It will now be apparent that when the trigger member 12 is depressed or drawn inwardly with respect to the body of the hand grip, the nose 12<sup>b</sup> thereof moves the flexible finger 41 to cause its contact button 41<sup>c</sup> to engage its cooperating contact button 40<sup>c</sup> of the stationary finger for completing a portion of an electrical circuit. It will also be apparent that when the selective adjustment lever 15 is disposed in the position seen in Fig. 4 of the drawings, the plunger body 16 will have been rotated so as to dispose its nubbin 20 immediately above the outer free end portion of the flexible switch finger 43, so that when the plunger 14 is depressed in such position of adjustment of the lever 15, said flexible finger 43 will be moved downwardly to cause its contact button 43<sup>b</sup> to move into engagement with the contact button 40<sup>b</sup> of the stationary finger 40 for completing a portion of an electrical circuit. When the selective adjustment lever 15 is positioned as seen in Fig. 5 of the drawings, the nubbin 20 is then disposed in a position in registration with the outer free end portion of the flexible finger 42, as seen in Figs. 5 and 7 of the drawings, so that when the plunger is depressed in such position of adjustment of the lever 15, said flexible finger 42 is moved downwardly to cause its contact button 42<sup>a</sup> to engage the contact button 40<sup>a</sup> of the stationary finger for completing a portion of an electrical circuit.

It will now be manifest that by merely shifting the adjustment lever 15 to either of the positions seen in Figs. 4 and 5 of the drawings, it is possible that when the plunger 14 is depressed to complete either of two different electrical circuits which may be employed for operating different devices or mechanisms. In military planes, it is preferred that the top of the head of the hand grip be provided with suitable indicia in registration with the two positions of the adjustment lever 15 to indicate the different types of device or armament to be actuated when the lever 15 is in either of said two positions of adjustment, and the plunger 14 depressed. For example, the plunger member may control electrical circuits for operating bomb releasing mechanisms and for operating a cannon, and the trigger member 12 may serve to control an electrical circuit for operating a machine gun. It will be manifest, however, that these same operating members 12 and 14 may be utilized for operating electrical circuits for controlling the various types of apparatus, such as the landing gear, the landing lights, the radio and other apparatus of an airplane, without necessitating the pilot removing his hand from the hand grip on the upper end of the "control stick" of the plane.

To avoid possible injury to the hands of the pilot in operating the plane at high altitudes or in low temperatures, it is preferred that the body of the hand grip 10 as well as the trigger member 12 in the cap, and the plunger 14 be formed of suitable heat-insulating material, such as "Tentite." It is also preferred that after the unitary switch mechanism has been rigidly anchored in place by the screws 49 and 50, that the recessed areas providing clearance for the heads of the screws 49 and 50, as well as the recessed area for accommodating the head of the screws 17 in the cap of the plunger, be filled with suitable heat-insulating compound, such as a wax or asphalt composition. For convenience in mounting the

completely assembled hand grip with the switch structure on the "control stick," I prefer that the respective switch fingers 40, 41, 42 and 43 have attached thereto suitable lengths of conductor wire, as indicated respectively at 40<sup>d</sup>, 41<sup>d</sup>, 42<sup>d</sup>, and 43<sup>d</sup>, which wires may be encased in a sheath 53.

Although I have herein shown and described a preferred embodiment of my invention, manifestly it is capable of modification and rearrangement of parts without departing from the spirit and scope thereof. I do not, therefore, wish to be understood as limiting this invention to the specific embodiment herein disclosed, except as I may be so limited by the appended claims.

I claim:

1. In a switch device of the character described, comprising a mounting; a switch assembly comprising a stationary, elongated relatively wide switch finger having a pair of transversely spaced apart contact buttons on one face thereof and a contact button on the opposite face thereof, a pair of transversely spaced apart flexible, elongated switch fingers disposed in alignment with said one face of the stationary finger, and an auxiliary flexible, elongated switch finger disposed in alignment with said opposite face of the stationary finger, said stationary and flexible fingers being fixedly secured at one end to said mounting in insulated relation to each other, the opposite end of each of said flexible fingers being free and each being provided with a contact button disposed in spaced apart aligned relation to said contact buttons on the stationary finger; switch operating means carried on the mounting and comprising a depressible plug disposed centrally relatively to the free ends of said pair of flexible fingers and having a nubbin depending from the lower end thereof, and a laterally extending lever operatively connected to said plug for rotating the latter to selectively register said nubbin with either finger of said pair, whereby depression of the plug moves the finger registered therewith into cooperative contacting engagement with the stationary finger; and separate means carried on the mounting for moving the auxiliary flexible finger into cooperative contacting engagement with the stationary finger.

2. In a switch device of the character described, comprising a mounting; a switch assembly comprising a stationary, elongated relatively wide switch finger having a pair of transversely spaced apart contact buttons on one face thereof and a contact button on the opposite face thereof, a pair of transversely spaced apart flexible, elongated switch fingers disposed in alignment with said one face of the stationary finger, and an auxiliary flexible, elongated switch finger disposed in alignment with said opposite face of the stationary finger, said stationary and flexible fingers being fixedly secured at one end to said mounting in insulated relation to each other, the opposite end of each of said flexible fingers being free and each being provided with a contact button disposed in spaced apart aligned relation to said contact buttons on the stationary finger; switch operating means carried on the mounting and comprising a depressible plug disposed centrally relatively to the free ends of said pair of flexible fingers and having a nubbin depending from the lower end thereof, and a laterally extending lever operatively connected to said plug for rotating the latter to selectively register said nubbin with either finger of said pair, said plug and lever being keyed together to permit endwise movement of the plug relatively to the lever for causing

the nubbin to move the aligned finger of the pair into contacting engagement with the stationary finger; and separate means carried on the mounting for moving the auxiliary flexible finger into cooperative engagement with the stationary finger.

3. In a switch device of the character described, comprising a mounting; a switch assembly comprising a stationary, elongated relatively wide switch finger having a pair of transversely spaced apart contact buttons on one face thereof and a contact button on the opposite face thereof, a pair of transversely spaced apart flexible, elongated switch fingers disposed in alignment with said one face of the stationary finger, and an auxiliary flexible, elongated switch finger disposed in alignment with said opposite face of the stationary finger, said stationary and flexible fingers being fixedly secured at one end to said mounting in insulated relation to each other, the opposite end of each of said flexible fingers being

free and each being provided with a contact button disposed in spaced apart aligned relation to said contact buttons on the stationary finger; switch operating means carried on the mounting and comprising a depressible plug disposed centrally relatively to the free ends of said pair of flexible fingers and having a nubbin depending from the lower end thereof, and a laterally extending lever operatively connected to said plug for rotating the latter to selectively register said nubbin with either finger of said pair, whereby depression of the plug moves the finger registered therewith into cooperative contacting engagement with the stationary finger; separate means carried on the mounting for moving the auxiliary flexible finger into cooperative contacting engagement with the stationary finger; and means for releasably retaining said lever at either of said nubbin registering positions of adjustment.

THEODORE OBSZARNY.