Aug. 22, 1950 E. G. GAYNOR 2,519,899

TWO-BUTTON SWITCH

Filed Nov. 30, 1946 2 Sheets-Sheet 1

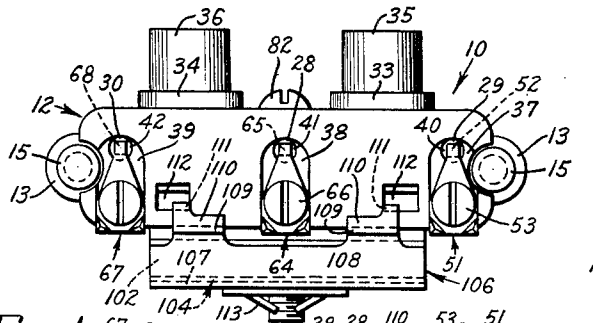


Fig. 1

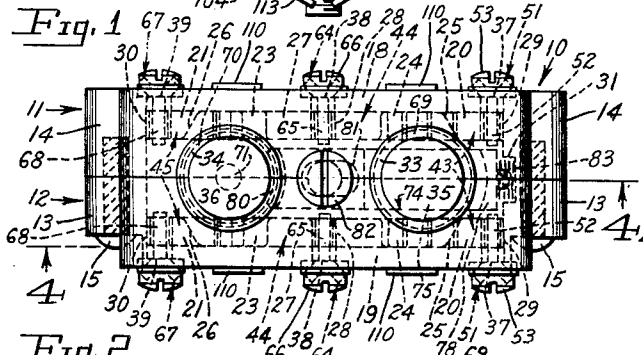


Fig. 2

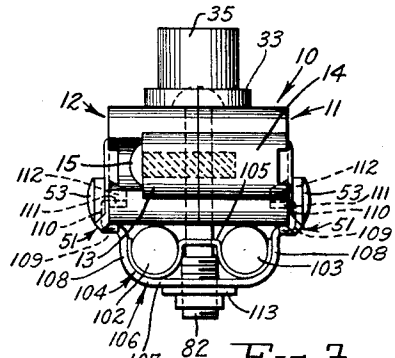


Fig. 3

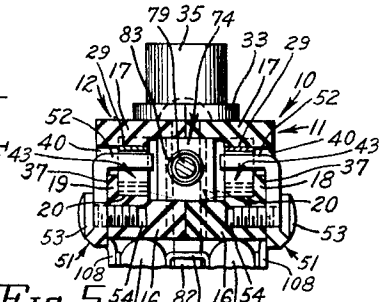


Fig. 5

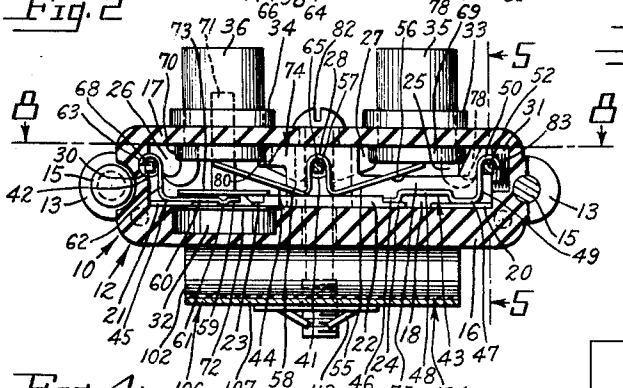


Fig. 4

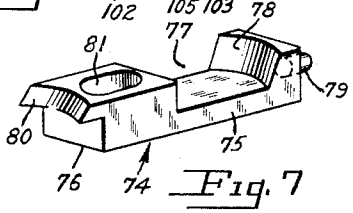


Fig. 7

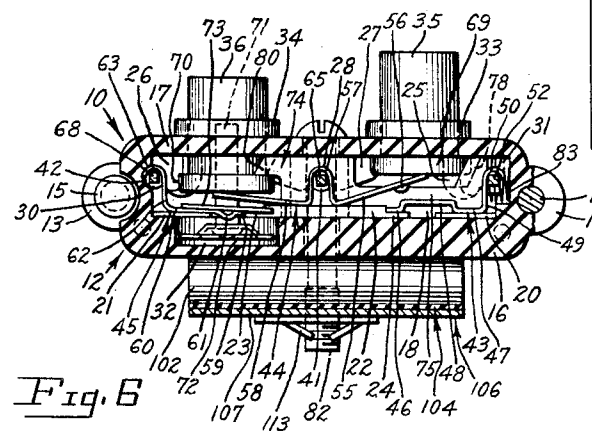


Fig. 6

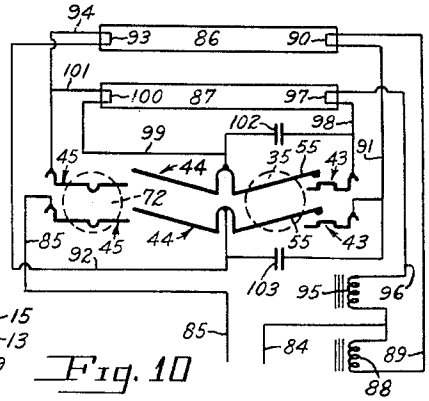


Fig. 10

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TWO-BUTTON SWITCH

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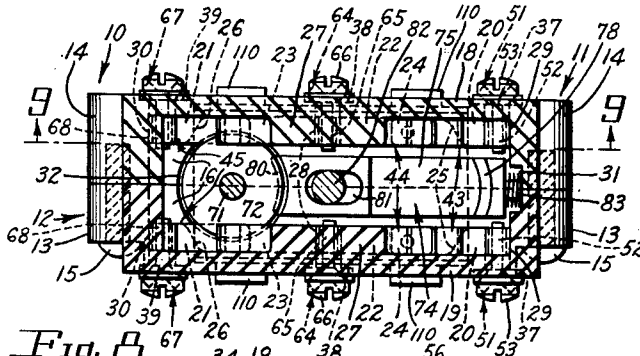


Fig. 8

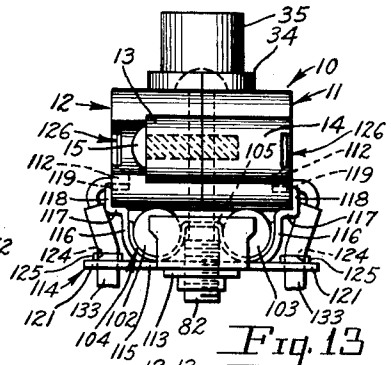


Fig. 13

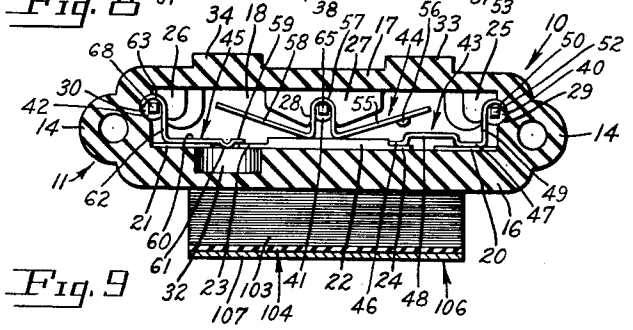


Fig. 9

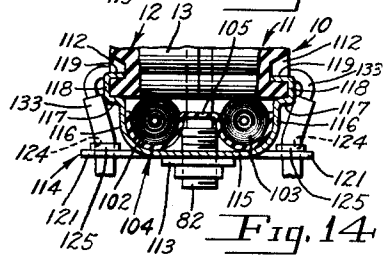


Fig. 14

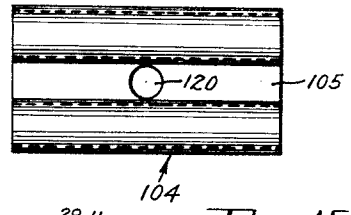


Fig. 15

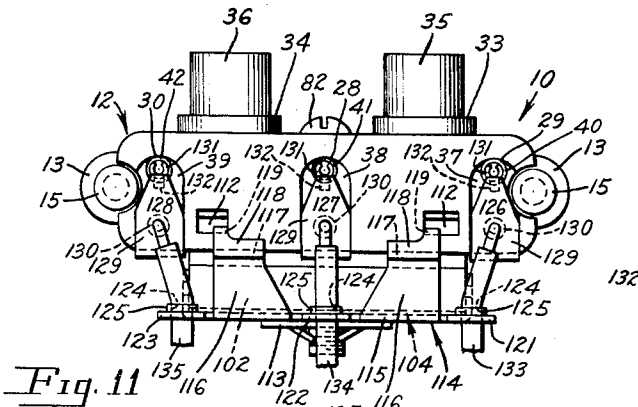


Fig. 11

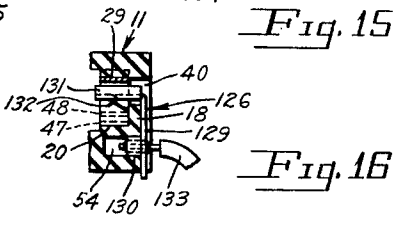


Fig. 16

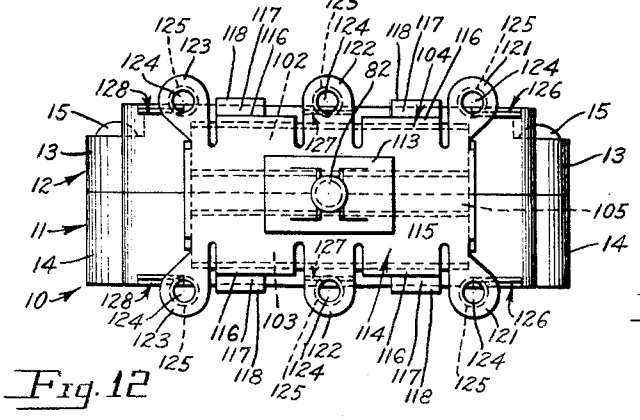


Fig. 12

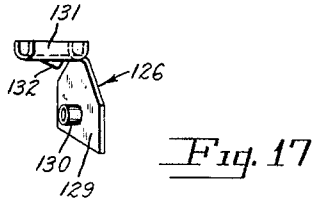


Fig. 17

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UNITED STATES PATENT OFFICE

2,519,899

TWO-BUTTON SWITCH

Edwin G. Gaynor, Fairfield, Conn.

Application November 30, 1946, Serial No. 713,279

11 Claims. (Cl. 200—5)

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This invention relates to new and useful improvements in fluorescent lighting apparatus and has particular relation to a switch for the control of fluorescent lamps.

The objects and advantages of the invention will become apparent from a consideration of the following detailed description taken in connection with the accompanying drawings wherein a satisfactory embodiment of the invention is shown. However, it is to be understood that the invention is not limited to the details disclosed but includes all such variations and modifications as fall within the spirit of the invention and scope of the appended claims.

In the drawings:

Fig. 1 is a side elevational view showing a switch constructed in accordance with the present invention;

Fig. 2 is a top plan view thereof;

Fig. 3 is an end view looking as from the right in Fig. 1;

Fig. 4 is a sectional view taken along the plane of the line 4—4 of Fig. 2;

Fig. 5 is a detailed sectional view taken as along the line 5—5 of Fig. 4;

Fig. 6 is a view similar to Fig. 4 but with the off-button of the switch latched in depressed or open circuit position;

Fig. 7 is an isometric view of a latching means employed;

Fig. 8 is a sectional view taken as along the plane of the line 8—8 of Fig. 4;

Fig. 9 is a sectional view taken as along the plane of the line 9—9 of Fig. 8;

Fig. 10 shows a wiring diagram;

Fig. 11 is a view similar to Fig. 1 but showing a modification of the wiring terminals and condenser mounting, the latter including a strain reliever feature;

Fig. 12 is a bottom plan view of Fig. 11;

Fig. 13 is an end elevation view of Fig. 11;

Fig. 14 is a central transverse sectional view through the condenser mounting;

Fig. 15 is a bottom plan view of an insulator employed over the condenser;

Fig. 16 is an enlarged detail sectional view showing the manner in which the wiring terminals of Fig. 11 are mounted; and

Fig. 17 is an isometric view showing one of such terminals alone.

Referring in detail to the drawings, and at first more particularly to Figs. 1–10, the present switch includes a housing generally designated 10 and shown as formed of a pair of molded parts 11 and 12. Structurally, the parts 11 and 12 are

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substantially duplicates of one another. On its ends, part 12 includes bead-like portions 13 while the part 11 has somewhat similar portions 14. Drive screws 15 pass through the portions 13 and into sockets in the portions 14 and serve to lock the housing parts 11 and 12 together.

Parts 11 and 12 are complementary and when secured together by the screws 15 have their open sides in abutting relation whereby the housing 10 is substantially hollow and includes a bottom wall 16, a top wall 17, and side walls 18 and 19. Each of the parts 11 and 12, on the inner surface of its bottom wall and adjacent its side wall, is provided with narrow raised portions or lands 20 and 21 adjacent its respective ends and intermediate its ends with a raised portion or land 22 of greater thickness than the portions 20 and 21 and being integral with its end portions 23 and 24 substantially of the same height of the portions 20 and 21 but spaced slightly from them.

Additionally, the side walls of the parts 11 and 12 are thickened in their end corner portions as at 25 and 26 and formed with said side walls and with the top wall 17 of each part is a thickened portion 27 having a recess or trough 28 entering through its bottom edge and opening through its side. In the end portions of the parts adjacent their side walls, socket-like recesses 29 and 30 are formed and in one the end wall where the parts abut they are provided with complementary depressions which in the assembly combine to provide a socket 31. Somewhat similarly, in their bottom walls the parts are provided with recesses or depressions which are complementary and which in the assembly combine to provide a depression or recess 32.

Integral with the outer or top walls of the parts are annular extensions 33 and 34 and the opening through the extension 34 is aligned with the socket or depression 32. These extensions or annular projections 33 and 34 form guides for manuals or push buttons 35 and 36. In their outer surfaces the sides 18 and 19 of the parts 11 and 12 are provided with three similar depressions 37, 38 and 39. Openings 40 through the upper portions of the depressions 37 enter the sockets 29 at opposite sides of the body 10 while openings 41 in the inner ends of the depressions 38 enter the recesses 28 at the mid portions of the body and openings 42 at the other end of the body and in the inner portions of the recesses 39 enter the sockets 30 at said other end of the body.

Within each of the body portions 11 and 12 are contact elements 43, 44 and 45, respectively,

As best shown in Figs. 4, 6 and 9, the element 43 comprises a piece of flat stock, as of brass, bronze, or the like, bent to provide a pair of spaced bottom flat portions 46 and 47, an intermediate raised portion 48 and an outwardly extending arm 49 at its upper end bent to provide a curved or hook-like portion 50. The elements 43 are located in the respective parts 11 and 12 of the housing in positions directly opposite one another and with their flats 46 and 47 on the raised portions or lands 24 and 29 respectively and with their curved portions 50 partly located in the recesses 29.

Substantially received in the recesses 37 in the opposite sides of the housing 10 are similar terminals 51 each having an inwardly extending arm portion 52 entering the curved or hook portion 50 of that contact element 43 adjacent its side. Preferably, these arms 52 are soldered to the mentioned contact portions. Each of the elements 50 is provided with a binding post or screw 53 for the attachment of leads and these screws (see Fig. 5) enter sockets 54 in the respective parts of the body.

The elements 44 are also each formed from a length of flat spring metal and each includes a contact arm 55 having a tit-like projection 56 on its under side, an intermediate U-shaped portion 57 and an arm 58. The arms 55 and 58 are at the opposite sides of the portion 57 and integral with the arms of the latter and normally incline outwardly and upwardly from the inner ends of the arms of said portion 57.

In the assembly, the elements 44 are located against the side walls of the parts 11 and 12 with the U-shaped portion 57 of each element substantially received in the notch or recess 28 of the lug 27 of its part and with the juncture of the arms of its U-shaped portion and its arms 55 and 58 located on the land or raised portion 22. The relative sizes of the parts are such that the elements 44 are inserted laterally and are held in place by engagement with the lugs 27 and the lands or flats 22. However, it will be appreciated that the arms 55 and 58 of the elements are free to flex from the normal positions in which they are shown in Figs. 4 and 9.

Element 45 is also formed up from a piece of flat stock and comprises a pair of flat portions 59 and 60 and an intermediate depressed portion 61 located between the flats 59 and 60. Additionally, the element includes an upstanding arm 62, corresponding with the arm 49 of the element 43, the upper end of which is bent to provide a curved portion 63.

In the assembly, the flats 59 and 60 of element 45 rest on the raised portions or lands 23 and 21, respectively, within the housing parts 11 and 12 and, in addition, each element has its curved portion 63 received in the recess or socket 30 of its housing part. The depressed portions 61 of the elements are located between the spaced ends of the raised portions or lands 23 and 21 and in alignment with opposite edge portions of the socket or recess 32 in the bottom wall of the housing.

In the recesses 38 in the outer sides of the housing parts 11 and 12 are terminal members 64 each including an arm 65 extending through the openings 41 and into the bite portion of the U-shaped portion 57 of the respective elements 44. Preferably, these arms 65 are soldered in the said bite portions to insure a good and lasting electrical connection. Each element 64 carries a binding screw or post 66. Similarly, terminal members 67 are located in the recesses 39 in the outer sides of the housing parts and each such terminal member includes an arm 68 passing through the opening 42 in said housing part and entering and soldered in the curved portion 63 of the element 45 located in said part. It will be understood that one each of the elements 43, 44 and 45, is located in each of the housing parts 11 and 12.

The manual or push button 35, which in the present construction may be described as the starting button, has an annular enlargement 69 at the inner side of the top wall 17 of the housing 10. This enlargement prevents casual movement of the button completely out of the housing and further the enlargement spans the arms 55 of the elements 43 located in the respective housing parts 11 and 12. Somewhat similarly, at the inner side of the wall 17, the button 36 is provided with an enlargement 70 of a diameter to prevent the button from moving completely out through said wall and also of a diameter to span the arms 58 of the two parallel elements 44.

A stud 71 extends inwardly from the button 36 and is provided with a metallic or connecting head portion or disc 72 on its inner end. The disc 72 is of a diameter to be freely received in the socket 32 and is of a diameter to span the inner arms or portions 59 of the elements 45 and to close a circuit between said elements on engagement with the depressed portions 61 thereof. It is noted that the spanning member or head 72 is at the under side of the arms or portions 59 of the elements 45. On the shank or stem 71 and located at the outer or upper sides of said arms or portions is a disc or member 73 of insulating material. This disc is not rigid with the stem but is simply located by the stem whereby the latter may pass through the disc and the function of the disc is to prevent any possibility of contact between the arms 58 of elements 44 and the flat portions 59 of the elements 45.

At all times, the enlargement 69 of the button 35 is in engagement with the arms 55 of the elements 44 whereby said arms either support the button 35 in projected position or are tending to move it to projected position when it is depressed or moved toward circuit closing position. Similarly, the enlargement 70 of the button 36 is in engagement with the arms 58 of said elements 44 whereby said arms are maintaining the button 36 in projected position or are constantly tending to move said button to a projected or circuit closing position.

With the structure thus far described, it will be understood that in the normal or projected position of the button 36, the head or element 72 is spanning and engaging the pair of elements 45 so that the latter are in closed circuit relation. Thus, the switch controlled by the button 36 is hereinafter referred to as a normally closed switch and in a fluorescent lighting circuit button 36 may be considered part of the off switch for de-energizing the light tubes. Button 35, controlling the "on" switch, must be depressed to flex the arms 55 of the elements 44 to press their tit-like projections 56 into engagement with the raised portions 48 of the respective elements 43 to give a closed circuit relationship to the parts of the "on" switch.

Means are provided for latching the "off" switch in open circuit position. Such means comprise a slidable latch member 74, shown as molded of insulating material and comprising a body 75 having a flat under side 76 and opening through its upper side having a recess 77, the wall 78 of which is inclined providing a cam sur-

face. A stud 79 extends from one end of the body 75 and at the other end of the latter is a sort of tooth portion 80.

Intermediate the ends of the body, the latter is provided with an elongated opening 81 which in the assembly accommodates a screw 82. Also in the assembly, the bottom surface 76 of the latch 74 is disposed on the inner surface to the bottom wall 16 of the housing with its stud 79 entering the socket 31 wherein a coil spring 83 is located about said stud and is constantly pressing against the latch in an effort to move it toward the left in Figs. 4 and 6.

When the switch is in use in a circuit with a pair of lamps which are operating, the parts are positioned as in Fig. 4. There it will be seen that the tooth-like portion 80 of the latch 74 is pressing against the enlargement 70 of the off button 36 and that such button, as well as the on button 35, is in projected position. To stop the lamp, it is merely necessary to depress the button 36, as from the position of Fig. 4 to that of Fig. 6. This carries the bridging member 72 out of circuit closing relation with the depressed portions 61 of the pair of elements 45.

Additionally, as the push button 36 is depressed, its enlarged portion 70 is carried below the tooth 80 of the latch 74 and the spring 83, acting against said latch, shifts the same from the position of Fig. 4 to that of Fig. 6 locating the tooth above the enlarged portion 70 of button 36. The elongated opening 81 in the latch permits of this movement relative to the screw 82 and when the latch is in this new position it will be clear that the arms 58 of the elements 44 may not shift the button 36 back to normal or projected position. The button 36 is latched in this depressed position and so the switch, of which said button forms a part, is locked in open or off position.

Now, to again start the lamp or lamps, the button 35 is depressed. As this button is depressed, its enlarged diameter portion 69 engages the cam surface 78 of the slide 74 and forces the same to the right in Fig. 6 against the tendency of the coil spring 83. This withdraws the tooth from over the enlarged portion 70 of the push button 36 whereupon the arms 58 of the elements 44 act to shift said button to its normal projected circuit closing position with its spanning member 72 in the position of Fig. 4 and closing a circuit between the portions 61 of the elements 45. Further, as the button 36 is depressed, it carries the arms 55 of the elements 44 inwardly or downwardly bringing their tit-like portions 56 into engagement with the raised portions 48 of the elements 43. Thus, closing circuits between the respective elements 43 and the respective elements 44 of the switch.

Fig. 10 shows a suggested wiring diagram with the present switch included therein. In such diagram, the power line from any suitable source is shown at 84 and the return at 85. In this circuit a pair of fluorescent lamp tubes are shown at 86 and 87. When the button 35 is depressed, moving the arms 55 of the elements 44 into circuit closing relation with the elements 43, the of the tube 86 and then through a wire 91 and an element 43, an arm 55 to a connection 92 through the latter to the filament 93 of said starting circuit is from the wire 84 through a ballast 88 to a wire 89, through a filament 90 lamp and out through a lead 94 to an element 45 and through the bridging disc 72 to the other element 45, thence to the return 85. For the lamp 87, the starting circuit is through a ballast

95, wire 96, filament 97, wire 98 to an element 43 to an arm 55 to a lead 99, filament 100 and connection 101 to wire 94 above described.

After the lamps have been started, the button 35 is released so that its switch is open, but then the circuit is through the lamps as from the filament 90 to the filament 93 of lamp 86 and from the filament 97 to the filament 100 of lamp 87. Condensers 102 and 103 are connected across the respective switches controlled by the push button 35 to prevent broadcasting by the switches.

As here shown, these condensers are located against the under side of the housing 10. They are held in elongated pockets formed in an open sided insulation member 104 (see Fig. 15). Preferably, such member is of impregnated cardboard or the like and retains the insulators in spaced relation since the member includes an inwardly directed mid-portion 105. This insulating member 104 is received in a metal shell or housing 106 including a bottom wall 107 and side wall portions 108, each provided at its upper edge with an outwardly extending portion 109 engaging against the bottom of the housing 10.

Beyond said portions 109, the housing or shell includes side portions 110 engaging opposite sides of the housing 16 and each provided with a lug 111 bent inwardly and received in a recess 112 formed in the side wall of the housing 10. These lugs 111 are bent in so that portions of the housing are clamped between the lugs and between the lateral portions 109 of the shell 106 so that the shell is rather securely attached to the housing, clamping the condensers between the insulator 104 and the bottom of the housing.

Additionally, the screw 82 above referred to, passes through the inwardly bent portion 105 of the insulator substantially midway the ends of the latter, and through the bottom wall 107 of the shell 106. At the underside of said shell a nut 113, as a speed nut, on the screw or bolt 82 locks the latter in place and provides for the use thereof in the maintaining of the metal shell 106 of the insulator 104 against the housing 10.

From the foregoing description it will be understood that I have provided a simple and inexpensive construction of a two-button switch for the control of fluorescent lamp circuits. The circuit breaking or the off switch 36 is of the normally closed type and I have provided means for locking it in open position to secure against casual starting of a fluorescent lamp such as might occur were the off switch of a construction to be opened and then permitted to close.

Additionally, means is provided for latching the off switch in open circuit position. Such means is automatically shifted to an inoperative position by the on switch manual when the latter is moved to close a circuit. The elements 44, in addition to comprising switch elements or contact elements, also comprise spring means for maintaining or constantly attempting to maintain the respective manuals of the push buttons in their projected positions, which position of the button 35 represents an open circuit position and which position of the button 36 represents a closed circuit position.

The switch of Figs. 11 through 17 is very similar to that previously described and includes many identical parts. To avoid unnecessary description here, where the parts in Figs. 11 through 17 are those previously described, they

are given the same reference characters. Thus, in these figures, the condensers 102 and 103, protected by the insulating member 104, are held against the underside of the housing 10 by means of a metal shell 114 including a bottom wall 115 and side portions 116.

At the upper ends of the portions 116, the metal of the shell is carried outwardly as at 117, then upwardly along the sides of the housing 10, as at 118, and then includes lugs 119 bent into the sockets or recesses 112. Additionally, the bolt or screw 82 passing through the housing 10 passes through the opening 120 in the insulator 104 and then through the bottom wall 115 of the shell 114. One of the nuts 113 is on the lower end of the bolt 82. As thus far described, the shell 114 is substantially the same as the shell 106 of the figures first described.

However, shell 114 includes three pairs of lateral extensions 121, 122 and 123, each such pair including one extension at each side or edge of the shell. These extensions have openings 124 formed through their outer portions. Preferably, the openings are not formed by punching out the metal, but are formed by displacing the metal so as to form or provide short nipples 125 to reinforce the holes and to avoid the formation of sharp corners. This structure of shell including the extensions 121, 122 and 123 provide strain relievers for leads to the switch as will appear.

The modification includes a modified construction of terminals. These terminals are arranged in pairs in the recesses 37, 38 and 39 in the outer sides of the respective parts 11 and 12 of the body 10. The terminals diametrically opposite one another comprise a pair. Thus, in the drawing we have pairs of terminals 126, 127 and 128, all of the same construction and one of which is shown in detail in Fig. 17. Thus, the terminal 126 includes a flat body portion 129 having at its inner side a short tubular portion 130 and at its upper end having a trough-like portion 131 from the bottom wall of which is lanced and pressed a tooth or pawl 132.

With this construction, the terminal is easily and quickly and securely mounted on the housing 10. Thus, the trough-like portion 131 of a terminal is entered through the opening 40, 41 or 42, depending on the location of the terminal, and is soldered or otherwise fixed to the appropriate portion of an element 43, 44 or 45, as the location may permit. Additionally, the tubular portion 130 of the terminal enters the appropriate socket 54 in the housing.

As the terminal is being mounted on the housing, the tooth or pawl 132 is somewhat deflected and the terminal and housing are forced together until this tooth or pawl snaps over the side wall 18 or the side wall 19, depending upon which side of the housing the terminal is being mounted, as to the position of Fig. 16. This locks the terminal to the housing. Thereafter, the end of a lead, as the lead 133, is inserted into the tubular portion 130 and secured therein with a drop of solder or the like.

As suggested in Figs. 11 and 13, the various leads 133, 134 and 135 from the switch are carried through the openings 124 in the different arms 121, 122 and 123. With this construction, any pull on the leads or rattails must be in or substantially in the planes of the body 129 of the terminals and at right angles to any pull likely to separate the terminals from the body. It will be understood that any pull on a lead will be

downwardly as the switch is shown in the drawings and will not be outwardly or laterally of the switch.

From the above, it will be seen that in the modification, the terminal elements are of simple and inexpensive construction and are very easily secured on the switch body. The elements are secured without the use of screws or the like and the connection of the leads to the elements are also made without the use of screws or the like. In addition, in the modification the means for securing the condensers to the switch body includes strain relief construction copoerating with the terminals used to the end that the terminals will not be casually disconnected from the switch should a pull be exerted on any lead.

Having thus set forth the nature of my invention, what I claim is:

1. In a switch, a body of insulating material, a first pair of spaced stationary contacts in said body, a pair of movable contacts in said body and normally in open circuit relation with said stationary contacts, a manual normally maintained in one position by said movable contacts but adapted to be operated to shift the latter into circuit closing relation with said stationary contacts and to be returned to normal position by the movable contacts when released, a second pair of stationary contacts in said body, a single movable contact in said body and normally held in circuit closing relation with said second pair of stationary contacts by spring extensions of said pair of movable contacts, and a manual movable with said single movable contact and in the normal position of the latter occupying a projecting position and adapted to be shifted to move said single movable contact into open circuit relation with said second pair of stationary contacts.

2. In a switch, a body of insulating material, a first pair of spaced stationary contacts in said body, a pair of movable contacts in said body and normally in open circuit relation with said stationary contacts, a manual normally maintained in one position by said movable contacts but adapted to be operated to shift the latter into circuit closing relation with said stationary contacts and to be returned to normal position by the movable contacts when released, a second pair of stationary contacts in said body, a single movable contact in said body and normally held in circuit closing relation with said second pair of stationary contacts by spring extensions of said pair of movable contacts, a manual movable with said single movable contact and in the normal position of the latter occupying a projecting position and adapted to be shifted to move said single movable contact into open circuit relation with said second pair of stationary contacts, means automatically operable to latch said manual in the last named position when moved thereto, and means thereafter operable to release said latching means on the first named manual being next operated to move said pair of movable contacts into circuit closing relation with the first pair of spaced stationary contacts.

3. In a switch, a body of insulating material, a first pair of spaced stationary contacts in said body, a pair of movable contacts in said body and normally in open circuit relation with said stationary contacts, a manual normally maintained in one position by said movable contacts but adapted to be operated to shift the latter into circuit closing relation with said stationary contacts and to be returned to normal position by

the movable contacts when released, a second pair of stationary contacts in said body, a single movable contact in said body and normally held in circuit closing relation with said second pair of stationary contacts by spring extensions of said pair of movable contacts, a manual movable with said single movable contact and in the normal position of the latter occupying a projecting position and adapted to be shifted to move said single movable contact into open circuit relation with said second pair of stationary contacts, each of said stationary contacts comprising a metallic piece having a pair of arms substantially at right angles to one another and of which one arm comprises a circuit closing arm and the other an arm for connection of a lead, said stationary contacts arranged in said housing with their last mentioned arms all extending substantially parallel, terminal members on the outer sides of said housing, said terminal members each including an arm extending through the side walls of said housing and electrically connected with the second mentioned arms of said stationary contacts.

4. In a switch, a body of insulating material, a first pair of spaced stationary contacts in said body, a pair of movable contacts in said body and normally in open circuit relation with said stationary contacts, a manual normally maintained in one position by said movable contacts but adapted to be operated to shift the latter into circuit closing relation with said stationary contacts and to be returned to normal position by the movable contacts when released, a second pair of stationary contacts in said body, a single movable contact in said body and normally held in circuit closing relation with said second pair of stationary contacts by spring extensions of said pair of movable contacts, a manual movable with said single movable contact and in the normal position of the latter occupying a projecting position and adapted to be shifted to move said single movable contact into open circuit relation with said second pair of stationary contacts, a latch within said housing, means mounting said latch for sliding movement, said latch adapted in one position to overlie part of and secure said last mentioned manual in open circuit position, means constantly tending to move said latch to said position, and cooperating means between said latch and the first mentioned manual for sliding said latch back to released position on operation of said first mentioned manual to circuit closing position.

5. In a switch, a body of insulating material, a stationary contact in said body, a movable contact in said body normally in open circuit relation to said stationary contact, a manual normally maintained in one position by said movable contact but adapted to be operated to shift the latter into circuit closing relation with said stationary contact and to be returned to normal position by the movable contact when released, a pair of stationary contacts in said body, a single movable contact in said body and normally held in circuit closing relation with said pair of fixed contacts by spring extensions of said movable contact, and a manual movable with said single movable contact and in the normal position of the latter occupying a projecting position and adapted to be shifted to move said single movable contact into open circuit relation with said pair of stationary contacts.

6. In a switch, a body of insulating material, a stationary contact in said body, a movable contact in said body normally in open circuit relation to said stationary contact, a manual normally maintained in one position by said movable contact but adapted to be operated to shift the latter into circuit closing relation with said stationary contact and to be returned to normal position by the movable contact when released, stationary contacts in said body, a single movable contact in said body and normally held in circuit closing relation with said stationary contacts by spring extensions of said movable contact, a manual movable with said single movable contact and in the normal position of the latter occupying a projecting position and adapted to be shifted to move said single movable contact into open circuit relation with said stationary contacts, means automatically operable to lock said manual in the last named position when moved thereto, and means thereafter operable to release said locking means on the first named manual being next operated to move said movable contacts into circuit closing relation with the first stationary contact.

7. In a switch, a stationary contact, a movable contact, a push button for moving said movable contact into engagement with said movable contact, said stationary contact comprising a spring arm normally engaged by said push button and adapted to return said push button to a normal position when the latter is moved to flex said arm into engagement with said stationary contact and is then released, a pair of spaced stationary contacts in said body, a bridging member for engaging and closing a circuit through said pair of stationary contacts, a second push button connected with said bridging member for controlling the position of the latter, and a second spring arm on said movable contact structure and operable to support said second push button in position with said bridging member closing a circuit between the contacts of said stationary pair and to return the second push button to said position on being moved therefrom and then released.

8. In a switch, a body of insulating material, a first pair of spaced stationary contacts in said body, a pair of movable contacts in said body and normally in open circuit relation with said stationary contacts, a manual normally maintained in one position by said movable contacts but adapted to be operated to shift the latter into circuit closing relation with said stationary contacts and to be returned to normal position by the movable contacts when released, a second pair of stationary contacts in said body, a single movable contact in said body and normally held in circuit closing relation with said second pair of stationary contacts by spring extensions of said pair of movable contacts, a manual movable with said single movable contact and in the normal position of the latter occupying a projecting position and adapted to be shifted to move said single movable contact into open circuit relation with said second pair of stationary contacts, a latch within said housing, means mounting said latch for sliding movement, said latch adapted in one position to overlie part of and secure said last mentioned manual in position with said single movable contact in open circuit relation with said second pair of stationary contacts, means constantly tending to move said latch to said position, cooperating means between said latch and the first mentioned manual for sliding said latch back to released position on operation of said first mentioned manual to circuit closing position, said latch having an elongated slot therein, and a

bolt passing through said housing and said slot and comprising a guide means for said latch.

9. In a switch, a body of insulating material, a stationary contact in said body, a movable contact in said body normally in open circuit relation to said stationary contact, a manual normally maintained in one position by said movable contact but adapted to be operated to shift the latter into circuit closing relation with said stationary contact and to be returned to normal position by the movable contact when released, a pair of stationary contacts in said body, a single movable contact in said body and normally held in circuit closing relation with said pair of stationary contacts by spring extensions of said movable contact, a manual movable with said single movable contact and in the normal position of the latter occupying a projecting position and adapted to be shifted to move said single movable contact into open circuit relation with said pair of stationary contacts, a latch within said housing, means mounting said latch for sliding movement, said latch adapted in one position to overlie part of and secure said last mentioned manual in position with said single movable contact in open circuit relation with said second pair of stationary contacts, means constantly tending to move said latch to said position, cooperating means between said latch and the first mentioned manual for sliding said latch back to released position on operation of said first mentioned manual to circuit closing position, said latch having an elongated slot therein, and a bolt passing through said housing and said slot and comprising a guide means for said latch.

10. In a switch, a body of insulating material, a first pair of spaced stationary contacts in said body, a pair of movable contacts in said body and normally in open circuit relation with said stationary contacts, a manual normally maintained in one position by said movable contacts but adapted to be operated to shift the latter into circuit closing relation with said stationary contacts and to be returned to normal position by the movable contacts when released, a second pair of stationary contacts in said body, a single movable contact in said body and normally held in circuit closing relation with said second pair of stationary contacts by said pair of movable contacts, a manual movable with said single movable contact and in the normal position of the latter occupying a projecting position and adapted to be shifted to move said single movable contact into open circuit relation with said second pair of stationary contacts, each of said stationary contacts comprising a metallic piece having a pair of arms substantially at right angles to one another and of which one arm comprises a

circuit closing arm and the other an arm for connection of a lead, said stationary contacts arranged in said housing with their last mentioned arms all extending substantially parallel, terminal members on the outer sides of said housing, said terminal members each including an arm extending through the side walls of said housing and electrically connected with the second mentioned arms of said stationary contacts, a metal member at the inner side of said switch, said member having a perforation therethrough for each of said terminal members and located inwardly of the latter, and said perforations adapted for the passage of leads to said terminal members whereby said metal member functions as a strain reliever.

11. In a switch, a body of insulating material, a first pair of spaced stationary contacts in said body, a pair of movable contacts in said body and normally in open circuit relation with said stationary contacts, a manual normally maintained in one position by said movable contacts but adapted to be operated to shift the latter into circuit closing relation with said stationary contacts and to be returned to normal position by the movable contacts when released, a second pair of stationary contacts in said body, a single movable contact in said body and normally held in circuit closing relation with said second pair of stationary contacts by said pair of movable contacts, a manual movable with said single movable contact and in the normal position of the latter occupying a projecting position and adapted to be shifted to move said single movable contact into open circuit relation with said second pair of stationary contacts, each of said stationary contacts comprising a metallic piece having a pair of arms substantially at right angles to one another and of which one arm comprises a circuit closing arm and the other an arm for connection of a lead, said stationary contacts arranged in said housing with their last mentioned arms all extending substantially parallel, terminal members on the outer sides of said housing, and said terminal members each including an arm extending through the side walls of said housing and electrically connected with the second mentioned arms of said stationary contacts.

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