Nov. 30, 1965 E. G. GAYNOR 3,221,112

TWO-BUTTON TWO-STAGE SWITCH

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Fig. 1

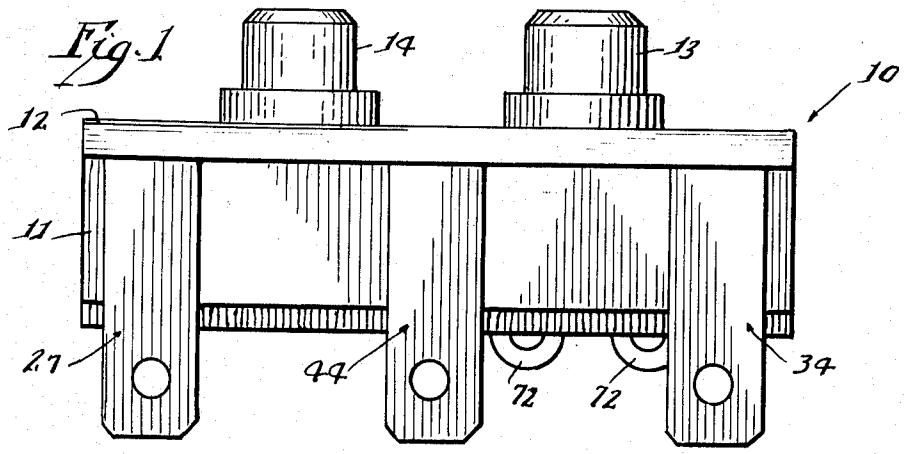
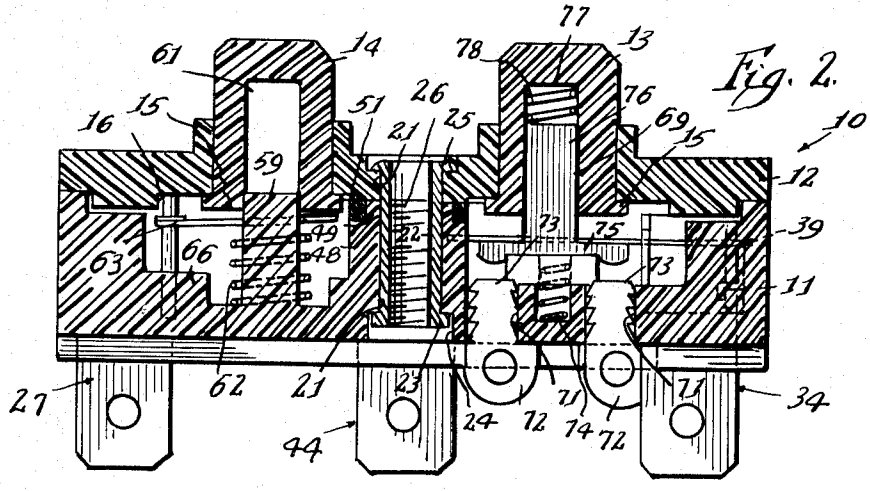



Fig. 2.



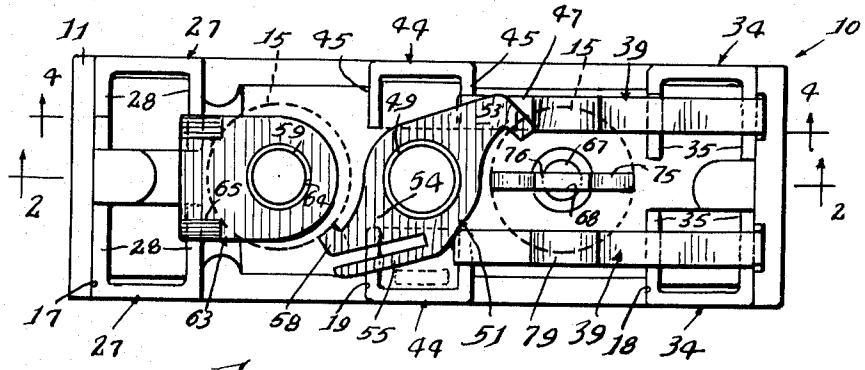




Fig. 3.

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TWO-BUTTON TWO-STAGE SWITCH

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Fig. 4.

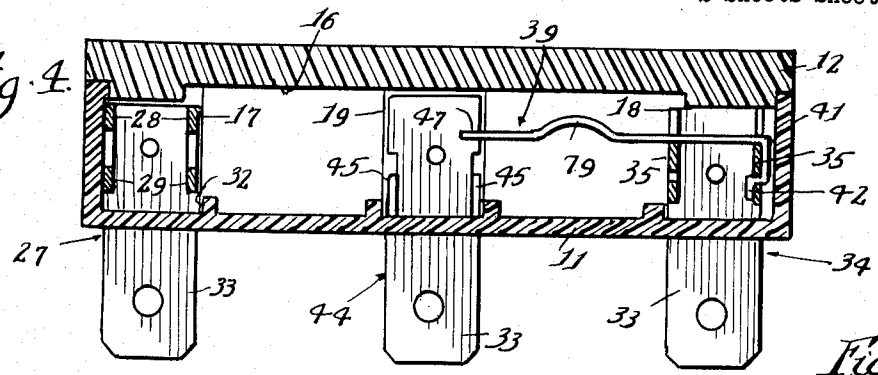



Fig. 8.

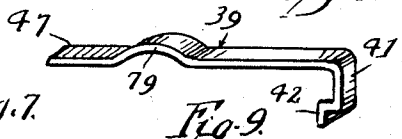



Fig. 5.

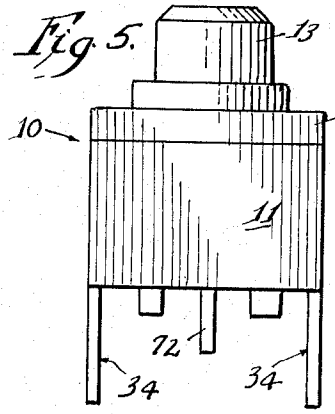



Fig. 6.

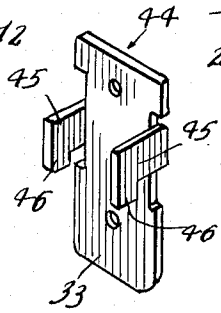



Fig. 7.

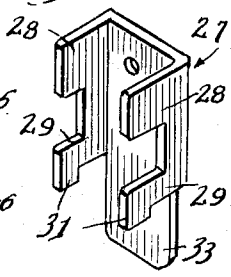



Fig. 9.

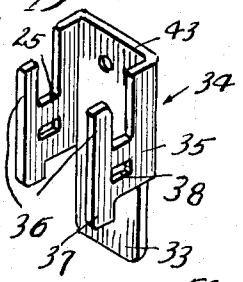



Fig. 12.

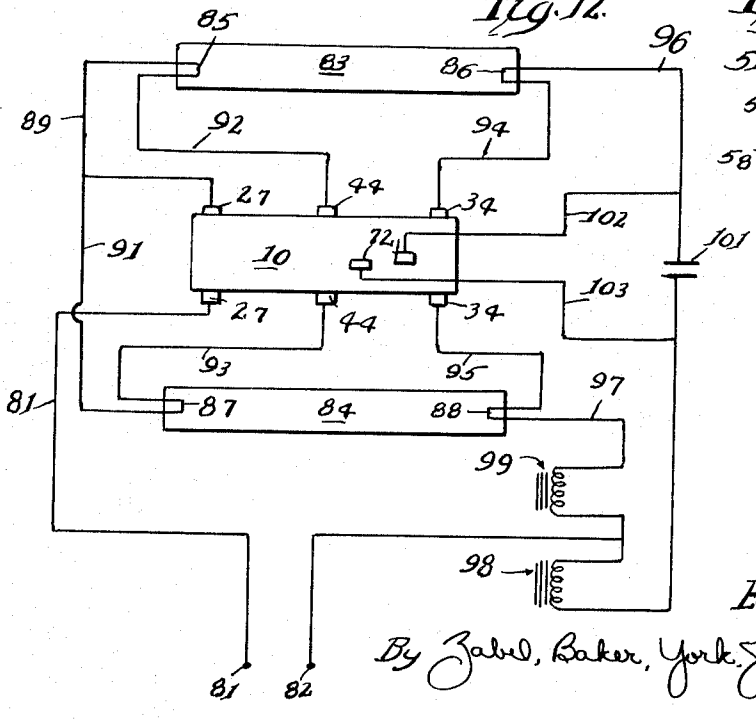



Fig. 10.

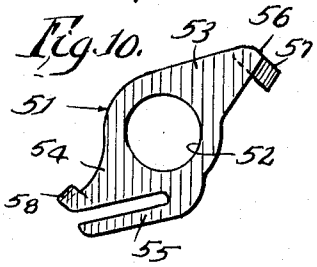
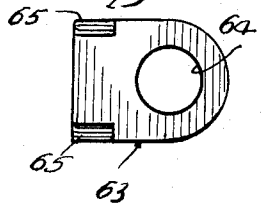



Fig. 11




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3,221,112

# TWO-BUTTON TWO-STAGE SWITCH

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3 Claims. (Cl. 200—5)

The present invention relates to a novel two-button switch for a fluorescent lamp and more particularly to a fluorescent lamp switch which may be utilized for a single-lamp circuit or for a pair of fluorescent lamp tubes with improved results over prior switches.

A fluorescent lamp utilizes a tube filled with gas under low pressure and having a fluorescent material or phosphor coating on the interior surface of the tube. Filaments are mounted at each end of the tube which normally function as electrodes for conduction of current through the tube and, to start conduction through the tube, it is necessary to heat these filaments to initiate ionization of the gas within the tube.

A fluorescent lamp has a marked stroboscopic effect which appears as a series of very rapid flashes or a flickering of the lamp. This effect is not too noticeable for a single lamp, but when plural lamps are used together in pairs, the stroboscopic effect is heightened. This effect is very bothersome to some people and may cause headaches, etc. To lessen the stroboscopic effect, a condenser is inserted in the circuit for one of the pair of lamps to throw that one lamp out of phase with the other lamp. However, in starting the lamps, the heater coil in the first mentioned lamp would be in series with the condenser and the lamp would be very slow to start. Therefore, it is necessary to short circuit the condenser during starting of the lamp so that the pair of lamps will have a fast start. The present invention provides for the automatic short circuiting of the condenser utilized in the circuit for a pair of fluorescent lamps.

An important object of the present invention is the provision of a two-button switch which can be utilized as a two-pole switch for a single fluorescent lamp and as a single-pole switch for a pair of fluorescent lamps. The switch arrangement provides an "off" switch which is held in its "off" position until released by depression of the "on" button to light the lamp or lamps and is especially adapted for the circuitry requirements involved in a two lamp arrangement.

Another important object of the present invention is the provision of a two-button switch having a conducting member associated with and actuated by the "on" button to complete a circuit utilized to short circuit condensers or other components in the fluorescent lamp system which would hinder the initial heating of the filaments in a fluorescent tube preparatory to conduction of current through the tube. Thus, a condenser utilized in a two-lamp system to throw one lamp out of phase with the other is not desired in the circuit during the starting operation as the lamp in the circuit including the condenser would be very slow to start, and the switch will short circuit the condenser out of the starting circuit.

A further object of the present invention is the provision of a two-button switch for actuation of a pair of fluorescent tubes having an extra pair of terminals to be connected with a condenser in the circuit that is desired to be short circuited during the short period of time when tube conduction is initiated by the heating of the filaments.

Further objects are to provide a construction of maximum simplicity, efficiency, economy and ease of assembly and operation and such further objects, advantages and capabilities as will later more fully appear and are inherently possessed thereby.



In the drawings:

FIG. 1 is a side elevational view of the two-button switch of the present invention showing the terminals for the pair of fluorescent lamps in a suitable circuit and the additional pair of terminals for a desired short circuit.

FIG. 2 is a vertical cross sectional view of the switch taken on the line 2—2 of FIG. 3 and viewed in the direction of the arrows.

FIG. 3 is a top plan view of the switch with the cover and push buttons removed.

FIG. 4 is a vertical cross sectional view taken on the line 4—4 of FIG. 3 and viewed in the direction of the arrows.

FIG. 5 is an end elevational view of the switch taken from the right end of FIG. 1.

FIG. 6 is an enlarged perspective view of the intermediate terminals in the switch.

FIG. 7 is an enlarged perspective view of the line terminals of the switch.

FIG. 8 is an enlarged perspective view of a movable starter contact.

FIG. 9 is an enlarged perspective view of the left hand end terminals of the switch as seen in FIG. 4.

FIG. 10 is an enlarged top plan view of the yieldably biased detent member.

FIG. 11 is an enlarged top plan view of a movable contact plate.

FIG. 12 is a wiring diagram showing the use of the present switch therein.

Referring more particularly to the drawings wherein is shown an illustrative embodiment of the present invention, FIG. 1 discloses a two-button switch **10** having a hollow casing or housing **11** and a complementary cover **12** both formed of an insulating material, such as a suitable plastic. The cover has a pair of spaced openings adapted to receive an "on" button **13** and an "off" button **14**. Each button is hollow and is provided with a radial flange **15** at its lower end which engages the interior surface **16** of the cover **12** to prevent removal of the buttons.

The casing **11**, on each side thereof, has an opening or slot **17** and **18** at each side adjacent each end (FIGS. 3 and 4) and an opening or slot **19** at each side intermediate the two ends. Aligned central openings **21** in the casing and cover are provided for a suitable generally tubular securing member or connector **22** having a flange **23** at one end with a generally square or polygonal periphery received in a complementary recess **24** on the bottom of the casing. The connector **22** extends upwardly through the casing **11** and cover **12** and terminates in an outwardly upset end or peripheral flange **25** to secure the cover **12** onto the casing. The connector may be internally threaded as at **26** to be adapted for attachment to or in a suitable mounting.

Mounted in each pair of aligned openings or slots **17, 18, 19** is a pair of terminals to be connected into the circuit for the fluorescent lamp. The openings or slots **17** contain the terminals **27** (FIGS. 3, 4 and 7) which are connected to the line and load in the lighting circuit. These two terminals include a pair of inwardly extending arms or stationary contacts **28** at the upper edge of the terminal and a pair of mounting arms **29** intermediate the terminal ends with downward projections **31** adapted to engage mounting recesses **32** in the bottom of the casing. The projecting lower end **33** of the terminal depends below the casing with suitable means for connection to the circuit wiring.

The openings or slots **18** at the opposite end of the casing house a pair of terminals **34** (FIGS. 3, 4 and 9) utilized for the starter circuit to heat the fluorescent tube filaments. These terminals have a pair of inwardly extending arms **35** with both upwardly extending projec-

tions 36 and oppositely depending projections 37. Each arm 35 contains a central slot 38 adapted to receive an elongated conducting member or movable contact 39 (FIGS. 4 and 8) having one end 41 which is turned downward and then inward and then downward at 42 to provide a hook-like contour. The member 39 rests on the arms 35 between the terminal body 43 and the projections 36 with the end 41 extending downwardly on the outside of an arm 35, inwardly through the slot 38 and downwardly on the inside of the arm 35 to anchor the member 39 onto the terminal 34.

The intermediate openings or slots 19 contain a pair of terminals 44 (FIGS. 3, 4 and 6) which have a pair of inwardly extending arms or stationary contacts 45 intermediate the terminal ends with depending mounting projections 46 thereon adapted to seat in mounting recesses in the casing. The arms 45 are adapted to be contacted by the free end 47 (FIG. 8) of the movable contacts 39 to complete the starting circuit for the lamps. Both the terminals 34 and 44 have suitable projecting tabs such as at 33 for connection to the circuitry for the fluorescent tubes.

A central projection or stem 48 (FIG. 2) surrounds the securing member or connector 22 and has a reduced upper end 49 with a circular periphery. A yieldably biased oscillating detent member 51 (FIG. 10) formed of a suitable non-conducting material has a central opening 52 receiving the end 49 of the stem 48. The detent member 51 includes a pair of oppositely disposed arms 53 and 54 and arm 55 extends parallel to the arm 54 and contacts the interior of the casing 11 to bias the member 51 in a clockwise direction as seen in FIG. 3. The arm 53 terminates in a downwardly projecting end or offset 56 having a curved camming surface 57 cooperating with the flange 15 on the button 13. The arm 54 terminates in a downwardly projecting end or offset 58 which is arranged to cooperate with the flange 15 on the button 14 to hold the button in a depressed position.

An upwardly extending stem 59 in the casing 11 (FIG. 2) is adapted to be received within the hollow portion 61 of the button 14 to guide the movement thereof. A compression spring 62 surrounds the stem and yieldably biases the button 14 upwards. A movable contact or contact plate 63 (FIGS. 2, 3 and 11) is mounted on the stem 59 between the spring 62 and the flange 15 on the button 14 and extends toward the terminals 27. The plate 63 is provided with an opening 64 adjacent one end to receive the stem 59, said end having a rounded periphery. The opposite end of the plate has a pair of upwardly bent opposed contact tabs 65 which are adapted to contact one arm 28 on each terminal 27 when the button 14 is in its extended upward position. If the button is depressed, a central rib 66 on the casing provides a stop preventing the plate 63 from contacting the mounting arms 29 on the terminals 27.

A stepped stem 67 (FIG. 3) is located between the elongated contact members 39 to guide the "on" button 13. The flange 15 of the button 13 normally contacts the camming surface 57 of the detent member 51 (FIGS. 3 and 10). The stem is centrally slotted at 68 to provide for a spring-biased short circuit member 69 positioned therein. A pair of slots 71 positioned centrally of the side walls of the casing 11 are provided for short circuit terminals 72 which have serrated edges positively to engage and secure the terminals in the casing, and their contact ends 73 (FIG. 2) extend sufficiently within the casing to engage the member 69 in its depressed position. A compression spring 74 is located in the casing to bias the member 69 yieldably upward.

The short circuit member 69 is a flat conductive member of generally inverted T-shape and having a horizontal portion 75 and an upwardly extending stem 76, the latter being received in the hollow portion 77 of the button 13. A second compression spring 78 is mounted



in the opening 77 between the stem 76 and the closed end of the button. The elongated members 39 (FIGS. 3 and 8) have generally U-shaped humps 79 adapted to engage the flange 15 of the button 13 for movement of the members 39 upon depression of the button.

In the diagram of a fluorescent lamp circuit utilizing this switch shown in FIG. 12, the power line from a suitable source is shown at 81 with a return line 82. A pair of fluorescent lamp tubes 83 and 84 have filaments at each end; tube 83 having filaments 85 and 86 and tube 84 having filaments 87 and 88. The power line 81 is connected to one terminal 27 of the switch 10 with the other terminal 27 thereof connected to a line 89 leading to the filament 85 and a branch line 91 going to filament 87. From filaments 85 and 87, the lines 92 and 93 respectively lead to terminals 44 in the switch. Terminals 34 through lines 94 and 95 go to filaments 86 and 88, respectively, and lines 96 and 97 lead from filaments 86 and 88 to the ballast 98 and 99, with the return line 82 connected to the ballast. Condenser 101 in line 96 is utilized for a two-lamp circuit and is not effective in the circuit during the starting operation and therefore is connected to the terminals 72 through lines 102 and 103 to be short circuited when the button 13 is depressed.

In operation with the fluorescent lamps cold the, "off" button 14 is depressed and held by the flange 15 located underneath the projection 58 on the arm 54. The biasing arm 55 yieldably urges the member 51 in a clockwise direction (see FIG. 3) to retain the button 14 in its depressed position with the movable contact plate 63 also depressed.

To energize the fluorescent lamps, the "on" button 13 is manually depressed with its flange 15 engaging the camming surface 57 on the arm 53 and, upon downward movement of the button, the camming action causes counterclockwise rotation of the member 51 against the biasing force of arm 55 so that the projection 58 releases the flange 15 of button 14 and the spring 62 urges the contact plate 63 and button 14 upward with the plate 63 engaging stationary contacts 28 on the line terminals 27 to complete the circuit thereacross. As the button 13 continues downward movement, the flange 15 engages the humps 79 and urges the movable contacts 39 downward so that the free ends 47 thereof contact the stationary contacts 45 on terminals 44 and complete the starter circuit. Simultaneously with this, the short circuit member 69 is urged downward to engage the ends 73 of the short circuit terminals 72 to short circuit condenser 101 from the circuit.

The filaments of the tubes 83 and 84 become hot in a very short period of time and, when this occurs, the button 13 is released so that spring 74 urges member 69 upward to break the short circuit and button 13 is urged upward by spring 78 to open the circuit between terminals 34 and 44 and allow the lamps to light through the main circuit; the condenser 101 throwing the lamp 83 out of phase with the lamp 84.

To turn off the lamps, the button 14 is depressed to lower the contact plate 63 breaking the circuit through the terminals 27 and, as the button is depressed, the arm 54 carrying projection 58 is urged over the flange 15 by the biasing arm 55 to hold the button in its depressed position.

While a two-button switch of a particular and effective shape has been shown and described, it is not my intent or desire to unnecessarily restrict the improvement by virtue of this limited showing. It is also contemplated that specific descriptive terms employed herein be given the broadest possible interpretation consistent with the actual disclosure.

Having thus described the invention, what is claimed as new and desired to secure by Letters Patent is:

1. In a switch, a casing and cover of insulating material, a first pair of spaced stationary contacts in said casing, a pair of spaced movable contacts in said casing nor-

mally in open circuit relation with said first pair of contacts, a first button yieldably biased to an extended position in said casing and adapted to be manually depressed to shift the movable contacts into closed circuit relation with said stationary contacts, a second pair of spaced stationary contacts in said casing and spaced from the first pair of contacts, a movable contact plate in said casing yieldably biased to circuit closing relation with said second pair of contacts, a second button engaging said contact plate and adapted to be manually depressed to shift the contact plate into open circuit relation with said second pair of contacts, an oscillating detent member yieldably biased to a position retaining said second button in its depressed position, said detent member including a pair of oppositely disposed arms extending from a rotatably mounted base portion, one arm having a downwardly extending camming surface at the outer end and the other arm holding a projection at the outer end thereof, and a third arm parallel to said last mentioned arm abutting said casing and yieldably biasing said member in one direction, said first button cooperating with said detent member to release said second button upon depressing said first button, and means cooperating with said first button to provide a short circuit upon depressing said first button, including a third pair of stationary contacts in said casing, and a reciprocable contact member adapted to engage said third pair of contacts.

2. A switch as set forth in claim 1, in which said second button carries a flange which, upon depressing said button, is shifted thereby allowing the detent member to rotate in said one direction and render said second button inoperative, and said first button being in position engaging said camming surface, upon being depressed, cooperates with said camming surface to rotate said detent member in a direction opposite to said one direction and release said second button.

3. In a switch, a casing and cover of insulating material, a first pair of stationary contacts mounted in said



casing, a pair of movable contacts in said casing and normally spaced from said stationary contacts, a first button yieldably biased to an extended position through said cover and adapted to be manually depressed to shift said movable contacts into engagement with said stationary contacts, a second pair of spaced stationary contacts and movable contacts, a movable contact plate yieldably biased into engagement with said second pair of stationary contacts, a second button abutting said contact plate and yieldably biased to extended position through said cover and adapted to be manually depressed to shift said contact plate away from said second pair of contacts, a detent member in said casing yieldably biased in one direction and adapted to retain said second button in its depressed position, said detent member having camming means cooperating with said first button to rotate said member in the opposite direction and release said second button upon depression of said first button, a third pair of spaced stationary contacts mounted centrally in said casing between the sides thereof, said casing having therein a vertical slot disposed centrally between said pair of movable contacts, a reciprocating contact member formed of a conductive material positioned in said slot and cooperating with said first button and adapted to engage said last mentioned contacts, said contact member being generally of inverted T-shape, biasing means urging said contact member upwards and separate biasing means located between said contact member and said first button.

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KATHLEEN H. CLAFFY, *Primary Examiner.*