Nov. 17, 1942. E. G. GAYNOR 2,302,438

LAMP HARNESS AND SWITCH

Filed Oct. 30, 1939

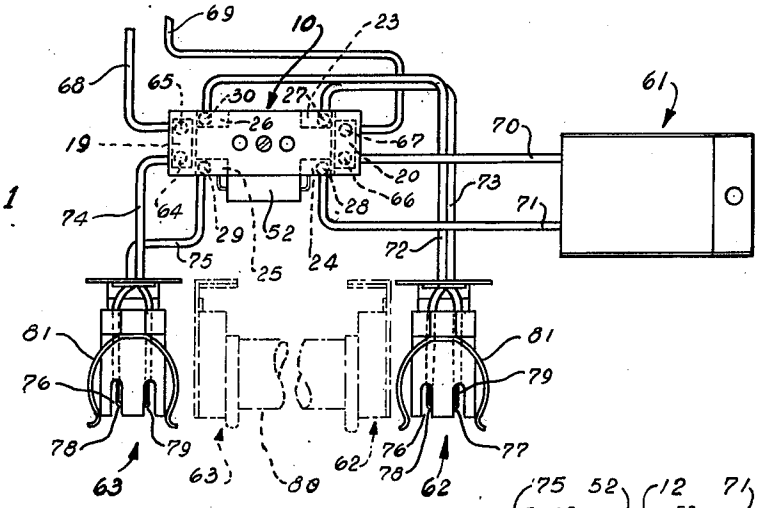


Fig. 1

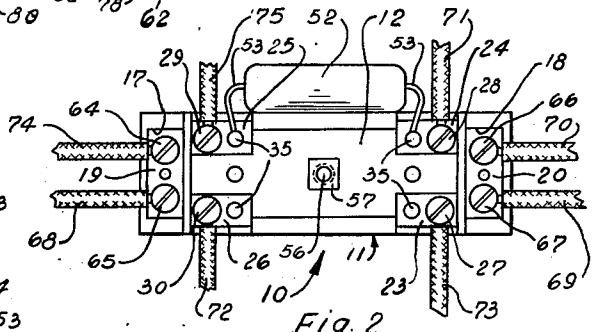


Fig. 2

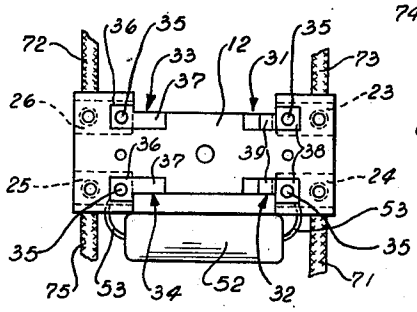


Fig 3

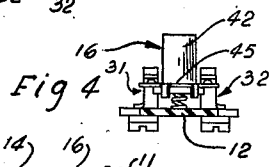


Fig 4

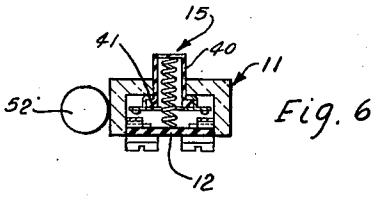


Fig. 6

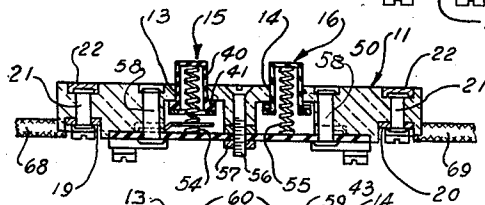


Fig. 5

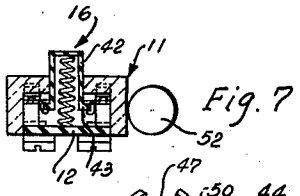


Fig. 7

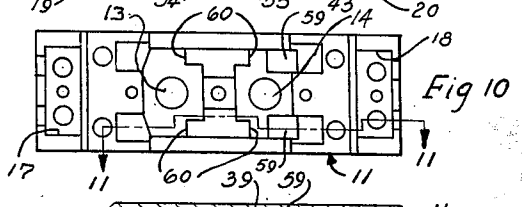


Fig 10

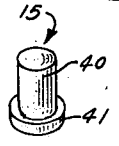


Fig 9

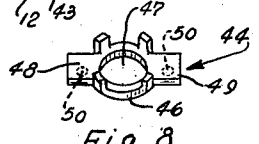


Fig 8

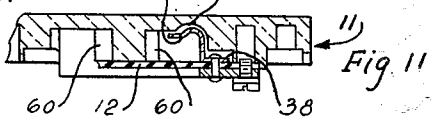


Fig 11

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LAMP HARNESS AND SWITCH

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Application October 30, 1939, Serial No. 301,979

8 Claims. (Cl. 176—124)

This invention relates to new and useful improvements in lamp harness and switch and has particular relation to a harness and switch for the mounting and control of lamps of the fluorescent type.

The objects and advantages of the invention will become apparent from a consideration of the following detailed descripton taken in connection with the accompanying drawing 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 the scope of the appended claims.

In the drawing:

Fig. 1 is a view showing the harness of the invention, the switching means of the invention being incorporated in said harness and shown in front elevation;

Fig. 2 is a bottom plan view of said switch;

Fig. 3 is a top plan view of a closure or back plate employed as a part of the switch and which plate has the contact elements of the switch and certain other parts mounted thereon to form an assembly unit therewith;

Fig. 4 is a transverse sectional view of the back plate with a push-button mounted thereon;

Fig. 5 is a central longitudinal sectional view through the complete switch;

Fig. 6 is a transverse sectional view through one push-button section of the switch;

Fig. 7 is a sectional view taken through the other push-button section of the switch;

Fig. 8 is a perspective of a contact employed;

Fig. 9 is a perspective of a push-button employed;

Fig. 10 is a bottom plan view of the switch body alone;

Fig. 11 is an enlarged detail sectional view taken as along the line 11—11 of Fig. 10 and showing a contact in relation to said body.

Referring in detail to the drawing my improved switch generally designated 10 comprises a body 11, formed of porcelain or other insulating material, and a back closure plate 12, also of insulating material, as, for example, a sheet of fibrous material. Body 11 is open at its rear side and in its front wall is provided with a pair of spaced opening 13 and 14 for the passage of push buttons 15 and 16 respectively. In its rear side adjacent its ends, the body 11 is provided with recesses 17 and 18 receiving terminal blocks 19 and 20 respectively which are held in place as by means of rivets 21 passing through the terminals and the said body. Preferably the upper or outer ends of such rivets are covered by an insulating material as at 22.

On the other or bottom side of the plate 12 are four terminals 23, 24, 25 and 26 equipped with binding posts 27, 28, 29 and 30 respectively. At the inner side of plate 12 are switch contact elements 31, 32, 33 and 34 of which those numbered 31 and 32 comprise a pair while those numbered 33 and 34 comprise a second pair. Rivets 35 passing through the mentioned terminals and the said switch contacts secure the said terminals and contacts to the plate whereby an assembly unit is provided. In this connection it is noted that the terminals and contacts may be easily and quickly secured to the plate when the latter is apart from the body 11 and access to all parts of the plate readily had.

In order that the functions of the various parts may later be better understood it is here pointed out that the rivets 35 serve not only to mechanically connect the terminals and switch contact elements with the plate but serve also to electrically connect particular terminals and particular switch contacts. Thus contact 31 is connected with terminal 23; contact 32 is connected with terminal 24; contact 33 is connected with terminal 26 and contact 34 is connected with terminal 25. The switch contacts 33 and 34 are of similar construction and each comprises an attaching portion 36 through which the rivets 35 pass and a spring tongue-like portion 37 located in a plane above the said attaching portion and located in spaced parallel relation as shown in Fig. 3. The pair of contacts 31 and 32 are also of the same construction and each comprises an attaching portion 38 through which the rivets 35 pass and an upper bowed spring portion 39.

The push buttons 15 and 16 are of identical construction and each carries a contact element identical with the element carried by the other. However since the said elements are mounted on the respective buttons in different positions it is thought best to give different numbers to the different portions of the said buttons and to the contact elements thereon. Thus push button 15 comprises an elongated shell like portion 40 open through its inner end and about such inner end provided with a head 41 of enlarged diameter. Similarly push button 16 includes an elongated shell-like portion 42 open through its inner end and about such end provided with a head-like portion 43 of enlarged diameter. The contact elements on the respective buttons 15 and 16 are

designated 44 and 45 respectively and one of said contacts is shown alone in detail in Fig. 8.

In said Fig. 8 contact 44 is shown as formed from a single piece of brass or other conducting material and comprises a body 46 in the form of an annulus having an opening 47 therethrough of a diameter greater than that of the openings in the elongated portions of the push buttons and somewhat less than the diameters of the head-like portions of said button. Extending laterally from diametrically opposite sides of the body 46 are contact lugs 48 and 49 each of which may on its contact engaging side be provided with a raised spot or tit-like portion 50. Integral with the body 46 and bent out of the plane thereof are attaching lugs 51 by means of which the contacts 44 and 45 are attached to the push buttons 15 and 16 respectively. As here shown four such attaching lugs are provided although it will be apparent that such number is not controlling and may be varied as found desirable.

Contract 44 is applied to the push button 15 by placing the body of such contact against the lower end of the head 41 of such button and bending the lugs 51 about such head. With this arrangement the contact lugs 48 and 49 project beyond the edges of said head 41 and the body of the contact is held against the inner end of such head. The diameter of the opening 47 is such that its edges are spaced from the lower open end of the hollow button. Contact 45 is applied to the button 16 by passing the portion 42 of such button through the opening 47 in said contact whereby to dispose the body of the contact on the upper side of the head 43. Thereafter the attaching lugs 51 of the contact are bent about the head and have their ends against the lower or inner side thereof but in such relation as not to extend into or across the opening through such end of the button. Thus in the manner described the contacts 44 and 45 are securely fastened to the head portions of the buttons 15 and 16 respectively.

A condenser 52 is connected with the terminals 24 and 25 on the back plate 12 and thus said condenser is across the switch contacts 32 and 34. Leads 53 from the condenser are relatively short and stiff and are connected with the terminals as by being soldered or otherwise permanently attached thereto. Thus the condenser is connected with and physically supported by the back plate 12 and forms part of the above mentioned assembly unit. This condenser serves to suppress radio broadcasting by a fluorescent lamp connected with switch 10 as will hereinafter more fully appear. Here it is noted that my tests and experiments show that for the intended purpose the condenser should be of about .004 microfarads capacity.

In assembling the switch 10 the push button 15 having the contact element 44 applied thereto is inserted into the body 11 by dropping its portion 40 through the opening 13 in the front wall of the body. Thereafter a coil spring 54 is dropped into such hollow elongated button portion, the length of the spring being such that its end projects through the inner open end of the button.

Next a coil spring 55, identical with the spring 54, is dropped into the button 16 through the inner open end thereof and is of such length as to project from the said end. Now button 16 is mounted on plate 12 by compressing spring 55 and engaging the contact lugs 48 and 49 of contact element 45 with the inner or under sides of the upper portions of the contact elements 31 and 32 as shown best in Fig. 4. The spring 55 is acting to press outwardly on the button and thus the contact lugs 48 and 49 are held against the inner sides of the portions 39 and the button and associated parts kept in proper relation on the back plate 12.

Now the back plate 12 is applied to the body 11. In this operation the button 16 has its elongated portion 42 passed through the opening 14 in the front wall of the body and the contact part 37 of contact elements 33 and 34 are located at the respective sides of the projecting end portion of spring 54 and the free end of the latter is against the inner side of plate 12. Thus both coil springs 54 and 55 are compressed between the said plate 12 and the closed outer ends of the respective push buttons.

Spring 54 serves to normally maintain the contact 44 spaced from the contact elements 33 and 34 while spring 55 normally maintains the contact 45 in engagement with the pair of contact elements 31 and 32. A bolt 56 passes centrally through the body 10 and the back plate 12 and a nut 57 on said bolt serves in part to secure the body and back plate together. In addition sunken headed rivets 58 serve to secure such parts together as in Fig. 5. Obviously on depressing button 16 against the action of coil spring 55 the contact 45 will be moved from engagement with the elements 31 and 32 opening the circuit between them while on depression of button 15 the contact 44 will be moved into bridging engagement with the pair of elements 33 and 34 to complete a circuit between them.

Deformation of the contact elements 31 and 32 due to the normal constant pressure against their under or inner surfaces by the contact 45, urged on by the spring 55, is prevented owing to the construction of the body 10. The relationship of these particular parts is shown best in Fig. 11. There it will be noted that the inner surface of the outer wall of the body 10 is provided with curved depressions 59 receiving the bowed or curved portions 39 of the elements 31 and 32. Thus the said portions of the elements are supported by the wall of body 10 and said elements will not be deformed by the constant pressure exerted against them.

Spring 54 normally maintains the outer surface of the button head 41 against the inner surface of the body 10 whereby any bodily turning movement of the button relative to the body 10 is resisted. The pressing of the contact lugs 48 and 49 against the contact elements 31 and 32 also sets up a resistance to any casual turning movement of the push button 16. In connection with any turning of the push buttons it is noted that should such buttons turn out of proper positions they would not hold the contacts 44 and 45 in alignment with the respective pairs of contact elements comprising the pairs 33 and 34 and 31 and 32.

In addition to the action exerted by the coil springs as above set out it is noted that the ends of the contact lugs 48 and 49 are located adjacent vertical shoulders 60 within the body 10 and that such shoulders are so related to the end portions of said lugs 48 and 49 as to prevent any appreciable turning movement of the contacts 44 and 45 and thus of the buttons. It is also noted that the shoulders 60 extending in the direction of movements of the buttons during depression thereof will act as guides and

prevent any turning movements of the contacts during reciprocable movement thereof and when the latter are in any positions to which they may be depressed.

The switch 10 is for use with a fluorescent lamp and in Fig. 1 the complete lamp harness, including the switch, is shown. The lamp harness in addition to the switch 10 includes a choke coil 61, sockets 62 and 63 and certain necessary wiring to be described. Terminal 19 is provided with binding posts 64 and 65, while terminal 20 is provided with binding posts 66 and 67.

Lead-in wires to be connected with a source of current are shown at 68 and 69 and are connected with the terminals 19 and 20 respectively by the binding posts 65 and 67 respectively. Wires 70 and 71 connect the choke coil 61 with the terminals 20 and 24 by being attached to the binding posts 66 and 28 respectively. Wires 72 and 73 from the socket 62 are connected with the terminals 26 and 23 respectively by means of the binding posts 30 and 27 respectively. Wires 74 and 75 from the socket 63 are connected with the terminals 19 and 25 respectively by means of the binding posts 64 and 29 respectively.

The sockets 62 and 63 are shown in detail in and comprise the invention of my application Serial Number 283,849, filed July 11, 1939. Such sockets are each provided in their forward wall or face with a pair of slots 76 and 77 giving access to spaced contacts 78 and 79 respectively, connected with the respective wires to the switch 10.

Spaced contact pins (not shown) on the ends of fluorescent lamps are received in the slots 76 and 77 and establish electrical contact with the elements 78 and 79. In the drawing the sockets are shown facing one another by the dotted lines and a fluorescent lamp 80 is also shown by dotted lines as connected with such sockets. Each socket is shown provided with a spring clip 81 to receive the ends of the lamp and thus support the latter.

It will be understood that when the harness is to be used in a direct current installation, a resistor will be substituted for the choke coil 61. With this harness, the lamp 80 being extinguished and the wires 68 and 69 connected with a source of current, there will be no flow through the lamp. When the lamp is to be lighted, push-button 15 is depressed to bring contact 44 into engagement with elements 33 and 34.

Then a circuit will be completed from wire 68 through terminal 19 to wire 74 to contact 79 of socket 63, through the terminal pins and the end filament of lamp 80 to socket contact 78 and wire 75 to terminal 25 and contact element 34, through contact 44 to element 33 to wire 72 and contact 79 of socket 62, through the terminal pins and the filament at the other end of lamp 80 to contact 78 to wire 73 to element 31, through push-button contact 45 to element 32 and wire 71 through choke coil 61 to wire 70 and through terminal 20 and thus to wire 69 completing the circuit.

Push-button 15 is held depressed or in circuit closing position but a moment. Thus the push-button is held depressed only for a time sufficient to have the current heat up the filaments of the lamp 80 and vaporize the mercury in the lamp. Thereafter the said push-button is released and the spring 54 shifts such button and its contact 44 opening the circuit between the elements 33 and 34. However, the mercury now being vaporized in the lamp the current flow is through the lamp vapor and the lamp is lighted. To extinguish the lamp the push button 16 is momentarily depressed carrying contact 45 away from the elements 31 and 32 to open the lamp circuit. When such contact 45 is moved from elements 31 and 32 and the circuit broken through the lamp, the vapor in the lamp condenses and on release of the button 16 and return of contact 45 into engagement with elements 31 and 32 the lamp remains extinguished.

The lamp harness of Fig. 1 is complete. As above suggested a resistor will be substituted for or put in series with the choke coil 61 when the harness is to be used with direct current. The fluorescent type of lamps broadcast and the condenser 52 of about .004 mfd. serves to suppress such broadcasting. Such condenser will not entirely eliminate the broadcasting by the tube or lamp but it will rather well suppress it. It is noted that the condenser is physically mounted on the back plate 12 and thus forms a unit therewith when assembling the switch. Obviously when such plate is removed from the body 11 all parts of the switch are fully exposed for replacement or repair and this means that during assembly of the switch all parts are readily fastened in place since they are fully exposed and there need be no fitting of any part into a cramped space.

Attention is directed to the fact that the switch of the invention might be described as a momentary switch. The contacts 44 and 45 have normal positions from which they may be manually moved but to which they return immediately on release. For lighting and extinguishing of the lamp it is necessary that the push-button 15 be but momentarily held in circuit closing position and that the push-button 16 be but momentarily held in open circuit position. The terminals for the choke coil and for the power lead-in wires are all mounted on the same body or block 11 of insulating material thus forming a compact unit readily placed in use with a lamp.

It is also noted that the push buttons 15 and 16 are of the same identical construction as are the contacts 44 and 45 on such buttons. Thus there is a simplification of parts and in making up the switch it is but necessary to mount the contact 44 on the inner end of button 15 while mounting contact 45 on the upper side of the head of button 16. As noted above the various terminals and binding posts and switch contact elements are mounted directly on the back plate 12 thus forming a simple assembly unit.

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

1. A lamp harness for a fluorescent lamp having a filament at each end and a pair of pin terminals for each filament, said harness comprising a switch block, a pair of terminals mounted on said block, lead-in wires connected with the respective terminals of said pair, two pairs of spaced contacts on said block, a choke coil, wires connecting said choke coil with one of said terminals and one of said contacts, a pair of sockets each adapted to receive the pin terminals at one end of a fluorescent lamp and each including a pair of spring contacts for engagement with said pin terminals, wires connecting the respective spring contacts of one socket with a contact of each of said pair, wires connecting the respective spring contacts of the other socket with the other contact of one of said pair and with one of said terminals, a condenser connected with a contact

of each of said pair and physically supported by said block to form a unit therewith and of a capacity to suppress radio broadcasting from a fluorescent lamp mounted by said sockets, a first switch means on said block and normally in circuit closing relation with the contacts of one of said pairs of contacts, a second switch means on said block and normally in open circuit relation to the contacts of the other of said pairs of contacts, and said first switch means adapted to be manually held in open circuit position and said second switch means adapted to be manually held in closed circuit position.

2. In a switch unit for use in a fluorescent lamp circuit, a switch block of insulating material, spaced shallow recesses in said block, terminals secured in said recesses, a back plate of insulating material secured to said block, two pairs of switch contacts secured on said plate and located at the inner side thereof, a condenser physically mounted on said back plate and electrically connected with one contact element of each of said two pairs of such elements to suppress broadcasting by a fluorescent lamp connected in circuit with said elements, binding posts secured on said plate and located at the outer side thereof and electrically connected one with each of said switch contacts, a pair of movable switch contact elements located in said block at the inner side of said back plate and associated one with each pair of said contact elements, a manually operable push button connected with each of said movable switch elements and projecting through the front face of the block, and spring means associated with said push buttons and normally acting to retain the same in projected positions and thereby maintain the movable switch contact element of one button in engagement with each contact element of one pair and to maintain the other movable contact element out of engagement with the contact elements of the other of said pairs, said first button adapted on being depressed to move said movable contact and open a circuit between the contact elements of the first pair, said second button adapted on being depressed to move said second movable contact element into engagement with the second pair of said pairs of contact elements to close a circuit between them, and said spring means adapted to return the buttons and movable contacts to their normal positions on release of the buttons.

3. A lamp harness for a fluorescent lamp having a filament at each end and a pair of pin terminals for each filament, said harness comprising a switch block, a pair of terminals mounted on said block, lead-in wires connected with the respective terminals of said pair, two pairs of spaced contacts on said block, a choke coil, wires connecting said choke coil with one of said terminals and one of said contacts, a pair of sockets each adapted to receive the pin terminals at one end of a fluorescent lamp and each including a pair of spring contacts for engagement with said pin terminals, wires connecting the respective spring contacts of one socket with a contact of each of said pair, wires connecting the respective spring contacts of the other socket with the other contact of one of said pair and with one of said terminals, a first switch means on said block and normally in circuit closing relation with the contacts of one of said pairs of contacts, a second switch means on said block and normally in open circuit relation to the contacts of the other of said pairs of contacts, and said first switch means adapted to be manually held in open circuit position and said second switch means adapted to be manually held in closed circuit position.

4. In a switch unit for use in a fluorescent lamp circuit, a body of insulating material, two pairs of contact elements on said body, a switch element for bridging and normally closing the circuit between one pair of said contact elements, a second switch element normally out of circuit closing relation with the other pair of contact elements, means mounting each of said switch elements on said body for movement from and return movement to its normal position, manually operable means connected with said switch elements for moving them from their normal positions to open circuit and closed circuit position respectively, a condenser physically mounted on said body to form a unit therewith of a capacity to suppress radio broadcasting by a fluorescent lamp in circuit with said switch, and means electrically connecting said condenser with one contact element of each of said two pairs of contacts.

5. In a switching means of the class described, a body of insulating material having a pair of openings through its front wall, two pairs of spaced contacts in said body, one pair adjacent the front wall and one pair adjacent the back wall, a pair of hollow push-buttons open through their inner ends and extending one through each of said openings, each of said push-buttons having an inner end of enlarged diameter, a perforated contact element disposed against the inner end of one of said buttons and in alignment with the contacts of one of said pairs, spring means entering the inner end of said button through the perforation in said contact and normally maintaining said button in a position holding said element in spaced relation to the contacts of the pair adjacent the back wall, a perforated contact element about the other of said buttons and on the upper side of the enlarged inner end portion thereof and disposed at the under side of and in alignment with the contacts of the other of said pair, spring means entering the inner end of and normally maintaining said other button and its contact element in position with the latter in engagement with the inner surfaces of the contacts of said second pair whereby on depressing of said first button a circuit is closed between the contacts of the first pair and on depressing of the second button a circuit is opened between the contacts of the second pair.

6. A manual control unit for a fluorescent tube having a pair of spaced filaments and a starter circuit for heating said filaments to render said tube conductive, comprising a cover member and an insulating base having a pair of contacts secured thereon and adapted to be electrically connected in said starter circuit to form a gap therein; a bridging contact slidably mounted in said cover and normally urged out of engagement with said contacts and adapted upon manual actuation to close said gap; a second pair of contacts secured on the base and adapted to be electrically connected in the circuit supplying energy to said tube; a second bridging contact slidably mounted in said cover normally urged into engagement with said contacts and adapted upon manual operation to momentarily open said circuit to the source of energy and render the tube inoperative; and a condenser mechanically secured to the base and electrically connected across the first-mentioned pair of contacts to

suppress radio interference caused by operation of the connected tube.

7. A unit for controlling a fluorescent lamp comprising a base of insulating material; a cover secured thereto and having a pair of openings therein; push buttons of insulating material having an abutment at the inner end thereof positioned in said openings and guided by said cover to move in a plane perpendicular to the plane of the cover, said push buttons being hollow and forming a pocket therein opening to the interior of the cover; a spring located in said pocket so as to be insulated and guided thereby and engaging the base to urge said buttons into a projected position with respect to the cover as determined by said abutment; a plurality of contact means carried by said base, each adapted to be connected in a circuit and associated with one of said push buttons to be controlled thereby, the abutment on one push button having a contact thereon cooperating with the associated contact means, in the projected position, to maintain a closed circuit therethrough and the abutment on the other push button having a contact thereon and, in the projected position, cooperating with the associated contact means to maintain an open circuit therethrough; and a condenser mechanically secured to said base and electrically connected across the last-mentioned contacts.

8. A control unit for a fluorescent lamp comprising a base of insulating material; a cover secured thereto and having a pair of openings therein; push buttons positioned in said openings and guided by the cover to move in a plane perpendicular to the plane of the cover; two pairs of contacts mounted on the base, the contacts of each pair being spaced from one another to form a gap in a circuit, one pair of said contacts being located adjacent the base and the other pair of said contacts being located adjacent the cover; contact means carried by each of the push buttons for engaging and bridging the gap between said contacts, said contact means comprising two contacting surfaces disposed at opposite sides of an annular portion overlying the end of the push button, the push buttons being hollow and providing a pocket therein; and a spring located in said pocket so as to be guided thereby and engaging the base to force said buttons into a fully projected position with respect to the cover wherein the contact surfaces carried by one of the buttons engage the pair of contacts adjacent the cover to form a normally closed gap, and the contact surfaces carried by the other button is moved away from the contacts of the base to maintain a normally open gap.

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