

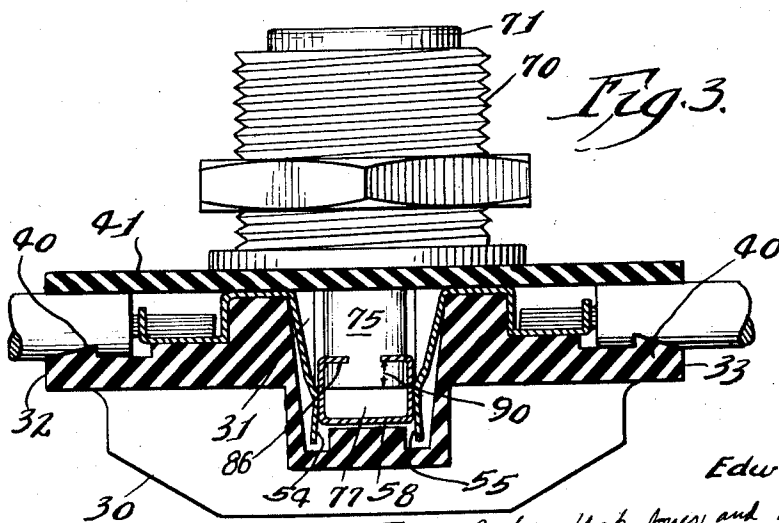
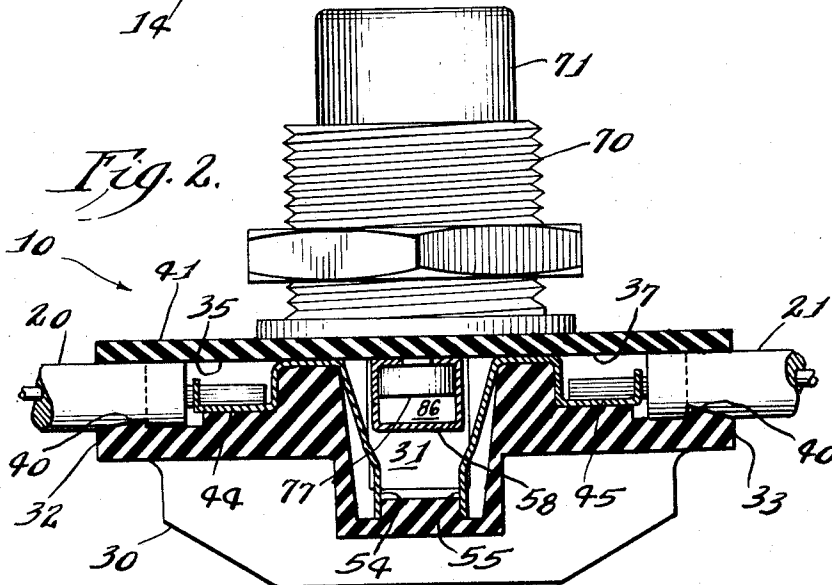
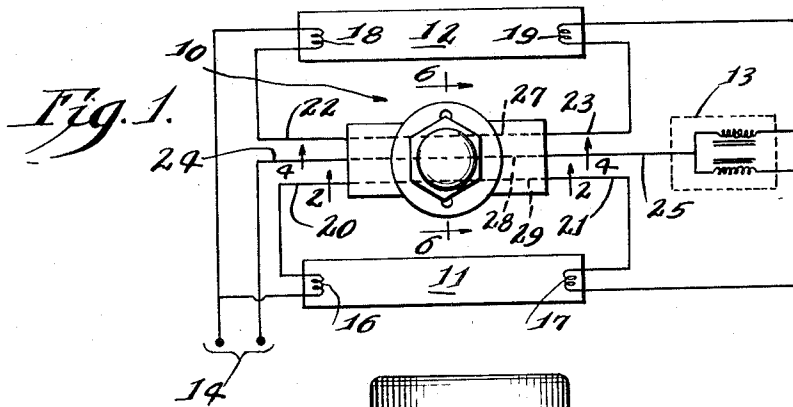
July 29, 1958

E. G. GAYNOR
FLUORESCENT LAMP SWITCH

2,845,498

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2 Sheets-Sheet 1



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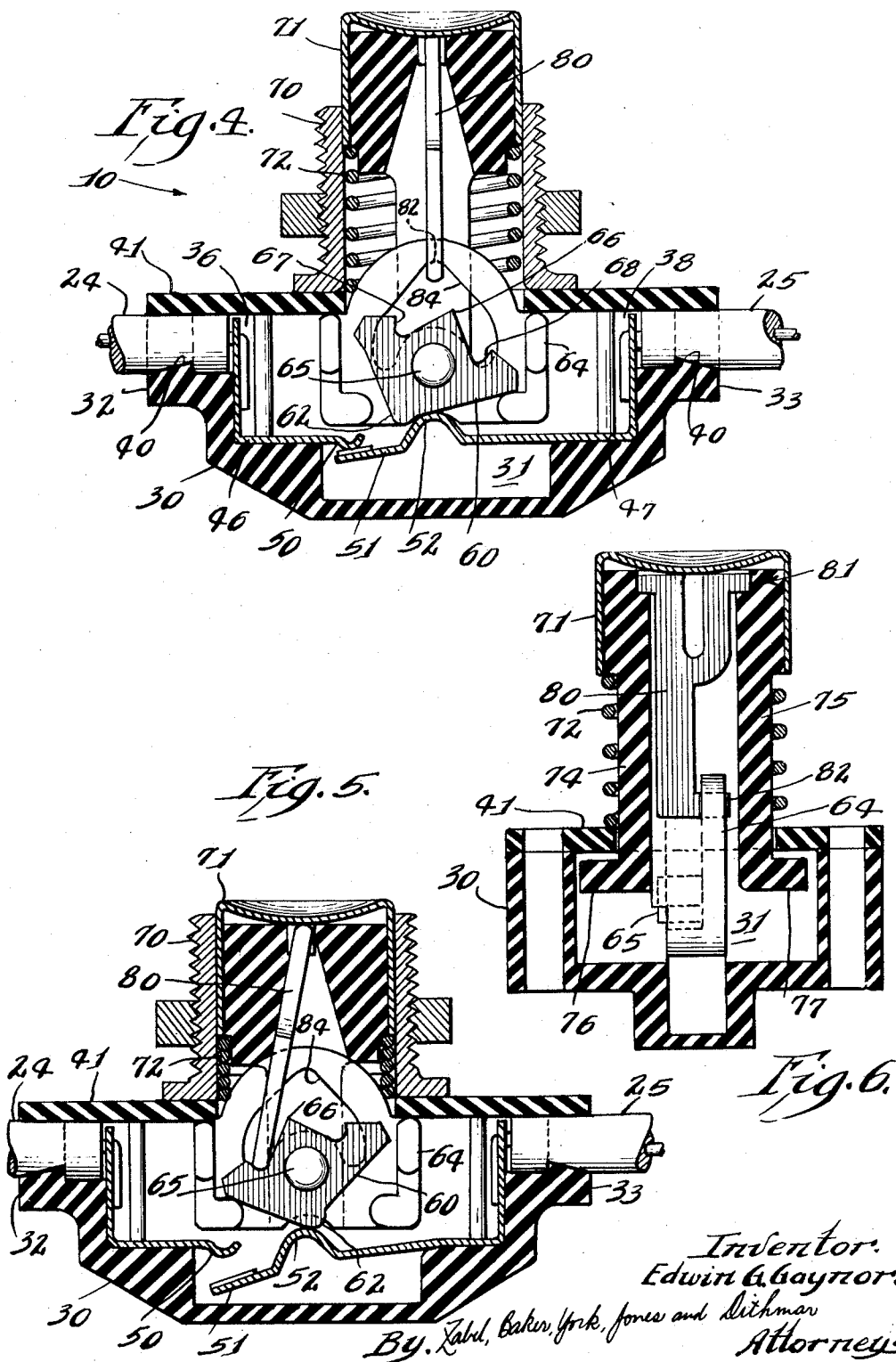
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FLUORESCENT LAMP SWITCH

Edwin G. Gaynor, Bridgeport, Conn.

Application November 4, 1954, Serial No. 466,811

1 Claim. (Cl. 200—5)

This invention relates to a fluorescent lamp switch, 15 and more particularly to a fluorescent lamp switch of the single-button type.

A fluorescent lamp, as is well known, comprises a tube or other envelope filled with gas under low pressure. The tube contains two spaced filaments which function as electrodes when the tube is conducting. To start tube conduction it is necessary to heat the filaments to initiate ionization of the gas within the tube.

Switches used with tubes of this character have a component which establishes a circuit through the filaments to generate heat in the filaments. This circuit normally is closed for a short length of time only, and thereafter it is open. Another switch component functions to establish a circuit through the lamp between the filament electrodes, this circuit being the one which illuminates the lamp. This invention contemplates a switch having the aforesaid two switch components. One object of the invention is to provide a single-button fluorescent lamp switch which is small in size, easy and effective in operation and inexpensive to make.

Another object of the invention is to provide a single-button switch of this character which includes a switch component so designed that there is a time delay between releasing the button and the reaction which opens the switch component. This time delay is ample for the heat-generating circuit through the filaments.

Still another object of the invention is to provide a switch of this character having lead wires which are anchored by novel means within the switch body, the anchor feature being capable of withstanding a pull of at least twenty pounds on a lead wire.

Yet another object of the invention is to provide a fluorescent lamp switch which is designed for use with either one or two lamp units.

Other objects, advantages and details of the invention will be apparent as the description proceeds, reference being had to the accompanying drawings wherein one form of the invention is shown. It is to be understood that the description and drawings are illustrative only and that the scope of the invention is to be measured by the appended claim.

In the drawings:

Fig. 1 is a top plan view of a switch embodying the invention, the figure also including a circuit diagram illustrating a manner of connecting the switch in circuit with a pair of fluorescent lamps;

Fig. 2 is an enlarged sectional view on line 2—2 of Fig. 1 illustrating one switch component in "open" condition;

Fig. 3 is a sectional view like Fig. 2 except that the switch component is shown in "closed" condition;

Fig. 4 is an enlarged sectional view on line 4—4 of Fig. 1 illustrating another switch component in "closed" condition;

Fig. 5 is a sectional view like Fig. 4 except that the other switch component is shown in "open" condition, and

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Fig. 6 is an enlarged sectional view on line 6—6 of Fig. 1 illustrating various details of the invention, certain parts being omitted for clarity.

Referring now to the drawings, and particularly Fig. 5 1 thereof, the illustrated switch embodying the invention is designated 10. Shown connected in circuit with switch 10 are a pair of fluorescent lamps 11 and 12, a ballast 13 and a voltage line 14. Lamp 11 has spaced filaments 16 and 17 while lamp 12 has spaced filaments 18 and 19.

As previously mentioned, switch 10 is designed for operation with either one or two lamps; however, the connections and circuit elements shown in Fig. 1 illustrate the use of the switch with two lamps.

Still referring to Fig. 1 switch 10 has two cooperating lead wires 20 and 21, the lead wire 20 being connected to one terminal of filament 16 and the lead wire 21 being connected to one terminal of filament 17. Switch 10 has another pair of cooperating lead wires 22 and 23, the lead wire 22 being connected to one terminal of filament 18 and lead wire 23 being connected to one terminal of filament 19.

Switch 10 also has a central pair of cooperating lead wires 24 and 25, the lead wire 24 being connected to one side of line 14 and lead wire 25 being connected to one terminal of ballast 13. Another terminal of ballast 13 is connected to the other terminal of filament 19, while the third terminal of ballast 13 is connected to the other terminal of filament 17. The other terminals of filaments 16 and 18 are connected together and to the other side of line 14.

When the push-button, presently to be referred to, of switch 10 is depressed, all switch components of the switch are closed. The closed circuits through the switch are indicated by the dotted lines 27, 28 and 29 within the switch. At this time one series circuit through filaments 16 and 17 is established, this circuit leading from one side of line 14 through filament 16, lead wire 20, dotted line 29, lead wire 21, filament 17, ballast 13, lead wire 25, dotted line 28 and lead wire 24 to the other side of line 14. At the same time another series circuit through filaments 18 and 19 is established, this circuit leading from one side of line 14 through filament 18, lead wire 22, dotted line 27, lead wire 23, filament 19, ballast 13, lead wire 25, dotted line 28 and lead wire 24 to the other side of line 14. These two circuits, due to the construction of switch 10, stay closed until momentarily after the push-button is released. Following a short delay the dotted line closed circuits 27 and 29 in switch 10 are opened. The heat generated in the respective filaments during the time the circuits are closed sufficiently ionizes the gas contained within lamps 11 and 12 so that the gas in the respective lamps becomes conducting at the available voltage. The lamps become illuminated when gas conduction starts.

One illuminating circuit extends from one side of line 14 through filament 16, the gas in lamp 11, filament 17, ballast 13, lead wire 25, the still closed dotted line connection 28 in switch 10 and lead wire 24 to the other side of line 14. The other illuminating circuit extends from one side of line 14 through filament 18, the gas in lamp 12, filament 19, ballast 13, lead wire 25, the still closed dotted line connection 28 and lead wire 24 to the other side of line 14. The lamps remain illuminated until the next time the push-button is depressed.

Referring now to Figs. 2-6, switch 10 comprises a body 30 of insulating material having a hollow interior 31. Body 30 has ends 32 and 33, the ends 32 and 33 being the left and right ends respectively in Figs. 2-5.

At least two channels lead from the exterior of body 30 to the hollow interior 31 in each end 32-33 of the body. Thus left end 32 has channels 35 (Fig. 2) and 36

(Fig. 4) while right end 33 has channels 37 (Fig. 2) and 38 (Fig. 4).

Channels 35, 36, 37 and 38 receive the ends of lead wires, the lead wires 20, 24, 21 and 25 (also shown in Fig. 1) being respectively received in said channels.

In the form of the invention illustrated body 30 has another channel (not shown) in each body end, the additional channels receiving the ends of lead wires 22 and 23 (Fig. 1).

Each channel has a tooth element 40 facing away from the body exterior which bites into the insulation of the lead wires to anchor the wires securely within body 30. To accommodate this arrangement body 30 includes a top plate 41 of insulating material which forms the top of the several channels and which is not put in position until after the lead wires have been placed in the channels. When top plate 41 is forced down in position with respect to the remainder of body 30, the lead wires are pressed against tooth elements 40 to enable the latter to bite into the insulation and thus anchor the lead wires.

Each lead wire is connected to a switch terminal mounted in body 30. Thus, lead wires 20 and 21 (Fig. 2) have terminals 44 and 45 while lead wires 24 and 25 (Fig. 4) have terminals 46 and 47.

Lead wires 22 and 23 (Fig. 1) also have switch terminals (not shown), the structure of the terminals and other cooperating elements, presently to be described, being the same as those illustrated and described with reference to lead wires 20 and 21. In other words, switch 10 is symmetrical so far as concerns the cooperating lead wires 22—23 and 20—21.

Referring to Fig. 4, terminals 46 and 47 are provided with a first pair of contact elements 50 and 51. In the form of the invention shown contact elements 50 and 51 are spring biased to engage each other, and the contacting portions thereof present cylindrical surfaces to each other at right angles. Contact element 51 has an intermediate portion 52 which is engaged by a rocker cam element, presently to be described, to control the engagement and disengagement of the contact elements 50 and 51.

Referring to Fig. 2, terminals 44 and 45 are provided with a second pair of contact elements 54 and 55. As here shown, contact elements 54 and 55 are in spaced relation, that is, the contact elements normally are in open relation. A connection between contact elements 54 and 55 is established by a make means 58, presently to be described.

The functional switch elements so far described are contact elements 50 and 51 which comprise one switch component and contact elements 54 and 55 which comprise a second switch component, the respective pairs of contact elements being in side-by-side relation. Cooperating with these switch components is a simultaneously acting means for opening or closing contact elements 50 and 51 and momentarily establishing a connection between contact elements 54 and 55. This simultaneously acting means now will be described.

The simultaneously acting means includes a rocker cam element 60 which is pivotally mounted within the hollow interior 31 of body 30. Rocker cam element 60 has a protruding portion 62 which engages intermediate portion 52 of contact terminal 51 to effect separation of contact element 51 from contact element 50 or is withdrawn from portion 52 to permit the two contact elements to engage each other in response to the spring bias therebetween.

In the form of the invention shown, a bracket 64 is mounted in fixed position for the most part within hollow interior 31 of body 30. An axle 65 projects from one face of bracket 64, and extends through a central opening in rocker cam element 60. Thus, the latter is pivotally mounted within body 30.

The upper edge of rocker cam element 60 has a central apex 66 which slopes laterally on each side to shoulders 67 and 68. These shoulders are engaged successively

by a pendulum element, presently to be described, which rocks the rocker cam element 60 from side to side, as will be seen.

A guide element 70 is mounted on top plate 41 above the central portion of switch body 30. A push-button 71 is arranged for telescopic movement within guide element 70, a spring 72 being provided to bias push-button 71 to extended position.

Referring to Fig. 6 wherein guide element 70 has been omitted for clarity, push-button 71 includes a pair of spaced, depending legs 74 and 75 having feet 76 and 77 respectively. Legs 74 and 75 terminate within hollow interior 31 of body 30 and feet 76 and 77 extend in opposing directions.

Still referring to Fig. 6, a pendulum element 80 is disposed in the space between legs 74 and 75 of push-button 71. Pendulum element 80 is mounted in a pivotal manner at its upper end as at 81 to the interior of push-button 71, the pivotal relationship between pendulum element 80 and push-button 71 having considerable friction so that pendulum element 80 is not free to swing unless pressure is applied as when push-button 71 moves in and out of guide element 70.

The lower end of pendulum element 80 has a finger 82 which enters an opening or recess 84 in a face of bracket 64. Recess 84 is generally triangular in shape with an upper apex centrally located with respect to bracket 64.

Bracket 64, recess 84 therein and finger 82 of pendulum element 80 constitute means to center pendulum element 80 when push-button 71 is extended. As will be seen, pendulum element 80 swings in one direction or the other when push-button 71 is depressed, and as push-button 71 and associated pendulum element 80 are extended by means of spring 72, finger 82 cooperates with recess or opening 84 to center pendulum element 80, as best illustrated in Fig. 4.

The previously referred to make means 58 is, as illustrated in Fig. 2, associated with push-button foot 77. In the form of the invention shown, make means 58 is a rectangular band of conducting material which is mounted on and moves with foot 77. The relationship between make means 58 and foot 77 is such that there is relative motion between make means 58 and foot 77 whereby, when push-button 71 and foot 77 are depressed to position make means 58 between contact members 54 and 55, a delay occurs between release of push-button 71 and withdrawal of make means 58 from between the two contact elements.

This relative motion feature, in the form of the invention shown, includes an elongated opening or recess 86 in make means 58. Foot 77 enters this recess or opening but the vertical dimension thereof is considerably less than the vertical length of recess or opening 86, as best shown in Fig. 2.

Fig. 3 illustrates the relationship between make means 58 and foot 77 when push-button 71 is depressed and make means 58 is positioned between contact elements 54 and 55. The small arrow 90 indicates the distance through which foot 77 must move as push-button 71 is extended before foot 77 engages make means 58 and starts to withdraw the latter from its circuit establishing position between contact elements 54 and 55. The travel distance designated by arrow 90 introduces a sufficient time delay to insure that the series circuits through the lamp filaments 18, 19, 20 and 21 have functioned long enough to generate the heat necessary to ionize the gas contained in lamps 11 and 12.

Thus, when push-button 71 is extended, the series filament circuits are broken by the withdrawal of make means 58 from connection-establishing relation with contact elements 54 and 55. However, as shown in Fig. 4, rocker cam element 60 has been rocked to the right, the position which permits switch elements 50 and 51 to close to establish the aforesaid heating and illuminating circuits through lamps 11 and 12 and ballast 13.

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When it is desired to turn the lamps out, push-button 71 again is depressed and, referring to Fig. 4, the lower end of pendulum element 80 strikes rocker cam element 60 on the left hand side of apex 66. Continued inward movement of pendulum element 80 rocks cam element 60 to the left and into the position shown in Fig. 5. Protruding portion 62 of cam element 60 effects separation of contact elements 50 and 51, thereby breaking the lamp-illuminating circuit.

When push-button 71 is extended from the position shown in Fig. 5, pendulum element 80 is centered as aforesaid and thus positioned for the next down stroke which will rock cam element 60 back to the position shown in Fig. 4, the pendulum element 80 striking cam element 60 on the right hand side of apex 66.

From the above description it is thought that the construction and advantages of my invention will be readily apparent to those skilled in the art. Various changes in detail may be made without departing from the spirit or losing the advantages of the invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

A fluorescent lamp switch comprising a hollow body of insulating material, a first pair of cooperating contact elements mounted within said body, a second pair of contact elements mounted within said body, said pairs of contact elements being in side-by-side relation, and simultaneously acting means for opening and closing said first pair of contact elements and momentarily establishing a connection between said second pair of contact elements, said simultaneously acting means including a rocker cam element pivoted within said body and engag-

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ing a contact element of said first pair of contact elements, a spring-biased push-button mounted on said body, said push-button having make means which, when the button is depressed, establishes a connection between said second pair of contact elements, said make means being mounted on said push-button to have relative motion therewith whereby delay occurs between release of the push-button and withdrawal of said make means from its position of establishing a connection between said second pair of contact elements, and a pendulum element frictionally related to said push-button, said pendulum element engaging said rocker cam element when said push-button is depressed to rock said cam element in successively opposite directions to open and close said first pair of contact elements, and means to center said pendulum element when said push-button is extended.

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