Aug. 17, 1948. F. C. DAZLEY ET AL 2,447,318

STARTING SWITCH

Filed March 18, 1946

Fig. 1.

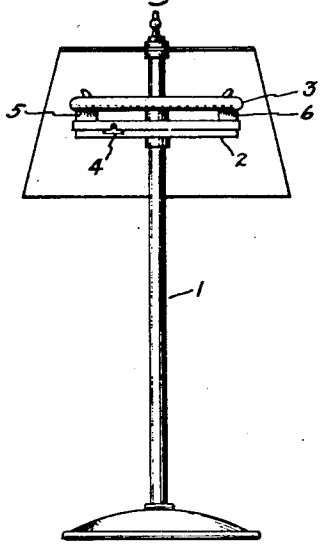


Fig. 2.

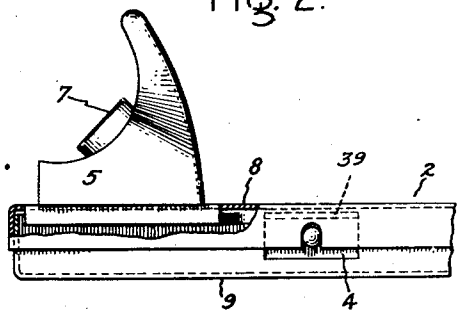


Fig. 3.

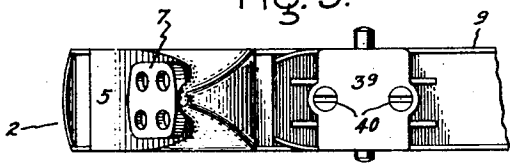


Fig. 4.

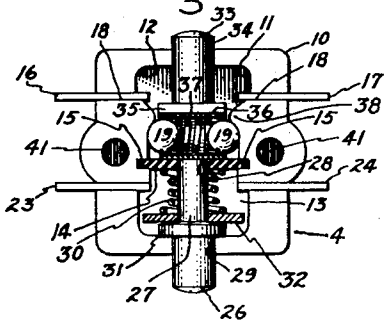


Fig. 5.

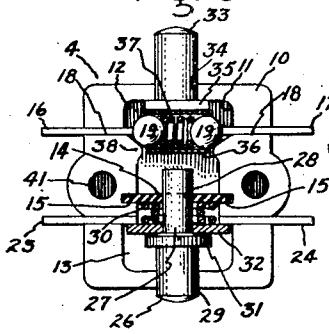


Fig. 8.

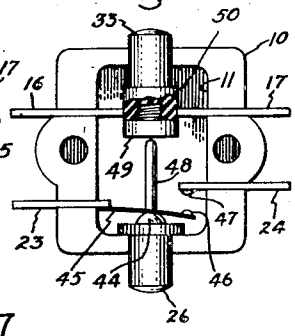


Fig. 6.

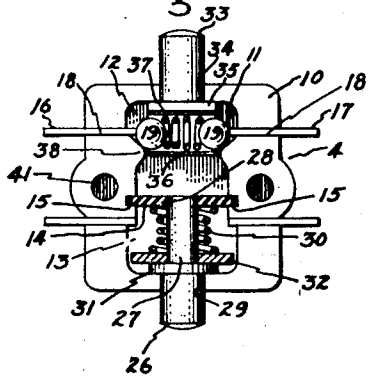
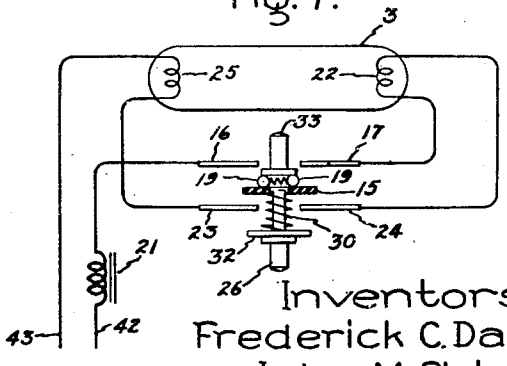


Fig. 7.



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STARTING SWITCH

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Application March 18, 1946, Serial No. 655,073

8 Claims. (Cl. 200—16)

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Our invention relates to operating mechanisms for discharge lamps and more particularly to starting switches for fluorescent lamps of the type now in commercial use.

It is an object of our invention to provide a new and improved operating mechanism for fluorescent lamps in which manually operable switch means is employed to start the lamp.

It is another object of our invention to provide an improved switch mechanism for starting fluorescent lamps in which the switch is manually operated by means of push buttons.

A further object of our invention is the provision of a switch mechanism which is small in size making it especially suitable for use in table lamps, or the like, and in which the mechanism comprises relatively few parts thereby providing a construction which may be manufactured at low cost.

In the accompanying drawing, Fig. 1 illustrates a table lamp provided with a switch constructed in accordance with our invention; Figs. 2 and 3 show the switch mounted in position on the lamp holder; Fig. 4 is a view of the interior of the switch showing the parts in "off" position; Fig. 5 shows the switch parts in starting position during preheat of the lamp filaments; Fig. 6 shows the switch in "on" position; Fig. 7 is a circuit diagram showing how the switch is connected between the lamp and the current supply, and Fig. 8 is a view of a modification of the switch structure.

Referring to Fig. 1 of the drawing, we have illustrated a table lamp 1 provided with a lamp holder 2 on which is mounted a fluorescent lamp 3. The lamp is controlled by means of a manually operated switch 4 constructed in accordance with our invention. Lamp 3 is illustrated as being one of the new circular fluorescent lamps now on the market. Lamp holder 2 is provided with spaced arms 5 and 6, one of which is movable, so that the arms may be positioned in the loop of the lamp to support the lamp on the holder. As shown in Figs. 2 and 3, the arm 5 is provided with a contact receptacle 7 for making an electrical connection with the lamp contact pins. The lamp holder itself forms no part of the present invention. It may be of the type disclosed in the copending application of Frederick C. Dazley, Serial No. 624,036, filed October 23, 1945, and assigned to the same assignee as the instant application. In such lamp holder, the body portion is constructed of two telescoping channel members which we have identified as 8 and 9 in Fig. 2. We construct our switch of the present invention

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of a size to seat within the telescoping members so that the switch is supported directly in the lamp holder. In this way, the switch is made easily accessible and is furnished with the lamp holder. It may be wired to the holder at the factory, although for the sake of clarity, the wires have been omitted in the showing of Figs. 2 and 3.

Circular fluorescent lamps of the type described are provided with filaments at each end of the discharge tube, the latter being bent in the form of a circle. Such a lamp is shown schematically in Fig. 7. As is well understood in the art, the lamp is started by first passing a heating current through the filaments until they reach an electron emitting temperature. At that time, a high voltage is applied from the associated ballast in the system so that a glow discharge takes place between the filaments lighting the lamp. Our switch is designed for operation in such a system and is manually operated to preheat the lamp filaments and apply the high voltage kick from the ballast.

Turning now to the construction of the switch and referring to Figs. 4, 5 and 6, the switch 4 is provided with a housing 10 formed of suitable insulating material, such as a molded plastic. The housing is formed with a recess 11 which is separated into two chambers 12 and 13 by a strip of insulating material 14, such as sheet fiber. The strip rests in recesses 15 formed in opposite walls of the recess. A pair of line contacts 16 and 17 are mounted in recesses 18 in opposite walls of the housing. One end of each contact extends into chamber 12 in position to be engaged by the movable contact balls 19. The outer ends of the contacts 16 and 17 are connected to the lamp ballast 21 and one of the lamp filaments 22, respectively, as shown in Fig. 7. Each contact comprises a blade punched from sheet bronze, or the like; each one is formed with a projecting tang (not shown) which engages the bottom wall of the chamber 12 and prevents the contact blades from sliding longitudinally out of the housing. A pair of starting contacts 23 and 24 are likewise carried by the housing and extend into the chamber 13. They are similar to contacts 16 and 17 and are held in the housing in like manner. As shown in Fig. 7, contacts 23 and 24 are connected to lamp filaments 25 and 22, respectively.

The switch is provided with an operating push button 26 having a plunger 27 resting in chamber 13 and extending into an opening 28 in the fiber plate 15. The button extends through an opening 29 in the wall of the recess so that it is accessible for operation of the switch. A coil

spring 30 is mounted on the plunger 27 and biases the button 26 outwardly, outward movement being limited by a flange 31 which engages the inner wall of the recess. In order to make an electrical connection across the contacts 23 and 24, the plunger carries a contact blade or plate 32 which may be moved into engagement with the fixed contacts. Spring 30 holds the blade 32 in position on the plunger.

A second operating button 33 is mounted on the opposite side of the housing in opposed relation to the button 26. It likewise extends through an opening 34 in the wall of the housing and its outward movement is limited by a flange 35. The aforementioned contact balls 19 are mounted in a cylindrical tube 36 which, in turn, is fastened to the flange of button 33 in any suitable manner as by a pin (not shown). The tube 36 may be formed of insulating material, such as a molded plastic, or it may be made of metal since it is carried by the insulating button 33. In any event, the contact members 19 are free to slide or rotate toward and away from each other within the guide tube 36 and they are biased outwardly by means of a coiled compression spring 37. Spring 37 is made of good conducting material such as phosphor bronze wire and the contact balls 19 are preferably made of brass so that they will make a good electrical connection with the fixed contact blades 16 and 17. It will be manifest that tube 36 carrying the contact balls 19 will be moved back and forth with movement of operating button 33. In one position, the contact balls will be biased outwardly into engagement with the side walls of recess 11 on one side of projections 38, as shown by Fig. 4. In the other position, the contact balls will be spring biased into engagement with the contact blades 16 and 17 on the other side of projections 38, as shown in Fig. 5.

The switch mechanism thus far described is easily assembled on the housing simply by placing the parts in the recess and slots in the housing. The parts are then held in assembled relationship by means of a cover plate 39, as shown by Figs. 2 and 3. The cover plate is punched from insulating material, such as sheet fiber, and is fastened to the housing by means of self-tapping screws 40 extending into openings 41 in opposite walls thereof.

The operation of the switch is illustrated in Figs. 4 to 7, inclusive. Fig. 4 shows the switch in "off" position; Fig. 7 includes a diagrammatic showing of the switch, likewise in "off" position, with the switch connected into a lamp operating circuit which includes a ballast 21 and current supply leads 42—43 which may be a standard 110 volt A.-C. current source. Ballast 21 may consist of a choke coil or an auto transformer, such devices now being commercially available.

To start the lamp, operating button 26 is depressed. Plunger 27 engages the tube 36 and forces the tube 36 and contact balls 19 to snap past the projections 38 to a position such that the contact balls engage the line contacts 16 and 17, as shown by Fig. 5. At the same time, contact plate 32 is moved into engagement with starting contacts 23 and 24. Current now flows from line 42 through ballast 21, contact 16, contact balls 19 and spring 37, contact 17, lamp filament 22, contact 24, plate 32, contact 23, lamp filament 25 to the other supply line 43. In this way, current flows through the lamp filaments to heat them to an electron emitting temperature. Accordingly, this position of the switch is

known as the "preheat" position. Button 26 is held manually depressed, with the contact plate 32 electrically connecting contacts 23 and 24 for a period of time sufficient for the lamp filaments to heat up. Usually, this time is on the order of one second. Button 26 is then released so that spring 30 moves plate 32 away from the starting contacts 23 and 24. This opens the circuit across the lamp filaments. Due to the magnetic decay in the ballast occasioned by the sudden interruption of current, a high voltage kick is applied to the ballast across the filaments causing the lamp to light. The switch is now in the "on" position, shown by Fig. 6. The spring 37 holds the contact balls 19 firmly in engagement with the contacts 16 and 17, thereby maintaining the circuit to the line supply closed.

Button 33 is depressed to turn the lamp off. This moves the contact balls 19 out of engagement with contacts 16 and 17 to a position on the other side of the projections 38, so that the line supply of current is interrupted. The switch has now been returned to "off" position shown by Fig. 4. Due to the biasing action of spring 37, the contact balls move to one side or the other of projections 38 with considerable snap action. This means that the switch mechanism is held securely in "on" or "off" position. When the switch is in "off" position, the power supply to the lamp filaments is maintained open. In this way, no power loss can occur in the ballast when the lamp is not lighted.

A modification of the switch construction is shown in Fig. 8. Operating button 26 is provided with a shoulder 44 which engages a flexible spring contact arm 45 fastened to contact blade 23. The spring arm carries a contact point 46 which mates with a similar point 47 on contact blade 24. It will be apparent that when button 26 is pushed inwardly, blade 45 will flex permitting contact points 46 and 47 to close. This will close the starting contacts in the manner already described. Button 26 is provided with an extension 48 which is adapted to engage a conducting disk 49 screw threaded into the end of button 33. Since button 33 is constructed of insulating material, the circuit through contacts 16 and 17 will be closed only when they engage disk 49. The contact blades 16 and 17 extend into the recess 11 and frictionally engage the side walls of the button 33 so that the button is securely held in any one of its two positions.

Fig. 8 shows the switch in "off" position. To light the lamp, the button 26 is pushed inwardly. This movement closes contacts 46 and 47 and extension 48 pushes button 33 to a position such that conducting disk 49 is engaged by contact blades 16 and 17. In this position of the switch, preheat current flows through the lamp filaments in the manner already described. Button 26 is then released so that spring blade 45 returns it to its original position and at the same time opens the circuit through the starting contacts 23 and 24. This lights the lamp. To turn the lamp off, operating button 33 is pushed inwardly to a position such that the insulating portion of the button is placed between contact blades 16 and 17. Outward movement of button 33 is limited by a flange 50 which engages the side wall of recess 11. Inward movement is limited by disk 49 engaging extension 48. The modification of Fig. 8 has the advantage that the construction has been simplified by reducing the number of parts thereby providing a construction which may be manufactured at lower cost.

Our switch is one which comprises relatively few parts providing a low cost item. The two push button operating members 26 and 33 provide a switch mechanism which is easily operated particularly when the switch is mounted in the relatively narrow channel of the lamp holder 2. If desired, the button 26 may be manufactured of colored plastic material, such as red compound, in order to provide identification of the proper button to push to turn the switch on.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. An electric switch comprising, in combination, a housing of insulating material, spaced contact members carried by said housing, a push button movable relative to said contact members, conducting means carried by said push button including spring biased ball contacts engaging said contact members for closing a circuit therethrough and a separate switch mechanism carried by said housing and including a push button provided with operating means cooperating with the first-mentioned push button to move it to circuit closing position.

2. An electric switch comprising, in combination, a housing of insulating material, spaced contact members carried by said housing, a push button movable relative to said contact members, conducting means carried by said push button including spring biased ball contacts engaging said contact members for closing a circuit therethrough, a separate switch mechanism carried by said housing, said mechanism including a plunger adapted to engage said push button to move it to closed circuit position, and spring means normally biasing said switch mechanism to open circuit position.

3. In a switch mechanism, a housing of insulating material having two chambers separated by an insulating wall, spaced contact members located in one of said chambers, a push button provided with a contact plate for engaging said contact members to close a circuit therethrough, said push button being provided with a plunger extending through said insulating wall, spaced contact members located in the other of said chambers, and a circuit controlling mechanism in said other chamber cooperating with said second-mentioned contact members, said mechanism including a tubular casing open at its ends and having therein a conductive spring and a pair of conductive balls, one at each end opening, said balls being tensioned apart by said spring and said balls and spring being adapted to contact and to close an electrical circuit between said second mentioned contact member, the said plunger cooperating with said circuit controlling mechanism to move it to circuit closing position upon operation of said push button, the circuit controlling mechanism itself being provided with a push button to move it to circuit opening position.

4. An electric switch comprising in combination, a housing of insulating material, spaced contact members carried by said housing, a push button movable relative to said contact members, conducting means carried by said push button including a casing containing spring biased ball contacts adapted to engage said contact members for closing a circuit therethrough and a separate switch mechanism carried by said housing and including a push button provided with a plunger cooperating with said casing on said first mentioned push button to move it into circuit closing position.

5. An electric switch comprising in combination, a housing of insulating material, spaced contact members carried by said housing, a push button movable relative to said contact members, conducting means carried by said push button including a casing containing spring biased ball contacts adapted to engage said contact members for closing a circuit therethrough, opposed projections on opposite walls of said housing positioned so as to be engaged by said balls to provide definite open circuit and closed circuit positions for said push button and a separate switch mechanism carried by said housing and including a push button provided with a plunger adapted to engage said casing of the first mentioned push button to move the latter into circuit closing position.

6. An electric switch comprising, spaced stationary contact members, a snap action push button mechanism adapted to remain in either open circuit or closed circuit positions and having movable conductive means adapted in closed circuit position to engage said contact members to close a circuit therethrough, a separate second push button mechanism normally biased to open circuit position and means cooperating with both of said mechanisms to move said snap action mechanism just beyond its dead center when the second push button mechanism is moved to closed circuit position, whereby said first push button mechanism snaps into closed circuit position when the second push button is closed.

7. In a switch mechanism, a housing of insulating material having two chambers separated by an insulating wall, spaced contact members located in one of said chambers, a push button provided with a contact plate for engaging said contact members to close a circuit therethrough, means biasing said push button to open circuit position and said push button being provided with a plunger extending through said insulating wall, spaced contact members located in the other of said chambers, a snap action circuit controlling mechanism in said other chamber cooperating with said second mentioned contact members, the said plunger cooperating with said snap action mechanism to move it just beyond dead center whereby said circuit controlling mechanism snaps into closed circuit position upon operation of said push button, the circuit controlling mechanism itself being provided with a push button to return it to open circuit position.

8. In a switch mechanism, a housing of insulating material having two chambers separated by an insulating wall, spaced contact members located in one of said chambers, a push button provided with a contact plate for engaging said contact members to close a circuit therethrough, said push button being provided with a plunger extending through said insulating wall, spaced contact members located in the other of said chambers, and a circuit controlling mechanism in said other chamber cooperating with said second-mentioned contact members, said mechanism including a tubular casing open at its ends and having therein a conductive spring and a pair of conductive balls, one at each end opening, said balls being tensioned apart by said spring, said balls and spring being adapted to contact and to close an electrical circuit between said second mentioned contact member, and opposed projections on opposite walls of said housing in said other chamber positioned to cooperate with said balls to provide definite open circuit and closed circuit positions for said mechanism, the said

plunger cooperating with said circuit controlling mechanism to move it to circuit closing position upon operation of said push button, the circuit controlling mechanism itself being provided with a push button to move it to circuit opening position.

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The following references are of record in the file of this patent:

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