

July 4, 1944.

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2,352,936

OPERATING SYSTEM FOR DISCHARGE LAMPS

Filed July 21, 1942

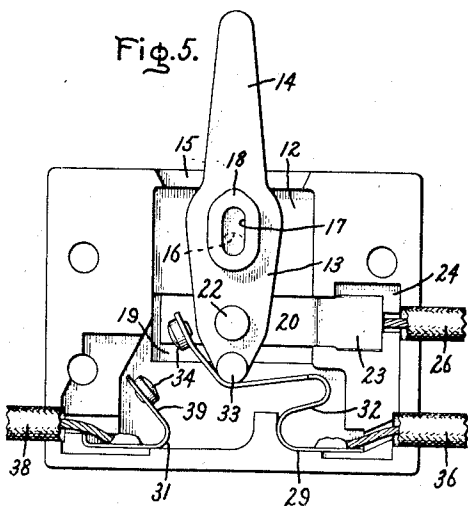
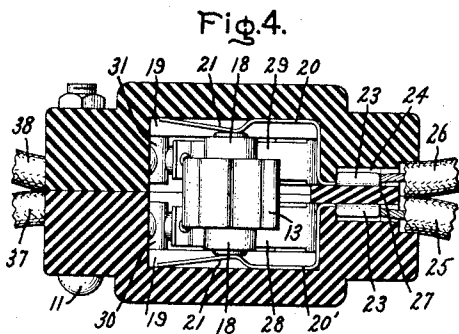
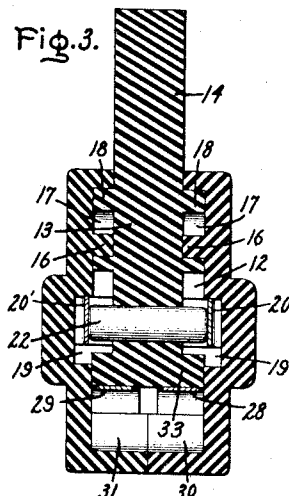
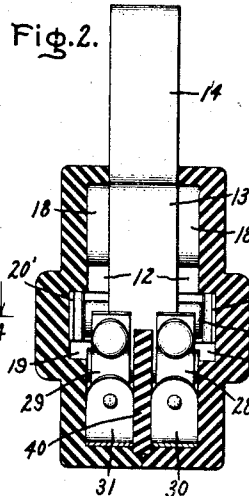
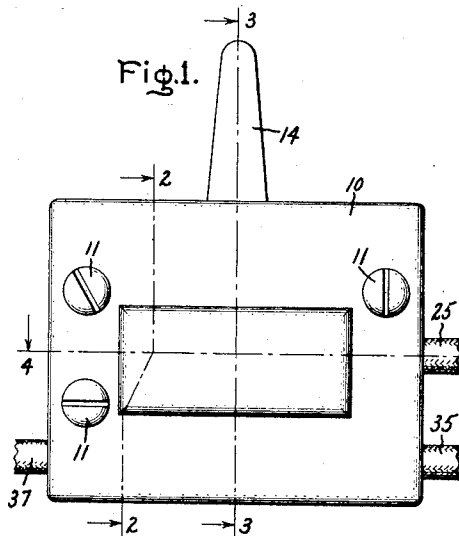
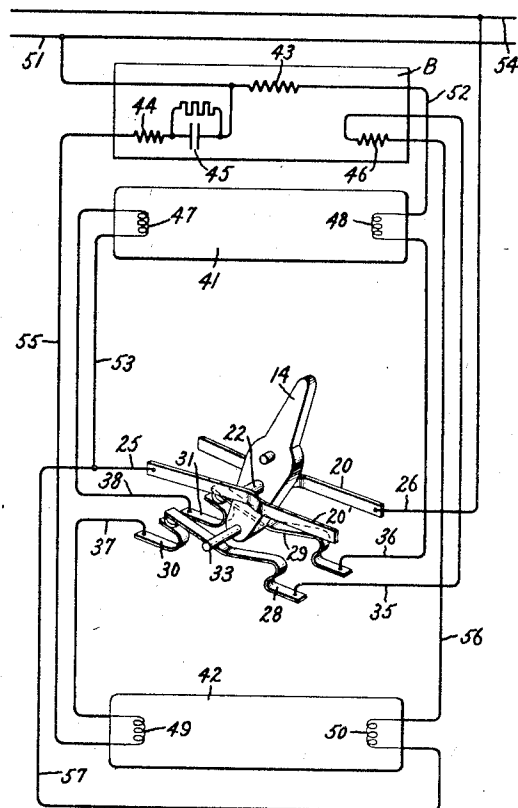


Fig. 6.



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UNITED STATES PATENT OFFICE

2,352,936

OPERATING SYSTEM FOR DISCHARGE LAMPS

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Application July 21, 1942, Serial No. 451,699

2 Claims. (Cl. 200—5)

My invention relates to an operating system for discharge lamps and more particularly to electric switches for use with discharge lamps of the type now on the market, such as fluorescent lamps.

The object of my invention is the provision of a new and improved switch mechanism which may be manually operated to control the operation of such lamps and which may be used with one or more lamps as occasion requires.

In the accompanying drawing, Fig. 1 is an elevational view of my switch; Figs. 2, 3 and 4 are cross-sectional views through the switch taken along the lines 2—2, 3—3 and 4—4, respectively, of Fig. 1; Fig. 5 is a view of the switch mechanism showing the positions of the elements when the lamps are lighted and Fig. 6 is a diagrammatic view showing one manner of connecting the switch in circuit with a plurality of discharge lamps and showing the switch elements in position to start the lamps.

Referring to the drawing, my switch includes a housing 10 which is preferably made in two parts of any suitable insulating material, such as a molded plastic. The two parts of the housing are held together by suitable fastening means, such as the screws 11. Each one is hollowed out so that when assembled together they form a chamber 12 within which is pivotally mounted an operating member 13. This member is provided with a handle 14 which extends beyond the confines of the housing and is movable through a slot 15 in the outer wall of the housing. Opposite side walls of the housing are provided with projecting bosses 16 which form arbors and which are seated in recesses 17 formed in complementary projecting bosses 18 on the operating member 13. When the two parts of the housing are assembled around the operating member, the member is securely held in position for pivotal movement within the housing since the arbors 16 project into the recesses 17. Recesses 17 are somewhat elongated, as indicated in Fig. 5, so that the operating member has a certain degree of play or movement for a purpose to be described later.

Opposite walls of the housing are formed with recesses 19. Within the recesses spaced contact blades 20 and 20' are mounted one on each side of the operating member. Each contact blade is formed of a strip of suitable flexible conducting material, such as spring bronze, and each is provided with a projecting or cam surface 21 which co-operates with and is engaged by a conducting or shorting member 22 carried by the operating

member 13. In assembled position, the contact blades 20 and 20' are fitted closely adjacent the walls of the recesses 19. When the handle of the operating member is moved to the extreme left, in the showing of Figs. 1, 4 and 5, the shorting member 22 is of such a length that it does not make electrical contact with the fixed contact members. However, when the handle of the operating member is moved to the right to mid-position or beyond the shorting member engages the projecting surfaces 21 of the contact blades to complete an electrical connection between the blades. The resiliency of the contact blades 20 and 20' is such that the operating member will be held in mid-position, as shown in Figs. 4 and 5, by the biasing action of the blades on the shorting member. Each contact blade is provided with an offset terminal portion 23 which is seated in a recess 24 adjacent the chamber 12 where connection is made to the conductors 25 and 26 for connection to a current supply in a manner to be described later. The terminal portions 23 on the respective contact blades are separated and insulated from one another by a barrier plate 27 which, as shown in Fig. 4, is clamped between the two parts of the housing in a position to separate the contact blades from one another.

In a portion of the chamber 12 spaced from the contact members 20 and 20' are a plurality of spaced flexible contact members 28 and 29 co-operating with fixed contacts 30 and 31, respectively; they are made of suitable conducting material, such as spring bronze. The flexible contact members 28 and 29 rest on the bottom wall of the chamber 12 and are provided with a reversely bent portion 32 in the form of an S so that they are capable of a certain degree of movement when engaged by the operating member 13. The operating member is formed at its lower end with projecting portions 33, as shown by Figs. 3 and 5, which when the handle 14 is moved to the right, in the view of Fig. 5, engage the flexible contact members 28 and 29 and depress them into engagement with the fixed contacts 30 and 31. Both the fixed and movable contact members are provided at their engaging ends with contact surfaces or buttons 34 of high conductivity material, such as silver, to insure a good electrical connection between these elements. The movable contacts 28 and 29 are connected to conductors 35 and 36, respectively, shown most clearly by Fig. 6. Similarly, the fixed contacts 30 and 31 are connected to conductors 37 and 38, respectively. The fixed contacts 30 and 31

are each formed of sheet material, such as spring bronze, and the outer end is bent at an angle, as indicated at 39, so that the contact button 34 is presented for contact with the corresponding button on the movable contacts. The contacts are insulated from one another adjacent the contact buttons 34 by an additional barrier 40 of insulating material, as shown by Fig. 2. They are held in position in the housing by being clamped between the side walls of the housing and the barrier member.

In the showing of Figs. 4 and 5, the operating member 13 is in mid-position which corresponds to the lighted position of the lamps with which the switch is used. If the handle 14 is moved to the left, as shown in Fig. 5, the circuits through contacts 28 and 29 remain open; at the same time the circuit through the contact members 20 and 20' is also interrupted due to the fact that the shorting member is not in engagement with them. This corresponds to the "off" position of the lamps. When it is desired to light the lamps, the handle 14 is moved to the right to the position shown by Fig. 6 so that the circuits through the movable contact members 28 and 29 are closed while a separate circuit is also established through the contacts 20 and 20' in the manner aforementioned. Upon release of the operating member, the biasing action of the blades 28 and 29 will return it to mid-position, as shown by Fig. 5. The biasing action of the resilient contact blades is increased due to the fact that the operating member may move on its pivots within the range of the elongated slot 17 thereby making possible a further initial deformation of the blades. The manner in which the switch operates to control the operation of a discharge lamp and the manner in which it is connected into an operating circuit with the lamp will now be described with particular reference to Fig. 6.

I have shown two lamps 41 and 42, such as fluorescent lamps, operatively connected in circuit with my switch and with the ballast B of a type now commercially available. The ballast is provided with a reactor 43 having a lagging power factor connected to lamp 41 while a second reactor 44 having a leading power factor by reason of the capacitor 45 is connected to the other lamp 42; a compensator 46 in the form of a reactor adds inductance to the heating circuit of the second lamp 42 to insure quick starting. As mentioned above, this is an example of a ballast of a type now available on the market and of itself forms no part of my invention. Fluorescent lamp 41 is provided with emissive filaments 47 and 48 at opposite ends thereof while the lamp 42 is likewise provided with such filaments designated 49 and 50. The manner in which the switch operates to start the lamps, will now be described, it being noted that in the diagrammatic showing of Fig. 6 the switch is in the "start" position with the circuit through the contact members 20 and 20' closed by the shorting member 22 and with the flexible contact members 28 and 29 depressed to form an electrical connection with the fixed contacts 30 and 31, respectively.

When the operating handle 14 has been moved clear to the right, as indicated in Fig. 6, the circuit through the shorting member 22 will be closed in the manner already described. Current thus flows from one side 51 of an alternating current supply line to the reactors 43 and 44 of the ballast B. Current from reactor 43 flows through a conductor 52 to the filament 48 at one

end of the lamp 41, then by conductor 36 to movable contact 29, fixed contact 31, a conductor 38 to the filament 47 at the other end of the lamp, by conductor 53 to conductor 25, contact 20', shorting member 22, contact 20 and a conductor 26 to the other side 54 of the current supply line. Simultaneously, current flows from the reactor 44 through a conductor 55 to filament 49 at one end of the lamp 42, then through conductor 37, fixed contact 30, movable contact 28, conductor 35 to the compensating reactor 46, then by a conductor 56 to the filament 50 at the other end of the lamp, then by conductor 57 to conductor 25, contact 20', shorting member 22, contact 20, conductor 26 to the other side of the supply line.

It will be apparent that the arrangement is such that as long as the handle 14 is manually held turned to the right in the position indicated current will flow through the electrodes of both fluorescent lamps in the manner just described to heat them. Usually, this preheating time is of the order of 1 to 5 seconds. After that time, the operating handle 14 is released so that the resilient spring contact members 28 and 29 move the operating member 13 to mid-position, as shown in Fig. 5, the circuit through the movable contact members 28 and 29 being simultaneously opened. Upon opening of the circuits through the contacts 28 and 29, the circuits across the filaments of the lamps are opened so that the reactors 43 and 44 provide an inductive kick, causing a glow discharge to strike between the electrodes of each lamp, lighting the lamps. When this occurs, the circuit through my switch is as follows.

Current flows from one side of the supply line to reactor 43, through line 52 to filament 48, across the glow discharge through lamp 41 to the filament 47, line 53; conductor 25, contact 20', shorting member 22, contact 20 and conductor 26 to the other side of the supply line. Simultaneously, current flows from reactor 44 through conductor 55 to filament 49, across the glow discharge in lamp 42 to filament 50, then by conductors 57 and 25 to contact 20', shorting member 22, contact 20, conductor 26 to supply line 54.

When it is desired to turn off the lamps, the operating handle 14 is moved to the left, in the views of Figs. 5 and 6, thereby moving the shorting member 22 out of engagement with the fixed contacts 20 and 20', interrupting the circuit through the lamps. After the lamps have been turned off, they may be turned on again simply by moving the handle 14 to the right so that the movable contacts 28 and 29 again engage the fixed contacts and the shorting member 22 spans the contacts 20 and 20', the handle being manually held in this position for a time sufficient to permit preheating of the lamp filaments and thereafter being released.

While I have illustrated my switch as being used with two fluorescent lamps, it should be manifest that the switch will operate equally as well with only a single fluorescent lamp simply by omitting the connection to one of the pairs of contacts 28 and 30 or 29 and 31.

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

1. An electric switch for starting and operating a discharge lamp having spaced filaments comprising a base forming a chamber, a pair of main contacts and spaced auxiliary contact means held in the chamber, an operating member pivotally supported on the base, a shorting

member held on the operating member for closing the main contacts in a starting position of the operating member, a projection on the operating member for closing the auxiliary contact means in the starting position, said auxiliary contact means including a spring blade which in the starting position exerts a biasing force on the operating member and upon manual release of the latter forces it away from the starting position into an operating position in which the main contacts only are closed.

2. An electric switch for starting and operating a discharge lamp having spaced filaments comprising a base forming a chamber, main con-

tacts located in lateral recesses of the chamber, auxiliary contacts held on the bottom of the chamber and including a contact blade, an operating member pivotally held in the chamber and having a shorting member and a projection for closing the main and auxiliary contacts respectively in a starting position of the operating member, said contact blade in the starting position of the operating member exerting a biasing force thereon sufficient upon manual release in the starting position automatically to force the member into operating position in which the main contacts only are closed.

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