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N. DE TORO

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GLOW SWITCH FOR STARTING DISCHARGE DEVICES

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Fig. 1.

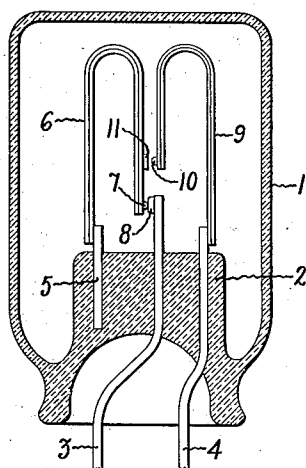
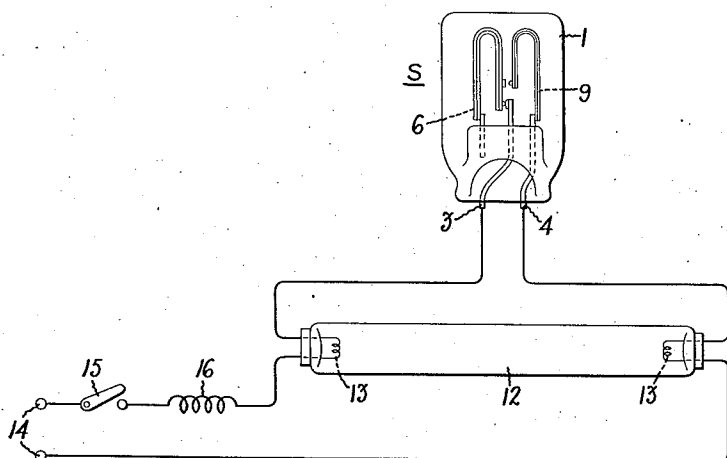


Fig. 2.



Inventor:
Nicholas DeToro,
by *Harry E. Dunham*
His Attorney.

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GLOW SWITCH FOR STARTING DISCHARGE DEVICES

Nicholas De Toro, Bridgeport, Conn., assignor to General Electric Company, a corporation of New York

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4 Claims. (Cl. 200—113.5)

My invention relates to glow switches for starting discharge devices, such for example as fluorescent lamps, and it has for its object the provision of an improved construction of switches for that purpose enabling one to obtain a faster starting of the devices and a minimum of polarization of the interelectrode gaseous conduction.

My invention will be better understood from the following description taken in connection with the accompanying drawing and its scope will be pointed out in the appended claims.

Referring to the drawing, Fig. 1 is a side view partly in section of a switch embodying my invention and Fig. 2 is a circuit diagram including the switch and apparatus connected therewith. In the drawing, 1 is an envelope which may be constructed of glass containing an ionizable medium such for example as neon at a low pressure. Secured in the press 2 of the envelope are the two leads 3 and 4, and the support 5. Welded or otherwise suitably secured at one end to the support 5 is the flat bimetallic thermal strip 6, the opposite end being provided with the contact 7 which normally engages the cooperating fixed contact 8 on the lead 3. The strip 6 is constructed with the metal having the greater coefficient of thermal expansion on that side thereof whereby when the temperature of that part of the strip adjacent to the other strip 9 is raised the cooperating contacts 7 and 8 tend to disengage. Welded or otherwise secured to the other lead 4 is a second flat bimetallic thermal strip 9 which is provided with the contact 10 facing the thermal strip 6. The strip 9 is constructed with the metal having the greater coefficient of thermal expansion on that side thereof whereby when the temperature of that part of the strip adjacent to the other strip 6 is raised it will be deflected toward the other strip and its contact 10 will engage the contact 11 on the other strip. The two strips 6 and 9 preferably are similar as to form and as to the metals employed but differ from each other in that they have different thicknesses, the strip 9 being the thinner of the two whereby it has less mass and is the more sensitive to temperature changes. The two strips are coated with a high electron emission film except that no coating is applied to the contact 7 or to the end portion of the strip 6 adjacent to that contact. Also, no film is applied to the lead 3.

In the circuit diagram shown by Fig. 2, 12 represents a discharge device, such as a fluorescent lamp, having the electrodes 13 connected to be supplied from a source of alternating current 14

through the control switch 15 and the ballast 16. The starting switch 3 shown in detail by Fig. 1 is connected in a branch circuit across the lamp which includes the electrodes 13 whereby they may be suitably heated by current flow therethrough prior to automatic opening of the branch circuit to start the lamp.

Upon closing the control switch, the thermal strips 6 and 9 of the starting switch 1 being in their unheated positions as shown by Fig. 1, the gas filling of the envelope immediately becomes ionized and a glow discharge starts. Those strips, particularly the adjacent parts thereof, accordingly begin to heat up, the strip 9 more rapidly than the strip 6 because of its smaller mass. Because of the tendency of the strip 6 to deflect, the contact 7 thereon engages the contact 8 with less pressure; strip 9, however, being more sensitive deflects so that its contact 10 soon touches the contact 11 on the other strip thereby short circuiting the glow discharge but even though that source of heat is extinguished the strip 9 continues to deflect due to heat inertia and to the resistance heating of the strip by the flow therethrough of the lamp electrode preheating current until the contacts 7 and 8 are caused to separate. During the interval of engagement of the contacts 10 and 11 and before the contacts 7 and 8 separate the filaments 13 are heated to the point of electron emission. The subsequent opening of the circuit at the contacts 7 and 8 causes the lamp to start after which by reason of the cooling of the two strips, that of the strip 9 being more rapid than that of the strip 6, the contacts 10 and 11 first separate then the contacts 7 and 8 re-engage. In contrast to a form of a glow switch at present in common use for starting fluorescent lamps the current flow during the glow discharge in the case of my above described switch is relatively large, and hence the heat produced is relatively great, for both electrodes, that is both thermal strips 6 and 9 are coated with the electron emission film so that the discharge occurs during both half cycles, the electrodes being non-rectifying, and both strips have substantially the same large surface area. Greater speed of operation naturally results from the production of the greater heat by the glow discharge. It will be noted that the lamp electrode circuit is interrupted at a time when there is no ionization in the envelope and the interruption occurs in a region where the cooperating contact members present small areas to each other and have surfaces of minimum electronic emission rates. As a result and in further contrast to present day

starters my switch is effective to start the lamp equally well on either half cycle. The thermal strips 6 and 9 are constructed and spaced apart and the gas employed is such that ionization occurs at a suitable voltage which, in the case of a 40 watt lamp on a 118 volt supply circuit, may be 170 volts. After the contacts 10 and 11 have closed extinguishing the glow the inductive voltage produced across the contacts 7 and 8 by their subsequent opening and hence that applied to the lamp to start it may be as high as 1000 volts for since the parts adjacent to those contacts are not coated a glow discharge does not readily form in the envelope the effect of which would be to shunt the lamp. The diameter of the lead 3 and hence its exposed surface may, moreover, be very small, materially smaller than the wire electrodes of present day starters which require a certain minimum surface.

After the lamp has started, the voltage across it is insufficient to ionize the space between the two thermal strips; if it fails to start the starting cycle is automatically repeated as soon as the contacts 7 and 8 re-engage, contacts 10 and 11 being already separated.

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

1. A glow discharge starting switch comprising an envelope containing an ionizable medium, a plurality of thermal members mounted in said envelope and having adjacent portions arranged to be deformed in the same direction by heat of a glow discharge therebetween, one of said members being more sensitive than the other, a fixed contact in said envelope, a cooperating contact carried by the other thermal member of less sensitivity and a contact carried by said thermal member of more sensitivity and arranged when that member is deformed by heat of the discharge to engage the other thermal member and to cause said cooperating contact to disengage said fixed contact.

2. A glow discharge starting switch comprising an envelope containing an ionizable medium, a

first thermal strip mounted therein having a contact at one end, a cooperating fixed contact, a second thermal strip more sensitive than said first strip and mounted adjacent thereto, said strips being constructed to be deformed in the same direction in response to heat from a discharge between them, and said second strip having a contact operable when the strip is deformed to engage the first strip and to move its contact away from said fixed contact.

3. A glow discharge starting switch comprising an envelope containing an ionizable medium, a plurality of thermal members having coatings of electron emitting material, each secured at one end in said envelope, said members being constructed to move their opposite ends in the same direction in response to heat produced by a glow discharge between them and the one member being more sensitive than the other and a fixed contact normally engaged by the less sensitive member, said member of greater sensitivity being arranged to be deflected in engagement with the other member in response to heat of the discharge whereby the discharge is extinguished and by its continued deflection to separate said less sensitive member from said fixed contact.

4. A glow discharge starting switch comprising an envelope containing an ionizable medium, a first thermal strip mounted at one end therein, a slender fixed contact member arranged normally to be engaged by the opposite end portion of said strip, a second thermal strip more sensitive than said first strip mounted at one end in said envelope and arranged when deflected by the heat of a discharge between said strips to engage said first strip and move said opposite end portion out of engagement with said fixed contact member, and a coating of electron emitting material on each of said strips, that portion of said first strip adjacent said fixed contact member being devoid of said coating whereby a higher voltage is required to produce a discharge between it and the fixed contact.

NICHOLAS DE TORO.