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STARTER FOR ELECTRIC GASEOUS DISCHARGE DEVICES

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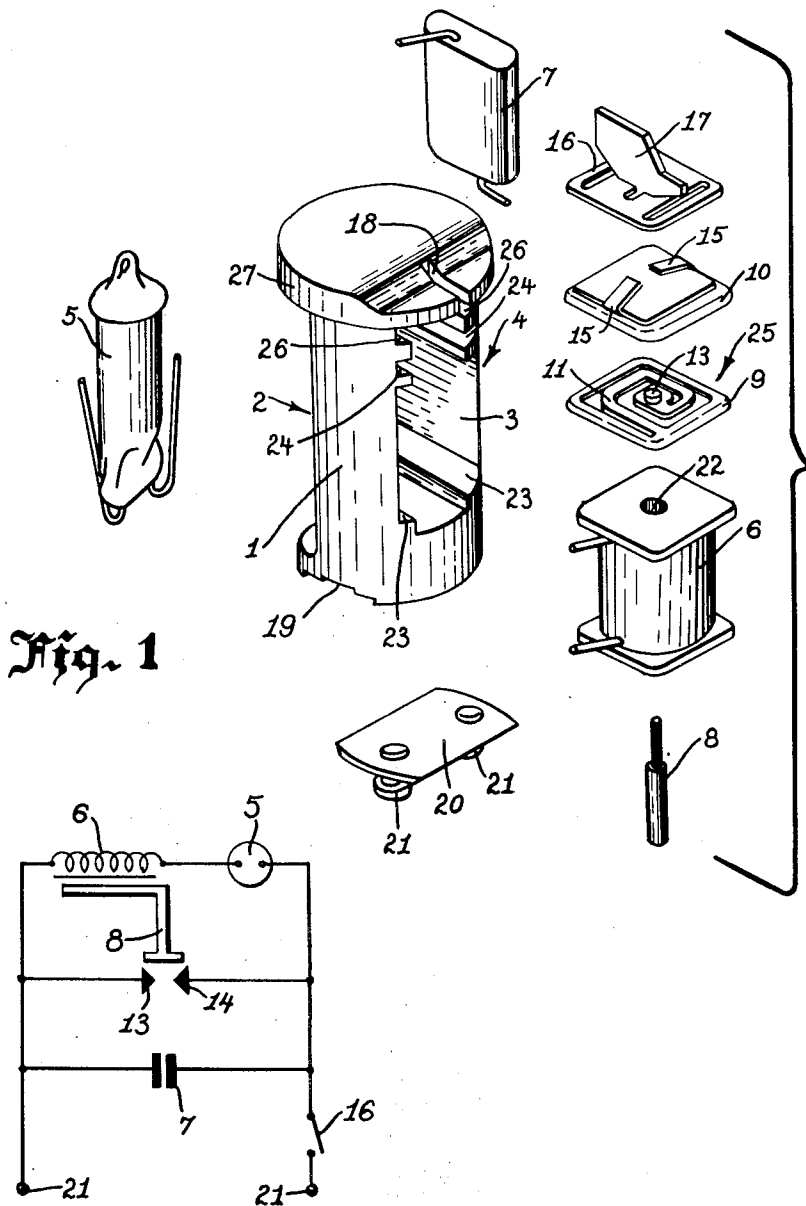


Fig. 2

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STARTER FOR ELECTRIC GASEOUS
DISCHARGE DEVICES

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2 Claims. (Cl. 200—88)

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This invention relates to starters and more particularly to starters for electric gaseous discharge devices such as fluorescent lamps.

An object of this invention is to provide a starter for electric gaseous discharge devices.

Another object is to provide a starter for fluorescent lamps provided with filamentary electrodes.

A further object is to provide a starter for fluorescent lamps which will facilitate the initiation of the discharge across the lamp.

Further objects, advantages and features will be apparent from the following description when read in conjunction with the accompanying drawing in which:

Figure 1 is an exploded view of the starter of my invention.

Figure 2 is a schematic drawing of the circuit thereof.

It has been the practice to provide fluorescent lamps with certain auxiliary equipment. One of these pieces of auxiliary equipment is a starter which operates to provide for the pre-heating of the filamentary electrodes of the lamp to electron-emitting temperatures before the discharge across the lamp is initiated. Generally speaking these starters are usually of the glow or the thermal type. However, I have found that in many cases the electrode preheating period provided by many starters of the glow and thermal types is unnecessarily long. I have found that many fluorescent lamps may be started in a shorter period of time than many of the conventional glow and thermal starters will permit. The starter of my invention is considerably faster in its operation than the conventional glow and thermal starters and thus enables one to start a fluorescent lamp in a shorter period of time.

The starter of my invention is a solenoid-actuated one. It includes a current regulator of the glow lamp type adapted to pass enough current to energize the solenoid and a cut-out which renders the starter inoperative after a reasonable number of attempts have been made to start the lamp and the lamp fails to light.

The starter of my invention comprises a body member 1 which may be moulded, for example, as shown in Figure 1, to provide for the seating therein of the several starter components. Compartments 2, 3 and 4 are provided in the body member 1 for the reception therein of a glow lamp 5, a solenoid 6 and a condenser 7 respectively. The solenoid 6 is provided with an armature 8. Seated above the solenoid 6 in the body member 1 and in register therewith is a pair of plates 9 and 10. The adjacent faces of the plates

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9 and 10 are each formed into a resilient spiral metal mesh 11. Electrical contacts 13 are centrally mounted on the resilient spiral metal meshes 11. The top of plate 10 is provided with inwardly extending metal tabs 15, one end of each being connected to the periphery of the plate 10, the other ends being free. A bimetallic cut-out member 16 is mounted on a shelf 26 provided therefor in the body member 1 directly above the plate 10 and normally engaged by the tabs 15 thereon. A tab 17 is mounted in the bimetallic member 16. When disposed and secured in the body member 1 the tab 17 extends through a slot 18 therefor in the body member. The body member 1 is also provided with a channel 19 adapted to receive a base plate 20 to which base pins 21 are connected.

As mentioned above, the solenoid 6, the plates 9 and 10, and their resilient spiral metal meshes 11, and the bimetallic cut-out member 16 are disposed in the compartment 2. I have found it desirable to mount the plate 9 on top of the solenoid 6 which is supported on the shelf 23. The plate 10 is mounted on a shelf 24 so that it is normally insulated from and out of physical contact with the plate assembly 25. The bimetallic cut-out member 16, which is mounted on shelf 26, is normally engaged by the metal tabs 15 on top of plate 10 but it is adapted, upon being excessively heated, to snap upwardly out of engagement with the tabs 15.

Figure 2 shows the manner in which the several starter components are electrically connected. The starter may be employed in a conventional fluorescent lamp circuit, such as that shown in U. S. Patent 2,195,115 for example, wherein a reactance coil is employed in the circuit to provide an inductive voltage surge to initiate a discharge across the lamp to start it and to ballast the lamp during operation. When a fluorescent lamp employing the starter of my invention is connected to a conventional 110-120 volt line, the glow lamp 5 will pass enough current to energize the solenoid 6. Energization of the solenoid 6 will actuate the armature 8 therein and cause the upper portion thereof to move upwardly through an aperture 22 in the solenoid 6 and engage the contact 13 of plate 9. The contacts 13 on the adjacent faces of the plates 9 and 10 normally do not engage one another. However, the resilient wire mesh 11 permits the contact 13 on plate 9 to be pushed upwardly by the armature 8 into engagement with the contact 13 on plate 10, thereby closing the circuit through these contacts and causing current to flow through the lamp

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electrodes, heating them to electron-emitting temperatures.

Although the line to which the lamp circuit is connected will normally be a 60 cycle A. C. line, the armature 8 will not be drawn upwardly within the solenoid 120 times due to inertia of the armature, the difference in spring tension of the meshes 11, and the tendency of the contacts 13 to stay closed. The contacts 13 will not just touch each other and break away quickly. When the armature 8 moves upwardly within the solenoid 6 the upper end thereof will engage the contact 13 of plate 9 before its upward stroke is completed. As it continues its upward movement it will push the contact 13 of plate 9 upwardly. The contact 13 of plate 9 will move upwardly with the application of very little force thereto because the resilient wire mesh 11 to which it is connected will readily distend. The upward stroke of the armature 8 is not completed when the contacts 13 on plates 9 and 10 engage one another. As the armature continues its stroke, the resilient wire mesh 11 to which a contact 13 is connected is urged upwardly. Thus the closed contacts 13 move upwardly together and are held in positive engagement until the armature completes its stroke.

When the armature 8 drops down after its stroke has been completed the contacts 13 will tend to stay closed during the time the resilient wire meshes 11 on plates 9 and 10 return to their normal positions. While these contacts are closed, pre-heating current will flow in the lamp electrodes. Normally the contacts will be closed long enough to permit the lamp electrodes to be heated to electron-emitting temperatures and when the contacts open the inductive surge from the reactance coil will initiate a discharge across the lamp.

It has been found highly advantageous to have the resilient metal meshes 11 under different tensions because it aids in preventing the starter from operating in synchronism with the 60 cycle current or in such a way that the contacts will always break at other than near peak cycle voltage. The starter operates more satisfactorily when it operates at less than 60 cycles per second because it provides a longer electrode pre-heating period and enables one to insure the breaking of the contacts at or near peak voltage.

If the lamp fails to start, the armature 6 will continue to operate, causing the above-described cycle of operation to be repeated until the lamp starts. If the lamp fails to light after a reasonable time and after several cycles of operation of the starter, the starter cut-out 16 will be actuated automatically. Actuation of the cut-out 16 disconnects the starter from the circuit thus protecting it from further unnecessary operation.

As mentioned above, the cut-out 16 is made of bi-metal. The tabs 15 on the plate 10 normally engage the cut-out 16 and close the circuit therethrough. Repeated attempts of the starter to cause the lamp to light will heat the bimetallic cut-out 16 enough to distort it sufficiently to cause it to snap away from its normal contact with the tabs 15 on the plate 10, thus breaking the circuit therethrough. The tab 17 which is mounted in the cut-out 16 and which extends through the aperture 18 in the body member 1 will be pushed upwardly when the cut-out is ac-

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tuated. When the defective lamp is replaced the cut-out 16 may be reset by pushing down on the tab 17.

The glow lamp 5 is provided with a pair of electrodes and a filling of an inert gas therein. The glow lamp is designed to pass enough current upon the application of a 110-120 volt line thereto to energize the solenoid 6 and actuate the armature 8 but not enough current to energize the solenoid after the fluorescent lamp lights.

The several elements of the starter assembly may be connected in accordance with the circuit of Figure 2, by metal strapping, and a sleeve of paper tubing may be slipped over the body member 1 with an end thereof engaging the shoulder 27. The sleeve may be cemented to the body member 1. Alternatively the body member 1 may be provided with grooves through which wires may be run to connect the several starter parts.

What I claim is:

1. A magnetic switch comprising: a solenoid; an armature disposed therein; a pair of plates secured adjacent the end of the solenoid, said plates being normally insulated from one another, and each of the adjacent faces thereof comprising a resilient substantially spiral metal mesh and an electrical contact disposed on the inside end of said mesh, said armature moving one of said electrical contacts into engagement with the other contact upon energization of said solenoid.

2. A magnetic switch comprising: a solenoid; an armature disposed therein; a metal plate secured adjacent the end of said solenoid, said plate having a resilient substantially spiral metal mesh on a face thereof, and an electrical contact centrally mounted on said mesh; a second metal plate disposed above and in register with and insulated from said first metal plate, said second plate having a resilient substantially spiral metal mesh on the face thereof adjacent the first metal plate, an electrical contact centrally mounted on said mesh and in register with the electrical contact on the first mentioned mesh, said armature moving one of said electrical contacts into engagement with the other contact upon energization of said solenoid, and a pair of metal tabs mounted on the periphery of one of said plates and extending inwardly across the top face thereof, and a bimetallic plate disposed above and in register with said tab-bearing plate and normally engaged by the tabs thereon to complete a circuit through said contacts and said bimetal plate.

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