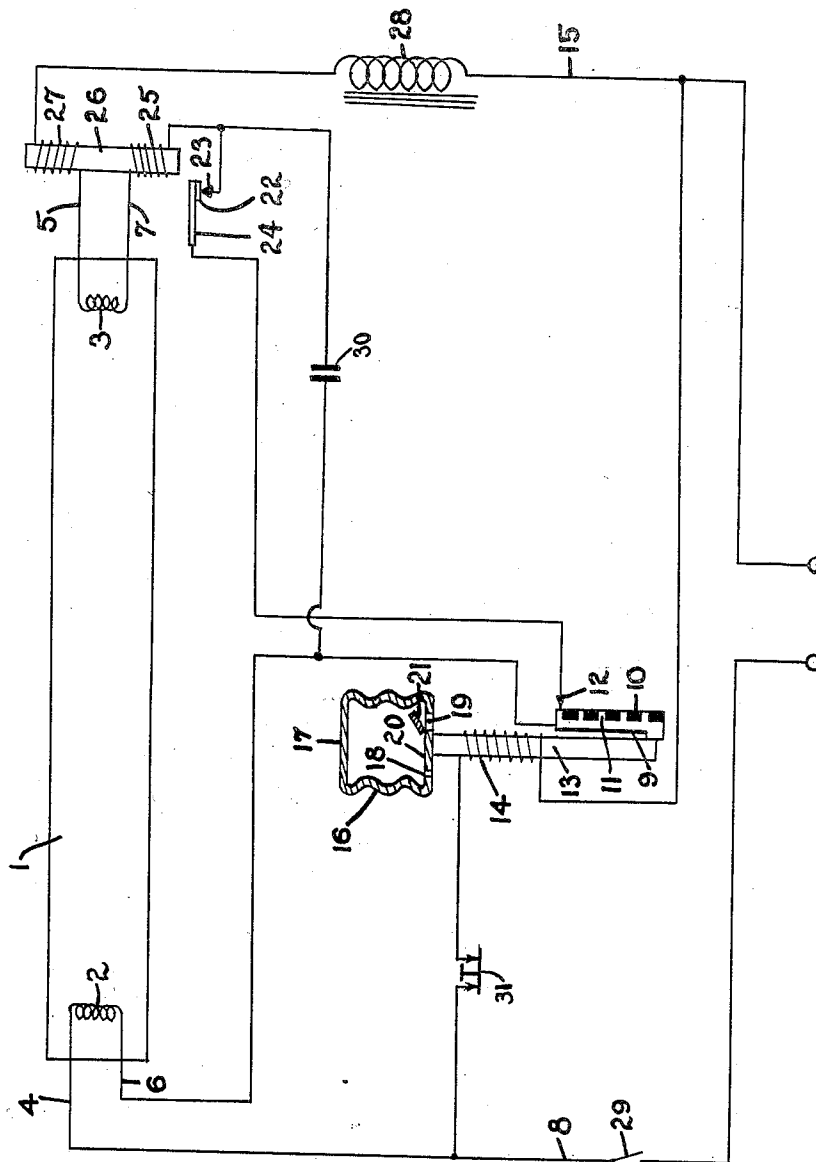


STARTING APPARATUS FOR DISCHARGE LAMPS

Filed Nov. 13, 1944



INVENTOR.
HENRY L. BYERLAY
 BY *Laurence B. Buss,*
 ATTORNEY

UNITED STATES PATENT OFFICE

2,392,282

STARTING APPARATUS FOR DISCHARGE LAMPS

Henry L. Byerlay, Marblehead, Mass., assignor to
Sylvania Electric Products Inc., Salem, Mass.,
a corporation of Massachusetts

Application November 13, 1944, Serial No. 563,217

2 Claims. (Cl. 315-102)

This invention relates to starting apparatus and circuits for electric discharge lamps and the like, and particularly to circuits permitting preheating of the electrodes of such lamps.

An object of the invention is to provide such an apparatus and circuit in which the lamp is allowed a definite preheating time before the starting voltage is applied. A further object is to provide no more than a definite and fixed number of repetitions of such starting attempts, so that a lamp which has failed will not cause annoyance, power loss, and the like by continued starting attempts. Still another object in the quick and automatic resetting of the starting apparatus after the fixed number of starting attempts, to its normal position in which it is ready to begin the starting cycle anew on closing of the circuit, as after a new lamp is inserted in place of the failed lamp.

A feature of the invention is a commutator or the like which moves slowly through a definite cycle on application of power to the circuit, and moves quickly back to its normal position on thereafter opening the circuit. Another feature is a relay having two windings, and in which the relay operates only when the currents in the two windings become unbalanced.

Other objects, features and advantages of this invention will be apparent when taken in conjunction with the following specification and drawing.

In the figure, the lamp 1 has the two filamentary cathodes 2, 3, each preferably coated with a material of high electron-emissivity, and having the lead-in wires 4, 5, 6, 7. The lamp may have a coating of fluorescent material on its inner surface, and a filling of inert gas and mercury vapor, if desired. One side 8 of the line is connected to one of said lead-in wires 4, and the other lead-in wire 6 to the same filament is connected to the metal commutator block 9, which has the insulating inserts 10. The contact 12, preferably of carbon, is normally in position to contact one of the metal commutator segments 11. The commutator 11 is attached to the iron armature 13, capable of longitudinal motion along the axis of the coil 14, in which it is set. The coil 14 is placed near one end of the armature 13, so that the passage of current through the coil 14 moves the armature upward, to a more central position with respect to the coil 14, which is connected between the line terminals 8 and 15.

The armature 13 is attached at its top to the metal bellows 16, closed at its top 17, and having

the small opening 18 and the large opening 19 in its bottom 20. The valve 21 opens when the pressure outside the bellows is greater than that inside and closes in the reverse situation. Thus when the coil 14 is energized by closing the switch 22, the armature 13 rises, compressing the bellows and the air therein, which closes valve 20. The air being compressed can then escape only slowly through small hole 18, so the armature's rise will be slow. I find 3 seconds to be satisfactory, if the armature has five segments, which gives five starting attempts. Five may be taken as sufficient; if the lamp will not start in five attempts, it will ordinarily be a defective or failed lamp. Other numbers of attempts may be used if desired.

On opening switch 29, armature 13 will drop, pulling down with it the bottom of bellows 16. The air in the bellows 16 will thus be rarified somewhat and the valve 20 will open, allowing the outside air to rush in quickly through the large valves opening, and thus the armature 13 will fall back quickly to its normal position.

Contact 12 is connected to contact 22 on the other armature 24 and through contact 23 to winding 25 on solenoid 26, and thence through lead-in wires 5, 7 and filament 3 to winding 27 also on solenoid 26, and then through ballast impedance 28 to line terminal 15.

The magnetic effect on armature 22 of coil 27 should be equal in magnitude and opposite in direction to that through coil 25 when the starting current flows, so that contacts 22, 23 remain closed until the lamp starts, at which time the contacts 22, 23 will be opened because current will flow through coil 27 but not through coil 25. Then if the lamp starts at the first attempt, after the contact 12 slides off the first commutator segment, the starting circuit will remain open while the commutator finishes its cycle.

At the end of the commutator's travel, the contact 12 should rest in open position, that is on a non-conducting segment of the commutator 11, in order to keep the starting circuit open if the lamp does not start in the fixed number of attempts.

For the purposes of my invention, a commutator may be taken to be any device, which in co-operation with a separate contact, can be used to open and close a circuit in a definite sequence. I may for example, use a pair of contacts opened and closed by a revolving cam or the like, the cam being geared to a telechron motor connected across the line in place of coil 14, with

provision for stopping the motor after a definite number of closings of the contacts, and provision for resetting the device to its normal position on opening the circuit.

A condenser 30, which may be 0.006 mfd., for example, may be used across the contacts in the position shown. Such a condenser will ordinarily be necessary to insure the lamp's starting when short preheating periods, such as are found convenient with the present invention, are used.

A normally closed push-button switch 31 may be used in series with the coil 14. Then if a failed lamp is to be changed without opening the switch 29, the push button 31 may be pushed temporarily to restore the armature 13 to its normal position, after inserting the new lamp.

What I claim is:

1. An electric discharge lamp starting device connected between a circuit to supply electric energy and at least one lamp to be started comprising a main lamp supply circuit, a lamp starting circuit connected to the lamp supply circuit a manual switch for energizing the main lamp circuit, an automatic electrically operated switch connected in series in said starting circuit and comprising a circuit controlling member longitudinally moveable and presenting a commutator

portion having a series of live conducting segments connected in the starting circuit alternating with non-conducting segments along its length, a fixed contact in the starting circuit arranged to contact the commutator a magnetic core portion on the circuit control member, means to apply a magnetic force to move said commutator in a given direction, dash pot means acting against the magnetic force to cause the fixed contact to contact the live and insulated portions on the commutator successively in predetermined timed sequence, a second switching means in series in the starter circuit operative to open the starter circuit when the lamp starts and means acting rapidly to restore said circuit control means to its original position after the lamp starts.

2. The combination of claim 1 in which the said second switching means in the starter circuit comprises a relay having normally closed contacts in series in the starter circuit, an armature for closing the contacts and two oppositely acting windings in magnetic relation to the armature, one of which is in series in the main lamp supply circuit and the other being in series in the starter circuit.

HENRY L. BYERLAY.