

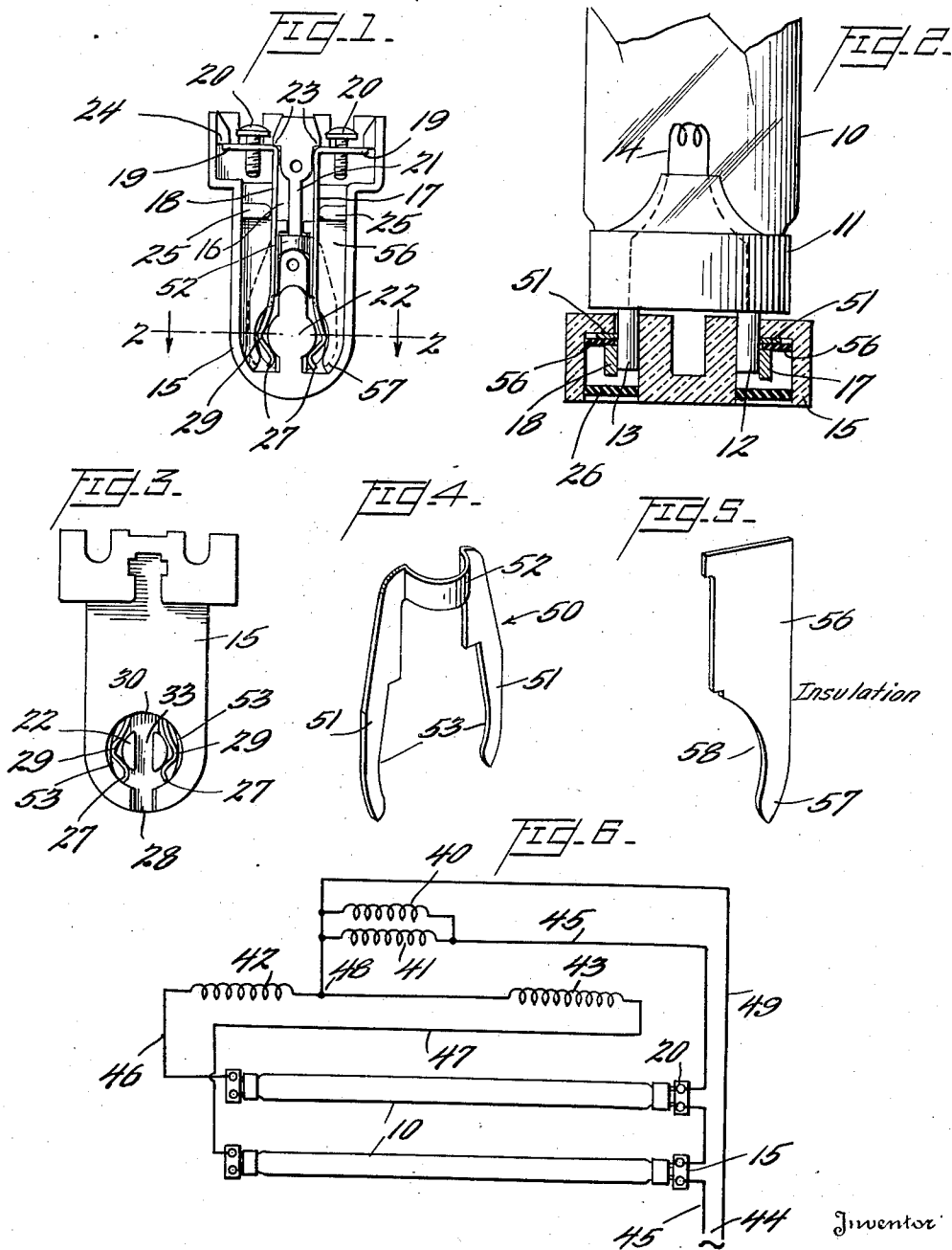
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FLUORESCENT LAMP SOCKET

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FLUORESCENT LAMP SOCKET

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This invention relates to lamp sockets and more particularly to sockets for double-ended electric lamps or similar devices, of which the present popular fluorescent lamp is an example, requiring the use of sockets in pairs, the two units of which are spaced apart so as to engage each with at least two contact or terminal pins at its end of a lamp.

It is a general object of the present invention to provide a novel and improved socket structure for certain specific uses.

More particularly it is an object of the invention to provide in a socket for fluorescent lamps and similar devices means for electrically connecting together the two terminal pins on one end of a lamp when it is positioned in the socket, but to open the circuit between the socket contact members, which are engageable with these pins, when the lamp is removed from the socket.

An important feature of the invention consists in the provision of a bridging contact member adapted for arrangement in the conventional fluorescent lamp socket, which member is normally insulated from the pair of spring contacts therein but serves to electrically connect them together when a lamp is positioned in the socket.

A further important feature of the invention comprises the arrangement of the bridging contact and its insulating means whereby it is adapted for arrangement in the conventional socket.

Other and further features and objects of the invention will be more apparent to those skilled in the art upon a consideration of the accompanying drawing and following specification wherein is disclosed a single exemplary embodiment of the invention with the understanding that such changes and modifications may be made therein as fall within the scope of the appended claims without departing from the spirit of the invention.

In said drawing:

Figure 1 is a rear elevation of a socket constructed in accordance with the present invention, the insulating rear cover plate being removed to expose the contact assembly;

Figure 2 is a transverse section taken on line 2-2 of Figure 1 on an enlarged scale and showing the end of a lamp associated with the socket and its contacts;

Figure 3 is a front view of the socket;

Figure 4 is a perspective view on an enlarged scale of the bridging contact member;

Figure 5 is a perspective view on the same scale as Figure 4 of one of the insulating elements; and

Figure 6 is a wiring diagram showing a pair of lamps and their associated transformers arranged in a circuit peculiarly adapted for sockets of the present construction.

Fluorescent lamps and similar devices are usually of tubular construction, comprising a body portion formed of cylindrical glass tubing as shown at 10 in Figure 2, having a cap at each end as shown at 11. This cap insulatingly supports a pair of terminal pins 12 and 13, parallel to each other and to the axis of the lamp tube and laterally spaced apart. These are, in the usual construction, connected to the two ends of a filament 14 just within the end of the lamp. The normal purpose of the filament is to supply heat for starting the lamp after which, through the agency of a suitable starting device, the current is shut off from the filament and it acts solely as a terminal at its end of the lamp, the current between opposite terminals passing through the gas in the lamp, ionizing the same and activating the fluorescent material with which the walls of the lamp tube are coated.

In the conventional operation of such lamps, various types of starting means are used to ensure the energization of the filaments momentarily, the application of a shock voltage to break down the resistance of the gas in the tube, and finally the deenergization of the filaments. Lamps are normally actuated at a voltage different from the line voltage and this is achieved through the use of transformers, reactances or the like sometimes associated with means to change the lead or lag of the current so that when lamps are operated, as customary, in pairs the power factor is improved and stroboscopic effects eliminated.

The sockets for use in supporting and connecting the lamps when used in the manner above described are fully illustrated in the patent to Marshaus No. 2,137,174 and need not be described in detail here, but by reference to Figures 1 and 3 it will be seen that they comprise a base or body portion 15 of suitable insulating material having a recess 16 in the back adapted to accommodate a pair of contact springs 17 and 18 each having a terminal member 19 and a clamp screw 20, these latter being arranged for access through the open bottom. The springs are spaced apart by a central web 21 and an integral guide stud 22, and shoulders 23 and 24 serve as abutments for the terminal portions to retain the contacts in position. A cover plate 25 shown only in Figure 2 closes the back of the socket and holds the contacts therein. Wings 26 integral with the body

bear against the outer faces of the long portions of the contacts and press them inwardly against the central stud 22. As seen in the front view the active portions of the contacts appear as in Figure 3, having outwardly flared ends 27 to enable the lamp pins, which are passed through the entrance slot 23, to spring the contacts away from the guide stud when they are rotated with the lamp, and to finally assume a position one in each of the bights 29 of its contact spring and between the same and the stud.

On the exposed face of the socket as shown in Figure 3, these springs appear in the circular recess 30 into which the central stud 22 projects from the solid back support shown. This post is slotted diametrically as at 33 in alignment with slot 23 to permit one pin to pass through the same as the lamp is inserted and to then be rotated into engagement with one of the springs while the other pin moves beneath the other spring by the aid of its upturned end 27. By this construction each contact pin is electrically connected to one of the contact springs and both pins are clamped against the central stud by these springs and held in position to securely support the lamp, which can only be removed by a 90° rotation of the same about its axis to bring the pins in alignment with the slots 23 and 33.

Under a more recently developed system for operating the lamps, the filaments are never used for heating purposes, acting solely as terminals or cold cathodes one at either end of the lamp. Under these conditions the need for a separate connection to each of the pins at each end of the lamp disappears and they may be both connected together during starting and while the lamp is in operation. For starting purposes a voltage three to four times as great as the normal operating voltage for the lamp is applied between the terminals at opposite ends thereof and serves to break down the resistance of the gas in the lamp. This voltage, being much higher than the operating voltage, is dangerous and the underwriters require that when the lamps are removed from the socket, the source of this high voltage be disconnected from the main power line which normally provides alternating current at 115 volts.

It is a purpose of the present invention to so improve the sockets that the pair of pins at each end of the lamp will be connected together by the socket associated therewith, but the spring contacts of the socket will not be connected together when the lamp is removed, to thereby open the circuit to the source of high voltage. The arrangement is as shown in Figure 6 where the four coils 40, 41, 42, and 43 are arranged in a single housing and constitute respectively the two primaries and two secondaries of a transformer. The primaries are connected in parallel as shown and also to a source of alternating current at 44, one of the conductors 45 passing through two of the sockets in accordance with the present invention before being connected to the junction of the two primaries. When the lamps are removed it will be seen that the circuit will be opened in two places in wire 45. Since the terminals 20 of any one lamp socket are insulated from each other by the body thereof the circuit will be open except when the lamps are in position as will be later described. Each secondary has its open end connected to one of the opposite ends of one of the lamps as by the conductors 46 and 47 while the other ends of the secondaries are connected

together at 48 and to the conductor 48 leading from the source of power to the junction of one set of ends of the primaries.

The operation of the above arrangement is such that when the current is first turned on, a voltage of approximately 400 is applied between the opposite ends of the lamps, the transformers operating on the auto-transformer principle with one primary and one secondary in series across each lamp, whereas the power source is applied only to the primaries constituting but a portion of the total winding. The high voltage strikes the arc across the resistances of the lamp tubes, but immediately upon ignition, the load of the lamp is increased or, in other words, the resistance is decreased and the higher flow of current reduces the potential across the lamps to that necessary for their operation and somewhat less than the potential at 44. This results from the poor regulation characteristics of the transformer. In this operation the filaments are not heated but each acts only as a terminal at its end of the lamp both for starting and running.

To ensure proper operation even though one or more of the filaments of the lamp may be burned out; to ensure that no current passes through intact filaments to heat them, and to provide a closed primary circuit only when the lamps are in the sockets, an auxiliary or bridging contact is provided in each socket which engages and shunts the two pins of the corresponding end of the lamp when they are in position and thus there is no circuit through the filaments at the right hand end of Figure 6, while both ends of the filaments at the left hand end are connected into their circuit even though only a single wire leads to each socket.

The structure within the socket for carrying out the above operation comprises a single bridging contact 50 best seen in Figure 2, formed of sheet metal and comprising two arms 51 spaced apart a distance slightly less than that between the outside of a pair of lamp pins and being connected together at their inner ends by a semi-cylindrical integral strip 52 which humps up over a lowered portion of the web 21 as seen in Figure 1 when the arms occupy positions in the two sides of the socket recess 16. The purpose of the arcuate strip 52 is to provide resilience for the spring arms and to serve in positioning the bridging contact in the socket body. The two arms 51 lie against the back wall of the front face of the body as seen in Figure 2, and their inner edges 53 project inwardly so as to be visible in the front view, shown in Figure 3 as the small sectors spaced apart less than the diameter of the recess 30. Each of the arms 51 is overlain by a sheet of insulation 54 one of which is shown in detail in Figure 5 as suitably shaped to fill the space between the central web 21 and the side wall of the recess 16 below the wings 25. The outer end is curved as at 57 to engage the arcuate wall of the recess to prevent movement of the insulation piece toward the curved end of the lamp body, but the concave portion 53 is sufficiently cut away to clear the recess 30.

The thickness of the bridging contact and its covering insulation sheets is not sufficient to require any changes in the shape or size of the insulating body or the conventional individual spring contacts therein, but the insulation sheets effectively serve to separate the bridging contact from the terminal contacts as seen in Figure 2. When no lamp pins are in position the individual contacts 17, 18 are insulated from each other so

that the circuit will be open as explained in connection with Figure 6. When, however, a lamp is positioned in the socket and rotated to engage its pins 12 and 13 with the contact springs 17 and 18 as shown in Figure 2, these pins will also engage the arms 51 of the bridging contact as also seen in that figure, thereby shunting the filament 14 and ensuring a continuous circuit from 44 to the primaries 40 and 41. It likewise ensures that both ends of the filament will be at the same potential on the left side of the lamps where but a single lead is arranged for each socket.

It will be appreciated that the device may be used as an attachment for sockets without otherwise making any changes in their construction and that it may readily be removed where it is desired to operate lamps under the older system with starters and reactors.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A socket for double-ended electric lamps having two laterally disposed longitudinally extending contact pins at one end, comprising a member of insulating material having in one face thereof a recess arranged to rotatably accommodate said pins, said recess being connected to an edge of said member by a slot for pin entrance, a pair of contacts in said member each constructed and positioned for engagement by one of said pins when rotated from entrance position, and a bridging contact in said member, insulated from said pair of contacts and positioned to be engaged by both said pins when they are engaged with said pair of contacts.

2. A socket for double-ended electric lamps having two laterally disposed longitudinally extending contact pins at one end, comprising a member of insulating material having in one face thereof a recess arranged to rotatably accommodate said pins, said recess being connected to an edge of said member by a slot for pin entrance, a pair of contacts in said member each constructed and positioned for engagement by one of said pins when rotated from entrance position, and a bridging contact in said member, positioned to contact both pins when they are engaged by said pair of contacts.

3. A socket for double-ended electric lamps having two parallel pins extending from one end, comprising a member of insulating material having a recess arranged to receive said pins, individual contacts for engaging said pins and for connection into a circuit, and a bridging contact insulated from said contacts and positioned to be engaged by both pins to shunt said contacts when the lamp is in position.

4. A socket for double-ended electric lamps having two terminals at one end, comprising a member of insulation, a pair of contacts positioned thereon for engagement each with one of said terminals, a bridging contact carried by said insulation separate from the pair, said

bridging contact being constructed to engage both said terminals only when they are engaged by said pair of contacts.

5. A socket for use with double-ended electric lamps having a base at one end fitted with a pair of outwardly extending pins, comprising a body of insulation having a pin recess in one face thereof and a pin entrance slot extending from the recess to the edge of said face, individual spring contacts in said recess spaced to each separately engage one of said pins upon rotation of the lamp pins 90° from the plane of said slot, and means on said socket to electrically connect said pins together when in said last mentioned position.

6. A socket for use with double-ended electric lamps having a base at one end fitted with a pair of outwardly extending pins, comprising a body of insulation having a pin recess in one face thereof and a pin entrance slot extending from the recess to the edge of said face, individual spring contacts in said recess spaced to each separately engage one of said pins upon rotation of the lamp pins 90° from the plane of said slot, and spring means in said recess to electrically engage and connect together said pins when in said last mentioned position.

7. A socket for use with a double-ended tubular lamp having a base at each end fitted with a pair of outwardly extending pins, all of which lie in a single plane, said socket having a face to confront one end of the lamp and having a pin recess and a pin entrance slot extending from the recess to the edge of said face, spring contacts in said recess spaced to engage the corresponding pins upon their rotation of 90° from the plane of said slot, and means carried by said socket to shunt said pins and to shunt said contacts therein only when the lamp is in said last mentioned position.

8. A bridging contact spring for use in a fluorescent lamp socket comprising a sheet metal member having arms spaced apart less than the distance between the outside surfaces of the pins on one end of a lamp, and an integral spring part joining said arms and being elevated out of the plane thereof.

9. For use with a conventional fluorescent lamp socket, associated parts comprising a bridging contact constructed to be received in the insulation body at the back of the front wall and including a pair of electrically connected arms each positioned to be contacted by one of the pins of a lamp; and means insulating said contact from the two socket contacts.

10. A lamp socket of the type described comprising a body of insulation, a pair of individual contacts, a bridging contact, means insulating each of said contacts from the others, said contacts being so positioned that they are all connected together through the pin contacts of a lamp positioned in the socket.

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