May 18, 1943 A. JARMOLOWSKY 2,319,736

FLUORESCENT LAMP

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Fig. 1.

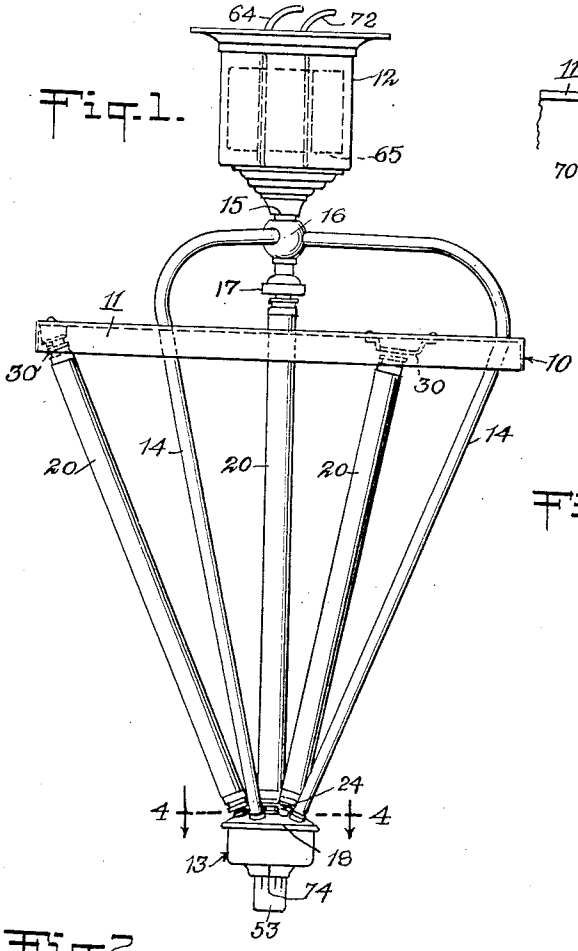


Fig. 3.

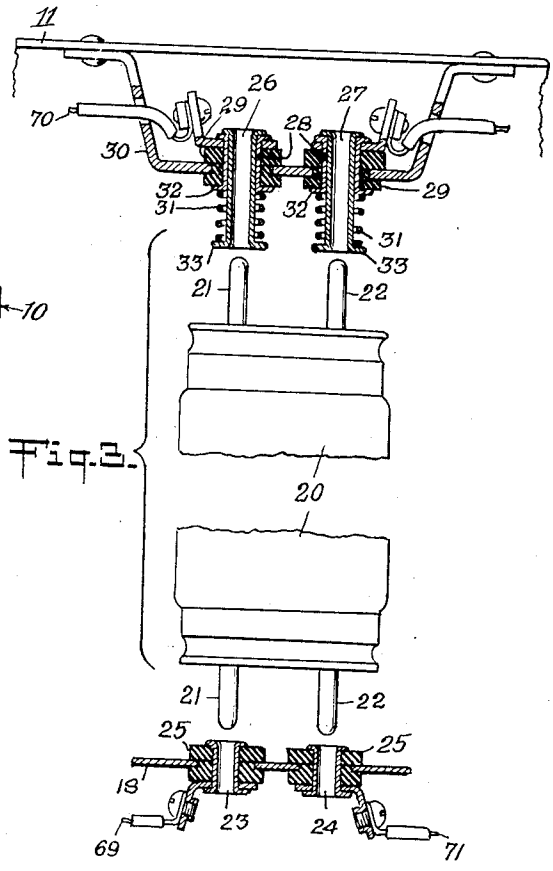


Fig. 2.

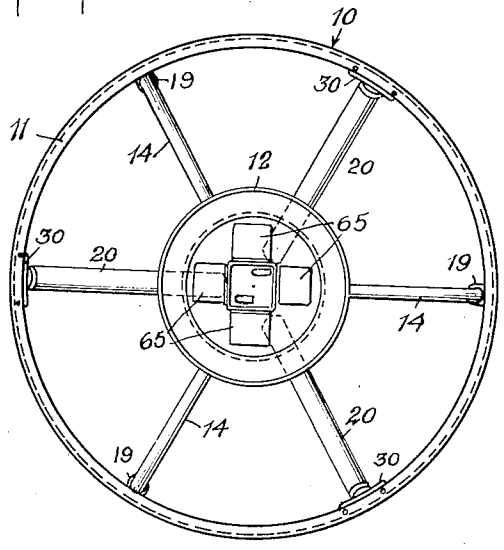
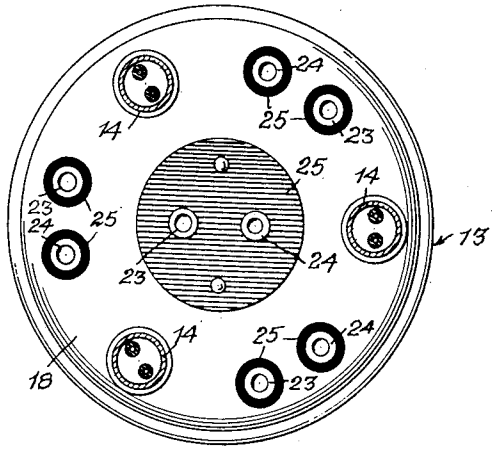


Fig. 4.



WITNESSES

Geo. W. Taylor

Chris Fleinle.

INVENTOR

Abraham Jarmolowsky

BY

Munn, Liddy, Glascum & Kane

ATTORNEYS

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Fig. 5.

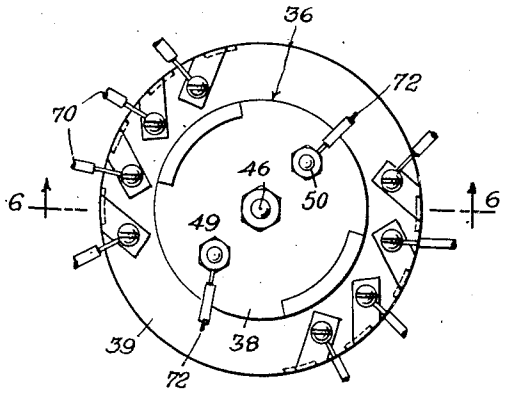


Fig. 8.

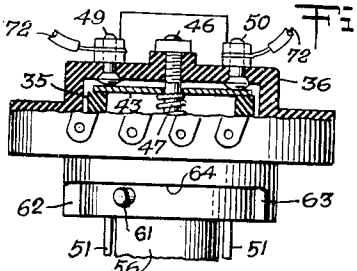


Fig. 9.

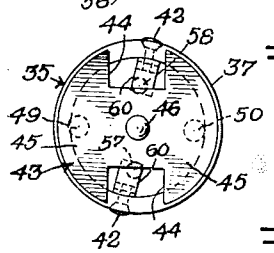


Fig. 6.

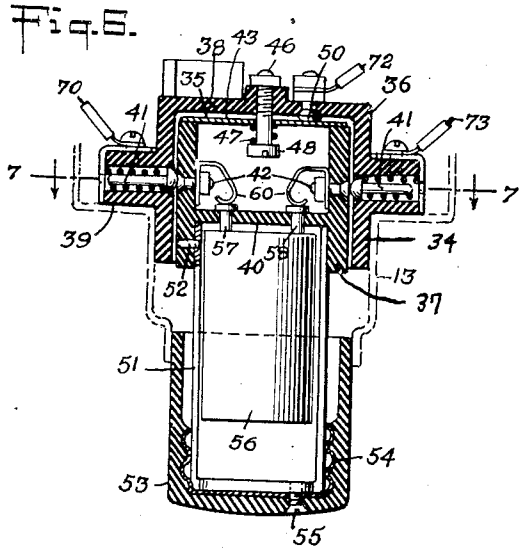


Fig. 10.

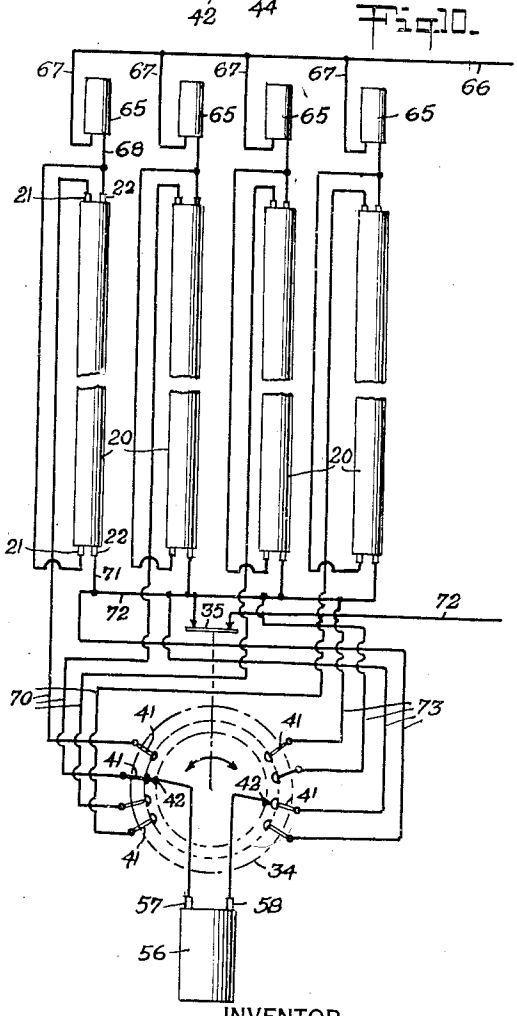
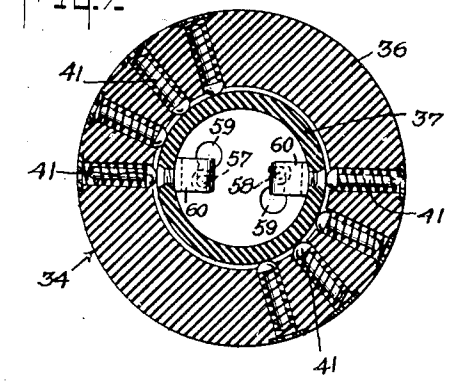


Fig. 7.



WITNESSES

Geo. W. Naylor

Chris Feinle.

INVENTOR

Abraham Jarmolowsky

BY

Munn, Liddy, Glascum & Kane

ATTORNEYS

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UNITED STATES PATENT OFFICE

2,319,736

FLUORESCENT LAMP

Abraham Jarmolowsky, Brooklyn, N. Y.

Application July 2, 1941, Serial No. 400,786

5 Claims. (Cl. 176—124)

This invention relates to lamps including a plurality of illuminating or lighting elements, such as mercury vapor and fluorescent lighting elements of any color as well as white

An object of the invention is the provision of a lamp of the indicated character in which the lighting elements are arranged so as to emit a maximum of light over a maximum area.

A further object in connection with a lamp of the indicated character is the provision of means whereby the amount of light may be varied by simple manipulations to light any one lighting element, or any combination of the elements, or all of said elements simultaneously.

A further object of the invention is the provision of a hanging lamp which utilizes fluorescent tubes arranged at an angle with respect to a vertical plane in order to emit the light downwardly and outwardly over a wide area.

With the foregoing and other objects in view, the invention resides in the structural and functional features set forth in the following specification, defined as to scope in the appended claims, and illustrated in the accompanying drawings, and it is to be understood that the right is reserved to embodiments other than those described and illustrated within the general meaning as expressed in the claims.

In the drawings—

Fig. 1 is a side view of a lamp embodying the features of the invention;

Fig. 2 is a top plan view of the lamp;

Fig. 3 is a collective view partly in elevation and partly in section of a fluorescent tube and electrical sockets for the electrodes respectively of the tube and showing portions of the lamp fixture and a portion of the tube being broken away;

Fig. 4 is an enlarged sectional view taken on the line 4—4 of Fig. 1;

Fig. 5 is a top plan view of the starter, selector-switch and control switch assembly detached;

Fig. 6 is a sectional view taken on the line 6—6 of Fig. 5;

Fig. 7 is a sectional view taken on the line 7—7 of Fig. 6;

Fig. 8 is a fragmentary side view and part section of the upper end of the assembly shown in Figs. 5 and 6;

Fig 9 is a top plan view of the control switch for turning the current off and on;

Fig. 10 is a wiring diagram illustrating the electrical connections of the main elements of the lamp.

Referring now more particularly to the drawings, it will be apparent that the lamp includes a hanging type of fixture 10. This fixture consists of a flanged ring 11, an upper casing 12, a lower casing 13, and tubular rods 14. Depending from the casing 12 is a tubular fitting 15 having a ball 16 and a receptor 17. The casing 13 has a cap 18. The rods 14, three in number, or any other suitable number, have the opposite ends thereof rigidly connected with the ball 16 to open into the interior of the fitting 15, and their lower ends rigidly connected with the cap 18 and opening into the interior of the casing 13. Each rod 14 is bent into an angular formation and is connected with the ring 11 by lugs 19.

The lamp also includes a plurality of lighting or illuminating elements 20. These elements 20 consist of fluorescent tubes in the present instance, which may be of any desired color as well as white. If desired, any other closely analogous lighting elements may be used, such as those utilizing a mercury vapor or gas providing the path for the electric current. Any suitable number of lighting elements may be used, and in the present instance four are arranged on the fixture 10, three being arranged between the ring 11 and the cap 18 and the fourth being arranged between the receptor 17 and the cap 18. Each of the elements or tubes 20 has a terminal 21 on each end and a terminal 22 on each end connected with the usual heating electrode and constituting thermionic means to render the mercury therein conductive. The terminals 21 and 22 on the lower end of each of the tubes 20 are received in fixed sockets 23 and 24, respectively, on the cap 18. Each of the sockets 23 and 24 is insulated from the cap 18 by a suitable insulator 25 engaged with the socket and cap 18, as shown most clearly in Fig. 3. The terminals 21 and 22 on the other or upper end of each of the tubes 20 are received, respectively, by resiliently mounted sockets 26 and 27. Three pairs of sockets 26 and 27 are arranged on the ring 11, and the fourth pair of sockets 26 and 27 is arranged on the receptor 17. Each of the sockets 26 and 27 is slidably mounted in a bearing 28 positioned in and extending through an insulator 29. The insulators 29 of the three pairs of sockets 26 and 27 are carried by a metal connector 30 of U-shape secured to the ring 11. The remaining pair of sockets 26 and 27 is suitably insulated from the receptor 17. Each of the sockets 26 and 27 is under the influence of a compression spring 31, which surrounds the socket and has one end thereof bearing against

the flange 32 of the socket and its other end in contact with the flange 33 on the bearing 28. By engaging the terminals 21 and 22 in the sockets 26 and 27, respectively, the sockets may be made to yield sufficiently to enable the insertion of the electrodes 21 and 22 on the other end of the tube 20 in the related sockets 23 and 24, respectively. In this manner, the tubes 20 are held in position in electrical connection with the sockets.

In accordance with the invention, three of the lighting elements or tubes 20, by reason of the arrangement of the several pairs of sockets, are disposed at an angle, which is less than a right angle, with respect to a vertical plane, or in other words, each of the tubes or elements 20 is disposed so as to extend at an upward and an outward angle. This manner of arranging the tubes or elements 20 makes it possible to obtain a maximum of light over a maximum area. The fourth tube or element 20 is disposed centrally and vertically of the fixture 10 and the aforesaid three tubes or elements are arranged about the central tube or element, as shown most clearly in Figs. 1 and 2.

In order to control the flow of electric current to optionally light any one of the tubes 20, or any combination of the tubes, or all of the tubes simultaneously, there is provided an assembly of constituents arranged within the casing 13 and other constituents being arranged within the casing 12. In the casing 13 there is arranged a selector-switch 34 and a control switch 35. The switch 34 includes a fixed insulator base section 36 and a movable insulator base section 37. The base section 36 is circular and of hollow construction with a head end 38 and an enlarged circular portion 39. The base section 37 is circular and also of hollow construction with a transverse partition 40. The section 37 is of a size to be loosely received within the section 36. The section 36 carries pairs of spring-pressed contacts 41, and the section 37 carries a fixed single pair of contacts 42. The contacts 41 of each pair are arranged radially and diametrically opposite each other. The contacts 42 are arranged on the section 37 radially and diametrically opposite each other so as to cooperate with the pairs of contacts 41. There is a pair of contacts 41 for each lighting tube or element 20. The control switch 35 consists of a bridge piece 43 fixedly mounted on the upper end of the base section 37 transversely thereof. The bridge piece 43 has notches 44 therein diametrically opposite each other to provide sector-shape portions 45. An arbor 46, consisting of a screw bolt with a nut, is positioned axially on the end 38 of the base section 36 and extends therethrough and also extends through a hole in the bridge piece 43. A coil spring 47 surrounds the arbor 46 with one end in contact with the head 47 of the arbor and its other end in contact with the bridge piece 43. Thus the base section 37 is mounted for rotatory movement, as well as axial movement, with respect to the base section 36 for a purpose to appear. The head end 38 of the base section 36 carries contact members 49 and 50, respectively, which cooperate with the bridge piece 43 and are in contact therewith to permit electric current from the supply source to flow, and are out of contact with the bridge piece 43 when the notches 44 are adjacent the contact members 49 and 50, respectively, or when the base section 37 is drawn downwardly to move the bridge piece 43 out of contact with the members 49 and 50 to turn off the electric current. A U-shape member 51 is secured, as at 52, to the base section 37 and a button 53 is in threading engagement with the lower end of the member 51, as at 54. A set screw 55 carried by the button and driven into the member 51 holds the button against turning movement with respect thereto. By removing the screw 55, the button 53 may be detached from the member 51. The button 53 as applied to the member 51 constitutes means for manipulating the base section 37 in order to operate both switches 34 and 35. The button 53 serves not only for turning the base section 37, which carries the bridge piece 43, but also serves for pulling the base section 37 and the bridge piece 43 carried thereby downwardly against the action of the spring 47, which has a normal tendency to urge the base section 37 and parts connected therewith upwardly.

A starter 56 is used for vaporizing the mercury in each of the tubes 20. This starter 56 is arranged between the legs of the U-shape member 51 and the terminals 57 and 58 of the starter are received in keyhole slots 59 in the partition 40. Spring connectors 60 are fastened to the contacts 42, respectively, and engage the terminals 57 and 58, respectively, in order to maintain a constant electrical connection between the starter 56 and the contacts 42 of the switch 34, as shown most clearly in Fig. 6. The movable base section 37 carries a radially disposed pin 61 which is engageable with the stop shoulders 62 and 63, respectively, provided by reason of the cutaway 64 in the base section 36. The pin 61 and shoulders 62 and 63 constitute means for limiting the rotatory movement of the base section 37 ninety degrees or one-fourth of a revolution about the arbor 46. By providing the keyhole slots 59, the starter 56 may be readily detached from the base section 37. The parts of the switches 34 and 35 and the starter 56 as a unit may be conveniently arranged within the casing 13, with the button 53 conveniently accessible for the purpose of operating the switches 34 and 35 not only to turn the electric current on and off, but also to optionally light any one of the lighting elements or tubes 20, or any combination of said tubes, or all of said tubes simultaneously. In conjunction with the starter 56, use is made of reactors 65, there being four, one for each of the lighting elements or tubes 20. These reactors 65 are conveniently arranged in the upper casing 12 of the fixture 10.

Referring now to Fig. 10, for the electrical connections between the various parts it will be seen that a feed wire 66 from a suitable source of electrical energy is connected by a lead 67 with one terminal of each of the reactors 65, and the other terminal of the reactor is connected by a lead 68 with the socket 27 of each pair of the resilient sockets. A wire 69 connects each lead 68 with the socket 23 of each pair of the fixed sockets. The socket 26 of each pair of the resilient sockets is connected by a wire 70 with one of the contacts 41 of each pair. The socket 24 of each pair of the fixed sockets is electrically connected by a lead 71 with a common return 72. A lead 73 is electrically connected with the common return 72 and the remaining contact 41 of each pair. The switch 35 is electrically connected in the common return 72. Certain of the lead wires from parts within the casing 13 lead upwardly through the rods 14 to the reactors in the casing 12.

To light any one of the lighting elements or

tubes 20, the button 53 is turned to bring the bridge piece 43 to a position in which the sector-shape portions 45 will bridge the contacts 49 and 50. The button 53 is turned to cause the contacts 42 to engage the particular pair of contacts 41, respectively. This allows current to flow from the feed wire 66, through the particular reactor 65 from its lead 67, thence to lead 68 from the reactor to the wire 69, related socket 23, terminals 21, lead 70, contact 41, contact 42, terminal 57 of the starter 56, terminal 58, the other contact 42, remaining contact 41 of the pair engaged, lead 73 to the common return 72, and from the common return 72 to the lead 71, socket 24, terminals 22, socket 27, lead 60, and to the reactor 65. After the lighting element 20 has been heated and the mercury therein generated into gas, the circuit through the terminals 21 is broken and current flows through the path formed by the vapor within the element 20 to light the same.

By pulling down on the button 53, the switch 35 will be opened, thereby turning off the current from the source of supply, and in a further manipulation the button 53 may be turned to skip one or more of the tubes 20 without heating the same in selecting a particular tube, or a plurality of tubes, for starting and lighting the same. After the particular tube or tubes 20 have been selected by turning the button 53 to engage the related pair of contacts 41 with the contacts 42, the button 53 is released to permit the spring 47 to return the bridge piece 43 into engagement with the contacts 49 and 50 to supply the current which creates the electrical discharge that results in light in each tube. The button 53 may be manipulated to light any one of the tubes 20, or any combination of the tubes by skipping some of them, or all of the tubes. All of the tubes may be maintained lighted simultaneously after they have first been started or rendered conductive one after the other.

In order to facilitate the lighting of the elements 20 as may be desired, indicating means is provided and the same is embodied by the button 53 and the casing 13. This indicating means is generally designated by the numeral 74. The button 53 may be rotated so that the notches 44 will be adjacent the contacts 49 and 50, in which case the main circuit which supplies the electric current will be opened. The turning movement to open the switch 35, as explained, is limited by reason of the fact that the pin 61 engages either the shoulder 62 or the shoulder 63. The contacts 42 may be engaged successively with the pairs of contacts 41, respectively, while the sector-shape portions 45 of the bridge piece 43 remains in contact with the contacts 49 and 50.

From the foregoing it will be apparent that there has been described a lighting device embodying novel features by which the objects of the invention may be readily attained.

I claim:

1. A lighting device including a main circuit for supplying electric current, fluorescent lighting tubes electrically connected in parallel in said circuit, each of said tubes having thermionic electrode means, a starter, and means operable to establish electrical connection between said means of any one of said tubes and the starter while retaining said main circuit open to render the same conductive and to subsequently close said main circuit for the purpose of lighting the selected tube.

2. In a lighting device, fluorescent lamps, a starter, a source of electrical energy, a multiple switch electrically connected with said lamps, starter and source of electrical energy, said switch including a single manipulator operable to close a circuit through any of the lamps to start the same and also operable to maintain a circuit through any of the lamps previously started, and means to retain the manipulator in circuit closing position to maintain the illumination of any of the lamps previously started, and said manipulator being movable to a position to open all of said circuits to turn off any of said lamps.

3. In a lighting device as set forth in claim 2, wherein said switch includes a fixed base, an arbor on said base and on which said manipulator is turnable and axially movable with respect to said base, and cooperative contacts on said base and manipulator.

4. In a lighting device as set forth in claim 2 wherein said starter is arranged within said switch.

5. In a lamp, a plurality of fluorescent tubes, a switch comprising a fixed cylindrical insulator base, a hollow member having turning and axial movement with respect to said base, pairs of contacts on said base electrically connected with said tubes respectively, the contacts of each pair being arranged radially with respect to the axis of said base, a pair of bridge contacts on said hollow member adapted to coact with the aforesaid pairs of contacts; a starter carried by said hollow member and being electrically connected with said bridge contacts, and a control switch operated by virtue of the movement of the hollow member, the provision and arrangement being such that by manipulating said hollow member said tubes may be selectively and initially heated one at a time to render the same conductive and to subsequently supply current to the tube or tubes previously rendered conductive to maintain the illumination thereof.

ABRAHAM JARMOLOWSKY.