June 13, 1950 E. G. GAYNOR 2,511,155

FLUORESCENT LIGHTING

Filed March 14, 1946 2 Sheets-Sheet 1

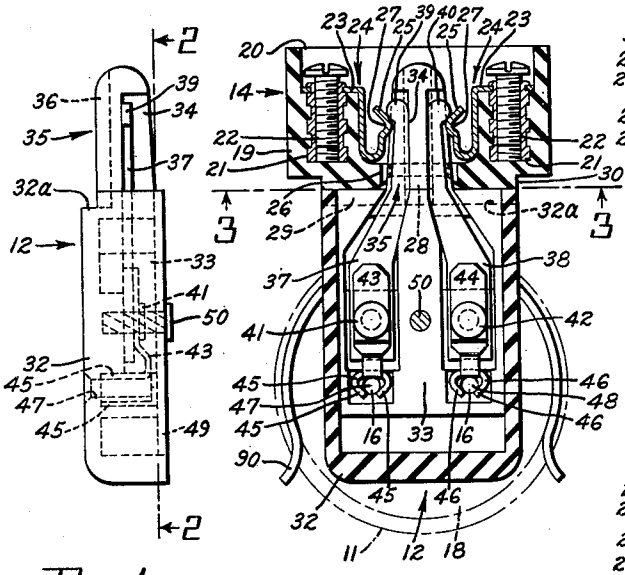

Fig. 1

Fig. 2

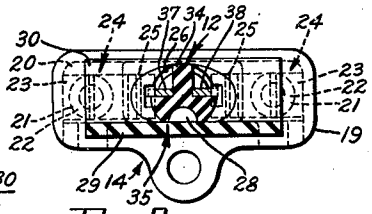

Fig. 3

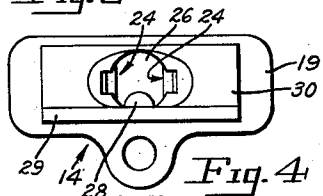

Fig. 4

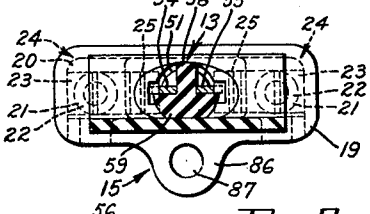

Fig. 7

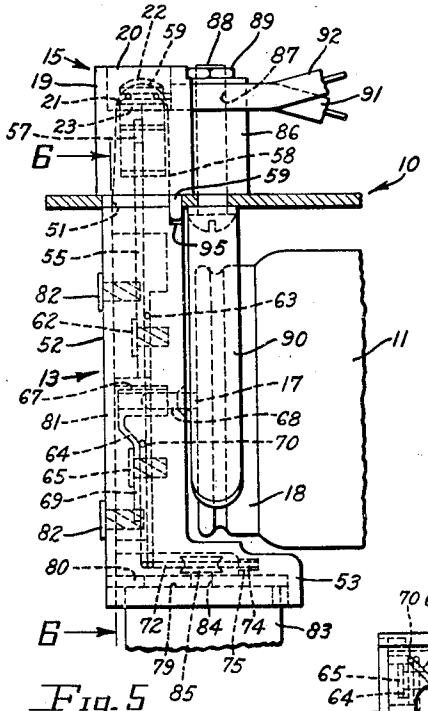

Fig. 5

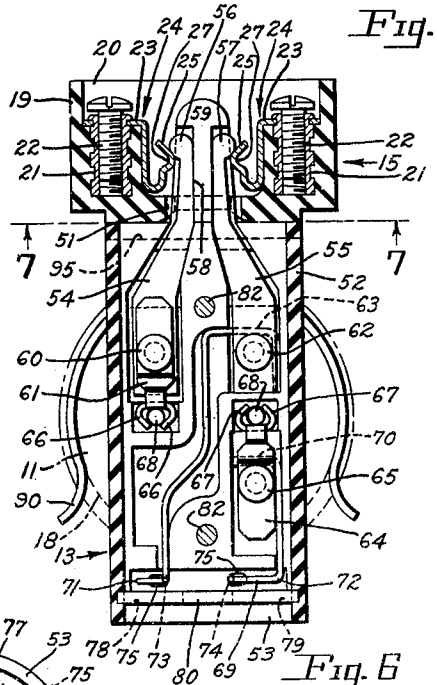

Fig. 6

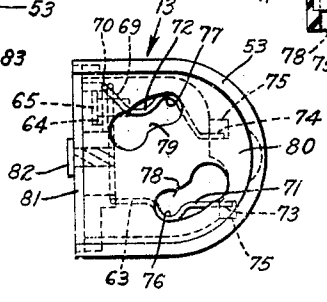

Fig. 8

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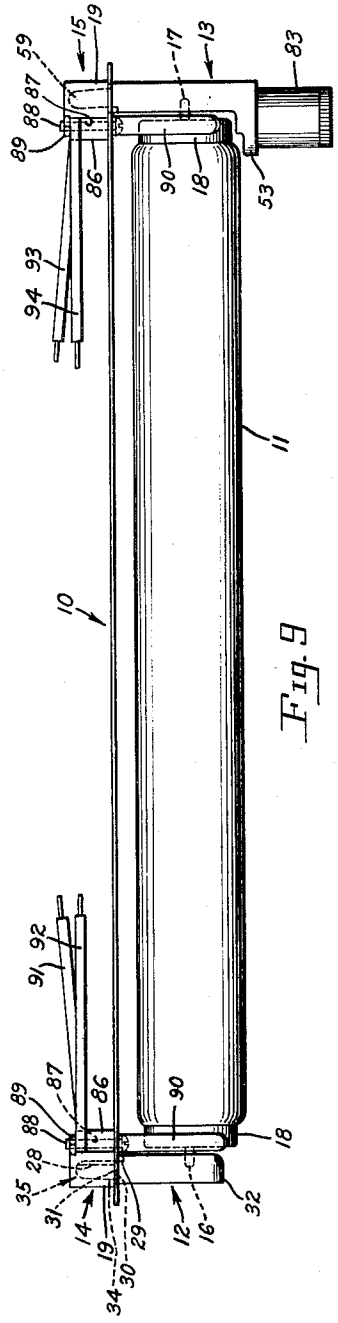

Fig. 9

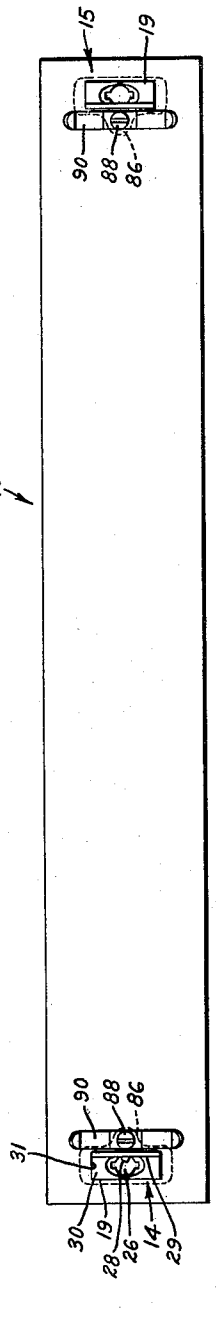

Fig. 10

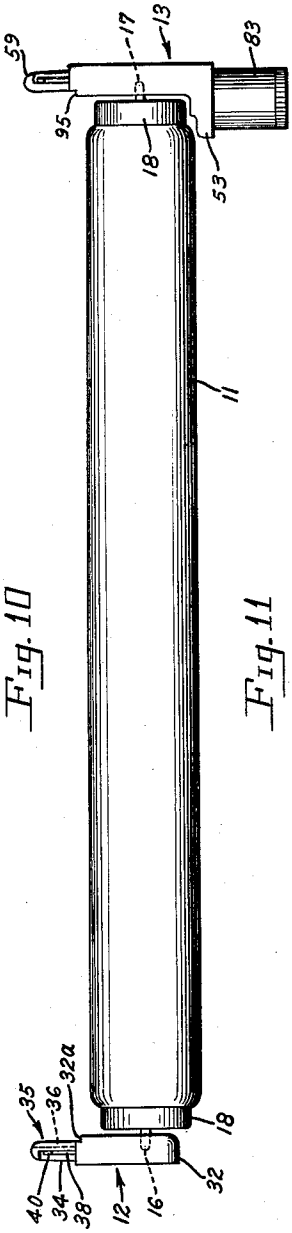

Fig. 11

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UNITED STATES PATENT OFFICE

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FLUORESCENT LIGHTING

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Application March 14, 1946, Serial No. 654,328

13 Claims. (Cl. 173—328)

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This invention relates to new and useful improvements in fluorescent lighting equipment and has particular relation to socket constructions for the mounting of fluorescent lamps.

An object of the invention is to provide fluorescent socket constructions whereby a fluorescent lamp may be mounted and dismounted by a simple rectilinear movement.

Another object is to provide a practical socket construction for the purpose indicated and which socket construction is simple and relatively inexpensive to manufacture and is durable in use.

Other objects and advantages of the invention will become apparent from a consideration of the following detailed description taken in connection with the accompanying drawings wherein a satisfactory embodiment of the invention is shown. However, it is to be understood that the invention is not limited to the details disclosed but includes all such variations and modifications as fall within the spirit of the invention and the scope of the appended claims.

In the drawings:

Fig. 1 is a side elevational view showing one plug member of a socket construction employed;

Fig. 2 is a sectional view taken as along the plane of the line 2—2 of Fig. 1, but through the plug and its base member;

Fig. 3 is a sectional view taken along line 3—3 of Fig. 2;

Fig. 4 is a bottom plan view of the base member of a socket;

Fig. 5 is an elevational view showing a second plug member in relation to its base member and as mounted on a support or reflector and in association with an end of a fluorescent lamp;

Fig. 6 is a sectional view as taken along the plane of the line 6—6 of Fig. 5;

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

Fig. 8 is a bottom plan view of the plug of Figs. 5 and 6;

Fig. 9 is a side elevational view showing a pair of sockets of the invention mounting a fluorescent lamp on a support or a reflector;

Fig. 10 is a bottom plan view of the support with the base members and clips mounted thereon; and

Fig. 11 is a side elevational view of the lamp and plugs separate from the support and bases.

Referring in detail to the drawings, at 10 (Fig. 9) is shown a support or a reflector means for a fluorescent lamp 11 mounted by a pair of sockets including plugs generally designated 12

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and 13 plugged into similar bases 14 and 15, respectively. Support 10 may be a reflector element or may simply be a convenient mounting means for assembly in a reflector. The lamp 11 is of the usual type of fluorescent lamp construction and at its respective ends is provided with the usual contact pins 16 and 17 connected within the lamp by the usual filaments (not shown). On each end of the lamp is a cap or the like including the usual metal band 18.

The bases 14 and 15 are very similar and each includes a body 19 of an insulating material and which body is open at its upper end, as at 20, and is adapted to be closed at such end by a suitable insulating plate (not shown). A pair of inserts 21 molded into opposite end portions of body 19 receive binding screws 22 and also mount the upper end portions 23 of contact elements generally designated 24. These elements 24 include rebent spring portions or arms 25 arranged at opposite sides of an entrance opening 26 leading into the body 19 from the lower side thereof.

Contacts 24 are so constructed that their portions 23 lie against the upper sides of the solid or body portions into which the inserts 21 are molded and then each contact includes an arm disposed against the vertical sides of the insert receiving body portions. Thus the only parts of the contacts which are in position to yield are the rebent portions or arms 25 and each of these includes an outwardly bent portion 27 arranged to cooperated with a conductor strip, as will be set forth.

Normally the arms 25 extend slightly across the opening 26. Extending along one side of the opening 26 is a rib 28 (see particularly Figs. 3 and 4) and this rib extends to the lower end of a flange or wall portion 29 arranged to set against a portion of the plug 12. The body 14 of the base includes a lower neck-like portion 30 of which the wall 29 comprises a continuation and in the mounting of the base 12 this neck-like portion 30 and the wall 29 extend into an opening 31 in the support 10 with the main body of the base disposed at the upper side of the support. In fact, the lower edge of the wall portion 29 extends entirely through the support 10 as best shown in Fig. 9.

The plug 12 comprises a body or housing 32 of an insulating material and which is generally hollow but is internally divided by a rib 33. This rib extends along through the body and above one end of the same becomes a flat sided portion 34 of a prong generally designated 35. This prong is somewhat T-shaped in transverse sec-

tion, as shown in Fig. 3, and includes a longitudinally extending groove 36. The prong is adapted to be inserted into the base 14 through the opening 26 and at such time the rib 28 of the base is received in the groove or channel 36 of the prong 35. Additionally, body 32 includes a shoulder 32a at the lower end of the channel 36 and which shoulder is abutted by the lower edge of the wall 29 when the plug 12 and the base 14 are fully together.

A pair of relatively stiff conducting strips 37 and 38 are located at the respective sides of the rib 33 and extending upwardly through the open end of the body 32 have their upper or free end portions located at opposite sides of the rib portion 34 and against the main body portion of the prong 35. These upper or free end portions are designated 39 and 40 respectively and each comprises a sort of enlargement or head-like portion. Such enlargements or head-like portions of the respective contact members extend in opposite directions or laterally outwardly with respect to the rib 34.

Rivets or the like 41 and 42 secure the conducting strips 37 and 38 in place and further secure to such strips contact clips or elements 43 and 44 respectively. The elements 43 and 44 include clip portions 45 and 46 respectively and these are located in alignment with the openings 47 and 48 entering the body 32 from the front or inner side thereof. Such openings are adapted to receive the contact pins 16 of the lamp 11 and when the contact pins are received in such openings they are engaged by the spring portions 45 and 46 of the clips 43 and 44 so that contact is established between these respective pins and the respective strips 37 and 38. The outer or rear side of the body 32 is closed as by a relatively stiff sheet or plate 49 of insulating material removably held in place as by a drive screw 50.

Referring now particularly to Figs. 5 through 8, wherein the details of the base 15 and plug 13 are disclosed, the base 15 is shown as similar to the base 14 in all respects save only that the base 15 does not include any part equivalent to the rib 28 of the base 14. Therefore the entire parts within the base 15 have been given the reference characters already applied to the corresponding parts of the base 14. Thus base 15 includes the inserts 21, the binding screws 22, and the contacts 24. Since base 15 does not include the rib 28 an entrance opening through the lower end of said base is designated 51 to distinguish it from the entrance opening 26 of the base 14 which entrance opening 26 is partly interrupted by the rib 28.

Plug 13 comprises a body 52 of insulating material and is relatively flat and elongated, but at its lower end is laterally expanded to provide a head-like portion 53. Within the body 52 are conducting strips 54 and 55 corresponding with the conducting strips 37 and 38 of the plug 12, and at their upper ends including head-like portions 56 and 57 projecting from opposite sides of a flat rib-like portion 58 comprising a portion of an insulating prong 59. The relation of the conductors 54 and 55 to the prong 59 is the same as that of the conductors 37 and 38 to the prong 35. A rivet or the like 60 secures a contact clip 61 to the lower end of conductor 54 and secures the latter and the clip in place in the body 52. A similar rivet 62 secures the conductor 55 in place and also may provide a convenient means for the attaching of a wire or lead 63 to such conductor. A contact clip 64 similar to the clip 61 is secured within the body by a rivet or drive screw, or the like, 65.

Clips 61 and 64 include clip portions 66 and 67 respectively located in alignment and located about the openings 68 entering the body 52 through the inner side thereof. These openings receive the contact pins 17 of the lamp 11 and when the pins are in the openings they are received by the portions 66 and 67 of the clips 61 and 64 respectively. A wire 69 is fixed in engagement with the clip 64 as at 70.

Wires 63 and 69 extend laterally into the head 53 and there include free arm portions 71 and 72 having their free ends 73 and 74, respectively, in small sockets 75. The described wires are of a stiff springy metal and their arm portions 71 and 72 are bent to provide loops 76 and 77 which extend partly across key hole slots or openings 78 and 79 in a cover plate 80 closing the lower end of the head 53. A cover plate 81 is held across the open outer side of the body 52 as by a pair of drive screws 82.

The head 53 with the described wires provides means for mounting a starter 83, which may be the conventional starter, so that the same will be included in the usual way in the circuit of lamp 11. Such starters include extending contacts in the form of pins 84 having heads 85. To mount the starter in place its pins are inserted through the larger portions of the key hole openings 78 and 79 to have the heads 85 of the pins disposed above the portions 71 and 72 of the wires. Then a slight twisting of the starter carries its pins into the smaller portions of the key hole openings deflecting the springy wires somewhat. The sockets 75 allow for this deflection of the wires but the wires remain in engagement with the pins of the starter and below the heads of such pins so that the wires are in good electrical engagement with the starter pins and the starter is supported in place. Should any trouble develop the starter may be easily removed and replaced.

Each of the bases 14 and 15 includes a laterally extending lug 86 having an opening 87 therethrough. When the bases are in place bolts 88 pass through the lugs 86 and the support 10 and are held in place by nuts 89. The heads of these bolts serve to secure in place spring clips 90 located at the underside of the support 10 and at the inner sides of the plugs 12 and 13, respectively, of the assembled lamp.

As the wiring diagram for fluorescent lighting is well known, no diagram is here given but in Fig. 9 lead wires 91 and 92 are shown as leading to the binding screws 22 of the base 14 while similar leads 93 and 94 are connected with the binding screws 22 of the base 15. Assuming that the proper wiring is provided when the lamp 11 is in place, the plug 12 has its prong located within the base 14 and with the conductor strips 37 and 38 of said plug engaged with the spring arms 25 of the contacts 24 of said base.

At this time, the outwardly bulged portions 27 of the spring arms 25 of the contacts are under the head-like portions 39 and 40 of the conductors 37 and 38 respectively. Thus the plug 12 is securely held to the base 14. Association of the plug with the base is guided by the rib 28 of the plug being received in the channel 36 of the prong 35 and by engagement of the lip or wall portion 29 of the base with the shoulder 32a of the plug.

In the same way the plug 13 is associated with base 15 and the prong 59 of said plug has been

passed through the entrance opening 51 of said base and the head portions 56 and 57 of the conductor strips 54 and 55 are disposed over the outwardly bulged portions 27 of the spring arms 25 of the contacts 24. Additionally, the lip or wall portion 59 of the base 15 is located on the shoulder 95 of the plug 13. Starter 83 being in place, the lamp may be operating.

As the bases 14 and 15 are wired up for the reception of the lamp and the starter 83, it will be understood that the starter must be associated with the proper end of the lamp and the proper base. In the construction disclosed, the rib 28 of base 14 prevents the accidental reversal of the parts so that the plug 13 may never be inserted or connected within the base 14. This is true since the prong 59 of plug 13 does not have any channel or groove corresponding with the channel 36 in the prong 35 of plug 12.

In using the device, if the lamp 11 is to be removed from the support 10, it is merely pulled downwardly to draw the prongs 35 and 59 out of the bases 14 and 15. As this is done, the spring arms 25 of the respective bases are forced slightly apart by the head-like portions of the various conductor strips and the lamp is pulled out from the spring clips 90. The plugs 11 and 12 are simply drawn off the pins 16 and 17 by movements outwardly in the direction of the length of the lamp and they are mounted on a new lamp by movement inwardly over the contact pins of the lamp.

The manner of changing the starter has already been explained. Now the assembly (shown in Fig. 11) comprising the lamp and the plugs and and starter is remounted on the support 10 simply by pushing the prongs 35 and 59 of the plugs through the entrance openings 26 and 51 of the respective bases 14 and 15. This aligns all the parts and carries the end portions of the tube or lamp into the spring clips 90.

As the prongs are forced into the bases, the spring arms 25 of the respective contacts 24 are forced apart but spring back toward one another again under the heads 39 and 40 of the conductors 37 and 38 and the heads 56 and 57 of the conductors 54 and 55. This insures the good electrical contact between these parts and also serves to assist in the supporting the assembly of Fig. 11 on the support 10. The spring clips 90 also serve in the supporting of the weight of this assembly.

From the foregoing description it will be seen that twisting and tilting of the lamp to remove it from the support 10 is avoided and that the lamp is mounted and removed by a simple rectilinear movement, such as may be obtained through the use of the device disclosed in the patent to Gaynor and Andrews, No. 2,371,437 of March 13, 1945. Attention is directed to the fact that the prongs 35 and 59 have rounded outer or free ends to facilitate their insertion into the bases. Further, such ends overlie the outer end of the conductor strips, to a large extent, so that said strips do not interfere with the movements of the prongs into the bases.

Having thus set forth the nature of my invention, what I claim is:

1. A two-part socket for use in a fluorescent lighting fixture, said socket comprising a base and a plug, said base having an entrance opening and a pair of spring contacts inwardly of said opening and extending partly across the latter, said plug having a pair of entrance openings in its side intermediate its ends to receive

the contact pins of a fluorescent lamp, contacts in said plug to be engaged by fluorescent lamp pins inserted through said pair of entrance openings, a prong of insulating material extending from one end of said plug and adapted to be inserted through the entrance opening of said base, a pair of spaced conductor strips extending along said prong and insulated from one another thereby and adapted to engage the spring contacts of the base on insertion of the prong through the entrance opening of the latter, a lateral head-like extension on the other end of said plug, means for mounting a starter on said head-like extension, and means whereby when a starter is mounted on said extension the said starter is electrically connected with one of said contacts and one of said conductor strips.

2. A socket for the purpose described comprising a base and a separable plug, said base having an entrance opening, a pair of contacts in said base and located one at each of a pair of the opposite sides of said entrance opening, said plug including a prong of insulating material adapted to be inserted through the entrance opening of the base, a pair of conductors in said plug and each including a portion extending along said prong and adapted to engage the contacts of the base on insertion of the prong through said entrance opening of the base, a laterally extending head-like extension at the end of said plug opposite said prong, means for removably mounting a starter on said head-like extension, and means whereby when a starter is mounted on said head-like extension the starter is wired to one of said conductor strips.

3. A socket for the purpose described comprising a base and a separable plug, said base having an entrance opening, a pair of contacts in said base, each of said contacts including a spring arm extending partly across said entrance opening, said plug including an elongated substantially straight prong of insulating material extending from one end thereof and adapted to be inserted through the entrance opening of said base, a pair of conductor strips in said plug and each including a substantially straight portion extending from the plug, said extending portions of the conductor strips engaging opposite portions of said prong and extending longitudinally thereof and spaced apart thereby and adapted to engage the respective contacts of the base on insertion of the prong through said entrance opening of the base, and outwardly extending head-like enlargements on the end portions of the extensions of the conductor strips nearest the free end of said prong to overlie the inner sides of said spring arms when the prong is in place in the base.

4. A socket for the purpose described comprising a base and a separable plug, said base having an entrance opening, a pair of spaced contacts in said base, said plug including a prong comprising a pair of conductor strips each adapted to engage one of the contacts of the base on insertion of the prong through said entrance opening of the base, a pair of contacts in said plug, entrance openings through a side of said plug intermediate its ends for the insertion of the pins of a fluorescent lamp into engagement with said contacts, means connecting one of said contacts with one of said conductor strips, a head-like portion on said plug at the other end thereof, said head-like portion having key hole slots therein for the insertion and turning of the pins of a starter, spring means in said head-like portions at the inner sides of said key hole slots for engagement with the pins

of a starter inserted through said slots and then turned, and means connecting one of said spring means with the other of said conductor strips and the other of said spring means with the other of said contacts.

5. A socket for the purpose described comprising a base and a separable plug, a pair of contacts in said base and adapted to have lead wires connected therewith, spaced elongated metal conductor strips secured within said plug and including portions extending from one end of said plug, said base having an entrance leading to said pair of contacts, said extending portions of said conductor strips adapted to be inserted through said entrance into said base into engagement with the respective contacts of said pair, said plug having entrance openings through a side thereof intermediate the ends thereof, contacts in said plug intermediate the ends thereof and located to be engaged by the contact pins of a fluorescent lamp, means connecting one of said contacts in said plug with one of said conductor strips, means on the other end of said plug for the detachable securing of a starter to the plug, and said means including means whereby when the starter is mounted on the plug its respective contact pins are electrically connected with the other of said conductor strips and the other of said contacts in said plug.

6. A plug including a body of insulating material, a pair of conductor strips having portions within said body and portions extending from one end thereof, said body including a portion separating said strips within the body, a pair of spring clips within said body, means securing one of said clips against and in electrical contact with one of said conductor strips and anchoring said conductor strip and clip to and in fixed position within said plug body, other means securing the other of said clips against and in electrical contact with the other of said conductor strips and anchoring said other conductor strip and said other clip to and in fixed positions within said plug body, said body having a pair of spaced openings in one of its sides providing entrances for the pins of a fluorescent lamp into said body, and said spring clips located to receive and engage pins so inserted.

7. The plug as in claim 6 including means securing said clips to said conductor strips and mounting the latter and the clips in the body.

8. In a plug for the purpose described, a body of insulating material, a rib dividing said body internally into a pair of compartments, said rib extending beyond one end of said body and forming a prong, a pair of conductor strips mounted within the body and separated by said rib, said strips having end portions extending outwardly of the body at opposite sides of and spaced apart by said prong, said prong having a head-like rounded portion at its outer end, said strips stopping inwardly of said portion, said prong inwardly of said portion substantially T-shaped in transverse section and receiving said extensions of the conductor strips in the corners at the inner side of the head and the opposite sides of the stem of said T-formation, a pair of spring clips mounted one on each of said strips, said body having a pair of spaced openings in one of its sides providing entrances for the pins of a fluorescent lamp into said body, and said spring clips located to receive and engage pins so inserted.

9. A socket for a fluorescent lighting structure comprising a base including a body of insulating material open at its rear end having an entrance opening through its front, a pair of thickened portions in said body located one at each side of said entrance and each forming a pair of right-angularly related surfaces, a pair of spring contacts each including two right-angularly related portions disposed against said surfaces of the respective thickened portions, each of said contacts also including a reversedly bent spring arm normally extending partly across said entrance, and said spring arms offset toward one another intermediate their ends.

10. In a socket for fluorescent lamps, a two-part separable structure comprising a base and a plug, contacts within said base, said base having an entrance leading to said contacts, said plug comprising a body of insulating material, a prong of insulating material extending from one end of said plug and insertable through said entrance into said base, contact strips on said plug body and including portions extending along said prong and insertable therewith into the base whereby to engage the contacts in the latter, said body having a pair of entrance openings to receive the contact pins of a fluorescent lamp, contact clips in said body and electrically connected with the respective contact strips and located to be engaged by fluorescent lamp pins inserted through said pair of entrance openings, said plug body having a shoulder at the inner end of said prong, and said base body having a wall-like extension along one edge adapted to abut against said shoulder when the plug and base are fully engaged.

11. In a socket for fluorescent lamps, a two-part separable structure comprising a base and a plug, contacts within said base, said base having an entrance leading to said contacts, said plug comprising a body of insulating material, a prong of insulating material extending from one end of said plug and insertable through said entrance into said base, contact strips on said plug body and including portions extending along said prong and insertable therewith into the base whereby to engage the contacts in the latter, said body having a pair of entrance openings to receive the contact pins of a fluorescent lamp, contact clips in said body and electrically connected with the respective contact strips and located to be engaged by fluorescent lamp pins inserted through said pair of entrance openings, a rib integral with said base body and projecting into said entrance and extending parallel therewith, and said prong having a longitudinally extending groove in a side thereof to register with and receive said rib on insertion of the prong into said base.

12. A socket for the purpose described comprising a base and a plug separable from the base, said base comprising a body having an entrance through a side thereof for the insertion of conductors into the body, a pair of spaced and electrically insulated contacts mounted in said body to be engaged by conductor strips inserted into the body through said entrance, a pair of spaced electrically insulated conductor strips in said plug and each including a portion extending from the same end of said plug and adapted to be inserted through said entrance into said base into engagement with the respective contacts therein, a laterally extending head-like extension at the end of said plug opposite that from which said conductor strips extend, means for removably mounting a starter on said head-like extension, and means whereby when

a starter is mounted on said head-like extension the starter is wired to one of said conductor strips.

13. A socket for the purpose described comprising a base and a plug separable from the base, said base comprising a body having an entrance through a side thereof for the insertion of conductor strips into the body, said plug having a pair of entrance openings in its side intermediate its ends to receive the contact pins of a fluorescent lamp, contacts in said plug to be engaged by fluorescent lamp contact pins inserted through said pair of entrance openings, a pair of spaced and electrically insulated contacts mounted in said body to be engaged by conductor strips inserted into the body through said entrance, a pair of spaced electrically insulated conductor strips in said plug and each including a portion extending from the same end of said plug and adapted to be inserted through said entrance into said base into engagement with the respective contacts therein, a lateral

head-like extension on the other end of said plug, means for mounting a starter on said head-like extension, and means whereby when a starter is mounted on said extension the said starter is electrically connected with one of said contacts and one of said conductor strips.

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