Oct. 1, 1946. G. S. MERRILL 2,408,471

ILLUMINATING APPARATUS

Filed June 3, 1943

Fig. 1.

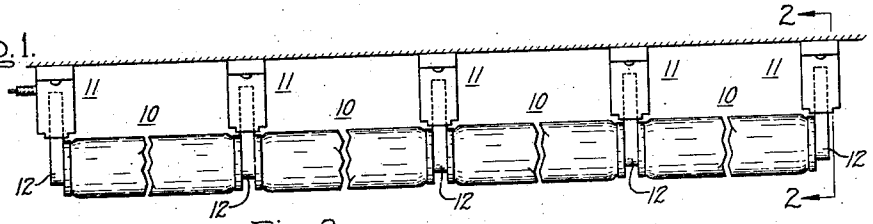


Fig. 3.

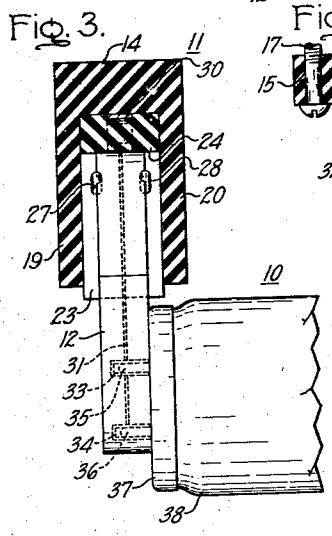


Fig. 2.

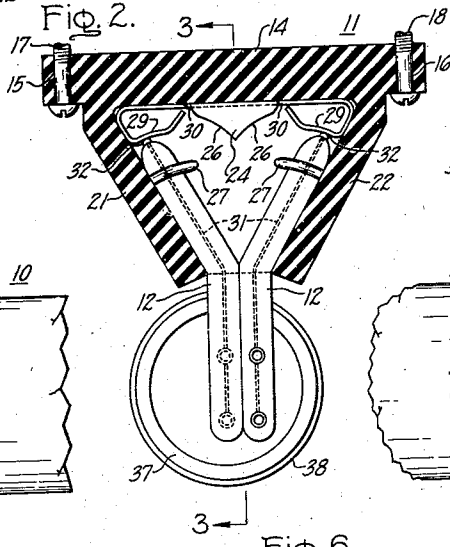


Fig. 4.

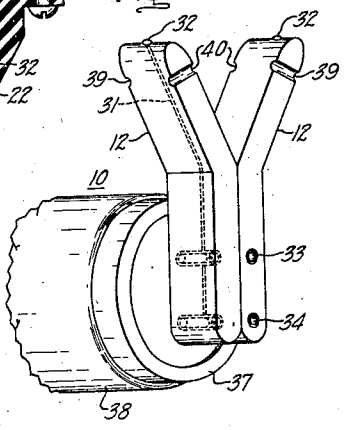


Fig. 5.

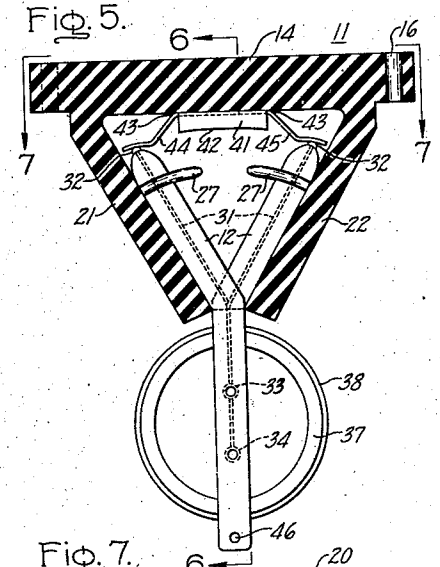


Fig. 6.

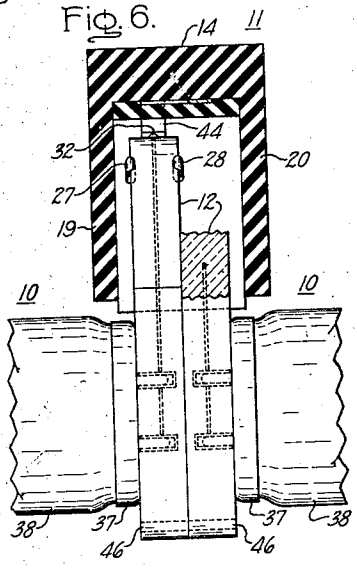


Fig. 8.

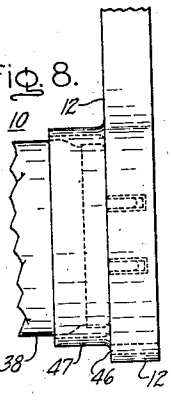
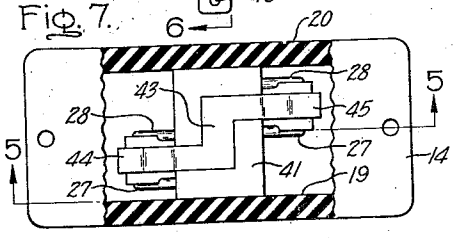


Fig. 7.



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UNITED STATES PATENT OFFICE

2,408,471

ILLUMINATING APPARATUS

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Application June 3, 1943, Serial No. 489,449

4 Claims. (Cl. 173—328)

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My invention relates to illumination, and its principal object is to provide an illuminating apparatus or system comprising a plurality of double-ended, rectilinear, electric light sources and a plurality of connector-supports for said sources. Another object of my invention is to provide a compact, easily assembled and disassembled connector-support for double-ended, tubular, electric lamps, which support is so constructed and arranged that mounting and removing the lamp is readily accomplished. Another object of my invention is to provide such a connector-support for suspending such lamps from a ceiling, or the like, and connecting such lamps in series. A further object of my invention is to provide a connector-support and a connecting rod which protects the user from accidental contact with the electrical connections. Further objects and advantages of the invention will appear from the following detailed description of species thereof and from the accompanying drawing in which Fig. 1 is a front elevational view of a species of my new illuminating system; Fig. 2 is a side elevational, partly sectional view of one of the connector-supports shown in Fig. 1; Fig. 3 is an end elevational, partly sectional view of the connector support shown in Fig. 2; Fig. 4 is a perspective view of the suspension rods shown in Figs. 1 to 3 and one end of a tubular lamp in engagement with one of said rods; Fig. 5 is a side elevational, partly sectional view of another species of connector-support embodying my invention; Fig. 6 is an end elevational, partly sectional view of the species of my invention illustrated in Fig. 5; Fig. 7 is a top plan, partly sectional view of the species of my invention shown in Figs. 5 and 6; and Fig. 8 is a side elevational view of a modified form of suspension rod useful for supporting lamps in the sockets of my invention. Like numbers denote like parts in all the figures.

Referring to Figs. 1 to 4 of the drawing, my new illuminating apparatus comprises a plurality of double-ended, tubular lamps 10, a plurality of aligned sockets 11 and connecting or suspension rods 12, two for each of said sockets, engaging with said sockets 11 and said lamps 10. In Fig. 1 the sockets are shown secured to a ceiling of a room, or the like, with the lamps 10 suspended therefrom by the rods 12. Each of said sockets 11 accommodates a pair of rods 12 and supports two lamp ends. Each of said lamps 10 is supported by a pair of rods 12 and sockets 11.

As best illustrated in Figs. 2 and 3 of the drawing, the sockets 11 comprise a slightly elongated

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hollow body portion of electrically insulating material and made up of a top plate portion 14 having apertures 15 and 16 for accommodating screws or bolts 17 and 18 for fastening the socket 11 to a ceiling or the like, two parallel side walls 19 and 20 and two end walls 21 and 22. The end walls 21 and 22 converge or slope toward each other from the plate 14 and, together with the side walls 19 and 20, form an opening 23 into the hollow interior of the socket 11. A guide 24, having slightly curved surfaces 25 and 26 which diverge in the direction of top plate 14, is secured to the inner surface of the plate 14 and extends laterally across the said plate 14 with the ridge formed by the junction of the two surfaces 25 and 26 directly above the center of the opening 23. Each of the end walls 21 and 22 has secured thereto a spaced pair of slightly curved and tapered projections, or pins 27 and 28 extending in the general direction of the guide 24. An electrical contact 29 of spring bronze, for example, is disposed centrally above the space between each pair of said pins 27 and 28 (Fig. 3). The spring contacts 29 are joined together and supported by a strip 30 of similar material held between the top plate 14 and the guide 24 and shaped so as to extend from the guide 24 to the end walls 21 and 22 and for a short distance along the walls 21 and 22. The contacts 29, which comprise a curved portion and a straight portion, extend from the parts of the strip 30 extending along walls 21 and 22 and terminate adjacent the most widely spaced portions of the surfaces 25 and 26 of guide 24 which consists of electrically insulating material. The spring contacts 29 have appreciable stiffness and elasticity for the purpose described below.

The rods 12, shown in detail in Fig. 4, consist of electrically insulating material, are rectangular in transverse section and comprise two straight portions making an oblique angle with each other. A wire 31 of electrically conducting material, such as copper, is embedded in each rod 12 and is joined to an exposed electrical contact 32 mounted on one end of the rod 12. The other end of the wire 31 is connected to a pair of resilient metal sleeves 33 and 34 recessed into spaced cavities in rod 12 and into which the spaced contact prongs 35 and 36 of the multipronged bases 37 secured to the envelope 38 of the lamp may be readily inserted and removed. The sleeves 33 and 34 make a frictional fit with the prongs 35 and 36 to make a good physical and electrical contact therewith. A pair of grooves 39 and 40 are provided in the portion of the member 12 adjacent

the end thereof bearing contact 32 for engagement with the support pins 27 and 28 of the socket 11.

In mounting a lamp 10 between a pair of sockets 11, a rod 12 is disposed on each end of the lamp with the sleeves 33 and 34 frictionally engaging the prongs 35 and 36. The contact bearing portions of the rods 12 are then inserted vertically upward into the sockets 11 until the contacts 32 engage one of the sides 25 or 26 of the guide 24 and slide along said surface to bring the grooves 39 and 40 into engagement with a pair of said support pins 27 and 28. The contact 32 engages with and slides along the straight portion of one of the contacts 29 as the grooves 39 and 40 slide along the supports 27 and 28 and finally engages the curved portion of the contact 29 when in the position shown in Fig. 2. The supports 27 and 28 and the contacts 29 are so spaced with respect to the distance between the grooves 39 and 40 and the contact 32 on the rod 12 that, as the grooves 39 and 40 slide along the supports 27 and 28, the free end of contact 29 is first moved into engagement with the strip 30 and then contact 29 is subjected to a clamping action exerted between the top plate 14 and the contact 32. As a result of the clamping action, the contact 29 is flexed more and more as the contact 32 slides along the straight portion of the contact 29. When the contact 32 passes over and beyond the junction between the straight portion and the curved portion of the contact 29, the said contact flexes in the opposite direction and exerts force of sufficient magnitude and in a direction such as to overcome the torque produced by the force of gravity on lamp 10. Thus, the lamp 10 is supported in the sockets 11 by the pins 27 and 28 on the end walls 21 and 22 opposing vertical movement and the contact 29 opposing the turning moment on rod 12. The force exerted by the contact 29 may be overcome to release the lamp 10 by manually moving lamp 10 so as to exert a turning moment on rod 12 with the free end of wall 21 or 22 acting as a fulcrum for rod 12. The lamp 10 and the rods 12 may then be easily moved from the sockets 11.

After one lamp 10 has been mounted in a pair of sockets 11, as described above, the other lamps are similarly mounted in the adjacent pairs of sockets 11, each of said pairs having one socket in common. As is apparent from Fig. 4 of the drawing, the longitudinal axes of the tubular lamps in each of the sockets 11 are offset from each other, but the space between the luminous parts of adjacent lamps is minimized because the contact prongs 35 and 36 of the bases 37 overlap. The lamps 10 of the apparatus are connected in series by the rods 12 and the electrically conducting members 29, 30 of the sockets 11.

The end sockets of the apparatus are provided with a conventional current leading-in wire extending therein as indicated at the left in Fig. 1. The leading-in wire is connected to the electrical conductor 29, 30 in the socket 11 for connecting the apparatus across the terminals of a suitable source of electric power in the conventional manner. The sockets 11 and the rods 12 may be made of material, such as porcelain or an organic plastic, having suitable electrical insulating and physical properties. The pins 27 and 28 on the end walls 21 and 22 of the sockets 11 may be replaced by similarly shaped and disposed ridges or tongues on the inner surface of the side walls 19 and 20 which may be separated a distance only slightly

greater than the width of the rods 12 to limit lateral movement of the rods 12 in sockets 11.

The embodiment of my invention illustrated in Figs. 5 to 7 of the drawing is useful for supporting tubular lamps with their longitudinal axes in the same straight line. The sockets 11 of this embodiment are the same as those illustrated in Figs. 1 to 4 except that the pins 27 and 28 on end wall 21 are offset such distance with respect to those on end wall 22 that the sides of smaller area of the rods 12 are contiguous, as shown in Fig. 6. The guide 41 has a downwardly facing, concave surface 42 to direct the grooves 39 and 40 of rods 12 onto the pins 27 and 28. The conductor for connecting the two supported lamps in series comprises a central portion 43 clamped between the guide 41 and the top plate 14, connecting and extending transversely to the contacts 44 and 45 which overlap for part of their length and are offset from each other as shown in Fig. 7. Rods 12 in this embodiment extend below the lamps 10 and are perforated as shown at 46 to accommodate a pin, or the like, (not shown) which positively locks the rods 12 together. In this embodiment also the contacts 44 and 45 are so shaped and of sufficient stiffness to oppose the torque on rods 12 exerted by the force of gravity acting on the lamps 10. Spring clips of metal or plastic material may be used in both embodiments to lock rods 12 together and contacts 44 and 45 as well as contact 29 may be used in either embodiment.

The lamps 10 may comprise a solid or a gaseous material capable of translating electrical energy into electromagnet radiations. For example, a tungsten filament extending along the lamp envelope 38 may be used for this purpose, or an attenuated, luminosity producing, ionizable gaseous atmosphere and discharge sustaining electrodes may be disposed therein. My invention is particularly useful in connection with discharge lamps of the high voltage type having co-operating electrodes disposed adjacent the ends of the tubular envelope 38, a gaseous filling, such as neon, or argon, at a pressure of approximately 1 to 10 mm., a quantity of vaporizable metal, such as mercury, the vapor of which is at a pressure of the order of 10 microns and is luminosity producing when excited by the passage of an electric discharge therethrough and a layer of fluorescent powder adherent to the inner surface of said envelope 10, which powder emits light under excitation by radiation from the gaseous discharge. The electrodes of such lamps are electrically connected to one or both of the prongs 35 and 36 of the base 37. Such lamps are operated on high voltage without starting switches, in which case the prongs 35 and 36 may be short-circuited by the conductor 31. If desired, a one prong base may be used with the rods 12 instead of the two prong bases illustrated. Where one pronged bases are used, the rods 12 may be provided with only a single contact sleeve.

In Fig. 8 of the drawing I have illustrated a feature which may be used in conjunction with either species of suspension rod shown in the drawing. This feature is a cup-shaped member 47 of electrically insulating material secured to the rod 12, as by being made integral therewith, and so disposed thereon that it covers the base 37 of the lamp 10 when the prongs 35 and 36 are inserted in the sleeve accommodating cavities of the rod 12. The inner diameter of the cup is slightly larger than the outer diameter of the envelope 38 and the depth of the cup is so related

to the width of the base 37 and the length of the prongs 35 and 36 that accidental contact between the base 37 and the person handling the lamp 10 when the prongs 35 and 36 are electrically engaged with the sleeves 33 and 34 is prevented. The peripheral portion of the cup 47 overlapping the lamp envelope 38 may consist or comprise a light transmitting organic plastic and be divided into a plurality of spring fingers for gripping the envelope 38.

In order to minimize the number of parts of my new apparatus, I prefer to make the sleeve accommodating cavities in the rods 12 by first forming apertures through the rods and then plugging one end of the aperture with an electrically insulating material. Thus, only a single die is needed to make the rods 12 of any one of the species disclosed above, since either end of the apertures may be plugged. Further, the number of items stocked may be minimized by making the sleeves 33 and 34 in such manner, such as a hollow cylinder open at each end and slightly constricted at its mid-portion, that the prongs 35 and 36 of the base 37 may be inserted therein from either direction. The manufacturer may then plug both ends of the apertures with insulating material and the user may remove the plugs from the aperture ends through which the prongs 35 and 36 are to be inserted.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A lamp holder for supporting one end of a pair of electric lamps extending in opposite directions therefrom, comprising the combination of a socket having a chamber therein with opposed walls diverging upwardly from an opening in the bottom thereof, a pair of detachable angular connector members having vertical portions projecting downwardly from said socket opening in side-by-side relation and angularly offset portions each engaging one of said opposed chamber walls, the vertical portions of said connector members each being provided with engagement means to hold an end of a lamp, and clamping means in said chamber adapted to grip the angularly offset portions of said connector members and hold them against said opposed chamber walls.

2. A lamp holder for supporting one end of a pair of electric lamps extending in opposite directions therefrom, comprising the combination of a socket having a chamber therein with opposed walls diverging upwardly from an opening in the bottom thereof, a pair of detachable angular connector members disposed in a common plane and having vertical portions projecting downwardly from said socket opening in abutting side-by-side relation and angularly offset portions each engaging one of said opposed chamber walls, the vertical portions of said connector members each being provided with engagement means to hold an end of a lamp, and clamping means in said chamber adapted to grip the angularly offset portions of said connector members and hold them against said opposed chamber walls.

3. A lamp holder for supporting one end of a pair of electric lamps extending in opposite directions therefrom, comprising the combination of a socket having a chamber therein with opposed walls diverging upwardly from an opening in the bottom thereof, a pair of detachable angular connector members disposed in offset parallel planes and having vertical portions projecting downwardly from said socket opening in side-by-side relation and angularly offset portions each engaging one of said opposed chamber walls, the vertical portions of said connector members each being provided with aligned engagement means to hold an end of a lamp with the lamps axially aligned, and clamping means in said chamber adapted to grip the angularly offset portions of said connector members and hold them against said opposed chamber walls.

4. The combination of a pair of connector members for supporting each of a pair of electric lamps extending in opposite directions therefrom, said connector members comprising parallel portions disposed side-by-side and each being provided with engagement means to hold an end of a lamp, said connector members further comprising angularly offset portions making obtuse angles with the said parallel portions so that the assembled connector members form a Y and a socket having a chamber therein with opposed walls diverging upwardly from an opening in the bottom thereof and clamping means in said chamber adapted to grip the angularly offset portions of said connector members and releasably hold them against said opposed chamber walls with the parallel portions projecting downwardly from the socket opening.

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