Nov. 10, 1925. 1,560,882

J. S. VAN HORNE

INCANDESCENT LAMP

Filed July 25, 1922

Fig. 1

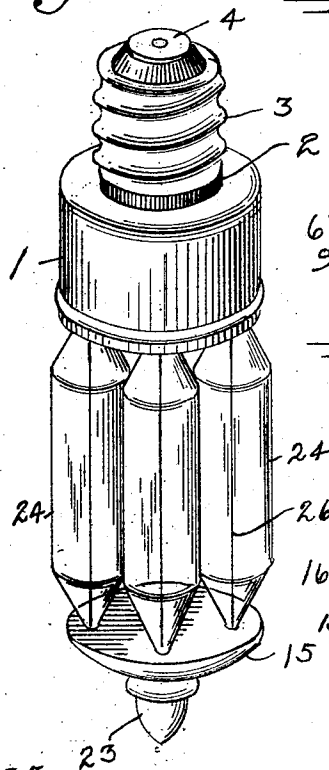


Fig. 4

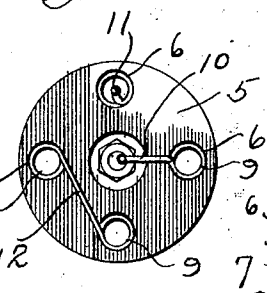


Fig. 5

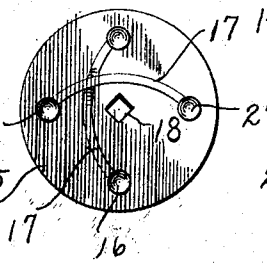


Fig. 2

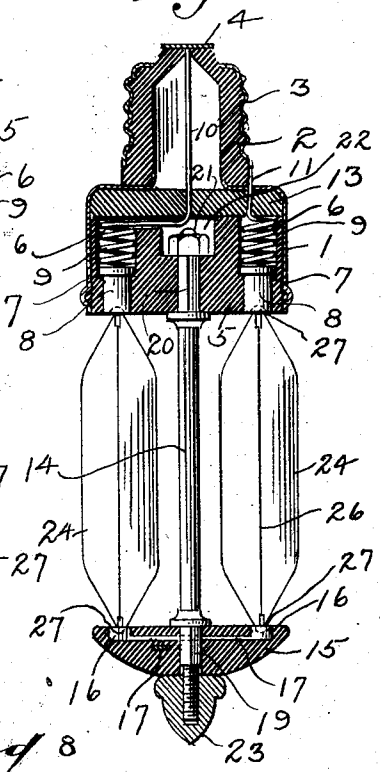


Fig 8

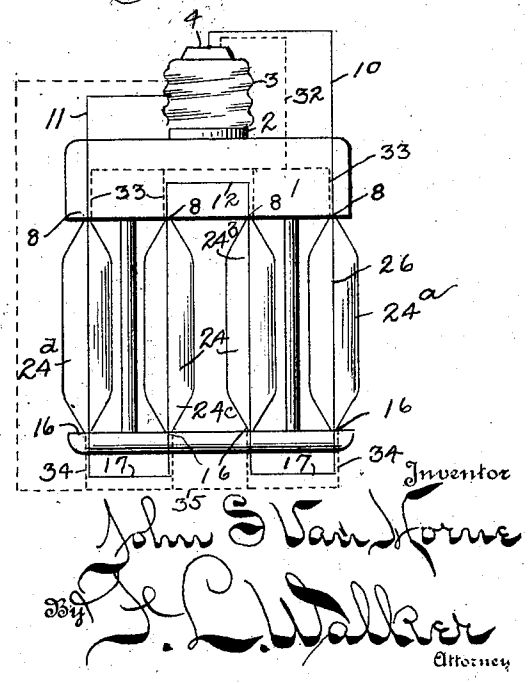


Fig 3

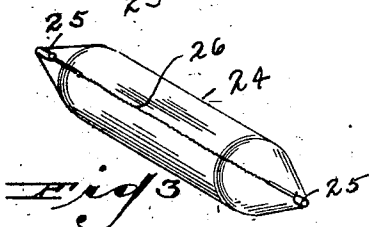


Fig 6

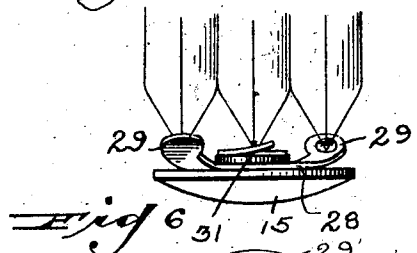
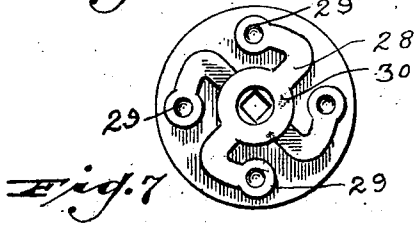


Fig. 7



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UNITED STATES PATENT OFFICE.

JOHN S. VAN HORNE, OF FRANKLIN, OHIO.

INCANDESCENT LAMP.

Application filed July 25, 1922. Serial No. 577,453.

To all whom it may concern:

Be it known that I, JOHN S. VAN HORNE, a citizen of the United States, residing at Franklin, in the county of Warren and State of Ohio, have invented certain new and useful Improvements in Incandescent Lamps, of which the following is a specification.

My invention relates to incandescent electric lamps and more particularly to a sectional lamp having independent interchangeable and replaceable units of fractional capacity.

The invention embodies a holder or support for the interchangeable and replaceable lamp units, having at one end the usual threaded stem or boss for engagement with an ordinary lamp socket and carrying in spaced relation, two sets of circuit terminals or contacts between which the lamp units are detachably engaged preferably though not necessarily by a yielding or spring tension characteristic of the contacts. The replaceable and interchangeable units comprise a simple and inexpensive form of glass bulb or tube closed at its opposite ends and either exhausted or filled with an inert gas and having a lighting filament extending through such unit from one end to the other, and communicating with terminal contacts at opposite ends of the unit tube or bulb. Each holder or support is adapted to contain a plurality of such detachable units, in which they are preferably electrically interconnected in series, but if desired, may be connected in multiple.

The ordinary incandescent electric lamp involves in its construction intricate and expensive manufacturing operations. It necessitates the employment of highly skilled labor in the manufacture and installation of the filament support, with the filament properly disposed thereon. In the event that the lamp is damaged either by being burned out or by accidental breakage of the lighting filament, it is the present practice to discard the entire lamp including the exhausted glass bulb, the filament stand or support, and the metallic threaded base cap all of which may be and in fact usually are intact and in perfect condition. While the monetary value of a single lamp thus discarded because of the destruction of the filament only is comparatively small, the economic waste and loss incident to the discarding of millions of commercial lamps, perfect as to their glass structure, and connections, but deficient only in their filament, is very great.

The object of the present invention is to simplify the structure as well as the means and mode of operation of electric incandescent lamps, whereby they will not only be cheapened in construction, but will be more efficient in use, of sectional character, whereby each section may be independently replaced, of greater durability, and unlikely to get out of repair.

A further object of the invention is to provide in combination with a suitable holder sectional tubes or units, which may be easily and comparatively cheaply manufactured, and which may be discarded without involving the economic loss and waste incident to the discarding of a commercial incandescent lamp of the type now commonly manufactured.

A further object of the invention is to provide a suitable holder or mounting capable of long and repeated use, having few parts capable of getting out of order, with means by which the sectional tubes or units may be readily engaged and disengaged, with minimum effort upon the part of the operator.

While it is recognized that heretofore lamps have been described embodying renewal features, particularly lamps having a number of filaments which may be brought into the circuit alternately, or when one filament is broken or burned out by a suitable adjustment the connection may be made with a second filament, one of the objects of the present invention is to provide a lamp having the filament divided into sections of fractional capacity, whereby any section of the filament may be replaced, thus utilizing the remaining portion of the original filament.

A further object of the invention is to provide a lamp which may be economically manufactured to meet the demand for a wide range of capacities by utilizing similar parts. For instance, a lamp of greater capacity or greater voltage may be provided by substituting units of greater capacity in the same holder or mounting, thus enabling the user to easily and quickly accommodate his lamp to different conditions by the mere substitution of lamp units or tubes of different capacity and enabling the manufacturer to employ the same mounting or holder

for a wide range of different capacity lamps. It also enables the manufacturer to provide lamps of different capacity by increasing or diminishing the number of contacts or terminals provided in each holder or mounting thereby adapting the mounting to a greater or less number of sectional units.

With the above primary and other incidental objects in view as will more fully appear in the specification, the invention consists of the features of construction, the parts and combinations thereof, and the mode of operation or their equivalents as hereinafter described and set forth in the claims.

In the accompanying drawings, wherein is shown the preferred, but obviously not necessarily the only form of embodiment of the invention, Fig. 1 is a perspective view of the assembled sectional incandescent lamp forming the subject matter hereof. Fig. 2 is a vertical sectional view of the assembled lamp structure. Fig. 3 is one of the lamp units or sections removed from the holder or mounting. Fig. 4 is a top plan view of the insulator block containing the yielding lamp circuit contacts. Fig. 5 is a top plan view of the opposite mounting or support disc containing the opposing terminals. Fig. 6 is a diagrammatic view illustrating the circuit connections, the series connections being shown by solid circuit lines, while the multiple connection is illustrated by dotted lines. This figure also illustrates a battery of four units or sections arranged in a lineal group or common plane, side by each. Figs. 7 and 8 are a side elevation and plan view respectively of a modified form of resilient or yielding circuit terminals for detachably engaging the lamp unit or section.

Like parts are indicated by similar characters of reference throughout the several views.

The sectional lamp construction forming the subject matter hereof is adaptable for lamps of either small or large capacity, and may embody a few or many tubes or units. In the present instance, for illustrative purposes, a lamp embodying but four removable sections or units is shown.

The holder or mounting comprises a housing or shell 1, preferably though not necessarily of sheet metal. Supported upon this housing or shell 1, but insulated therefrom by a body 2 of insulating material is the threaded metallic sleeve 3, for interconnection with the usual lamp socket. Carried upon the end of the insulating body 2 is a disc 4, forming one of the connection terminals of the threaded stem or boss, the other of which comprises the corrugated sleeve 3. Located within the housing or shell 1 is an insulating block 5 preferably of porcelain, but which may be of glass, fiber, hard rubber, phenolic condensation materials or other non-electroconductive substance. This insulator head or block 5 is provided with a plurality of spaced holes 6, counterbored to provide an internal shoulder 7. Located in each of the holes 6 is an axially movable plunger 8, having an enlarged head engaging the shoulder 7 to limit its outward movement under the influence of the helical spring 9, located in each of the bores or holes 6. The springs 9 not only afford the yielding or spring tension against which the plungers are yieldable, but also comprises the electrical conductors carrying current to the contact plungers 8 and thence to the sectional tubes or units which are detachably engaged with the plungers.

In the present instance, one of the helical conductor springs is connected through an extension 10, with the contact disc 4 on the end of the threaded connection stem, while another one of these conductor springs 9 is connected through an extension 11 with the corrugated sleeve 3. The other pair of conductor springs 9 located in the remaining two holes 6 of the block 5 are interconnected one with another by an intermediate connection 12. The insulator block 5 containing the depressible contact plunger 8 and spring connection is secured within the housing or shell 1 by cementing or by spinning the edge of the shell over the block or by other suitable means. Before inserting the block within the shell or housing 1, an insulating disc 13 having holes therein for the passage of the connections 10 and 11 is preferably inserted within the housing or shell and forms a closure for the inner ends of the holes 6 insuring electrical insulation of the conductor springs 9 from the metallic shell or housing. Interconnected with the insulator block 5 by means of a strut 14 is a disc or auxiliary head 15 carrying complementary contacts 16 alined with the plunger contacts 8. The disc 15 is of insulating material, preferably of opal glass, sometimes known as "milk" glass, but may be of porcelain, phenolic condensation material, fiber or the like. Inasmuch as this disc is in full view, the material employed is preferably one which will present a pleasing appearance. The disc 15 may be of any ornamental shape or configuration, or may carry any suitable ornamental design. The contacts 16 are embedded in the disc 15 of insulation material and are interconnected one with another into pairs, by intermediate ties 17. These ties are embedded in the material of the disc 15 at separated levels, whereby the respective pairs of contact fingers are insulated or electrically isolated one from the other. The intermediate connections between the contact 16 of each pair are

curved as in Fig. 5 to avoid the central orifice 18 which receives the shank 19 of the strut. The shank 19 of the strut engaged within the disc 15 as well as the shank 20 thereof engaging in the head 5 are polygonal in form. In this instance, they are shown rectangular, engaging in corresponding square holes in the respective members 15 and 5. This feature facilitates the assembly of the holder or mounting, and insures the contacts 8 and 16 being alined with each other. It also prevents the head from accidentally rotating out of such alinement subsequent to assembly. The extremities of the shanks 19 and 20 are reduced and screw threaded. The shank 20 receives a nut 21, seated within a recess or pocket 22 within the insulating block or head 5. The end of the shank 19 is similarly reduced and threaded to receive an ornamental clamp nut 23, by which the disc 15 is secured in its adjusted position.

The detachable lamp sections or units have been shown in the present instance as of cylindrical form, reduced or tapered at their ends. It is to be understood, however, that the shape or configuration of these lamp tubes or separable units may be varied either for ornamental purposes, or to meet different conditions of use or manufacture. Embedded or sealed in each end of the separable lamp tubes 24 is a contact terminal 25. These contact terminals are interconnected by an intermediate illuminating filament 26, which may be of any suitable material, preferably though not at all necessarily of tungsten. In the present instance, the filament 26 extends axially through the tube. While other forms of filament mounting and filaments of different formation may be employed, for economy of manufacture and simplicity of construction, the cylindrical tubular unit with an axially extending filament is to be preferred. These units are readily engaged by applying the contact head 25 at one end, against a yielding plunger 8, and pressing the latter inwardly until the contact 25 at the opposite end of the lamp tube may be seated upon the opposing contact 16. The terminal plungers 8 and opposing terminal contact 16 are preferably slightly concaved or recessed to form sockets as at 27 within which the contacts 25 at the ends of the unit engage. The units are equally as readily disengaged by a slight upward pressure against the yielding contact plunger 8, which permits the disengagement of the lamp unit from the lower contact 16. In Figs. 7 and 8 there is shown a modification wherein the contacts or terminals carried by the disc 15 are yielding in character, enabling stationary contacts to be employed in the head block 5. In this instance, the disc carries two pairs of electroconductive arms 28, the arms being somewhat L-shaped and having at their extremities concave heads 29, forming sockets for the extremities of the lamp unit. The arms 28 are interconnected in pairs by integral collars 30 centrally disposed and insulated one from the other by an interposed collar 31 of insulating material. The arms 28 are flexed away from the disc 15 and are of sufficiently flexible or resilient character that they will yield against pressure to permit the insertion and removal of the lamp tubes 24. The lamp tube terminals 25 make contact with the arms 28, and are interconnected thereby in pairs in the same relation that the contacts 16 are interconnected by the intermediate ties 17.

By insulating the arms 28 of one pair, one from the other, the construction shown in Figs. 7 and 8 may be applied to the head block 5 in lieu of the depressible plungers.

In lieu of arranging the lamp tubes 24 in polygonal or circular grouped formation, they may be alined one with the other in a row as shown in Fig. 6. In Fig. 6 the circuit connections are illustrated and are the same whether applied to a grouped arrangement as in Fig. 1 or to the alined formation as illustrated in Fig. 6. In this circuit the contact disc 4 at the end of the threaded stem or connection is electrically connected through connection 10 with the terminal plunger 8 for the initial tube 24^a of the series. The current passes thence through the filament of the tube to the contact 16, thence through the intermediate conductor 17 to the second contact 16, from which it passes through the filament of the tube 24^b to the plunger 8 pertaining thereto. This plunger being connected through the conductor 12 with a second contact plunger 8 pertaining to the lamp tube 24^c conducts the current to such tube and thence through the filament of the tube 24^c to the corresponding contacts 16 interconnected at 17 with the final terminal 16, with which is engaged the lamp tube 24^d. The contact plunger 8 engaging the opposite end of this tube 24^d is connected through the conductor 11 with the corrugated or threaded sleeve 3 of the connection stem.

In lieu of the series circuit before traced, the lamp tubes may for special construction be interconnected in multiple. Such circuit is illustrated by dotted lines in Fig. 8, wherein the conductor 32 leading from the disc 4 has a number of laterals 33 connecting with the contact plungers 8. The contacts 16 at the opposite ends of the tubes communicate through laterals 34 with a line 35 leading to the corrugated sleeve 3. By such circuit connections each lamp tube will be supplied with current independent of every other tube. In the series connection which is to be preferred, if one lamp unit is damaged, burnt out or broken, no current will pass and all of the tubes of the series will be

extinguished until the damaged or broken tube is replaced.

While as before stated the lamp units or tubes may be of any suitable or desired shape to meet varying conditions of use or convenience of manufacture, or for ornamental purposes, the form of cylindrical lamp tube having reduced or pointed ends, and an axially arranged filament as shown in the drawing is to be preferred. Such a tube may be very economically and cheaply manufactured, thereby providing replacement tubes at a very nominal cost. While these tubes may be independently or separately formed and exhausted or filled as the case may be, they are preferably and most economically manufactured in multiple. To this end, a series of such lamp tubes are formed from a single long piece of glass tubing by subjecting the tubing to heat at intervals, thereby reducing or contracting the tube at regular intervals equivalent to the length of the desired lamp unit. The tube, however, is not completely closed at such contracted intervals, but the succession of bulbs or tubes are left with intercommunicating passages. A continuous length of lighting filament having secured thereto at properly spaced intervals enlargements to form the unit terminals 25 is then introduced through such contracted glass tube and adjusted therein to bring the spaced enlargements within the restricted passages between the succession of bulbs. The continuous strand of filament with its spaced enlargements having been properly positioned the entire tube comprising an extended series of interconnected bulbs or sections is then subjected to exhaustion by suitable suction or vacuum means. By this means the entire series of bulbs or units is exhausted at a single operation. When the proper degree of vacuum has been attained the tubes are separated by fusing or burning off the succeeding tubes at the point of contraction. This fusing or burning off operation causes a further contraction of the glass tubes about the spaced enlargement upon the filament, which forms the terminal contact 25 of the finished tube, finally sealing such contacts or enlarged portions within the wall of the exhausted tube. As each tube is burned off or separated, the enlargement upon the filament is also divided, leaving a portion in each of the adjacent ends of succeeding tubes and leaving the tubes hermetically sealed. As at present advised, this method of manufacture of lamp tubes will form the subject matter of a separate application for Letters Patent. In lieu of the depressible contacts, the contacts may be fixed and the units engaged and disengaged by adjustment of the clamp nut 23.

From the above description it will be apparent that there is thus provided a device of the character described possessing the particular features of advantage before enumerated as desirable, but which obviously is susceptible of modification in its form, proportions, detail construction and arrangement of parts without departing from the principle involved or sacrificing any of its advantages.

While in order to comply with the statute the invention has been described in language more or less specific as to structural features, it is to be understood that the invention is not limited to the specific details shown, but that the means and construction herein disclosed comprises the preferred form of several modes of putting the invention into effect, and the invention is therefore claimed in any of its forms or modifications within the legitimate and valid scope of the appended claims.

Having thus described my invention, I claim:

1. A cluster lamp comprising a plug member having an enlarged head, a second head located in parallel spaced relation with the first head, a rod fixedly connecting the heads one with the other, a plurality of contacts carried upon the adjacent faces of the said heads, the contacts of one of the heads being yieldingly mounted, and a plurality of independent lamp units located intermediate the heads and having terminal abutting engagement at their opposite ends upon the contacts carried by the respective heads.

2. A cluster lamp including a mounting consisting of two discs concentrically disposed in parallel spaced relation, a centrally disposed rod fixedly connecting the discs one to the other, a threaded plug projecting from the outer face of one of the discs, a plurality of oppositely disposed relatively movable contacts located upon the adjacent faces of the respective discs and wholly within the peripheries thereof, and a series of independent lamp units clamped between the contacts carried by the respective discs with which they have terminal abutting engagement.

3. A cluster lamp comprising a pair of spaced heads located in parallel concentric relation, a rod detachably connected with the respective heads for maintaining said heads immovably in their relation with each other, oppositely disposed electrical contacts carried by the respective heads upon the inner or adjacent faces thereof, and a plurality of independent lamp units clamped between the discs and having terminal abutting engagement with the contacts carried thereby, one of said heads including a threaded attachment plug.

4. A cluster lamp comprising a pair of spaced heads interconnected one with the other, a threaded plug projecting from the

exterior face of one of the heads, a plurality of substantially Z shaped spring arms transversely arranged in relation with each other upon the inner face of one of the heads, a series of contacts located upon the inner face of the opposite head in positions opposite the extremities of the Z arms, and a plurality of lamp units interposed between the heads and abutting at one end upon said contacts and at their opposite ends upon the extremities of the Z arms and clamped in such position by the inherent tension of the Z arms.

In testimony whereof, I have hereunto set my hand this 20th day of July A. D. 1922.

JOHN S. VAN HORNE.