July 4, 1939. F. H. A. BRANDT 2,164,307

DISCHARGE DEVICE

Filed Oct. 26, 1937 4 Sheets-Sheet 1

Fig. 5.

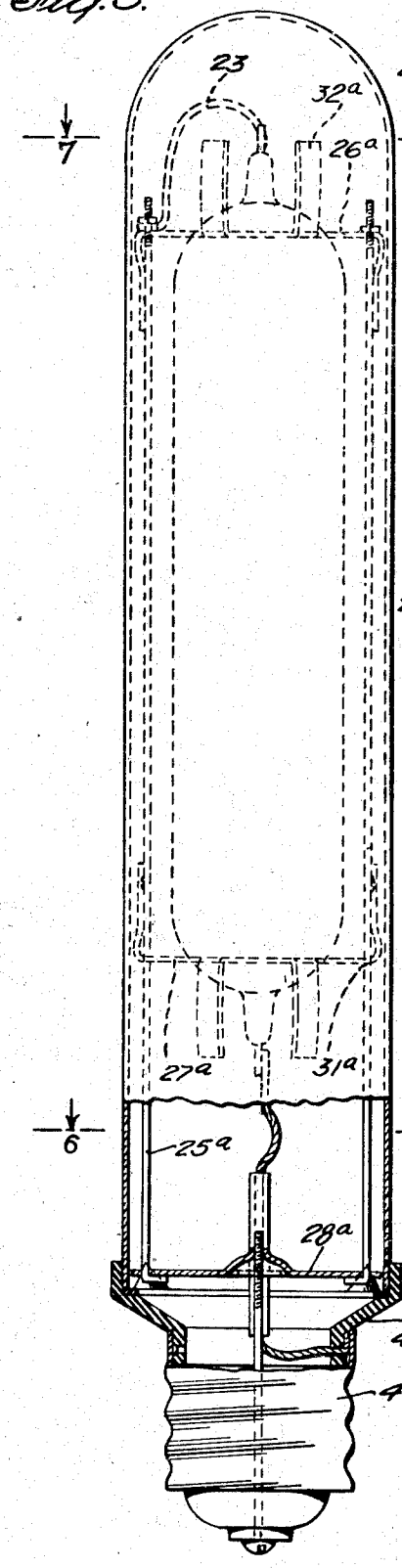
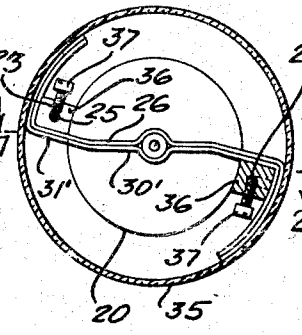


Fig. 2.



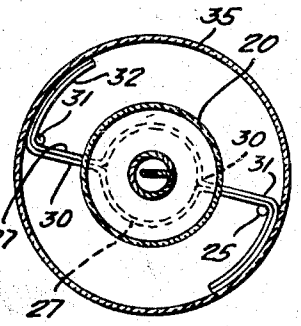


Fig. 3.

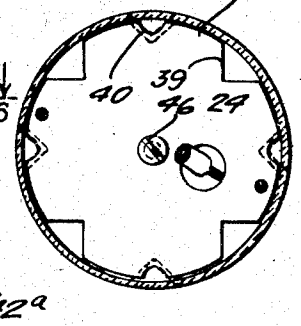
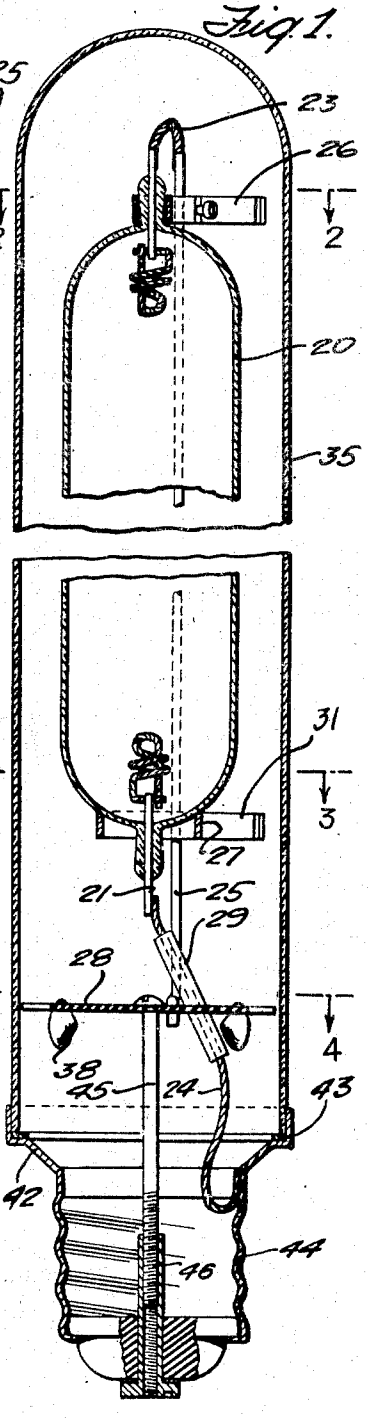


Fig. 4.

Fig. 1.



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Fig. 12.

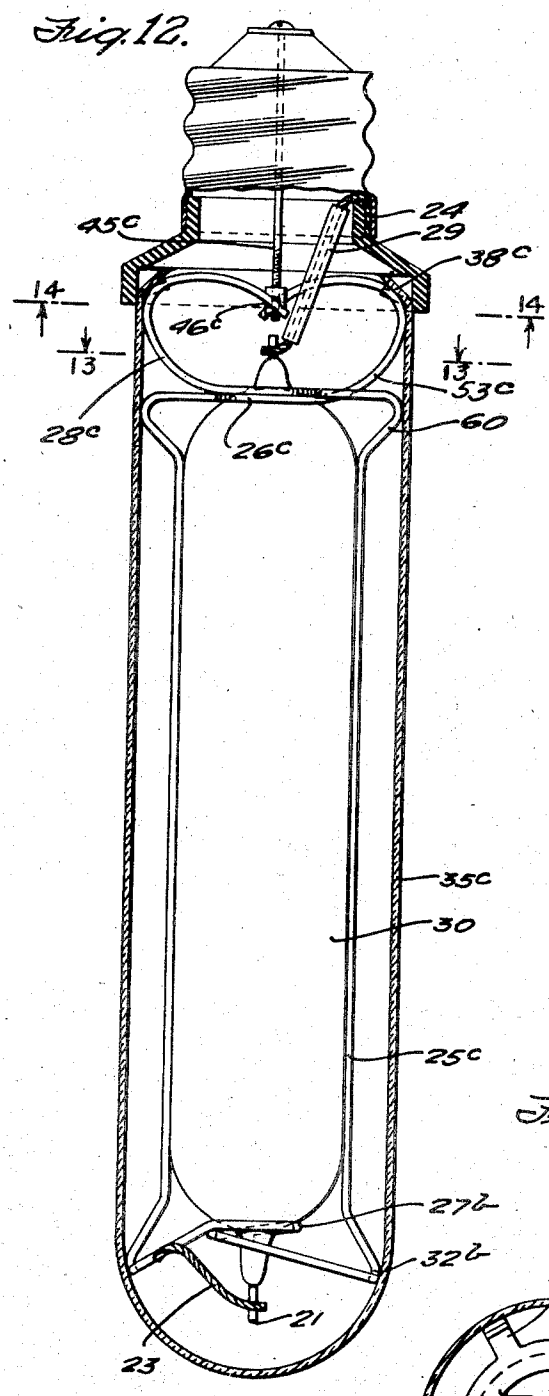


Fig. 13.

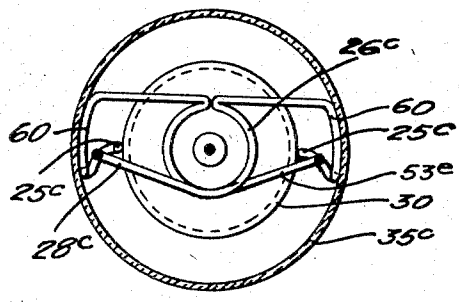


Fig. 14.

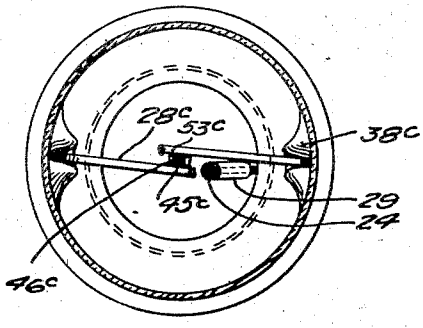


Fig. 6.

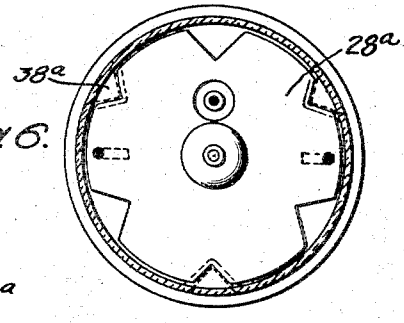
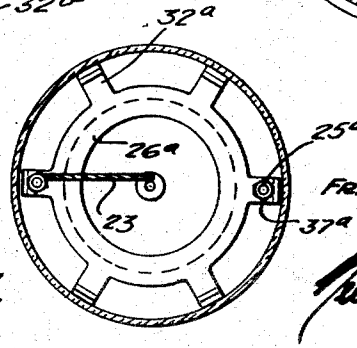


Fig. 7.



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Fig. 8.

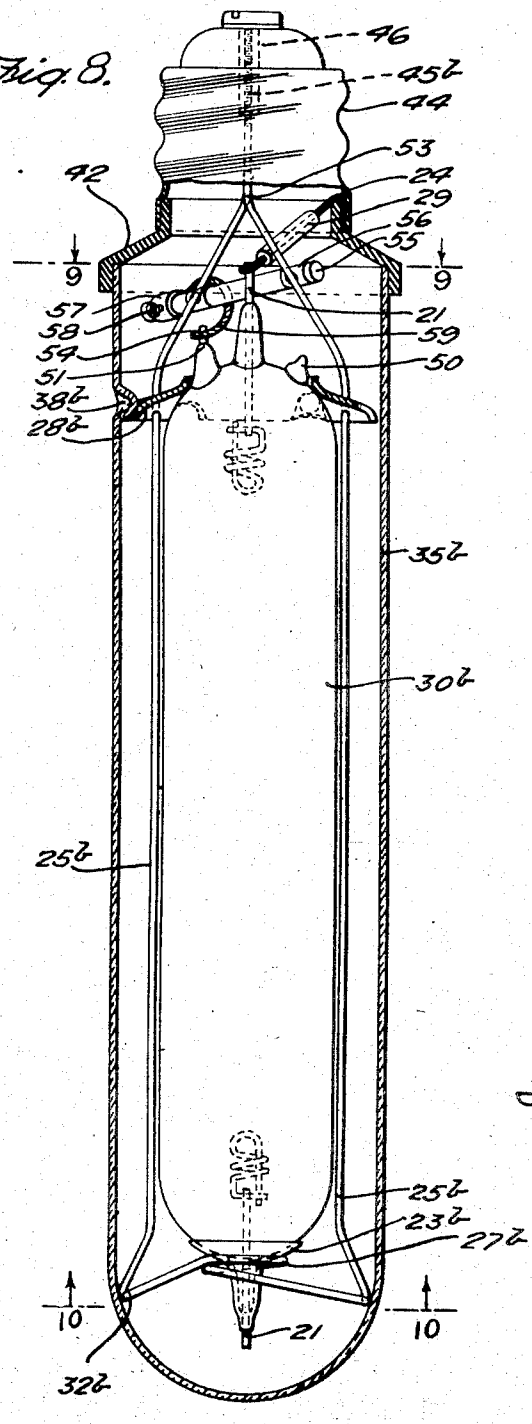


Fig. 9.

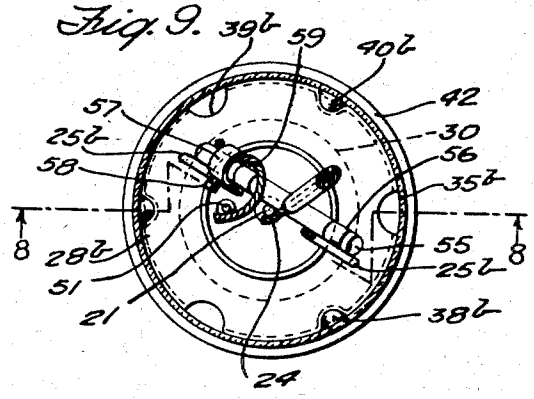


Fig. 10.

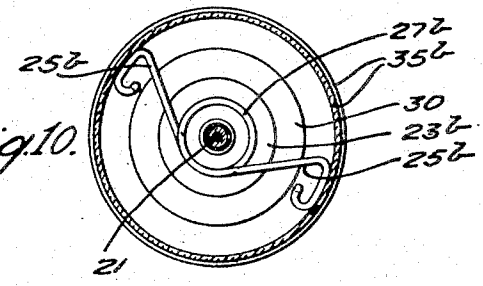
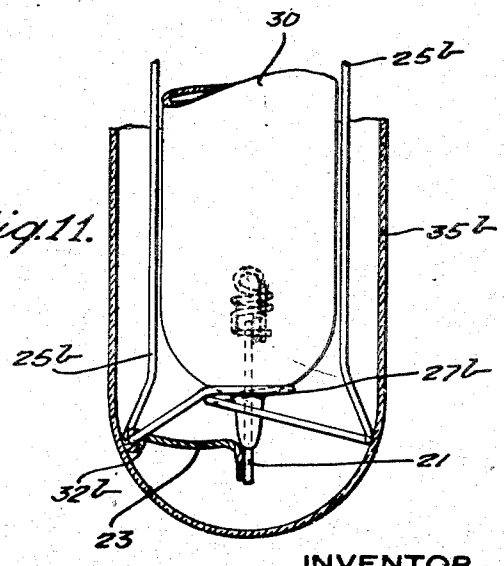


Fig. 11.



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Fig. 15.

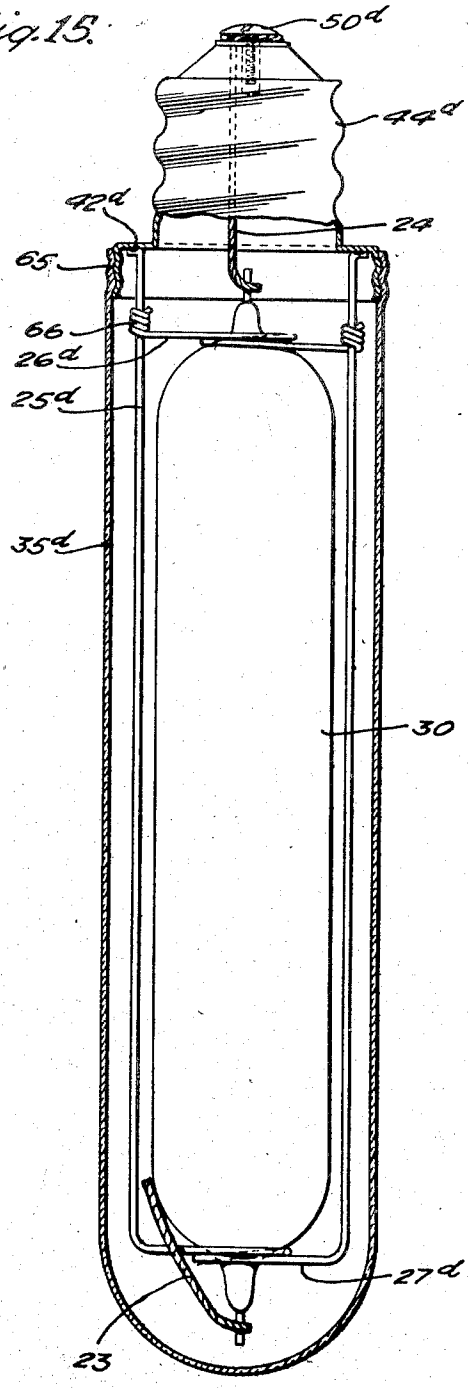
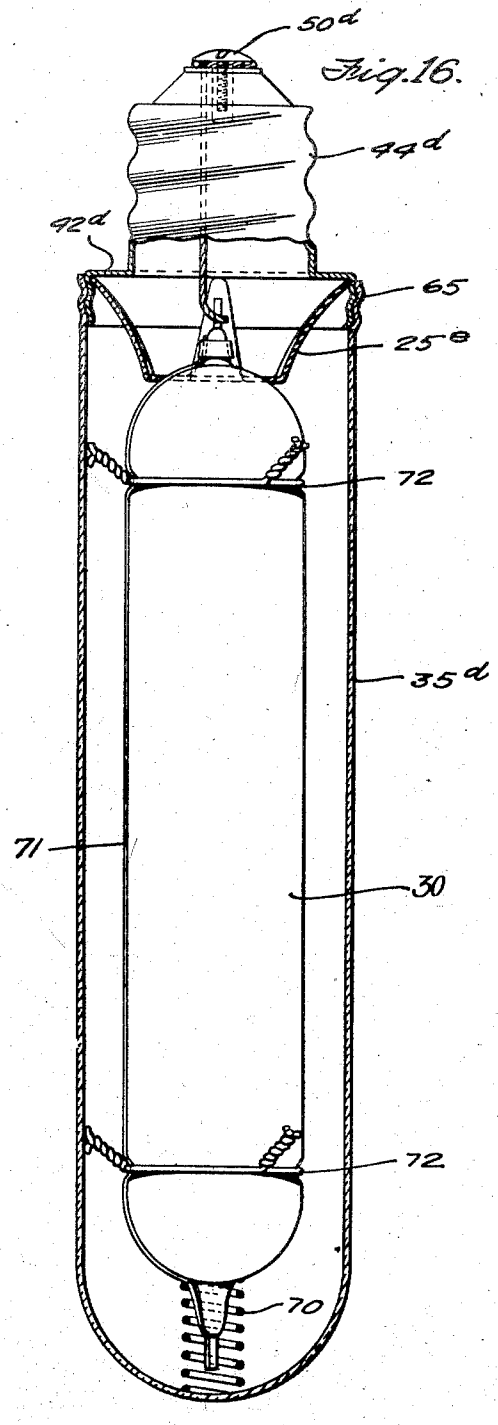


Fig. 16.



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Patented July 4, 1939

2,164,307

UNITED STATES PATENT OFFICE

2,164,307

DISCHARGE DEVICE

Friederich H. A. Brandt, New York, N. Y.

Application October 26, 1937, Serial No. 171,050

12 Claims. (Cl. 176—122)

This invention relates to a gaseous electrical discharge device; more particularly to a device of the type in which the envelope in which the discharge occurs is enclosed within a protective jacket.

Prior to my invention it has become customary, particularly in high temperature discharge lamps, e. g., the high intensity high pressure mercury arc lamps which have recently come into wide commercial use, to mount the discharge envelope upon a frame within a protective jacket. It has been common practice to manufacture this protective jacket substantially according to the methods and practice established in the manufacture of incandescent lamps supporting the frame by means of wires sealed into a pressed seal in substantially the same way that the filament support wires of incandescent lamps are mounted. Such a construction is expensive and its usefulness is terminated when the inner lamp is damaged or burned out.

It is an object of my present invention to provide a jacket and mounting for such discharge devices which will be simpler and less expensive than the mountings now in common use.

Another object of my invention is to provide a mounting capable of quick and easy removal from the jacket, whereby a burnt out or damaged discharge tube can be quickly replaced without the necessity of replacing the jacket and mounting.

Another object of the invention is to improve the thermal and electrical conditions to which the discharge tube is subjected during starting and operation.

With these objects in view my present invention contemplates the use of an open ended jacket with a connector base over the open end of the jacket and removable clamping means for securing the base on the jacket which means is releasable from the outside of the jaacket so that the assembly can be locked together when assembled or released for replacement of a discharge tube and advantageously there is provided also a frame for supporting the discharge tube within the jacket which is adapted to be releasably assembled with the jacket so that it can be inserted into and removed from the jacket as a unit and which, moreover, may with advantage be connected to or mounted upon a part of the base or the clamping means so as to be held positioned within the envelope when the base is clamped on the end of the jacket.

In the accompanying drawings I have shown several preferred embodiments of my invention and various modifications thereof. It is to be understood that these are not intended to be exhaustive or limiting of the invention but on the contrary are chosen with a view to instructing others skilled in the art so full as to the principles of the invention and the best manner of embodying it in practice that others will be readily able to adopt it and modify it and to embody it in numerous other forms each as may be best suited to the requirements of a particular use.

In these drawings:

Fig. 1 is a view in vertical section of a high pressure mercury vapor lamp embodying my invention;

Figs. 2, 3 and 4 are views in transverse section taken respectively on lines 2—2, 3—3 and 4—4 of Fig. 1;

Fig. 5 is a view partly in axial section and partly a phantom elevation showing another preferred embodiment of my invention;

Figs. 6 and 7 are sectional views similar respectively to those of Figs. 2 and 4 but showing the modified form of Fig. 5;

Fig. 8 is a view similar to Fig. 2 but showing another embodiment of the invention;

Figs. 9 and 10 are transverse sectional views taken on lines 9—9 and 10—10 of Fig. 8;

Fig. 11 is a fragmentary view corresponding to the lower end of Fig. 8 but illustrating a modification thereof;

Fig. 12 is a sectional view similar to Fig. 1 but showing another embodiment of the invention;

Figs. 13 and 14 are transverse sections taken on lines 13—13 and 14—14 respectively of Fig. 12; and

Figs. 15 and 16 respectively are sectional views similar to Fig. 1 showing other embodiments of the invention.

Referring first to Figs. 1 to 4, the lamp there shown comprises an inner discharge tube 20 which comprises a sealed envelope of refractory glass or quartz or other suitable material with the electrode lead-in wires 21 sealed through the ends thereof and each having an activated self-heating arcing electrode secured thereon. These electrodes may, for example, be of a type described and claimed in a copending application of Hans J. Spanner, Serial No. 130,872, filed March 15, 1937, or in the Patent No. 2,073,885, dated March 16, 1937. Within the envelope is a filling adapted to provide a gaseous atmosphere for the discharge. In the case of the high pressure mercury vapor arc the filling will advantageously be argon at a pressure in a range about 14 mm. and

an amount of mercury measured to provide when fully evaporated a pressure of about one atmosphere or more, which is equivalent to an operating voltage drop efficiently provided by the circuit for which the lamp is designed.

The seals by which the electrode wires 21 are sealed through the wall of the envelope 20 are advantageously of the type described and claimed in my copending application, Serial No. 135,214, filed April 6, 1937.

To each of the electrode wires 21 when the lamp is made there is welded a flexible conductor 23 or 24, advantageously of stranded nickel wire.

This discharge tube is mounted on a frame which consists of the longitudinal wires 25 and the transverse members 26 and 27 and a clamping plate 28. This frame constitutes a loop longitudinally around the discharge tube 20. The transverse member 27 is, in this preferred example, as best illustrated in Fig. 3, formed of a pair of nickel ribbons, spot welded at the points 30 and 31 and having the extensions 32 which serve as spring-fingers to engage the inner wall of the jacket 35 and hold the discharge tube 20 resiliently positioned within the jacket.

The outer transverse member 26 in the preferred example as most clearly shown in Fig. 2 is also formed of a pair of nickel ribbons similarly spot welded at the points 30' and 31'. In this case, however, instead of being welded directly to the longitudinal wires 25 they are welded to clamping blocks 36. These blocks, as clearly shown, are drilled for the reception of the wires 25 and are slidable on them, being held rigidly in position by means of the set screws 37. In addition to this the block 36' has an elliptical slot instead of one fitted to the wire 25; and beside the wire through this slot is inserted the end of the flexible connection 23 so that, when the set screw 37 is driven down, the connection 23 is clamped against the wire 25 and electrical connection is thus made between the outer electrode and the frame. The frame may be wholly or partly made of materials other than nickel; but, of course, should be sufficiently refractory so that it is not softened, corroded or otherwise damaged by the heat to which it is subjected or the air to which it is exposed within the jacket

In assembling the frame and discharge tube, the tube is first inserted through the inner transverse member 27, and the outer transverse member 26 is then slipped over the ends of the discharge tube and the ends of the wires 25. The free end of the flexible connection 23 is inserted into the opening in the block 36' and, with the transverse member 26 pushed down firmly against the top of the tube, the set screws 37 are driven tightly into position to hold the transverse member securely on the members 25.

This assembly together with the clamping plate 28 which is secured to the bottom of the wires 25 is then inserted longitudinally into the jacket 35 until the plate 28 is above the projection 38 in the wall of the tube. During the insertion the plate 28 readily passes the projections 38 by reason of the larger notches 39. Once the plate 28 is inserted beyond the projections 38 it is then turned so as to bring the smaller notches 40 into alignment with the projections. The end of the flexible connection 24 is pulled out through an opening in the plate 28 and an insulating tube 29 is slipped over it to insulate it from the plate 28. The end is then turned over the edge of the jacket 35 where it will be contacted by the flared skirt 42 of the connector base 44 and will be clamped between it and the jacket 35.

Finally the female screw 46 inserted through the center of the connector base 44 is screwed into the bolt 45 in the resilient metal plate 28 thus drawing the plate tightly against the projections 38 and on the other hand drawing the connector base tightly against the open end of the jacket 35. Thus the entire assembly is held clamped securely in assembled relation as shown.

When it is desired to replace the tube it is only necessary to remove the lamp from the socket, unscrew the screw 46, turn the plate 28 to align the larger notches 39 with the projections 38, remove the tube and frame assembly from the jacket, release the set screws 37, remove the transverse member 26, remove the tube 20 from the frame and repeat the assembly as just described above, using, of course, a replacement tube.

The construction shown in Figs. 5 to 7 is similar to that described above except that instead of using a skirt 42 on the base 44 a separate insulating ring 42*a* is used with a standard mogul screw base 44*a*. Again, instead of using the nickel ribbon cross members 26—27, I have used in this case sheet nickel stampings consisting of flat rings 26*a* and 27*a* with fingers 32*a* bent up and down to give resilient contact with the jacket 35 and the frame members 25*a*. At the inner end of the envelope the member 27*a* is fixed in the frame by welding at 31*a* to the frame members 25*a*. The outer cross member 27, however, is slidably mounted on the members 25*a* and is clamped against the end of the envelope by the nuts 37*a*. The connection 23 is likewise clamped in contact with the frame by winding it under one of the nuts 37*a* before the latter is screwed down against the cross member 27*a*.

In the embodiment of Figs. 5 to 7 I have used only three projections 38*a* and corresponding notches 39 and 40. This is an advantage both because it removes less metal from the washer 28*a* and also because it produces better centering and less strain on the projections 38*a*.

The disk 28*a* is provided with a rounded projection at the central threaded opening. This gives the disk greater rigidity and tends to make it more secure on the threads of the bolt 45.

In Figs. 8, 9 and 10 I have shown another embodiment of my invention. The structure shown in these figures is substantially similar to that shown in Figs. 1 to 7, and I have indicated corresponding parts by corresponding reference characters. In this case, however, instead of having the dents 38 at the end of the jacket 35, I have positioned the dents 38*b* a substantial distance from the end and the locking disk 28*b* is provided with a central opening sufficiently large to receive the seals for the lead-in wires and any other projections, as for example, the pumping tip 50 and the seal 51 for an auxiliary starting electrode, both on the end of the envelope.

Where an auxiliary electrode is sealed through this end of the tube and a pumping tip is left as shown, this requires a relatively large opening in the disk 28b and in order to give this disk sufficient strength, therefore, I have made it in the form of a punching, as shown most clearly in Fig. 8, with the edge adjacent the central opening turned up so as to provide additional rigidity and strength. As there shown also, I have in this case formed the edges of the notches 39*b* and 40*b* in a similar manner, which not only adds to the strength of the disk 28, but provides a

rounded surface of contact with the projections **38b**, thereby reducing any tendency to crush the glass at the point of contact.

The remainder of the frame is formed of a single looped wire extending substantially straight along the sides of the envelope as shown at **25b** and provided with a pair of shoulders at **32b** to engage the sides of the jacket **35b** and a loop at **27b** to embrace the end of the inner envelope **30b**. The upper ends of this wire frame are brought together in a V and spot welded at **53** with one wire extending beyond the weld and threaded, as indicated at **45b** to form a clamping bolt which is engaged by the female screw **46**.

A stranded wire conductor **24** welded to the outer end of the lead-in wire **21** is brought over the edge of the washer **42** where it is engaged by and makes electrical contact with the connector base **44**. A glass tube **29** insulates the connecting wire **24** from the frame and other electrical parts.

At the lower end of the envelope **30b** there is provided a nickel cap **23b** substantially fitted to the shape of the envelope and having its lower end welded to the electrode lead-wire **21**. This cap **23b**, therefore, serves to conduct the electrical current from the loop **27b** of the frame which is pressed against it to the lead-in wire **21** and through it to the electrodes within the lamp.

This embodiment of my invention is very simple and rugged in use. When the lamp is assembled, the disk **28b** is pulled upward in the loop along the side members of the frame **25b** until the distance between it and the loop **27b** is at least equal to the distance between the base of the seal at the lower end of the envelope **30b** and the tip of the electrode in-lead **21** at the upper end of the envelope. The envelope is then inserted by fitting the lower seal through the loop **27b** with its cap **23b** against the loop **27b**. The envelope is then swung into parallel position between the side members **25b** and the disk **28b** is pressed down over the end of the envelope until it is in a clamping position.

The friction of the side members of the frame **25b** in the holes in which they pass through the disk **28b** is sufficient to hold the parts in this assembled relationship. The assembly is then inserted into the jacket **35b** with the notches **39b** aligned with the projections **38b** on the side of the jacket. As soon as the disc **28b** is beyond the projections **38b**, the assembly may be rotated sufficiently to align the projections **38b** with the smaller notches **40b**. The insulating washer **42** is then put in position and the connecting wire **24** is drawn over its edge; the connector base **44** is fitted onto the neck of the washer **42**; and finally the female screw **46** is inserted through the center of the base **44** and engaged with the threaded end **45b** of the frame and screwed thereon until the parts are all securely clamped together.

It is an advantage of this construction that the nickel cap **23b** serves not only as an electrical conductor but also as a thermal reflector at the lower end of the envelope, which otherwise tends to be the coolest portion of the envelope and in which the condensed mercury would tend to collect. Thus this cap serves to improve the operation of the lamp by hastening the heating up and avoiding excessive cooling at this lowest point during operation. Also the contact between this cap and the metal frame **27b** serves to heat the end of the envelope by conduction from the sides adjacent the arc path. Likewise, after the lamp is extinguished the thermal contact between the nickel cap and the frame serves to dissipate heat from the end, and thereby to hasten the condensation of mercury which is necessary for restarting when, for any reason, the lamp is temporarily extinguished.

The disk **28b** likewise serves an important function during the operation of the lamp in that it constitutes a convection barrier. Without such a barrier the convection currents tend to flow upward along the envelope **30b** cooling the bottom of the envelope and heating the top and, especially when the lamp is burned in the base-up position as shown, such convection currents tend to overheat the connector base. The disk **28b**, as shown in Fig. 8, presents a barrier to these convection currents deflecting them from the upper end of the envelope outward against the jacket where they are cooled and returned to the bottom of the lamp. The draft in the jacket is thus divided, and thus, both the cooling of the bottom of the lamp and the overheating of the seal for the electrode in-lead and of the connector base are substantially reduced.

When an auxiliary electrode is used, as shown at **51**, the V portion of the frame provides a convenient mounting for a resistor **55** which is connected in series with the auxiliary electrode to limit the current loss through the auxiliary discharge. As shown in this figure the resistor **55** is mounted in bands **56** and **57**. The band **56** surrounds one end of the resistor **55** and is welded to the frame member **25b**, and thereby electrically connect one terminal of the resistor to the frame. The other band **57** holds the resistor mechanically on the frame but is electrically insulated. At the opposite end of the resistor a band is provided with a set screw **58** and a sufficient clearance to allow the stranded conductor **59** to be clamped between it and the set screw **58**. The opposite end of this stranded conductor **59** is welded to the in-lead **54** for the auxiliary electrode. Thus a connection is made between the auxiliary electrode and the center contact of the connector base through the frame **25b**, the band **56**, the resistor **55**, the connector **58**, the stranded conductor **59** and the in-lead **54**.

In Fig. 11, I have shown a modification of the construction shown in Figs. 8–10, in which, instead of the nickel cap **23b**, a stranded conductor **23** is welded to the lower in-lead **21** and this conductor wire is wrapped around the shoulder **32b** so as to be clamped against the frame by the pressure of the shoulder **32b** against the inside of the jacket **35b**.

In Figs. 12, 13 and 14 there is shown another convenient construction. In this case the frame **25c** is made of a single looped wire. The lower end of this frame, as shown, may be made with a closed loop similar to that shown at **27b** in Fig. 10, or with a re-entrant or U-shaped loop preferably with the adjacent ends of the U pushed together to form a substantially closed loop like that used at the top of this frame. Near this loop the frame is formed with shoulders **32b** substantially similar to those shown in Figs. 8 and 10. The side members **25c** are preferably close to the envelope, as shown, and near the upper end of the envelope the frame extends outwardly again to form shoulders **60** similar to the shoulders **32b** which contact with the sides of the jacket **35b**. The wire of the frame then turns inwardly from these shoulders **60** each side forming, as most clearly shown in Fig. 13, a part of a loop **26c** which engages the upper end of the envelope.

The ends of the wires then extend in a loop 28c, as clearly shown in Fig. 12, terminating in the weld 53c with a nut 46c welded between the ends, engages the clamping bolt 45c.

The jacket 35c is formed with grooved shelves 38c instead of the projections as in the other embodiments discussed above. The grooves in these shelves are adapted to engage the sides of the looped upper end of the frame to hold it both against twisting in the jacket away from the shelves 38c and against pulling longitudinally out from the jacket 35c. By reason of the concave form of the loop 28c, the pull on the nut 46c exerted by the bolt 45c serves to expand the looped end of the frame against the grooved shelves 38c, and this prevents the frame from collapsing and pulling over these shelves. This arrangement provides a substantial mechanical advantage against the glass, and it is important that this should not be allowed to be so great as to cause breakage of the jacket when the parts are assembled.

In the use of this embodiment of the invention the envelope is first inserted through the loop 27c in the same manner as already described in connection with Fig. 8. The upper end of the frame is then pressed so as to open the loop 26c to allow the upper electrode seal to pass into the loop. The frame is made so that when relaxed the spacing between the loops 26c and 27b is slightly less than the length of the envelope so that when the envelope is slipped into position the frame is slightly sprung and the envelope held resiliently in position. The stranded conductor 23 is then wrapped around the shoulder 32b, as already described in connection with Fig. 11, and the assembly is inserted into the jacket 35c with the shoulders 60 and the upper looped portion 28c of the frame at an angle to the shelves 38c so that they pass readily into the envelope. When this loop 28c is beyond the shelves 38c, the assembly is rotated to bring the loop 28c of the frame into alignment with the grooves in the shelves 38c and thereby the frame is locked into the jacket 35c.

The insulating washer 42 is next put into position and the end of the stranded wire 24 is folded over its edge, and finally the connector base 44 is put into position and the entire assembly clamped together by means of the bolt 45c.

It is an advantage of this construction that, once the frame is inserted into the jacket, the loop 26c is locked in its closed position and thereby the envelope 30 is held securely in the frame, whereas, as soon as the frame is removed from the jacket and the shoulders 60 are thereby released the frame can be spread and the loop 26c may be opened to release the envelope 30 from the frame.

In the embodiment of the invention shown in Fig. 15 the connector base 44d is provided with a wide flange 42d at the edge of which is a threaded portion 65. The jacket 35d is provided at its upper end with a threaded portion corresponding to the thread 65 on the base so that the jacket and base may be screwed together.

The frame 25d in this case, instead of merely being clamped within the jacket is secured, e. g., by welding, to the flange 42d of the base 44d and is made so that the envelope 30 is removably engaged within this frame.

In the case shown in Fig. 15 the frame consists of a simple looped wire 25d having at its lower end a closed loop 27d into which the end of the envelope 30 is fitted. The sides of the frame are straight and on them is fitted a cross member 26d which is provided with a loop corresponding to the loop 27d and at its ends is closely wound around the sides of the frame 25d as shown at 66.

In the use of this embodiment the envelope 30 is first mounted within the frame by inserting the lower end into the loop 27d, pushing the cross member 26d along the side members 25d toward the base swinging the envelope 30 into parallel relation between the side members 25d, and then pressing the cross member 26d down over the end of the envelope into clamping relationship. By virtue of the coils 66 a secure frictional engagement may be had for holding the parts in this relationship merely by pressing the coil 66 downward beyond the position which is naturally assumed when the member 26d first contacts the top of the envelope. The resilient twisting of the coils 66 which results from this deformation of the member 26d gives a frictional engagement with the frame 25d and holds the cross member against sliding upward.

The stranded conductor 23 connected to the lower in-lead wire is, as shown, engaged between the loop 27d and the envelope and thereby holds electrical connection with the frame. The stranded conductor 24 between the upper in-lead and the center contact of the base is drawn through a hole in the center contact and engaged under the set screw 50d. Finally the jacket 35d is slipped over the other parts and screwed onto the threaded portion 65 of the base.

In Fig. 16, a similar arrangement is shown in that the jacket is screwed onto the base at 65. The base and its method of connection to the stranded conductor 24 may be substantially the same as in the embodiment illustrated in Fig. 15. In this case, however, instead of a frame secured to the base, a simple resilient spider 25e is used to engage the upper end of the envelope, whereas the lower end of the envelope is held positioned in the jacket 35d by means of the helical spring 70. Since in this case there is no longitudinal frame to conduct the current from the lower electrode back to the connector base, there is provided in this case a metal ribbon 71, which is preferably insulated from the surface of the glass, e. g., by a strip of mica beneath it or by an enamel or other insulating coating, e. g., the strip may be made of aluminum or nickel heavily oxidized to provide an insulating coating of the oxide. This strip may be held in position, e. g., by means of the circumferential wires 72 and these should advantageously be insulated either from the strip 71 or from the glass of the envelope, e. g., in the same manner that the strip 71 is insulated. The end of the strip 71 passes between the envelope and the resilient spider 25e and its outer surface at this point exposes the bare metal whereby to form a pressed electrical connection with the spider 25e and through it with the shell of the connector base 44d.

In the use of this embodiment of my invention the spider 25e is fitted into the base. The stranded conductor 24 is then inserted through the opening in the base and secured by the set screw 50d. The envelope 30 is fitted onto the spider 25e, and the spring 70 onto its other end. Finally the envelope 35d is fitted over this assembly and screwed onto the base at 65.

What I claim is:

1. A lamp comprising a gaseous discharge tube, a light permeable open ended jacket adapted to receive and protect the discharge tube and having approximately cylindrical form from the open

end to the opposite end of the discharge tube, and having inwardly directed projections on its wall near the open end, a frame for supporting the discharge tube in the jacket having means to engage the jacket for positioning the frame therein, at least one longitudinal member, transverse members mounted on the longitudinal member and engaging the ends of the discharge tube and movable longitudinally relative to one another for insertion and removal of a discharge tube between them and means for holding the transverse members on the longitudinal member to prevent such relative movement, said frame with the discharge tube mounted therein being movable as a unit and dimensioned for insertion into and removed from the open end of said jacket, a resilient disk in the jacket having peripheral notches adapted to pass the projection on the jacket and lesser notches adapted to engage said projections and lock the disk thereon against turning and against longitudinal removal, an insulating collar over the open end of the jacket having a flange adapted to fit a connector base, a connector base on said flange, a bolt connecting the connector base to said disk to hold the connector base and through it said washer in place on the jacket, and means for connecting contacts of the connector base to the discharge tube.

2. A lamp comprising a gaseous discharge tube, a light permeable open ended jacket adapted to receive and protect the discharge tube and having means on its wall to engage a frame and hold it against longitudinal withdrawal, a frame for supporting the discharge tube in the jacket having means to engage the jacket and means to engage the tube whereby to position the tube in the jacket, a connector base on the open end of the jacket, means connecting the connector base to said jacket to hold the connector base thereon, and means for connecting contacts of the connector base to the discharge tube.

3. A lamp as defined in claim 1 in which the ends of the tube are provided with flexible conductors one of which is connected to the frame by releasable clamping means, and through the frame and the connecting bolt to the center contact of an Edison type base, and the other conductor at the other end of the tube is extended between the shell of the base and the insulating collar and is clamped therein in electrical contact with said shell by the action of said bolt on said base.

4. A lamp as defined in claim 2 in which the frame is adapted to engage and hold the discharge tube and is dimensioned to fit snugly into the jacket whereby the frame and tube may be inserted into and removed from the jacket as a unit and the means connecting the connector base to the jacket is adapted to secure the frame against longitudinal movement in the jacket.

5. A lamp comprising a gaseous discharge tube, a light permeable open ended jacket adapted to receive and protect the discharge tube, a frame for supporting the discharge tube in the jacket, an outwardly directed connector base mounted upon the open end of said jacket for connecting the lamp to a source of current, means to secure said base removably on said jacket, whereby the lamp may be supported by said connector base, means adapted removably to connect the contact elements of the connector base to the electrodes of the discharge tube, and means to position said frame removably in said jacket.

6. In combination with a jacket having a removable closure and a discharge tube therein, a frame for mounting the discharge tube which comprises a substantially rigid wire forming a longitudinal loop along the tube and transverse members associated with said loop adapted to embrace respectively the ends of the tube so as to hold the tube between them, and at least one of said transverse members being movable within the loop toward and away from the other for engagement with and release from the tube ends.

7. A frame for mounting a discharge tube which comprises a substantially rigid wire forming a longitudinal loop along the tube and transverse members associated with said loop adapted to embrace respectively the ends of the tube so as to hold the tube between them, at least one of the transverse members being slidable on the sides of the loop and having thereon means to engage said loop for locking said member at any desired position on said loop.

8. A frame for mounting a discharge tube which comprises a substantially rigid wire forming a longitudinal loop along the tube and transverse members associated with said loop adapted to embrace respectively the ends of the tube so as to hold the tube between them, at least one of the transverse members being an integral part of the loop and having formed centrally thereof a re-entrant loop adapted to receive a relatively small part of the end of the tube and normally closed therearound by lateral compression of the sides of the loop but adapted to open by resilient separation of said sides of the loop and thus to permit removal of the tube therefrom.

9. A frame for mounting a discharge tube which comprises a substantially rigid wire forming a longitudinal loop along the tube and transverse members associated with said loop adapted to embrace respectively the ends of the tube so as to hold the tube between them, at least one of said transverse members being movable within the loop toward and away from the other for engagement with and release from the tube ends, and in which the transverse member which is movable comprises a plate adapted to engage the jacket so that when pulled longitudinally against the jacket it serves to position the tube therein both longitudinally and transversely and the other transverse member comprises an integral end of the loop bent inwardly near its center part toward said plate and resilient, whereby when tension is put on the loop against a discharge tube the sides of the loop will be forced outwardly against the sides of the jacket.

10. In a lamp the combination of an open ended vitreous envelope having internal projections formed therein, a connector base fitted over the open end of said envelope, and clamping means engaging said projections inside said envelope and also engaging said base to clamp the base onto the open end of the envelope and said clamping means being adjustable and releasable from outside of the base.

11. The combination as defined in claim 10 in which the clamping means engaging the projections is a resilient disk having notches in its periphery adapted when aligned with said projections to permit the disk to pass thereover and smaller notches spaced from the first adapted in a different position of the disk to receive a part only of said projections whereby to lock the disk against turning but being too small to allow the disk to pass over the projections.

12. An electrical discharge lamp which comprises a sealed envelope for the discharge, elec-

trodes therefor, an open ended jacket adapted to receive and protect the envelope, means for removably engaging the envelope and supporting it in the jacket spaced from the walls thereof, a connector base extended from the open end of the jacket for connecting and supporting said lamp in a lamp jacket, a ring extended from said base over the rim of the jacket whereby to close its open end between the tube and connector base, means adapted removably to connect the contact elements of the connector base to the electrodes and means adapted to engage the jacket and to pull the connector base inwardly toward its open end and thereby clamp said ring against the jacket, hold the parts in assembled relation, and support the lamp assembly from the connector base.

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