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1,623,323

METHOD OF INTRODUCING VOLATILE MATTER INTO LAMPS AND THE LIKE

Filed Aug. 18, 1923

FIG. 1.

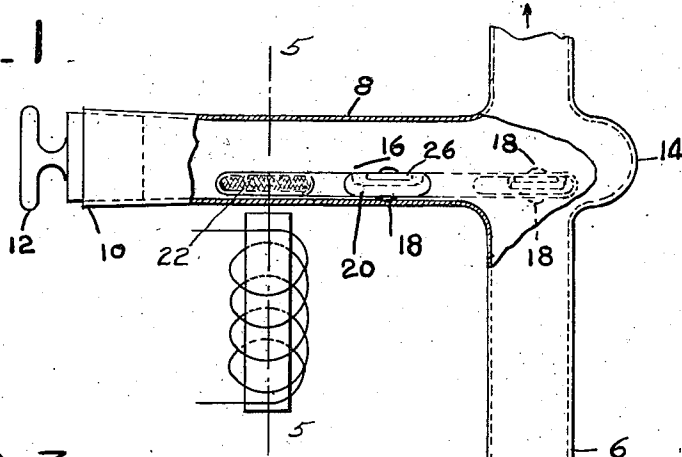


FIG. 3.

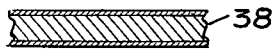
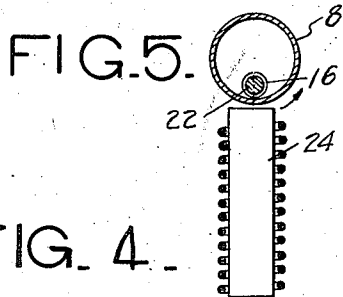


FIG. 4.

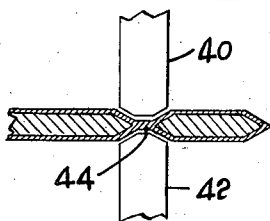
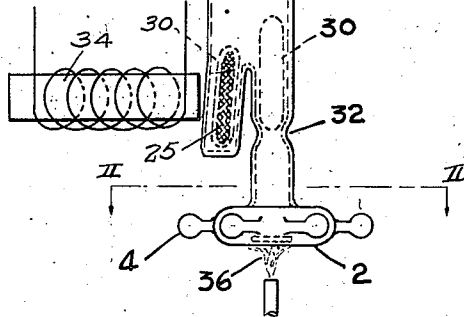
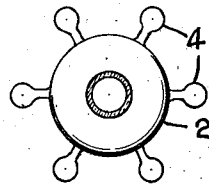


FIG. 2.



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1,623,323

UNITED STATES PATENT OFFICE.

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METHOD OF INTRODUCING VOLATILE MATTER INTO LAMPS AND THE LIKE.

Application filed August 18, 1923. Serial No. 658,097.

This invention relates to the manufacture of gaseous discharge lamps and more particularly to a method of and means for the introduction of potassium or other suitable vapor therein.

It is becoming well known that by introducing the vapor of metallic potassium, sodium or the like into an electric lamp filled with a gas such as neon, certain distinct advantages are obtained. Due to some peculiar phenomenon, the introduction of a vapor of an element of the class of potassium, reduces the starting and operating voltages of gas glow lamps to a minimum and in addition functions as an efficient clean-up agent.

It is an object of the invention to devise a method whereby the introduction of such metallic vapors may be facilitated.

It is a further object to devise an apparatus by which the method may be carried out efficiently.

Other objects will become apparent from the description and claims and from the accompanying drawing in which—

Fig. 1 is a sectional elevation of one type of apparatus by means of which the metallic vapors may be introduced into the lamp;

Fig. 2 is a section thereof taken on the line II—II of Fig. 1, looking in the direction of the arrows;

Fig. 3 is a sectional view of one form in which the metal may be prepared for introduction, and

Fig. 4 is a view of another form in which the metal may be prepared showing a manner in which it may be so prepared.

Fig. 5 is a section on the line V—V of Fig. 1.

In my copending application, Serial No. 569,861, filed June 21, 1922, entitled Manufacture of electric lamps and the like, and assigned to the Westinghouse Lamp Company, I have disclosed a method of and an apparatus for the introduction of an unstable volatile material in an electric lamp and, in certain respects, the method and apparatus of this application may be considered as modifications.

Numerous difficulties are encountered in introducing an alkali metal or its vapor into a lamp. These difficulties are due almost entirely to the chemical activity of the metal which, in the case of potassium, renders it almost impossible of manipula-

tion in the open atmosphere. Then too, as such metals volatilize at extremely low temperatures, it is not easy to maintain the metal in a non-volatilized or stable state while baking out the lamp during the exhaust. By my invention I render it practical to bake out the lamp during the exhausting operation and at the same time facilitate the introduction of the alkali metal vapor at the desired period.

In carrying out the operation, I so prepare the metal to be introduced, hereinafter specified as potassium, that it will be relatively stable under ordinary conditions and so dispose it with respect to the lamp that it may be readily positioned for volatilization into the lamp and where the hot exhaust from the latter or from the baking out apparatus (not shown) will not come into contact with it.

In Fig. 1, I have shown one form which my invention embraces and therein have diagrammatically illustrated a manner of connecting a number of electric lamps to the exhaust manifold, whereby the lamps may be hot exhausted simultaneously. To this manifold 2, to which a number of lamps 4 are suitably connected, is attached exhaust main 6 which may lead to a suitable exhaust pump (not shown). From a suitable point on the main 6 issues a side tube 8 closed at its outer end 10 by a ground glass stopper 12 and opposite the point of connection of tube and main is a recess 14 for a purpose hereinafter described.

Within the tube 8 is positioned a carrier generally designated 16 and adapted to slide therein on projections or guides 18, back and forth between the positions shown in full and dotted lines. The recess 14 permits the carrier 16 to position itself as shown in the dotted lines. The carrier may comprise a recessed cradle portion 20 of glass or like material and a portion 22 of soft iron or the like attached thereto for cooperation with a magnet 24, whereby the carrier may be moved from end to end of the tube upon movement of the magnet. The cradle 20 is provided with the recess to carry a pellet or other form of the material to be volatilized into the lamp.

The pellet of potassium, generally designated 26, may be displaced from the cradle 20 in any appropriate manner, but, preferably, I make the tube 8 round and of large

cross sectional area compared to the same area of carrier 16 so that by moving the magnet 24 to one side or circumferentially of the tube 8 as shown by the arrow in Fig. 5, I roll or rock the cradle 16 sufficiently to displace the pellet therefrom. The projections 18, in addition to serving as guides, act to prevent premature rotation of the carrier.

10 In order to insure that the potassium will be volatilized into the lamps and not into the main 6, I prevent the escape of any matter into the main, while the potassium is being volatilized, by a peculiar expedient.
15 At the base of the main 6 and adjacent to the manifold connection, I form a recess 28 large enough to receive a stopper or plug 30, preferably comprising a glass capsule enclosing a soft iron rod, adapted to be lifted
20 from the recess and placed within a constricted portion 32 of the main 6 by means of an electro-magnet 34. The glass enclosed stopper may be ground to fit the constricted portion 32 of the main 6 snugly and effectually closes the manifold 2 from the main 6
25 as shown in dotted lines. When it is desired to move the stopper 30 from within the recess 28 to the constriction 32 or vice versa, it is merely necessary to energize the magnet 34, bring it into position adjacent the stopper and then by an upward and circumferential movement raise the stopper from the recess 28 and move it to a position over the constriction 32 into which it
30 may then be readily deposited. Other magnetic or electrical means may be substituted for the electro-magnet as will be obvious.

After the lamps have been connected to the manifold, the ground glass stopper 12
40 is removed, a pellet or other form of the material to be volatilized is positioned in the carrier cradle 20, which is inserted within the tube 8, the stopper greased with vaseline or the like and replaced. The
45 lamps may now be exhausted as desired, preferably with baking. When the desired degree of exhaustion of the lamps is reached, the magnet 24 is energized and manipulated to precipitate the potassium pellet into the
50 main 6 and the magnet 34 is energized to lift the plug 30 from its recess 28 and to position it in the constricted portion 32. Heat may be applied, as shown at 36, to volatilize the potassium.

55 As will be apparent, any desired gas may be put into the lamps before or after volatilization of the potassium or other material. In this connection, however, I prefer to fill the lamps, to the desired pressure
60 with neon gas, after the potassium has been volatilized, as in this way I am enabled to vaporize the potassium more easily.

65 In Fig. 3 I have illustrated a glass encapsulated potassium pellet which is formed as described in my copending application

above referred to except that prior to the insertion of the capsule within the cradle of the carrier, I break off the ends of the glass as shown at 38 to expose the potassium for volatilization.

70 In Fig. 4 I have shown an alternative form of capsule, more fully described and claimed in the application of J. W. Marden, Serial No. 745,071, filed October 22, 1924, entitled Introduction of vaporizable material into exhausted containers, and assigned to the Westinghouse Lamp Company. In
75 this type, the potassium is covered with such a metal as lead in strip form until ready for use, whereupon it is cut into convenient
80 lengths by dull shears as shown at 40 and 42. By cutting the strip with a dull instrument, the lead or other metal encasing the potassium is drawn in as at 44 hermetically
85 sealing both severed ends. When heated within the manifold, the potassium volatilizes at a lower temperature than the lead and, owing to its greater coefficient of expansion at that temperature, bursts from its
90 lead confines.

While I have illustrated and described what I may consider a preferred form of my invention, many modifications thereof may be made within the spirit and scope of the appended claims.

What is claimed is:

1. The combination with an exhaust system for evacuated containers, of means for introducing volatile substances into said system at a point remote from said containers and means for subsequently transferring said material in a solid condition to a position adjacent said containers.

2. The combination with an exhaust apparatus for evacuated containers adapted to be baked out during evacuation, of means for introducing a volatile substance into said apparatus and maintaining it in a cooled portion thereof during the baking-out operation and means for subsequently transferring said substance without volatilization thereof to another part of said apparatus.

3. The combination with an exhaust apparatus for evacuated containers adapted to be baked out during evacuation, of means for introducing a volatile substance into said apparatus and maintaining it in a cooled portion thereof while said containers are being baked out and means arranged exteriorly of said system for subsequently transferring said substance without volatilization thereof to another part of said apparatus.

4. The combination with an exhaust apparatus for evacuated containers adapted to be baked out during evacuation and a pump connection therefor, of means for introducing a volatile substance into said apparatus and maintaining it in a cooled portion there-

of while said containers are being baked out, means for subsequently transferring said substance without volatilization thereof to another part of said apparatus and means for sealing said material from the pump connection.

5 5. The combination with an exhaust apparatus for evacuated containers adapted to be baked out during evacuation and a pump connection therefor, of means for introducing a volatile substance into said apparatus and maintaining it in a cooled portion thereof while said containers are being baked out, means for subsequently transferring said substance without volatilization thereof to another part of said apparatus, means for sealing said material from the pump connection and means for volatilizing said material into said container.

20 6. The combination with an exhaust apparatus having an exhaust manifold and a pump connection, of means for introducing a volatile substance into said pump connection at a point remote from said manifold, and electromagnetic means for subsequently transferring said substance to said manifold.

30 7. The method of introducing a volatile substance into an evacuated device which consists in introducing said substance into an exhaust system communicating with said device, at a point remote therefrom, evacuating the device, transferring the substance in a solid condition to a point adjacent said device and volatilizing it into said device.

35 8. The method of introducing the vapor of a volatile substance within an hermetically sealed vessel which comprises posi-

tioning said substance at an inactive position within a portion of said vessel, sealing said vessel hermetically, performing preliminary operations upon said vessel, bodily repositioning said substance to an active position while maintaining said seal and volatilizing said substance.

45 9. The method of introducing the vapor of a volatile substance within an hermetically sealed vessel which comprises positioning said substance at an inactive position within a portion of said vessel, sealing said vessel hermetically, evacuating said vessel, repositioning said substance without volatilization thereof to an active position while maintaining said seal and thereafter volatilizing said substance.

55 10. An exhaust system for an evacuated container having a pump connection, a valve located wholly within said pump connection, a seat for said valve and means external to the system for raising said valve from its seat and depositing it at a point out of the path of communication between the pump and container.

65 11. An exhaust system for an evacuated container having a pump connection, a valve located wholly within said pump connection, a seat for said valve and electromagnetic means for lifting said valve from its seat and depositing it at a point in said pump connection out of the path of communication between the pump and container.

70 In testimony whereof, I have hereunto subscribed my name this sixteenth day of August, 1923.

CLETUS CLINTON VAN VOORHIS.