Aug. 9, 1938. P. V. MALLOY 2,126,686

PRODUCTION OF HIGH VACUUM

Filed Feb. 11, 1936

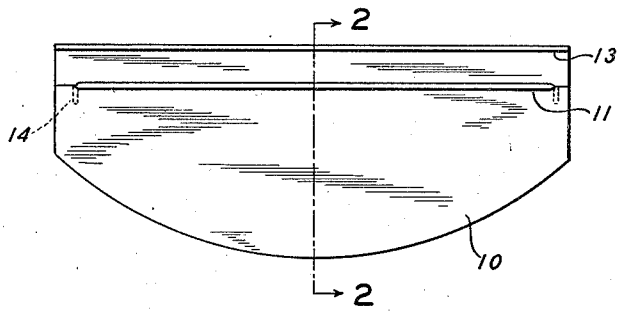


FIG. 1

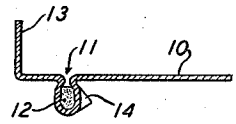


FIG. 2

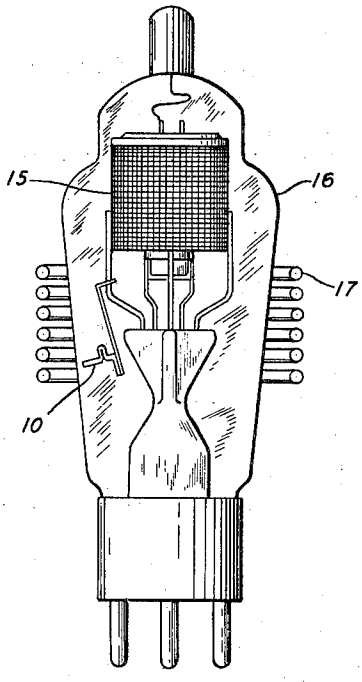


FIG. 3

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Patented Aug. 9, 1938

2,126,686

UNITED STATES PATENT OFFICE

2,126,686

PRODUCTION OF HIGH VACUUM

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Application February 11, 1936, Serial No. 63,302

1 Claim. (Cl. 250—27.5)

The invention relates to the production of high vacuum and provides new and useful method and means for producing a high vacuum within a closed envelope such as that of a thermionic valve or similar device.

One common procedure for evacuating a thermionic device involves two steps: The major part of the gas is exhausted by pumping and the remainder is "cleaned up" by vaporizing within the device a small amount of an active material, or "getter", usually a metal or alloy comprising metals of the alkali, alkaline earth, and rare earth metal groups, and which combines avidly with gas. It has been the practice to secure a small piece or tablet of getter material within a depression provided in a thin strip of metal, to fasten the strip within the outer glass envelope of the thermionic device, and to induce electric currents in the strip from a coil outside the envelope, whereby the getter is heated and vaporized, or "flashed".

The procedure described above has been used successfully for the production of many millions of thermionic valves. Nevertheless, it possesses certain limitations. The time required to flash the getter is at least four to six seconds, for if sufficient power is used in the induction coil to speed up the flashing step, the getter material tends to blow out of its support with a small explosion, to splash on the valve elements, to drop unvaporized particles of getter into the envelope, and to form a poorly adherent film of metal on the glass envelope. The slowness of the flashing step not only limits the output of the evacuating machine, it also tends to heat the metal elements and nonmetallic insulators of the valve excessively and unevenly, tending at times to warp and to weaken them.

It is an object of the present invention to eliminate the above described limitations to the use of getters. This and other objects are attained by so arranging the getter and its support that, as the support is inductively heated, successive portions of the getter are vaporized. Thus, the getter is vaporized smoothly and steadily from the beginning to the end of the support-heating period instead of suddenly and explosively at the end of that period.

A typical embodiment of the invention is illustrated in the accompanying drawing in which:

Fig. 1 is a plan view of a getter and getter support.

Fig. 2 is a cross-sectional view taken through 2—2 of the device shown in Figure 1, and

Fig. 3 is a front elevation, partly in cross-section, of a thermionic valve and the device shown in Figures 1 and 2, arranged for the flashing operation.

Referring specifically to Figures 1 and 2, the device shown therein consists of a single thin strip 10 of metal, which is preferably nickel, provided with an elongated pocket 11 which extends from the outer edges of the strip to its central portion. A body 12 of active getter material is contained within the pocket 11 and is preferably in firm contact with the metal strip 10. The outer ends of the pocket 11 are preferably sealed by bending over the ends to form ears 14 or by an equivalent expedient. One side of the strip is preferably bent to form a wing 13 which acts to direct the vapors of getter material during flashing.

In Figure 3 is shown a typical way of using the device illustrated in Figures 1 and 2. The strip of metal 10 containing the active getter is suspended below the operating elements 15 and within the outer envelope 16 of a thermionic device. High frequency electric current is passed through a coil 17 placed about the envelope 16 at the level of the strip 10. Currents are induced in the strip 10 and heat it, the outer edges being heated first and the heat then proceeding progressively towards the center of the strip. Thus, portions of the active getter 12 near the outer edge of the strip 10 are vaporized almost immediately and portions progressively nearer the center are vaporized as they are raised progressively to a high temperature. The total time for flashing is thereby considerably reduced, from five or six seconds to about 2 seconds for instance, a consistently effective clean-up action is obtained, and the film of getter deposited on the wall of the envelope is securely adherent.

It is preferred that the pocket 11 be formed in the strip 10 by bending and folding the strip, rather than by drawing it. By bending closed the entrance of the pocket 11, and by bending flaps 14 at the ends of the pocket, there is formed a sheath which will spring open sufficiently to permit the escape of vapors but insufficiently to allow particles of metal or cinder to drop out of the pocket.

Although it is preferred that the active material 12 be retained in the strip 10 by means of the pocket 11, other means of fastening the active material along a line extending from the center to one or more edges of the strip are within the invention. For instance, a strip or small bar of active material may be welded or other-

wise adhesively secured in place on the strip 10.

I claim:

Method of producing a high vacuum within a closed envelope which comprises securing below said operating elements within said envelope containing the operating elements of a thermionic device; a getter tab consisting of a metal strip and a body of getter material secured in firm thermal contact with said strip, said body extending substantially from the edge to the center portion of said strip, and then heating said strip from its edges progressively towards its center, whereby successive portions of said getter material are vaporized.

PAUL V. MALLOY.

CERTIFICATE OF CORRECTION.

Patent No. 2,126,686. August 9, 1938.

PAUL V. MALLOY.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, first column, line 4, claim 1, after "envelope" insert the words containing the operating elements of a thermionic device; and lines 6 and 7, same claim, strike out the words and semicolon "containing the operating elements of a thermionic device;"; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 4th day of October, A. D. 1938.

Henry Van Arsdale

(Seal) Acting Commissioner of Patents.