Jan. 26, 1960 O. T. McILVAINE 2,922,216

PHOTO TUBES AND THEIR MANUFACTURE

Filed April 17, 1956

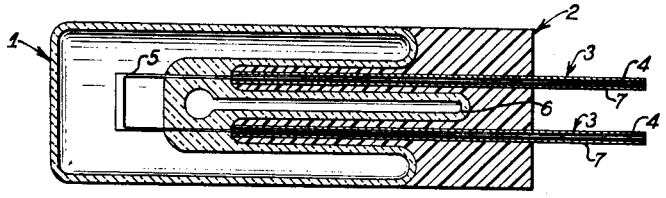



Fig. 1

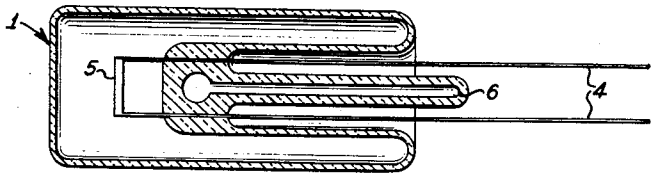



Fig. 2

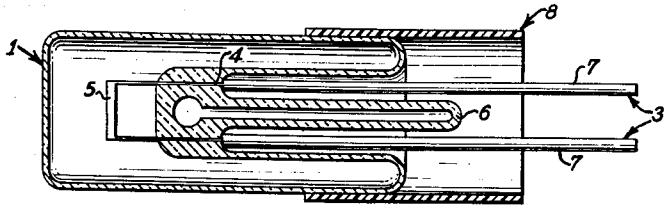



Fig. 3

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United States Patent Office 2,922,216
Patented Jan. 26, 1960



2,922,216

# PHOTO TUBES AND THEIR MANUFACTURE

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Application April 17, 1956, Serial No. 578,693

2 Claims. (Cl. 29—25.13)

This invention relates to photo tubes and their manufacture. More particularly, it relates to the integration of bulbs made of glass or other materials with plastic bases to form electron tubes.

The usual method of manufacturing an electron tube is to form a bulb about various electrical elements and to form a separate base out of a metal or plastic material and then to cement the base to the bulb, making provisions for electrical connections through pins in the base. This method has never been entirely satisfactory, since the base tends to expand and contract with heat and humidity at a different rate than the bulb itself. This results in the base coming loose from the bulb, which results in vibration in the tube, and usually ends in its complete destruction.

It is an object of the present invention to eliminate the possibility of the bulb becoming loose in its base or breaking away entirely.

It is another object of this invention to make unnecessary the pre-forming of the bases for tubes, and thus to eliminate some of the steps in their manufacture.

It is a further object to make it possible to construct such tubes more economically than was possible heretofore.

It is a still further object of this invention to provide a method of manufacturing such tubes which is inherently faster and simpler than the methods formerly employed.

The foregoing objects, and others ancillary thereto, I prefer to accomplish as follows:

According to a preferred embodiment of my invention, a glass bulb is secured which contains the electrodes of an electron tube, with leads projecting through the tube. Metal tubes of a size suitable to make the desired pins are cut into lengths and slipped over the lead wires. A piece of pliable tape, which may be formed of a suitable plastic, if desired, is fastened around the lower portion of the glass bulb and is made to protrude beyond the bulb for a distance equal to the thickness of the base to be constructed. The bulb is then placed with the leads and pliable tape up, and the space bounded by the pliable tape and the bulb is filled with plastic or other suitable moldable material. When the material has dried or cooled to a solid state, the tape may be removed, and the metal tubes enclosing the lead wires are cut to the desired length unless pre-formed to that length.

This preferred embodiment of the invention is set forth in the accompanying drawings, in which:

Fig. 1 is a longitudinal section of a finished tube, showing the combination of the bulb, metal tubes and plastic base;

Fig. 2 is a sectional view of the formed bulb, before the metal tubes and the base are applied; and

Fig. 3 is a section of the tube, showing metal tubing placed over the lead wires and tape around the glass bulb and extending a selected distance beyond, ready to receive the plastic for the base.

The invention as shown is of a standard tube comprising a transparent envelope or bulb 1 of conventional construction to which is fused a plastic base 2. The plastic base may be composed of such materials as "Araldite" plastics, "Epon" resins or phenolic compounds, or other desired materials suitable for the purpose. It may be used, if desired, in miniature tubes.



The sectional view shown in Fig. 1 is of a finished tube comprising the combination of the bulb or envelope 1 and the base 2. The transparent envelope or bulb 1 is shown with the plastic base 2 fused to it, and with base pins 3 protruding through the plastic base. Electrical unit 5, which is merely exemplary of the great number and variety of such units which may be employed in tubes embodying this invention, connects to lead wires 4 and metal sleeves 7 that form base pins 3. For example, in a light-sensitive tube, the unit 5 may comprise a photo-crystal mounted between the lead wires 4. Spaced electrodes may be provided on these wires. Any other suitable means may be used, as desired.

In Fig. 2 there is shown a sectional view of a typical bulb which might be used in the manufacture of tubes. In the bulb 1 are shown the electrical units 5 passing through the walls of the bulb 1, the lead wires 4, and the exhaust tubing 6. The exact formation of the bulb may be varied greatly, so as to include many more elements, different base configurations, etc.

The transparent bulb 1 is shown in Fig. 3, along with the metal tubes 7 which are placed over the lead wires 4 to form the base pins 3. The metal sleeves 7, as pointed out above, are selected to provide base pins of the desired size and are placed over the lead wires to which they are subsequently soldered. Plastic tape 8 is placed around the end of the glass bulb 1, as indicated, with a portion thereof extending beyond the edge of the glass bulb from a quarter to a half inch, depending upon the thickness of the base desired.

Having placed the plastic tape 8 and the metal tubes 7 in position, the bulb is placed with its base up, and the space bounded by the tape in the tube is filled with a plastic material such as "Araldite" plastics, Epon resins, phenolic compounds, or other suitable plastic material, to a position level with the end of the plastic tape.

After the plastic material has solidified, the plastic tape is removed and the metal sleeves or tubings 7 are cut to the proper length and soldered to close the ends thereof. At this point, a finished tube will result. It should be noted, however, that the plastic tape can be left in place in those instances in which its removal is not actually necessary to increase the usefulness of the tube.

The advantages of this construction are numerous. It is possible by this means to form a base quickly and easily for any tube once the bulb is in hand, without the use of elaborate equipment. It is evident also that this method affords an economical way of forming bases for tubes of quite different characteristics and with greatly varying placement of pins. An additional advantage is that this method of manufacture affords a new kind of base for a tube, which is lightweight, electrically resistant, does not cause any electrical distortion in the tube, and which does not become separated from the bulb as a result of heat changes and changes in humidity.

Although a detailed description of a preferred embodiment of the present invention has been given, it will be understood by persons skilled in the art that various modifications and variations may be made without departing from the spirit of the invention. Consequently, the foregoing description is to be considered as exemplary only and the scope of the invention is to be determined from the following claims:

I claim:

1. The method of forming a base on a bulb, comprising placing metal tubing over lead wires throughout substantially the entire exposed length of the wires, wrapping plastic tape around the bulb substantially overlapped

with said end and supported thereby and extending past one end thereof, filling the space bounded by the plastic tape, the edge of the plastic tape, the bulb and the metal tubes with plastic material, removing the plastic tape from the bulb when the plastic hardens, cutting the metal tubing with the lead wires to length, and soldering.

2. The method of forming a base for a photo discharge device, comprising wrapping a tape-like means around one end of an elongated envelope substantially overlapped with said end and supported thereby and extending beyond the end thereof, filling the space bounded by the end of the envelope and the tape-like means with a sealing material, allowing the sealing material to harden, and removing the tape-like means from the device.



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