July 24, 1951 C. E. BECHARD 2,561,838

TIPPING-OFF METHOD

Filed Oct. 28, 1949

Fig. 1.

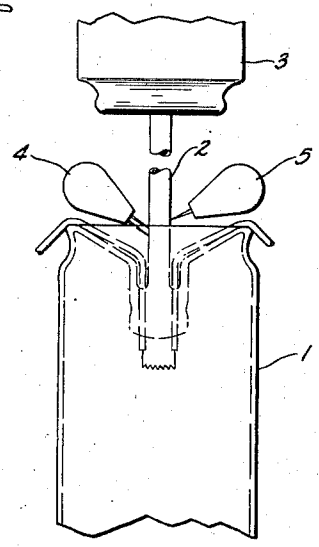


Fig. 3.

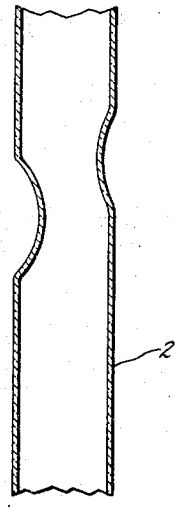


Fig. 2.

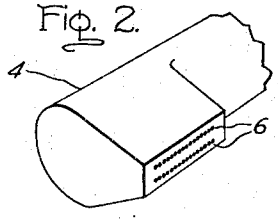


Fig. 4.

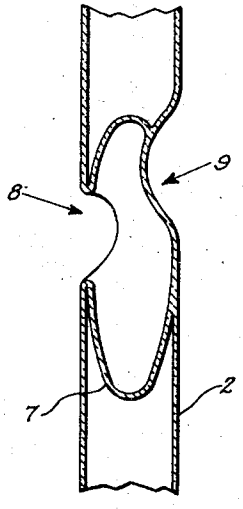


Fig. 6.

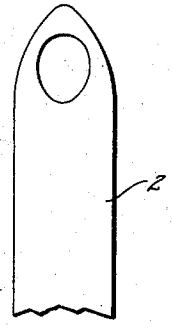
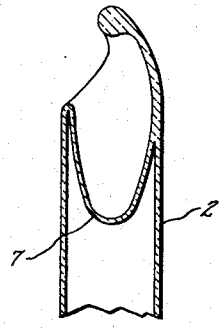


Fig. 5.



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UNITED STATES PATENT OFFICE

2,561,838

TIPPING-OFF METHOD

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Application October 28, 1949, Serial No. 124,187

3 Claims. (Cl. 49—78)

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My invention relates to a method of sealing evacuated envelopes. More particularly my invention relates to a method of tipping-off a glass exhaust tube extending from an evacuated container.

The usual method of tipping-off devices having evacuated envelopes, such as electric lamps, is to apply gas flames to opposite sides of the exhaust tube to first soften it and permit it to be collapsed by the external atmospheric pressure, and to then sever the tube by continued application of the flames. In some cases that process produces an accumulation of glass at the tip which produces stresses or strains which sometimes result in cracks. In other cases a portion of the glass wall is apt to be sucked in to produce a bubble having an extremely thin wall which is easily ruptured.

It is an object of the present invention to provide a novel method of tipping-off exhaust tubes which will avoid the above-mentioned difficulties. Another object is to provide a method whereby a portion of the glass wall is deliberately permitted to be sucked in, but under conditions such as to avoid undue stress or strain in the glass and to form a bubble of adequate wall thickness. Other objects and advantages of my invention will appear from the following detailed description and from the accompanying drawing.

In the drawing, Fig. 1 is an elevation showing the essential elements of apparatus which may be used in practicing my invention; Fig. 2 is a perspective view of a portion of one of the gas burners; Fig. 3 is an elevation, in section, of a portion of an exhaust tube illustrating a preliminary phase of the tipping-off process; Fig. 4 is a similar view showing an intermediate step in the process; Fig. 5 is a similar view showing the finished seal; and Fig. 6 is an elevation corresponding to, but at right angles to, that shown in Fig. 5.

Referring to Fig. 1, I have herein illustrated the invention as applied to the exhausting and tipping-off of an electric lamp 1 of the well-known fluorescent type having an exhaust tube 2 extending therefrom and communicating with the interior of the lamp envelope 1. The exhaust tube 2 is held in an exhaust head 3 which may, for instance, be part of an exhaust machine of the type shown in Patent 2,247,513 issued July 1, 1941, to A. J. Marshaus and assigned to the same assignee as the present invention. The apparatus further includes a pair of tipping-off burners 4 and 5 which are arranged for disposal adjacent the exhaust head 3 on opposite sides of the exhaust tube 2. In accordance with my invention, the burner 4 is designed to project a hotter and wider flame than the burner 5. This is most conveniently accomplished by providing the burner 4 with two rows of holes 6, the burner 5 being provided with only a single corresponding row of holes. As shown in the drawing, the burner 4 is directed to project its flame at an area of the exhaust tube 2 slightly below that heated by the burner 5, that is, the area heated by the burner 4 is closer to the envelope 1 or, conversely stated, more remote from the exhaust head 3. Both burners 4 and 5 are set quite close to the exhaust tube 2, the burner 4 being slightly farther away from the exhaust tube than the burner 5.

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In the operation of tipping-off, after the envelope 1 has been evacuated through the exhaust head 3, and filled with the usual atmosphere of mercury and rare gas, such as argon or krypton at a pressure of a few millimeters of mercury, the exhaust tube 2 is heated by the burners 4 and 5 and both sides of the tube 2 start to suck in at the same time, as illustrated in Fig. 3. The glass from the right side of the tube joins the glass from the left side and a large bubble 7 is formed with an opening 8 at the left where the double row burner 4 is located, and at the same time the bulb 1 is pulled down to stretch and thin the wall of the tube 2 at the area 9 to form the structure shown in Fig. 4. Upon continuation of the heating the burner 5 severs the tube 2, the resulting tip being illustrated in Figs. 5 and 6.

The wider flame projected by the burner 4 results in the heating of a larger area of the tube 2 and thus avoids the production of a bubble 7 of undue thinness. At the same time the method and apparatus described above avoid the accumulation of excessive glass at the tip.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. The method of tipping-off a glass exhaust tube extending from an evacuated envelope which comprises heating opposite sides of the exhaust tube, one of said sides being heated over an area which is larger than the area at the other side and slightly closer to the envelope than said area at the other side so as to cause the area of glass heated on the said one side to join with the glass at the opposite side of the tube and be sucked into the tube to form a bubble closing off the tube, and continuing the heating until the tube is severed.

2. The method of tipping-off a glass exhaust tube extending from an evacuated envelope which

comprises directing flames at opposite sides of the exhaust tube, one of said flames being hotter and covering a larger area than the other and being directed at an area of the tube slightly closer to the envelope than the other flame so as to cause the area of glass heated by the said one flame to join with the glass at the opposite side of the tube and be sucked into the tube to form a bubble closing off the tube, and continuing the heating until the said other flame severs the tube.

3. The method of tipping-off a glass exhaust tube extending from an evacuated envelope which comprises directing flames at opposite sides of the exhaust tube, one of said flames being hotter and covering a larger area than the other and being directed at an area of the tube slightly closer to the envelope than the other flame so as to cause the area of glass heated by the said one flame to join with the glass at the opposite side of the tube and be sucked into the tube to form a bubble closing off the tube, longitudinally stretching the heated portion of the tube to thin the wall thereof, and continuing the heating until the said other flame severs the tube.

CONRAD E. BECHARD.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,984,488	Mulder	Dec. 18, 1934
2,247,513	Marshaus	July 1, 1941