

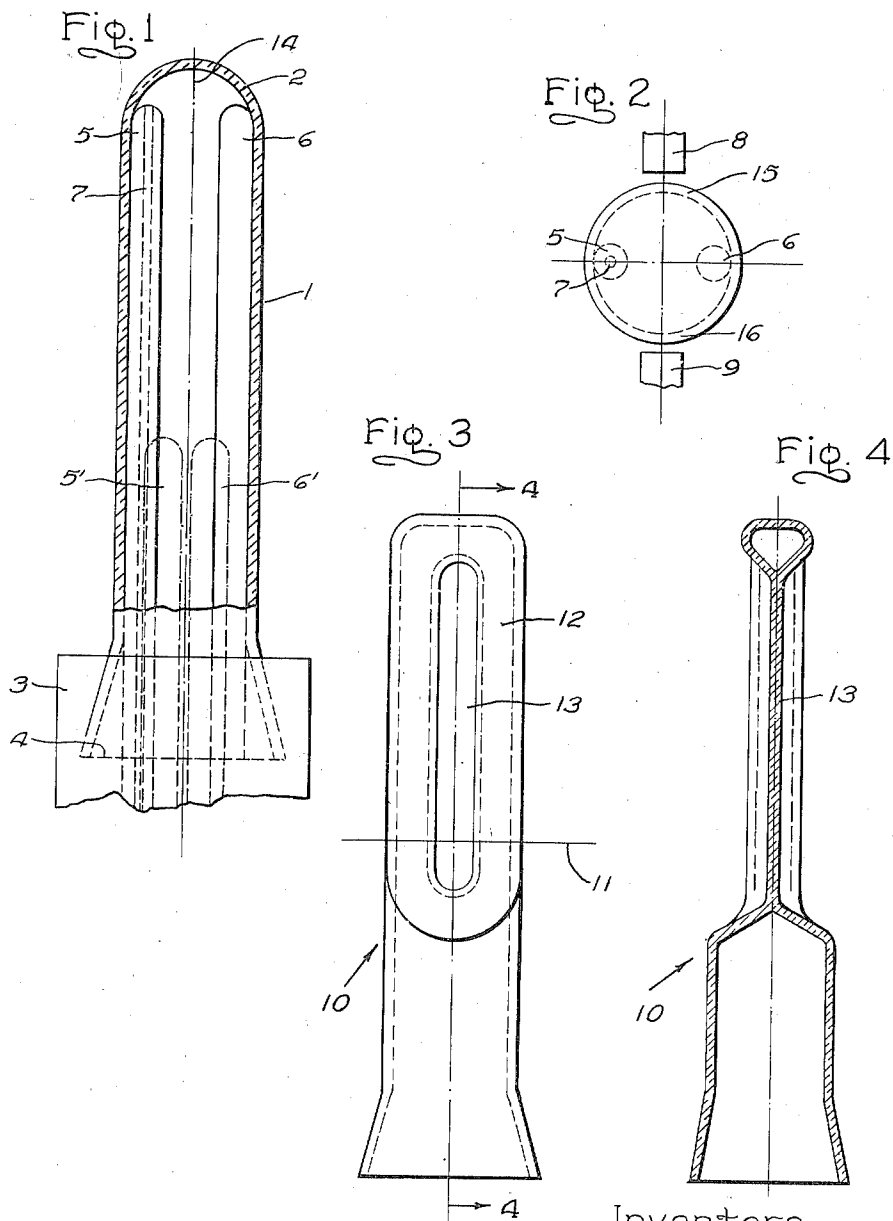
Dec. 20, 1949

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2,491,848

METHOD OF MANUFACTURING A GLASS BLANK

Filed Aug. 1, 1947



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UNITED STATES PATENT OFFICE

2,491,848

METHOD OF MANUFACTURING A GLASS
BLANK

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Application August 1, 1947, Serial No. 765,470
In Great Britain January 7, 1946

Section 1, Public Law 690, August 8, 1946
Patent expires January 7, 1966

2 Claims. (Cl. 49—84)

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This invention relates to a method of manufacturing electric discharge lamps of the kind having a relatively long discharge path and more particularly, but not exclusively, to such lamps having the glass envelope enclosing the path coated internally with fluorescent powder. Several suggestions have been made for making such tubes compact physically so that they occupy but little space and the electrodes of a lamp are closely adjacent one another.

One convenient form of lamp may be formed by bending a straight tube into U-form to bring the ends of the tube adapted to receive the electrodes closely adjacent one another. However, to bend a straight tube into the form of a U with closely adjacent limbs is not a process which is easily done by a machine and it requires a skilled glass-worker to bend the tube by hand.

One of the objects of the present invention is to provide a method of manufacturing a discharge lamp of the type specified which has a U-shaped discharge path which is capable of being carried out by a machine on mass production lines.

Preferably, the glass blank is made by a method which consists in heating a cylindrical glass bulb closed at one end and pressing two diametrically opposite parts of the bulb together over the major portion of the length of the bulb.

Two spaced cylindrical or tempering mandrels may be placed within the bulb during the pressing operation and the wall of the bulb may be pressed by two parallel opposing surfaces so that the diametrically opposite parts of the wall join and seal between the mandrels.

One method of manufacturing a glass blank for a hot cathode electric discharge lamp, of the kind specified, will now be described by way of example with reference to the four figures of the accompanying drawings, in which Figure 1 shows a partly diagrammatic elevation of the apparatus for manufacturing the glass blank, Figure 2 shows a plan view of the apparatus, Figure 3 shows an elevation of the finished blank and Figure 4 shows a section at line 4—4 of Figure 3.

Referring to Figure 1 of the drawing, the glass blank is manufactured from a glass bulb 1. The preformed glass bulb 1 is cylindrical in shape with a closed end 2, being a well-known shape of bulb produced by blowing in a machine, and the bulb 1 is of such a length that when the major portion of its length is divided by a central partition, a U-shaped discharge path is formed of correct length for the discharge lamp of which it is the blank.

The machine comprises a spring-chuck 3

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(shown diagrammatically) over which the open end 4 of the glass bulb 1 fits, the axis 14 of the bulb 1 being vertical and the closed end 2 uppermost, and approximately two thirds of the length of the bulb 1, from the closed end 2 down, is arranged to be heated by suitable gas flames (not shown). The chuck 3 and the bulb 1 are arranged to be rotated and the flames stationary so that the part of the bulb 1 is evenly heated. Alternatively the chuck 3 and bulb 1 may be stationary and the flames rotatable or both flames and bulb 1 may be fixed.

Passing through the chuck 3 parallel to the axis 14 of the bulb 1 are two spaced rods or mandrels 5 and 6 of brass, carbon or other suitable material which taper slightly and are circular in cross-section and which may be moved up into the top of the bulb 1 either by movement of the chuck 3 relatively to the rods 5 and 6 or by the movement of the rods 5 and 6 through the chuck 3. The tops of the rods 5 and 6 are suitably rounded to correspond with the round shape of the end of the bulb 1 and the rod 5 has a central bore 7 for the passage of blowing air.

When the rods 5 and 6 are moved up into the top of the bulb 1, as shown in Figure 1, the spacing between them is a maximum and the outer edges of the rods 5 and 6 engage the walls of the bulb 1; on the other hand, when the rods are in their lower position, shown as 5' and 6' in Figure 1, in which they project a short distance into the bulb 1 they are closer together and do not touch the inside of the bulb 1. The reason for this will be explained later.

Referring also to Figure 2, in a plane containing the axis 14 of the bulb 1 and at right angles to the plane containing the axis 14 and the axis of the two parallel rods 5 and 6, are two opposing pressing jaws 8 and 9, having parallel vertical pressing surfaces of width just slightly less than the maximum spacing between the rods 5 and 6 and of length about two thirds the length of the bulb. The jaws 8 and 9 are movable towards and away from each other in such a manner that they may be forced together to press the glass of the bulb 1 when hot between the rods 5 and 6 to form a partition extending down the major portion of the length of the bulb 1. Actually, the pressing surfaces of the jaws 8 and 9 terminate just below the top 2 of the bulb 1 so that there is a small part at the top 2 of the bulb 1 left unpressed.

In operation of the method and machine the glass bulb 1 is placed on the machine with the two rods 5 and 6 close together and near the bot-

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tom of the bulb 1. The rods 5 and 6 are, therefore, clear of the glass of the bulb 1 and there is no risk of cracking of the glass by contact with the rods 5 and 6 which may be hot from previous heating. The bulb 1 is then heated and the glass of the bulb 1 raised in temperature; when the glass of the bulb 1 begins to collapse, the rods 5 and 6 are moved right up into the top 2 of the bulb 1 and engage the inside wall of the bulb 1.

After further heating and at such a temperature that the glass does not stick to the rods 5 and 6 but is sufficiently hot to seal when pressed together, heating is discontinued and the pressing jaws 8 and 9 are forced in to press the glass of the bulb 1 between the rods 5 and 6 and to seal the opposing parts 15 and 16 of the bulb 1 together to form a central partition reaching almost to the top 2 of the bulb 1. Air at sufficient pressure to prevent the top 2 of the bulb 1 collapsing is passed through the bored rod 5 before and during the pressing process and, after pressing, the pressing jaws 8 and 9 are retracted and the bulb 1 may then be removed from the chuck 3 for annealing.

The shape of the finished blank 10 made by this method is shown in Figures 3 and 4. In order to make a discharge lamp from the blank 10 made as described above, the remaining cylindrical part of the bulb 1 is removed by cutting the blank 10 approximately at the plane indicated by the line 11 in Figure 3, the inside of the bulb coated with fluorescent powder and suitable electrodes sealed into the open ends of the U-tube 12 formed by the central partition 13.

As will be appreciated, the method of making the glass blank 10 described above is readily adaptable for mass production by machinery. The machine described may be provided with a number of heads in a manner well known in the glass bulb making art and the process may be continuous.

What we claim is:

1. The method of manufacturing a glass blank from a cylindrical glass bulb closed at one end which comprises inserting into the bulb a pair

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of mandrels in spaced, substantially parallel relationship at opposite sides of the bulb, heating the bulb, and then applying pressure to diametrically opposite parts of the bulb in directions substantially normal to the plane including the mandrels to press said parts together between the mandrels and form a partition terminating short of the closed end of the bulb and defining a U-shaped passage.

2. The method of manufacturing a glass blank from a cylindrical glass bulb closed at one end which comprises inserting into the bulb a pair of mandrels one of which is hollow and with the mandrels disposed in spaced, substantially parallel relationship at opposite sides of the bulb, heating the bulb, and then applying pressure to diametrically opposite parts of the bulb in directions substantially normal to the plane including the mandrels to press said parts together between the mandrels and form a partition terminating short of the closed end of the bulb and defining a U-shaped passage while applying gas pressure to the interior of the hollow mandrel to prevent the said closed end of the bulb from collapsing.

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