June 1, 1929. J. C. GROGAN 1,716,167

APPARATUS FOR AND METHOD OF ALIGNING ELEMENTS IN SEALED CONTAINERS

Filed May 18, 1925

FIG. 1

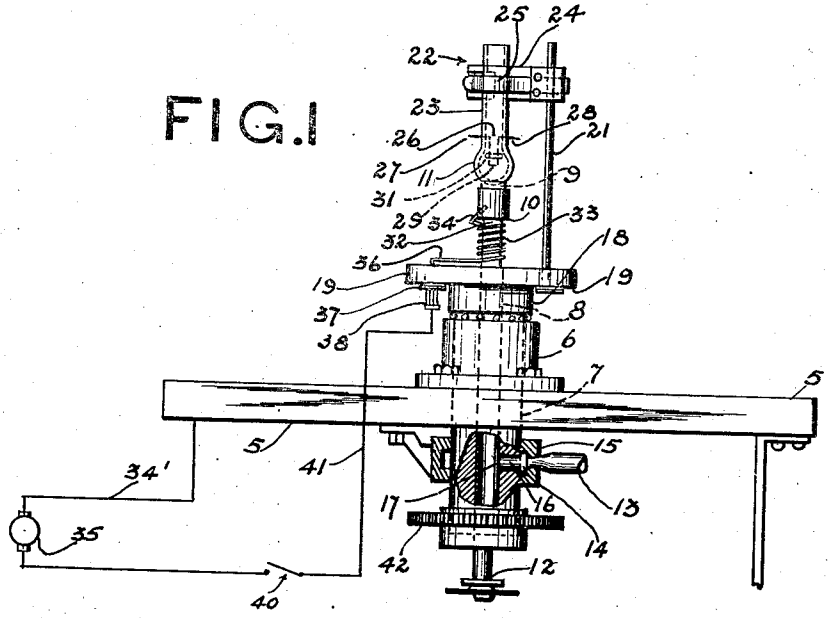


FIG. 2

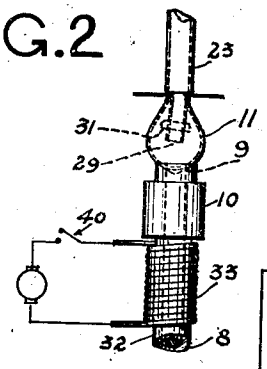


FIG. 3

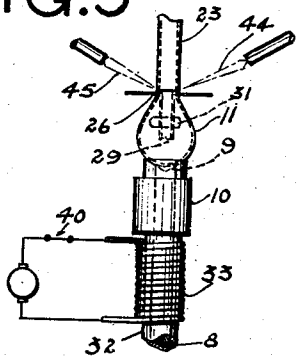
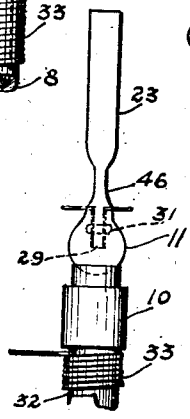


FIG. 4



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR AND METHOD OF ALIGNING ELEMENTS IN SEALED CONTAINERS.

Application filed May 18, 1925. Serial No. 30,980.

The present invention relates to a machine for and method of manufacturing an electrical device, such as an incandescent electric lamp or a similar article, comprising a sealed container in which it is necessary to support an element in a given relative position.

In devices of the above type it is often inconvenient or impossible to dispose an element within the envelope so that the element will, in each device, be located in exactly the same relative position with respect to the walls of the container.

In the present invention, I take advantage of the fact that the internal elements of many electrical devices embody a magnetic material and in practice, I employ a magnetic field to adjust an element within a bulb to a predetermined position.

The invention has been found advantageous in the manufacture of electrical devices such, for example, as electric incandescent lamps as used with parabolic or other reflectors or in projection apparatus, in which it is essential that the light source or filament be positioned in a predetermined relation with respect to the envelope in which it is disposed.

It will readily be appreciated that in lamps of the above type, the lighting element must be disposed at a focal point, thus taking into consideration the relative position of the filament with respect to the base of the lamp and its alignment on the longitudinal axis of the lamp. In the operation necessary to effect such adjustment of the filament, efforts are made to eliminate, as far as possible, all manual operations as require the skill or depend upon intelligence or acuteness of an operator.

Ordinarily the filament is manually adjusted by an operator after the supporting members of the filament have been embedded in the wall of the bulb and while the wall is still in a plastic condition. The degree of accuracy is governed by the skill and perception of the operator.

In addition to the inaccuracies which often occur by this manual adjustment, the personal attention required of the operator limits her rate of production, in that the rate of speed of manufacture of a lamp is greatly reduced. Inasmuch as this adjustment of the filament was heretofore considered a hand operation, it will be appreciated that efforts to produce a wholly automatic machine were defeated when this step in the manufacture of an electrical device was encountered.

An object of the present invention is therefore to provide means for automatically aligning a filament within a bulb.

Another object of the invention is to provide a lamp-making device in which coordinating machine elements may be actuated so that the sealed-in filament is automatically moved to or retained in a predetermined position.

Another object of the invention is to subject a lamp-mount to a magnetic force to move the filament to a predetermined position within a bulb.

A further object of the invention is to provide a lamp-making device with means for securing a bulb and in associating an electromagnet with said device to cause a magnetic force to act upon a lamp-mount and position the same in axial alignment within the bulb.

A further object of the invention is to create a magnetic force in such relation with a lamp-mount disposed in a bulb during a sealing-in operation so as to act upon and move the mount to embed portions thereof in the plastic portion of the bulb.

A still further object of the invention consists in providing a step in the method of manufacturing electrical devices having an envelope with an element therein in a predetermined position by subjecting the element to a magnetic force so associated with the element as to axially align the same with respect to a bulb.

Other objects and advantages will be apparent as the description proceeds.

Although the present invention may be practiced for the adjustment of a light source or other element within a bulb, it is shown and described herein as employed in connection with what is known as a butt-sealing machine or head for the manufacture of so-called miniature or flash-light lamps. In making lamps of this type a mount is placed within a bulb having a relatively short neck and an exhaust tube is subsequently fused to the neck of the bulb leaving lead-in wires of the mount extending externally thereof.

After the seal is made, a contraction is drawn in the tube at a point adjacent to its union with the bulb for the purpose of tipping-off the same, after which the pro-

jecting lead wires are threaded through apertures in a base, the base is cemented to the bulb and the projecting lead-wires severed and soldered to the base.

In the present invention an electro-magnet is suitably positioned with respect to a bulb so that when a bulb is secured in a holder and a mount is applied to the neck thereof, the magnetic force created acts upon the nickel-iron lead-in wires of the mount. The electromagnet is positioned so that the magnetic lines of force draw the mount and filament toward a point positioned on the longitudinal axis of the bulb.

It will thus be evident that with an electromagnet applied, a lamp-mount when positioned upon a bulb will be immediately adjusted laterally and longitudinally so that the filament is axially aligned. This adjustment of the filament may be performed by producing an electro-magnetic field immediately upon the disposition of a mount upon or adjacent to the bulb neck or such field may be created after the exhaust tube has been sealed to the bulb and the glass portion in which the leading-in wires are embedded is still in a plastic condition.

Under certain conditions it has been found desirable to position a mount upon the bulb neck and to soften the edge thereof by suitable flames and then subject a mount to a magnetic force sufficient to move the mount along the longitudinal axis of the bulb and wholly embed portions of the leading-in wires in the bulb neck after which the exhaust tube may be fused thereto. This operation has a certain advantage, in that the leading-in wires become surrounded by glass having uniform properties and not by a mixture of two glasses as when the exhaust tube is sealed to the bulb.

The invention will be more fully understood by reference to the accompanying drawing, in which:

Fig. 1 is a side view in elevation of a sealing-in machine or head;

Fig. 2 shows a portion of the machine illustrated in Fig. 1 with a bulb in position and having a mount out of alignment;

Fig. 3 is a view similar to that shown in Fig. 2 but shows the mount adjusted to the axial line of the bulb by reason of a magnetic force; and

Fig. 4 shows a bulb with the exhaust tube thereof elongated to provide a constricted portion for tipping-off purposes.

The machine selected to show a practical embodiment of the invention may comprise a supporting structure or table 5 provided with a vertical bearing 6 in which a sleeve 7 is rotatably disposed.

Positioned axially within the sleeve 7 is a hollow rod 8 terminating at its upper end in a concave seat or pocket 9 open to the bore of the rod and shaped to fit the spherical portion of a bulb and serve as a bulb holder 10. The lower end 12 of the rod 8 is closed and may project from the sleeve 7 for engagement with any suitable mechanical element such as a cam to move the rod vertically within the sleeve or the rod may be moved by hand for purposes to be hereinafter described. The rod 8 may be provided with a feather or may be splined in the usual manner against rotation but free to be reciprocated in the sleeve 7.

The bulb 11 is held in position in the seat 9 by reason of a vacuum created within the bore of the rod 8. The vacuum may be caused by any suitable pump (not shown) connected to a pipe 13 communicating with an internal annular groove 14 of a valve-ring 15 in which the sleeve 7 is slidable. Communication between the bore of the rod 8 and the groove 14 is provided by a port 16 in alignment with a slot 17 in the wall of the rod 8. The rod may thus be moved up or down and a vacuum maintained therein.

The upper end of the sleeve 7 may be provided with a hub 18 having a flange 19 to which is secured a post 21 to support a gripping-member 22 for holding an exhaust tube 23 in the desired relation to the bulb 11.

The gripping-member may comprise a plate 24 and an elastic-member 25 so arranged that the exhaust tube may be held in place when inserted between the last mentioned member and the plate. The exhaust tube may readily be disposed with an end 26 adjacent to leading-in wires 27 and 28 which in conjunction with a filament 29 and a bead 31 constitute a mount.

The bead 31 is usually a fusible non-conductive material such as glass and serves as a coupling to hold the leading-in wires in spaced relation and the filament may be of any shape and secured to ends of the leading-in wires as by welding.

In the present type of mount the leading-in wires are of nickel steel alloy and susceptible to magnetic attraction which property is utilized to move the mount in the bulb 11 after it has been positioned with the free ends of the leading-in wires extending outwardly from and resting on the neck of the bulb.

A permanent magnet may be used but it has been found desirable in the present type of machine, to render the bulb-holder 10 magnetic inasmuch as the bulb-holder or hollow-rod 8 is disposed on a line coincident with the longitudinal axis of a positioned bulb. This is accomplished by surrounding a portion 32 of the rod with a helical coil 33 spaced or insulated from the rod but having an end 34 in contact with the rod and electrically connected through the metallic portion of the machine and a conductor 34' to a generator 35 or other source of electrical energy. The opposite end 36 of the coil

33 may be in contact with a ring-shaped plate 37 secured to and insulated from the under side of the flange 19. A brush 38 and a conductor 41 connected to the generator 35 completes the circuit and the rod 8 is caused to create a magnetic field which serves to draw the mount toward the rod and consequently to the axial line of the bulb. A switch 40 may be provided for creating or terminating the magnetic force as desired.

By reason of the brush contact the head may be revolved during the heating of the neck of the bulb and the end 26 of the exhaust tube. A gear-wheel 42 may be secured to the sleeve 7 and connected to any suitable source of power (not shown).

In operation a bulb 11 may be placed in the holder and a mount temporarily supported on the neck of the bulb by the leading-in wires 27 and 28. As shown in Fig. 2 the mount when so positioned may be out of axial alignment. When the magnetic field is created by closing the switch 40 the mount will be moved and held in the required axial position as shown in Fig. 3. Fires 44 and 45 may then be so directed as to soften the neck of the bulb and the end 26 of the exhaust tube, causing them to unite by fusion, the mount being maintained in axial alignment with respect to the bulb. The exhaust tube is then elongated by a downward movement of the rod 8 to provide a constriction 46 for tipping-off purposes. This movement may be caused by a mechanical element engaging the end 12 of the rod or the rod may be actuated manually.

As will be evident the present invention provides a simple and positive means for aligning a mount. A sealing-in head embodying the invention may therefore be employed to cooperate with other machines operating to make a complete lamp. For example, whereas heretofore the operator of a sealing-in machine was occupied in adjusting the mount, such time may be utilized in attending an additional machine, thus reducing the labor cost in lamp manufacture and at the same time improving the quality by reason of the greater accuracy in positioning the filament.

Although a preferred embodiment of the invention is shown and described herein, it is to be understood that modifications may be made therein without departing from the spirit and scope of the invention as set forth in the appended claims.

What is claimed is:

1. A sealing-in machine comprising means for supporting a bulb, a mount embodying a magnetic material positioned in said bulb and means for creating magnetic lines of force to maintain the mount with the filament thereof on the axial line of the bulb.

2. A sealing-in machine comprising means for supporting a bulb, a mount embodying a magnetic material positioned in said bulb, a magnet associated with said machine to affect the mount and position the filament thereof on the axial line of the bulb.

3. A sealing-in machine comprising means for supporting a bulb for the disposition of a mount, a magnetic material in the neck portion thereof, means for fusing an exhaust tube to said bulb and means for creating a magnetic force to adjust the mount and adjust the filament thereof on the axial line of the bulb.

4. A sealing-in machine comprising means for securing a bulb with the neck portion thereof in position to receive a mount embodying a magnetic material for disposition with the lead wires of the mount engaged with the edge of the bulb, means for softening the edge of the bulb and means for creating a magnetic force to move the mount and embed portions of the lead wires in softened material of the bulb.

5. A sealing-in machine comprising means for securing a bulb with the neck portion thereof in position to receive a mount embodying a magnetic material for disposition with the lead wires of the mount engaged with the edge of the bulb, means for softening the edge of the bulb, means for creating a magnetic force to move the mount and embed portions of the lead wires in softened material of the bulb, means for supporting an exhaust tube with an end adjacent the said softened edge of the bulb and means for fusing the bulb and exhaust tube together.

6. A sealing-in machine comprising a vacuum cup to receive and secure a lamp bulb in position for the disposition in the neck portion of said bulb, a mount embodying a magnetic material, means for supporting an exhaust tube with an end adjacent the neck portion of the bulb, means for softening and fusing the bulb and exhaust tube together and means for creating a magnetic force to adjust the mount while the fused portion is still in the plastic condition.

7. A sealing-in machine comprising a support for a bulb, means for securing the bulb with the neck portion in position to receive a mount embodying a magnetic material, means for supporting an exhaust tube with an end thereof adjacent to the neck portion of said bulb, means for fusing a bulb and exhaust tube together, means for creating a magnetic field to attract and move said lamp mount to position a filament on the axial line of the bulb and means for forming a constriction in the exhaust tube adjacent to the bulb.

8. A mechanism for consolidating a bulb and a mount embodying magnetic material comprising means for supporting the mount

and bulb in given relative positions and means for creating magnetic lines of force capable of axially aligning the mount with respect to the bulb.

9. A mechanism for consolidating a bulb and a mount embodying magnetic material comprising means for supporting a bulb with a mount positioned adjacent thereto and means for creating magnetic lines of force to reposition said mount and axially align the same with respect to said bulb.

10. A mechanism for consolidating an object embodying magnetic material to a bulb comprising means for uniting said article to the bulb and means for creating a magnetic field to maintain the object in a given position preparatory to union with said bulb.

11. A machine for sealing an element in a container comprising means for holding the container and means for rendering the said holding means magnetic.

12. A machine for sealing an element in a container comprising a pneumatic chuck to secure the container and means for rendering said chuck magnetic to adjust an element in said container.

13. A machine for sealing a mount in a bulb comprising a holder for said bulb and means for rendering said holder magnetic to adjust said mount in the container.

14. The step in the method of manufacturing an electrical device comprised of a bulb and an internal structure including a magnetic material which consists in embedding said structure within a plastic portion of a bulb, creating a magnetic field to move and reposition said structure within the bulb.

15. The method of manufacturing incandescent lamps which include a bulb and a mount embodying magnetic material and having a filament which comprises fusing the walls of the bulb neck, embedding the leading-in wires of a mount in said fused neck and in subjecting the mount to a magnetic force to position the same in a predetermined relation with the walls of the bulb while the fused portion of the bulb is still plastic.

16. The method of manufacturing incandescent lamps which include a bulb and a mount embodying magnetic material and having a filament which comprises disposing a portion of the mount in a fused portion of the bulb and subjecting the mount to a magnetic force while the fused portion is plastic to move the filament of the mount along the axial line of the bulb.

17. The method of sealing together two hollow bodies and embedding a third body embodying a magnetic material in the seal thereof which comprises positioning said hollow bodies with an end of each body adjacent to said third body, applying heat to render plastic portions of the bodies adjacent to said third body, permitting said plastic portions to unite and embed said third body within the joint, subjecting the said third body to a magnetic force to adjust the same within one of said bodies.

18. The method of sealing together two hollow bodies and embedding a third body embodying a magnetic material in the seal thereof which comprises positioning said tubular bodies with an end of each body adjacent to said third body, subjecting said third body to a magnetic force to adjust the same in a predetermined position with respect to said hollow bodies, applying heat to render plastic portions of the tubular bodies adjacent to said third body, permitting said plastic portions to unite and embed said third body within the joint and retaining the third body in position until said plastic portions harden.

19. The method of sealing two tubular bodies and embedding a third body, embodying a magnetic material in the seal thereof which comprises positioning said tubular bodies with an end of each separated by said third body, heating to render plastic portions of the tubular body adjacent to the third body, permitting said plastic portions to unite and embed said third body within the joint, subjecting said third body to a magnetic force to move said body to a predetermined position with respect to said tubular bodies.

20. The method of butt sealing two tubular bodies and embedding a third body embodying a magnetic material in the seal thereof which comprises positioning said tubular bodies with an end of each separated by and in contact with said third body, applying heat to render plastic portions of the tubular bodies adjacent to said third body, permitting said plastic portions to unite and embed said third body within the joint, subjecting said third body to a magnetic force to move and retain said third body in a predetermined position with respect to said tubular bodies.

21. The method of butt sealing two tubular bodies and embedding a third body embodying a magnetic material in the seal thereof which comprises positioning said tubular bodies with an end of each separated by and adjacent to said third body, applying heat to render plastic portions of the tubular bodies adjacent to said third body, permitting said plastic portions to unite and embed said third body within the joint, subjecting said third body to a magnetic force to move and retain said body in a predetermined position with respect to said tubular bodies and elongating one of the tubular bodies while a portion thereof is still plastic to provide a constriction.

22. A sealing-in machine comprising

means for supporting a bulb, means for supporting a mount in said bulb, means for fusing the bulb to unite the mount thereto, means associated with said machine to automatically adjust the mount and position the filament thereof on the axial line of the bulb while the fused portion of the bulb is still plastic.

23. A sealing-in machine comprising means for supporting a bulb for the disposition of a mount therein, means for holding a mount within said bulb, means for fusing said bulb to secure the mount thereto and means for automatically changing the relative positions of the mount and bulb while the fused portion is still plastic to adjust the filament of the mount to a given relative position within the bulb.

In testimony whereof, I have hereunto subscribed my name this 15th day of May, 1925.

JACOB C. GROGAN.