May 3, 1927. 1,626,679

H. D. KELLY

LAMP MAKING MACHINE

Filed Oct. 12, 1923

FIG. 1.

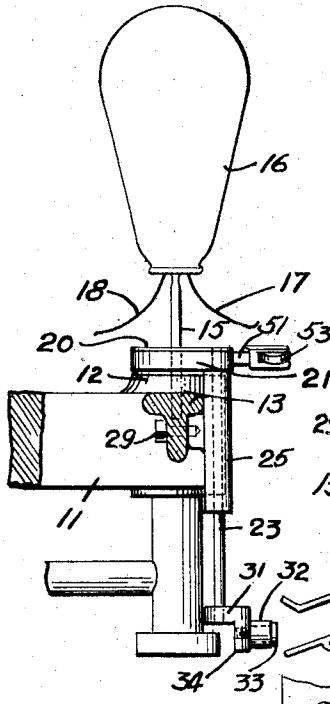


FIG. 2.

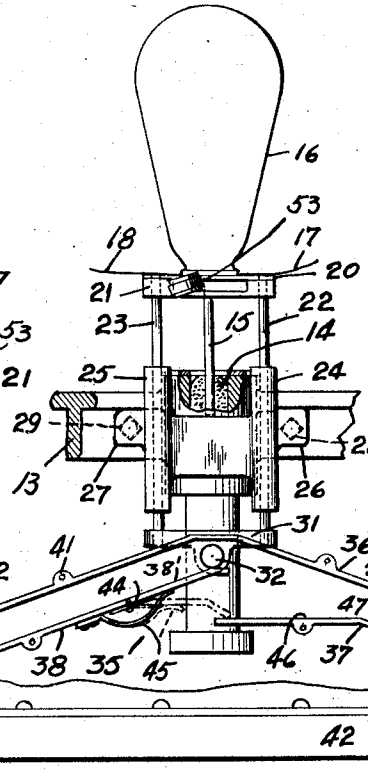


FIG. 5.

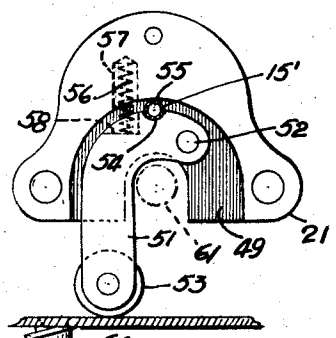


FIG. 6.

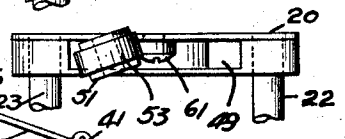
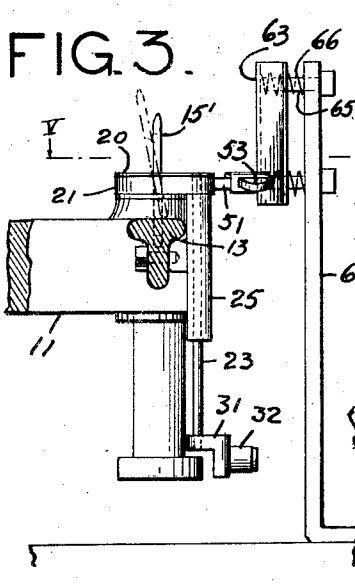


FIG. 3.



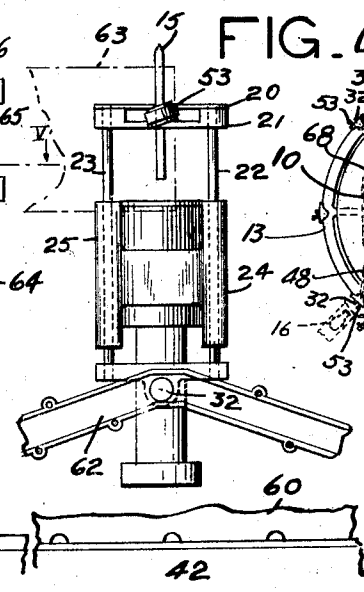
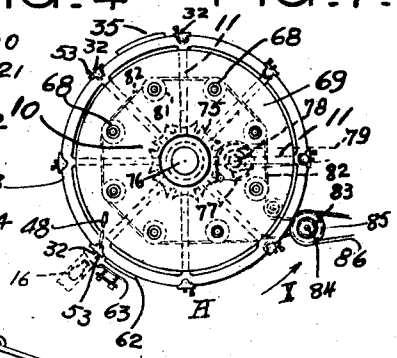


FIG. 4

FIG. 7.



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UNITED STATES PATENT OFFICE.

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LAMP-MAKING MACHINE.

Application filed October 12, 1923. Serial No. 668,050.

This invention relates to lamp making machinery and more particularly to machines for performing the exhausting operation.

An object of the invention is to provide a machine wherein certain of the lamp parts may be removed from contact with a flame during a tipping-off operation.

Another object of the invention is the provision of means for gripping an exhaust tube and lifting the tube from an exhausting aperture.

A further object of the invention is to provide a device which will operate to first position the leading-in wires of a lamp away from tipping-off fires and subsequently operate to extract the remaining portion of an exhaust tube after a tipping-off operation.

A still further object of the invention is to provide a simple and effective mechanism which may readily be applied to an exhausting machine of standard construction and automatically actuated to perform the respective operations in the proper sequence.

In the manufacture of incandescent electric lamps, it is common to employ a machine termed "a sealing-in and exhaust machine". The present invention provides mechanism attachable to the exhaust portion of the above type of machine. It is, of course, obvious that such mechanism may be employed with an exhausting machine irrespective of whether the sealing-in operation is combined thereto or not. Ordinarily, after a lamp has been sealed in, that is, the stem portion has been consolidated with the neck of a bulb, the exhaust tube is inserted into an exhaust-tube-receiving or supporting aperture of an exhaust machine.

Machines for producing vacua in lamp bulbs are well known in the art and such machines usually comprise a pump having a valve consisting of a disc movable upon a nether plate and having suitably disposed ducts in given relative positions. The ducts are connected with intermediate passages which in turn afford communication to a plurality of communicating passages, the latter terminating in tube-supporting members or tube-supporting apertures.

The disc valve is operated to open and close the ports leading to the tube-supporting apertures, to successively evacuate the several positioned lamps. The bulbs are usually exhausted in a series of progressive exhausting steps, each step effecting a certain degree of vacuum until the proper evacuation has been attained.

The tube-supporting-apertures are generally located at the termination of arms of a spider or other conveyor and the conveyor is moved intermittently to position the tubes successively for the several evacuating operations. After a bulb has been evacuated prior to its removal from the exhaust-tube aperture, it is positioned in a heat zone which may be created by a suitable gas flame, at which time the bulb is tipped-off to seal it. The bulb is then guided to a suitable receptacle and the remaining portion of the exhaust tube is generally extracted by the operator when another lamp is applied for the exhausting operation.

The manual extraction of tubes is not only time consuming, but is a source of considerable annoyance to an operator, since the projecting tube is slippery with lubricating oil and difficult to extract. The present invention, therefore, provides a means for automatically removing such tubes without loss of time and to the advantage of the operator.

Ordinarily, when an operator applies a lamp to an exhaust-tube-aperture, the conductors or leading-in wires which project from the lower end of the bulb become positioned substantially parallel to the exhaust tube. Thus during the tipping-off operation, the fires act to heat the wires to a relatively high temperature. This heating of the conductors is detrimental and the present invention provides means for automatically repositioning the wires to remove them from the path of the flames employed for the tipping-off operation.

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

Fig. 1 shows a side elevation of an embodiment of the present invention applied to an exhausting machine, a portion of which is shown partly in section;

Fig. 2 is a front view of the embodiment partly in section and showing a cam arrangement for operating certain of the parts;

Fig. 3 is a side view of the device similar to Fig. 1 but showing a cam face for operating a gripping jaw;

Fig. 4 is a front view of the device shown

in Fig. 3 showing a lifting cam, the cam for operating the jaws being shown in dotted lines;

Fig. 5 is a view of the device taken on line V—V in Fig. 3, the cover plate being removed to show a gripping jaw;

Fig. 6 is a front view of the gripping jaw and housing, and

Fig. 7 is a diagrammatic representation of a sealing-in and exhausting machine showing the relative positions of the lifting and jaw-operating cams.

A device embodying the present invention may comprise a spider or conveyor 10 (see Fig. 7), provided with a plurality of arms 11 which terminate in hubs 12 connected by reinforcing sections 13. The exhaust-tube may be supported in the usual resilient socket 14, generally consisting of a soft rubber tube. An exhaust tube 15 of a bulb 16 (see Fig. 1) is inserted into the socket 14, a lubricating fluid such as castor oil being applied to the tube to more effectively seal the bulb from the atmosphere. These sockets constitute "the exhaust-tube apertures".

As shown in Fig. 1, when the exhaust tube 15 of the bulb or lamp 16 has been inserted into an exhaust tube aperture, the leading-in wires 17 and 18 of the bulb project downwardly and usually lie in the path of fires, when directed at the constricted portion of the tube 15 during the tipping-off operation.

For the purpose of removing the leading-in wires from the path of the fires, a spreader or deflector member or plate 20 is provided and adapted to be moved upwardly to position the leading-in wires substantially perpendicular to the vertical axis of the bulb. Owing to the flexibility of the leading-in wires, they readily take the position into which they are bent. The deflector member 20 may comprise the cover for a housing 21 for an exhaust-tube-gripping device which will hereinafter be more fully described.

The deflector member 20 and housing 21 may be mounted upon a pair of rods 22 and 23 slidable in guides 24 and 25. The guides may be constructed as a single casting and may be provided with projections 26 and 27, secured to sections 13 of the spider 10 by tap-bolts 28 and 29. The lower ends of the rods 22 and 23 may have secured thereto, a cross-head 31 having a centrally disposed guide roller 32. The roller may be held in any desired manner as by a pin 33 threadedly connected to a depending portion 34 of the cross-head 31.

For the purpose of effecting an upward movement of the deflector 21, a box cam which may be designated as a whole by the numeral 35, is provided at a suitable point throughout the movement of the conveyor 10. The cam arrangement may consist of an upper plate 36 and lower plates 37 and 38. These plates may be secured to an upright or backing 39, suitable ears 41 being provided on the plates, whereby they may be bolted to the backing 39.

As shown in Fig. 2, the backing 39 has been broken away to more clearly show the cam arrangement, it being obvious, however, that any suitable support such as a metal sheeting may be provided and bolted to a table 42, upon which the conveyor 10 may be mounted. As the conveyor moves around, the roller 32 will traverse the guide plate 38 and thus the deflector-member 20 will be lifted.

For the purpose of compensating for any variation in the vertical position of the bulb, a portion 38′ of the guide plate 38 is made resilient. Thus if the distance between the lower portion of a bulb and the top of the exhaust-tube-aperture varies, the deflector member may make contact with the lower portion of the bulb. It will be evident, however, that by reason of the resilient portion 38′, sufficient pressure to bend the wires may be exerted, but not great enough to lift the exhaust tube in the aperture.

As illustrated, a hinge 44 is provided to connect the portions of the lower plate 38 and a spring 45 secured to the rigid portion of the plate 38 is so disposed, as to normally keep the movable portion 38′ in alignment with the rigid portion, thus providing what may be termed "a resilient cam or guide surface". When the roller 32 leaves the portion 38′, the deflector member will drop and the roller 32 will then traverse the surface 46 of the plate 37 and as the conveyor rotates, the roller makes contact with the upper surface 47 to positively bring the deflector plate to its lower position. The support wires having been bent to position as shown in Fig. 2, the bulb may be moved to the tipping-off position and tipping-off fire 48 (see Fig. 7) then operates to sever the bulb, which is ejected as indicated in dotted lines in Fig. 7. After the tipping-off operation, the remaining portion 15′ of the exhaust tube is left in the exhaust-tube-apertures (see Fig. 3) and projects upwardly through the housing 21 and deflector plate 20. The housing is provided with a recess 49 (see Fig. 5) in which is disposed a lever arm 51 having one end pivoted on a pin 52 within the housing and the opposite end projecting from the housing and provided with a roller 53.

The lever arm 51 is provided with a notched portion 54 adapted to make contact with a side of the exhaust tube 15′ projecting from the exhaust-tube-aperture. A movement of the arm 51, therefore, serves to secure an exhaust tube by compression between the surface of the notch 54 and the side 55 of the recess 49. The arm 51, however, is normally maintained from contact with the exhaust tube by reason of a spring

56 disposed in an aperture 57 and adapted to make contact with a flat portion 58 of the arm 51. The housing 21 is provided with the cover plate 20 as above mentioned and clearly shown in Fig. 6. A tap-bolt 61 is positioned on the under side of the plate 20 to limit the outward movement of the arm 51.

After the bulb 16 has been tipped-off and the conveyor moved, the roller 32 may enter a suitably positioned guide 62 having upwardly and downwardly inclined surfaces. The guide 62 may be supported on a plate 60, which plate may be secured to the table 42 in a manner similar to that shown for the box cam 35. Prior to the entrance of the roller into the guide 62, the arm 51 is moved to grip the upwardly extending exhaust tube. An actuation of the arm 51 may be effected by a resilient cam surface 63 positioned to make contact with the roller 53. The cam 63 may be mounted on an upright 64 and carried on rods 65. The rods may be slidable in the upright and helical springs 66 disposed between the cam and the upright may provide the resilient action. As the conveyor moves and the arm 51 is operated to grip the exhaust tube, the roller 32 enters the guide 62 and the housing carrying the arm 51 is moved upwardly until the exhaust tube leaves the aperture, at which time the roller 53 may leave the cam surface 63, permitting the tube to drop and rest upon the upper surface of the exhaust-tube aperture and as the conveyor continues to move, the housing and the arm 51 will be returned to their lower positions by reason of the downwardly inclined portion of the guide 62. The exhaust tube 15 then takes the position somewhat as shown in dotted lines in Fig. 3.

It will be understood that the exhaust tube will not drop into the aperture again, it being necessary to force the tube into the aperture since the hole is normally of less diameter than the diameter of the exhaust tube.

Although the portion 15′ of the exhaust tube may be ejected from the machine automatically, it has been found of advantage to leave it in the position as shown in Fig. 3, ready for removal by the operator who may readily discard it and insert another lamp to be exhausted.

Another advantage of leaving the exhaust tube in position, is that in the event that an operator does not have another lamp ready for insertion into the exhaust-tube-aperture, the tube 15′ may be inserted to serve as a seal during the rotation of the machine, thus preventing air from being sucked into the line.

When the present invention is applied to a machine as diagrammatically shown in Fig. 7, the bulbs are sealed to the stem when in sealing-in-heads 68 mounted upon a disc or conveyor 69 which may be part of the conveyor or spider 10.

Sealing-in and exhausting machines are so constructed that the sealing-in heads are independently rotated and the conveyor which carries the heads and the exhaust-tube-receiving apertures is rotated intermittently.

For the purpose of showing a means of intermittently rotating the machine, Fig. 7 illustrates a Geneva drive comprising a slotted disc 75 which may be rotatable about a vertical shaft 76 upon which the conveyor is rotated and may be secured to the conveyor. The Geneva driving wheel 77 may be mounted on a vertical shaft 78 and driven through a belt 79 which may be connected to any suitable source of energy, as a motor (not shown).

By reason of the Geneva movement which is provided with an eight slotted disc, the conveyor may be moved intermittently through a rotary path having eight stationary stages to accommodate the eight exhaust-tube apertures provided in this machine.

As is common in sealing-in and exhausting machines, the sealing-in heads 68 are rotated and provided with sheaves 81 adapted to engage with an endless belt 82, which may be led over a driving sheave 83 mounted on a vertical shaft 84. The shaft 84 may be provided with a pulley 85, connected by a belt 86 to any suitable source of energy (not shown).

It will, of course, be understood that the diagrammatic construction is merely representative and that more desirable forms of construction may be had and that the present invention is applicable to machines of more advanced design.

Referring to Fig. 7, the operator may be positioned at "A" and may remove a sealed lamp from one of the heads 68 and insert it into an exhaust-tube-receiving aperture 14 while the conveyor is stationary. Suitable mechanism being employed to stop the rotation of a head as required the belt 79 may then be operated to effect an intermittent rotation of the machine, which results in the progressive exhaustion of the lamp as the machine revolves in the direction of the arrow "X."

When a roller 32, of the present embodiment of the invention, reaches the box cam 35, it engages with the cam surface and the deflector plate 20 is raised and operates to spread and remove the leading-in wires from the path of the fires employed in the tipping-off operation. A continued rotation of the machine then brings the exhaust tube of a lamp in operative relation to the tipping-off mechanism which is indicated by the burner 48. The roller 53 then makes con-

tact with the resilient cam face 63 and the roller 32 engages with the cam 62. The portion of the exhaust tube, which remains after the tipping-off operation, is gripped in the notch in the jaw 51 and as the roller 32 traverses the cam 62, the tube is lifted from the aperture and left ready for discharge by the operator, when another lamp is to be inserted.

It will be evident, that by reason of the present invention, the operation of exhausting lamps is greatly facilitated and that considerable loss due to the burning of leading-in wires is obviated.

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

What is claimed is:

1. In a machine the combination with means for supporting a bulb having leading-in wires projecting therefrom, a lead wire deflector member for engaging said leading-in wires and means for moving said member to bend said wires away from the axial line of said bulb.

2. In an exhausting machine for incandescent electric lamps, the combination with means for supporting a bulb having leading-in wires projecting therefrom and means for bending said leading-in wires away from the axial line of said bulb.

3. In an exhausting machine for incandescent electric lamps, the combination with a conveyor having an exhaust-tube-receiving aperture, means adjacent said aperture for engaging the leading-in wires of a lamp positioned in said aperture and positioning the wires away from said exhaust tube and means for automatically actuating said engaging means.

4. In an exhausting machine for incandescent electric lamps, the combination with a conveyor having an exhaust-tube-receiving aperture, a deflector plate movable adjacent to said aperture to engage leading-in wires of a lamp supported in said aperture and means for automatically actuating said deflector plate during the movement of said conveyor.

5. In an exhausting machine for incandescent electric lamps, the combination with a conveyor having exhaust-tube-receiving apertures, deflector plates disposed in operative relation with said apertures and movable to engage with and spread leading-in wires projecting from bulbs supported in said apertures and means for automatically actuating said deflector plates.

6. In an exhausting machine for incandescent electric lamps, the combination with a conveyor having exhaust-tube-receiving apertures, deflector plates disposed above said apertures, a passageway in said deflector plates for the insertion of an exhaust-tube of a bulb therethrough and into said exhaust-tube-receiving apertures, and means for automatically reciprocating said deflector plates to position leading-in wires of said bulb out of a given path.

7. An exhausting machine for incandescent electric lamps comprising a conveyor having apertures to receive the exhaust tube of a lamp bulb, means for intermittently rotating the conveyor, a member movable about said exhaust tube for engaging the leading-in wires of said bulb and means adjacent said conveyor for operating said member during movement of said conveyor to move said leading-in wires to a predetermined position.

8. An exhausting machine for incandescent electric lamps comprising a conveyor having exhaust-tube-receiving apertures, means for gripping exhaust tubes disposed in said apertures and means for causing the gripping means to lift said exhaust tubes from said apertures.

9. An exhausting machine for incandescent electric lamps comprising a conveyor having exhaust-tube-receiving apertures, a reciprocable member having jaws for gripping an exhaust tube disposed in one of said apertures, means for actuating said jaws to grip said tube, means for raising said member and means for causing the jaws to release the tube.

10. An exhausting machine for incandescent electric lamps comprising a conveyor having exhaust-tube-receiving apertures, a vertically reciprocable member, means associated with said member adapted to grip an exhaust tube disposed in said aperture, means for lifting said member to remove an exhaust tube from said aperture and means for causing the jaws to release the tube.

11. An exhausting machine for incandescent electric lamps comprising a conveyor having exhaust-tube-receiving apertures, a movable member having means adapted to grip an exhaust tube disposed in one of said apertures, means for rotating said conveyor and an inclined track adjacent said conveyor for effecting a movement of said member to lift an exhaust tube from said aperture.

12. An exhausting machine for incandescent electric lamps comprising a conveyor having exhaust-tube-receiving apertures, a movable member, means associated with said member adapted to grip an exhaust tube when said tube is disposed in one of said apertures, means for rotating said conveyor, means adjacent said conveyor for effecting a reciprocation of said member to lift an exhaust tube from said aperture and return said member to its normal position and means for causing the jaws to release the tube.

13. An exhausting machine for incandes-

cent electric lamps comprising a conveyor having exhaust-tube apertures, a movable member having means adapted to grip an exhaust tube when said tube is disposed in one of said apertures, means for rotating said conveyor, a resilient cam surface for moving said member into contact with said tube during a movement of said conveyor and means for moving said member to lift said tube from the aperture.

14. An exhausting machine for incandescent electric lamps comprising a conveyor having exhaust tube apertures, a movable member, means associated with said member adapted to grip an exhaust tube when said tube is disposed in one of said apertures, means for rotating said conveyor, a resilient cam surface for engaging and moving said member into contact with said tube during a movement of said conveyor, means for moving said member to lift said tube from the aperture and means for causing the jaws to release the tube.

15. A lamp-making machine comprising a conveyor having a plurality of exhaust-tube-receiving apertures, a deflector plate adapted to be moved to and from an aperture to engage leading-in wires of a lamp positioned with an exhaust tube thereof in said aperture, a tube gripping member associated with said deflector plate and means for successively actuating said deflector plate and said tube gripping means.

16. An exhausting machine for incandescent electric lamps comprising means for supporting a lamp bulb by the exhaust tube thereof, a deflector plate movable about the exhaust tube and adapted to engage with the leading-in wires of said bulb, a cam surface adapted to cooperate with said deflector plate to move the latter to bend said leading-in wires and a yieldable portion associated with said cam to permit contact between said deflector plate and said bulb without effecting a movement of said bulb.

In testimony whereof, I have hereunto subscribed my name this 10th day of October, 1923.

HARRY DANIEL KELLY.