

Aug. 17, 1926.

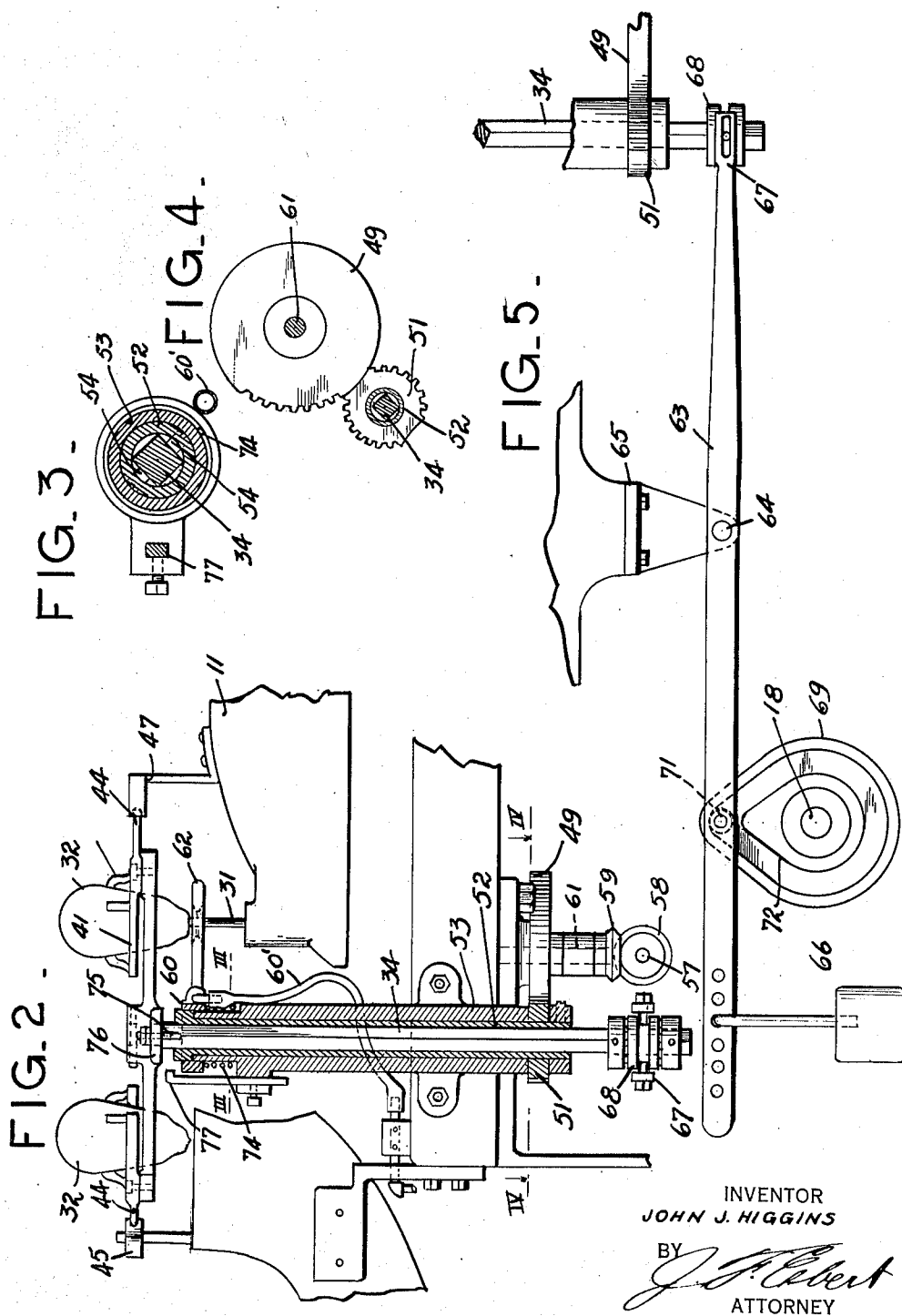
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1,596,733

TIPPING-OFF AND TRANSFER MECHANISM

Filed June 9, 1924

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UNITED STATES PATENT OFFICE.

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TIPPING-OFF AND TRANSFER MECHANISM.

Application filed June 9, 1924. Serial No. 718,708.

The present invention relates to machines for making incandescent electric lamps and more particularly to a device for tipping-off an exhaust tube from an evacuated bulb and transferring the bulb for discharge from the machine.

An object of the invention is to provide a device for the expeditious and automatic performance of the tipping-off and bulb transfer operations.

Another object of the invention is to provide a machine which may operate to locally heat a portion of an exhaust tube to sever the same from a bulb and subsequently convey the bulb from the machine.

A further object of the invention is to provide coordinating machine elements which will operate to perform the tipping-off and bulb transfer operations in an effective and efficient manner in accordance with the production standards required on such machines.

Other objects and advantages of the invention will be apparent from the following description.

The manufacture of incandescent electric lamps includes an operation known as exhausting in which the lamp bulb is evacuated to a given degree. Machines for producing a vacuum in lamp bulbs are well known in the art and usually include a pump having a valve consisting of a pair of disks having suitably disposed ducts in given relative positions. The ducts or ports are connected with intermediate passages which in turn, afford communication to a plurality of exhaust-tube-receiving apertures. These tube-receiving apertures usually comprise openings in flexible tubes of soft rubber which constitute what may be termed tube-supporting members. The disk valve may be operated to open and close the ducts leading to the supporting members to successively evacuate the several lamps positioned in a series of supports.

Exhaust machines of the type to which the present invention relates may consist of a conveyer preferably of circular form having a plurality of tube-supporting members adjacent the periphery thereof. The supporting members may be successively con-

nected with the exhaust pumps for creating from a minimum to a maximum degree of vacuum. Thus the exhaust tube of a lamp bulb is disposed in a tube-supporting aperture or member and the bulb is subjected to several evacuating operations until finally the proper degree of vacuum is attained. It then becomes necessary to perform what is termed the tipping-off operation to seal the bulb and remove the same from the lower portion of the exhaust tube which remains in the tube-supporting aperture.

The present invention pertains to mechanism for handling and operating upon a lamp when it reaches the tipping-off position in an exhaust machine. Such mechanism first grips the lamp when disposed in the tipping-off position, then is slowly elevated, as the heating continues, to effect the tipping-off operation, after which suitable co-related machine elements are actuated to remove the tipped-off lamp from its position in the sealing-in machine and to convey the lamp to position over a suitable guide or chute whereupon the lamp is released for conveyance by gravity or otherwise away from the machine.

More specifically, the mechanism for accomplishing the above recited operations may comprise what may be termed a turnstile device including oppositely projecting arms mounted on a vertical shaft and adapted to be rotated therewith. The arms may be provided with gripping jaws and so arranged that upon a rotary movement of the shaft a given number of degrees, one pair of jaws will engage with a bulb in a sealing-in machine. Mechanism then operates to heat the exhaust tube and the turnstile is raised gradually to effect the tipping-off operation, whereupon a rotary movement of the shaft a given number of degrees brings the lamp to position for discharge, at which time mechanism operates to release the lamp.

The invention will be more fully understood by reference to the accompanying drawings, in which—

Fig. 1 is a plan view of a sealing-in machine having the present invention applied thereto;

Fig. 2 is a fragmentary elevational view

partly in section, showing the tipping-off and transfer mechanism illustrated in Fig. 1, viewed in the direction of the arrow X in Fig. 1;

Fig. 3 is an enlarged sectional view taken on line III—III in Fig. 2;

Fig. 4 is a view taken on line IV—IV in Fig. 2 and shows the intermittent gearing, and

Fig. 5 is a fragmentary view of mechanism for lifting the lamps as part of the tipping-off operation.

As illustrated in Fig. 1, the invention may be applied to a sealing-in machine including a supporting frame 10 upon which is mounted a spider or conveyor 11, rotatable with a centrally disposed shaft 12. The conveyor may be rotated intermittently through the agency of the usual geneva movement including a slotted disk 13 and a driving member 14. The driving member may be secured to a vertical shaft 15 which in turn is secured to a spiral gear 16 driven by a companion spiral gear 17 fastened to a horizontal shaft 18. The spiral gearing may be of one to one ratio to effect a complete revolution of the shaft 15 with each revolution of the shaft 18. The shaft 18 may be connected by spur gears 19 and 21 to a shaft 22 of any source of energy, as for example a motor, not shown. The shaft 18 may be suitably supported in bearings hung upon the frame 10 and may be controlled by a pin-clutch 26 operable by a treadle comprising a foot piece 27 and a link 28. The pin-clutch is a well known mechanism and each actuation of the same permits the shaft 18 to make a complete revolution. Any suitable type of clutch may be employed and further description thereof is not believed to be necessary.

The conveyor is provided with a plurality of exhaust-tube-receiving apertures 29 in which exhaust tubes 31, (see Fig. 2) of lamp bulbs 32, are inserted. The conveyor 11 is rotated in the direction of the arrow Y and the operator may be positioned at A to insert lamps for the exhausting operation. When the conveyor has made a cycle and the exhausting operation is completed, the lamp is then at position B, adjacent a rotatable member or turnstile 33 mounted on a vertical square-shaft 34. The member 33 may comprise two oppositely projecting arms 35 and 36, each having a pair of jaws 37 and 38 mounted at the free ends thereof, respectively. The jaws 37 and 38 are similar in construction and operated by similar mechanism, and may comprise gripping-members 39 and 41 mounted on pins 42 and 43 respectively.

The gripping-member 41 is provided with a hub 40 having teeth to engage with teeth on hub 41' of the gripping member 39, thus

a rotation of one of the hubs will effect a movement of the opposite one and the gripping members may be opened or closed. In order to automatically open the said gripping members, the member 39 is provided with an arm 44. The arm may engage with a cam surface 45 suitably positioned with respect to the rotatable member 33, so that when the gripping members are positioned over a chute or guide 46 an object secured by the gripping members will be released for passage thereto.

For the purpose of opening the jaws 37 to receive a lamp bulb positioned in the exhausting machine, the conveyor of said machine may be provided with cam member 47 suitably positioned with respect to each of the exhaust-tube-receiving apertures, so that just as the lamp is moved to position for the tipping-off operation, arm 44 of one of the gripping members of the jaws 37 will be engaged by the cam surface and the jaws opened as the conveyor moves to position a lamp therebetween, the jaws being closed as the arm 44 passes from the cam 47. The gripping-members 39 and 41 may be normally urged to a closed position by a spring 48 having the ends thereof secured to said members.

The foregoing description sets forth the movements required of the turnstile member to grip and transfer a bulb. Mechanism for transmitting motion to effect these various operations is interposed between the shaft 18 and the vertical shaft 34, upon which the turnstile or rotatable member 33 is mounted.

For the purpose of alternately rotating and stopping the member 33, a pair of intermittent gears 49 and 51 are provided. The gear 51 is secured to a sleeve 52 (see Fig. 2), rotatable in a vertical guide bearing 53 in which the shaft 34 is centrally disposed. This shaft may be of rectangular cross-section and movable about its longitudinal axis with the sleeve 52 through the engagement of studs 54 (see Fig. 3), the shaft being, however, movable longitudinally within the sleeve.

As shown in Fig. 1, motion is transmitted to the sleeve 52 from the shaft 18 through the agency of beveled gears 55 and 56, shaft 57, beveled gear 58 and a beveled gear 59 which is secured to shaft 61 upon which the driver gear 49 of the intermittent gears is mounted. The toothed portions of the intermittent gears may be so arranged that they will operate in the proper timed relation to the operation of the conveyor 11 to bring the gripping members 39 and 41 about a bulb. When the members are so positioned, a gas burner 62 of any suitable type may be provided and so positioned as to direct flames upon the exhaust tube 31.

The burners may be of the open ring or U-shape type so that the conveyor may move an exhaust tube between a plurality of oppositely disposed flames. The burner may be secured to a movable collar 60 at the upper end of the sleeve 52 and connected by a flexible tube 60' to a source of fuel supply. As the exhaust tube becomes plastic, it is desirable to effect a tensional stress therein to stretch the tube and expedite the tipping-off operation. For this purpose, the member 33 is caused to raise.

Mechanism for effecting an upward movement of the member 33 may comprise a lever arm 63 pivoted about a pin 64 in a suitable bearing 65 secured to the frame work or supporting structure of the machine. One end of the lever is provided with an adjustable weight 66 and the opposite end 67 being forked to engage in a slotted collar 68 secured to the shaft 34. A stress may, therefore, be applied to the exhaust tube 31 by reason of the potential energy of the weight. However, means are provided for controlling the force resulting from the weight and such means may comprise a box cam 69 secured to the shaft 18. This cam is positioned to engage with a pin 71 extending from the lever arm 63.

When the cam is in position as shown in Fig. 5, the weight 66 will operate to raise the member 33 a given distance or until the pin 71 engages with a face 72 of the cam. The cam being then rotated, operates to control the upward movement of the shaft 34 as the pin 71 traverses the face 72 of the cam. When the burners 62 are positioned to heat the exhaust tube 31, it is desirable that they take a predetermined position and move for a comparatively short distance as the member 33 is moved upwardly. This is accomplished by mounting the burners on the ring or collar 60 slidably fitted to the upper end of the sleeves 52.

A spring 74 is provided to normally urge the ring and burners upwardly when the member 33 is in its lowest position. However, a set screw 75 projecting from an offset portion 76 on the member 33 engages with the ring 60 and maintains the burners in proper relation to an exhaust tube. As the member 33 is raised, the burners under the action of the spring 74, also move upwardly. This movement is, however, arrested by a stop member 77 adjustably secured to the guide bearing 53. The member 33 may then lift the bulb in order that the tipped off end of the exhaust tube may clear the burners to permit a rotary movement of the member 33 in transporting the bulb from the sealing-in machine. When a bulb has been tipped-off, the lower remaining section of the tube will be left in the conveyor. At the time the conveyor moves the

waste section of the exhaust tube from the tipping-off position, the burner will be raised to permit the free passage of this section, however, since the section is held in a flexible exhaust socket or aperture, it is free to be slightly rocked if the burner contacts therewith when the conveyor is moved.

The operation of the machine is as follows:

In practice, an operator positioned at A may insert the exhaust tube of a lamp bulb in an aperture 29 of the exhaust machine. The pin clutch mechanism is then operated and the shaft 18 permitted to make a complete revolution. During this revolution of the shaft 18, the conveyor, by reason of the spiral gearing and geneva movement provided, is rotated a given number of degrees.

In the present embodiment of the invention, a so-called eight-head machine is employed and the conveyor is thus moved a distance equal to one-eighth of a cycle. When the conveyor moves one-eighth of its movement, the geneva mechanism maintains it stationary and a lamp is brought to position B. During the movement of the conveyor, the shaft 18 operates other mechanism above described and the shaft 34 is rotated to bring the gripping members 39 and 41 toward the positioned lamp. As the members move into place, the conveyor is moving to a stationary position and the arm 44 engages with the cam member 47 and the gripping members open. The conveyor then stops and the rotatable member 33 continues to move, the arm 44 passes the cam member 47 and the jaws close. At this time, the intermittent gears reach a dead spot and the member 33 is maintained stationary to permit the fires to heat the exhaust tube, at which time the weight 63 is free to act, owing to the position of the cam 69 and the member 33 is raised, stretching the plastic portion of the exhaust tube to effect the tipping-off operation.

This tipping-off operation is predetermined and when the same is effected, the teeth of the intermittent gears will again mesh and the bulb will be carried from the sealing-in machine to position over the chute 46 and the arm 44 of the gripping members will engage with the cam surface 45 and the bulb will be released. At the time the member 33 begins to remove the bulb from the sealing-in machine, the geneva mechanism will operate to rotate the conveyor to position another bulb for the tipping-off operation and the foregoing movements of the various elements will be repeated.

It will be appreciated that the present invention provides a machine which combines the operation of tipping-off a bulb and automatically removing a tipped-off lamp from a sealing-in machine and the machine op-

erates to transfer such lamp either to another machine or to a hopper.

Considerable advantage is derived from the invention as above described, inasmuch as it expedites the production of lamps and effects an economy in manual operations, which are important factors in the lamp art.

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 transfer device for an incandescent electric lamp, exhaust and tipping-off machine comprising means for engaging a bulb during a tipping-off operation and means for automatically transporting an engaged bulb from the machine.

2. A transfer device for an incandescent electric lamp, exhaust and tipping-off machine comprising gripping jaws for securing a bulb during a tipping-off operation and means for transporting the gripped bulb from the machine.

3. A transfer device for incandescent electric lamps comprising means for tipping-off a bulb, means for engaging and raising the bulb during a tipping-off operation and means for automatically transporting an engaged tipped-off bulb from the machine.

4. A machine for tipping-off and transferring an incandescent electric lamp comprising tipping-off mechanism, means for gripping a bulb during a tipping-off operation and means for automatically transporting the gripped bulb from the machine.

5. A machine for tipping-off and transferring an incandescent electric lamp comprising tipping-off mechanism, gripping means for securing a bulb during a tipping-off operation and means for moving the gripping means to transport a tipped-off bulb from the machine.

6. A machine for tipping-off and transferring an incandescent electric lamp comprising means for tipping-off a bulb, means for supporting the bulb during the tipping-off operation and means for moving the supporting means to transport a tipped-off lamp from said machine.

7. A machine for tipping-off and transferring an incandescent electric lamp comprising means for tipping-off a bulb, means for gripping a bulb during the tipping-off operation and means for actuating said gripping means to transport a tipped-off bulb from said machine.

8. A machine for tipping-off and transferring incandescent electric lamp bulbs comprising a rotatable carrier, a bulb conveyor positioned in operative relation to said carrier, means associated with said car-

rier for securing a bulb positioned for a tipping-off operation and means for rotating the carrier to remove a tipped-off bulb from said conveyor.

9. A machine for tipping-off and transferring incandescent electric lamp bulbs comprising a conveyor in combination with a rotatable member having a plurality of gripping mechanisms associated therewith and positioned in operative relation to said conveyor, means for actuating said mechanisms to simultaneously grip a bulb positioned for a tipping-off operation, means for transporting the tipped-off bulb from the machine and means for releasing the bulb.

10. A machine for tipping-off and transferring incandescent electric lamp bulbs comprising a conveyor in combination with a rotatable member having a plurality of radially disposed arms, a pair of gripping jaws positioned at the end of each of said arms, means for moving said member and opening said jaws to embrace a bulb supported in said conveyor for a tipping-off operation, means for actuating said jaws to secure said bulb, means for moving said member to remove said bulb from the conveyor and means for opening said jaws to release the bulb.

11. In a lamp-making mechanism the combination with an exhaust machine having a conveyor, a plurality of exhaust-tube-receiving apertures in said conveyor, means for intermittently moving said conveyor, a bulb tipping-off and transfer mechanism positioned adjacent said conveyor comprising a rotatable member having a plurality of pairs of gripping jaws to receive bulbs, means for tipping-off bulbs supported in said conveyor and means for rotating said member to remove tipped-off bulbs therefrom.

12. In a tipping-off and transfer device the combination with an exhaust machine having a conveyor, a plurality of exhaust-tube-receiving apertures in said conveyor, means for intermittently moving said conveyor, a bulb tipping-off and transfer mechanism positioned adjacent said conveyor and comprising a rotatable member having a plurality of pairs of gripping jaws to receive bulbs, means for tipping-off said bulbs, means for rotating said member to remove tipped-off bulbs from said conveyor and means for releasing bulbs when moved from the conveyor.

13. In a machine for exhausting incandescent electric lamp bulbs, the combination with tipping-off and transfer mechanism, a conveyor having exhaust-tube-receiving apertures, a rotatable carrier having jaws to receive lamp bulbs, means for actuating said carrier to position a lamp between said jaws, means for rendering plastic

a portion of the exhaust tube of a bulb supported in said conveyor, means for raising said carrier to elongate said plastic portion to sever said exhaust tube and means for actuating said carrier to receive said bulb from said conveyor.

14. In a machine for exhausting incandescent electric lamp bulbs, the combination with tipping-off and transfer mechanism, a conveyor having exhaust-tube-receiving apertures, a rotatable carrier having jaws to receive lamp bulbs, means for actuating said carrier to position a lamp supported in said conveyor between said jaws, means for rendering plastic a portion of the exhaust tube of said bulb, means for raising said carrier to elongate said plastic portion to sever said exhaust tube, means for actuating said carrier to remove said bulb from the conveyor, and means for releasing said removed bulb.

15. In a machine for exhausting incandescent electric lamp bulbs, the combination with tipping-off and transfer mechanism, a conveyor having exhaust-tube-receiving apertures, a rotatable carrier having jaws to receive lamp bulbs supported in said conveyor, means for actuating said jaws to grip a bulb, means for rendering plastic a portion of the exhaust tube of said bulb, means for raising said carrier to elongate said plastic portion to sever said exhaust tube, a chute for guiding bulbs away from said device, means for actuating said carrier to position the bulb over said chute and means for releasing said bulb.

16. In a machine for exhausting incandescent electric lamp bulbs, the combination with tipping-off and transfer mechanism, a conveyor having exhaust-tube-receiving apertures, a rotatable member having arms, gripping means positioned at the end of each of said arms, means for actuating said member to move said gripping-means toward a bulb positioned in said conveyor, means upon said conveyor cooperating with said arm to operate said gripping-means to receive and secure a lamp, means for tipping-off said bulb and means for moving said bulb from said conveyor.

17. In a machine for exhausting incandescent electric lamp bulbs, the combination with tipping-off and transfer mechanism, a conveyor having exhaust-tube-receiving apertures, a rotatable member having arms, gripping-means positioned at the end of each of said arms, means for actuating said member to move said gripping-means toward a bulb positioned in said conveyor, means upon said conveyor cooperating with said arm to operate said gripping-means to receive and secure a bulb, means for tipping-off said bulb, means for moving said bulb from said conveyor and means for operating said gripping-means to release said bulb.

18. In a machine for exhausting incandescent electric lamp bulbs, the combination with tipping-off and transfer mechanism, a conveyor having exhaust-tube-receiving apertures, a rotatable member having arms, gripping-means positioned at the end of each of said arms, means for actuating said member to move said gripping-means toward a bulb positioned in said conveyor, means upon said conveyor cooperating with said arm to operate said gripping-means to receive and secure a bulb, a chute, means for tipping-off a bulb, means for moving said bulb over said chute and means for releasing the bulb for passage along the chute.

19. In a machine for exhausting incandescent electric lamp bulbs, the combination with tipping-off and transfer mechanism, a conveyor having exhaust-tube-receiving apertures, a rotatable member having arms, a pair of jaws positioned at the end of each of said arms, means for actuating said member to move said jaws toward a lamp positioned in said conveyor, means upon said conveyor cooperating with said arm to open and close said jaws to receive and grip a lamp, means for tipping-off said lamp and means for moving said lamp from said conveyor.

20. In a machine for exhausting incandescent electric lamp bulbs, the combination with tipping-off and transfer mechanism, a conveyor having exhaust-tube-receiving apertures, a rotatable member having arms, gripping-means positioned at the end of each of said arms, means for actuating said member to move said gripping-means toward a bulb positioned in said conveyor, means upon said conveyor cooperating with said arm to operate said gripping-means to receive and secure a bulb, means for tipping-off said bulb, means for moving said bulb from said conveyor and means for actuating said jaws to release a bulb.

21. In a machine for exhausting incandescent electric lamp bulbs, the combination with tipping-off and transfer mechanism, a conveyor having exhaust-tube-receiving apertures, a rotatable member having arms, gripping means positioned at the end of each of said arms, means for actuating said member to move said gripping-means toward a bulb positioned in said conveyor, means upon said conveyor cooperating with said arm to operate said gripping-means to receive and secure a bulb, means for tipping-off said bulb, means for moving said bulb from said conveyor, means for actuating said jaws to release a bulb and means for removing said bulb from said tipping-off and transfer mechanism.

22. In a machine for exhausting incandescent electric lamp bulbs, the combination with tipping-off and transfer mechanism, a conveyor having exhaust-tube-receiving apertures, a rotatable-member having arms, a

pair of jaws at the ends of each of said arms, means for actuating said member to move said jaws toward a bulb having the exhaust tube thereof positioned in an aperture of said conveyor, means upon said conveyor for actuating said jaws to grip a bulb, a heating element to render plastic a portion of said exhaust tube, means for raising said rotatable member to stretch the plastic portion of said tube, means for effecting an upward movement of said heating element during said stretching operation, means for limiting said movement and means for actuating said rotatable-member to remove a bulb from said conveyor.

23. In a machine for exhausting incandescent electric lamp bulbs, the combination with tipping-off and transfer mechanism, a conveyor having exhaust-tube-receiving apertures, a rotatable-member having arms, a pair of jaws at the end of each of said arms, means for actuating said member to move said jaws toward a bulb having the exhaust tube thereof positioned in an aperture of said conveyor, means upon said conveyor for actuating said jaws to grip a bulb, a heating element to render plastic a portion of said exhaust tube, means for raising said rotatable member to stretch the plastic portion of said tube, means for effecting an upward movement of said heating element during said stretching operation, means for limiting said movement, means for actuating said rotatable-member to remove a bulb from said conveyor and means for releasing said bulb.

24. In a machine for exhausting incandescent electric lamp bulbs, the combination with tipping-off and transfer mechanism, a conveyor having exhaust-tube receiving apertures, a rotatable-member having arms, a pair of jaws at the end of each of said arms, means for actuating said member to move said jaws toward a bulb having the exhaust tube thereof positioned in an aperture of said conveyor, means upon said conveyor for actuating said jaws to grip a bulb, a heating element to render plastic a portion of said exhaust tube, means for raising said rotatable member to stretch the plastic portion of said tube, means for effecting an upward movement of said heating element during said stretching operation, means for limiting said movement, means for actuating said rotatable-member to remove a bulb from said conveyor, means for releasing said bulb and means for moving the bulb away from the tipping-off and transfer mechanism.

25. In a machine for exhausting incandescent electric lamp bulbs, the combination with tipping-off and transfer mechanism, a conveyor having means to support bulbs by the exhaust tubes thereof, a rotatable member having arms, a pair of jaws at the end

of each of said arms, means for actuating said member to move said jaws toward a bulb positioned in said conveyor, means upon said conveyor for actuating said jaws to receive and grip a bulb, a heating element to render plastic a portion of the exhaust tube of the bulb, means for raising said rotatable member to stretch the plastic portion of said tube, means for effecting an upward movement of said heating element during said stretching operation, means for limiting said movement, means for actuating said member to remove a bulb from said conveyor, and means for releasing said bulb and a chute for conveying released bulbs from said mechanism.

26. In a machine for exhausting incandescent electric lamp bulbs, the combination with mechanism including a bulb conveyor, means for intermittently rotating said conveyor, a rotatable-member having a plurality of bulb-gripping devices mounted thereon in spaced relation, means for operating said bulb conveyor and said rotatable-member in timed relation to position a bulb in operative relation to one of said devices, means for actuating said device to secure a positioned bulb and means for moving said bulb from said conveyor.

27. In a machine for exhausting incandescent electric lamp bulbs, the combination with mechanism including a bulb conveyor, means for intermittently rotating said conveyor, a rotatable-member having a plurality of bulb-gripping devices mounted thereon in spaced relation, means for operating said bulb conveyor and said rotatable-member in timed relation to position a bulb in operative relation to one of said devices, means for actuating said device to secure a positioned bulb, means for moving said bulb from said conveyor, and means disposed adjacent to the path of said conveyor and cooperating with said device to release said bulb.

28. In a machine for exhausting incandescent electric lamp bulbs, the combination with mechanism including a bulb conveyor, means for intermittently rotating said conveyor, a rotatable-member having a plurality of bulb-gripping devices mounted thereon in spaced relation, means for operating said bulb conveyor and said rotatable-member in timed relation to position a bulb in operative relation to one of said devices, means upon said conveyor cooperating with said device to secure a bulb, means for removing the bulb from the conveyor and means for releasing the bulb.

29. In a machine for exhausting incandescent electric lamp bulbs, the combination with mechanism including a bulb conveyor, means for intermittently rotating said conveyor, a rotatable-member having a plurality of bulb-gripping devices mounted

thereon in spaced relation, means for operating said bulb conveyor and said rotatable member in timed relation to position a bulb in operative relation to one of said devices, means upon said conveyor cooperating with said device to secure a bulb, means for removing the bulb from the conveyor, means for releasing the bulb and means for guiding said bulb away from said device.

In testimony whereof, I have hereunto subscribed my name this seventh day of June 1924.

JOHN JOSEPH HIGGINS.