May 14, 1929. H. DE F. MADDEN 1,712,670

MECHANISM FOR CONVEYING AND DISCHARGING LAMP BULBS

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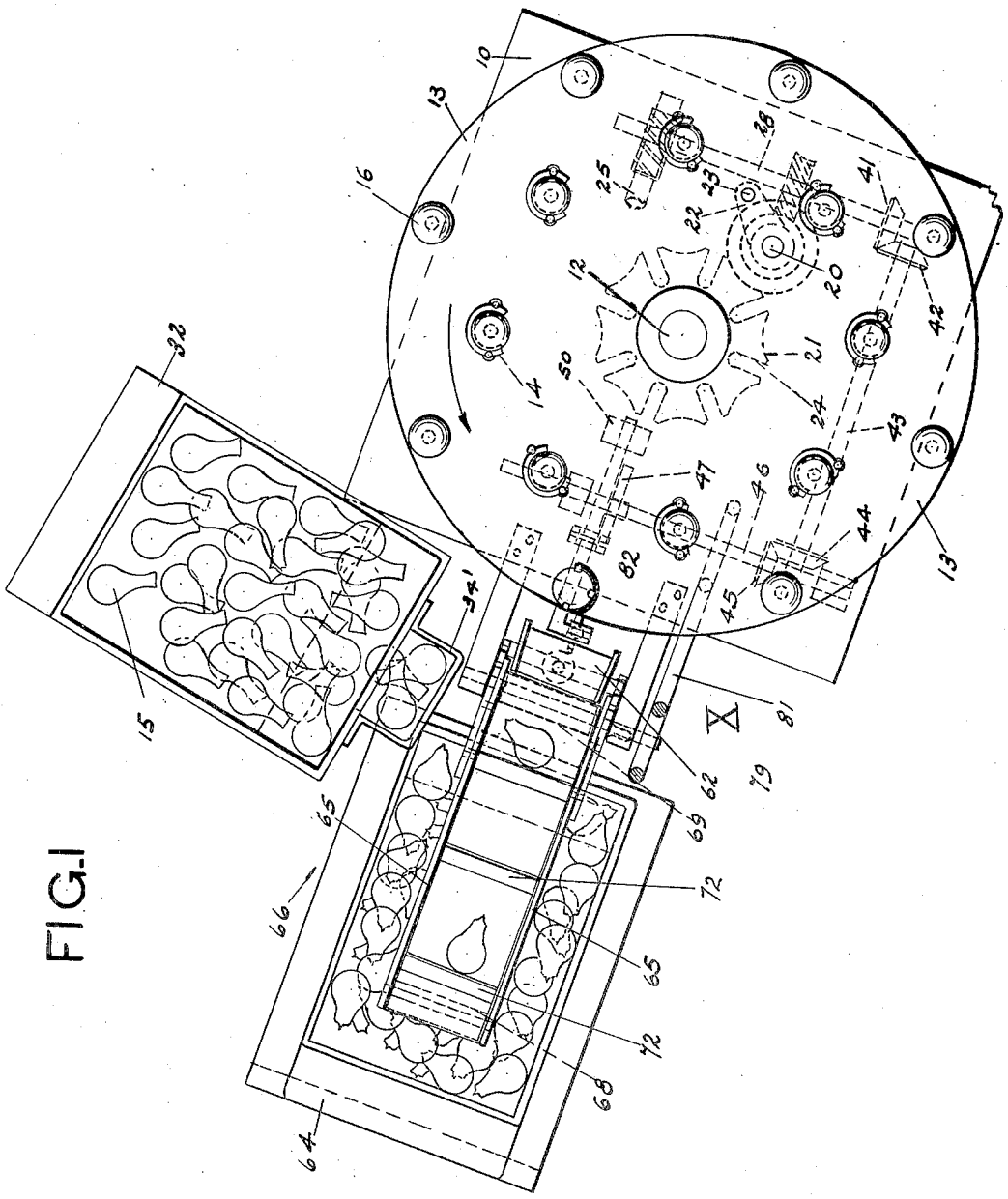


FIG.1

INVENTOR
HARRY D. MADDEN
BY
ATTORNEY

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FIG. 2

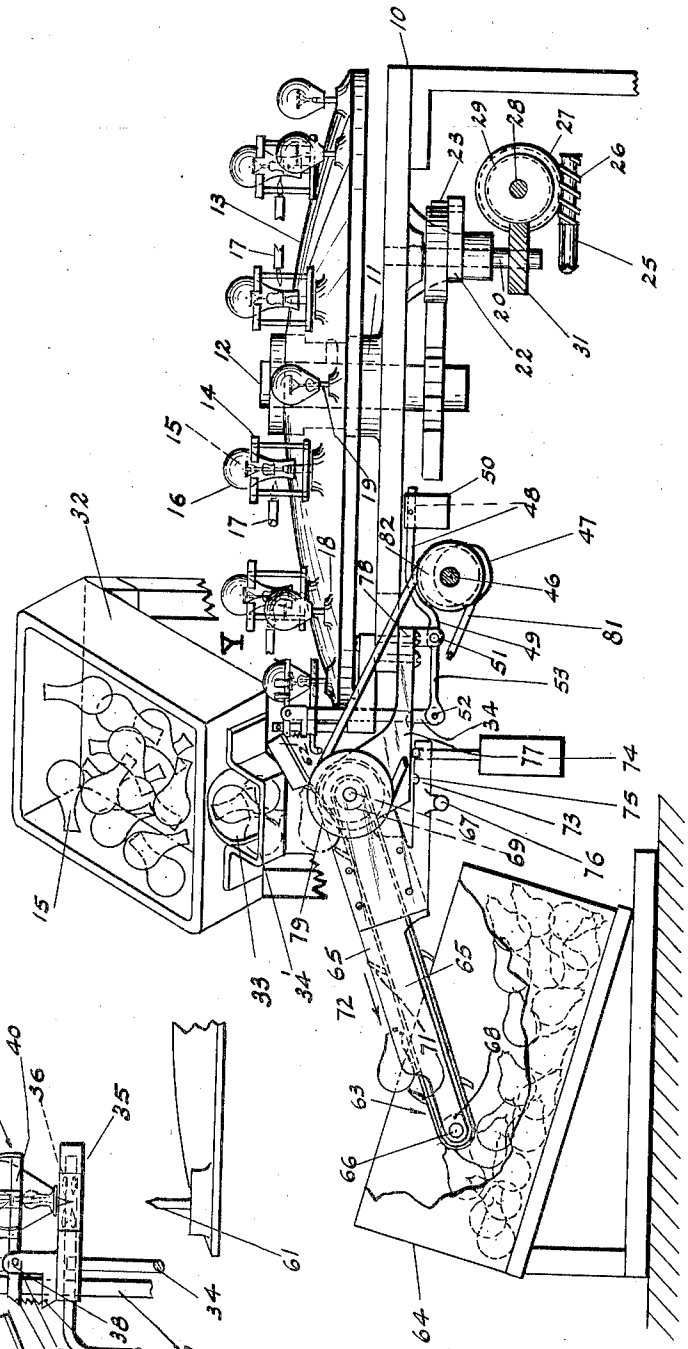


FIG. 3

INVENTOR
HARRY D. MADDEN
BY
ATTORNEY

Patented May 14, 1929. 1,712,670

UNITED STATES PATENT OFFICE.

HARRY DE FOREST MADDEN, OF MONTCLAIR, NEW JERSEY, ASSIGNOR TO WESTINGHOUSE LAMP COMPANY, A CORPORATION OF PENNSYLVANIA.

MECHANISM FOR CONVEYING AND DISCHARGING LAMP BULBS.

Application filed May 10, 1926. Serial No. 107,834.

This invention relates to lamp-making machines and more particularly to bulb handling mechanism employed in connection therewith.

In the manufacture of incandescent electric lamps, constant efforts have been made to provide efficient and high speed lamp-making machinery which would occupy a minimum amount of floor space. Further attempts have been made to reduce the amount of manual handling of the bulbs and to reduce the relatively large amount of floor space necessary in positioning or arranging the bulbs before and after operations have been performed thereon by the lamp-making machinery.

A certain amount of success has been attained in reducing the area of the floor space required by the lamp-making machines by combining lamp-making operations and arranging combinations of machines in a more effective manner. Such arrangement of the machines did not, however, reduce the amount of floor space required by the delivery of bulbs to and from a machine. The supply and removal of bulbs to machines has heretofore always been accomplished by the use of racks or trays at the expense of a relatively large amount of room. A bulb tray as constructed in accordance with the accepted factory practice comprised a box-like structure having a wall or shelf provided with a plurality of symmetrically arranged perforations to receive and support a plurality of bulbs in a predetermined orderly arrangement. In order to provide an ample supply of bulbs for an operation, it was necessary to construct the trays of relatively large proportions and it is evident that trays of this character were bulky and occupied a considerable amount of valuable floor space. The same was true with respect to the removal of lamps from a machine since, owing to the limited number of bulbs which could be deposited in a rack, it was necessary to give time and effort to the removal of filled racks.

Although contrary to what has heretofore been considered possible, I have found that electric incandescent lamps or lamp bulbs may, to a considerable extent, be handled in bulk without separation by supporting structure in the orderly arrangement on racks or trays as has previously been the practice. By reason of the above fact, I am able to provide an ordinary receptacle, such as a wooden box or other container, and fill the same haphazardly with lamp bulbs. With this promiscuous or unorderly disposition of the bulbs in a container, it is possible to dispose approximately 350 bulbs in a space formerly occupied by approximately 100 bulbs. This means not only that a greater saving in space in the factory is attained, but furthermore that the operator may be supplied with a greater amount of bulbs at one time and a machine may be operated for a longer period without interruption as was necessary when the bulbs were supplied to the operator in racks. Heretofore, it had been the practice and was thought to be essential for the operator to carefully place each lamp taken from a machine into an aperture of a rack in an orderly manner so that the lamps or bulbs would be separated from contact with each other. It has been found, however, that completed lamps or partially completed lamps, as, for example, the sealed-in evacuated bulbs after leaving the exhaust machine, may be discharged directly into a receptacle by means of a mechanical device such as a conveyor. The bulbs may be deposited into a receptacle without any particular arrangement until the receptacle is filled. The receptacle may then be removed, as in the case of exhausted bulbs, to another machine where the operator may feed the same for further operations to make complete lamps.

When discharging bulbs partially completed or completed lamps from a machine, it has been found desirable to employ what may be termed a "balanced conveyor". This conveyor automatically conveys the bulbs to the receptacle and the end of the conveyor is initially disposed close to the bottom of the conveyor so as to deposit the lamps with a minimum amount of drop. The conveyor may be so constructed as to be readily mov-

able to lift its discharge end for adjustment to different positions thus keeping the same substantially flush with the upper surface of accumulated bulbs.

An object of the present invention is, therefore, to eliminate the use of the bulb trays as above described and to avoid the laborious and time-consuming operation of the orderly arrangement of the bulbs prior to or subsequent to the lamp-making operation.

Another object of the invention is to provide means for the promiscuous delivery of bulbs to an operator and for the discharge of bulbs from a machine in a haphazard or indiscriminate manner.

A further object of the invention is to provide for the promiscuous delivery of bulbs to a receptacle in an expeditious and time-saving manner at a predetermined rate of speed.

A further object of the invention is to provide mechanism operable to deliver bulbs to a receptacle and adjustable in accordance with the accumulation of bulbs in the receptacle.

A further object of the invention is to provide a device which may be inserted into a receptacle for the delivery of bulbs thereto and conveniently and easily adjusted to avoid contact with delivered bulbs.

Other objects of the invention will be apparent as the description proceeds.

Although the present invention is shown applied to a lamp-making machine which seals the mount to the bulb, it is obvious that various applications of invention are possible, as, for example, in connection with other lamp-making mechanisms. 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 showing bulbs in position for application to the machine and the conveyor for discharging bulbs into a receptacle.

Fig. 2 is a front view of the machine illustrated in Fig. 1 and

Fig. 3 is a fragmentary view of a device for tipping off the bulb after an exhausting operation.

As a practical embodiment of the invention, the same is illustrated and described as applied to a combined sealing-in and exhaust machine.

The drawing shows a machine comprising a supporting frame 10 having a centrally disposed hub 11 provided with a rotatable shaft 12 upon which a carrier or conveyor 13 is secured for rotation with the shaft. The conveyor may be provided with a plurality of sealing-in heads 14 of any suitable type into which lamp mounts 15 and bulbs 16 are positioned in sealing-in relation. The sealing-in operation is performed by heating the neck portions of the bulbs by suitably disposed flames 17 at different stages during the travel of the heads with the conveyor which is moved intermittently by mechanism to be presently described. Adjacent to and in staggered relation to the sealing-in heads are provided exhaust apertures 18 to secure exhaust tubes 19 of bulbs. After the sealing-in operation is performed, a sealed-in bulb is transferred, by hand in the present machine, to an exhaust aperture into which the exhaust tube of the bulb is inserted, thus connecting the interior of the bulb with any well-known exhausting apparatus as may be provided with this type of machine; the drawing merely showing the exhaust apertures from which the bulb is tipped off and discharged from the machine.

The conveyor 13 may be rotated in a series of intermittent progressive movements and in the present machine, wherein 8 sealing-in heads and 8 exhaust positions are provided, the machine makes 8 intermittent movements during each complete revolution. The means for intermittently driving the conveyor may comprise a Geneva movement consisting of the usual slotted disc 21 which is secured to the lower end of the shaft 12 and a driving arm 22 having a pin 23 rotatable with a shaft 20 mounted in a suitable bearing on the under side of the frame 10. The pin 23 is so disposed as to enter slots 24 of the member 21 causing a partial revolution of the conveyor during a complete revolution of the driving arm 22. The Geneva movement may be operated from any suitable source of power (not shown) through a shaft 25 having a worm 26 in mesh with a worm wheel 27. The worm wheel 27 may be secured to a horizontal shaft 28 which has secured thereto a spiral gear wheel 29 in mesh with a companion gear wheel 31 secured to the shaft 20. Motion is thus transferred to the conveyor and the continuous rotation of the driving shaft 25 will cause an intermittent rotary movement of the conveyor. It will be understood that during each stationary period of the conveyor, an operator, who may be stationed at the position indicated by "X" in Fig. 1, removes a sealed lamp from a sealing-in head and inserts the exhaust tube thereof into an exhaust aperture 18. The lamp having been previously disposed in the machine for an exhausting operation and having been tipped off, by mechanism to be presently described, is discharged from the machine. For the purpose of facilitating the handling of the bulbs, the present invention provides a container 32 suitably supported adjacent to the machine and within easy reach of an operator.

In accordance with the present invention, the bulbs 15 disposed promiscuously in the container, thus permitting the container to hold a relatively large quantity of bulbs with an economizing in floor space. The container 32 may be held in an inclined position so as to permit the downward movement of bulbs through an outlet or doorway 33 and

on to a shelf 34', the aperture 33 serving to feed to the bulbs by reason of their potential energy for convenient removal by the operator. After a bulb has been removed from the container 32 and disposed in a sealing-in head in proper relation to a mount, the bulb and mount are carried through a series of intermittent movements until the sealing-in operation has been performed. The operator having properly removed the sealed-in bulb and placed it in an exhaust aperture adjacent to a sealing-in head from which the bulb was taken, it will be evident that the sealed-in bulb is also carried through a circular path at which time the various exhaust operations were performed so that when the sealed-in bulb reaches the position "Y" (see Fig. 2) it is ready to be tipped off and discharged from the machine.

The tipping off operation may be performed in any suitable manner and the present machine provides as an example one type of what is termed a "tipping torch" carried on a vertical rod 34. The tipping torch may comprise a burner 35 having oppositely disposed flames 36 adapted to be positioned around the exhaust tube 19 of a bulb when the same is positioned in the exhaust aperture. The flames 36 issue from a concave surface of an arc shaped manifold so that the exhaust tube of a bulb may be heated by oppositely disposed flames. An exhaust tube 19 is moved into position between the flames as the conveyor rotates, the conveyor being operated in timed relation to the tipping off mechanism so that the exhaust tube is heated to a plastic state and severed to seal up the bulb during a stationary period of the conveyor. The tipping torch is provided with a rocker member 37 pivoted at 38 and having an end 40 of curved form so as to partially encircle a bulb and provided with spring clips 39. The rocker arm is so disposed that when the bulb is moved to position for tipping off, it is engaged by the spring clips 39 and when the exhaust tube of a bulb has been released, the rocker member tips upwardly as shown in dotted lines in Fig. 3 and discharges the bulb, the means for effecting this operation being more specifically described hereinafter.

The tipping torch may be operated by connection to the shaft 28 (see Fig. 1) which is provided with a bevel gear wheel 41 in mesh with a gear wheel 42 at one end of a transversely disposed shaft 43. This shaft is provided with a bevel gear wheel 44 in mesh with a bevel gear 45 on a countershaft 46. The countershaft 46 as shown in Fig. 2 is provided with a cam member 47 engageable with one arm 48 of a lever-member 49 pivoted at 51 to a stationary portion of the machine and the vertical rod 34 which actuates the tipping torch is pivoted at its lower end at 52 to arm 53 of the lever-member 49.

The arm 48 is provided with a weight 50 so that the arm 53 will be normally urged upwardly to cause an upward thrust of the rod 34. When a lamp is initially disposed in the clips 39 of the rocker member 37, the cam 47 is by reason of the timed relation of the operating parts of the machine, engaged with the arm 48 of the lever-member 49. The action of the weight 50 is thus removed as the tipping torch is being held in position to receive the exhaust tube of a bulb. As soon as the rocker member 37 engages a bulb, the cam 47, which continues to move, releases the arm 48 so that the weight 50 may be effective to impart a pull upon the exhaust tube. As the fires soften the exhaust tube, the bulb is lifted, by reason of the weight 50, and the tipping off operation completed. For the purpose of effecting a discharge of the tipped off lamp, the rocker arm 37 is provided with an extension 55 which engages with a stop 56 on a fixed post 57.

It will be evident that inasmuch as the stop 56 is immovable, an upward movement of the tipping torch will cause the bracket 37 to rock and discharge the bulb. In order to provide a resilient engagement between the rocker arm 37 and a bulb, the extension 55 is connected to a projection 58 on a relatively immovable portion of the tipping torch by a spring 59. After a lamp has been discharged, the severed portion 61 of the exhaust tube remains in the aperture and is removed by hand by the operator before applying the exhaust tube of another lamp to the aperture.

From the foregoing, the operation of applying bulbs to the sealing-in machine, transferring the bulbs to the exhaust ports and the discharge of the bulb from the exhaust ports will be readily understood. Although the machine shown is more or less diagrammatic, it serves to illustrate one type of apparatus to which the present invention may be applied. The present invention broadly relates to the promiscuous handling of bulbs in general but it is particularly important in connection with the discharge of fragile bodies such as lamp bulbs from a machine.

When a sealed off bulb is discharged from the tipping torch, it is permitted to roll or slide over an inclined guide 62 and on to a conveyor 63 which is movable to carry the bulb at a predetermined rate of speed and deposit the same in a suitably positioned container 64. The conveyor may comprise a pair of side plates 65 having shafts 66 and 67 journalled in opposite ends thereon. The shafts may be provided with rollers 68 and 69 respectively to drive an apron or endless belt 71. The belt may be any suitable flexible material such, for example, as canvas and may be provided with flaps or partial pockets 72 in spaced relation so as to prevent bulbs from sliding downwardly along the moving belt. As the lamps are discharged into the container 64 and accumulated at the bottom

thereof, it has been found advantageous to change the position of the discharge end of the conveyor by raising the same to accommodate the rising level of the accumulated bulbs. The present invention not only provides a conveyor which may be maintained with its discharge end properly positioned, but one wherein it is possible to prevent the discharge end of the conveyor from resting to any appreciable degree upon the discharged bulbs. For the purpose of accomplishing the above, the present mechanism provides what may be termed a "balanced" conveyor. The machine elements for balancing the discharge of the conveyor may comprise an arm 73 secured to one of the plates 65 of the conveyor and having a weight 74 attached to an end thereof. The arm may be provided with notches 75 so that the weight may be adjusted to vary the leverage thereof as necessary to attain the proper balance of the discharge end of the conveyor. The conveyor as a whole is rockable about the shaft 67 and may be so balanced that a slight movement by means of a handle 76 will serve to change the position of the conveyor which may be balanced so that it will stand in various positions owing to the inherent friction of the parts as, for example, the side plates 65 which may be in slight frictional engagement with bracket plates 77 which serve as supporting bearings for the shaft 67 and are secured to the frame of the machine by bolts 78. The shaft 67 which acts as a pivot point for the conveyor may be rotatable and provided with a grooved pulley 79 connected by an endless belt 81 to a pulley 82 rotatable with the shaft 46 which is driven as hereinbefore described by its connection to the driving shaft 25.

In operating a machine provided with the present invention, it is only necessary to supply a container such as 32 having a quantity of promiscuously deposited lamp bulbs or blanks therein. The machine may be set in operation with the discharge end of the conveyor 63 disposed in a container 64. The operator in starting the machine fills each sealing-in head with a mount and bulb until all the heads have been filled at which time the initially loaded head will contain a bulb sealed to a mount. The operator then removes the sealed bulb, supplying the head with a new mount and bulb, and also deposits the sealed bulb into an exhaust aperture. This operation is repeated for another cycle of the conveyor at which time an exhausted bulb is moved into operative relation to the tipping torch which automatically discharges the exhausted bulb from the machine. The conveyor which receives the exhausted bulb from the guide 62 operates to carry the bulb downwardly and deposits the same on to the bottom of the container 64. The free end of the bulb discharging conveyor may be in close relation to the bottom of the container and the bulbs have but a short distance to drop. Although the inclination of the conveyor may vary as the container 64 becomes filled, the rate of discharge of the bulbs will be the same since each bulb is carried at a given rate of speed independent of the inclination of the conveyor. When the container has become filled, the same may be removed and an empty receptacle substituted while the machine is in operation.

The great saving in floor space by reason of supplying bulbs in an unsymmetrical manner as well as the saving in time over the unsymmetrical disposition of exhausted bulbs makes the invention a valuable contribution to the lamp-making industry since it produces a new and unforeseen result which tends to reduce the cost of lamps and to increase their rate of production.

Although a preferred embodiment of the invention described is shown herein, it is to be understood the invention is not restricted to the precise machine shown and described and that modifications may be made therein which fall within the spirit and scope of the invention set forth in the appended claims.

What is claimed is:

1. A lamp-making machine comprising a bulb carrier, bulb supporting means disposed in spaced relation on said carrier, a conveyor having one end pivoted adjacent to said carrier, the opposite discharge end of said conveyor being movable and means for balancing said discharge end to adapt the same for adjustment to different positions.

2. A lamp-making machine comprising a bulb carrier, bulb supporting means disposed in spaced relation on said carrier, a conveyor having one end pivoted adjacent to said carrier, the opposite discharge end of said conveyor being movable, means for balancing said discharge end to adapt the same for adjustment to different positions, and means for actuating said conveyor for discharging bulbs at a predetermined rate of speed.

3. A lamp-making machine comprising a carrier, supports for lamps in spaced relation on said carrier, a conveyor having the receiving end thereof mounted on a pivot stationary with respect to the conveyor, the discharge end of the conveyor being movable and means for balancing the said discharge end of the conveyor.

4. A lamp-making machine comprising a carrier, supports for lamps in spaced relation on said carrier, a conveyor having the receiving end thereof mounted on a pivot stationary with respect to the conveyor, the discharge end of the conveyor being movable, means for balancing the said discharge end of the conveyor, and means for actuating said conveyor for the discharge of lamps therefrom at a predetermined rate of speed.

5. A machine for handling fragile articles comprising supporting means for said

articles, a container to receive articles, a conveyor having one end disposed for the delivery of articles to said container, means for discharging articles from said supporting means to said conveyor and means for counterbalancing said conveyor in adjustable relation to said container to avoid detrimental contact between the free end of said conveyor and the fragile articles as the said articles accumulate.

In testimony whereof, I have hereunto subscribed my name this 7th day of May, 1926.

HARRY DE FOREST MADDEN.