July 7, 1931. R. W. CONN 1,813,565

ELECTRIC INCANDESCENT LAMP MAKING MACHINE

Filed Sept. 30, 1927 2 Sheets-Sheet 1

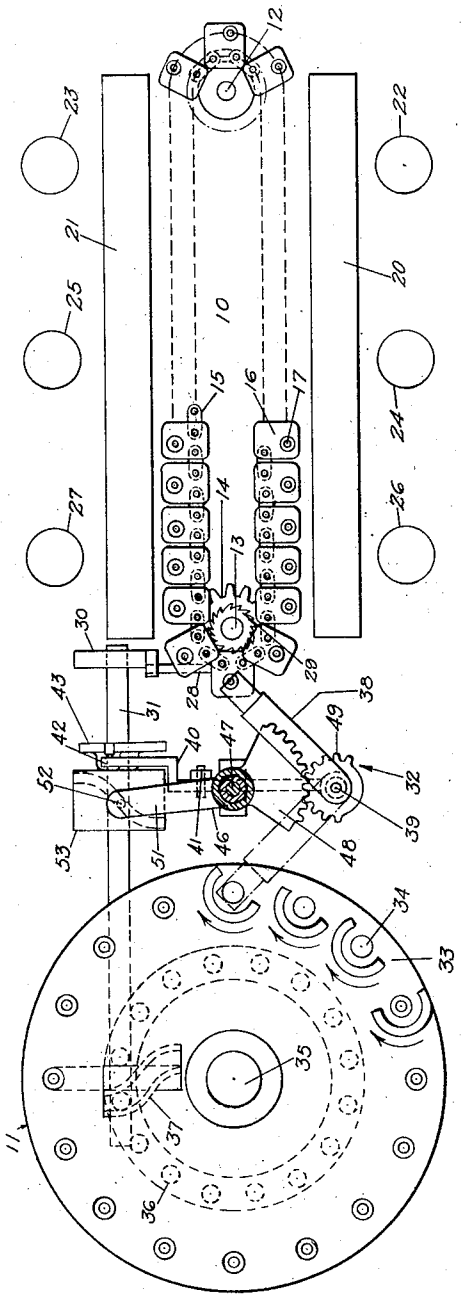

FIG. 1.

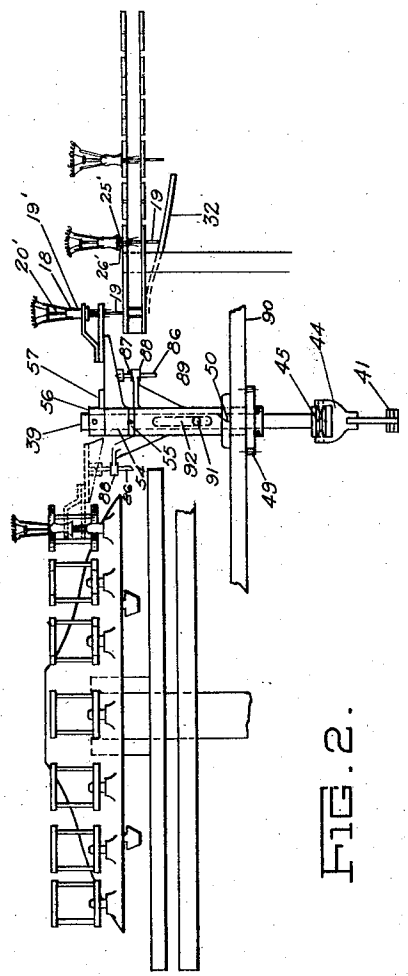

FIG. 2.

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ELECTRIC INCANDESCENT LAMP MAKING MACHINE

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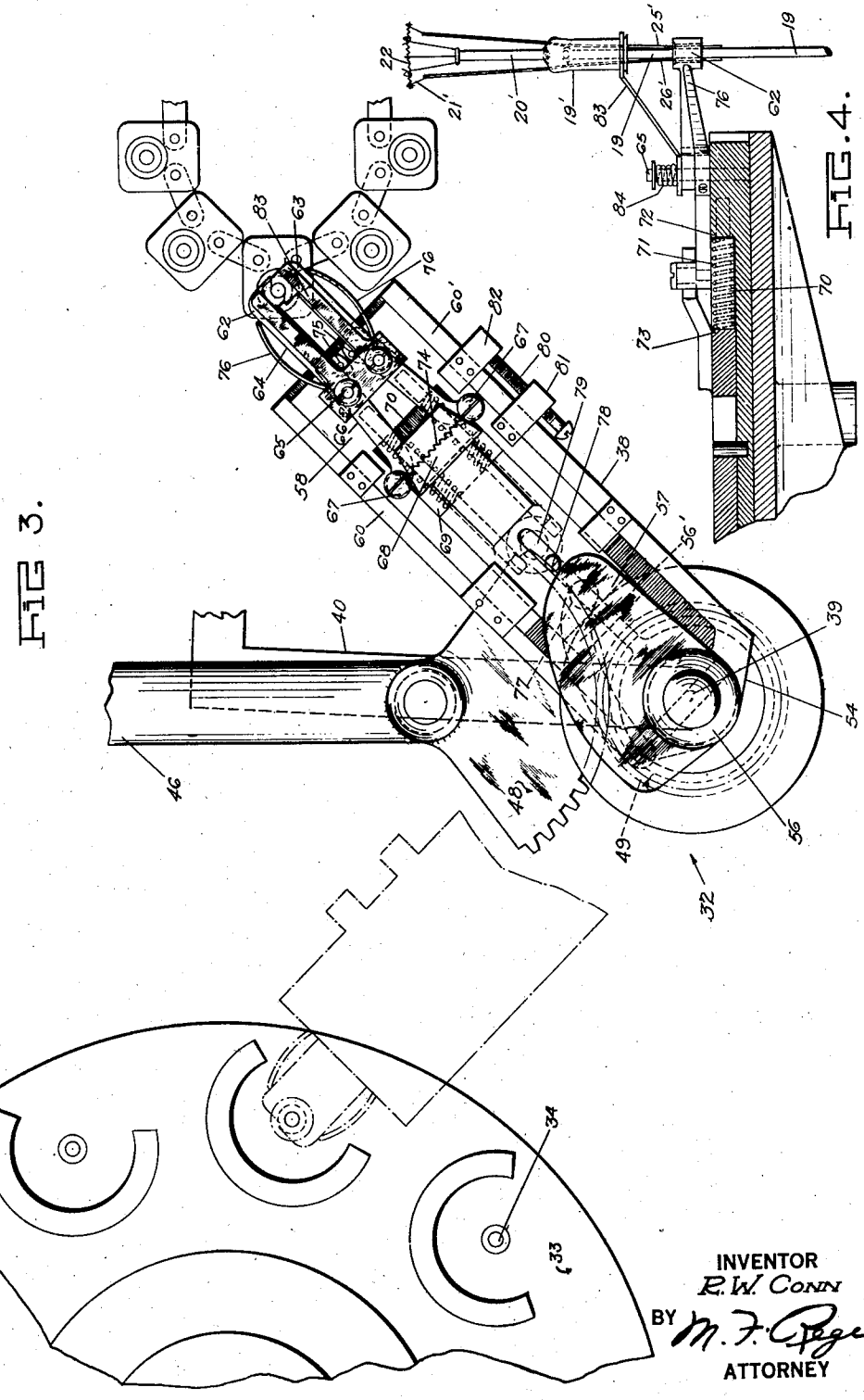

FIG. 3.

FIG. 4.

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UNITED STATES PATENT OFFICE

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ELECTRIC INCANDESCENT LAMP MAKING MACHINE

Application filed September 30, 1927. Serial No. 223,058.

This invention relates to lamp making machines and more particularly to mechanism for positioning lamp mounts for consolidation with lamp bulbs.

In the manufacture of incandescent electric lamps, it is necessary to unite a lamp mount with a bulb prior to the evacuation of the bulb in an exhaust machine. The lamp mount generally consists of several glass parts comprising an arbor, flare tube and an exhaust tube which parts are fused together and united at a given point termed the press. Leading-in conductors consisting of suitable wires are positioned in given relation to the glass parts during their consolidation so that the said wires are embedded in the press during the union of the glass parts.

It is then generally the practice to radially insert a number of wires into the upper end of the arbor and to form hooks at the projecting ends of the wires to receive the filament. The article produced by the above mentioned operations is generally termed a stem and is automatically produced in a stem making machine. To this stem a filament is added by application to the support wires, and when the stem has had the filament applied thereto, the entire structure is termed a "mount".

The filament is disposed in the hooked ends of the radially projecting support wires of the stem and the ends of the filament are clamped or welded to the leading-in conductors. The mount may then be united to a bulb by an operation including the positioning of a bulb over a mount so that the neck of the bulb is disposed adjacent to the flared portion of the flare tube of the mount. Heat is then applied until the neck of the bulb and the flare tube are fused together and consolidated. This is known in the art as the "sealing-in" operation.

The operation of uniting the bulb and mount together is performed in what is known as a sealing-in head. The various operations just described are usually performed automatically with the exception of the mounting of the filament on to the support wires.

Owing to the extreme fineness of the filament, the operation of mounting the same on the support wires is a difficult performance and requires the services of skilled operators. The automatic operations, such as the production of the stem, the sealing-in operation, etc., are performed at relatively high speed and, therefore, lamps may be made at a greater rate of speed than is possible for a single operator to accomplish the necessary filament mounting operation. It is, therefore, necessary that several operators for mounting filaments be employed in connection with a single sealing-in machine so that a sufficient quantity of stems might be obtained to meet the output of the machine.

Usually the lamp mounting operators who attend the sealing-in machine deposit the mounts in holders, the same being subsequently removed by an operator attending the sealing-in machine who positions each mount in a sealing-in head prior to the disposition of a lamp bulb over the mount. This condition multiplies the number of operations and increases the manual labor, thereby raising the cost and at the same time, failing to give the proper efficient results. Furthermore, even though the filaments may be automatically mounted in the support wires, the complete mount would obviously have to be handled by the sealing-in operator for disposition in the sealing-in machine.

It is an object of the present invention, therefore, to provide a lamp making mechanism whereby a lamp mount may be sealed into a bulb with a minimum amount of handling and with a minimum number of operations.

Another object of the invention is to provide mechanism for automatically disposing a lamp mount in position for consolidation with the lamp bulb.

Another object of the invention is to provide co-ordinating machine elements for moving a lamp mount to a predetermined position with respect to another machine and disposing the mount in operative position in said machine.

The present invention provides for the automatic delivery of stems from a suitable source as, for example, a stem making machine, to positions convenient for the application of the filament by an operator or op-

erators. By reason of the present construction, it is practical for a number of operators to receive stems and apply the filaments thereto in a convenient and expeditious manner. The mounts or stems with filaments thereon are then delivered to or received by mechanism which automatically transfers them to the sealing-in machine for consolidation with a lamp bulb. By reason of the present arrangement of mechanical elements, it is possible to avoid the laborious operation of hand feeding a sealing-in machine and the disadvantage of the manual operation and the excessive handling of a delicate lamp part such as the mount is avoided, and the rate or production materially increased.

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

Fig. 1 is a diagrammatic plan view of a sealing-in machine having the mount transfer mechanism associated therewith;

Fig. 2 is a side elevational view of the machine shown in Fig. 1;

Fig. 3 is a plan view of mechanism for transferring a mount from a conveyor to a sealing-in machine; and

Fig. 4 is a side elevational view showing a portion of the transfer mechanism illustrated in Fig. 3.

The present embodiment of the invention may comprise a stem conveyor 10 positioned in operative relation to a sealing-in machine 11 as diagrammatically shown in Fig. 1. The stem conveyor may consist of vertical shafts 12 and 13, the shaft 13 having a sprocket wheel 14 engageable with a link chain 15 constituting the actuating mechanism of the conveyor. The said chain may be provided with holders 16 having apertures 17 to receive and support stems 18, each of which includes an exhaust tube 19, a flare tube 19', an arbor 20' and leading-in wires 25' and 26'. Support wires 21' (see Fig. 4) support a filament 22'. This type of stem is used in the so-called tipless lamp.

When employed for handling stems of the tipless lamp, the exhaust tubes 19 of stems are inserted into apertures 17. The stems may be received from any suitable source as, for example, from a stem making machine (not shown). The conveyor 10 is arranged to pass between tables 20 and 21 about which operators may be located at 23, 24, 25, 26 and 27 so that as the stems pass they are easily accessible to the operators and may have the filament applied thereto to complete them in the form of mounts ready for application to a sealing-in machine. When an operator inserts a mount into an aperture 17, the leading-in wires 25' and 26' are held against the exhaust tube 19 and also inserted into the said aperture. By this means, a sufficient number of mounts may be provided to supply the demand of the sealing-in machine and maintain its rate of production.

The mount conveyor 10 may be moved intermittently through the action of a pawl 28 and a ratchet wheel 29, the latter being secured to the shaft 13. The pawl 28 may be disposed in operative relation with a cam 30 secured to a shaft 31. This shaft 31 constitutes the main driving shaft and serves to actuate the conveyor, sealing-in machine and interposed transferring mechanism, indicated as a whole by the numeral 32, for transferring a mount to the sealing-in machine.

For the purpose of positioning a mount to be received by mechanism for transfer to the sealing-in machine a cam-track 32' is provided to engage with the exhaust tubes 19 of the mounts. As the conveyor 10 moves the mounts to position for removal, the cam-track causes the mounts to move upwardly, leaving room for the exhaust tubes to be received by the mount transfer mechanism as will be presently described.

The shaft 31 may be driven by suitable connection to a source of power as, for example, a motor (not shown). The sealing-in machine 11 is also driven intermittently and includes a rotary conveyor 33 having a plurality of the usual type of sealing-in heads 34 disposed in spaced relation adjacent to its periphery. A suitable vertical shaft 35 is provided upon which the conveyor 33 is rotatably mounted.

The conveyor may be driven intermittently by any suitable mechanism, the mechanism indicated consisting of pins 36 engageable with a slotted cam 37 secured to the shaft 31. This mechanism is well known and it is believed that as diagrammatically represented in the drawings, is fully comprehensive to those skilled in this art.

The mechanism 32 above referred to, which transfers a stem from the conveyor 10 to the sealing-in machine, may comprise an arm 38 secured to a shaft 39. This shaft is adapted to be lifted and lowered by means of a lever 40 pivoted at 41 and having an end 42 disposed in engagement with a cam 43 secured to the shaft 31 (see Fig. 1). The opposite end of the lever is provided with a yoke 44 engageable with a collar 45 rotatably attached to the lower end of the shaft 39, thus providing means whereby upon a rotation of the shaft 31 a suitable, vertical, reciprocal motion may be imparted to the shaft 39.

An oscillatory movement of the arm 38 may be attained by means of a lever-segment-member 46 pivoted at 47 and having a toothed segment-member 48 engageable with a segmental pinion 49 secured to a sleeve 50 disposed about the shaft 39. The lever-segment-member 46 is provided with an arm 51 having a pin 52 engageable with a guide-way in barrel cam 53 secured to the shaft 31, thereby a rotation

of said shaft causes an oscillatory movement of the lever-segment-member 46 with a consequent oscillation of the arm 38.

The general operation of the interposed transfer mechanism 32 having been above set forth, the same will be more clearly understood by reference to Figs. 3 and 4. It will be noted that the arm 38 includes a hub 54 (see Fig. 3) which is journaled on the shaft 39 and held in position between a collar 55 and a hub 56, a cam-member 57 having a slot 56'. The said cam-member serves to project mechanism for gripping a lamp mount and to carry the arm 38 in an arc from a mount receiving position A to a mount discharging position B.

This mechanism may comprise a bottom-slide-plate 58 movable in a track between guides 60 and 60' on the arm 38. This slide-plate carries a pair of jaws 62 and 63. Each of the jaws is disposed on an end of an arm 64 pivoted on pins 65 on the upper side of a lever-member 66. This lever-member is also pivoted on the pins 65. The free end of the lever 66 is provided with a roller 67 for engagement with a wedge-shaped-member 68 mounted on an upper-slide-plate 69.

The slide plate 58 is movable in the arm 38 and carries the jaws while the slide plate 69 is mounted on the slide-plate 58 and is movable relative thereto. The said slide-plate 69 is disposed in a guide slot 70 and a spring 71 disposed in the slot engages a shoulder 72 of the bottom plate 58 and an end 73 of the upper plate 69, thus normally moving the wedge 68 from engagement with the rollers 67 of the jaw-members. A spring 74 is provided to normally move the ends of the levers 66 together, thus when the wedge is moved from contact with the rollers 67, the jaws 62 and 63 will be opened.

Inasmuch as each of the levers 66 is pivotally attached to jaws 62 and 63, a stop-pin 75 is provided for each jaw to limit its movement in one direction and tension members 76, secured to the levers 66, and having the free ends in contact with the jaws 62 and 63, serve to tensionally hold the jaws against the stop-pins. By this construction, the jaws may operate to grasp an object such as exhaust tube 19 without imparting any excessive stress thereon.

Operating mechanism for guiding the jaws consists of the cam-member 57 which is engaged by a pin 77 projecting from the upper plate 69. The plate 69, however, is associated with the lower plate by reason of a pin 78 which projects through a slot 79 in the upper plate 69 so that an independent movement of the top plate may be had for a given distance or until the pin 78 engages an end of the slot 79, whereupon the top plate is moved to carry the jaws outwardly after a given movement of the cam 57, while a continued movement of the cam causes the top plate 69 to move and engage the wedge 68 with the rollers 67, effecting an opening of the jaws.

In order to obtain a positive movement of the wedge-member 68, the slide 58 is provided with a stop-member in the form of a stop-pin 80 which extends through a projection 81 secured to the slide 58 and engages with projection 82 secured to the arm 38.

In addition to the jaws 62 and 63 a tensional member in the form of a finger 83 is provided. This member is in the form of a U-shaped extension and is held beneath a helical spring 84 on the pins 65 about which the jaws 62 and 63 rock. The purpose of the member 83 is to engage the flared end of the flare tube 19' and provide a positive means for thrusting the exhaust tube 19 into the holder of the sealing-in machine.

When in position to receive a mount from the conveyor 10 or to insert a mount in the sealing-in machine, the arm 38 is held stationary by means of a guide rod 86 which enters an aperture 87 in one of a pair of brackets 88, each bracket being integral with a vertical bearing 89 in which the shaft 39 is disposed. This bearing may be supported on a plate 90 constituting a portion of the stationary structure of the said machine.

In operation, the arm 38 is actuated in timed relation to the other operating mechanism. When a mount holder of the conveyor 10 has carried a mount to position A as indicated in Fig. 1, the mount will be raised. The arm 38 is then moved to position so that the jaws 62 and 63 may grip the exhaust tube of the mount and at the same time, secure the ends of the leading-in wires 25' and 26'. Assuming that the jaws 62 and 63 are closed about an exhaust tube as shown in Figs. 3 and 4, the cam-member 57 will be at the end of its stroke and the slide plate 58 will have been moved outwardly, since the pin 78 of the slide-plate 69 will have engaged with the end of the slot 79, the wedge-member 68 having already moved to close the jaws about the exhaust tube. After this operation, the cam 43 by reason of the formation of its effective cam surface, will operate to raise the shaft 39 and lift the arm 38 until the guide rod 86 clears an aperture 87 in a bracket 88 at which time the cam 53 will operate the segment 48 causing the segmental pinion 49, which is secured to the sleeve 50, to rotate. A rotation of the sleeve 50 causes a rotation of the shaft 39 by reason of a pin 91 which extends from the shaft 39 and into a slot 92 in the said sleeve. The arm 38 is, therefore, carried to a position over a holder 34 in the sealing-in machine. When this position is reached, the cam 53 operates to cause a downward movement of the shaft 39, thereby effecting a movement of the exhaust tube of the mount into the holder of a sealing-in head and the guide rod 86 enters the aperture in a bracket 88.

At this time, the lever-segment-member

46 begins to operate to cause the cam 57 to effect a reversal of movement of the slide-plates 58 and 69, thereby opening the jaws 62 and 63, whereupon a mount is released. The cam 43 operates to again raise the arm 38 just subsequent to the initial movement of the cam 57 which opens the jaws 62 and 63. A continued movement of the cam brings the pin 77 to the other end of the slot 56′ and the cam operates to carry the arm 38 into position over a mount in a holder of the mount conveyor at which time the cam 43 operates to lower the arm and the cam 57 is actuated through a return movement, with the result that the jaws 62 and 63 are again closed about and secure a mount.

It will be obvious that by a suitable formation of the cam surfaces which operate the transfer mechanism, the jaws 62 and 63 may be opened just prior to the final downward movement of a mount into a holder, thus the finger 83 which engages a flare tube may cause the mount to be moved down to its final position without opposition of the jaws and in a more positive manner, since if gripped by the jaws alone the same may slip, owing to the smooth surface with which they have to contact.

It will be evident that by reason of the present construction, it is possible to transfer a lamp mount from one position to another. This is of particular advantage in connection with the above described lamp making operations, wherein the lamp mounts are produced by attaching a filament to a stem by hand. It is obvious, however, that the present invention would be equally advantageous in connection with an apparatus which would automatically secure the lamp filament to the stem, whereupon the present mechanism might be employed for automatically transferring a mount to a sealing-in machine.

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 lamp making machine comprising means for supporting a lamp mount, jaws for gripping the exhaust tube of said mount, means for moving said jaws to position said exhaust tube over a holder, means for moving said jaws to insert said exhaust tube into said holder and secondary means for engaging said mount to insure a downward movement thereof to insert the exhaust tube into said holder.

2. A machine of the class described comprising a conveyor for lamp mounts having exhaust tubes, a sealing-in head, means for gripping the exhaust tube of a mount, means for moving the mount for insertion into said head and secondary means for engaging said mount to insure a movement of the same into said head.

3. A lamp making machine comprising a holder for supporting a lamp mount having an exhaust tube for consolidation with a bulb, a conveyor for moving a mount adjacent to said holder, gripper members for engaging the exhaust tube of said mount, a presser finger for engaging another portion of said mount and means for moving said jaws to insert said exhaust tube in said holder.

4. In combination, a machine having a holder for a lamp mount comprising an exhaust tube, means for gripping said exhaust tube, means for moving said gripping means to insert said exhaust tube in said holder and means for engaging another portion of said mount during movement thereof into said holder.

5. A machine of the class described comprising a conveyor for lamp mounts having exhaust tubes, a sealing-in machine, heads on said machine to receive lamp mounts, gripping jaws for engaging the exhaust tubes of mounts, means for adjusting mounts in said conveyor to be received by said jaws, means for moving said jaws to position mounts in said heads and means cooperating with said jaws to insure movement of said mounts into said holders.

6. A lamp making mechanism comprising a support for receiving an exhaust tube of a lamp mount to hold the mount in position for consolidation with a bulb, means for engaging the exhaust tube of said mount, means for transferring said mount to said support, means for actuating the transferring means to insert the exhaust tube of said mount into said support and means for engaging another portion of said mount to insure movement thereof into said support.

In testimony whereof, I have hereunto subscribed my name this 29th day of September, 1927.

ROBERT W. CONN.