Aug. 5, 1952 C. A. YOUNG ET AL 2,605,590

MOUNT TRANSFER APPARATUS

Filed June 30, 1949 4 Sheets-Sheet 1

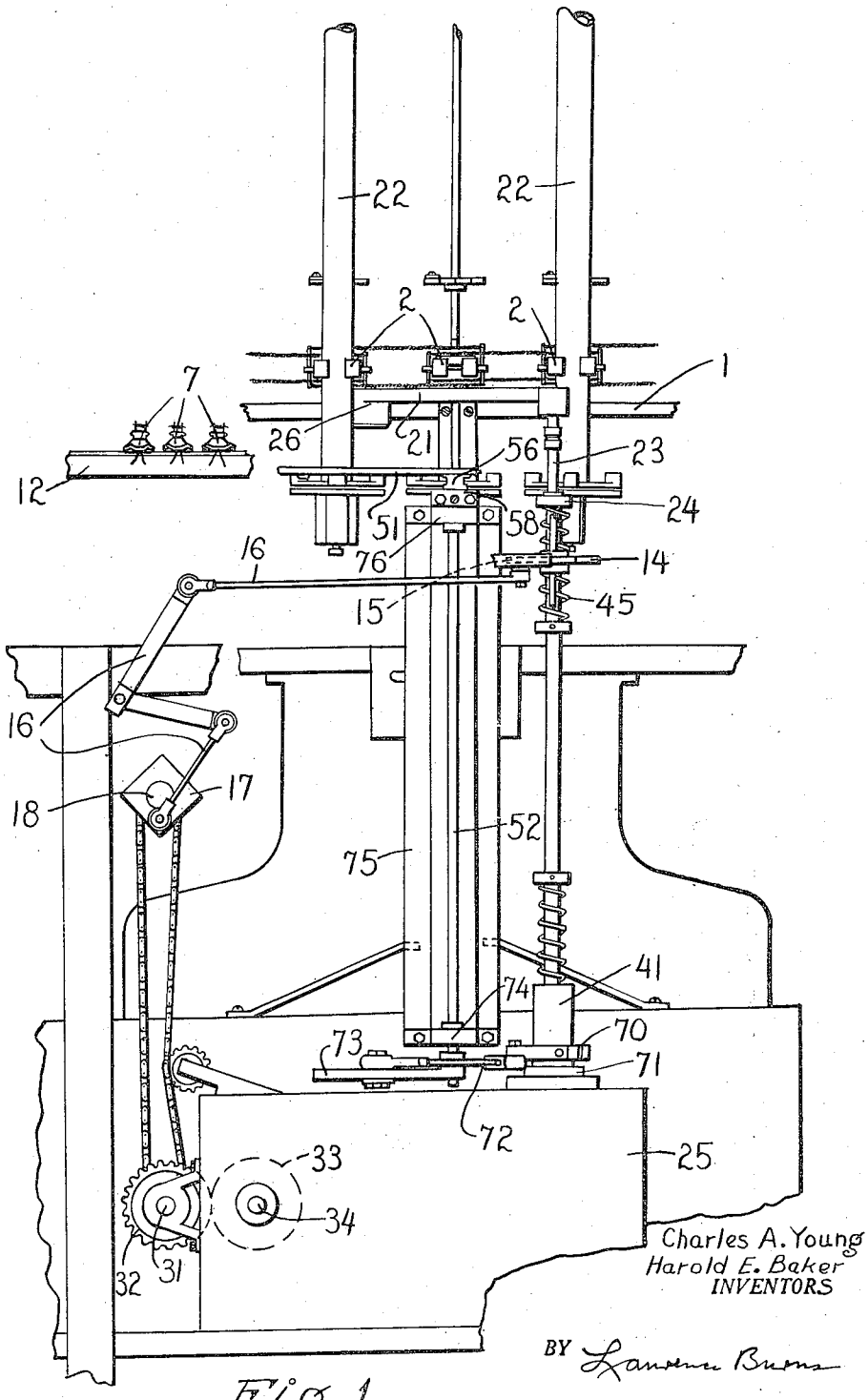


Fig. 1

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MOUNT TRANSFER APPARATUS

Filed June 30, 1949 4 Sheets-Sheet 2

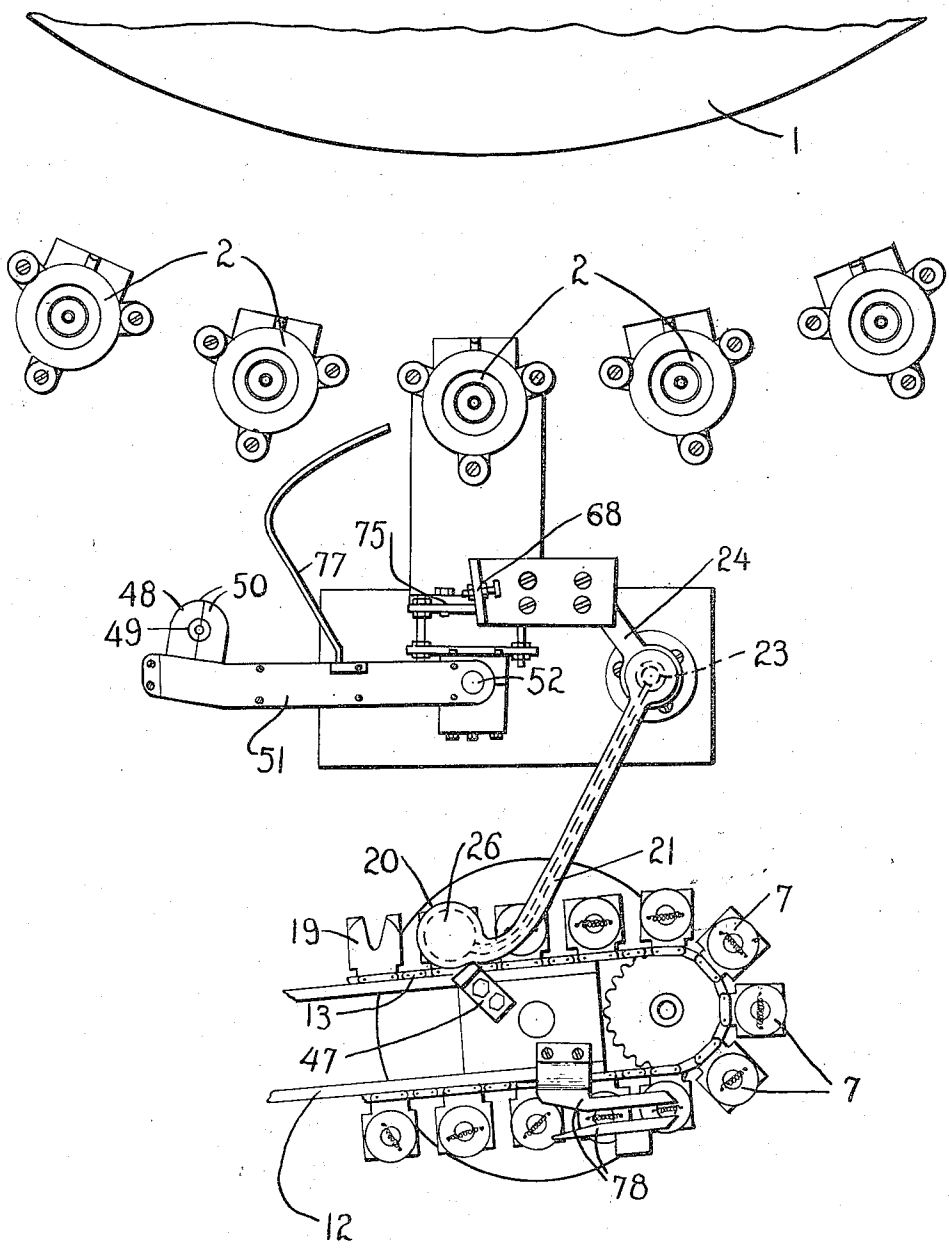


Fig. 2

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MOUNT TRANSFER APPARATUS

Filed June 30, 1949 4 Sheets-Sheet 3

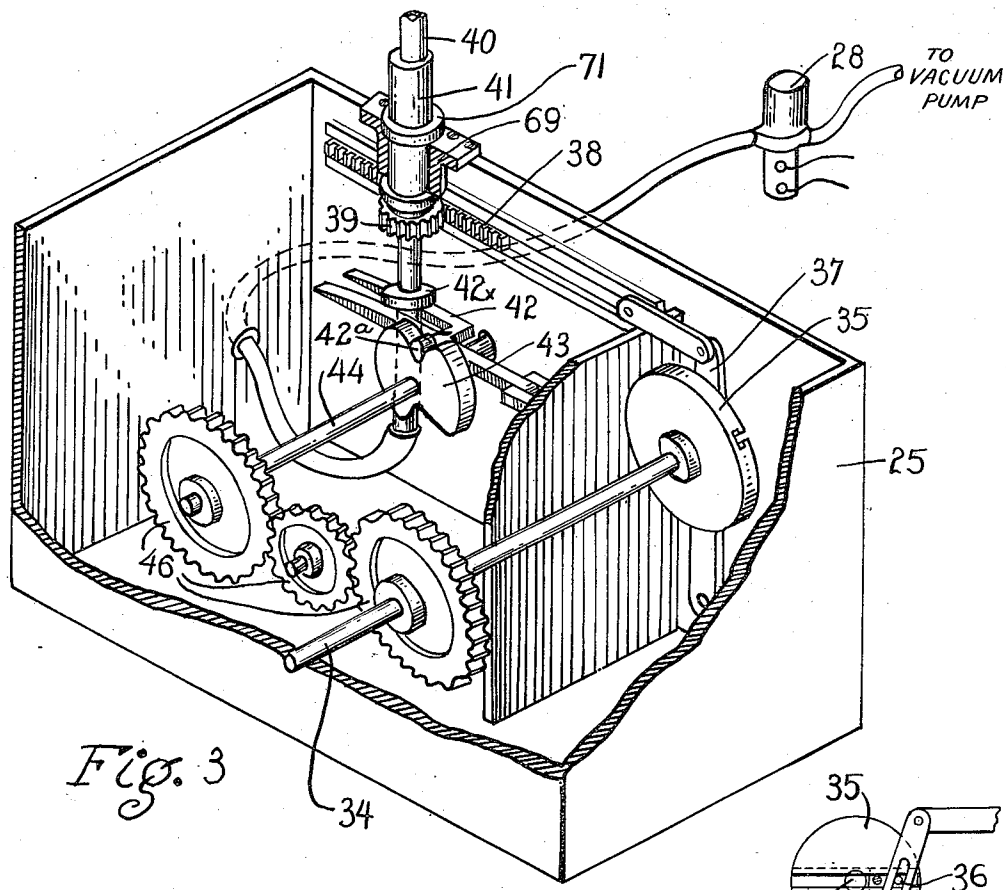


Fig. 3

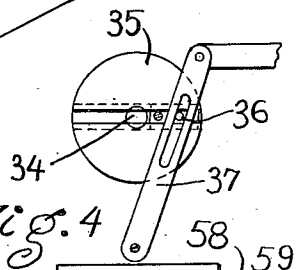


Fig. 4

Fig. 5

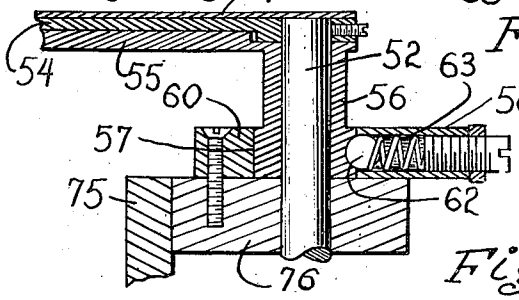


Fig. 6

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MOUNT TRANSFER APPARATUS

Filed June 30, 1949 4 Sheets-Sheet 4

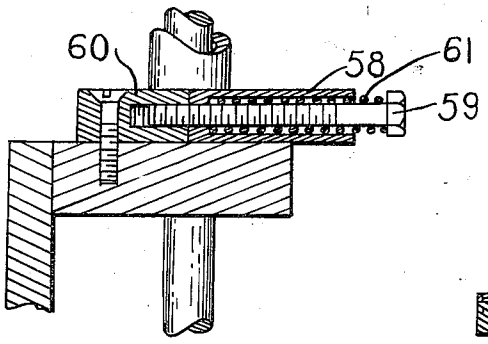


Fig. 7

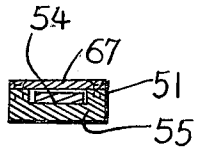


Fig. 8

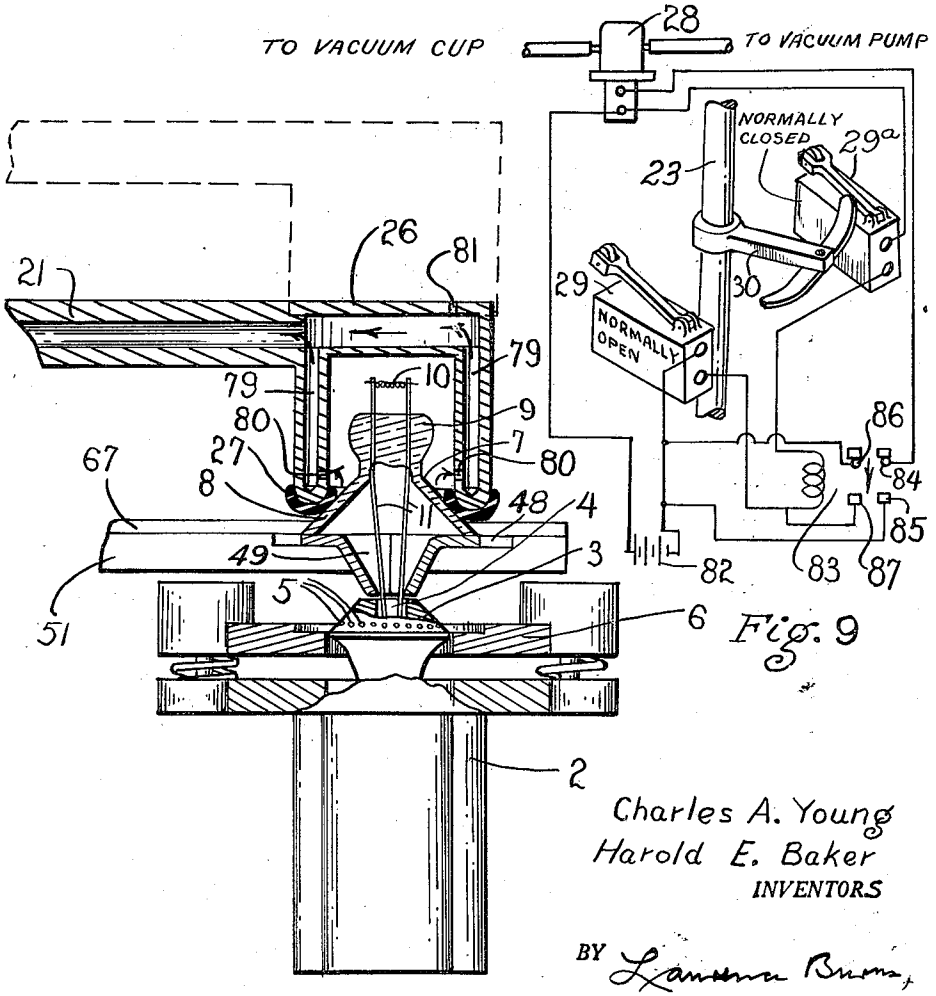


Fig. 9

Fig. 10

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Patented Aug. 5, 1952 2,605,590

UNITED STATES PATENT OFFICE

2,605,590

MOUNT TRANSFER APPARATUS

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Application June 30, 1949, Serial No. 102,246

3 Claims. (Cl. 49—2)

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This invention relates to an automatic mechanism for feeding electric lamp mounts to sealing position upon a sealing machine.

In the manufacture of electric incandescent or discharge type lamps the envelopes thereof are finally closed and made ready for exhausting by sealing the bulb portion thereof to the lamp mounts.

The mount is the common term used to designate the end portion of the lamp and consists of a glass structure having a flared portion the periphery of which is sealed to the open end of the lamp bulb. A body or stem portion which the flare surrounds supports the lamp filament or cathode. Such a mount may also have an exhaust tube extending downward therefrom.

The invention provides an automatic means for accurately placing mounts in their sealing positions upon the sealing heads of the sealing machine. Certain factors however render this operation difficult of successful execution. The mount is usually provided with lead wires and may have an exhaust tube which depends from the flared portion and must therefore be placed in an aperture provided therefor in the sealing head of the sealing machine.

The invention provides a carrier member for picking up a mount and placing it in sealing position upon the axis of the aperture in a sealing head and another means having a conical or funnel shaped opening through which the lead wires must pass before entering the sealing head. The funnel opening redirects and confines any lead wires which may be outside of the circle of the aperture in which they must be received, to a position where they will be sure to enter the aperture when they are lowered into final sealing position. Means are also provided to coordinate the movements of all of the elements to feed mounts to successive sealing heads during operation of the device.

It is an object of the invention to provide means to speed the operation of fabricating lamps.

A further object of the invention is to provide a mechanism for successively placing lamp mounts accurately in sealing position upon the sealing heads of a sealing machine.

A further object of the invention is to position the mounts with reliable consistency upon every sealing head as it is presented to its sealing station.

A further object of the invention is to provide a mechanisms which functions smoothly and without injury to the mounts.

Other objects and features of the invention will more fully appear from the following description

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in connection with the accompanying drawings in which:

Fig. 1 is a general front elevation of the mechanism constituting the invention.

Fig. 2 is a plan view of the mechanism.

Fig. 3 is a perspective view illustrating the mechanism used to drive the mount handling elements of the invention.

Fig. 4 is a detail view illustrating more clearly the drive for producing reciprocating motion of the mount carrying means.

Fig. 5 is an enlarged view of the lead wire guiding arm with its top plate removed to show its structural details.

Fig. 6 is a sectional view on line 6—6, Fig. 5.

Fig. 7 is a sectional view on line 7—7, Fig. 5.

Fig. 8 is a cross sectional view on line 8—8, Fig. 5.

Fig. 9 is a detail view partially diagrammatic, illustrating the manner of controlling the action of the vacuum pick up means.

Fig. 10 is a sectional view illustrating the relative position of the parts when a mount is about to be placed in sealing position.

The invention is applied to a circular type sealing machine for tubular lamps which has a turret 1 provided with a plurality of sealing heads 2. Such a machine is usually provided with a mechanism for indexing the heads successively into their sealing position although such a mechanism is not a part of the invention.

The heads 2 are or may be of conventional design being provided with a central conical member 3 having a main axial opening 4 and a plurality of gas jets 5. A concentric ring 6 surrounds the cone 3 and is universally and resiliently supported to act as a manipulator during the sealing operation in the usual manner.

The mechanism of the invention transfers a mount 7 which it picks from a supply of mounts and places it in sealing position upon a sealing head 2. The mount 7 is or may be of conventional design.

As shown herein the mount is for a fluorescent lamp and has a skirt or flare portion 8 surrounding a stem or press portion 9 which supports a filament 10. The lead wires 11, connected to the filament extend downward from the press 9. The mount may or may not be provided with an exhaust tube. Herein a mount is shown without an exhaust tube it being assumed that the sealing operation is being performed on the end of the lamp opposite to that having an exhaust tube. The operation of the device is the same with or without an exhaust tube and requires that the mount be presented to the axis of its sealing

position and above the cone member after which it is lowered, during which time its lead wires enter the opening 4 and the flare 8 comes to rest upon the cone member 3.

The invention provides special means to insure that the mount will be properly positioned with its lead wires in the aperture 4.

A convenient manner of presenting the mounts to the mechanism is to provide a conveyor 12 which may be of any suitable construction. As shown the conveyor consists of an endless chain 13 passing over a pair of sprockets one of which is driven by a ratchet wheel 14 which is driven in timed relation to the operation of the sealing machine by a driving pawl 15 arranged to engage notches in the wheel 14. The pawl may be driven by a system 16 of links and levers driven from an eccentric 17 upon a driven shaft of the sealing machine such as the shaft 18.

The chain 13 is provided with a plurality of equally spaced mount holders 19 which are kept filled with mounts by an operator. The holders ride upon a supporting rail which in turn is supported upon posts secured to the floor upon which the machine is mounted. The conveyor is so adjusted that it will present a mount to a predetermined pick-up position indicated at 20.

A pick-up and carrier member 21 is arranged to lift the mount at pick-up position on the conveyor and move it to the axis of a predetermined feeding in station where the sealing operation begins and is continued as the turret 1 rotates in the manner well known to those skilled in the art. At the feeding in station a lamp bulb or tube 22 is held upon the machine turret and is moved down into contact with the mount with its bottom edge engaging the peripheral portion of the flare 8. The axis of the feeding in station will hereinafter be termed the working axis of the mechanism.

The member 21 may be constructed to provide the necessary feeding in movement in any suitable manner. As shown herein it is in the form of a swinging arm secured at one end to an operating shaft 23 which is pivoted at its upper end in a bearing 24 secured to the machine and extends into a box 25 containing a mechanism, to be described, which actuates the arm.

The outer end of the carrier arm has secured thereto a vacuum head 26 in the form of an inverted cup with its downwardly opening end provided with a sealing means such as a ring of rubber 27 which engages the flare 8 as it is lowered into pick up position over the mount.

A partial vacuum may be created in the cup 26 in any desired manner. As shown herein the carrier arm is hollow to provide a conduit which connects with the cup at one end and with the shaft 23 which is also hollow. The lower end of the shaft is provided with a flexible tube which is connected to a vacuum pump not shown.

The vacuum line has a valve 28 therein which is operated in timed relation to the machine to pick up a mount from the conveyor and release it when the cup is over the sealing head and axially on the working axis. The vacuum valve may be electrically operated in which case it is controlled by a pair of switches 29 and 29a which are positioned to be closed by an arm 30 on the shaft 23. The arm is positioned to cause the valve to turn on the vacuum when the cup is in position to pick up a mount and to release the vacuum when the mount is positioned upon the working axis.

The shaft 23 is driven by a mechanism in the box 25. The mechanism may be driven in any suitable manner but is desirably driven from a shaft on the sealing machine such as shaft 18.

An auxiliary shaft 31 is journalled on the box 25 and driven by sprockets and a chain from the shaft 18.

The shaft 31 has a gear 32 secured thereon which meshes with a gear 33 secured to a shaft 34 journalled within the box. The shaft 34 has secured thereon a drive disc 35 within which is slidably received a trunnion member 36 adjustable toward and from the axis of the shaft. The member 36 projects into a slot within a lever 37. The lever 37 is fulcrumed at one end upon the base of the box 25 and is pivotally connected at its upper end to a link which in turn acts to drive a rack 38 guided in its movement along the side of the box and having its teeth meshing with a gear 39 which drives the shaft 23 by means of a spline 40. The lower end of the shaft 23 and the hub 41 of the gear are journalled in the top of the box in a manner to be described. Rotation of the shaft 34 causes reciprocation of the rack and oscillation of the shaft 23 which in turn swings the arm carrying the cup 26 into its operating positions. The extent of the travel of the arm can be accurately determined by adjusting the trunnion 36.

The carrier arm 21 and the cup 26 must also be raised and lowered to pick up and deposit the mounts. This may be done in any suitable manner and is herein accomplished by raising and lowering the shaft 23 bodily. The bottom end of the shaft extends through a slot in an actuator arm 42 disposed substantially horizontally and fulcrumed upon a post or wall within the box 25.

As hereinbefore stated the shaft 23 is made hollow to serve as part of the vacuum line and its lower end is connected to a flexible hose which in turn leads to the vacuum valve 28.

The shaft 23 has secured thereto a collar 42X which engages the actuator arm 42 along the sides of its slot.

The arm 42 also has a cam follower 42a mounted thereon which engages the periphery of a cam 43 which is mounted on a shaft 44 journalled in the box.

The cam 43 is concentric for the major portion of its periphery and is provided with two diametrically opposite depressions in which the follower rides to lower and raise the shaft 23 while the gear 39 acts to oscillate the shaft to swing the vacuum cup into pick up and delivery position. If desired a spring 45 may be provided surrounding the shaft and acting against a collar on the shaft to urge it downward.

The shaft 44 is driven at the same speed as the shaft 34 desirably by a train of gears 46 connecting the shafts. The position of the cup 26 when it picks up a mount may be positively determined by a stop 47 secured to the conveyor guideway.

One of the important aspects of the invention is a means for accurately controlling and guiding the depending portion of the lead wires into the aperture 4 in the conical central portion of the sealing heads.

The invention provides a wire guiding means 48 having a hollow conical structure presenting a conical aperture 49 having its large diameter extending upward. Means are provided to move the guide into position just below the vacuum cup and disposed with the bottom of the conical aperture 49 in accurate register with the hole 4 in the sealing head. This small end of the aper-

ture 49 should be the same size or slightly smaller in diameter than the aperture 4 as shown in Fig. 10.

When the cup 26 is lowered to deposit the mount on the sealing head the wires first engage the sloping sides of the aperture and are guided directly and positively into the hole 4 after which the guide must be removed to permit the mount to drop upon the conical center member 3 of the head.

Special means are provided to remove the guide 48 laterally from the mount. To do this the guide member is divided into at least two sections 50 which are individually pivoted upon a supporting and carrier arm 51 which in turn is mounted on a drive shaft 52 which swings it into and out of active position.

The dividing line between the sections 50 desirably is passed diametrically through the conical aperture 49 and is substantially perpendicular to a radius from the shaft 52. The sections 50 are pivoted upon the pins 53 fixed in the arm 51.

The sections 50 are automatically held closed when the guide is moved into operating position and opened when the guide is moved away. This may be done in any suitable manner. A desirable manner of accomplishing this end is shown herein wherein the torque applied to the drive shaft 52 to move it into and out of operating position acts also respectively to close and open the sections 50 of the lead wire guide. To do this the arm 51 has two parts, an actuator arm 54 and a coacting support arm 55. Desirably the arm 54 is received in the channeled upper face of the arm 55 and is provided with space therein in which it may have relative motion with respect to the support arm 55.

The arm 55 has a depending sleeve portion 56 within which the shaft 52 is loosely received. The lower end of the sleeve 56 has a cylindrical friction face 57 against which bears a friction block 58. The block 58 is held against rotation upon the shaft by a pair of screws 59 passing loosely through it into a rigid support member 60 secured to the sealing machine. The block 58 floats upon the screws 59 and is urged into frictional engagement with the sleeve 56 by springs 61 which expand between the bottom of spring recesses in the block and the heads of the screws 59. The inner end of the block has a semicircular recess fitting closely against the friction face 57 of the sleeve 56.

If desired additional friction means may be employed such as a steel ball 62 loosely received in a recess 63. The ball is urged against the surface 57 and enters notches therein when the arm is in operative position and away from operative position.

The actuator arm 54 is rigidly secured to the shaft 52 and has a pair of slots 64 extending longitudinally of the arm within which are received a pair of studs 65 secured in the sections 50. The sections 50 of the guide are pivoted on the pins 53 which are in turn secured in the arm 55. It will be readily seen that torque applied to the shaft is transmitted through the pins 65 to the sections 50. When the shaft 52 is rotated clockwise to move the guide into active position the first motion thereof closes the sections 52 and when they are closed further motion of the shaft overcomes the friction set up by the block 58 and carries the guide into operating postion in register with the opening 4 in the sealing head. Just prior to the retracting motion of guide the sections 50 are separated to disengage the guide from the mount.

The sections 50 are made relatively light by making them thin and forming the conical aperture as shown in Fig. 10 wherein the aperture is actually the inner chamber of a hollow cone. The position of the sections must be accurately determined at all times. To insure this an additional pair of pins 66 are fixed in the support member in line with the predetermined centerline between the sections. Symmetrical notches are formed in the opposite edges of the sections 50 within which one of the pins 66 are received when the sections are closed and another pair of similar notches which embrace the other pin when the sections are separated as shown in Fig. 5. In this manner the two sections are positively guided and held in their desired position at all times. To complete the wire guiding arm a top plate 67 is secured thereon which serves to hold the sections 50 in alignment on a common plane and to enclose the arm 54.

To insure that the operating position of the arm is correct it may be desirable to provide a stop such as the stop 68 which is made adjustable for accurately setting the arm position.

In describing the mechanism within the box 25 it was stated that the gear 39 is provided with a hub portion 41. This hub is extended upward through and is rotatably received in a bearing 69 in the top of the box 25. The hub extends beyond the bearing 69 and has secured thereon an arm 70.

The gear 39 is held against vertical bodily motion by reason of a shoulder formed on its hub and a collar 71 which embraces the bearing 69.

The arm 70 acts to drive the shaft 52 which actuates the guide member 51. The connection may be made in any desired manner. As shown herein a link 72 is pivoted to the arm 70 at one end and to another arm 73 secured to the lower end of the shaft 52.

The lower end of the shaft 52 is rotatively mounted in a bearing 74 which in turn is secured to a frame 75 fastened to the main frame of the sealing machine. Support for the upper end of the shaft 52 is obtained by securing the friction block 58 to a bearing block 76 which in turn is secured to the frame 75 and through which the shaft freely passes.

For purposes of uniformity in manufacture it is desirable that the mounts be placed in sealing position with their filaments arranged in a uniform manner. One desirable result of such an arrangement is to insure that the relative position of the filaments or cathodes at each end of the lamp can be aligned in a predetermined manner. Any suitable structure may be employed for this purpose. One means for accomplishing this end is to secure to the arm 51 a positioning wire 77 the outer end of which is concentric with the axis of the shaft 52, the concentric portion being positioned to engage the filament on the mount upon the return stroke of the arm 51. As the wire 77 wipes by the filament it will automatically rotate the mount until its filament lies tangent to the circle along which the sealing heads move. If found desirable other orienting means for the mounts may be used to supplement the wire 77 or they may be used independently. Such other means may be in the form of one or more guideways 78 secured to the conveyor 12 and provided with narrow runways through which the filaments are forced to travel in a plane lying in the direction of their movement on the conveyor.

The operation of the mechanism is as follows.

Lamp mounts are fed to the work axis at a time in the work cycle when no lamp tube is present. During this period the vacuum cup **26** picks up a mount from the conveyor raises it and moves it to the working axis by reason of the combined action of the rack **38** and gear **39** and the cam **43**. During this inward movement the lead wire guide **48** also moves into its acting position with its sections **50** closed. The cup **26** is then moved down by the action of the cam **43**.

This downward movement feeds the lead wires into the aperture **4** in the sealing head. The vacuum in the cup is then released which deposits the mount upon its guide. The arm **51** and the carrier arm **21** then start to move into retracted position, the first application to torque upon the shaft **52** acts through the arm **54** to open the sections **50** of the guide thus permitting the guide to move away from the mount. The carrier at this time moves to its pick up position **20** while the arm **51** moves out away from the sealing head to a position which will avoid contact with other machine parts. When the guide **48** moves away from the mount, the mount assumes its sealing position upon the sealing head. Immediately thereafter a lamp tube is placed in the turret **1** of the sealing machine with its end above the mount.

The lamp tube is then moved down into contact with the mount. This placement of the lamp tube may be manual or automatic and is not a part of the present invention.

The lamp tube and mount are then sealed in the conventional manner.

A refinement of the invention resides in the protection afforded the filament where, in the particular case illustrated herein, a mount is shown for a hot cathode discharge lamp. In such case the cathode filament **10** is coated with an emission material which may be partially blown away if subjected to a blast of air.

To prevent such damage to the cathode the cup **26** is desirably of special construction. The vacuum conduit leads from the arm **51** to one or more vertical conduits **79** formed in the walls of the cup. The conduits **79** connect with openings **80** leading into the inner chamber of the cup adjacent its lower marginal portion or lip. The volumetric capacity of the vacuum pump must be great enough to produce a partial vacuum in the cup when a mount is present thus to hold the mount in position on the cup.

It must be assumed in the operation of the device that the mounts will not necessarily always seat themselves tightly against the gasket **27** due to possible irregularities in the skirt or for other reasons in which case a leak of air will enter the cup and might injure the cathode. However any air which enters the cup is withdrawn through the ports **80** and is thus routed away from the filament.

Another feature which adds to the efficiency of operation of the cup is the provision of a bleeder opening **81** which leads from the vacuum conduit to the atmosphere. When the vacuum valve **28** shuts off the vacuum the bleeder insures that the vacuum will be quickly reduced to release the mount.

The switches **29** and **29***a*, and the valve **28** are or may be connected in a conventional circuit to provide automatic control of the vacuum in the cup **26**. As shown herein one pole of a suitable source of current **82** is connected to one side of the solenoid coil in the valve **28**. The other pole of the source is connected to one side of the normally open switch **29** the other side of which is connected to one side of the magnet of a normally open double pole double throw relay **83**. The other side of the magnet coil connects to one side of the normally closed switch **29***a* the other side of which connects to the solenoid coil.

Thus when the arm **30** closes the normally open switch **29**, the relay is energized which causes the switch blade **84** to close upon the contact **85** which closes the circuit through the solenoid of valve **28** which in turn applies vacuum to the cup **26**. The relay also moves the knife **86** to engage the contact **87** which by-passes the normally open switch **29**.

The shaft **23** then moves to feed a mount to its sealing position at which time the arm **30** moves away from the normally open switch **29**. However as pointed out its circuit remains closed by the relay therefor vacuum is still applied to the cup **26**. When the cup reaches its delivering position the arm **30** opens the normally closed switch **29***a* which opens the circuit to the solenoid coil of the valve **28** and the relay coil. The vacuum is thus cut off and the relay open circuited. The mount now drops from the cup to sealing position and the arm returns to pick-up position where the cycle is again repeated.

What we claim is:

1. In combination with a lamp sealing machine having centrally apertured sealing heads, apparatus for transferring mounts having lead wires depending therefrom from a supply thereof to the sealing machine heads comprising: a mount carrier arm; a mount holder on said arm; means for oscillating said arm between the mount supply and above a lamp sealing machine head; means for actuating said mount holder to pick up a mount from the supply thereof and release said mount when it is above and in register with a lamp sealing machine head; a wire guide means including a split funnel; means for oscillating said wire guide means to and from a position above and in register with the lamp sealing machine head, and between the head and said mount holder, and in timed relation to the oscillation of said mount carrier arm and the mount holder thereon whereby the mount holder presents a mount to the delivery position above and in register with the lamp sealing machine head when the funnel of said wire guide means is disposed therebetween; means for opening said funnel as the wire guide oscillating means starts to move from a position over a lamp sealing machine head and closing said funnel as the wire guide oscillating means starts to move toward a lamp sealing machine head.

2. In combination with a lamp sealing machine having centrally apertured sealing heads, apparatus for transferring mounts having leadwires depending therefrom from a supply thereof to the sealing machine heads comprising: a mount carrier arm; a mount holder on said arm; means for oscillating said arm between the mount supply and above a lamp sealing machine head; means for actuating said mount holder to pick up a mount from the supply thereof, and release said mount when it is above and in register with a lamp sealing machine head; a wire guide means including a split funnel; means for oscillating said wire guide means to and from a position above and in register with the lamp sealing machine head, and between the head and said mount holder, and in timed relation to the oscillation of said mount carrier arm and the mount holder thereon; means for opening said funnel as the

wire guide oscillating means starts to move from a position over a lamp sealing machine head and closing said funnel as the wire guide oscillating means starts to move toward a lamp sealing machine head.

3. In combination with a lamp sealing machine having centrally apertured sealing heads, apparatus for transferring mounts having leadwires depending therefrom from a supply thereof to the sealing machine heads comprising: a mount carrier arm; a mount holder on said arm; means for oscillating said arm between the mount supply and above a lamp sealing machine head; means for actuating said mount holder to pick up a mount from the supply thereof and release said mount when it is above and in register with a lamp sealing machine head; a wire guide means including a split funnel; means for oscillating said wire guide means to and from a position above and in register with the lamp sealing machine head, and between the head and said

mount holder, and in timed relation to the oscillation of said mount carrier arm and the mount holder thereon; means for opening said funnel as the wire guide oscillating means starts to move from a position over a lamp sealing machine head and closing said funnel as the wire guide oscillating means starts to move toward a lamp sealing machine head.

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