April 18, 1961 S. BOROS 2,980,266

APPARATUS FOR LOADING LAMP MOUNTS

Filed Sept. 25, 1958 3 Sheets-Sheet 1

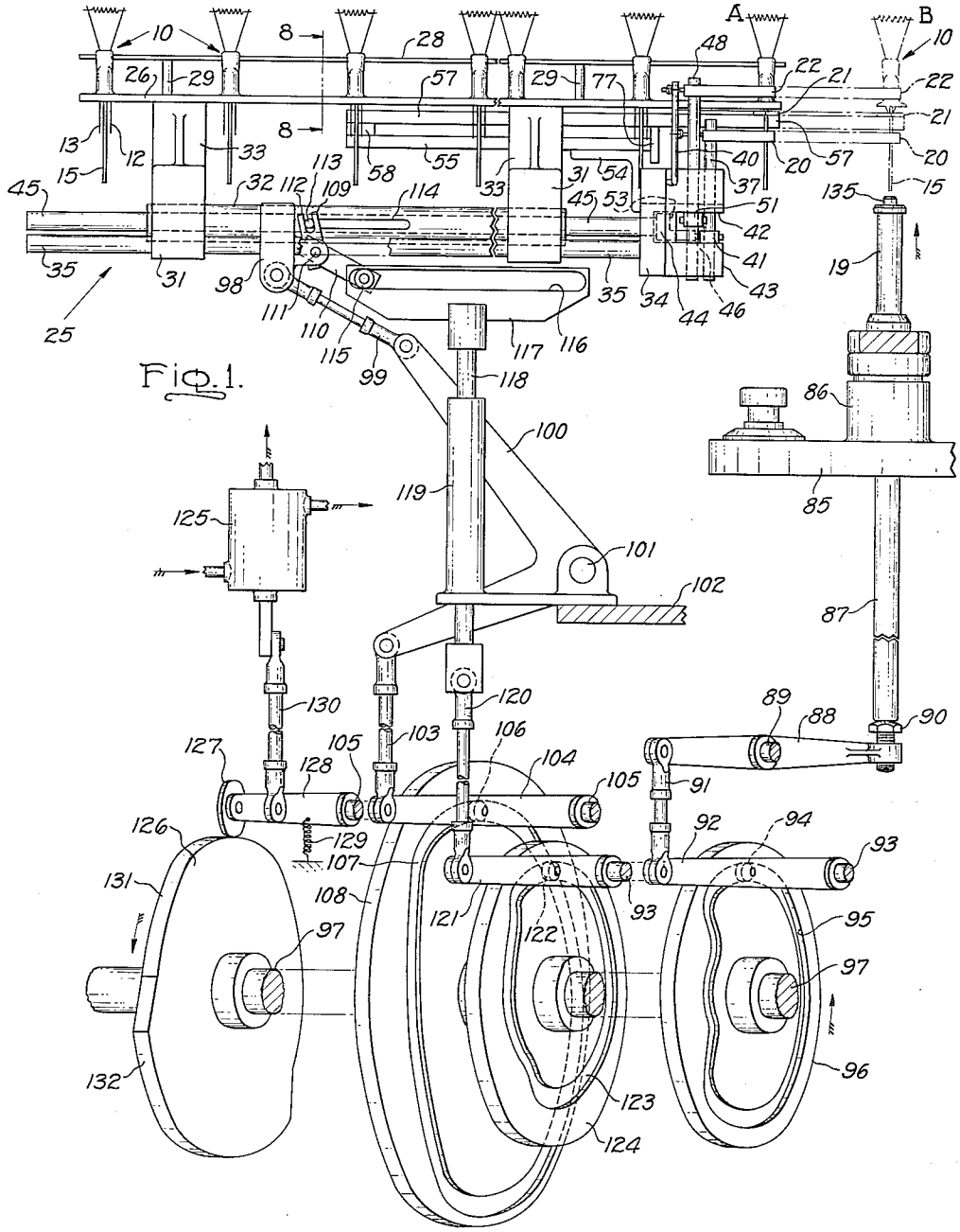


Fig. 1.

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APPARATUS FOR LOADING LAMP MOUNTS

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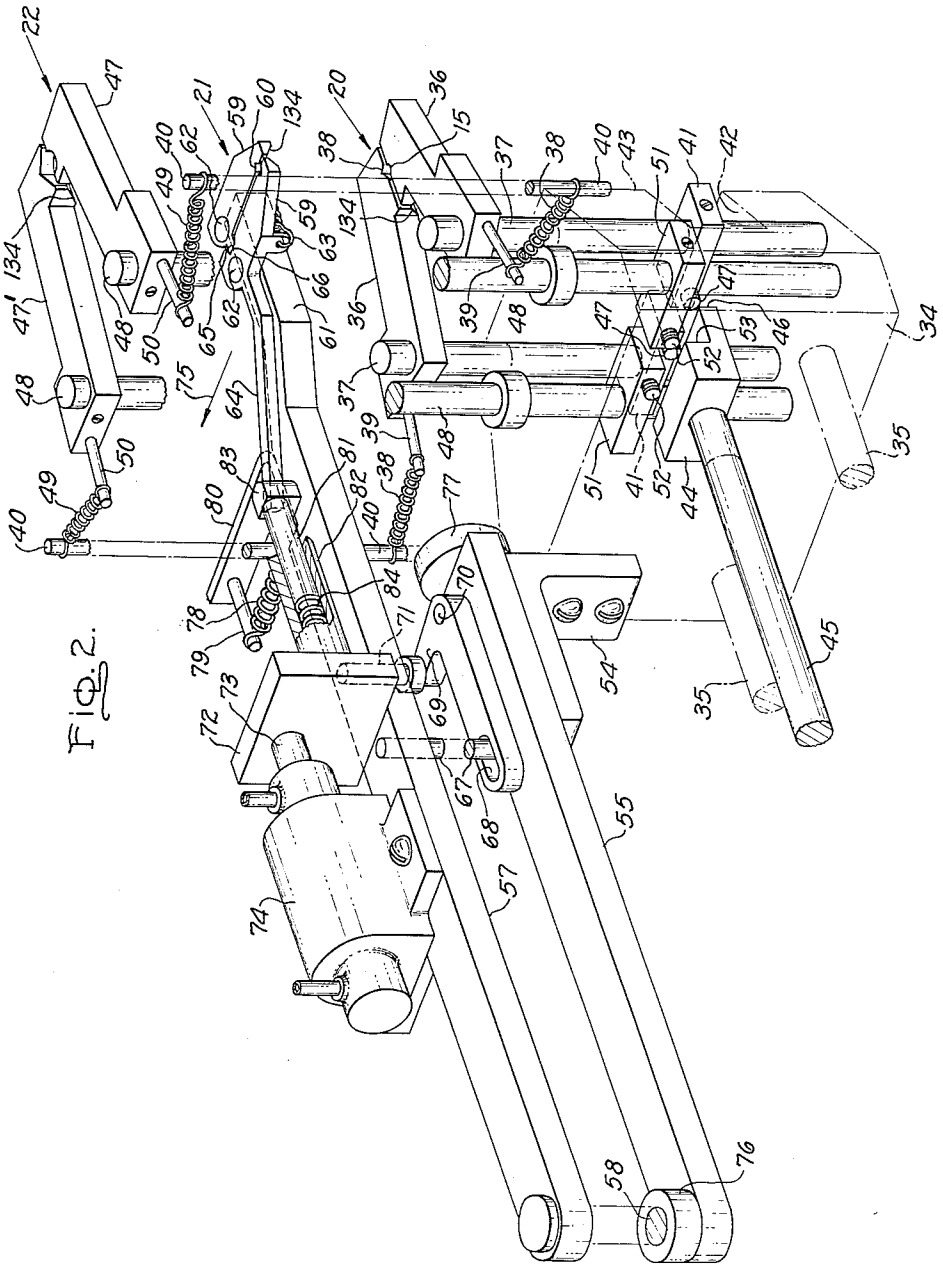


Fig. 2.

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APPARATUS FOR LOADING LAMP MOUNTS

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Fig. 3.

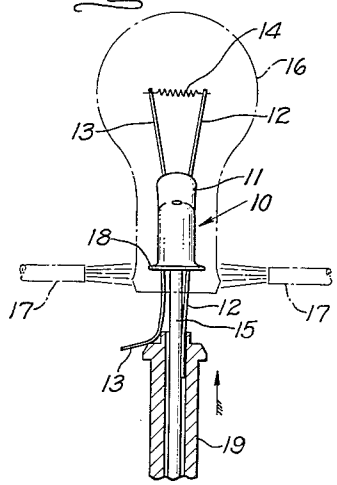


Fig. 4.

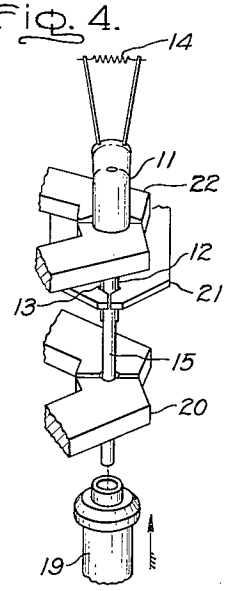


Fig. 5.

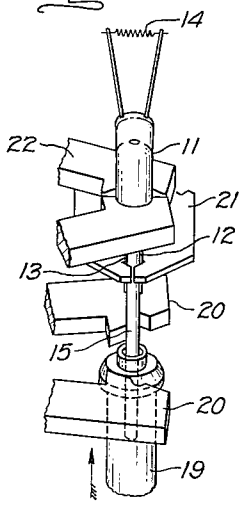


Fig. 6.

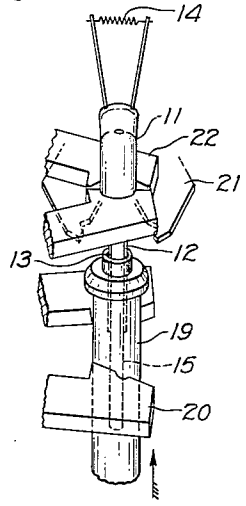


Fig. 7.

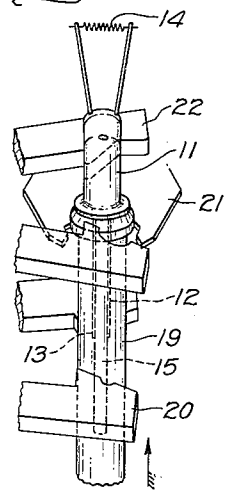
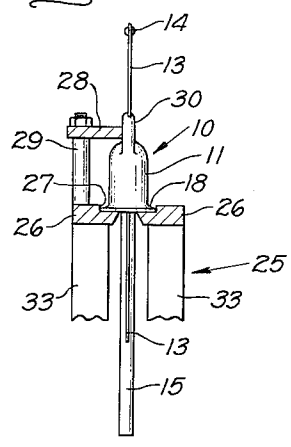


Fig. 8.



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United States Patent Office 2,980,266
Patented Apr. 18, 1961

2,980,266

APPARATUS FOR LOADING LAMP MOUNTS

Steve Boros, Whitehaven, Tenn., assignor to General Electric Company, a corporation of New York

Filed Sept. 25, 1958, Ser. No. 763,372

7 Claims. (Cl. 214—1)

This invention relates to apparatus for loading lamp mounts and more particularly to apparatus for loading or transferring a lamp mount having a stem tube, exhaust tube and lead wires from a support on one piece of equipment in the lamp making process to another for subsequent processing into a finished lamp.

In the manufacture of lamps utilizing a lamp mount constructed with a stem tube, exhaust tube, filament, and lead wires, the mount is transferred to a lamp sealing machine for assembly of the enclosing lamp bulb and subsequent sealing of the bulb to the mount. In this operation it is important that the lead wires be properly positioned on the sealing machine and protected during the firing process when the lamp bulb is heat sealed to the mount. If the lead wires are unprotected and extend at random angles they may be burned off by the sealing fires resulting in a defective lamp at this intermediate stage of manufacture. To prevent this occurrence, the apparatus of the instant invention is designed to grasp the lamp mount and lead wires at spaced points for transfer to and loading on the lamp sealing machine. The lead wires are maintained in assembled relationship parallel to the exhaust tube as the lamp mount is loaded onto the sealing machine where the leads are protected from the sealing fires.

It is therefore, an object of the invention to provide a new and improved apparatus for transferring lamp mounts from one piece of lamp making equipment and loading them onto another in which means is provided to maintain the lead wires and parts of a lamp mount in proper assembled relationship during the transfer and loading operations.

Another object of the invention is to provide, in combination with a lamp sealing machine, loading apparatus to grip parts of the lamp mount and lead wires and to transport the mount from a supporting surface to the lamp mount receiving part on the sealing machine.

Still another object is to provide improved loading apparatus for transferring lamp mounts from one machine to another in which means is provided to maintain the lead wires in close parallel relationship on opposite sides of the exhaust tube to prevent damage or bending of the lead wires during the loading operation.

In brief, the loading apparatus is provided with spaced pairs of jaws for gripping both the stem tube portion of the lamp mount and the exhaust tube which extends below the stem to support the mount in upright position. In addition, a device is provided to grip the lead wires and maintain them in parallel relationship on opposite sides of the exhaust tube thereby eliminating displacement or bending of the wires during the loading operation. In one form of the invention, the device comprises an intermediate pair of jaws for holding the lead wires against the exhaust tube so that both the exhaust tube and lead wires may be positioned within the hollow spindle or supporting tube of a sealing machine. The pairs of jaws are released from engagement with parts of the lamp mount in sequence as the spindle rises to engage the

mount so that the exhaust tube and lead wires may be threaded into the interior of the supporting tube or spindle for subsequent manufacturing operations.

Further objects and advantages of the invention will appear from the following detailed description taken in connection with the accompanying drawings in which:

Fig. 1 is a side elevation of loading apparatus constructed in accordance with the invention, the apparatus being shown in operative relationship with a sealing machine of lamp making equipment;

Fig. 2 is an exploded perspective view showing the lamp mount loading apparatus;

Fig. 3 illustrates assembly of a lamp mount on a sealing machine for sealing the lamp bulb showing incorrect positioning of the lead wires;

Figs. 4 to 7, inclusive, are schematic views showing the manner in which the pairs of jaws of the loading apparatus grip the lamp mount for correct positioning of the leads during mounting on the sealing machine; and

Fig. 8 is a sectional view along the line 8—8 of Fig. 1 showing means for positioning and guiding the lamp mount.

Referring to Fig. 3 of the drawings, a lamp mount **10** has been illustrated and comprises a stem tube **11** to which spaced lead wires **12** and **13** are sealed in a manner well understood in the art. The upper ends of the lead wires carry a filament **14** of any suitable material such as tungsten; the lower ends extend beyond the stem tube in a direction generally parallel to and on opposite sides of an exhaust tube **15** sealed to the stem tube **11**. A lamp mount so constructed in the preliminary stages of manufacture of the electric lamp is loaded, by one means or another, onto a lamp sealing machine. A lamp bulb **16** of vitreous material is placed over the mount and sealed to the mount by the sealing machine fires directed from burners **17** located around the periphery of the bulb. If desired, the stem tube **11** may be provided with a flare **18** to facilitate sealing of the stem tube with the bulb wall.

In one type of lamp sealing machine, the lamp mount is held in upright position for assembly of the lamp bulb by supporting the mount on a tubular member or spindle **19** with the exhaust tube **15** extending downwardly into the hollow interior portion of the spindle. The type of sealing mechanism here under discussion is well known in the art. In actual manufacture, the lamp mount **10** is held in position over the spindle **19** and the spindle raised so that the lamp mount is threaded onto the spindle for subsequent sealing into the lamp bulb. There is little difficulty in placing the lamp mount **10** and spindle **19** in axial alignment so that the exhaust tube **15** is easily threaded into the interior of the hollow spindle. When it comes to the fine, ductile lead wires, there is some likelihood that they will not be properly threaded into the interior of the spindle. Instead, the end of spindle **19** may engage the lead wire as the spindle moves upwardly and deflect the wire away from the exhaust tube **15** so that the stem tube **11** rests on the spindle **19** with the lead wire **13** extending outwardly at an angle, as indicated in Fig. 3. When this occurs the lead wire **13** is almost invariably burned off by the sealing fires since it is not protected by being nested within the spindle. This results in a defective lamp at an intermediate stage of manufacture. To overcome this difficulty, the loading apparatus of the instant invention is provided with a device for engaging the lead wires on opposite sides of the exhaust tube to hold them firmly in alignment against the exhaust tube so that they may be easily and quickly threaded into the interior of the spindle as the spindle moves upwardly into engagement with the lamp mount.

As shown schematically in Figs. 4 to 7, inclusive, one form of the lamp mount loading apparatus is provided with a first pair of jaws **20** which are movable into and out of engagement with the exhaust tube **15**. The apparatus also includes a device for engaging leads **12** and **13**, for example, a second pair of jaws **21** which are movable into and out of engagement with the leads to hold them in parallel alignment on opposite sides of the exhaust tube. A third pair of jaws **22** are movable into and out of engagement with the stem tube **11**. As shown in Fig. 4, the pairs of jaws **20**, **21** and **22** grip the lamp mount at three spaced points to hold it securely in an upright position in alignment with the advancing spindle **19** of the lamp sealing machine.

As spindle **19** advances toward the lamp mount in the direction shown by the arrow, exhaust tube **15** is projected into the interior of the hollow spindle. As the spindle approaches jaws **20**, the jaws open to permit the spindle to move upwardly around the exhaust tube with the spindle passing between the open jaws **20** as indicated in Fig. 5. Continued upward movement of the spindle will cause it to be threaded over the ends of lead wires **12** and **13** held against opposite sides of the exhaust tube and which extend for a short distance below the second pair of jaws **21**. As shown in Fig. 6, just before spindle **19** reaches jaws **21** these jaws are opened to permit the spindle to continue its upward movement around the exhaust tube and lead wires toward the stem tube **11**. As the spindle approaches the upper pair of jaws **22** these jaws are likewise opened to release the stem tube **11** onto the end of the spindle. In this way the exhaust tube and lead wires are easily and accurately threaded onto the hollow spindle **19** so that the lead wires are completely protected within the spindle during subsequent heat sealing of the lamp bulb to the lamp mount. The operating mechanism for positioning the lamp mount in axial alignment with the spindle and for opening the jaws in sequence as the spindle advances will now be described.

Referring to Fig. 1, a series of lamp mounts **10** are moved in spaced relationship along the length of a feeding mechanism **25** to the end of the mechanism which constitutes a support station A for the mount before transfer to work station B of the sealing mechanism. As shown in Fig. 8, the feeding mechanism **25** is constructed with spaced guide rails **26** for supporting and guiding the completed lamp mounts in upright position with the exhaust tube **15** and lead wires **12** and **13** extending downwardly between the guide rails. Flare **18** rests in channels **27** formed in the guide rails. A guide plate **28** is carried by spaced supports **29** secured to one of the rails and contacts the stem press or flattened portion **30** of the lamp mount. The operation of the guide plate **28** is such that each mount **10** is always aligned in predetermined position as it travels down the guide rails **26** with the filament **14** parallel to the rails. This means that the lead wires **12** and **13** are likewise located in predetermined positions on opposite sides of the exhaust tube **15** in a direction parallel to the guide rails. When so positioned, the lead wires **12** and **13** are kept out of contact with the edges of the guide rail **26** as the lamp mount travels down the rails to prevent bending of or damage to the lead wires.

The mechanism for moving the lamp mount in spaced step-by-step movement along the length of the guide rails forms no part of the instant invention; it is disclosed and claimed in co-pending application Serial No. 729,406 entitled, Article Conveyor and Feeding Mechnism, filed April 18, 1958 by Steve Boros and assigned to the same assignee as the instant application. In any event, it is only necessary that the lamp mounts be moved along the guide rails one after the other to support station A, shown in Fig. 1, at which point they are transferred to work station B by loading apparatus incorporating the instant invention.

In Fig. 1, the lamp mount feeding mechanism **25** is shown as provided with spaced supporting blocks **31** carried by a machine bedplate (not shown). A hollow supporting tube **32** extends between and is fastened at each end to the blocks. Each block carries spaced uprights **33** for supporting the aforementioned guide rails **26** the space between the uprights accommodating the lamp mount exhaust tube and lead wires, as best shown in Fig. 8. A supporting base structure **34** is supported on the ends of spaced rods **35** (Figs. 1 and 2), the rods being mounted for sliding longitudinal movement in the support blocks **31**. Supporting base **34** carries the aforementioned jaw structures **20**, **21** and **22** which grip a lamp mount and, by sliding movement of the rods **35**, move it from the supporting station A to the work station B.

Referring to Fig. 2, the first pair of jaws **20** includes spaced arms **36** fastened at their inner ends to pivot rods **37** rotatable in the base **34**. At their outer ends the arms are provided with indentations **38** of a size to receive the exhaust tube **15** of the lamp mount. The arms are biased toward each other by tension springs **38** extending between pins **39** carried by the arms and rods **40** carried by base **34**. The springs serve to clamp the jaws **20** around the exhaust tube **15** with sufficient force to hold the tube firmly. To separate arms **36** and remove the jaws from clamping engagement with the exhaust tube, each pivot rod **37** is provided with an abutment plate **41** fastened to the rod and which moves in a recess **42** extending inwardly from the front face **43** of base **34**. The plates are moved toward the front face **43** against the action of springs **38** by a stepped element or block **44** carried at the end of an operating rod **45**. In turn, rod **45** is supported by and is movable within the hollow supporting tube **32** of the feeding mechanism, as shown in Fig. 1. When moved to the right in the showing of Fig. 2, a lower front face **46** of the stepped block engages adjustment screws **47** carried by the abutment plates **41** so that as the stepped block moves forwardly actuating rods **37** are rotated against the action of springs **38** to open the jaws **20**.

In a similar manner, the upper pair of jaws **22** includes spaced arms **47'** fastened to actuating rods **48** pivotally mounted in base **34** and which rotate in the base against the action of springs **49** fastened between the rods **40** and pins **50** extending from arms **47'**. Each actuating rod **48** carries an abutment plate **51** fastened to the rod and located within the aforesaid recess **42**. Each abutment plate carries an adjusting screw **52** which is engaged by a second face **53** formed on the stepped block **4**. As the stepped block **44** moves to the right face **53** will engage screws **52** to pivot the actuating rods **48** against the action of tension springs **49** and thereby open jaws **22**. The arrangement of the two offset faces **46** and **53** is such that as the stepped block **44** moves to the right first the lower jaws **20** and then, after a predetermined period of time, the upper jaws **22** will open. As previously described, the lower set of jaws **20** engages the exhaust tube **15** and the upper set **22** the stem tube **11** to firmly grip the lamp mount as it is moved from support station A on the feeding mechanism for loading on the sealing machine at work station B. During this loading operation the lead wires are held in aligned position against the exhaust tube by the intermediate pairs of jaws **21** which are opened and closed by means of mechanism described below.

In Fig. 2, base **34** is provided with a mounting bracket **54** to which an elongated mounting plate **55** is fastened in any suitable manner. As shown in Fig. 1, the mounting plate extends rearwardly away from the operating jaws in a direction parallel to the support plates **26** of the lamp mount feeding mechanism. An elongated arm **57** extends generally parallel to plate **55** and may be rotated with respect to the plate. One end of the arm is pivoted to the plate by means of a pin **58**; the other end carries the intermediate pair of jaws **21**. Jaws **21**

include opposed arms 59 having notches 60 at their outer ends for engaging the lead wires and exhaust tube; they are pivoted at their inner ends to an offset portion 61 of arm 57 by means of pins 62. Arms 59 are biased toward each other to close the jaws by means of a tension spring 63 extending between the jaws. One of the arms 59 is provided with an angularly extending offset portion 64 to form, in effect, a lever reaching to arm 57 and useful to open and close the jaws. The other arm 59 is provided with a tongue 65 extending into a recess 66 in the first arm so that as the first arm moves it operates the second through the interengaging action of the tongue 65 resting in the recess.

In addition to grasping and releasing the lead wires and exhaust tubes, jaws 21 are moved laterally out of axial alignment with the spaced jaws 20 and 22 to permit retraction of the loading apparatus once the lamp mount has been positioned on the spindle 19 of the lamp sealing machine. To this end, a pin 67 is carried by arm 57 and extends into an elongated slot 68 formed in one end of a bell crank lever 69 pivoted by means of a pin 70 to the supporting plate 55. The other end of the bell crank lever carries an upstanding roller pin 71 adapted to engage an abutment plate 72 fastened to the outer end of piston 73 extending from a fluid pressure operated cylinder 74 mounted on arm 57. As piston 73 moves toward jaws 21, plate 72 engages roller 71 and pivots the bell crank lever 69 in a clockwise direction, as shown in Fig. 2, to rotate arm 57 in a counterclockwise direction so as to move the pair of jaws 21 out of alignment with the spaced jaws 20 and 22. The direction of movement is shown by the arrow 75 in Fig. 2. Elongated arm 57, and the mechanism carried by it, rides on a spacing collar 76 surrounding pin 58 and a roller 77 fastened to the end of plate 55. Return movement of arm 57 to its original position upon release of fluid pressure is obtained by means of a tension spring 78 fastened at one end to the fixed rod 40 and at its other end to a pin 79 carried by a bracket 80 fastened to arm 57.

In addition to pivoting jaws 21 out of alignment with spaced jaws 20 and 22, the fluid pressure cylinder 74 also operates to open the intermediate pairs of jaws 21 by a mechanism which includes a plunger 81 carried in a sleeve 82 extending from the plate 72. One end of plunger 81 is provided with a curved surface 83 which rides against the side of lever 64 as the plunger is moved outwardly to rock lever 64 and open the jaws 21. A spring 84 is located in sleeve 82 and is compressed between the sleeve and plunger 81 to provide a lost motion connection and cushioning effect when pressure cylinder 74 is operated. Plunger 81 rides at all times against lever 64 by action of spring 84. This means that as pressure cylinder 74 is actuated to move the piston 73 toward jaws 21, spring 84 presses against plunger 81 with sufficient force to move lever 64 to open the jaws 21. Continued movement of piston 73 and plate 72 compresses spring 84 to provide a lost motion connection so that as the plate moves against pin 71 arm 57 is rotated to move jaws 21 out of alignment with jaws 20 and 22.

As previouly described, the loading apparatus not only grips the lamp mount to hold all parts in assembled relationship but it operates to transfer a lamp mount from the supporting station A to the work station B where it is held in axial alignment with the hollow spindle 19 of the lamp sealing machine. As spindle 19 moves upwardly the pairs of jaws gripping the mount open in sequence to position the mount on the spindle with the exhaust tube and lead wires located within the interior of the spindle. A suitable mechanism to accomplish these purposes in accordance with one form of the invention is illustrated by Fig. 1.

A conventional lamp sealing machine includes a rotatable turret 85, part of which is shown by Fig. 1, and which carries a plurality of the hollow spindles 19 located around the periphery of the turret so that the spindles may be brought, one after the other, to work station B to receive lamp mounts. Slide bearings 86 permit spindles 19 to be moved upwardly away from the turret plate 86 for engaging and receiving a lamp mount. Thereafter, a lamp bulb is placed over the mount and sealed to the lamp flare by burners in a manner well understood in the art. As the spindles 19 are indexed in a step-by-step movement to work station B, they are raised into lamp mount receiving position by a push rod 87 operated by a lever 88 pivoted to shaft 89. One end of lever 88 is provided with an adjustment screw 90 which bears against the lower end of push rod 87 and the other end is connected to a tie rod 91 extending between lever 88 and a cam lever 92 pivoted on shaft 93. Cam lever 92 is provided with a roller cam 94 which operates in a cam groove 95 cut into a cam 96 fastened to shaft 97. Shaft 97 is rotated in synchronism with the turret mechanism of the lamp sealing machine.

To move the three pairs of jaws gripping a lamp mount from support station A to work station B over spindle 19, a tie block 98 extends between the two spaced rods 35 and slides on supporting tube 32 to advance rods 35, the supporting base 34, and jaws toward the spindle. Tie block 98 is connected by means of an adjustable link 99 to a bell crank lever 100 pivoted on shaft 101 supported on part of the frame 102 of the lamp sealing machine. A tie rod 103 connects the other end of the bell crank lever to a cam follower lever 104 pivoted to shaft 105. A cam roller 106 is fastened to lever 104 and rides in a cam groove 107 cut into the side wall of cam 108 fastened to shaft 97. The arrangement is such that as cam follower lever 104 is raised bell crank lever 100 is pivoted in a clockwise direction to advance tie block 98 and the sliding rods 35 toward the spindle.

To operate the spaced jaws 20 and 22 to release a lamp mount, once the jaws are in alignment with the spindle 19, actuating rod 45 is driven to move the stepped block 44 into engagement first with the abutment plates 41 to open the lower jaws 20 and then with abutment plates 51 to open the upper jaws. Actuating rod 45 is moved with respect to the tie rods 35 by means of a pair of levers 109 and 110 fastened to a pivot shaft 111 carried by tie block 98. A slot 112 in the end of lever 109 is engaged by a pin 113 fastened to actuating rod 45 the pin extending through an elongated slot 114 in supporting tube 32. As rods 35 are moved to advance the jaw mechanism by movement of tie block 98, rod 45 will follow with its attached pin 113 moving freely in slot 114. Lever 110 is provided with a cam roller 115 riding in cam slot 116 formed in a cam plate 117. Again, as the tie block 98 and lever 110 are moved to the right in the showing in Fig. 1, the cam roller 115 moves freely in slot 116. However, to effect further motion of actuating rod 45 with respect to rods 35, the cam plate 117 is moved downwardly thereby pivoting the two levers 109 and 110 in a clockwise direction to further advance actuating rod 45 so that the stepped block 44 operates the jaws 20 and 22. Up and down movement of cam plate 117 is obtained by mounting it on a rod 118 sliding in a sleeve 119 carried by the aforementioned bedplate 102. Rod 118 is connected to an adjustable tie rod 120 extending to a cam follower lever 121 pivoted on the shaft 93. A cam roller 122 is fastened to lever 121 and rides in a groove 123 cut into the side of a cam 124 fastened to shaft 97. As cam 124 rotates the cam plate 117 will be moved up and down in timed sequence to the operation of the sealing mechanism.

To operate fluid pressure cylinder 74, and thereby open and close the intermediate jaws 21, a fluid pressure operating valve 125 (Fig. 1) is connected to apply fluid pressure to opposite sides of the piston 73 of cylinder 74; valve 125 is controlled by rotation of a cam 126 fastened to shaft 97. A cam follower wheel 127 is fastened to one end of a cam follower lever 128 the other end of the lever being pivoted on shaft 105. A spring 129 main-

tains roller 127 in engagement with the surface of cam 126. An adjustable tie rod 130 connects lever 128 to the fluid control valve 125 so that fluid pressure is applied to one side or the other of cylinder 74 to actuate the piston 73. When roller 127 is in engagement with cam surface 131 piston 73 is in retracted position permitting jaws 21 to close; when roller 27 is engaged by the enlarged cam surface 132 fluid pressure is applied to cylinder 74 to move the piston to open the jaws and swing them out of alignment with the other jaws and spindle in the manner already described.

At the start of a work cycle involving transfer of a lamp mount from the support station A to the work station B and loading of the mount on the spindle of a lamp sealing machine, the loading apparatus is in the position shown by Fig. 1 with the three pairs of jaws gripping a lamp mount at support station A and with the loading apparatus in retracted position away from the lamp sealing machine. As shaft 97 rotates counterclockwise in timed sequence with the operation of the lamp sealing machine, lever 104 is raised by the action of cam 108 to rotate bell crank lever 101 counterclockwise and thereby move tie block 98, supporting rods 35, base 34 and the sets of jaws 20, 21 and 22 carrying a lamp mount to the right so that the lamp mount is moved to work station B. If the lamp sealing machine is of the conventional turret type the direction of movement is radially to the direction of rotation of the turret; otherwise, the direction of movement is simply that to bring a lamp mount into a position for subsequent working.

During the time of advance of the lamp mount and jaws, one of the spindles 19 is being rotated on the turret plate 85 into position at work station B. Cam 95 on shaft 97 has now reached the point where it begins to lower lever 92 to thereby start elevation of spindle 19. As the hollow spindle rises, it extends over the lower end of exhaust tube 15. By the time spindle 19 approaches the lower pair of jaws 20, however, cam 124 has rotated to a position such that lever 121 is pulled downwardly lowering cam plate 117 and pivoting levers 109 and 110 clockwise to advance actuating rod 45 so that the lower face 46 of block 44 (Fig. 2) engages the abutment plates 41 to open the lower pair of jaws 20. Once past jaws 20, spindle 19 continues its upward travel towards the intermediate jaws 21. Before reaching them, however, lever 128 is elevated by the enlarged cam surface 132 to actuate the fluid control valve 125 to admit fluid pressure to cylinder 74 thereby moving piston 73 to the right, in the showing of Fig. 2. Movement of piston 73 causes plunger 81 to operate lever arm 64 thereby opening the intermediate pair of jaws 21 to release the lead wires within the spindle. Simultaneously, but with some slight delay occasioned by the lost motion connection of spring 84, further movement of piston 73 causes plate 72 to engage pin 71 and rotate arm 57 to move the jaws 21 laterally in a direction shown by arrow 75 out of alignment with the remaining jaws and lamp mount. As illustrated in Fig. 6, this permits the spindle to move upwardly around the lead wires and exhaust tube, the intermediate jaws 21 having performed their function of maintaining the lead wires in alignment on opposite sides of the exhaust tube for threading into the hollow spindle. In the meantime, and as spindle 19 moves past the open jaws 21, actuating rod 45 has been moved further by lowering of cam plate 117 to bring the second abutment face 53 of block 44 into engagement with the actuating plates 51 to open the upper jaws 22 and thereby release the lamp mount onto the upper end of spindle 19.

Once the lamp mount is located on the spindle of the sealing machine, cam 108 has been rotated to a position to lower the lever 104 thereby rotating bell crank lever 100 counterclockwise to retract tie block 98, supporting rods 35, base 34 and the three sets of jaws to initial position. The lower jaws 20 and the upper jaws 22 remain open during retraction of the jaws because cam plate 117 remains in its lowermost position so as to maintain actuating rod 45 and the stepped block 44 advanced against the actuating plates 41 and 51. There is no relative movement between support rods 35 and actuating rod 45 during retraction of the parts because roller 115 slides easily in the elongated track 116 of cam plate 117. As jaws 20 and 22 return to initial position they pass easily around the stem tube 11 and exhaust tube 15 of the next succeeding lamp mount which was advanced to the support station A by the feeding mechanism 25 during the time interval when the jaws were in advanced position over spindle 19. Inasmuch as intermediate jaws 21 extend at right angles to jaws 20 and 22, these jaws would interfere with the advancing and retracting movement of the loading apparatus by hitting against the exhaust tube of the lamp mount were it not for the fact that they are moved laterally out of alignment with the jaws 20 and 22 during retraction of the jaws.

As soon as the jaws have returned to initial position to grasp the next succeeding lamp mount, cam 126 actuates fluid control valve 125 so that fluid pressure is applied to cylinder 74 to retract piston 73. As piston 73 and its attached plate 72 are retracted the bell crank lever 69 is rotated counterclockwise, as shown in Fig. 2, by the tension in spring 78 to return arm 57 to initial position such that the open jaws 21 will now be in axial alignment with the upper and lower jaws around the exhaust tube and lead wires of the lamp mount. This initial retraction of plate 72 does not immediately close jaws 21 because spring 84 maintains the plunger 81 extended to maintain the jaws in open position until the compressive stresses in spring 84 are reduced to a point where they are overcome by the action of spring 63 in closing the jaws. Jaws 21 then close around the mount. As soon as the upper and lower jaws are returned to initial position around the next succeeding lamp mount, cam 124 elevates the cam plate 117 thereby moving levers 109 and 110 counterclockwise to retract the actuating rod 45 releasing the stepped block 44 from engagement with the actuating plates 41 and 51 permitting the jaws 20 and 22 to close around the lamp exhaust tube and stem tube, respectively. Once the loading apparatus is actuated, spindle 19 carrying the lamp mount is indexed to the next succeeding work station on the lamp sealing machine and a new spindle is brought into position for receiving the next lamp mount.

With the parallel orientation of the series of lamp mounts by the guide bar 28, as shown in Figs. 1 and 8, the lead wires 12 and 13 will extend downwardly in parallel relationship on opposite sides of the exhaust tube. Since jaws 20 are likewise parallel to the guide bar 28 they cannot be used to grip the lead wires which would float freely in the space between the jaws clamped around the exhaust tube. On the other hand, by disposing the intermediate set of jaws 21 at right angles to jaws 20, the jaws 21 are in position to engage the lead wires and hold them in recesses 60 in the jaws against the exhaust tube.

A lamp mount loading apparatus constructed in accordance with the instant invention provides a means for transferring a lamp mount from one station in the lamp making process to another without bending or damage to the lead wires which extend from the lamp mount. Moreover, the apparatus provides for accurate loading of lamp mounts on a spindle of the sealing machine in such a way that the lead wires are protected by the spindle from damage or cutoff in the subsequent operation of sealing the lamp bulb onto the lamp mounts. Another advantage of the apparatus is that as the spindle moves upwardly to receive the lamp mount any misalignment of parts or misfunctioning of the apparatus will result only in a broken or damaged lamp mount, not damage to the gripping jaws. The reason for this is that, in the event the jaws fail to open, the bevelled end 133 of the

lamp spindle will engage the bevelled surfaces 134 (Fig. 2) formed on each jaw face so as to spread the jaws against the actions of their closing springs as the spindle moves upwardly between the jaws.

Although a preferred embodiment of the invention has been disclosed, it will be understood that modifications may be made within the spirit and scope of the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. Apparatus for loading lamp mounts having a stem tube, an exhaust tube and lead wires comprising, in combination, a first pair of jaws for gripping the exhaust tube, a second pair of jaws in vertical alignment with said first pair for gripping the lead wires and exhaust tube to hold the lead wires in parallel relationship against the exhaust tube, a third pair of jaws for gripping the stem tube, a hollow member for supporting the lamp mount, means for moving the hollow member toward said pairs of jaws, and means to open the pairs of jaws in sequence to position the lamp mount on the hollow member with the exhaust tube and leads located within the interior of the hollow member as the member passes between the open jaws.

2. Apparatus for removing lamp mounts having a stem tube, an exhaust tube and lead wires from a support comprising, in combination, a base structure, a first pair of jaws for gripping the exhaust tube, a second pair of jaws for gripping the lead wires and exhaust tube to hold the lead wires in parallel relationship against the exhaust tube, a third pair of jaws for gripping the stem tube, a hollow spindle adapted to support the lamp mount, means supporting said three pairs of jaws in vertical alignment on said base structure and for moving them into axial alignment with said spindle, means for moving said hollow spindle toward said pairs of jaws, means to open said first pair of jaws upon initial movement of said hollow spindle to position the end of the exhaust tube within the interior of the spindle, means to open said second pair of jaws upon continued movement of said spindle to position the lead wires within the spindle and simultaneously move said second pair of jaws out of alignment with the spindle, and means to open said third pair of jaws when said hollow spindle approaches said pair to release the stem tube onto the end of the hollow spindle.

3. A lamp making machine for removing lamp mounts having a stem tube, an exhaust tube and lead wires from a support comprising, in combination, a base structure, a pair of jaws for gripping the exhaust tube, a second pair of jaws for gripping the lead wires and exhaust tube to hold the lead wires in parallel relationship against the exhaust tube, a third pair of jaws for gripping the stem tube, a rotary turret including a plurality of hollow spindles for receiving lamp mounts, means supporting said three pairs of jaws in vertical spaced alignment on said base structure, means for rotating said turret to bring one of said spindles to a work station and simultaneously advance said base in a path radially of the turret to bring said jaws and the lamp mount from the support into axial alignment with said one spindle, means on said turret to move said spindle toward said pairs of jaws along the axial path of alignment, means to open said first pair of jaws upon initial movement of said hollow spindle to release the end of the exhaust tube within the interior of the spindle, means to open said second pair of jaws as the lead wires enter the interior of the spindle, means to open said third pair of jaws to release the stem tube onto the end of the hollow spindle, and means to retract the said base along said radial path to move the open jaws out of alignment with the spindle and return them to initial position to grip the succeeding lamp mount on the support.

4. A lamp making machine for removing lamp mounts having a stem tube, an exhaust tube and lead wires from a support comprising, in combination, a base structure, a first pair of jaws for gripping the exhaust tube, a second pair of jaws for gripping the lead wires and exhaust tube, and a third pair of jaws for gripping the stem tube, a movable apparatus including a plurality of hollow spindles for receiving lamp mounts, means supporting said three pairs of jaws in vertical spaced alignment on said base structure, means for moving said apparatus to bring one of said spindles to a work station and simultaneously advance said base along a path to bring said jaws and the lamp mount from the support into axial alignment with the spindle, means on said apparatus to move said spindle toward said pairs of jaws along the axial path of alignment, means to open said first pair of jaws upon initial movement of said hollow spindle to release the end of the exhaust tube into the interior of the hollow spindle, means to open said second pair of jaws to release the lead wires into the interior of the spindle, and means to open said third pair of jaws to release the stem tube onto the end of the hollow spindle.

5. In apparatus for transferring lamp mounts having a stem tube, an exhaust tube and lead wires from a support onto a hollow spindle, the combination of a base, a first pair of jaws pivotally mounted on said base for gripping the exhaust tube with the open ends of the jaws facing the spindle, an arm pivotally mounted for rotation on said base, a second pair of jaws pivotally mounted on said arm in vertical alignment with said first pair for gripping the lead wires to position them in parallel relationship on opposite sides of the exhaust tube, a third pair of jaws pivotally mounted on said base in vertical alignment with said first and second pairs for gripping the stem tube with the open ends of the jaws facing the spindle, a hollow spindle for receiving a lamp mount, means to advance said base to remove a gripped lamp mount from the support and bring the mount and pairs of jaws into axial alignment with the hollow spindle, means to move said spindle toward said jaws, means to open the pairs of jaws in sequence upon movement of the spindle to position the lamp mount on the spindle with the exhaust tube and lead wires located within the interior of the hollow spindle, means to rotate said arm to move said second pair of jaws out of alignment with the lamp mount and spindle, and means to return said base to initial position to retract said first and third pairs of jaws from alignment with the lamp mount and spindle so that the jaws are in position to grip the next succeeding lamp mount on the support.

6. In apparatus for transferring lamp mounts having a stem tube, an exhaust tube and lead wires from a support onto a hollow spindle, the combination of a base, a first pair of jaws for gripping the exhaust tube, means including a first abutment for pivotally mounting said jaws on said base, an arm pivotally mounted for rotation on said base, a second pair of jaws in vertical alignment with said first pair pivotally mounted on said arm for gripping the lead wires to position them in parallel relationship on opposite sides of the exhaust tube, a third pair of jaws in vertical alignment with said first and second pairs for gripping the stem tube, means including a second abutment for pivotally mounting said third pair of jaws on said base, means to advance said base to remove a gripped lamp mount from the support and bring the mount and pairs of jaws into axial alignment with the hollow spindle, a stepped element carried by said base, means to move said stepped element into engagement with said abutments in sequence to pivot said jaws to release the lamp mount on the spindle, and means to pivot said second pair of jaws to release the lead wires and simultaneously rotate said arm on the base to move said second pair of jaws out of alignment with the lamp mount.

7. In apparatus for loading lamp mounts, the combination of a base, spaced aligned pairs of jaws for gripping a lamp mount, means including spaced abutments

for pivotally mounting said pairs of jaws on said base, an arm pivotally mounted for movement on said base, a third pair of jaws pivotally mounted on said arm in vertical alignment with said spaced pairs of jaws for gripping a lamp mount, said third pair of jaws being disposed between said spaced pairs of jaws, a stepped element carried by said base, means to move said stepped element into engagement with the spaced abutments to pivot the jaws and open them in sequence to release the lamp mount, a reciprocating member carried by said arm, means to move said reciprocating member into engagement with the third pair of jaws to open the jaws to release the lamp mount, and means actuated by said reciprocating member to pivot said arm to move said third pair of jaws away from the spaced pairs of jaws.

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