May 20, 1952 H. B. MALONEY 2,597,354

FILAMENT TRANSFER AND MOUNTING APPARATUS FOR LAMP STEMS

Filed Jan. 31, 1947 4 Sheets-Sheet 1

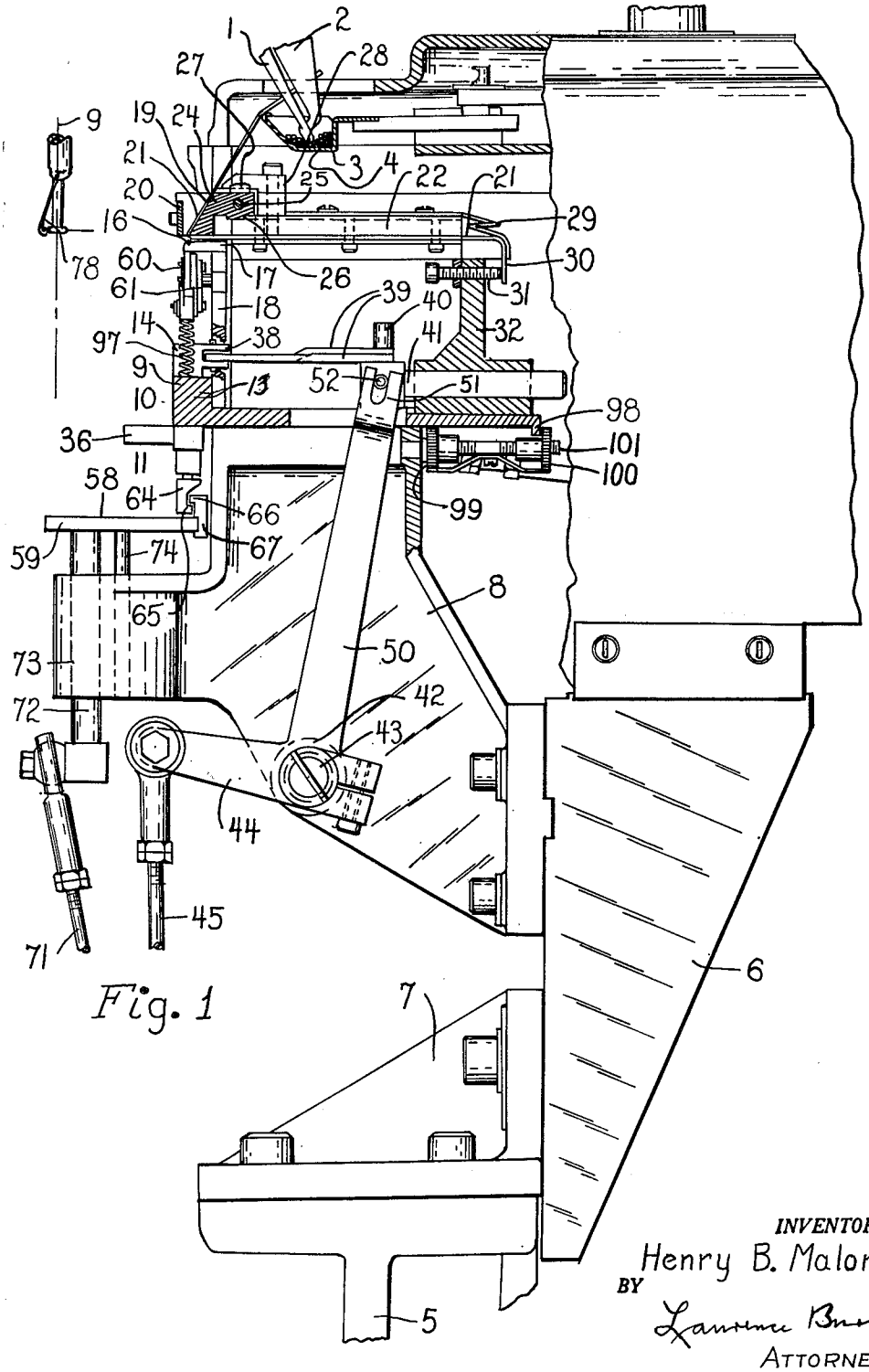


Fig. 1

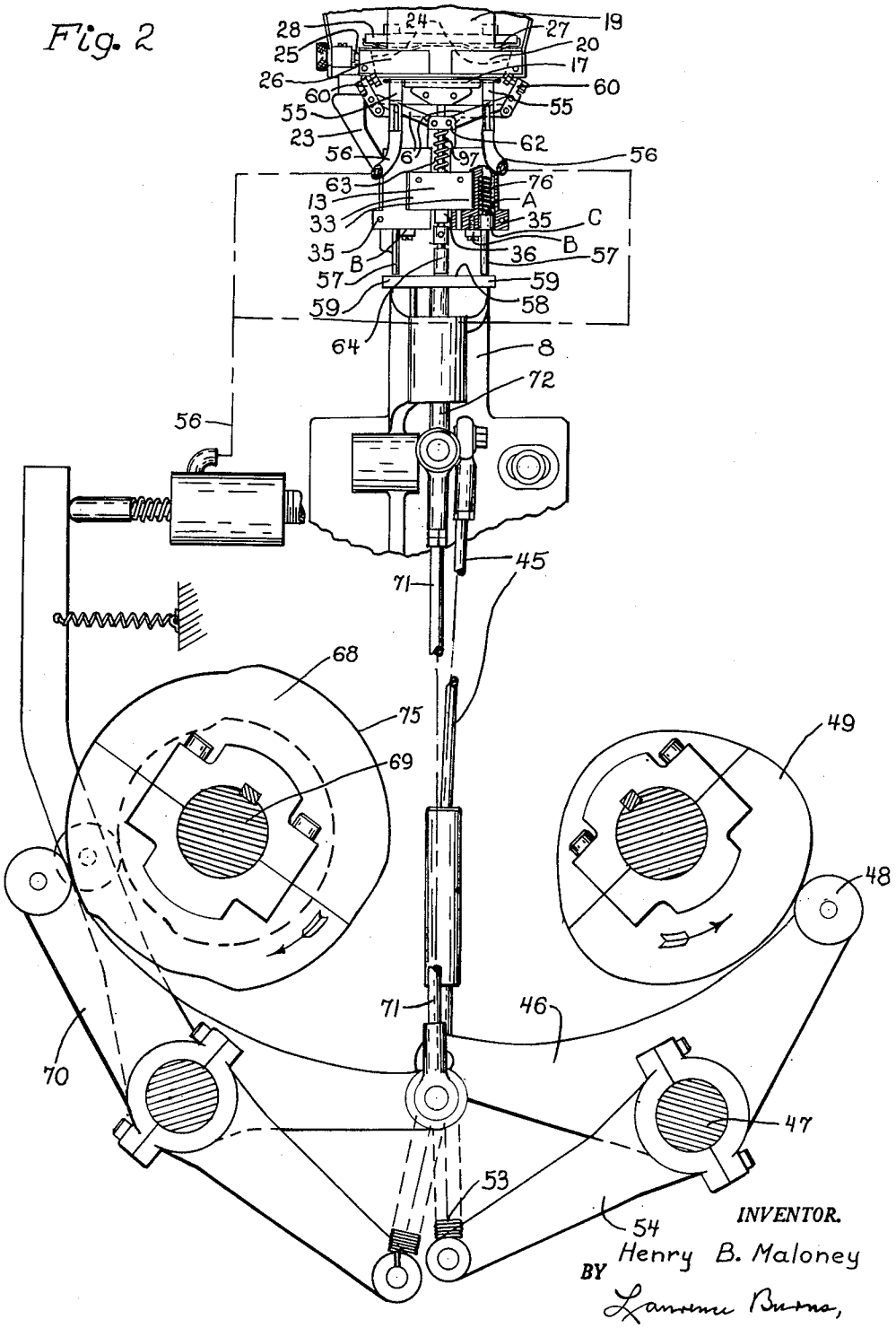
INVENTOR.
Henry B. Maloney
BY
Lawrence Burns,
ATTORNEY

May 20, 1952 H. B. MALONEY 2,597,354

FILAMENT TRANSFER AND MOUNTING APPARATUS FOR LAMP STEMS

Filed Jan. 31, 1947 4 Sheets-Sheet 2

Fig. 2



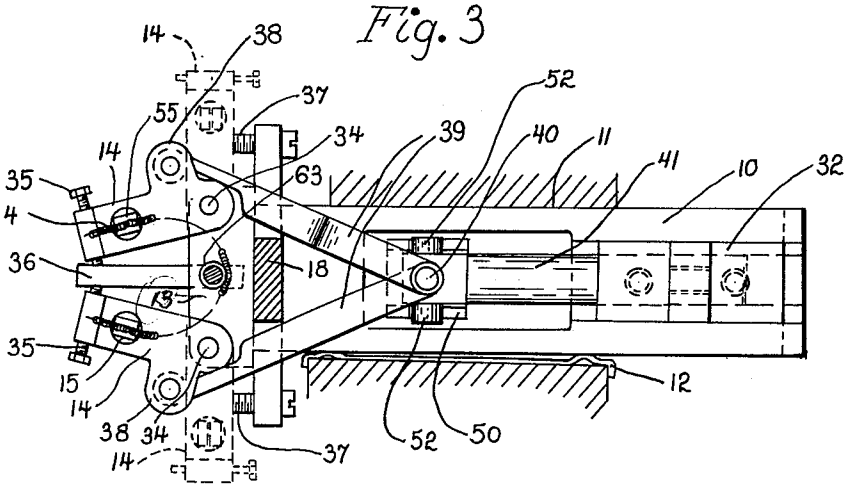
INVENTOR.
Henry B. Maloney
BY
Lawrence Burns,
ATTORNEY

May 20, 1952 H. B. MALONEY 2,597,354

FILAMENT TRANSFER AND MOUNTING APPARATUS FOR LAMP STEMS

Filed Jan. 31, 1947 4 Sheets-Sheet 3

Fig. 3



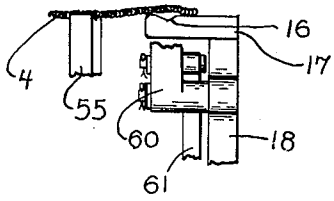


Fig. 4

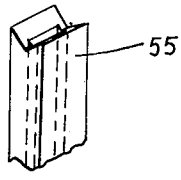


Fig. 5

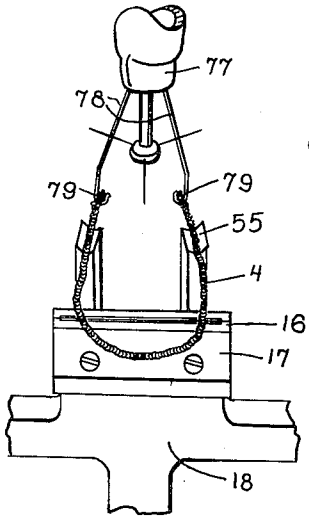


Fig. 6

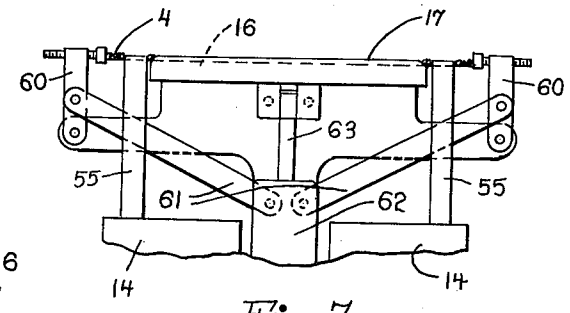


Fig. 7

INVENTOR.

BY Henry B. Maloney

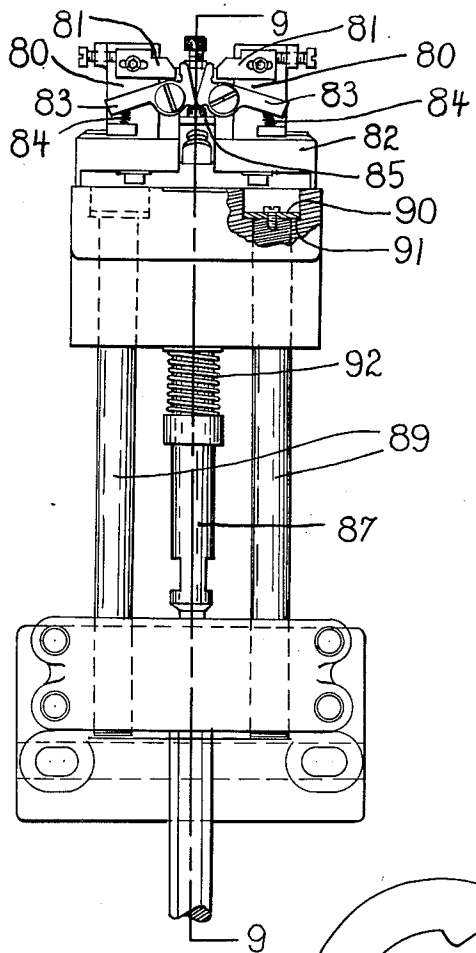
Lawrence Burns,

ATTORNEY

May 20, 1952 H. B. MALONEY 2,597,354

FILAMENT TRANSFER AND MOUNTING APPARATUS FOR LAMP STEMS

Filed Jan. 31, 1947 4 Sheets-Sheet 4



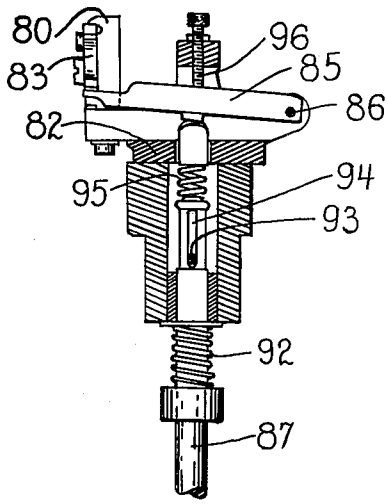


Fig. 9

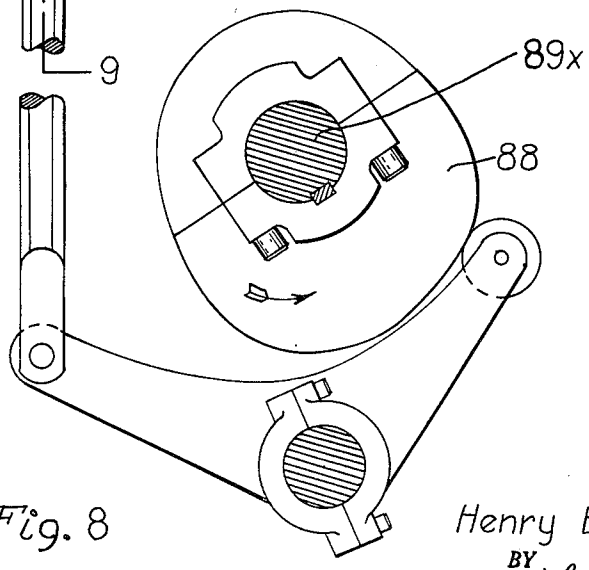


Fig. 8

INVENTOR.
Henry B. Maloney
BY
Lawrence Burns,
ATTORNEY

Patented May 20, 1952

2,597,354

UNITED STATES PATENT OFFICE

2,597,354

FILAMENT TRANSFER AND MOUNTING APPARATUS FOR LAMP STEMS

Henry B. Maloney, Lynn, Mass., assignor to Sylvania Electric Products Inc., Salem, Mass., a corporation of Massachusetts

Application January 31, 1947, Serial No. 725,417

7 Claims. (Cl. 140—71.6)

1

This invention relates to a mechanism for transferring a lamp filament from a stack of filaments to working position on a lamp stem assembly and particularly to such a mechanism for use with a looped or U-shaped filament.

The mechanism of the invention provides automatic means for feeding filaments one by one rapidly to working position upon the stem assembly with its ends connected to lead wires. In addition to feeding the filaments the mechanism forms them into a loop or U-shape from a straight filament.

The object of the invention is to feed lamp filaments automatically and at a rapid rate to filament mounting devices which operate on lamp stems fed successively into filament mounting position.

A further object of the invention is to provide means for feeding filaments to lamp stems with consistent precision and without damage to the filaments.

Other objects and features of the invention will more fully appear from the following description and will be particularly pointed out in the claims.

The mechanism consists in general of a chute or guideway over which the filament travels by gravity after having been lifted from a stack of filaments and dropped thereon.

At the base of the chute the filament enters a trough-like structure from where it is dropped into a receiving slot therebelow and accurately positioned therein. At each end of the filament at this time a pick up finger is positioned. The fingers are provided with means to grip the filament at its ends such as by suction means.

The fingers are mounted on swinging arms which are so pivoted and moved that the filament is carried away from the supporting groove, formed into a loop and presented to a stem with the ends of the filament in position to be secured to the lead wires thereof.

Means are provided at this time to secure the filament to the lead wires as by pinching the bent tips of the lead wires onto the filament.

The stem is then moved to subsequent stations where the filament is further processed to its finished form.

To present a better understanding of the invention a particular embodiment thereof will be described and is illustrated in the accompanying drawings in which:

Figure 1 is a side elevation of the apparatus partially in section;

Figure 2 is a front elevation of the apparatus;

Figure 3 is a plan view of the filament forming and transfer device;

Figure 4 is a fragmentary side elevation of the device shown in Figure 3;

Figure 5 is an enlarged detail of a filament suction holding finger;

2

Figure 6 is a diagrammatic perspective view illustrating the presentation of the filament to the lead wires;

Figure 7 is a fragmentary front view of the means for endwise positioning of the filament;

Figure 8 is a front elevation of the filament clamping means for securing a filament to its lead wires; and

Figure 9 is a cross sectional view taken on line 9—9, Figure 8.

Desirably the mechanism of the invention is operated in connection with a lamp stem fabricating machine having means to successively present lamp stems or the like to filament mounting position. Such a machine may be that presented in the copending application relating to Automatic Lamp Stem Fabricating Apparatus filed in the names of Roland M. Gardner, Stanley J. Gartner, and Edwin W. Barrett and bearing the Serial Number 637,440.

The means for picking an individual filament from a plurality of filaments may be of any construction and constitutes no part of the present invention. As herein shown an arm having pincer-like fingers 1 and 2 is manipulated to pick a single filament from a container 3 having a plurality of filaments 4 therein.

The mechanism for transferring a filament from a container to the stem to which it is applied, may be mounted directly upon the stem fabricating machine or it can be mounted on a separate support or stand. As shown herein the mechanism is supported upon a portion 5 of the main frame of the fabricating machine. Any suitable supporting means may be used. As shown a supporting bracket 6 is secured to the member 5 by means of an angle block 7. The bracket 6 has mounted thereon a device for actuating a battery of filament containers which is not part of the present invention. The bracket also has secured thereto a main frame 8.

The frame 8 has slidably mounted thereon a carrier mechanism for transferring filaments one at a time to a lamp stem or the like moved into filament mounting position with its axis upon the working axis 9. The carrier 10 is received in a horizontal guideway 11 in the upper portion of the frame 8 and is provided with filament receiving and manipulating means.

For reasons which will appear hereinafter it is desirable that a slight degree of friction be applied to the carrier 10 at the guideway to retard its movement therein. To do this a leaf spring 12 is inserted in ways bearing against the member 10. The front or leading end of the carrier 10 is provided with an upstanding boss 13 to which are vertically pivoted a pair of swinging filament formers 14 which are laterally spaced and present upwardly extending suction filament gripping fingers normally situated at the ends of a filament which has been delivered to a receiv-

ing groove 16 in a plate 17 secured to an upright 18 extending upward from the member 10. The details of the members 14 will be described subsequently.

A filament is fed to the groove 16 from a device which receives and aligns it as it is dropped by the fingers 1 and 2. When dropped the filament falls by gravity upon an inclined plate 19 secured to the frame 8 from where it is received in a substantially V-shaped trough formed by the plate 19 and a plate or plates 20. During the non-feeding portion of its cycle the trough structure retains and aligns the filament. A sliding gate member 21 at this time closes the bottom of the trough. The gate 21 is slidably mounted on the bottom of a plate 22 which is secured along one of its sides to a rigid bracket 23 extending downward along one side of the member 13 and is rigid with the frame 8.

The plate 22 extends over the end close to the carrier. Desirably the trough is made adjustable in length to provide for proper handling of the filaments as they move down into the trough structure. A suitable structure is shown to lengthen or shorten the trough and consists of a pair of blocks 24 which are adjustable simultaneously toward and away from each other by means of a spindle 25 having right and left hand threads respectively engaging the two blocks. The spindle 25 is held against axial movement and is rotated to vary the length of the trough. The blocks are held in their guiding slot 26 by means of a leaf spring 27 which is backed up by a retaining member 28 secured to the plate 22.

The gate 21 projects outward and down from the back of the plate 22 to provide an extension 30. The plate 21 has a spring 29 connected to move the plate into position to close the trough.

The downward extension 30 of the gate is engaged by a screw 31 having threaded engagement in a post 32 secured to the carrier 10. The screw 31 is so adjusted that it engages the portion 30 of the gate and opens the trough to permit a filament to pass through at the end of the retractive or inward movement of the carrier 10.

As above pointed out the pick up members 14 are pivoted on the front portion 13 of the carrier 10. Desirably these members are generally C-shaped and embrace oppositely disposed ears 33 on the portion 13 of the carriage 10. Pivot pins 34 pass vertically through the members 14 and the ears 33 and permit the members 14 to swing substantially 100° from their pick up position shown in Figure 1 into delivery position shown in Figure 4. Movement of the members 14 is limited in their delivery position by stop screws 35 which engage opposite sides of a central stop boss 36 integral with the carrier 10 while their pick up position is determined by stop screws 37. The filament is thus given a substantially horseshoe shape with its ends bent slightly inward toward each other which aids in placing the filament ends within the looped or hook shaped ends the lead wires 78 as shown in Figure 4.

Suitable means is provided for actuating the members 14. As illustrated in the drawings each of the members 14 is provided with a bifurcated rearward projection 38 within which is pivotally received a link 39 the opposite end of which is connected to a common pivot pin 40 projecting upward from the square outer end of a slide member 41. The inner end of the member 41 is cylindrical and slidably received in the base of the post 32.

The means for driving the slide 41 also drives

the carrier 10. The driving means illustrated consists of a bell crank lever 42 fulcrumed upon the frame 8 at 43. The arm 44 of the lever is pivotally connected to a link 45 which in turn is pivoted to a lever 46 fulcrumed upon the shaft 47. The lever 46 is provided with a roll 48 which engages a cam 49 which in turn is contoured to produce the required movement of the members 10 and 41. The arm 50 of the lever 42 extends upward and desirably is provided with one or more slots 51 in its upper end within which is received the rolls 52 pivoted upon opposite sides of the squared portion of the slide 41. Desirably the end of the arm 50 is bifurcated to embrace both sides of the member 41.

The roll 48 is held against the cam 49 by means of a spring 53 connected at one end to the lever 46 and at its other end to a fixed arm 54 secured to the fulcrum shaft 47. The cam thus moves the carrier 10 away from the working axis 9 while the spring moves it in its opposite direction during which time the filament is transferred. In operation the initial motion outward of the lever arm 50 acts through the links 39 to swing the members 14 into looping position and further motion of the lever moves the whole carrier toward the working axis as will be described in more detail hereinafter.

The members 14 are provided with suction pick up fingers 55 which are vertically movable therein and extend upward therefrom having V slots in their upper ends which are normally disposed in alignment with opposite ends of the V-slot 16 in the plate 17. The upper ends of the fingers 55 are provided with vacuum ducts which open into the V-slot at their upper ends and into which are led flexible vacuum lines 56 which in turn are connected to a vacuum pump not shown.

The fingers 55 extend through vertical apertures in the members 14 and also have a portion extending below the members 14. These bottom extensions 57 closely approach the upper flat surface 58 of an actuator 59, the operation of which will subsequently be described.

Means is provided to accurately position the filament longitudinally in its groove 16 before it is delivered to the stem. To do this a pair of relatively short positioning fingers 60 are pivoted upon lateral extensions of the post 18. The upper ends of the fingers 60 are provided with adjustable filament contact members which are situated to engage the ends of a filament in the groove 16. The fingers 60 are moved away from filament locating position by means of a pair of links 61 connected at one end to the fingers and at their other end to a head 62 fixed upon a vertical rod 63. The rod 63 is vertically movable in an aperture in the portion 13 of the carrier 10. The lower end of rod 63 extends below the carriage 11 and is provided with a head 64 which in turn is provided with a shoulder 65 which interlocks with a projection 66 on a block 67 secured to the actuator 59.

As shown in the drawings in Figure 1 the actuator 59 is in its raised position at which time the rod 63 is also raised which in turn moves the fingers outward away from their filament locating position. Motion is transmitted to the actuator 59 in any suitable manner such as by means of a cam 68 mounted on a cam shaft 69 which is one of the main cam shafts of the whole stem fabricating machine. The cam 68 acts through a suitable follower and lever 70 to actuate a link 71 connecting the lever to a rod 72 movable in a vertical aperture 73 in a projection of the frame

8. The actuator 59 is rigidly secured upon the end of the rod 72 and is moved thereby. The rod 72 and actuator 59 are prevented from rotation by a rod 74 parallel to the rod 72 and secured at its upper end to the actuator 59 and arranged to move in an aperture in the frame 8.

When the elements of the mechanism are in the position shown in Figure 1 the gate 21 has just released a filament into the slot 16 by reason of the engagement of the screw 31 engaging the portion 30 of the gate. At this time the highest portion 75 of the cam 66 has raised the actuator 59 to its maximum height. The cam 66 then lowers the actuator which pulls down the rod 63, by reason of the engagement of shoulder 65 with the projection 66, to move the positioning levers 60 into engagement with the ends of the filament to accurately position it lengthwise in its slot 16.

At this time a cam mounted on one of the cam shafts acts to open a vacuum valve leading to the vacuum lines 56 which grips the ends of the filament in the fingers 55. During the above operations the fingers are held in their downward positions by springs 76 surrounding the fingers, bearing at one end against the upper wall of apertures in which they are received and at their other ends against shoulders A upon the fingers. The downward position of the fingers is limited by a block B secured to the members 14 which engage a shoulder C on the fingers.

The cam 49 now acts through the lever 42 to move the slide 41 to the right which swings the pick up members 14 through substantially 100° of arc which forms the filament into horseshoe form shown in Figure 3. When the stop screws 35 in the members 14 engage the projection 36 further movement of the lever 42 moves the carriage 11 toward the stem axis 9 upon which the stem 77 is held. The stem is provided with a pair of lead wires 78. During this motion of the carrier the filament is raised into position with its ends adjacent and above the ends of lead wires 78. Raising of the filament is accomplished by the action of the cam 68 which raises the actuator 59 against the bottom of the fingers 55 which slide upon the surface 58. The cam 68 then acts to lower the actuator 59 which acts to lower the fingers 55 and the filament. This downward movement of the filament causes the ends thereof to enter the looped ends 79 of the lead wires. The fingers 55 are then moved down further by the cam 68 at which time the vacuum cam cuts off the vacuum at the fingers which clear the lead wires.

At this time a pair of clamping devices 80 are moved into clamping position. Each of the clamping devices are provided with means for pinching the lead wires upon the filament ends. Any suitable means may be employed to pinch the lead wires. As shown in Figure 8 each device is provided with fixed jaws 81 upon a supporting frame 82 and coacting movable jaws 83. The movable jaws are pivoted upon the frame 82. The jaws 83 are normally held out of operation by springs 84. To move the jaws into clamping position an actuator lever 85 is provided. The lever 85 is pivoted on the frame at 86 and is moved upward by means of a plunger 87 guided in the frame and actuated by a cam 88 on a cam shaft 89x. As the lever 85 moves upward it engages the jaws 83 which are moved thereby to clamp the filament to the looped ends of the lead wires 78 thus securing the filament mechanically and electrically in working position.

Since, upon the stem machine to which the invention is applied the removing of a stem to which a filament has been added and replacement of another is accomplished by indexing them in a horizontal plane, means must be provided to move the clamping members 80 out of the path of the stems during indexing. This may be done in any suitable manner. As shown the supporting frame 82 moves vertically upon a pair of fixed rods 89.

The top of the rods 89 are provided with a stop shoulder 90 which engages the stop shoulder 91 on the frame 82 when the clamps 80 are in clamping position. The throw of the cam 88 is sufficient to raise and lower the frame 82. The plunger 87 has a spring 92 thereon backed by a collar at one end and engaging the bottom of the frame 82 at its other end. The spring is kept under a slight tension by a stop pin 93 secured in the frame and engaging the top of a slot 94 in the plunger. Starting with the member 80 in down position it is moved upward by the plunger by engagement of the spring 92 with the member 82. When the member 82 is stopped further travel of the plunger 87 compresses the spring 92 and the plunger acts to push the lever 85 upward to clamp the filament to the lead wires. Desirably the upward travel of the lever 85 is limited by an adjustable stop screw 96. Excess travel of the plunger if present, is compensated for by a relatively heavy spring 95 introduced between sections of the plunger. Thus damage to the mechanism is prevented and extremely accurate adjustment of the cam throw is not required.

The stem is then carried to additional fabricating stations for completion and another stem moved into filament mounting position. During filament forming and mounting operations the block 64 has disengaged from the projection 66 on the actuator 59. The spring 97 is thus permitted to maintain the fingers 60 in their inactive position. At the end of the filament mounting operation the carrier 10 is returned by the cam 49 to pick up another filament. During the return of the carriage the cam 66 acts to raise the actuator 59 to its upper position and as the carrier reaches its pick up position the shoulder 65 on the block 64 assumes a position to reengage the projection 66. The above cycle of operations is then repeated to mount another filament.

Accurate determination of the travel of the carriage may be obtained in any desired manner. As illustrated herein the carriage is provided with a downwardly extending stop 98. This stop extends into the path of a pair of adjustable stop nuts 99 and 100 which have threaded engagement with a rod 101 rigidly secured in and extending horizontally from the frame 8. At the inner limit of the carrier travel the stop 98 strikes the stop nut 100 and when at its outer or delivery position the stop 98 engages the nut 99. By properly adjusting the nuts 99 and 100 accurate travel of the carriage is obtained. Desirably the nut 100 is first adjusted to provide the correct backward stop position of the carriage after which the throw of the cam 49 is adjusted to produce this travel of the carriage by adjusting the length of the link 45. Any suitable means may be employed for this purpose. The delivery position of the carriage is then critically adjusted by the nut 99. Any excess motion occasioned by the throw of the low portion of the cam simply causes the lever follower 48 to leave the cam because the inward travel of the carrier is

powered by the spring **53** anchored to the fixed arm **54** and to the link **45** at its other end.

What I claim is:

1. In a lamp stem fabricating apparatus having means to hold a stem with its lead wires thereon upon a working axis, a mechanism for forming and mounting the filament upon the lead wires comprising a supporting frame, a trough-like receptacle in which a filament is received, a gate at the bottom of the trough, a carrier below said trough slidable on said frame into receiving and delivering positions, means to open said gate when the carrier is in receiving position thereby to drop a filament onto said carrier, means on the carrier to grip and form the filament into substantially U-shaped form, means to move the carrier into delivering position with the filament ends adjacent said lead wires and means to secure the filament to the lead wires.

2. In a lamp stem assembling apparatus having means to hold a stem, including lead wires, on a working axis and means to pick a single filament from a plurality thereof, a mechanism for forming and presenting filaments to the stem comprising a supporting frame, a fixed shute secured to said frame upon which filaments are dropped, a gate at the bottom of said shute, a carrier member slidable on said frame into filament receiving and delivering positions, a groove in the carrier in which said filament is received from the shute, means to open said gate to release a filament into said groove, a pair of filament forming members pivoted on said carrier and having a pair of pick up fingers situated at the ends of said groove when the carrier is in receiving position, means on the fingers to grip the filament, means to swing said filament formers to form the filament into U-shape, means to move the carriage into delivery position with the filament ends adjacent the lead wires, and means to secure the filaments to the lead wires.

3. In a lamp stem fabricating machine having means to hold a stem, with hooked ended lead wires, upon a working axis, a mechanism for forming and mounting a filament upon the stem comprising a supporting frame, a trough-like receiver secured to said frame having an opening at its bottom through which a filament may pass horizontally, a gate closing the aperture, a carrier below said trough slidable upon the frame from receiving to delivering position, a groove in said carrier, means to open said gate to release a filament into said groove, filament formers pivoted on said carrier having filament gripping fingers, means connected to said carrier moving means and operable to move the filament formers into filament forming position, means to lower said gripping fingers when the carrier is in delivery position to place the filament ends into the hooked ends of the said lead wires and means to clamp the lead wires upon the filament.

4. In a lamp stem fabricating machine having means to hold a lamp stem, with lead wires, upon a working axis, a mechanism for forming and mounting a filament upon said stem comprising a trough-like receiver having an opening in the bottom thereof through which a filament in horizontal position may pass, a gate closing the aperture, a carrier below said trough to receive and deliver a filament to its stem, a groove in said carrier below said gate when the carrier is in receiving position, means to open the gate to drop a filament into said groove, filament formers pivoted on said carrier and having filament gripping fingers operable to grip the ends of the filament, a common actuating means to cause said formers to bend the filament into a generally U-shaped form and move the carrier into position with the filament end above the hooked end of the lead wires, means to lower the filament into mounting position and means to secure the filament to the lead wires.

5. In a lamp stem fabricating apparatus having means to hold a stem having lead wires, upon a working axis, a filament transfer and mounting apparatus comprising: a frame; a container mounted on said frame and having a plurality of filaments therein; a carrier slidably mounted on said frame beneath said container; means for feeding filaments individually from said container to said carrier; a pair of filament-positioning fingers pivotally mounted on said carrier and movable into end-on engagement with the ends of a filament on said carrier; filament-gripping fingers mounted on said carrier and movable into gripping engagement with a filament on said carrier; means for moving said filament-gripping fingers with a filament held thereby to present the filament ends to the lead wires; and means for securing the filament to the lead wires.

6. In a lamp stem fabricating apparatus having means to hold a stem, having lead wires upon a working axis, a filament transfer and mounting apparatus comprising: a fixed positioning receptacle to receive a single filament; a movable carrier below said receptacle; means for releasing the filament from said receptacle to said carrier; a pair of filament-positioning fingers pivotally mounted on said carrier and movable into end-on engagement with the ends of the filament on said carrier; filament-gripping fingers mounted on said carrier and movable into gripping engagement with the filament on said carrier; means for moving said filament-gripping fingers with a filament held thereby to present the filament ends to the lead wires of the stem; and means for securing the filament to the lead wires.

7. In a lamp stem fabricating apparatus having means to hold a stem, having lead wires, upon a working axis, a filament transfer and mounting apparatus comprising: a filament positioning receptacle; a movable carrier below said receptacle; means for releasing a filament from said receptacle to said carrier; a pair of filament-positioning fingers pivotally mounted on said carrier and movable into end-on engagement with the ends of the filament on said carrier; gripping fingers mounted on said carrier for holding the ends of the filament; means for swinging said fingers in an arcuate path to bend the filament into U shape form; means for moving the carrier to present the filament ends to the lead wires; and means for securing the filament to the lead wires.

HENRY B. MALONEY.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,733,802	Higgins	Oct. 29, 1929
1,733,831	Illingworth	Oct. 29, 1929
1,733,881	Illingworth	Oct. 29, 1929
1,742,966	Miller	Jan. 7, 1930
1,801,119	Soepnel	Apr. 14, 1931
1,816,683	Ledig	July 28, 1931
1,821,894	Otaka	Sept. 1, 1931
1,907,532	Flaws	May 9, 1933
2,370,828	Widmont	Mar. 6, 1945