June 30, 1953 J. FLAWS, JR., ET AL 2,643,440

SUPPORT WIRE INSERTING APPARATUS FOR INCANDESCENT LAMPS

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Fig. 1.

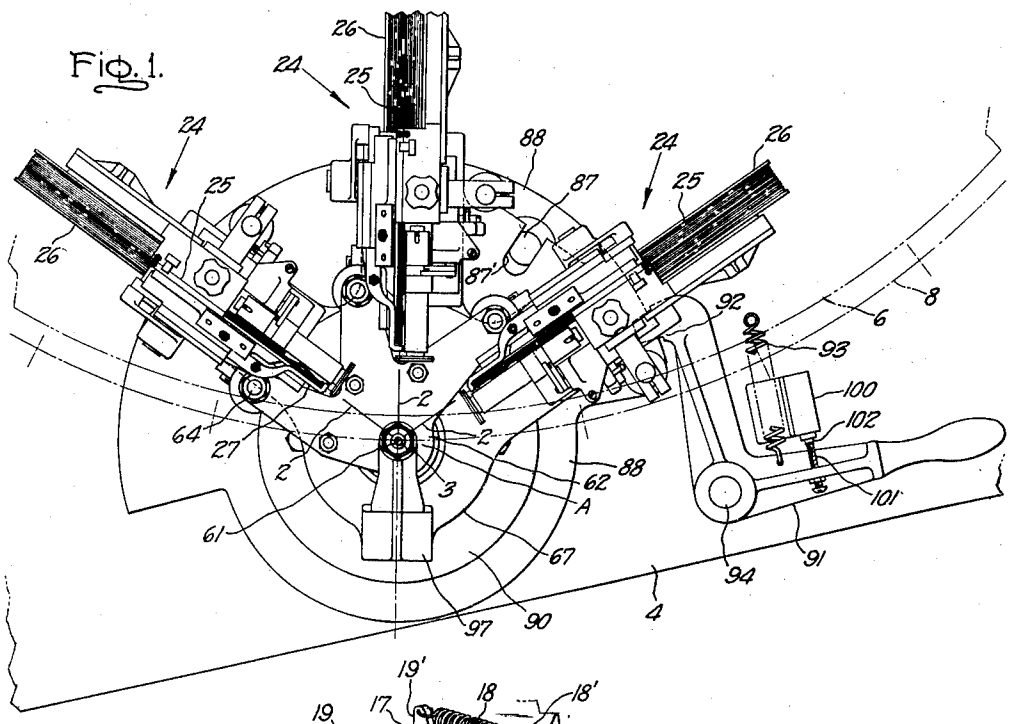


Fig. 2.

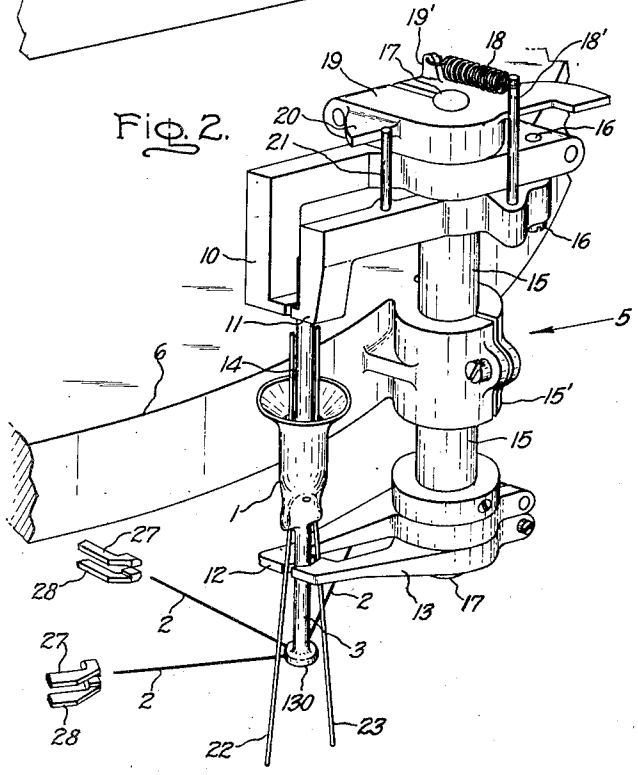
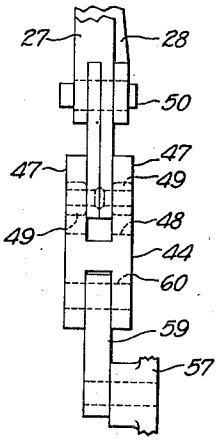


Fig. 5A.



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Fig. 3.

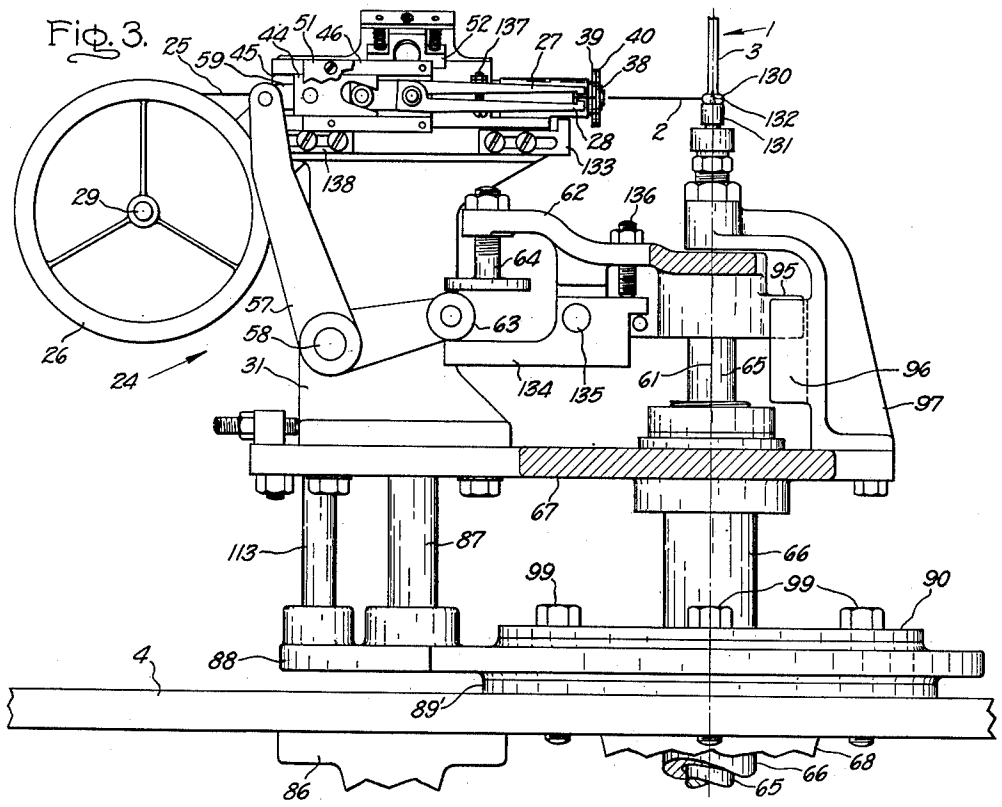


Fig. 4.

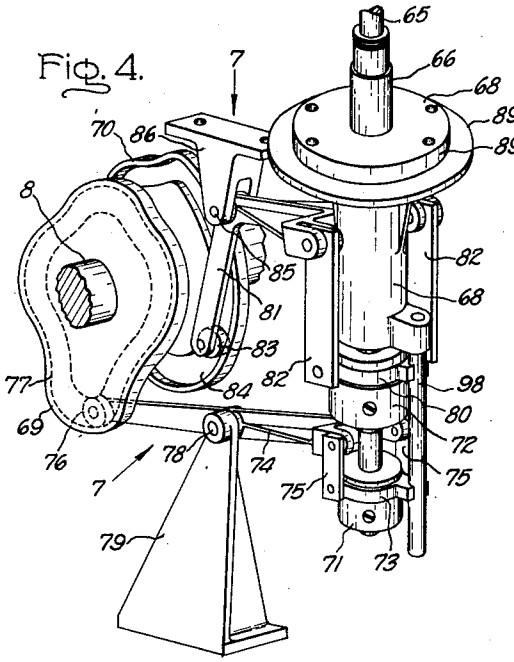
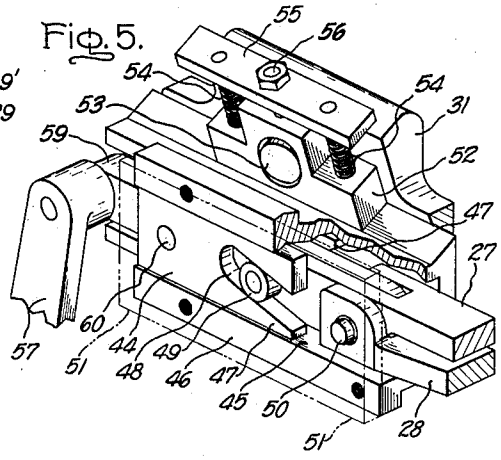


Fig. 5.



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Fig. 6.

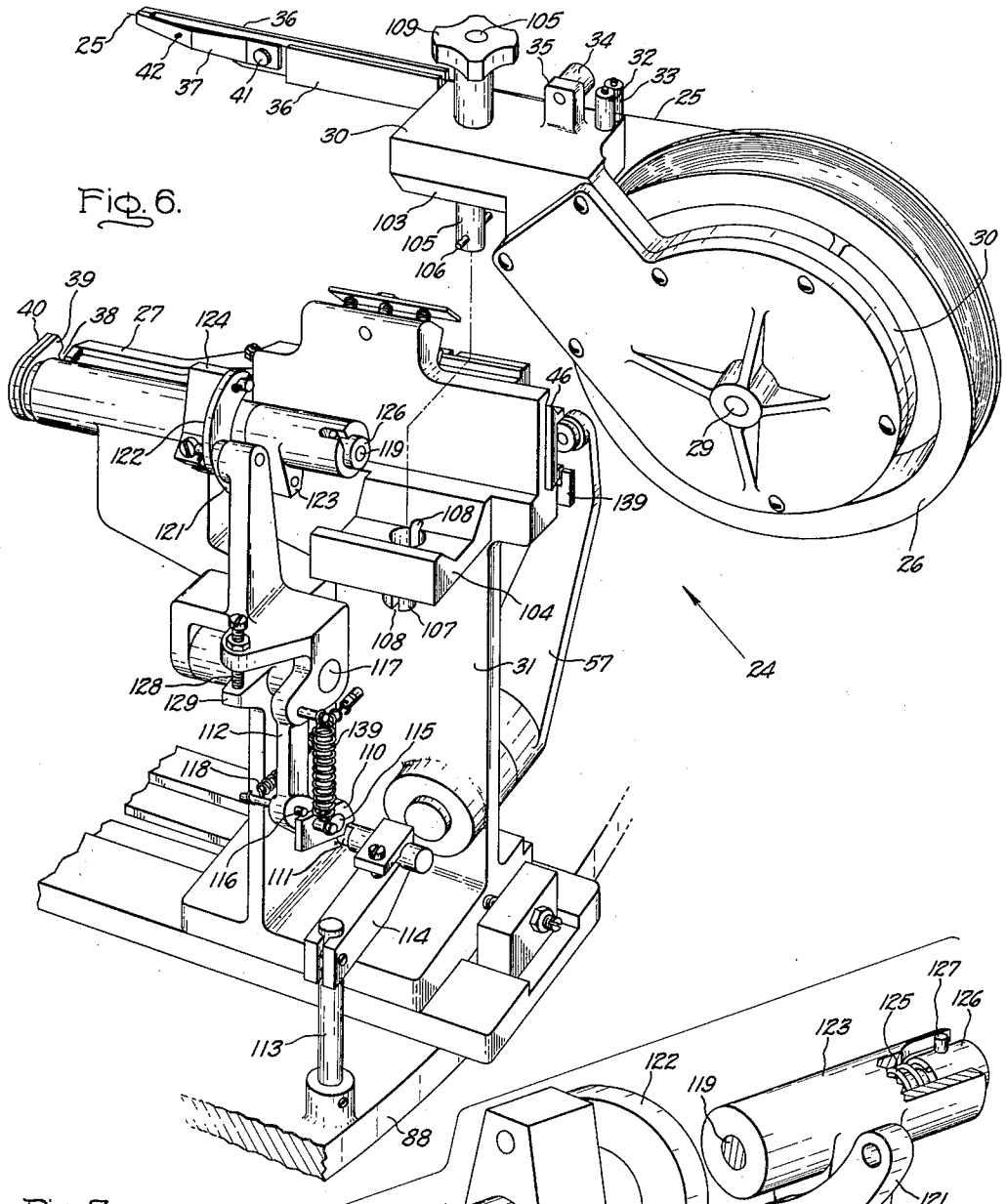
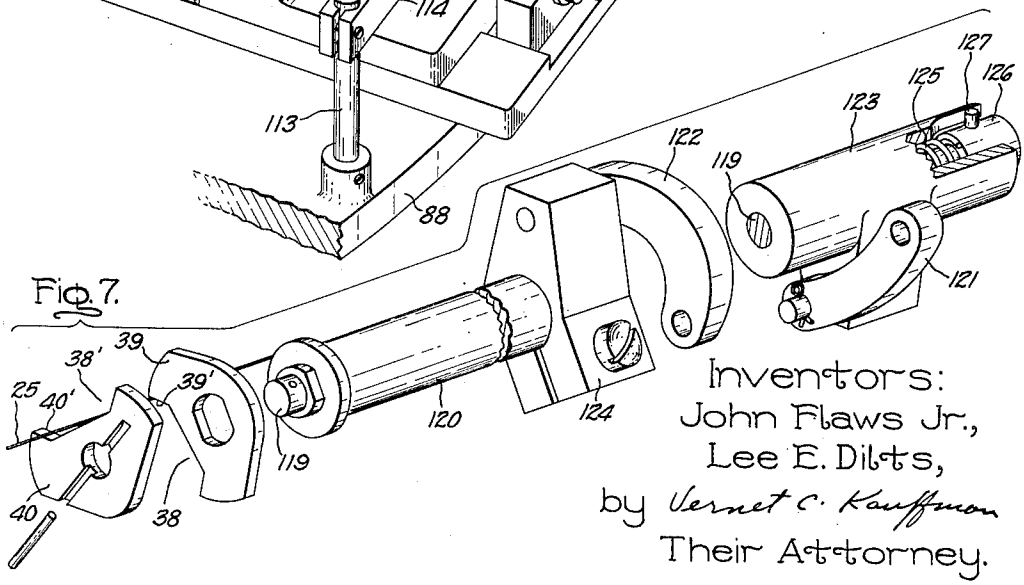


Fig. 7.



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UNITED STATES PATENT OFFICE

2,643,440

SUPPORT WIRE INSERTING APPARATUS FOR INCANDESCENT LAMPS

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Application February 25, 1950, Serial No. 146,344

9 Claims. (Cl. 29—25.2)

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Our invention relates to apparatus for making filament supporting spiders of electric incandescent lamps. More particularly, the invention relates to automatic apparatus for inserting a plurality of support wires into a stem portion of a lamp to develop a spider suitable for holding a filament.

Present lamp manufacturing practices usually provide for the automatic assemblage and fabrication of the lamp at successive work stations of an automatic, indexing turret machine, and in that connection provide for the insertion of a group of wires for supporting intermediate parts of the filament at one of said stations. The insertion of a plurality of support wires for each stem takes place simultaneously and is effected by thrusting the wires, end foremost, into a glass portion of the stem which has been heated to a semiplastic state at preceding work stations.

One object of our invention is to provide apparatus for automatically inserting a group of support wires into portions of lamp stems successively presented at a work station of a mount making machine, the apparatus being especially suited to high rates of operation with extreme reliability. The apparatus automatically withdraws lengths of the very fine wire from supply spools and, after cutting off said lengths from the main supply, inserts them into a heated and semi-plastic button on a glass arbor of the stem.

Another object of our invention is to provide wire inserting apparatus having the separate sections for handling each support wire mounted for ready movement or displacement to more accessible positions for servicing and adjustment. Difficulty heretofore has been experienced in replacing and rethreading the fine wire in the apparatus because of the compact and complex nature of the apparatus and its close proximity to adjacent mechanisms. These conditions are further aggravated in that the lamp stem is advanced to the work station occupied by the inserting apparatus by a turret which extends over one side of said apparatus. Accordingly, only one side of the inserting apparatus is exposed. It is an object of our invention to provide inserting apparatus wherein the wire handling and adjustable portions thereof are movable temporarily to the exposed side.

Still another object of the invention is to provide wire inserting apparatus for lamp manufacture in which the separate heads for handling each wire are readily movable to an accessible position without disturbing the operating means of said apparatus and are as readily returnable

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to their normal positions in the apparatus. Apparatus capable of the above movements allows manual adjustments and wire replacements to be made in each separate head thereof with the greatest accuracy and ease and results in shorter idle periods for the apparatus as a whole since the timing and other features of the operating means thereof is maintained at all times and does not require readjustment after the heads have been serviced. The above objects are attained by apparatus constructed so that the heads thereof are mounted upon a support rotatable in a horizontal plane and can therefore be advanced to the exposed side of the apparatus by rotation of said support. The heads in the apparatus are operated by vertical movement of actuating means located upon the axis of rotation of the support and are angularly displaced by the temporary rearrangement thereof but their relationship with the operating or actuating mechanisms is not disturbed by said movement.

Other objects and features of our invention will appear from the following detailed description taken in conjunction with the drawing.

In the drawing, Fig. 1 is a plan view of support wire inserting apparatus comprising our invention and illustrating its association with a support table and with the turret (shown in dot-dash lines) for advancing a lamp stem into operative relation thereto; Fig. 2 is a perspective view showing a lamp stem located within one of the heads of the turret at the moment of completion of the operating cycle when the ends of the jaws of the inserting heads are withdrawing; Fig. 3 is a side elevation developed from a transverse section through the upper portion of the apparatus, and shows one of the inserting heads and the associated operating or actuating means directly after insertion of the support wire and withdrawal of the jaws of said head; Fig. 4 is a perspective view of that portion of the actuating mechanism located below the table; Fig. 5 is a perspective view of the jaw-support slide and other associated operating means of an inserting head; Fig. 5A is a plan view of the jaw actuating subslide and associated means; Fig. 6 is an exploded perspective view of the opposite side of the inserting head from that shown in Fig. 3 with the readily separable wire supply and guiding unit thereof shown raised above its normal operative position in said head; and Fig. 7 is an exploded perspective view on a large scale of the elements comprising the shear means of an inserting head.

The support wire inserting apparatus disclosed in the drawing is arranged about a work station A of a mount making machine to which a lamp stem 1 (Fig. 2) is advanced in its course of manufacture, and has an automatically produced sequence of operations effecting the simultaneous insertion of three separate support wires 2 into the arbor 3 of said stem 1 in each cycle. The inserting apparatus is mounted upon a fixed table 4 at a position below that taken by the stem 1 and moves vertically to and from operative relation to the stems 1 which are successively advanced to work station A by heads 5 located at spaced intervals about the periphery of the turret 6. The cycle of operation of the apparatus is synchronzied with indexing movements of the turret 6 and, accordingly, with the advance of the stems 1 to work station A, by being under the control of the actuating apparatus 7 (Fig. 4) which is located below the table 4 and which is controlled by the rotation of cam shaft 8 which is the main driving means for the turret 6 and all other lamp manufacturing apparatus (not shown) associated therewith. Like other previously used inserting apparatus, the present apparatus requires the end of the glass arbor 3 of the stem 1 to be heated to a plastic condition at immediately preceding work stations about the turret 6. The common driving means for the turret 6 and inserting apparatus, and the heating means for the arbor 3 correspond to those shown in the lamp manufacturing apparatus disclosed in United States Patent 1,907,532—Flaws, dated May 9, 1933. The present apparatus is particularly suited to cooperate with the stem advancing means, operating means and other elements of the patented apparatus.

The cycle of operation of the apparatus disclosed is initiated by an indexing movement of the turret 6 which advances the stem 1 horizontally (from left to right, Fig. 1) to the work station A and occurs at a moment when the inserting apparatus is at a lowered position below the course of movement of the stem 1. The movement arranges the stem 1, which is securely held in an inverted position between two pairs of jaws 10—11 and 12—13, to the work station with the arbor 3 lowermost and aligned with a vertical axis through said station and with the exhaust tube 14 uppermost and correspondingly aligned.

The jaws 10 and 12, which are clamped tightly to opposite ends of a support sleeve 15 held in an integral clamp 15' on the periphery of turret 6, establish the position of the stem 1, whereas, the jaws 11 and 13 apply a gripping force thereto sufficient to prevent any displacement of the stem 1 during the operation of the apparatus. The jaw 11 is pivoted upon a pin 16 extending downward from the back of jaw 10, and the jaw 13 is attached to a shaft 17 within the support sleeve 15. Said jaws 11 and 13 are pressed against the stem 1 by the contraction force of a helical spring 18 extending between a post 18' on the jaw 11 and an offset ear 19' on the collar 19 clamped to the upper end of shaft 17. Separation of the jaws 10—11 and 12—13 can be effected to allow removal or insertion of the stem 1 by rotation of the collar 19 which rotation is directly transferred to jaw 13 through the shaft 17 and which is introduced in the jaw 11 by engagement of a laterally projecting ear 20 of said collar 19 with the post 21 extending from jaw 11. The stem 1 is definitely oriented so that the leads 22 and 23 lie in a plane tangent to the adjacent edge of the turret 6 when advanced to the work station, and is also at a definite vertical position.

During the index of the stem 1 to the work station, the inserting apparatus prepares for succeeding operations in the cycle by causing each of the three inserting heads 24 comprising the apparatus to withdraw sufficient wire 25 from the supply spools 26 thereof to form the support wires 2. The withdrawing operation is effected in each inserting head 24 by motion of a pair of feed jaws 27 and 28 (Figs. 1, 2, 3, and 6) having laterally extending forward ends located on opposite sides of the end portion of the wire 25 and taking a direction of motion carrying them away from the spool 26 which is mounted upon a stationary pivot 29 retained by a bracket 30 (Fig. 6) clamped to the support standard 31 of the head 24. The wire 25 at such times extends from the top edge of the spool 26, between a pair of guide rollers 32 and 33 on vertical axes, below the horizontal guide roller 34 on the upstanding lug 35 on the bracket 30, and thence through a groove in the top edge of arm 36 of said bracket 30, and between jaws formed by the end of arm 36 and the spring finger 37, to a position between the ends of the jaws 27 and 28 (Figs. 1 and 3). The end of the wire 25 lies within the notch 38 (Fig. 7) in the blade 39 of the shear means of the inserting head at a position between the mated cutting edges 39' and 40' of the blades 39 and 40, respectively, and is advanced longitudinally through the corresponding notch 38' of blade 40 by the movement of the jaws 27 and 28 which close upon an end portion of the wire 25 between blade 39 and the end of spring finger 37. Prior to the closing movement of the jaws 27 and 28, the end of the wire 25 is held in place by the pressure of the spring finger 37 which is held by the head of a pin 41 extending from arm 36 and which is kept from turning out of position by a second pin 42 attached to said arm 36 and fitting loosely in a hole in said spring finger 37.

Both the closing and feeding movements of the jaws 27 and 28 are taken from the motion of a subslide 44 (Figs. 3, 5, and 5A) located in the hollow channel way 45 within the slide 46, and are effected through the advance of corresponding cam portions 47 projecting from the forward edge of each side of the subslide 44. The cams 47 have oppositely inclined cam slots 48 therein accommodating corresponding rollers 49 on the back ends of said jaws 27 and 28. The first advance of the cams 47 forces the rollers 49 toward the bases of the slots 48 therein, causing the jaws 27 and 28 to turn about the pivot pin 50 and close on the wire 25. Further motion of the cams 47 pushes said jaws 27 and 28 forward and, accordingly, moves the slide 46 in a direction concurring with the feeding of the wire 25. The pivot pin 50 has an enlarged shank or midportion on which the jaws 27 and 28 are held. The end portions (of reduced diameter) of said pin 50 are mounted in holes located, respectively, in the side wall of slide 46 and in a cover plate 51 (only partially shown) covering said channel way 45. Motion does not occur in the slide 46 during the first movement of the cams 47 because the slide 46, which rests in ways in the support standard 31, resists motion to a degree determined by the pressure of the friction block 52 against the top edge thereof. The friction block 52 is a stationary element kept from moving horizontally by a pin 53 which engages a vertical slot therein and which extends from the sup-

port standard 31. Said block 52 is pressed against the slide 43 by the helical springs 54 located below the bar 55 on the upper end of a stud 56 extending upward through a portion of friction block 52 from pin 53. The motion of the subslide 44 is derived from an operating lever 57 pivoted upon a pin 58 projecting from the lower portion of the support standard 31, and is transferred to the said subslide 44 by a link 59 having one end located within a slot in the end of subslide 44 and pivoted on pin 60 which extends through said slot.

All of the inserting heads 24 take the above-described feeding motion from a common source around which they are grouped and which comprises a spider 62 movable along a vertical axis 61 through the work station A. The cycle of operation is started with the operating lever 57 of each head 24 at a position where the roller 63 on the lower end thereof is below the flanged head of a stud 64 on one arm of the spider 62 and is caused to progress by downward motion of said spider 62 carrying the stud 64 against the roller 63 and then further downward sufficiently to turn lever 57 an amount to feed the required length of support wire 25. The spider 62 is fastened to the upper end of a shaft 65 extending downward through a hollow shaft 66, which, in its corresponding association with the platform 67, forms the support means for the inserting heads 24, and has a vertical position controlled by the operating means 7 of the apparatus located below the table 4. At such times, the inserting heads 24 are at a lower level than they appear in Fig. 3 in order to allow said stem 1 to be indexed to work station A, and the spider 62 is at a correspondingly lower position. The spider 62 and platform 67 are secured to the shaft 65 and hollow shaft 66, respectively, which shafts extend downward through a support bearing 68, as shown in Fig. 4, and have vertical positions throughout the cycle determined by means controlled by the rotative or angular position of the respective cams 69 and 70 on the main drive shaft 8 and engaging the collars 71 and 72 on the lower ends of said shafts 65 and 66, respectively. The full weight of the assembly mounted on the shaft 65 is carried by the operating lever 74 through a yoke 73 which is located within a circumferential groove around the collar 71. The said operating lever 74 is connected to opposite legs of the yoke 73 by the links 75 and it engages a track 77 in cam 69 through the roller 76. In the presently described feeding movement of the inserting apparatus, the drive shaft 8 is turning the cam 69 so that the roller 76 is pulled toward said drive shaft 8, and the lever 74 is turned in a clockwise (Fig. 4) direction about the fulcrum pin 78 on the upper end of stationary bracket 79. The full weight of the assembly mounted on the shaft 66 is similarly carried through a yoke 80 which is located within a circumferential groove around the collar 72, by an operating lever 81 connected to opposite legs of the yoke 80 by the links 82 and engaging cam 70 through the roller 83. The present stationary position of the inserting heads 24 persists during the rotation of the drive shaft 8 and the cam 70, inasmuch as the roller 83 is located within a concentric portion of the track or groove 84 in said cam 70 so as to hold the operating lever 81 at a single position with respect to the fulcrum pin 85 on the bracket 86. Brackets 79 and 86 are stationary members fastened to the bed (not shown) of the apparatus and the table 4, respectively.

The inserting heads 24 are mounted at the same relative angular relation as that desired of the support wires 2, and are maintained at this orientation about the vertical axis 61 by the arrangement of the support standard 31 of each head 24 upon the platform 67, which arrangement is maintained throughout the operative cycle. The supporting shaft 66 for said platform 67 is rotatable in bearing 68 but, in turn, is fixed in its orientation by the keying effect of a post 87 extending upward into a close fitting opening 87' (Fig. 1) in said platform 67 from the flat ring 88 located below.

Inasmuch as the positions of the inserting heads 24 are such that the heads are closely covered by a portion of the turret 6 for supporting and advancing the stem 1 and access thereto is usually blocked by still other apparatus (not shown) at work stations on both sides thereof, they are difficult to service and adjust. However, means are provided which enable the support platform 67 to be rotated about the center axis 61 of the apparatus so that said inserting heads 24 are swung out from under the turret 6 and carried around to the opposite side of the work station to a position where they can be conveniently worked on. The rearrangement of the heads 24 is effected by rotating the flat ring 88 which is mounted within a groove formed by the flange 89' (Fig. 4) on the upper end of the support bearing 68, the shoulder 89 on said flange, and the cover plate 90 (Fig. 3). However, said ring 88 must first be unlocked by turning the hand lever 91 (Fig. 1) so as to withdraw the end 92 thereof from a peripheral notch in the ring. Normally the contraction force of a spring 93 extending between the hand lever 91 and a post in the upper surface of the table 4 keeps said hand lever 91 biased about the upstanding pivot pin 94 in said table 4 so that it is kept in the said notch in the ring 88. The rotation of the assembly does not disturb the fixed relative relation of the inserting heads 24 or their relation to the operating elements therefor inasmuch as the operating studs 64 are keyed and caused to turn with the platform 67 and said flat ring 88 by the location of a laterally extending tongue 95 on the spider 62 in a vertical slot or keyway in an elongated embossment 96 on the bracket 97 attached to said platform 67. The rotation of the spider 62 and platform 67 during the displacement of the inserting heads 24 also turns the operating shaft 65 and hollow shaft 66 and thereby carries said motion into the operating means below the table 4 where it is taken up in the swivels formed by the collars 71 and 72 and the yokes 73 and 80 and results only in a rotation of the collars 71 and 72 with respect to yokes 73 and 80, respectively. Movement of the yokes 73 and 80, both rotatively and outwardly from the collars 71 and 72, is prevented by the engagement of the yokes 73 and 80 with the guide post 98 extending downward from a boss on support bearing 68. Bolts 99 extending downward through the cover plate 90 and the flange 89' on the support bearing 68 to the table 4 hold said support bearing 68 at a fixed position within an opening in the table 4 at all times.

Inasmuch as interference between the inserting heads 24 and the stem head 5 can result in certain instances if the former are not properly orientated, means are provided in the enclosed switch 100 under control of the hand lever 91 for

effecting certain safety measures to avoid operation of the apparatus at such times. The switch 100 is mounted upon the upper surface of the table 4 at a position causing the screw 101 on the hand lever 91 to engage the control button 102 of the switch 100 at intervals when the hand lever 91 and the inserting apparatus are in operative positions and effects a change in an electrical circuit (not shown) usable for lighting a warning lamp and disconnecting the master machine-control switch when the hand lever 91 is out of said position and the screw 101 is withdrawn from contact with the control button 102.

Normal servicing operations consist in rethreading the wire 25 through the apparatus or in replenishing the supply thereof and can only be accomplished satisfactorily when the inserting heads 24 are swung out in the open before the work station A. Usually it is also preferable to separate the assembly comprised of the supply spool 26, the guide rollers 32, 33 and 34 and the arm 36, which are mounted upon the bracket 30, completely from the inserting head 24 as shown in Fig. 6 to permit the ready handling of the fine wire 25. The latter operation is provided for by the method of mounting the bracket 30 which has a midportion 103 so shaped as to seat properly in the laterally projecting pad 104 of the support standard 31 and which is clamped thereto by the lock pin 105. A cross pin 106 in the lower end of the lock pin 105 rides upon the sloping end surfaces of the boss 107 on the bottom of the pad 104 and clamps the bracket 30 in place thereon when the assembly is in place and can be turned into a vertical slot 108 by manual rotation of the knob 109 on the lock pin 105 when the assembly is to be removed. Very quick replenishment of the wire 25 can be provided in any of the inserting heads 24 by having extra assemblies including the bracket 30 and a filled spool 26 available for substitution with the assemblies therein.

The concomitant stem-advancing and wire-feeding operations are immediately followed by an upward positioning movement of the inserting apparatus which arranges each of the inserting heads 24 at positions opposite the lower end of the arbor 3 of the stem 1 at which time further movement of the feed jaws 27 and 28 will insert the end of wire 25 therein. The upward travel of the inserting apparatus is the result of motion in the support platform 67 for the inserting heads 24 and is initiated by virtue of the contour of that portion of the track 84 of cam 70 being advanced into engagement with the roller 83 of the operating means, and the consequent upward movement of the shaft 66 and platform 67. The position of the wire feeding jaws 27 and 28 and the wire 25 remains unchanged during the present movement of the apparatus because the spider 62 of the operating means is moved upward correspondingly by virtue of the contour of the track 77 of cam 69 which produces an upward movement in shaft 65 to which said spider 62 is attached.

The final upward travel of the inserting heads 24 also results in another operative function of the apparatus wherein the length of wire 25 previously advanced by the feed jaws 27 and 28 is cut from the main supply thereof. In this operation the end portions of the wires 25 extending out in front of the inserting heads 24 and supported only by the feed jaws 27 and 28, are separated from the immediately adjacent portions thereof still within the inserting heads 24 to form the individual support wires 2 therefrom. The shearing operation is effected by opposite rotative motions in the blades 39 and 40 of the shear means of each inserting head 24 and occurs when the upward motion of said heads 24 carries the end of the pawl 110 (Fig. 6) of each head 24 across the face of the stationary cam 111 and thereby forces the lower end of the shear actuating lever 112 outward away therefrom. The cam 111 is fastened to the upstanding post 113 on the flat ring 88 at a position determined by the position of the clamp 114 therealong and is engaged by the rounded end of the pawl 110 for an instant just prior to the completion of the upward movement of the inserting head 24. Although the pawl 110 is pivoted upon the pin 115 extending from the lever 112, it is blocked from rotative motion during the immediate interval by the stud 116 also extending from lever 112 and is only capable of swinging the lever 112 about the pivot pin 117 on the support standard 31 against opposite rotative urging of a spring 118 extending between posts in said lever 112 and said support standard 31. The interval of operation is relatively short and causes a quick rotation of the shaft 119 (Fig. 7) and the surrounding hollow shaft 120 to which the shear blades 40 and 39, respectively, are attached and to which the lever 112 is operatively connected by means of the links 121 and 122 and the arms 123 and 124, respectively. Sufficient rotative motion is created within the blades 39 and 40 to turn the opposite edges of the notches 38—38', which have heretofore held the wire 25, beyond a mating position so that said wire 25 is severed. Positive shearing action is assured between the adjacent edges 39'—40' of the blades 39 and 40 by the expansion force of a helical spring 125 located about the opposite end of the shaft 119 within a shallow cavity in arm 123, which spring 125 presses against the collar 126 on the end of shaft 119 and the arm 123 which, in turn, bears against the arm 124 on hollow shaft 120. The pin 127 which fastens collar 126 to shaft 119 has opposite ends located within slots in the arm 123 and causes said arm 123 and shaft 119 to turn as a single unit while allowing longitudinal motion of said arm 123 along the shaft 119 as required. At the end of the upward travel of the inserting heads 24, the pawl 110 passes beyond the cam 111 and the contraction force of the spring 118 turns the lever 112 and consequently the blades 39 and 40 back to their original positions. At the limit of the return motion the stop screw 128 in a projecting lug on the lever 112 comes to rest upon a projecting lug 129 on the support standard 31.

The upward travel of the inserting apparatus also causes the upsetting of the lower end of the glass arbor 3 which develops a concentration of glass in the form of a button 130 therein so that the support wires 2 can be more deeply and securely imbedded therein. As shown in Fig. 3, the upset occurs when an anvil 131 mounted upon the top of the bracket 97 on the platform 67 and in direct alignment with the operating center 61 of the apparatus is caused to engage and push upward on said arbor 3 by the movement of said platform 67. A pointed protuberance 132 at the center of the anvil 131 enters the open end of the arbor 3, which in the present instance is a hollow tubular cane, and in so doing assists in the formation of a symmetrical button 130. The upset operation depends upon the end of the arbor 3

being heated at stations previously taken by the stem 1 in the manner customary in prior art inserting apparatus and, as described in United States Patent 1,698,321, Staudenmeier which is assigned to the assignee of the present invention, inserts a protuberance 132 into the button 130 for steadying said arbor 3 in the subsequently occurring inserting operations.

The next operation of the apparatus provides for the insertion of the support wires 2 now held by the jaws 27 and 28 of each inserting head 24 and is produced by still further forward motion of said jaws 27 and 28 toward the stem 1. The movement occurs after the spider 62 and platform 67 have advanced to the upper limit of their motion in positioning the inserting heads 24 opposite the stem 1 when the spider 62 is again moved down and thereby effects longitudinal motion of the jaws 27 and 28 in a horizontal plane. The support wire 2 advances longitudinally and plunges end-first into the still somewhat plastic button 130 to a depth which will cause it to be securely held in place thereby. The jaws 27 and 28 hold the support wires 2 relatively near the forward end and do not allow them to buckle during the inserting operation although the button 130 has been cooled somewhat by contact with the anvil 131 and resists the insertion of the wires 2 to a certain extent. Accurate control over the depth of the insertion is established in succeeding cycles of operation by limiting the forward movement of the jaws 27 and 28 through the presence of a stop 133 attached to the support standard 31 in the path of movement of the slide 46.

The inserting apparatus now has only to be disengaged from the support wires 2 and the arbor 3 and to be moved down to its retracted position to complete the cycle of operation. The disengagement of the apparatus takes place first, when the jaws 27 and 28 are opened and then retracted by an upward movement created in the spider 62 by the operating means and is effected by a counterclockwise (Fig. 3) motion in the operating lever 57, the first such motion that has occurred therein during the above-described cycle of operation. The upward movement of the spider 62, at this time, carries the extending ends of corresponding bars 134 like that shown in Fig. 3 against the rollers 63 on the operating levers 57 of the inserting heads 24 and induces movement in the levers 57 inasmuch as the bars 134 are prevented from rocking about the support pins 135 held by spider 62 by the stop screws 136 also retained thereby. The resulting motion in the subslide 44 of each inserting apparatus first causes the cams 47 to be displaced within the slide 46, as the friction block 52 continues to resist motion of said slide 46 under such conditions, and moves the cams 47 so that the jaws 27 and 28 are opened. When the jaws 27 and 28 are sufficiently open, the jaw 27 seats against the nuts upon a screw 137 held by jaw 28 and passing through an opening in jaw 27, and the subslide 44 and slide 46 move as a unit. At the limit of the jaw retracting motion, the slide 46 engages the stop 138 (corresponding to stop 133) on the support standard 31. The entire apparatus is then at the position shown in Fig. 3. It should be noted that the roller 63 is at all times spaced either from the head of stud 64 or the bar 134 and, therefore, does not have the full movement of the spider 62 which is greater than needed in the present instance and could, therefore, effect the feeding of longer support wires if required. The effective downward and upward limits of motion of the spider 62 are controlled by adjusting the position of the stud 64 thereon or tilting the bar 134 by adjustment to screw 136.

The downward movement of the inserting heads 24 occurs after the complete retraction of the jaws 27 and 28 and is effected by corresponding downward movements of both spider 62 and platform 67 under the control of the operating means located below the table 4. In the downward movement of the inserting heads 24, the pawl 110 of the shear means is momentarily turned back about the pin 115 against the contraction force of a spring 139 extending between posts in lever 112 and said pawl 110 so that the shear means is not operated. The stem 1 is free of all apparatus when the inserting heads 24 are completely lowered, and can be indexed out of work station A and a succeeding cycle of operation can be started.

Although a preferred embodiment of our invention has been disclosed, it will be understood that the invention is not to be limited to the specific construction and arrangement of parts shown, but that they may be widely modified within the spirit and scope of our invention as defined by the appended claims.

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

1. In a lamp mount-making machine, the combination with a carrier having heads at the periphery thereof adapted to support lamp stems and carry them along a horizontal path to successive work stations including a support-wire inserting station, of support-wire inserting apparatus located at said inserting station and comprising a plurality of inserting heads located under said carrier so as to be difficultly accessible, each inserting head including means for carrying a spool of wire and for severing a length of the wire and inserting it end-foremost into a portion of a stem at said station, support means carrying said inserting heads in fixed relative relationship and mounted for rotation at will in a horizontal plane about a vertical axis occupied by the stem in the stem-holding head at said station whereby to enable said heads to be brought out to the front of said carrier for servicing and adjustment, and vertically reciprocable actuating mechanism connected to effect operation of the inserting means in the several said inserting heads, said actuating mechanism being mounted on the axis of rotation of said inserting heads for rotation therewith while maintaining the relationship between said inserting heads and said actuating mechanism.

2. Support wire inserting apparatus of the class described comprising a horizontal platform mounted for rotation at selected intervals about a vertical axis, a plurality of inserting heads mounted on said platform in fixed relationship about the said axis and each including support means for a spool of wire and severing and inserting means for severing a length of the wire and carrying it forward rectilinearly for insertion end-foremost into a stem, and vertically reciprocable actuating mechanism connected to effect operation of the said inserting means, said actuating mechanism being mounted on the axis of rotation of said platform for rotation therewith while maintaining the relationship between said heads and said actuating mechanism.

3. Support wire inserting apparatus of the

class described comprising a horizontal platform mounted for rotation at selected intervals about a vertical axis, a plurality of inserting heads mounted on said platform in fixed relationship about the said axis and each including support means for a spool of wire and severing and inserting means for severing a length of wire and carrying it forward rectilinearly for insertion end-foremost into a stem, and vertically reciprocable actuating mechanism connected to effect operation of the said inserting means, said actuating mechanism being mounted on the axis of rotation of said platform for rotation therewith while maintaining the relationship between said heads and said actuating mechanism, and means including releasable lock means normally holding said platform in a fixed angular position but operable to release the platform to permit its rotation to temporarily relocate said heads for servicing and adjustment thereof.

4. Apparatus of the class described comprising inserting heads located about a vertical axis and each including support means for a spool of wire and severing and inserting means for severing a length of wire and for inserting it end-foremost into a plastic portion of a stem located in said axis, support means for the inserting heads comprising a horizontal platform and a longitudinally movable vertical shaft aligned with the said axis for carrying the platform and the inserting heads to and from operative relation to the stem, actuating means located adjacent the vertical path of movement of the inserting heads and engaged during said movement for operating said severing and inserting means on said heads, and means rotatable about the axis of the shaft for supporting the said actuating means and including means for fixing the rotative position of the platform but permitting the rotation of said platform at will to permit the inserting heads to be temporarily relocated for servicing and adjustment.

5. Apparatus of the class described comprising inserting heads located about a vertical axis and each including inserting means for carrying a filament support wire and inserting it end-foremost into a plastic portion of a stem located in said axis, support means for the inserting heads comprising a horizontal platform having attached thereto a longitudinally movable hollow vertical shaft aligned with the said axis for carrying the platform and the inserting heads to and from operative relation to the stem and for permitting rotation of the platform at will to permit the inserting heads to be temporarily relocated for servicing and adjustment, a vertical inner shaft located within the hollow shaft for rotation with the hollow shaft but for reciprocation independently thereof, and actuating means attached to the upper end of the said inner shaft and connected with the inserting means of said inserting heads so that the relationship between said actuating means and said heads is not disturbed by rotation of said platform.

6. Apparatus of the class described comprising inserting heads located about a vertical axis and each adapted to insert a filament support wire end-foremost into a plastic portion of a stem located in said axis, support means for the inserting heads rotatable about said axis to permit the inserting heads to be relocated for servicing and adjustment, a vertical shaft located in said axis and extending through an opening in the support means, actuating means attached to the upper end of the shaft and connected to actuate the inserting heads upon vertical movement of the shaft, and operating means in engagement with the lower end of said shaft for reciprocating said shaft vertically, said operating means being connected to said shaft by a swivel connection to permit the independent rotation of the shaft during relocation of the heads.

7. Apparatus of the class described comprising inserting heads located about a vertical axis and each adapted to insert a filament support wire end-foremost into a plastic portion of a stem located in said axis, support means for the inserting heads comprising a horizontal platform and a longitudinally movable hollow vertical shaft located in said axis for carrying the platform and the inserting heads to and from operative relation to the stem, a vertical inner shaft located within the hollow shaft for rotation with the hollow shaft but for reciprocation independently thereof, actuating means attached to the upper end of the said inner shaft and connected to the inserting heads for actuation thereof upon reciprocation of said inner shaft, operating means in engagement with the lower ends of each of said shafts for moving said shafts vertically, said operating means being connected to said shafts by swivel connections to permit rotation of the shafts together with the said platform for relocation of the heads to permit servicing and adjustment thereof.

8. Support wire inserting apparatus of the class described comprising a horizontal platform mounted for rotation at selected intervals about a vertical axis, a plurality of inserting heads mounted on said platform in fixed relationship about the said axis and each including support means for a spool of wire and severing and inserting means for severing a length of the wire and carrying it forward rectilinearly for insertion end-foremost into a stem, a vertical hollow shaft disposed in said axis and attached to said platform and mounted for vertical reciprocation to carry said platform and inserting heads into operative relation to said stem, means mounted at a fixed elevation but rotatable about said hollow shaft and locked in fixed angular relationship to said platform and also carrying tripping means for actuating the severing means of said heads upon vertical movement thereof, an inner shaft located within the said hollow shaft for rotation with the hollow shaft but for reciprocation independently thereof, actuating means attached to the upper end of said inner shaft and connected with the inserting means of said inserting heads, and operating means for reciprocating said shafts to first move both shafts vertically upward to cause said tripping means to actuate said severing means and to then move said inner shaft downward to actuate said inserting means, said operating means being connected to said shafts through swivel connections whereby to permit rotation of said platform at will without disturbing the relationships between said inserting heads and the actuating mechanisms therefor.

9. A wire inserting head comprising a standard, severing mechanism including cutting jaws mounted on said standard, a pair of inserting jaws mounted adjacent said severing jaws, movable support and actuating means for said inserting jaws mounted on said standard for recip-

rocation and including means to effect opening and closing of said inserting jaws and to carry them away from and toward said severing jaws, a readily separable wire-supporting attachment comprising a support bracket mounted on said standard for quick detachment therefrom, said bracket having thereon means for supporting a spool of wire and for guiding the wire including gripper means located on said bracket at a point adjacent said cutting jaws, said inserting jaws being movable from a position between said severing jaws and said gripper means to a position

away from said gripper means beyond said severing jaws to periodically deliver lengths of wire severed from said spool.

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