Oct. 2, 1956 D. MULLAN 2,764,953

MACHINE FOR TRIMMING, FLUXING AND SOLDERING THE LEAD WIRES OF FLUORESCENT LAMPS

Filed March 14, 1951 5 Sheets-Sheet 1

Fig. 1.

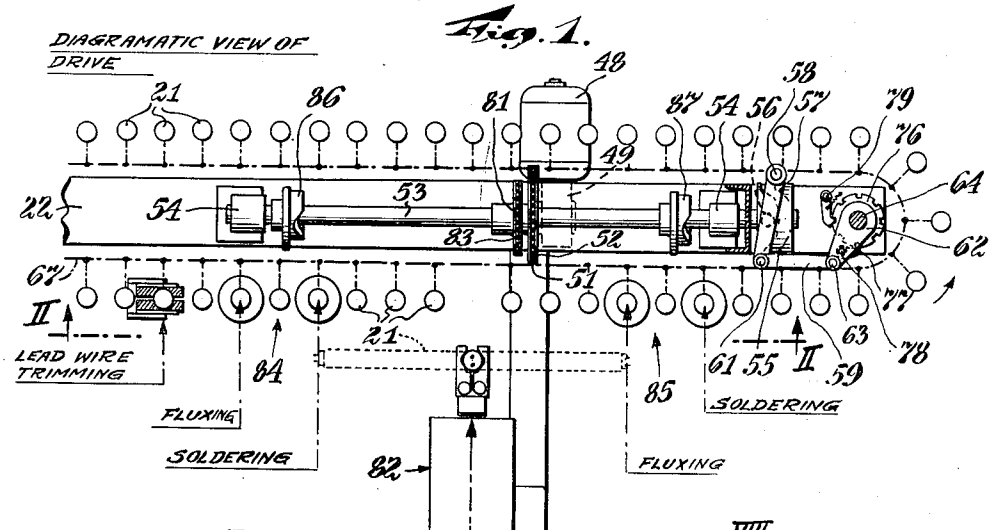
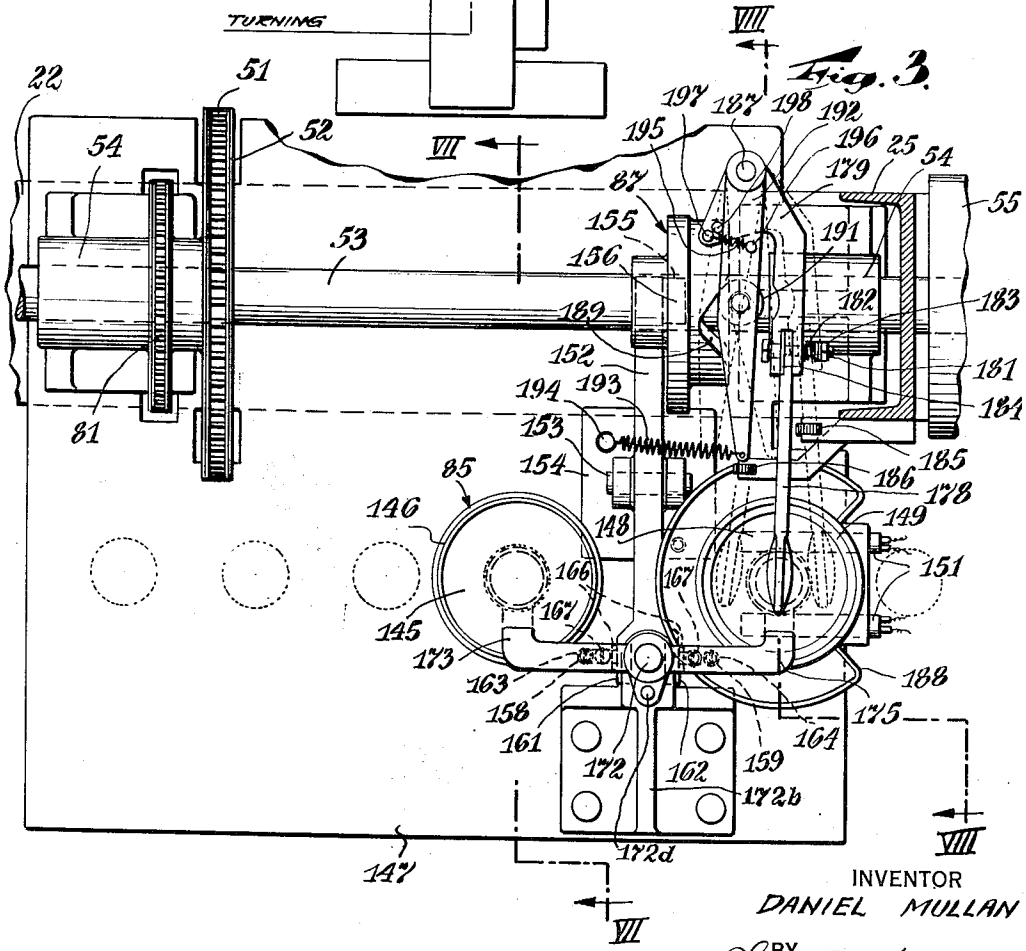


Fig. 3.



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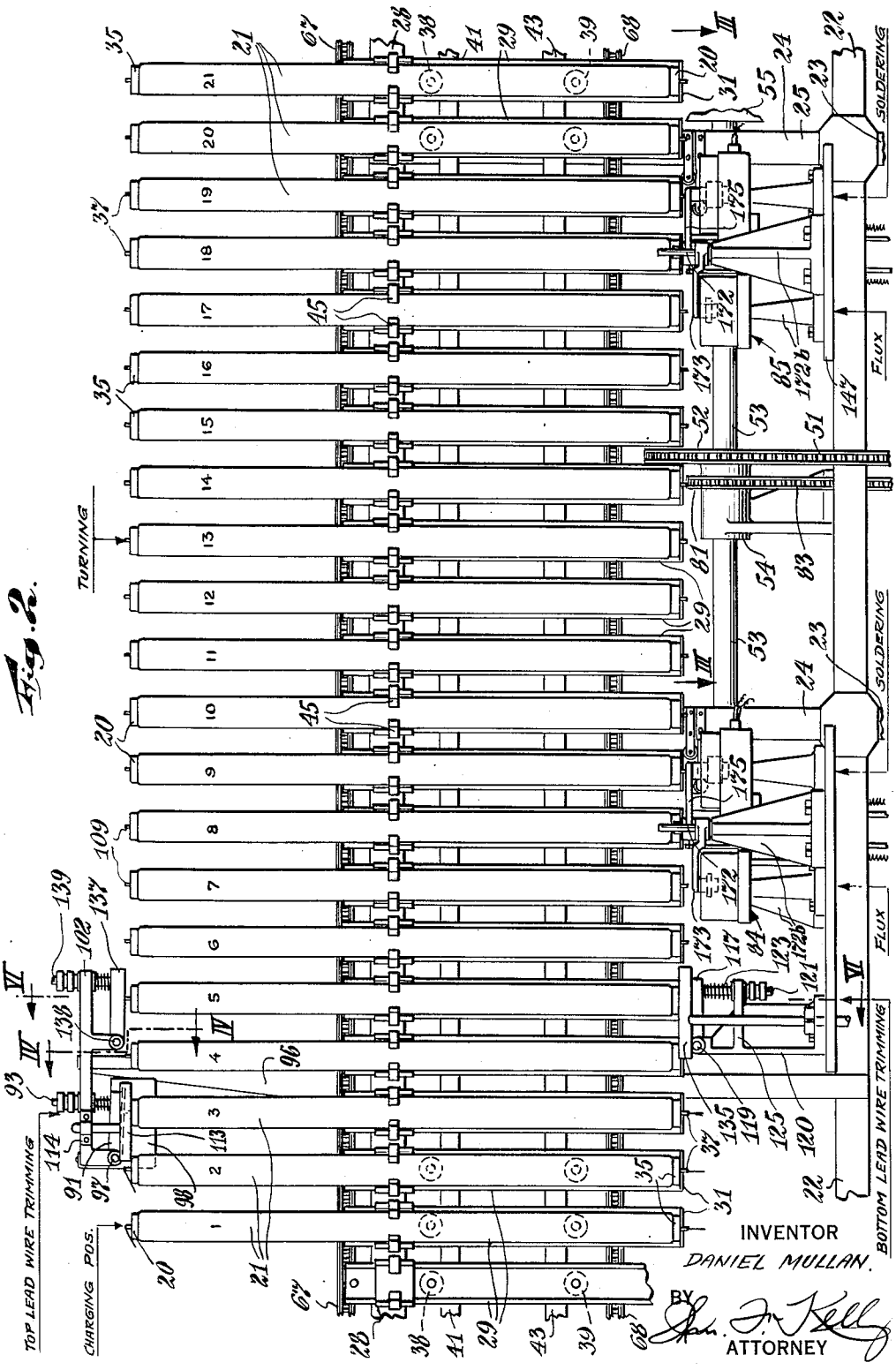


Fig. 2.

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5 Sheets-Sheet 3

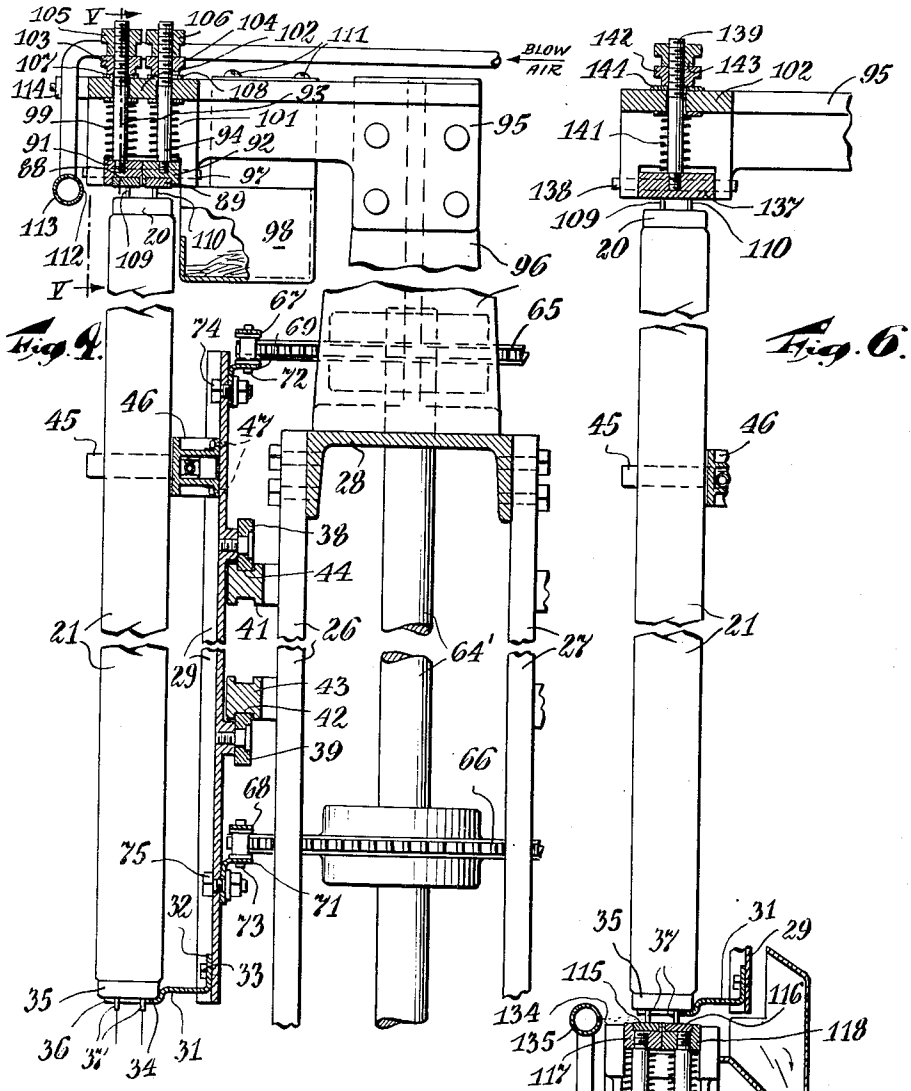
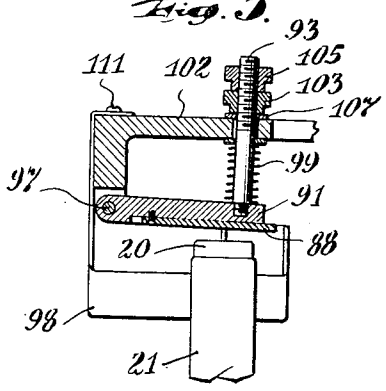


Fig. 4.

Fig. 6.

Fig. 5.



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MACHINE FOR TRIMMING, FLUXING AND SOLDERING THE LEAD WIRES OF FLUORESCENT LAMPS

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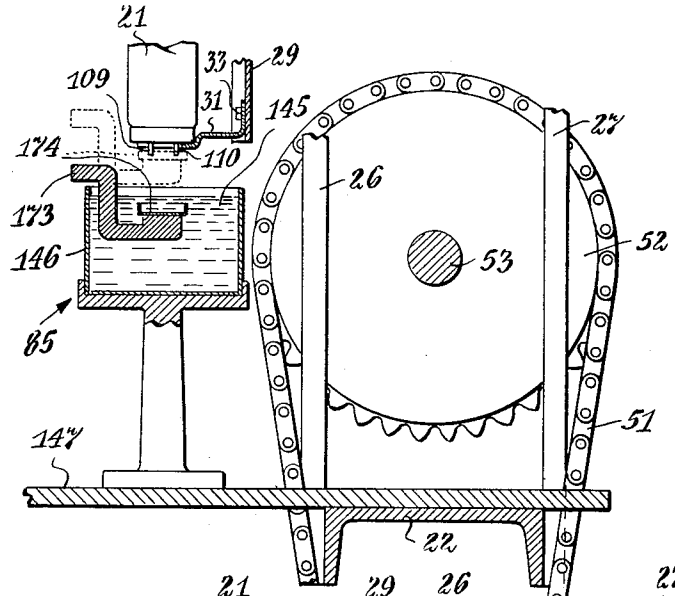


Fig. 7.

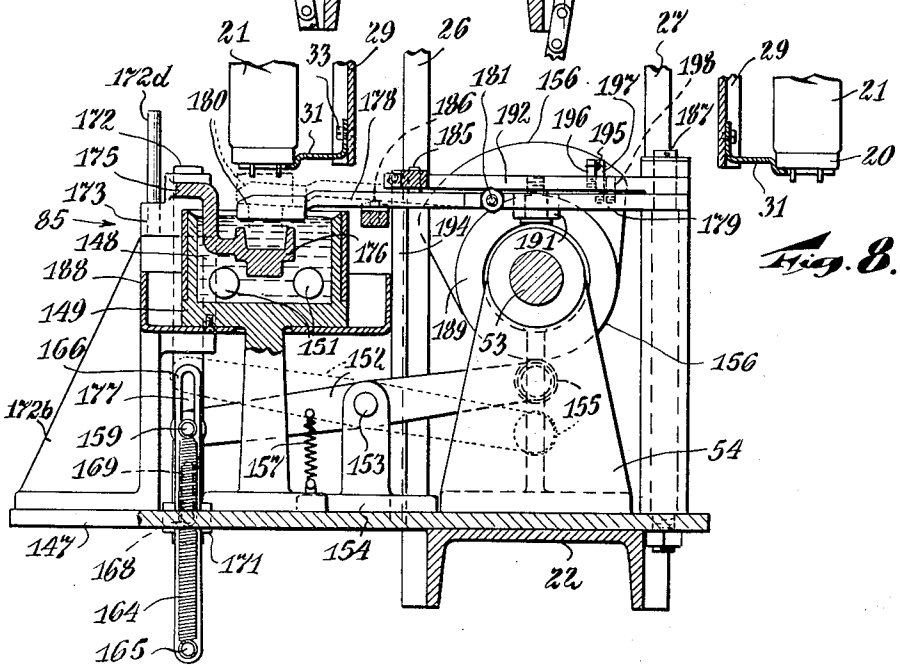


Fig. 8.

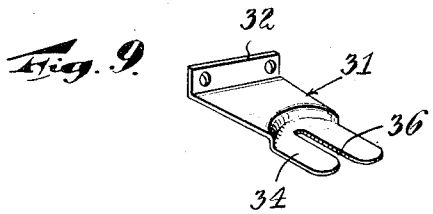


Fig. 9.

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MACHINE FOR TRIMMING, FLUXING AND SOLDERING THE LEAD WIRES OF FLUORESCENT LAMPS

Filed March 14, 1951 5 Sheets-Sheet 5

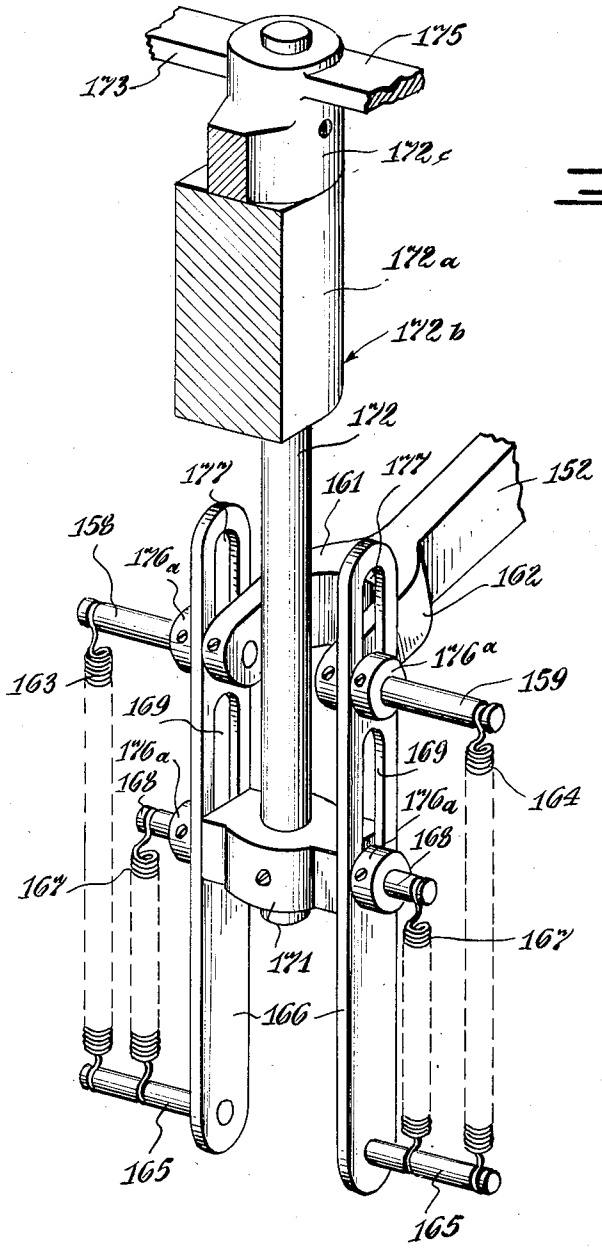


Fig. 10.

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United States Patent Office

2,764,953

Patented Oct. 2, 1956

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MACHINE FOR TRIMMING, FLUXING, AND SOLDERING THE LEAD WIRES OF FLUORESCENT LAMPS

Daniel Mullan, Hillside, N. J., assignor to Westinghouse Electric Corporation, East Pittsburgh, Pa., a corporation of Pennsylvania

Application March 14, 1951, Serial No. 215,602

4 Claims. (Cl. 113—59)

This invention relates to a method for trimming, fluxing, and soldering the lead wires of all types of pin bases and, more particularly, to such for fluorescent lamps.

The principal object of my invention, generally considered, is to provide for the removal of the lead wire portions which project beyond the contact pins of lamps, and the subsequent fluxing and soldering thereof.

Another object of my invention is to provide a method for trimming, fluxing, and soldering the leads of each electrical device which project beyond the ends of contact pins thereof, comprising filing off the projecting leads, applying flux to the lower ends of said leads, dipping said fluxed leads into molten solder and, if contact pins are at both ends of the device, reversing end for end and repeating at the then lower end of the device.

A further object of my invention is to provide a machine for automatically trimming, fluxing and soldering the leads of based fluorescent lamps, and other electrical devices having hollow contact pins projecting from the base or bases thereof and lead wires extending through said pins and beyond their ends, comprising a conveyor indexing from station to station, means on said conveyor for holding a series of such devices with their axes vertical, means disposed at one station along said conveyor for removing lead wire portions which project beyond the contact pins at one end, means at a subsequent station for removing the lead wire portions which project beyond the remaining contact pins, if any, means at a later station for fluxing the lower ends of the lower contact pins, means at an adjacent station for dipping the fluxed contact pins into molten solder to effect a permanent connection between said leads and pins, means at a subsequent station, if the devices have contact pins at both ends, for reversing the position of each device, means at a still later station for applying flux to the ends of the then lower contact pins of each device, and means at a subsequent station for dipping said fluxed contact pins into molten solder to effect a permanent connection between said leads and pins.

Other objects and advantages of the invention, relating to the particular arrangement and construction of the various parts, will become apparent as the description proceeds.

In the scale drawing:

Figure 1 is a plan view of apparatus embodying my invention.

Figure 2 is a front elevational view on a larger scale of the apparatus shown in Figure 1, on the line II—II thereof.

Figure 3 is a fragmentary plan view, with parts in section on the line III—III of Figure 2, in the direction of the arrows.

Figure 4 is a transverse sectional view on the line IV—IV of Figure 2 in the direction of the arrows.

Figure 5 is a fragmentary sectional view on the line V—V of Figure 4 in the direction of the arrows.

Figure 6 is a transverse sectional view on the line VI—VI of Figure 2 in the direction of the arrows.

Figures 7 and 8 are transverse sectional views on the lines VII—VII and VIII—VIII, respectively, of Figure 3, in the direction of the arrows.

Figure 9 is a perspective view of the base holder or socket member shown in Figures 7 and 8.

Fig. 10 is a perspective view of an elevating mechanism for the fluxing and soldering apparatus.

After fluorescent lamps have had their bases applied, but before said bases are cemented in place, the lead wire portions projecting through and beyond the hollow contact pins thereof are bent over the ends of said pins to prevent the bases from slipping off the respective ends of the lamps. These lamps are then processed to cement the bases in place thereon. After this has been done, they are transferred, one by one, to a machine embodying the present invention. The operator pulls down on the leads extending beyond the contact pins of each lower base and fits each lamp into holders on the machine. The machine indexes said lamps from station to station, trimming off the top (or bottom) lead wires flush with the ends of the contact pins, and then trimming off the remaining (bottom or top) lead wires flush with the ends of said contact pins.

Each lamp then passes to a fluxing position where a pad saturated with (or a shallow cup of) flux is brought up to engagement with the lower contact pins. Each lamp then passes to a subsequent position where a pot of molten solder is brought up to engagement with the lower ends of said pins, causing the leads to be soldered to the pin ends. The lamps are then reversed in position, either manually or by automatic power means, and the fluxing and soldering operations are repeated. The lamps are (after any other desired processing) removed, one by one, in finished condition.

Referring to the drawings in detail, like parts being designated by like reference characters, the apparatus (Figs. 1–8) of my invention, one embodiment only of which is illustrated, comprises a conveyor for supporting and transporting a series of electrical devices, shown as fluorescent lamps **21**, which have had bases **20** and **35** (Fig. 2) cemented thereto, and from the contact pins of which project leads not yet connected thereto, a framing for supporting said conveyor with said lamps, drive means for causing movement of said conveyor to index said lamps, one by one, from station to station, mechanism for trimming the lead wire portions which project beyond the ends of the upper contact pins of such lamps while held upright, or with their axes vertical, as they are positioned on said conveyor, mechanism for (while holding down on said lamps) similarly trimming projecting lead wires at the lower ends of said lamps, mechanism for fluxing the ends of the contact pins at the bottoms of said lamps, mechanism for then submerging the lower ends of said fluxed pins in a pot of cleaned molten solder, means for effecting a reversal of the position of each lamp, and mechanism for then repeating the fluxing and soldering at the then lower ends of said lamps.

Lamp conveyor and frame

The frame (Figs. 1, 2, 3, 6, 7 and 8) of the present embodiment comprises a table **22**, which extends the length of the machine and may be in the form of a channel member (Fig. 8) with the web at the top and the flanges projecting downwardly. This table member **22** is supported from the floor by a plurality of legs **23** (Fig. 2). Upstanding from the table **22** are a plurality of pedestals **24**, the end pedestal being desirably in the form of channel member **25** (Fig.3), and intermediate pedestals being desirably in the form of spaced plates **26** and **27** (Fig. 4). All of the pedestals are united to an upper channel member **28** (Figs. 2 and 6) which extends the length of the machine.

The conveyor for the lamps 21 comprises a series of normally vertical channel members 29 (Fig. 2), each carrying at its lower end a base holder or socket member 31, shown in detail in Fig. 9. The latter is provided with an upstanding flange 32 secured to the lower end of its channel member 29 by means such as set screw 33 (Figs. 7 and 8). The outer part of the normally horizontal portion of the holder 31 is downwardly offset, as indicated at 34, to provide a conforming seat for the lower base 35 of the supported lamp. The offset portion 34 is also slotted, as indicated at 36, so that the contact pins 37 on said base are received therein and served to insure that the supported lamp is oriented about its vertical axis, in a position where its contact pins 37 lie in planes perpendicular to the direction of lamp movement so that they are properly positioned for the lead-trimming operations.

Each channel member 29 carries rollers 38 and 39 (Figs. 2 and 4), pivoted thereto, the former of which travels in a pedestal-carried track member 41, which is carried by the pedestals 24, and the latter of which rides in a corresponding lower groove 42 in a similar pedestal-carried track member 43. This means that each channel member 29 is supported for travel on an upper track member 41, and prevented from getting out of the upper groove 44 thereof by a lower roller riding in a lower groove of a lower track member. These track members extend along the front and back of the machine. At both ends the channel members 29 and their carried lamps 21 are supported by the chains 67 and 68 (Figs. 1, 2 and 4). The lamps 21 may travel from one end to the other along the front and to the back of the machine, the lamps being loaded, say at Station "1" (Fig. 2), and unloaded after the desired processing.

Each channel member 29 is also provided with a pair of spring-actuated lamp-gripping hooks 45 (Fig. 4), so shaped that a lamp 21 may be pushed therebetween into engagement with shock-absorbing bumpers, and held in place on the socket member 31, which also serves as a height locator, until pulled therefrom. These hooks 45, described in detail and claimed in the D. Mullan and H. Bauer application Ser. No. 215,603, filed simultaneously herewith are mounted on a block 46, secured to each channel member 29 by screws or the like 47.

Drive mechanism

The power means (Figs. 1, 2, 3, 7 and 8) for the conveyor comprises a motor 48 driving, through reduction gearing 49, a chain 51 (Fig. 7) passing over a sprocket wheel 52. The latter is mounted on drive shaft 53 rotating in bearings 54 (Fig. 8) mounted on the table 22. The shaft 53 carries at one end a cam 55 in which rides a roller 56 on a lever 57, pivoted at 58 to the frame of the machine. The free end of the lever 57 is connected to link 59 by pin 61. The other end of the link is connected to a crank 62 by pin 63. The crank 62 is mounted on a vertical shaft 64 carrying sprocket wheels, over which chains 67 and 68 (Fig. 4) pass, and to which the series of channel members 29 are connected by means of angular clips 69 and 71. The chains 67 and 68 also pass around sprocket wheels 65 and 66 on a shaft 64' at the other end of the frame, generally like the shaft 64 and its sprocket wheels. The clips 69 and 71 on the one hand, are connected to pivot pins 72 and 73 of the chains 65 and 66, respectively, and on the other hand, are connected by bolts 74 and 75 to the series of channel members 29.

The shaft 64 (Fig. 1) also carries a ratchet 76 engaged by a pawl 77 connected to the crank 62 by pin 78, whereby reciprocation of the link 59 at each revolution of the shaft 53 turns the shaft 64 sufficiently to move, through the chain of mechanism described, each lamp supporting channel 29 from one station to the next. A holding pawl 79 (Fig. 1), pivoted to the table 22 and spring-biased toward the ratchet 76, is provided to hold said ratchet

76 in a station position while the crank 62 is being returned preparatory to making the next indexing movement.

The shaft 53 also carries a sprocket wheel 81 (Figs. 2 and 3) which drives a bulb-turning mechanism, indicated only diagrammatically at 82 (Fig. 1), through chain 83. A bulb-turning mechanism which may be employed is described and claimed in application Serial No. 215,603, previously referred to.

The fluxing and soldering mechanism (Figs. 2, 3, 7 and 8), two sets of which are shown and designated respectively 84 and 85, are respectively both mounted on the shaft 53. Inasmuch as these sets of mechanisms are identical only one, numbered 85, is illustrated in detail and will subsequently be described.

Lead wire trim and hold down

The mechanism for trimming the portions of the lead wires which project beyond the contact pins 109, 110 of the lamps 21, when said pins are at the top at Station "3," comprises a pair of files 88 and 89 (Figs. 4 and 5) set in and secured to blocks 91 and 92. Although top trimming is mentioned first, it may, if desired, be preceded by bottom trimming. The blocks 91 and 92 (Fig. 2) are pivotally mounted, as indicated at 97, on a bracket 95 (Fig. 4) supported from a pedestal 96 extending from the top of the frame member 28. Rods 93 and 94, as shown more clearly in Figures 4 and 5, respectively connected to the free end portions of said blocks 91 and 92, are adapted to reciprocate in oversize apertures in said bracket 95. The blocks 91 and 92 are urged downwardly by coil springs 99 and 101 surrounding the same, each respectively acting between a washer (Fig. 5) engaging the lower surface of the top wall 102 of the bracket 95 and the blocks 91 and 92.

The rods 93 and 94 are held in adjusted position by nuts 103, 104, 105 and 106, the first two of which engage washers 107 and 108 resting on the top of the bracket 95. The compression of the springs 99 and 101 is so adjusted by the nuts 103, 104, 105, 106 that as the lamps 21 are drawn under the files 88 and 89, leads projecting beyond the contact pins 109 and 110 thereof are filed off and removed to the receptacle 93 (Fig. 4), secured to the bracket 95 by screws 111, by means of a blast of air from aperture 112 in compressed air pipe 113. The pipe 113 is carried on the bracket 95 by clamp 114.

The mechanism for trimming the lead wire portions which project beyond the contact pins of the lamps 21 which are at the bottom (at Station "5"), is similar to that for trimming the portions at the top. It likewise comprises a pair of files 115 and 116 (Fig. 6), set in and secured to blocks 117 and 118. The latter are pivotally mounted, as indicated at 119 (Fig. 2), on a pedestal 120 upstanding from and connected to the table 22. Rods 121 and 122, as shown most clearly in Figures 2 and 6, respectively connected to the free end portions of said blocks 117 and 118, are adapted to reciprocate in oversize apertures in said pedestal 120. The rods 121 and 122 are urged upwardly by coil springs 123 and 124 surrounding the same, each respectively acting between a washer engaging the upper surface of the wall 125 of said pedestal 120 and the blocks 117 and 118.

The rods 121 and 122 (Fig. 6) are held in adjusted position by nuts 126, 127, 128 and 129, the first two of which engage washers 131 and 132 pressing on the bottom surface of the wall 125. The compression of the springs 123 and 124 is so adjusted by the nuts 126, 127, 128, 129 that, as the lamps 21 are drawn over the files 115 and 116, the leads projecting beyond the contact pins 37 thereof are filed off and removed, to the receptacle 133 (Fig. 6) mounted on the table 22, by a blast of air from aperture 134 in compressed air pipe 135. The pipe 135 is carried on the pedestal 120 by clamp 136.

In order to insure that each lamp 21, the lower leads

of which are being trimmed, is not raised by the upward force on the files 115 and 116 from socket member 31, I provide a lamp hold-down device (Figs. 2 and 6) directly over the lower lead trimming mechanism at Station "5." This device comprises a smooth but desirably hard metal block 137, pivotally mounted on the bracket 95 as indicated at 138. A rod 139, shown most clearly in Figures 2 and 6, is connected to the free end portion of said block 137 and adapted to reciprocate in an oversize aperture in said bracket 95. Said rod 139 is urged downwardly by coil spring 141 surrounding the same, acting between a washer engaging the lower surface of the wall 102 of the bracket 95 and the block 137.

The rod 139 is held in adjusted position by nuts 142 and 143 (Fig. 6), the first of which engages a washer 144 resting on the top of the bracket 95. The compression of the spring 141 is so adjusted by the nuts 142 and 143, that the block 137 presses on the contact pins 109 and 110 with such force as to hold the lamp in its socket 31 during the lead trimming operation at its lower contact pins 109 and 110.

Fluxing and soldering of the leads

After the lead-trimming operations at Stations "3" and "5" (Fig. 2) respectively, the lamp 21 passes on to Station "7" where it is fluxed and then on to Station "9" where it is soldered. The fluxing and soldering apparatus 84 for effecting these operations is driven by the duplex cam 86 (Fig. 1) on shaft 53, which is identical with the duplex cam 87 on said shaft and which cams drive identical fluxing and soldering mechanisms 84 and 85. Inasmuch as this latter mechanism 85 only is shown in detail in Figures 2, 3, 7 and 8, I will now describe such mechanism only once.

The flux 145 (Fig. 7) is held in a receptacle 146 supported on a plate 147 mounted on the table 22. The solder 148 (Fig. 8) is likewise held in a receptacle 149 mounted on the plate 147. Suitable means, such as electric heating coils 151 are provided for maintaining the solder 148 molten and at the desired soldering temperature. Flux 145 and solder 148 are both lifted to engage the then lower contact pins, first those designated 37 and then those designated 109 and 110 after the lamp 21 is turned over, by the device 82 or manually, as the case may be.

Lifting mechanism

The lifting mechanism (Figs. 3, 7 and 8) comprises a lever 152 pivoted by pin 153 to a bracket 154 secured to the plate 147. The inner end of the lever 152 carries a roller 155 engaging the peripheral cam portion 156 of the duplex cam 87, being biased into engagement therewith by relatively stiff coil spring 157. Motion to the fluxing and soldering mechanism is resiliently transmitted from pins 158 and 159 (Fig. 3) extending, respectively, from the bifurcations 161 and 162 at the outer end of said lever 152, by the following mechanism.

From these pins 158 and 159 respectively extend springs 163 and 164 (Figs. 3 and 8) to corresponding pins 165, respectively extending outwardly from the lower end portions of a yoke consisting of generally vertical plates 166 (Fig. 3), each formed with a lower slot 169 and an upper slot 177, one plate lying on either side of the bifurcated portion of the lever 152. Each of said pins 165 carries a spring 167, one disposed between the spring 163 and one plate 166, and the other between the spring 164 and the other plate 166. The upper ends of said springs 167 are respectively connected to pins 168 (Fig. 8), one of which projects toward the spring 164 through the lower slot 169 in one of the plates 166 and the other of which projects through the lower slot 169 in the other plate 166 and toward the spring 163.

A rod 172 (Figs. 2, 3, 8 and 10) is vertically reciprocable along its axis in a bearing 172*a* provided in mounting bracket 172*b* (Fig. 8) secured to and upstanding from the plate 147 by means of a collar 172*c*, slidable on a guide rod 172*d* upstanding from bracket 172*a*.

These pins 168 have their inner ends secured to a collar 171 on the rod 172. The collar 172*c* carries an arm 173, the free end of which carries a pad or is provided with a relatively-small cavity 174 kept moist with said flux 145 by being dipped in and out thereof, from and to the position shown in dotted lines to and from that shown in full lines in Figure 7. The collar 172*c* also carries an arm 175 (Fig. 8), which carries a relatively small pot 176 which is movable into and out of the molten solder 148, that is, from and to the position indicated by dotted lines to and from that shown in full lines in Figure 8. The yoke plates 166 are guided on and restrained on bifurcation pins 158 and 159 and collar pins 168 by adjustable collars 176*a*.

From the foregoing, it will be seen that upon turning of the shaft 53 (Figs. 1, 2, 3, 7 and 8), the cam portion 156 of the duplex cam 87 thereon causes oscillation of the lever 152, between the positions shown full and dotted in Figure 8, thereby transmitting motion to both the flux pad 174 and the solder pot 176 from the pins 158 and 159 through springs 163 and 164, and from thence through the slotted plates 166 to the pins 168 on the collar 171 of rod 172. The springs 163 and 164, by causing the pins 158 and 159 to normally engage the lower ends of the upper slots 177, allow for the possibility of movement of the rod 172 being arrested, as by hardening of the solder or some obstruction, thereby preventing breakage of the machine in such an event by allowing the lever 152 to oscillate with a mere further tensioning of said springs upon movement of the pins 158 and 159 in said slots 177.

In a similar way (Figs. 3 and 8), movement of the rod 172 upward independently of the lever 152 may be effected, because of the springs 167 causing the pins 168 to normally engage the lower ends of the slots 169, as the pins 168 then reciprocate in said slots in the plates 166 with corresponding elongation of said springs 167. However, under normal conditions the rod 172 and the lever 152 move together, because the springs 167 referred to are sufficiently stiff to accomplish the purpose by holding the pins 168 in the lower ends of the slots 169 and the pins 158 and 159 in the lower ends of the slots 177.

Solder skimming mechanism

Inasmuch as it is desired to immerse the contact pins 37, 109, 110 of the lamp 21 in only clean solder 148, I provide a solder-skimming arm 178 connected to a bell crank lever 179 by a horizontal pivot pin 181.

The solder skimming arm 178, adjacent its free end, is desirably provided with a tip portion 180 which directly engages the molten solder 148. This portion 180 is desirably formed of refractory material of low heat conductivity, such as "transite" or other suitable ceramic, in order to avoid solidification by removing too much heat from the molten solder 148. This pin 181 carries a spring 182 (Fig. 3), compression of which is adjusted by nuts 183 to urge a shoe member 184 into frictional engagement with the solder skimming arm 178, so that the arm 178 tends to stay at one elevation with respect to the surface of the molten solder 148 until forcibly moved from such elevation.

Thus, movement from a position above the level of the solder 148 to one below, so as to sweep dross from the surface of said solder, as the skimming arm 178 moves between the dotted line positions shown in Figure 3, is effected by a top roller 185 and a bottom roller 186. In other words, as the bell crank lever 179 oscillates about its pivot pin 187, the arm 178 at one time moves to the right hand dotted position beneath the top roller 185 (Figs. 3 and 8), whereby it is pushed to a position below the top surface of the solder. At another time, it is moved to cause its tip portion 180 to sweep dross from said surface to the left hand dotted position, where it passes over the bottom roller 186 which lifts the arm 178 out of engagement with the solder surface, carrying dross from the

top of said solder **148** and pushing it over the edge of the receptacle **149** to the partially annular cup member **188** (Fig. 3) therebeneath.

Oscillation of the solder-skimming arm **178** is effected by the axially-acting cam portion **189** (Fig. 3) of the cam **87**, which engages roller **191** carried by lever **192** on the pivot **187**, and biased theretoward by coil spring **193** acting between its end and a pin **194** upstanding from the bracket **154**.

Right hand motion, as viewed in Figure 3, is transmitted from the lever **192** through spring **195** extending from a pin **196** thereon, to a pin **197** on the bell crank lever **179**. Movement to the left, as viewed in said figure is transmitted from the left edge of said lever **192** to pin **198** on the bell crank lever **179**. It will thus be seen that breakage of the mechanism is avoided, in case of solidification of the solder or other obstruction to movement of the arm **178**, by the spring **195** which allows the arm **192** to move the right, independently of the bell crank **179**, and the spring **193** which moves the skimming arm **178** to the left.

Turning, fluxing and soldering at other end

After fluxing and soldering the lower leads by means of the mechanism designated **84** at Stations "7" and "9", and now described in detail, the lamp **21** on reaching Station "13" is turned end for end, either by the automatic mechanism **82** described and claimed in application Serial No. 215,603, previously referred to, or by hand. After turning, the lamp **21** on reaching Station "17" has its other contact pins, such as those designated **109** and **110**, fluxed, by the mechanism **85**, in a manner as previously effected by the mechanism **84** for the contact pins **37** at Station "7." At Station "19," said pins **109** and **110** are soldered in a manner as previously effected for the pins **37** at Station "9," the lamp **21** then passes on to subsequent stations for any desired further processing or removal.

Summary

From the foregoing disclosure, it will be seen that I have disclosed a machine having a conveyor which receives lamps **21** at a station designated "1" in Figure 2. When placing a lamp **21** on the conveyor at Station "1," the operator pulls down on and straightens the lower leads which project beyond the lower ends of the contact pins **37**, so as to not interfere with placing the lower base **35** of said lamp **21** in the socket member **31** which supports the same. The upper leads however may be allowed to remain in bent-over condition, as shown in Figure 2. The lamp is then processed automatically through Station "2" to Station "3" where the top (or bottom) leads are trimmed. At Station "5" the bottom (or top) leads are trimmed. At Station "7" the bottom leads and contact pins **37** are fluxed, while at Station "9" said leads and contact pins **37** are soldered. The lamp **21** is then turned end for end of Station "13," the remaining leads fluxed at Station "17" and soldered at Station "19," whereupon the lamp **21** is further processed and/or removed from the machine.

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

I claim:

1. In a machine for processing electrical devices having hollow contact pins with enclosed lead wires, a frame, a conveyor for holding and transporting said devices with said pins at the bottom, power driving means, a shaft driven thereby, means on said shaft for intermittently moving said conveyor to cause it to index from station to station, a cam on said shaft, means for applying flux at one station to said pins and for applying molten solder at an adjacent station to said pins, said applying means comprising a lever oscillated by said cam, a receptacle containing flux disposed beneath said pins when indexed at the fluxing station, a receptacle containing solder disposed beneath said pins when indexed at the soldering station, means for maintaining the solder molten and at a predetermined temperature, a bracket on said frame, a reciprocable rod mounted in said bracket for vertical reciprocation along its axis and carrying at one side a flux carrier dipping into and out of the flux containing receptacle and at the other side a solder carrying pot dipping into and out of the molten solder receptacle and means for transmitting motion from said lever to said rod comprising bifurcations on the end of said lever contiguous to said rod and straddling said rod, a pair of yoke plates, each having an upper slot, a lower slot, and a pin extending therefrom adjacent its lower end, one on each side of said rod and adjacent a bifurcation, a bifurcation pin extending from the outer surface of each bifurcation, received in and passing through the upper slots, a collar on said rod and normally positioned beneath said bifurcations, collar pins extending from said collar, received in and passing through the lower yoke slots, collars on said bifurcation pins and said collar pins for guiding and restraining therein said yoke plates, and bifurcation and collar tension springs, the former extending between the bifurcation pins and the corresponding yoke plate pins and the latter extending between the collar pins and the corresponding yoke plate pins, whereby said bifurcation pins under the action of their springs normally engage the lower ends of the upper slots and the collar pins under the action of their springs normally engage the lower ends of the lower slots, so that the bifurcation springs allow for the possibility of upward movement of the rod being arrested without stopping the driving movement of the lever, while the collar springs allow for upward movement of the rod independently of the lever.

2. In a machine for processing electrical devices having hollow contact pins with enclosed lead wires, a frame, a conveyor for holding and transporting said devices with said pins at the bottom, power driving means, a shaft driven thereby, means on said shaft for intermittently moving said conveyor to cause it to index from station to station, a cam on said shaft, means for applying flux at one station to said pins, said applying means comprising a lever oscillated by said cam, a receptacle containing flux disposed beneath said pins when indexed at the fluxing station, a bracket on said frame, a reciprocable rod mounted in said bracket for vertical reciprocation along its axis and carrying at one side a flux carrier dipping into and out of the flux containing receptacle and means for transmitting motion from said lever to said rod comprising bifurcations on the end of said lever contiguous to said rod and straddling said rod, a pair of yoke plates, each having an upper slot, a lower slot, and a pin extending therefrom adjacent its lower end, one on each side of said rod and adjacent a bifurcation, a bifurcation pin extending from the outer surface of each bifurcation, received in and passing through the upper slots, a collar on said rod and normally positioned beneath said bifurcations, collar pins extending from said collar, received in and passing through the lower yoke slots, collars on said bifurcation pins and said collar pins for guiding and restraining therein said yoke plates, and bifurcation and collar tension springs, the former extending between the bifurcation pins and the corresponding yoke plate pins and the latter extending between the collar pins and the corresponding yoke plate pins, whereby said bifurcation pins under the action of their springs normally engage the lower ends of the upper slots and the collar pins under the action of their springs normally engage the lower ends of the lower slots, so that the bifurcation springs allow for the possibility of upward movement of the rod being arrested without stopping the driving movement of the lever, while the collar springs allow for upward movement of the rod independently of the lever.

3. In a machine for processing electrical devices having hollow contact pins with enclosed lead wires, a frame, a conveyor for holding and transporting said devices with said pins at the bottom, power driving means, a shaft

driven thereby, means on said shaft for intermittently moving said conveyor to cause it to index from station to station, a cam on said shaft, means for applying flux at one station to said pins and for applying molten solder at an adjacent station to said pins, said applying means comprising a lever oscillated by said cam, a receptacle containing solder disposed beneath said pins when indexed at the soldering station, means for maintaining the solder molten and at a predetermined temperature, a bracket on said frame, a reciprocable rod mounted in said bracket for vertical reciprocation along its axis and carrying at one side a solder carrying pot dipping into and out of the molten solder receptacle and means for transmitting motion from said lever to said rod comprising bifurcations on the end of said lever contiguous to said rod and straddling said rod, a pair of yoke plates, each having an upper slot, a lower slot, and a pin extending therefrom adjacent its lower end, one on each side of said rod and adjacent a bifurcation, a bifurcation pin extending from the outer surface of each bifurcation, received in and passing through the upper slots, a collar on said rod and normally positioned beneath said bifurcations, collar pins extending from said collar, received in and passing through the lower yoke slots, collars on said bifurcation pins and said collar pins for guiding and restraining therein said yoke plates, and bifurcation and collar tension springs, the former extending between the bifurcation pins and the corresponding yoke plate pins and the latter extending between the collar pins and the corresponding yoke plate pins, whereby said bifurcation pins under the action of their springs normally engage the lower ends of the upper slots and the collar pins under the action of their springs normally engage the lower ends of the lower slots, so that the bifurcation springs allow for the possibility of upward movement of the rod being arrested without stopping the driving movement of the lever, while the collar springs allow for upward movement of the rod independently of the lever.

4. A lifting mechanism for fluxing and soldering apparatus comprising a bracket, a reciprocable rod mounted in said bracket for vertical reciprocation along its axis and carrying at one side a flux carrier dipping into and out of a flux containing receptacle and at the other side a solder carrying pot dipping into and out of the molten solder receptacle and means for transmitting motion from said lever to said rod comprising bifurcations on the end of said lever contiguous to said rod and straddling said rod, a pair of yoke plates, each having an upper slot, a lower slot, and a pin extending therefrom adjacent its

lower end, one on each side of said rod and adjacent a bifurcation, a bifurcation pin extending from the outer surface of each bifurcation, received in and passing through the upper slots, a collar on said rod and normally positioned beneath said bifurcations, collar pins extending from said collar, received in and passing through the lower yoke slots, collars on said bifurcation pins and said collar pins for guiding and restraining therein said yoke plates, and bifurcation and collar tension springs, the former extending between the bifurcation pins and the corresponding yoke plate pins and the latter extending between the collar pins and the corresponding yoke plate pins, whereby said bifurcation pins under the action of their springs normally engage the lower ends of the upper slots and the collar pins under the action of their springs normally engage the lower ends of the lower slots, so that the bifurcation springs allow for the possibility of upward movement of the rod being arrested without stopping the driving movement of the lever, while the collar springs allow for upward movement of the rod independently of the lever.

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