

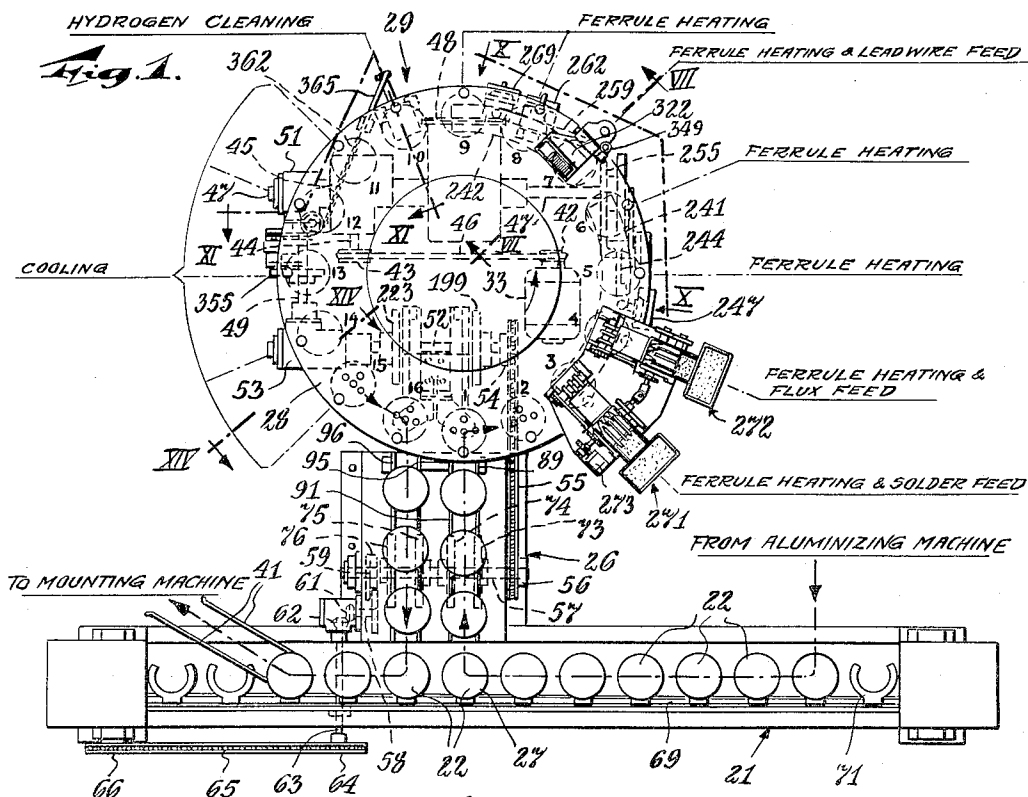
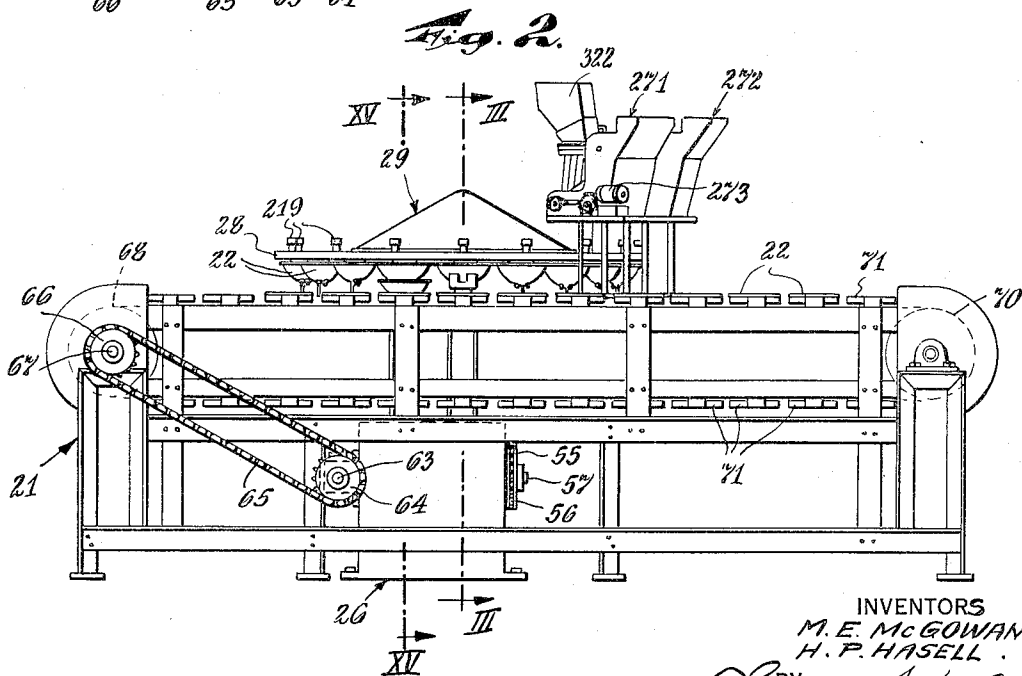
June 5, 1956

M. E. MCGOWAN ET AL
MACHINE FOR PROCESSING THE REFLECTORS
OF SEALED BEAM LAMPS

2,748,738

Filed Feb. 20, 1951

8 Sheets-Sheet 1



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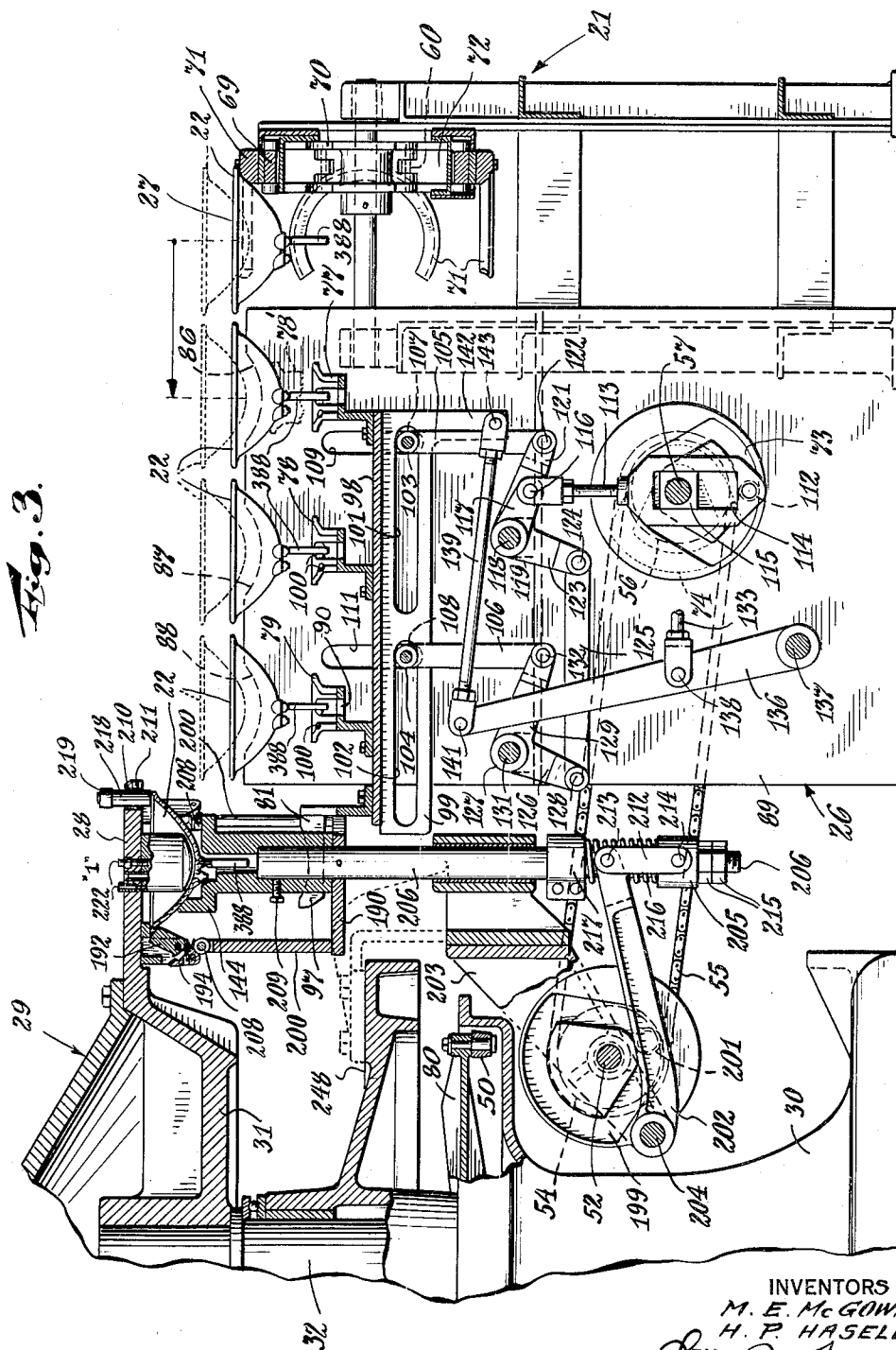
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3 Sheets-Sheet 2



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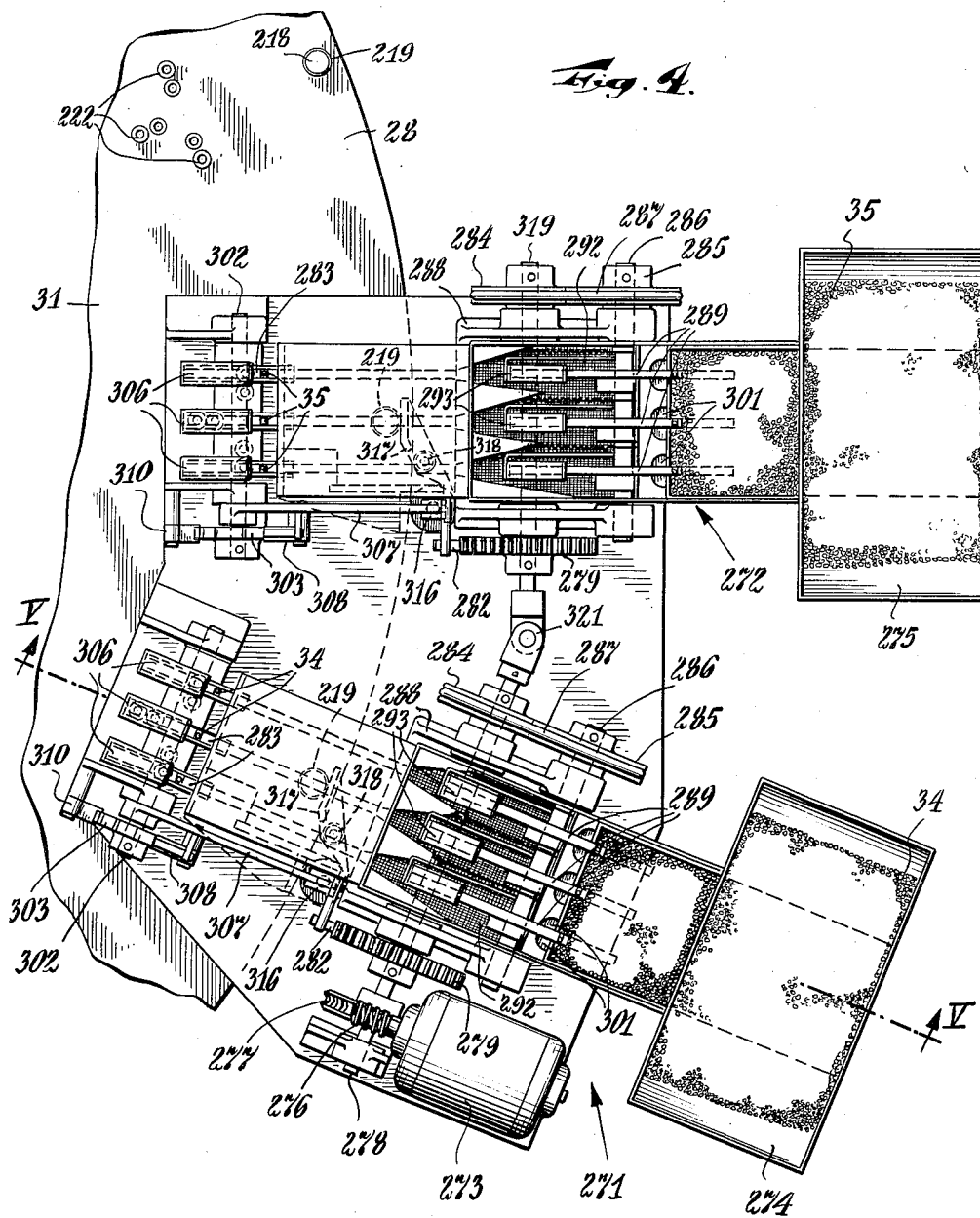
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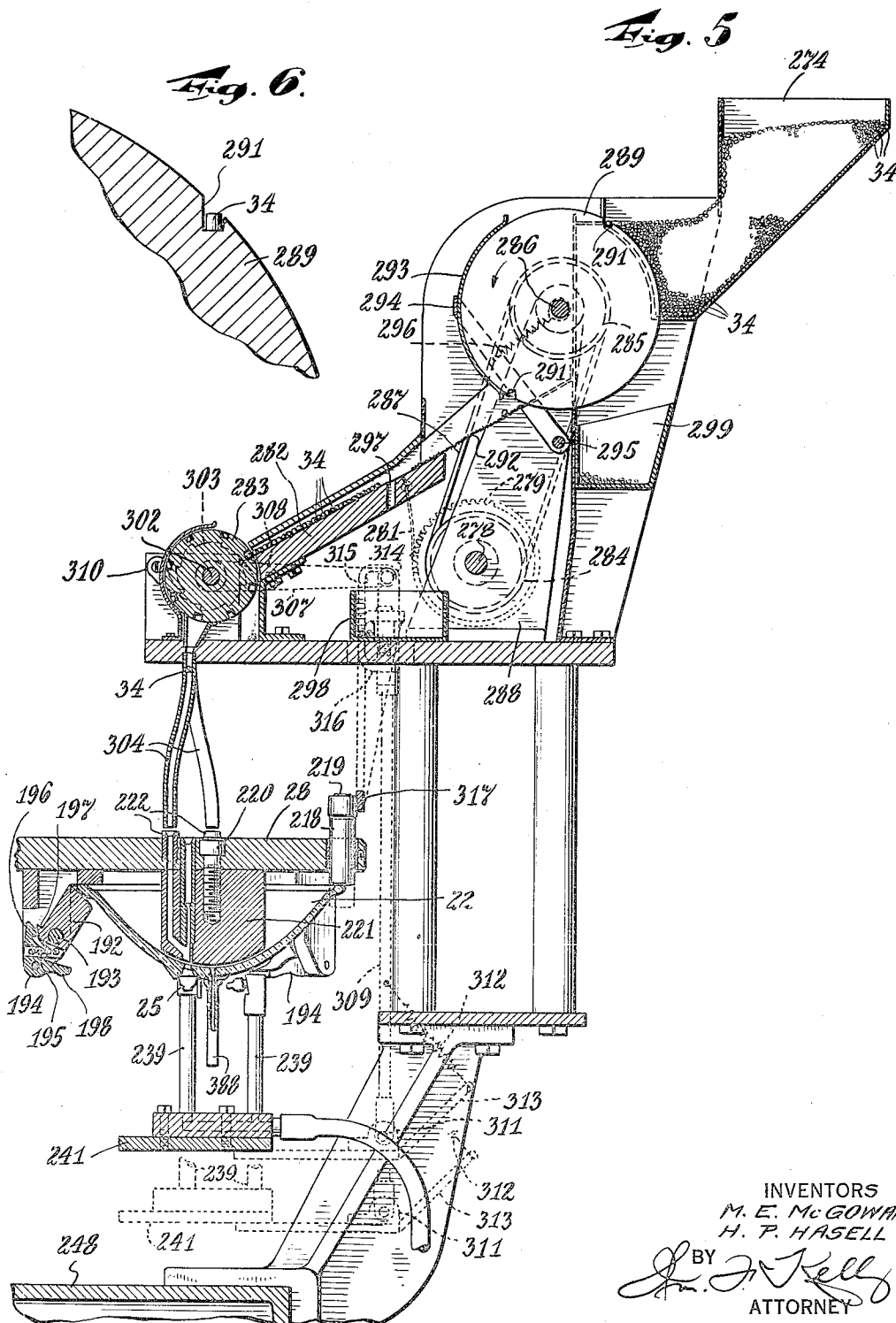
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8 Sheets-Sheet 4



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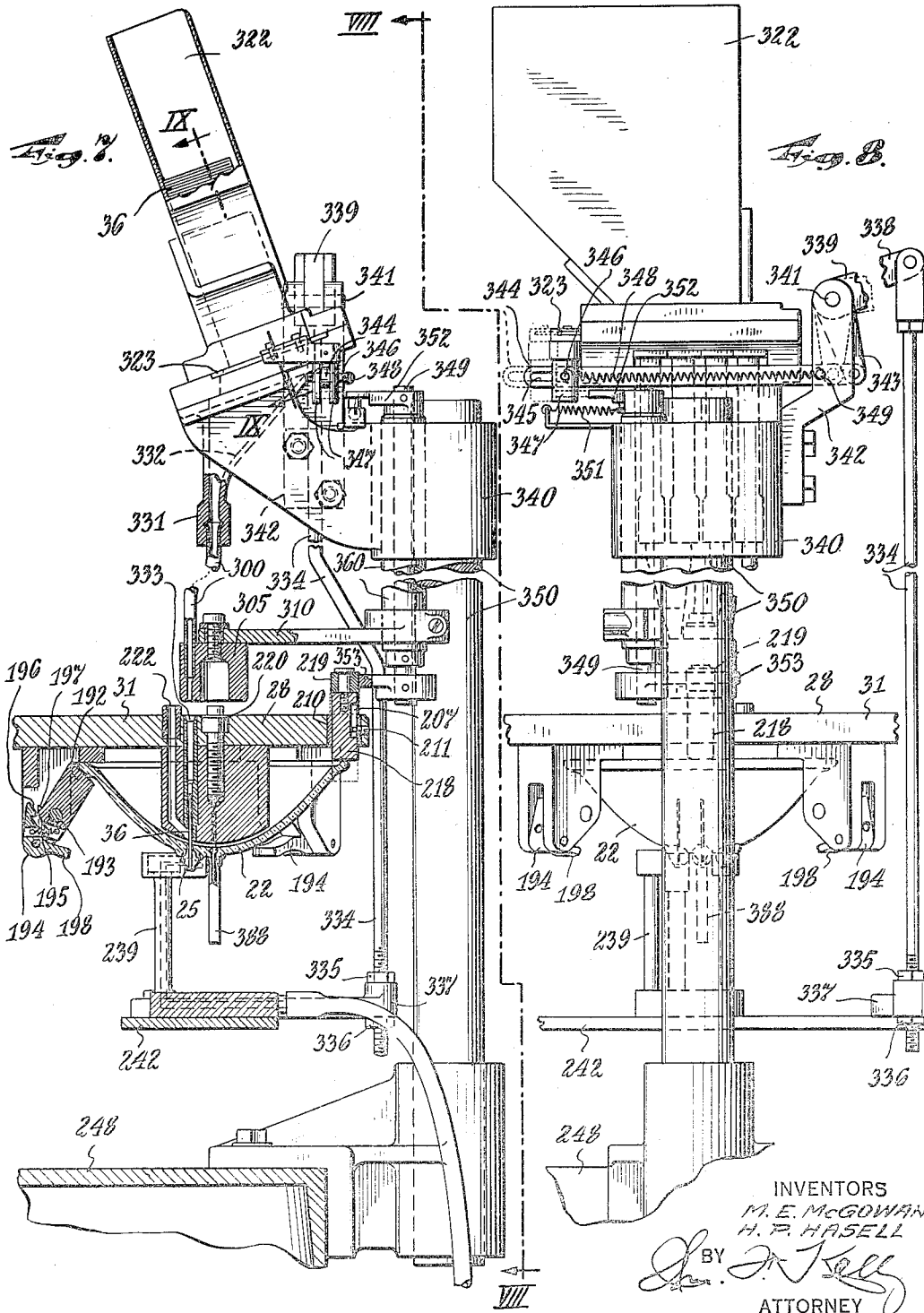
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Fig. 9.

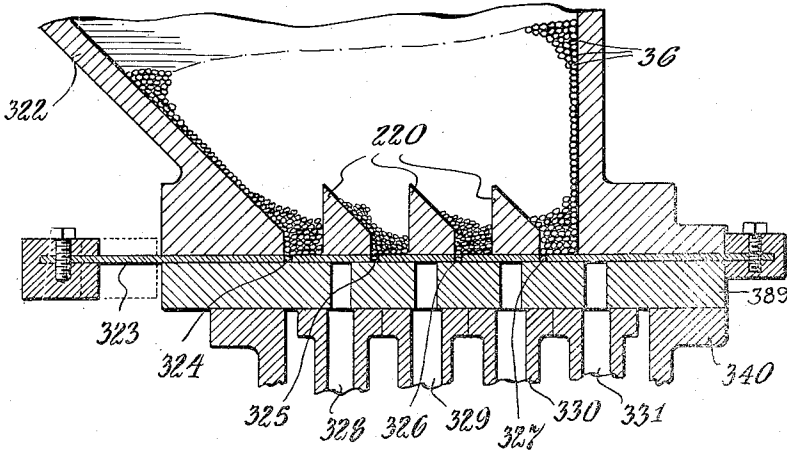
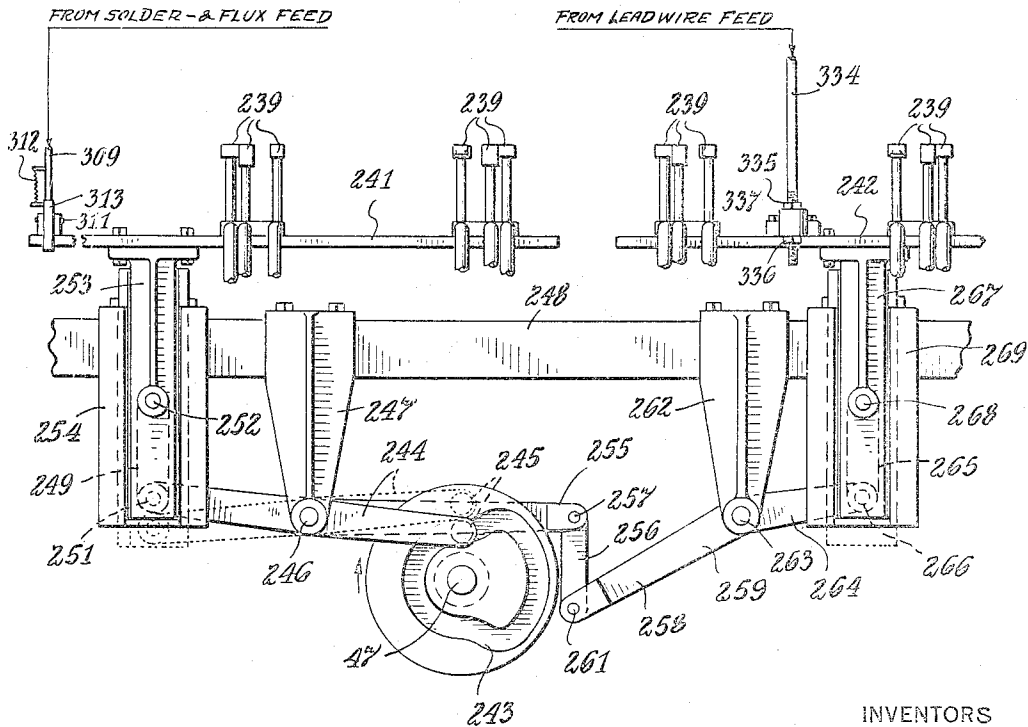


Fig. 10.



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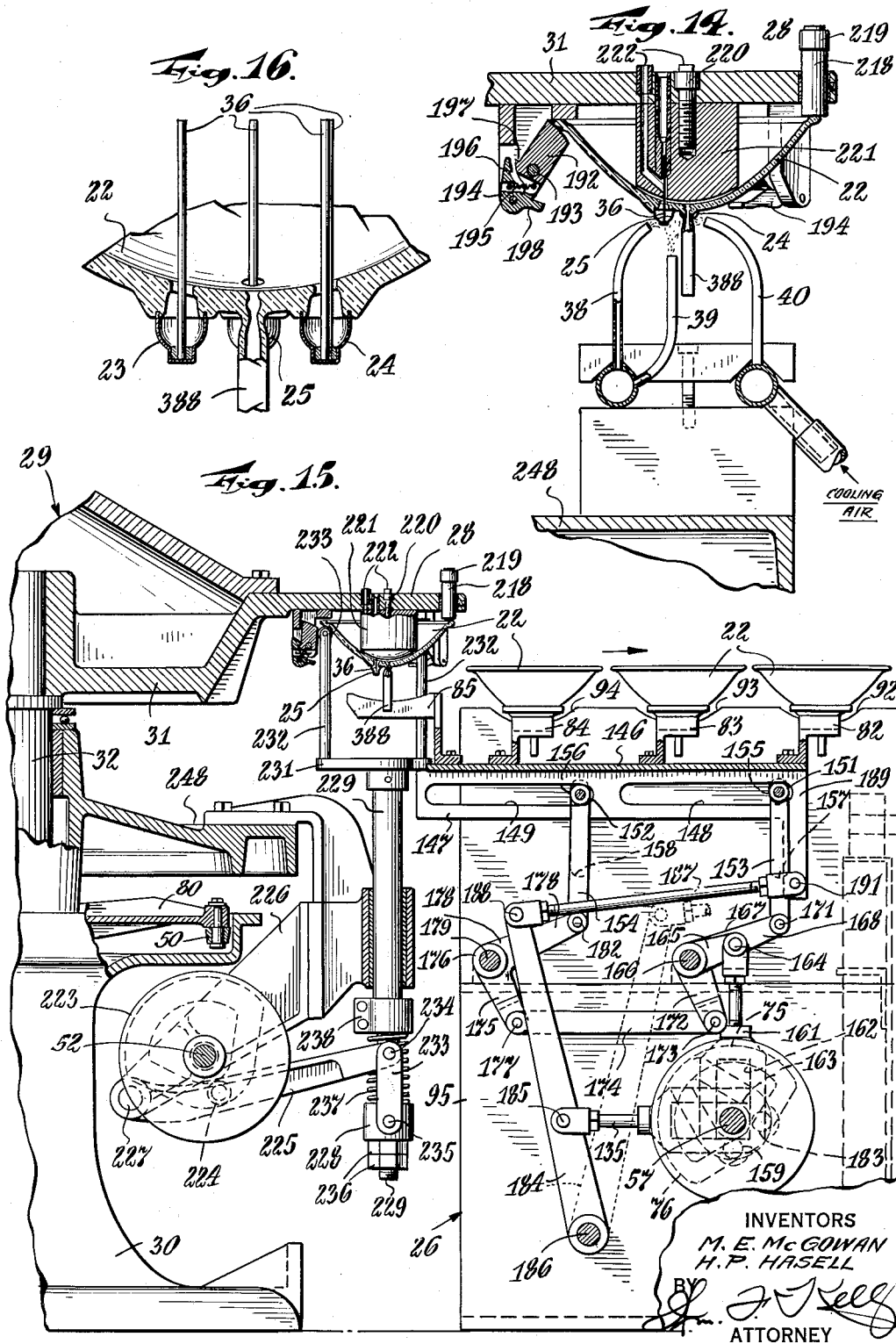
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2,748,738

MACHINE FOR PROCESSING THE REFLECTORS OF SEALED BEAM LAMPS

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Application February 20, 1951, Serial No. 211,956

8 Claims. (Cl. 113—59)

This invention relates to a method and machine for securing leads to "sealed beam" lamps and, more particularly, to a sixteen head lead brazing machine which the reflector portions are automatically fed to and removed from.

The principal object of our invention, generally considered, is to provide for automatic brazing of support leads to the interior of contact ferrules on the reflector portions of sealed beam lamps, and the removal of oxidation from the exterior end portions of said ferrules so that lugs may then be soldered thereto.

Another object of our invention is to provide apparatus for securing leads to sealed beam lamp ferrules, and removing oxidation from the exterior of the latter preparatory to soldering lugs thereto, comprising a conveyor with heads each for holding a sealed beam lamp reflector portion carrying a center and two end contact ferrules, means for causing said conveyor to index said lamps, one by one, from station to station, a brazing machine comprising a spider carrying a plurality of heads arranged in a circle about a vertical axis, each of said heads being adapted to hold one of said reflector portions, means for rotating said spider, step by step, about said axis for indexing the heads thereon through a plurality of positions, transfer apparatus between said conveyor and brazing machine for transporting said reflector portions, one by one, from a selected indexed position on said conveyor to a selected indexed position on said brazing machine, means at one of the indexed positions on the brazing machine for heating the ferrules of an indexed lamp while feeding a pellet of solder or a pellet of flux thereto, means at the next indexed position for heating while feeding pellets of flux or solder are fed to said ferrules, means at a subsequent indexed position for, while still heating, inserting one lead wire in the center and one end ferrule and two lead wires in the other end ferrule, means at a subsequent position for cleaning the oxidation from the exterior of said ferrules in streams of hydrogen ignited to flames by the heat of said ferrules and moving said flames toward said ferrules to snuff them thereover and allow said ferrules to cool in streams of hydrogen, means at subsequent positions for cooling in air, transfer means for moving said reflector portions, one by one, from a selected indexed position on the brazing machine to a selected indexed position on the conveyor, and means adjacent the discharge end of said conveyor for removing said reflector portions, one by one, therefrom for transfer to a mounting machine.

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 our invention.

Figure 2 is a front elevational view of the apparatus shown in Figure 1.

Figure 3 is a vertical sectional view on the line III of Figure 2, in the direction of the arrows.

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Figure 4 is an enlarged plan of a portion of the brazing apparatus shown in Figure 1.

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

Figure 6 is a vertical sectional view of a portion of the pellet-feeding wheel of Figure 5, showing in detail on an enlarged scale, the shape of a pellet-receiving pocket.

Figure 7 is an elevational view, with parts in section, on the line VII—VII of Figure 1, in the direction of the arrows.

Figure 8 is an elevational view of the apparatus illustrated in Figure 7, in the direction of the arrows on the line VIII—VIII thereof.

Figure 9 is a sectional view of an enlarged scale, on the line IX—IX of Figure 7, in the direction of the arrows.

Figure 10 is a diagrammatic elevational view of the cam and connecting mechanism for vertically reciprocating the fires and feeding solder, flux pellets and lead wires to the ferrules of lamp reflector portions, on the line X—X of Fig. 1, in the direction of the arrows.

Figure 11 is an elevational view, with parts in section, showing the cam and associated mechanism, in lowermost position, preparatory to burning the oxidation from the ferrules of such lamp reflector portions.

Figure 12 is a fragmentary sectional view corresponding with a portion of Figure 11, but on an enlarged scale, showing the mechanism in the next higher position where the flow of hydrogen has been ignited by a hot ferrule and is burning oxidation from the surface thereof.

Figure 13 is a fragmentary view corresponding with Figure 12, but showing the highest position of the apparatus, where a hydrogen burner has moved over a ferrule, causing the flame to be snuffed and the enclosed ferrule to be cooled in hydrogen.

Figure 14 is a detailed view on the line XIV—XIV of Fig. 1, showing apparatus for subsequently cooling the ferrules by blasts of air.

Figure 15 is a vertical sectional view on the line XV—XV of Figure 2, in the direction of the arrows.

Figure 16 is an axial sectional view of a reflector portion of a sealed beam lamp adapted to be handled by apparatus embodying our invention.

In the manufacture of sealed beam lamps, contact or terminal ferrules have sharp edges thereof embedded in the exterior of the reflector portion, around apertures through which supporting leads to the filaments extend. These leads are brazed or soldered to the interior surfaces of such ferrules in a lamp having two filaments and three ferrules, one of said ferrules carrying two leads. After the leads have been brazed to the ferrules, it has been the practice to index the latter while red hot over so-called clean-up cups through which hydrogen was flowing, and immediately surround the hot ferrules with the clean-up cups and attempt to cool them in the hydrogen atmosphere. The results were not consistent, and in most cases the ferrules were only partially cleaned of oxidation. It was also necessary to make such clean-up cups conform exactly to the shape of the ferrules.

Our method of removing oxidation from such ferrules is by indexing the latter while red hot over clean-up cups from which hydrogen flows and which are raised toward the ferrules. The cups are stopped in their upward motion approximately $\frac{1}{2}$ " from the ferrules for approximately 2 seconds, during which period the flowing hydrogen ignited by the heat of the ferrules, burns off the oxidation. Further upward movement of the cups, which are made to fit only the large diameter of the ferrules, smothers the hydrogen flames. The cups remain in such position for about two seconds, thereby cooling the ferrules in

a hydrogen atmosphere, whereupon they are removed and the ferrules further cooled in blasts of air.

In addition to this ferrule cleaning, we have provided automatic apparatus including a conveyor for indexing the ferrule-carrying reflector portions of sealed beam lamps, step by step; mechanism at a certain location transferring such reflector portions one by one from said conveyor to a head on an automatic brazing machine, said machine performing automatically the operations of heating while feeding; first, solder (or flux) pellets, then flux (or solder) pellets (collectively called pellets of processing material), and then lead-in support wires to the ferrules, thereby automatically assembling the parts, and subsequently cooling them in hydrogen and then in air for transfer back to the conveyor from whence they are, in turn, moved to a mounting machine.

Referring to the drawings in detail, like parts being designated by like reference character, the apparatus of our invention, one embodiment only of which is illustrated, comprises the following parts which will be described in order. In Figures 1 and 2, there is shown a conveyor 21 for transporting the aluminized or reflecting portions 22, of sealed beam lamps, termed "reflectors" for short, and each carrying as shown in Figure 16, three contact ferrules, that is end ferrules 23 and 24 and a "center" ferrule 25, from a position, at which the reflectors are loaded by hand, from the machine (not shown) which applies the aluminizing or aluminum reflecting coating thereto, to transfer or loading apparatus 26, which moves each reflector from the station 27, when indexed thereat, to a head 28 on the brazing machine 29, when said head is indexed at a position adjacent said conveyor. The operator places each reflector in a head of the conveyor in such position that the plane of the end ferrules 23, 24, and exhaust tube 388, coincides, at least approximately, with the mid-vertical longitudinal plane of the conveyor 21.

The brazing machine 29 comprises a spider 31, which is supported on a pedestal 30 and vertical shaft 32 carried thereby and to which it is keyed (Figure 3) and driven by motor 33 through means, to be subsequently described, so that it rotates intermittently and indexes the heads, or blocks secured to a peripheral plate portion 28, and forming heads therewith, step by step, at each of sixteen stations about the periphery thereof.

Calling the Station "1" at which the head 28 is indexed when it first receives a reflector 22 from the transfer apparatus 26, said reflector is moved through Station "2" and indexed at Station "3," where it is heated and a pellet 34 of solder (or flux) is fed to each of its ferrules 23, 24, and 25. At Station "4," while still being heated, a pellet 35 of flux (or solder, if the first set of pellets fed thereto was flux) is fed to each of its ferrules, 23, 24 and 25. The reflector then passes through heating Stations "5," "6," and on to Station "7" where one lead wire 36 is fed to each of ferrules 23 and 25 and two lead wires 36 are fed to other end ferrule 24.

At Stations "8" and "9" ferrule heating is continued insuring that the lead wires become well embedded in the fluxed solder for securing said leads to said ferrules. At Station "10," as shown in Figure 12, cups 37 from which hydrogen flows pass into the vicinity of said ferrules, the stream of hydrogen from the cups being ignited by the heat from the ferrules and burning off the oxidation thereof. As viewed in Figure 13, the cups 37 then move further upward, enveloping the lower portions of the ferrules, snuffing the hydrogen flames, and insuring that said ferrules are cooled in hydrogen, thereby preventing re-oxidation.

After withdrawal of the cups 37, said ferrules are cooled at Stations "11," "12," "13," "14" and "15," by jets of air from tubes 38, 39 and 40, as viewed in Figure 14.

At Station "16," as shown in Figure 15, the reflectors with leads embedded in and secured to the de-oxidized

ferrules, are unloaded from the brazing machine and transferred back to the conveyor 21, see Figures 1 and 2. The conveyor, on moving two stations further reaches a transfer or unloading device 41 which removes therefrom the reflectors, one by one, for transfer to a mounting machine (not shown).

Driving and conveyor mechanism

All of the apparatus, heretofore generally described, is in the embodiment illustrated driven from a single source of power such as the motor 33, so that the parts operate in the desired synchronism. The motor 33 has a pulley or sprocket wheel 42 which drives the pulley or sprocket wheel 43 on a shaft 44 from reduction gear box 45, by means of a belt or chain 46. Turning the shaft 44 causes turning of the shaft 47 to which it is geared. This in turn causes the step by step, or indexing, rotation of the spider 31, carrying the heads 28, through mechanism in gear box 48, including a cam wheel (not shown) with axially offset portions sequentially engaging rollers 50 on arms 80 outstanding from the shaft 32 to which they are secured. Such mechanism being standard in such equipment (see, for example, the drive for the spider 106 through its vertical shaft 108 by gear 112 carried thereon and formed by a series of rollers 113; with which the present arms 80 and rollers 50 correspond; driven by wheel 114 formed with a trough portion which joins axially offset trough portions 120 and 130; with which the unillustrated present cam wheel may correspond; forming a cam device for driving the spider step-by-step, as disclosed in the Green application, Serial No. 62,343, filed November 27, 1948, now Patent No. 2,569,852, dated October 2, 1951) is not illustrated in detail.

Motion is transmitted from shaft 47 to shaft 49 through gears in box 51, and from shaft 49 to shaft 52 through gears in box 53. The shaft 52 carries sprocket wheel 54 over which travels a chain 55 driving a sprocket wheel 56 on shaft 57. The shaft 57 drives a shaft 58, through a conventional Geneva movement 59. The shaft 58 carries a bevel gear 61 meshing with a bevel gear 61 meshing with a bevel gear 62 on shaft 63, carrying a sprocket wheel 64 over which a chain 65 travels, transmitting motion to sprocket wheel 66 on shaft 67, carrying drive sprocket wheel 68 over which the conveyor chain 69 passes. A driven sprocket wheel 70, carries the conveyor chain 69 at the other end of the conveyor 21.

The conveyor chain 69 comprises a series of heads 71 and links 72 of equal dimension longitudinally of the chain, connected together by horizontal pivot pins 60 (Figure 3) so that they are articulated with respect to one another and adapted to pass around the sprocket wheels 68 and 70 at their respective ends. Each head is in the form of curved prongs forming a partially annular support, as shown most clearly in Figures 1 and 3, of a size such that reflector portions of sealed beam lamps, such as those of the commercial 7" type, each carrying an exhaust tube and three contact ferrules, may seat thereon and be carried from right to left, as viewed in Figure 1. On account of the Geneva movement between the shafts 57 and 58, these heads move from one station to the next with each complete 360° rotation of the shaft 57, so that as a reflector is moved from station 27 on the conveyor to the first station on the transfer apparatus 26, the next reflector portion is moved to said station 27 to take its place, preparatory to being picked up by said transfer mechanism.

Mechanism for transferring reflectors to and from brazing machine

The transfer mechanism 26 is operated by four grooved cams, 73, 74, 75 and 76, fixed on frame-carried shaft 57. The cam 73 is for raising and lowering the cups or holders 77, 78, 79 and 81 (Fig. 3) of the mechanism for transferring reflectors from the conveyor 21 to the brazing machine 29, while the cam 75 is for simultaneously lower-

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ing and raising the cups or holders 82, 83, 84 and 85 (Fig. 15) for transferring reflectors from the brazing machine, after the desired work has been performed thereon, back to said conveyor.

Each of the transfer cups is apertured, as indicated at 90, to receive the exhaust tube 388 of the reflector being carried thereon. The upper face of the concave supporting portion of each cup is provided with depressions or pockets 100, to guidingly receive the ferrules 23, 24 and 25 of the supported reflector and either hold it in the desired oriented relationship or, if not initially exactly properly oriented, to twist it the necessary amount so as to orient said reflector to the position necessary for properly processing it on the brazing machine.

The cam 74 is for moving said cups 77 to 81, inclusive, out toward the conveyor and back at the time they are being raised and lowered, so that the reflectors 22 travel, step by step, from the conveyor to the brazing machine. At the same time, the cam 76 moves the cups 82 to 85, inclusive, out from the brazing machine toward the conveyor and back, while said cups are being simultaneously raised and lowered by the cam 75, so as to be at the same time transferring reflectors carried by said cups from said brazing machine back to said conveyor.

Inasmuch as the transfer of said reflectors to and from the brazing machine is not in one step, it is necessary to have nesting sockets between said conveyor and brazing machine, said sockets being provided by segmental depressions 86, 87 and 88 in vertical frame plates 89, and 91, for the incoming line of reflectors, and corresponding depressions 92, 93 and 94 in the vertical frame plates 95 and 96 for the outgoing line of reflectors.

The cups 77, 78 and 79, as well as the specially shaped cup 81 formed as fingers 97 projecting toward the brazing machine, are all mounted on an inverted channel member 98, the flanges 99 of which have slots 101 and 102 in which move rollers 103 and 104 pivotally mounted on links 105 and 106. These links 105 and 106 also respectively carry rollers 107 and 108, moving in vertical slots 109 and 111, in the plate 89.

Vertical reciprocatory movement of channel member 98 and its cups is thus effected, by the cam 73, on rotating, acting on the roller 112 on link 113, slotted as indicated at 114, so as to reciprocate over block 115. This reciprocatory motion is transmitted through pivot pin 116 to crank 117 fixed on frame-carried shaft 118, and through said shaft to bell crank lever 119, also fixed thereon. The arm 121 of lever 119 is connected to the lower end of link 105 by pin 122, while arm 123 of lever 119 is connected by pin 124 to link 125. Link 125 is connected to arm 126 of bell crank lever 127 by pin 128. Arm 129 of said lever 127 on frame-carried shaft 131, is connected to the lower end of link 106 by pin 132.

The horizontal or in-and-out movement of the cups 77 to 81 inclusive, is simultaneously effected by cam 74, not shown in detail in Figure 3, but identical with the cam 76 as shown in Figure 15, insofar as its shape and position is concerned. However, this cam is 90° out of phase, with respect to the cam 73, in the opposite direction as compared with the out of phase relationship between the cams 75 and 76 of Figure 15. In other words, the cam 74 causes the link 133 and carried engaging roller not shown but like the roller 183 in Figure 15, to be in its position nearest the brazing machine 29 when the cups 77 to 81, inclusive, are in lowered position; as contrasting with that position of the link 135 when the cups 82 to 85, inclusive, are in raised position. This difference is, of course, necessary so that the carried reflectors are moved in one direction by one mechanism and in the opposite direction by the other.

The link 133 is connected to lever 136, pivoted to the plate 89 by shaft 137, by pin 138. The free end of the lever 136 is pivoted to the link 139 by pin 141 and the other end of said link is, in turn, pivotally connected to a lug 142, projecting from the channel 98, by pin 143.

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From the foregoing, it will be seen that as the shaft 57 rotates counter-clockwise, as viewed in Figure 3, the cam 73 alternatively raises and lowers channel 98, and the reflectors carried on the cups thereof, the rollers 107 and 108 respectively traveling in the slots 109 and 111, while at the same time the cam 74 causes outward movement of said cups, the slots 101 and 102 permitting such travel on the rollers 103 and 104, to the position indicated at 78' for the cup 78. Thus, not only is the reflector at station 27 lifted from the conveyor, but also each of the reflectors is lifted from the segmental depressions 86, 87 and 88 and transported one station inward or toward the brazing machine. This means that the reflector on the conveyor at station 27 is moved toward the brazing machine and placed in segmental depressions 86, reflector in segmental depressions 86 is simultaneously transported to segmental depressions 87, that in segmental depressions 87 is transported and left in segmental depressions 88, while that in segmental depressions 88 is transported and left underneath a head of brazing machine at Station "1" thereof, in position to be engaged by loading cup 144 and lifted from the fingers 97 into locking engagement with the overlying head 28, in a manner which will be subsequently explained.

The cups 82, 83 and 84, as well as the specially shaped cup 85 formed as fingers 145 projecting toward the brazing machine, are all mounted on an inverted channel member 146, the flanges 147 of which have slots 148 and 149 in which move rollers 151 and 152 pivotally mounted on links 153 and 154. These links also respectively carry rollers 155 and 156 moving in vertical slots 157 and 158 in the plate 95.

Vertical reciprocatory movement of channel member 146 and its cups is thus effected by the cam 75 on rotation acting on roller 159 on link 161, slotted as indicated at 162 so as to reciprocate on block 163. This reciprocatory motion is transmitted through pivot pin 164 to crank 165, fixed on frame-carried shaft 166, and through said shaft to bell crank lever 167, also fixed thereon. The arm 168 of said lever is connected to the lower end of link 153 by pin 117, while arm 172 of said lever is connected by pin 173 to link 174. Link 174 is connected to arm 175 of bell crank lever 176 by pin 177. Arm 178 of said lever 176, on frame carried shaft 179, is connected to the lower end of link 154 by pin 182.

The horizontal, or in-and-out, movement of the cups 82 to 85, inclusive, is simultaneously effected by cam 76 acting on link 135 through roller 183. The link 135 is similar to the link 161, insofar as its movement with respect to the shaft 57 is concerned, except that said movement is generally horizontal rather than vertical. The free end of the link 135 is connected to a lever 184 by pin 185. The lever 184 is pivoted to the plate 95 by shaft 186, and its free end is pivoted to the link 187 by pin 188. The other end of the link 187 is, in turn, pivotally connected to a lug 189, projecting from the channel 146, by pin 191.

From the foregoing, it will be seen that as the shaft 57 rotates counter-clockwise, as viewed in Figure 15, the cam 75 alternately lowers from the position there illustrated, and raises channel 146 and the reflectors carried by the cups thereof; the rollers 155 and 156, respectively, traveling in the slots 157 and 158. At the same time, the cam 76 causes alternate outward and inward movement of said cups, the slots 148 and 149 permitting such travel on the rollers 151 and 152 to a position comparable with that indicated at 78' in Figure 3 for the cup 78.

Thus, not only is a reflector removed from a head at position "16" of the brazing machine, by fingers 145, but also reflectors are lifted from the segmental depressions 94, 93 and 92, and transported one station outward or toward the conveyor 21. This means that the reflector in the head at Station "16" of the brazing machine is moved toward the conveyor and placed in segmental depressions 94, the reflector in segmental depressions 94 is

simultaneously transported to segmental depressions 93, that in segmental depressions 93 is transported and left in segmental depressions 92, while that in segmental depressions 92 is transported and left on the conveyor 21 at the nearest station thereof.

Removing reflector from transferring apparatus to head at Station "1" and unloading reflectors at Station "16" of brazing machine

Each head 28 on the brazing machine 29 is formed with a plurality, preferably three latches 192 which swing from release position, illustrated in Figure 15, to locking position illustrated in Figure 3, where they underlie the rim of a reflector and hold said reflector in place on a head of the brazing machine when indexed at Station "1." Each latch or reflector clamping cam 192 pivots about a pin 193 and has a keeper 194 which, when in the position of Figures 3 and 14, tends to pull the latch to reflector-supporting position by means of spring 195, as there shown, while when the position of Figure 15, a keeper hook portion 196 overlies a latch lug 197 and holds the latch 192 in unlocking position. It tends to stay in such position due to action of the spring 195, until released by moving the tail 198 of the keeper upwardly until the hook portion 196 moves away from the lug 197. This locking and unlocking action is made use of in the loading of reflector on, and unloading of the reflector from, the brazing machine, as will now be explained.

The shaft 52 carries a cam 199 in which rides a roller 201 on a lever 202, carried on the frame portion 203 of the brazing machine by pivot pin 204, as shown in Figure 3. The free end of the lever 202 is connected to a cupped sleeve 205 sliding on a rod 206. The upper end of said rod supports a loading cup 144 connected thereto by a set screw 209, and shaped to nestingly receive the ferrule portions of reflectors 22, like the transfer cups 77, 78, 79, 82, 83 and 84, and a platform 190 carrying upstanding rods 200, each of which carries a roller 208 engageable with a tail 198 of a keeper 194, in order to release the latches 192 for holding a reflector 22. The connection between the lever 202, the free end of which is desirably bifurcated to fit around the rod 206, and the sleeve 205, is by a pair of links 212, the upper ends of which are connected to the lever by pins 213, and the lower ends of which are pivoted to studs 214, outstanding from the sleeve. The sleeve 205 is adjustable on the rod 206 by nuts 215. Motion is resiliently transmitted from the sleeve 205 to the rod 206 through coil spring 216 on said rod, the lower end of which seats in a pocket opening upwardly on sleeve 205, and the upper end of which engages a collar 217 fixed on the rod 206 which is slidably guided in the frame portion 203.

The loading cup 144, as viewed in Figure 3, operates in the following manner to fasten a reflector in a head of the brazing machine when said head is at position "1." When the shaft 57 is positioned 180° from that shown in Figure 3, the reflector held by the fingers 97 is in raised position, corresponding with the dotted line positions of the reflectors shown above the transfer cups 77, 78 and 79. At the same time, the loading cup 144 is in lower most position, so that it underlies a reflector supported by the fingers 97.

As movement of the mechanism continues, the fingers 97 are lowered, while the loading cup 144 is raised, lifting the reflector from the fingers 97 to the position shown in Figure 3. The rollers 208 on rising, trip the keepers 194 by pushing upwardly on the tails 198 thereof, releasing the latches 192. Upon further upward movement the reflector 22 passes beyond the upper ends of said latches, which then drop underneath its edge to the position shown in Figure 3, locking the reflector in place. The loading cup 144 is then withdrawn to allow another reflector to be moved into position thereabove, for placing it in the succeeding head upon indexing of the head shown in Figure 3, from Station "1" to Station "2."

In moving to latched or clamped position, the reflector 22 also pushes upwardly on a rod 218 carrying a roller 219 at its upper end, which is to perform a function later described. The rod 218 slides in a bushing 210 through which a set screw 211 passes. The inner end portion of the set screw 210 is received in a keyway 207 in the rod 218, (Fig. 7) to limit its travel. The lower surface of the plate portion 28, to which the reflector is clamped, carries a series of blocks forming, with the plate portion 28, heads 221 in which are passages 222 for feeding reflector-processing materials to the ferrules 23, 24 and 25, in a manner which will be later explained. Each block is held in place beneath the plate 28 by means of a bolt 220.

After the reflectors have been processed on the brazing machine, they are removed from Station "16" thereof by similar mechanism shown in Figure 15. In this figure, the shaft 52, as shown, carries a cam 223 in which rides a roller 224 pivoted on a lever 225 carried on the frame portion 226 of the brazing machine by pivot pin 227. The free end of the lever 225 is connected to a cupped sleeve 228 sliding on a rod 229. The upper end of said rod supports a platform 231 carrying upstanding rods 232, each of which carries a roller 233 engageable with a latch or clamping cam 192 and properly positioned for supporting the peripheral portion of a reflector. The lever 225 has its free end bifurcated to fit around the rod 229, and is connected to the sleeve 228 by a pair of links 233, the upper ends of which are connected to the lever by pins 234, and the lower ends of which are pivoted to studs 235 outstanding from the sleeve 228. The sleeve is adjustable on the rod 229 by nuts 236. Motion is resiliently transmitted from the sleeve 228 to the rod 229 through coil spring 237 on said rod, the lower end of which seats in a pocket opening upwardly on the sleeve 228, and the upper end of which engages a collar 238 fixed on the rod 229 which is slidably guided in the frame portion 226.

The unloading platform 231 and its roller-carrying rods 232 operate in the following manner to remove a reflector from a head at Station "16" of the brazing machine, after processing by said machine. As the shaft 52 turns, prior to reaching the position shown in Figure 15, the rollers 233 on upward movement of the platform 231 resiliently first engage the latches 192, and release them from the rim of the reflector carried on the head as there shown. Upon further movement, the reflector is engaged and carried down, while resting on the rollers 233, until it is supported by the fingers 85 therebeneath. Further movement causes the fingers to rise above the rollers 233, carry the reflector outwardly, and leave it in the supporting depressions 94, while at the same time the reflectors in said depressions and those outwardly thereof are carried one station further outwardly toward the conveyor 21.

Mechanism for vertically reciprocating the fires and operating the feed mechanism for the solder, flux and leads

At Stations "3" to "9," inclusive, through which the reflectors are sequentially moved, the ferrules of said reflectors are heated by fires from gas fixtures 239. These fixtures are mounted on a pair of manifold plates 241 and 242 (Figs. 5, 7 and 10) preferably three on one plate and four on the other, and a simultaneously raised as each reflector is indexed at a given station by mechanism operated from a manifold-operating or fire-lifting cam 243 fixed on the shaft 47 (Figs. 1 and 10). Rotation of the cam 243 oscillates the lever 244, carrying roller 245 riding therein, and fixed on a shaft 246 carried by bracket 247 from a frame portion 248 of the brazing machine. The other end of the lever 244 is connected to a link 249 by pivot pin 251. The other end of said link is pivotally connected by pin 252 to a manifold-supporting

member 253, slidably mounted in guide 254 carried by frame portion 248.

The shaft 246 is extended inwardly and has fixed thereto a crank 255, the free end of which is connected to a link 256 by pin 257. The other end of said link 256 is pivotally connected to the arm 258 of bell crank lever 259 by pin 261. The lever 259 is pivotally connected to bracket 262, carried by the frame portion 248, by pin 263. The other arm 264 of the lever 259 is pivotally connected to a link 265 by pin 266. The other end of the link 265 is pivotally connected to manifold-supporting member 267 by pin 268. The supporting member 267 is slidably mounted in guide 269 and carries the manifold plate 242.

Solder and flux feeding mechanism

The manifold plate 241 not only raises and lowers the fires as needed, upon indexing of the reflectors, but also operates the feed drums of mechanism 271 for feeding pellets of solder (or flux) to the reflector ferrules and the mechanism 272 for feeding pellets of flux (or solder, as the order of feeding the solder and flux is not essential), to said ferrules. However, in the present embodiment we employ a motor 273, carried by the frame of the brazing machine, for initially removing such pellets from the respective hoppers 274 and 275, and placing them in position to be fed to the reflector ferrules at Stations "3" and "4," respectively. The motor 273 carries a worm 276 on its armature shaft driving a gear wheel 277, fixed on shaft 278. The shaft 278 also carries a gear 279, or wheel the periphery of which is toothed, engaging a spring member 281 projecting from the guides 282 down which the solder pellets 34 travel on their way to the feed drums 283, for vibrating said guides to prevent clogging of said pellets.

The shaft 278 also carries a pulley 284 transmitting motion to pulley 285 on shaft 286 by means of a belt 287. The shaft 286 is mounted in the framing 288 which supports the solder (or flux) pellet hopper 274 and carries three notched wheels 289, for withdrawing pellets one by one from the hopper and allowing them to slide down to the guides 282, at a rate fast enough to supply the reflectors being processed. The notches 291 in the wheels 289 are desirably of the special shape and size illustrated in Figure 6, so as to hold pellets 34 of generally cylindrical shape in the position there illustrated. In order to prevent such pellets from falling out of the wheels 289 when not near the screen 292 on which they are to be first dropped, we provide shields 293 carried by arms 294 pivoted to the frame 288 by pins 295 and urged into the engagement with the respective wheels by springs 296.

In order to prevent undue accumulation in the pellets on the guides 282, each guide is provided with a relief aperture 297 through which pellets, tending to accumulate thereabove, drop into a receptacle 298. A receptacle 299, is also provided beneath the hopper 274 for catching pellets which escape to the sides of the wheels 289, and drop from the hopper 274 down along passages 301.

The feed drums or discs 283 are three in number, one for each reflector ferrule, and mounted on a shaft 302 carrying a ratchet 303. Each disc 283 has a series of pellet-receiving notches or depressions, spaced circumferentially to correspond with the spacing of the teeth of ratchet 303. The shaft is operated to feed one pellet to each of three tubes 304, only each time a reflector is indexed therebeneath. Each tube 304 at indexing is disposed over the top of a corresponding tube 222 (Fig. 4) in a block 221 which, because of the previous proper orientation of the reflector, directs the pellet to a ferrule, so that one and only one pellet 34 is fed to each ferrule at Station "3." The feed drums 283 are also provided with shields 306 for preventing pellets carried thereby from going any place other than into the tubes 304.

The shaft 302 is operated by a lever 307 (Figs. 4

and 5) pivoted thereon and carrying a spring-actuated pawl 308 engaging the ratchet 303. There is also provided a holding pawl 310 pivoted to the frame, to prevent reverse movement of the ratchet. The lever is normally operated by rod 309, the lower end of which is pivoted to the manifold plate 241 by pin 311. A spring 312 between said rod 309 and a diagonally extending bracket or strut member 313, urges the rod 309 outwardly, so that unless there is a reflector 22 in place in the head causing the pin 218 and its carried roller 219 to project upwardly the distance indicated in Figure 5, there will be no motion transmitted to the lever 307 by the rod 309.

This is because the roller 314 on the free end of said lever then merely rides up and down in the vertical portion of the slot 315 in the head 316 carried by said lever. However, when the pin 218 is in the position illustrated, its roller 219 engages the cam member 317 mounted on vertical pivot pin 318, moving the other end of said member toward the center of the brazing machine and thereby positioning the head 316 inwardly so that the horizontal portion of the slot therein receives the roller 314, and the reciprocating rod thus causes oscillation of the lever, thereby effecting feed of the pellets one by one to the underlying tubes 304. From the foregoing, it will be seen that at the Station "3" each reflector receives a pellet of solder (or flux) from the hopper 274.

The mechanism for feeding pellets of flux (or solder) 35 from the hopper 275 to the tubes 222, and from there to the underlying ferrules of a reflector, is like the mechanism 271, so corresponding reference characters have been applied. Its drive shaft 319 is operated from the shaft 278 through universal joint 321. Inasmuch as it is otherwise identical, a detailed description thereof will not be undertaken. It will, therefore, be seen that at Station "4," a pellet of flux (or solder) is fed to each of the tubes 222 and from there to the corresponding ferrules therebeneath, so that each ferrule then contains fluxed solder.

Lead wire feeding mechanism

After being indexed at Stations "5" and "6," where further heating of the ferrules is effected, each head is indexed at Station "7" where lead wires are fed thereto while the ferrule heating is continued. The lead wire feeding mechanism is illustrated in Figures 7 to 10, inclusive. A frame-supported hopper 322 holds a supply of lead wires 36 which gravitate over and pass through the apertures between three wedging partitions 220 and the hopper side walls, which aline and guide them to (in this embodiment four) generally parallel lead-feeding slots or exits therefrom, one of which lies under the upstanding right (as viewed in Fig. 9) wall of the hopper, and the others of which respectively underlie said partitions, as shown in Figure 9. Underlying the partitions is a slidable feeder plate 323 which is moved each time a reflector is indexed therebeneath to select and feed four leads, one in each of the slots 324, 325, 326 and 327, each of the proper size for taking only one lead, and transport to the right, as viewed in Figure 9, dropping said leads, through the lead-feeding slots in the generally horizontal bottom wall 389 of the hopper, into chutes 328, 329, 330 and 331, where they are turned to vertical position, after sliding down the diagonal walls 332 thereof as viewed in Figure 7, and finally placed vertically in the ferrules of the reflector therebeneath being guided by means of tubes 333 (Figs. 4 and 7).

On account of the construction of the reflectors for supporting two filaments, it is necessary to have two lead wires fed to one ferrule, said ferrule being that designated 24 as viewed in Figure 16. Therefore, two of the chutes merge to one before feeding to the tube 333 which is directly above the ferrule 24, which happens to be the leading end ferrule, so that the merging chutes are those

numbered 330 and 331. The four chutes thus deliver the leads to three tubes 300, the lower ends of which are held in block 305 secured to arm 310 on tube 360 mounted in hopper support coating 340.

The feeder plate 323 is operated from the manifold plate 242, through rod 334 upstanding therefrom, passing through bracket 337, secured thereto, and adjusted in position by nuts 335 and 336 threaded thereon. The upper end of the rod 334 is pivoted to the arm 338 of bell crank lever 339, mounted on pivot pin 341, passing through bracket 342, extending from the hopper support casting 340 carried by standard 350 from the frame of the machine. The other arm 343 of the lever is pivotally connected to link 344, the free end portion of which is slotted as indicated 345, and guidingly receives a pin 346, extending through projections 347 on the end of the feeder plate 323. The feeder plate is urged to the right by means of a spring 348, one end of which is secured to the bracket 342, as indicated at 349, and the other end of which is secured to the pin 346 of the projections 347. This means that every reciprocation of the rod 334 tends to push the plate 323 to the left, as viewed in Fig. 8, and on release it is thereafter resiliently drawn to the right to feed four leads to the ferrules of an underlying reflector.

In order to avoid feeding such leads if there is no reflector in place, we provide a "skip detector" comprising a rod 349, pivotally mounted in the tube 360 and carrying on its upper end a crank 352, biased by spring 351 to a position blocking feeding movement of the plate 323 by holding the projections 347 in their left end position. It carries on its lower end an arm 353 which is engaged by the roller 219 when a reflector 22 is in position and turned clockwise, so as to remove the crank 352 from blocking engagement with the projections 347, and allow the leads to be fed to the ferrules. The reflector with the lead wires in place is then sequentially indexed through Stations "8" and "9" where further heating insures that the leads are embedded in completely molten solder.

Cleaning end portions of ferrules and cooling in hydrogen

At Station "10," as viewed in Figures 1, 11, 12 and 13, the operation takes place of deoxidizing the outer portions of the ferrules 23, 24 and 25, adjacent their lower ends. The movement of the cups 37 from which the deoxidizing hydrogen flows from flexible supply pipe 354, is effected by cam 355 on shaft 49, acting on roller 356 carried by crank 357 on shaft 358 pivoted in bracket 359 secured to the frame of the machine. The shaft 358 also carries crank 361 to the free end of which is secured a cable or chain 362 passing over pulley 363, pivoted to the frame of the machine, and with its other end connected to arm 364 of bell crank lever 365 pivoted to the frame of the machine, and with its other arm 366 connected to link 367 by pivot pin 368.

The lower end of link 367 is connected to vertical extension 369 from plate 371 by pin 370. The plate 371 carries sockets 372 secured thereto by screw means or the like 380. The sockets 372 receive rods 373, held therein by set screws 376. The upper ends of the rods 373 carry heads 374 nesting in the lower ends of coil springs 375, in the upper ends of which nest the lower portions of the hydrogen-burning cups 37. These cups include hollow casing portions 377 providing chambers 378 to which a cooling medium such as water is supplied by flexible pipes 379 and withdrawn therefrom by flexible pipes 381.

A consideration of the cam 355 illustrated in Figure 11, will show how the mechanism described causes the following operations to take place at Station "10." Upon initial indexing of a reflector 22 at said station, its ferrules are hot from treatment at preceding stations, and the cups 37 are initially in lower position, because the roller rests on portion 382 of cam 355 of smallest radius. Shortly thereafter the cam, on turning counterclockwise, moves the crank 357 from full to dotted position shown in Figure 11,

as said roller rides up on the portion 383 of the cam of larger but intermediate radius. This moves the cups 37 from which hydrogen flows, from lowered position to the position illustrated in Figure 12, where said cups are close enough to the ferrules 23, 24 and 25 to cause the hydrogen flowing therefrom to ignite, indicated as the flames 384, burning the oxidation from the exterior of the lower end portions of said ferrules, until the roller 356 reaches the end of the portion 383, whereupon the cups are further raised by the portion 385 to snuff out the hydrogen flames 384, as illustrated in Figure 13. The cam then moves further and during the engagement of the portion designated 386, with the roller 356, hydrogen is flowing and leaking between the cup perimeters and the ferrules, effecting the desired cooling. Near the end of the stay at Station "10," the roller 356 descends along cam portion 387, and the hydrogen cups are thereby withdrawn, allowing the reflector to be moved to and indexed at Station "11."

Air cooling of the ferrules

At Stations "11" through "15," the reflectors during indexing are cooled by streams of air blown thereon from tubes 38, 39 and 40, as viewed in Figure 14. This treatment insures rapid cooling and avoidance of appreciable ferrule re-oxidation. At Station "16" the reflectors are transferred by means, already described, back to the conveyor 21. They are withdrawn from the conveyor by any desired means, such as an unloading device 41, for transfer to a mounting machine (not shown).

From the foregoing disclosure, it will be seen that we have provided apparatus to which sealed beam lamp reflectors, carrying ferrules and an exhaust tube 388, after manual delivery to a conveyor 21 at the right end portion, as viewed in Figure 1, are automatically processed. In other words, such reflectors are, without further manual operations, transferred to a brazing machine where each ferrule thereof has solder, flux, and lead wires placed therein, while being heated so that said lead wires are securely brazed thereto. The exterior end portions of the ferrules are then deoxidized in hydrogen flames and subsequently cooled in flowing hydrogen after snuffing of said flames. Quick further cooling of the ferrules in air is then effected to avoid undesired reoxidation. Said ferrules are then transferred back to the conveyor, from which they are automatically removed adjacent the left-hand end, for processing in a mounting machine.

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

We claim:

1. In a brazing machine, a plurality of heads for holding reflectors of sealed beam lamps, each head carrying a plurality of reflector-clamping cams pivoted about horizontal axes, and keepers associated with each cam for either holding it in unlocked position or releasing it to hold a reflector in place, means for lifting a reflector to locking position while simultaneously releasing said keepers to allow the cams to drop to locking position with respect to said reflector, and means at another station for unlocking said clamping cams and withdrawing the reflector held thereby.

2. In a brazing machine for sealed beam lamp reflectors, a spider, a plurality of heads disposed circumferentially thereabout, each head comprising a block secured to the lower face of said spider and including passages registering with the ferrules of sealed beam lamps when secured thereto, so that pellets of solder and flux may be fed through said head to said ferrules.

3. In a brazing machine for securing leads to the ferrules of reflectors for sealed beam lamps, means for feeding pellets of processing material to said ferrules comprising a hopper holding said pellets, a notched wheel for transferring pellets, one by one, from said hopper to each ferrule, a chute for each wheel and along which

said pellets slide, a feed drum receiving pellets one by one from each chute, and pawl and ratchet mechanism for operating said drums for feeding pellets, one each to each ferrule, said mechanism being operated by said brazing machine in synchronism with the indexing of heads thereof, so that only one pellet is fed to each ferrule at the pellet-receiving station thereof.

4. In a brazing machine for securing leads to ferrules of reflectors for sealed beam lamps, means for feeding leads to said ferrules comprising a hopper holding said leads, the lower portion of said hopper having wedging partitions for the purpose of insuring that said leads lie parallel, the bottom plate of said hopper having a series of generally-parallel lead-feeding slots corresponding in number with the leads per reflector, one of which slots underlies an upstanding wall of said hopper and the others of which respectively underlie said wedging partitions, a plate slotted to receive only one lead per slot and slidable over said bottom plate, but under said wedging partitions, chutes, one disposed beneath each bottom wall slot and each having one inclined guiding wall engageable by a lead end, so that when leads are dropped thereinto, they are upended to slide vertically into the ferrules of a reflector indexed therebeneath, and mechanism for reciprocating said slidable plate so that one lead is fed to each chute while a reflector is indexed therebeneath.

5. In a brazing machine for securing leads to ferrules of reflectors for sealed beam lamps, means for feeding leads to said ferrules comprising a hopper holding said leads, wedging portions in the lower portion of said hopper for insuring that said leads lie parallel, said hopper having a bottom plate with a plurality of generally parallel lead-feeding slots therein, one of which slots underlies an upstanding wall of said hopper and the others of which respectively underlie said wedging portions, a plate slotted to receive only one lead per slot and slidable over said bottom plate, but under said wedging portions, and a plurality of chutes, corresponding in number with said slots, one disposed beneath each bottom plate slot, said chutes having one inclined guiding wall engageable by said lead ends, so that when leads are dropped thereinto, they are upended to slide vertically into the ferrules of a reflector indexed therebeneath, and mechanism for reciprocating said plate so that one lead is fed to each chute while a reflector is indexed therebeneath.

6. In a brazing machine, a plurality of heads for holding reflectors of sealed beam lamps, each head carrying a plurality of reflector-clamping cams pivoted about horizontal axes, and keepers associated with each cam for either holding it in unlocked position or releasing it to hold a reflector in place, and means for lifting a reflector to locking position while simultaneously releasing said keepers to allow the cams to drop to locking position with respect to said reflector.

7. In a brazing machine for sealed beam lamp reflectors, a spider, a plurality of heads disposed circumferentially thereabout, means for indexing said heads through one station after another around the periphery of said spider, each head comprising a block secured to the lower face of said spider and including passages registering with the ferrules of sealed beam lamps when secured thereto,

and means for feeding pellets of processing material to said passages comprising a hopper holding said pellets, a notched wheel for each passage for transferring pellets, one by one, from said hopper, a chute for each wheel and along which said pellets slide, a feed drum receiving pellets one by one from each chute, a shaft on which said drums are mounted, a ratchet carried by said shaft, a pawl to operate said ratchet for feeding pellets, one each to each ferrule, and means operated by said brazing machine to move the pawl each time said heads are indexed, so that such pellets may be fed through an indexed head to said ferrules.

8. In a brazing machine for sealed beam lamp reflectors, a spider, a plurality of heads disposed circumferentially thereabout, means for indexing said heads through one station after another around the periphery of said spider, each head comprising a block secured to the lower face of said spider and having passages registering with the ferrules of sealed beam lamps when secured thereto, means for feeding leads to said ferrules comprising a hopper holding said leads, the lower portion of said hopper having wedging partitions for the purpose of insuring that said leads lie parallel, the generally-horizontal bottom wall of said hopper having a series of generally-parallel lead-feeding slots, corresponding in number with the number of leads per reflector, one of which slots underlies an upstanding wall of said hopper and the others of which respectively underlie said wedging partitions, a plate slotted to receive only one lead per slot and slidable over said bottom wall, but under said wedging partitions, a chute disposed beneath each bottom wall slot and having one inclined guiding wall engageable by a lead end, so that when leads are dropped thereinto, they are upended to slide vertically into the ferrules of a reflector indexed therebeneath, and mechanism for reciprocating said plate so that one lead at a time is fed to each chute while a reflector is indexed therebeneath.

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