April 18, 1944. E. E. LAKSO 2,347,057

AMPOULE WASHER

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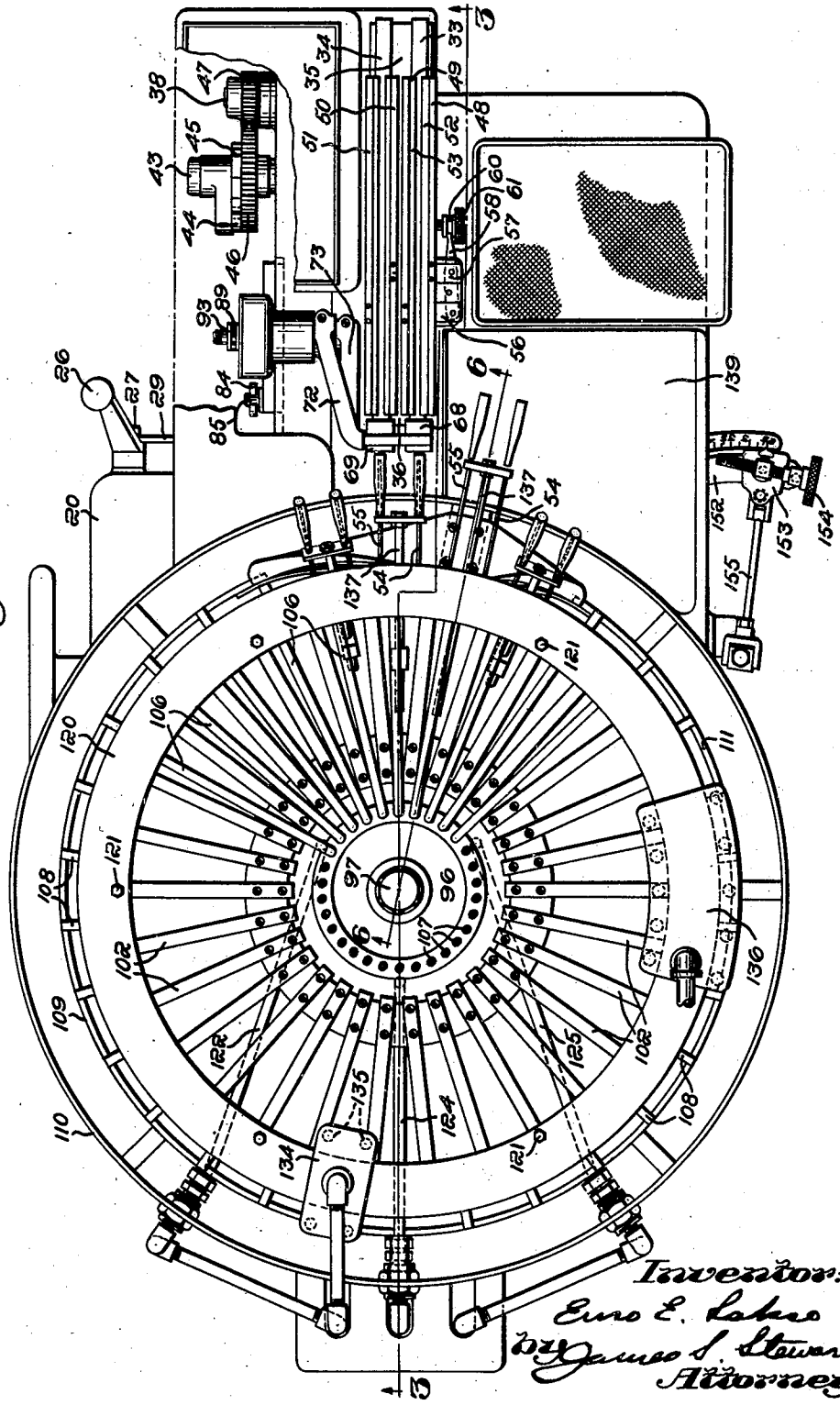


Fig. 1.

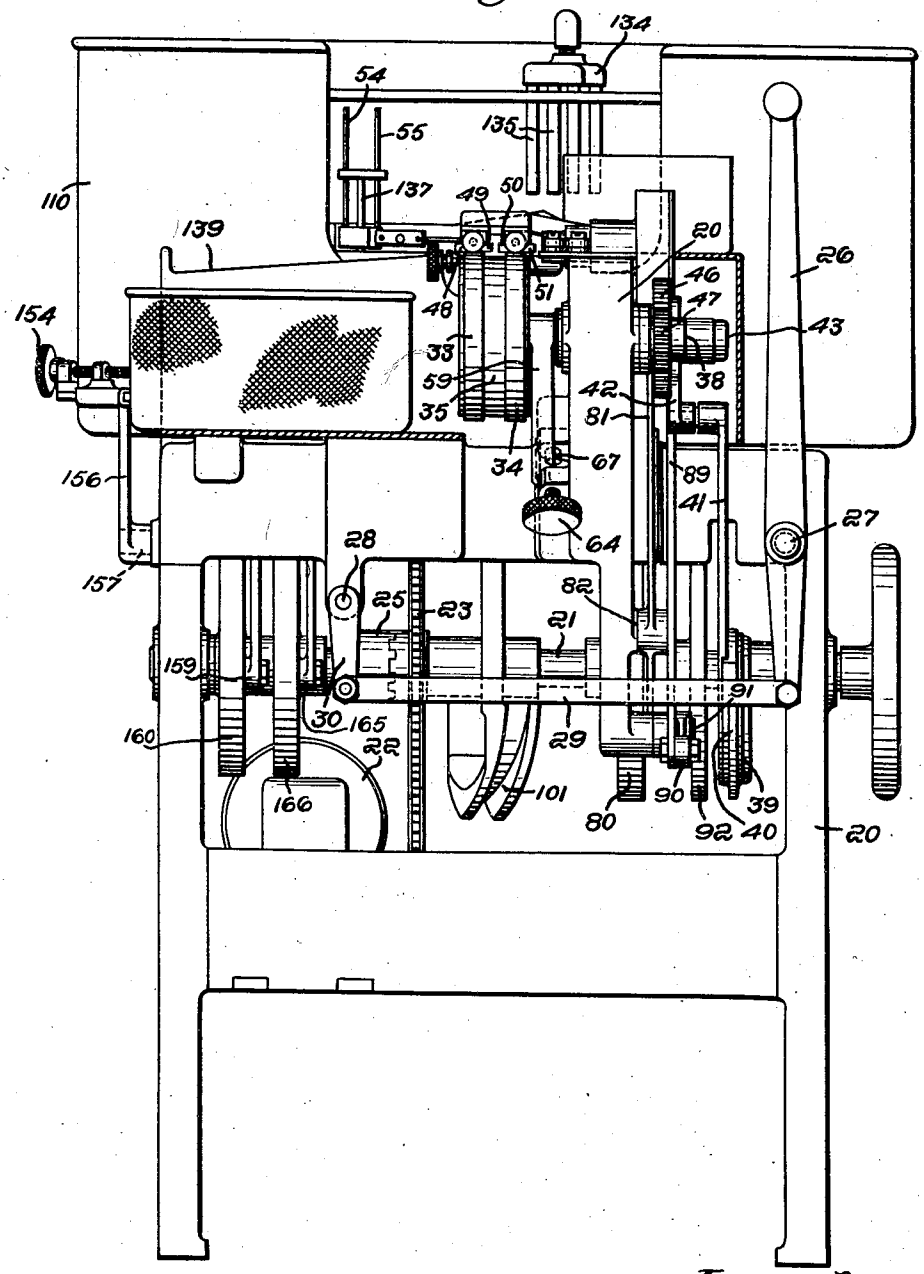
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AMPOULE WASHER

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Fig. 2.



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AMPOULE WASHER

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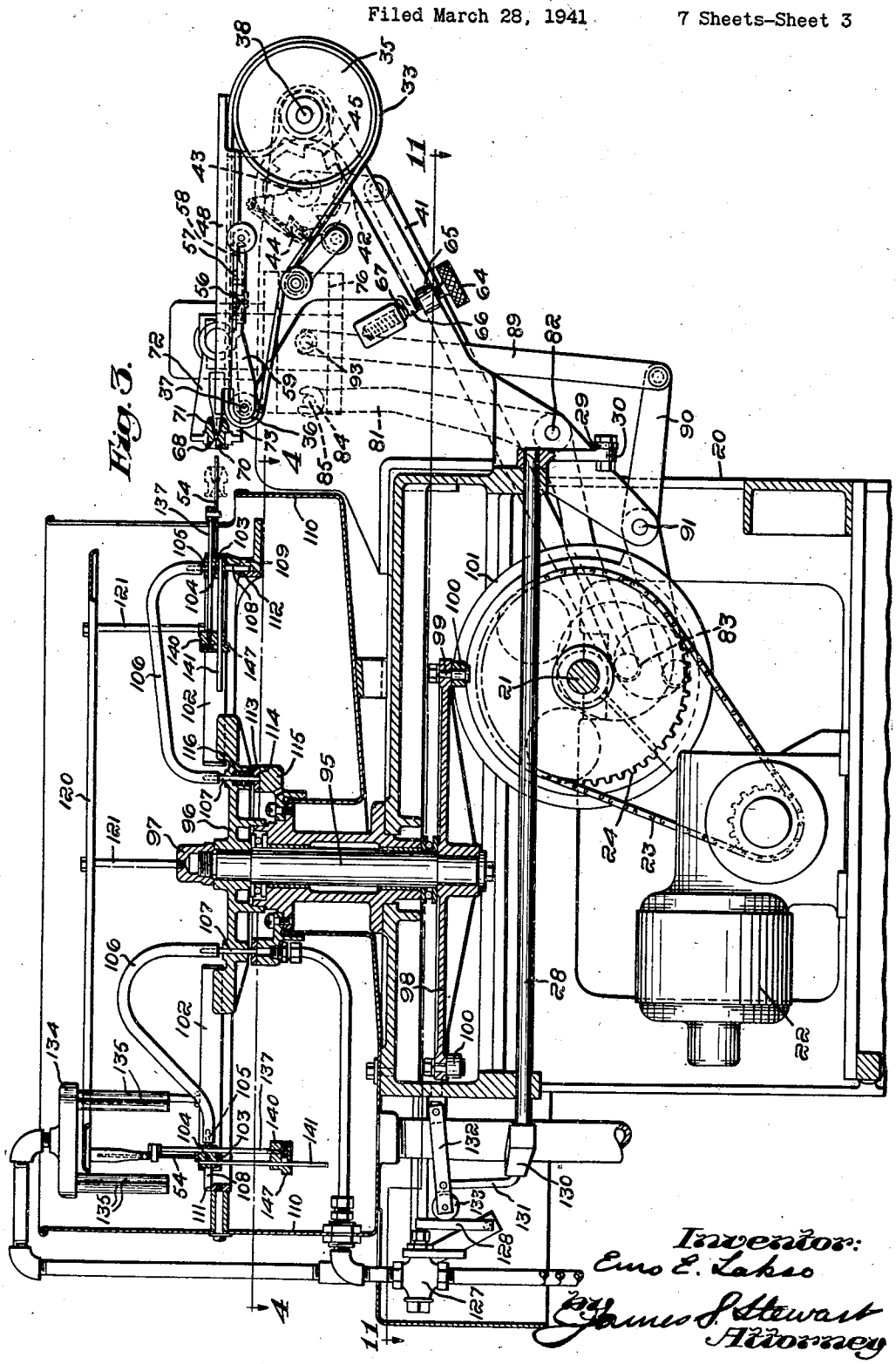


Fig. 3.

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AMPOULE WASHER

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Fig. 5.

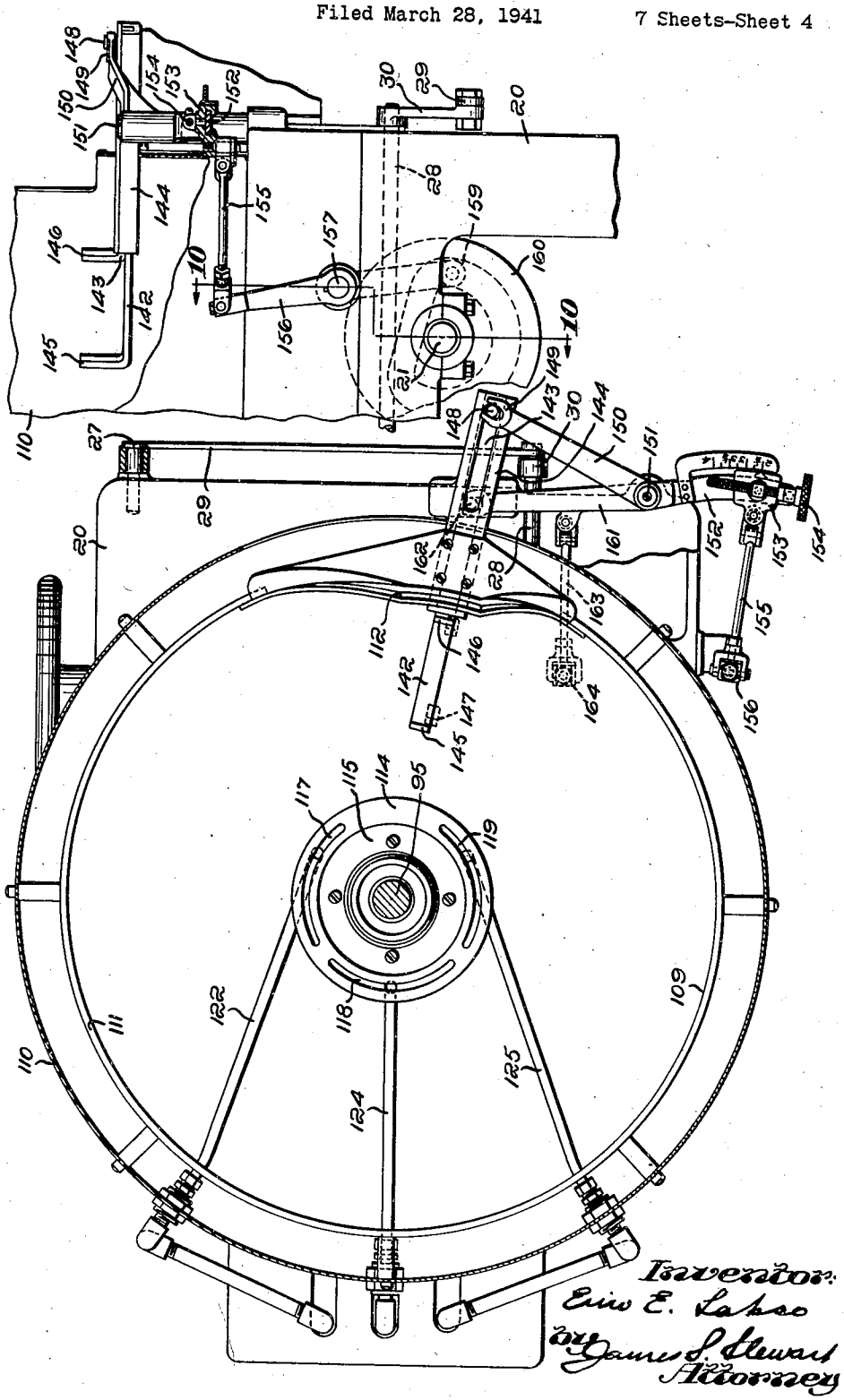


Fig. 4.

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AMPOULE WASHER

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Fig. 6.

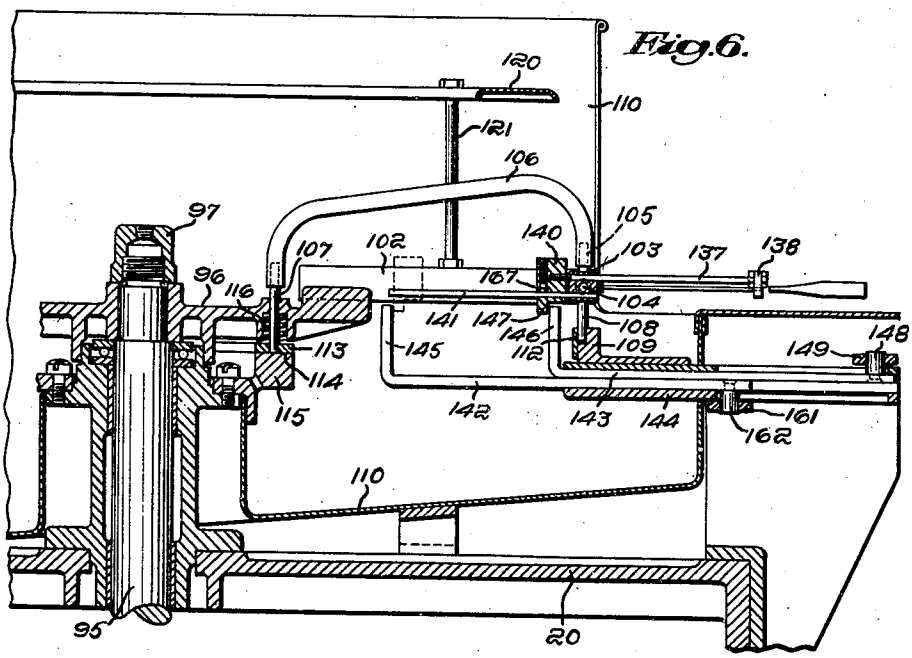
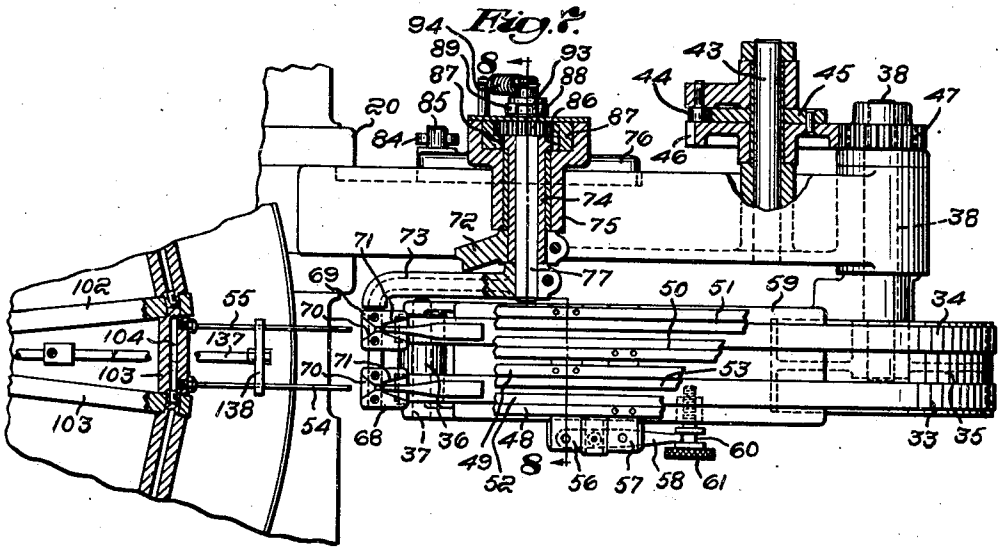


Fig. 8.



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AMPOULE WASHER

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Fig. 8.

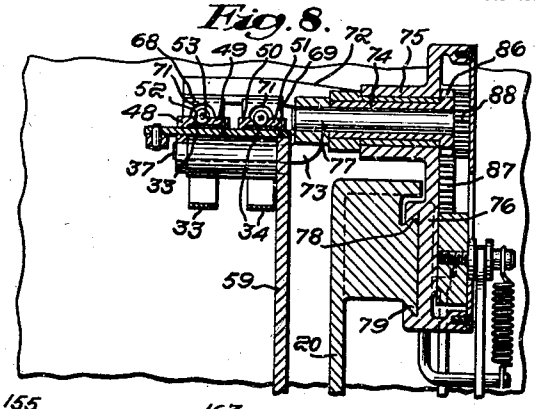


Fig. 9.

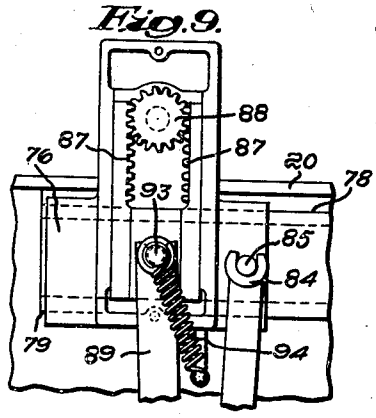


Fig. 10.

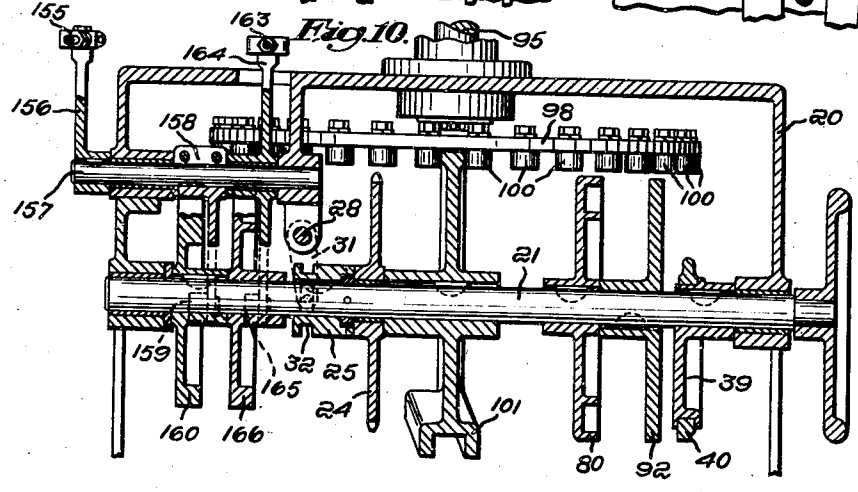
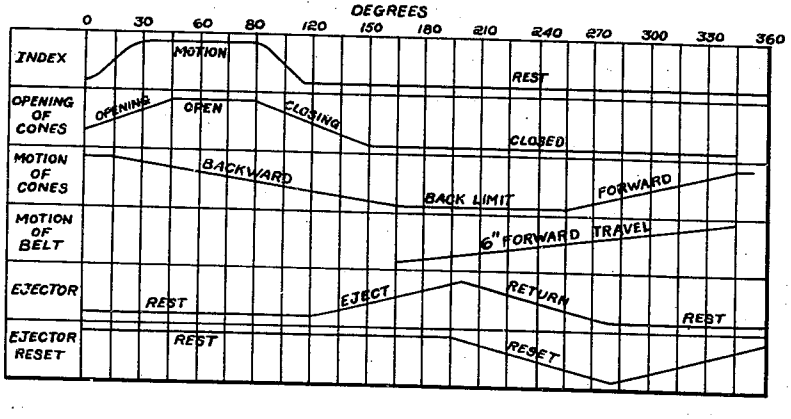


Fig. 12.



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AMPOULE WASHER

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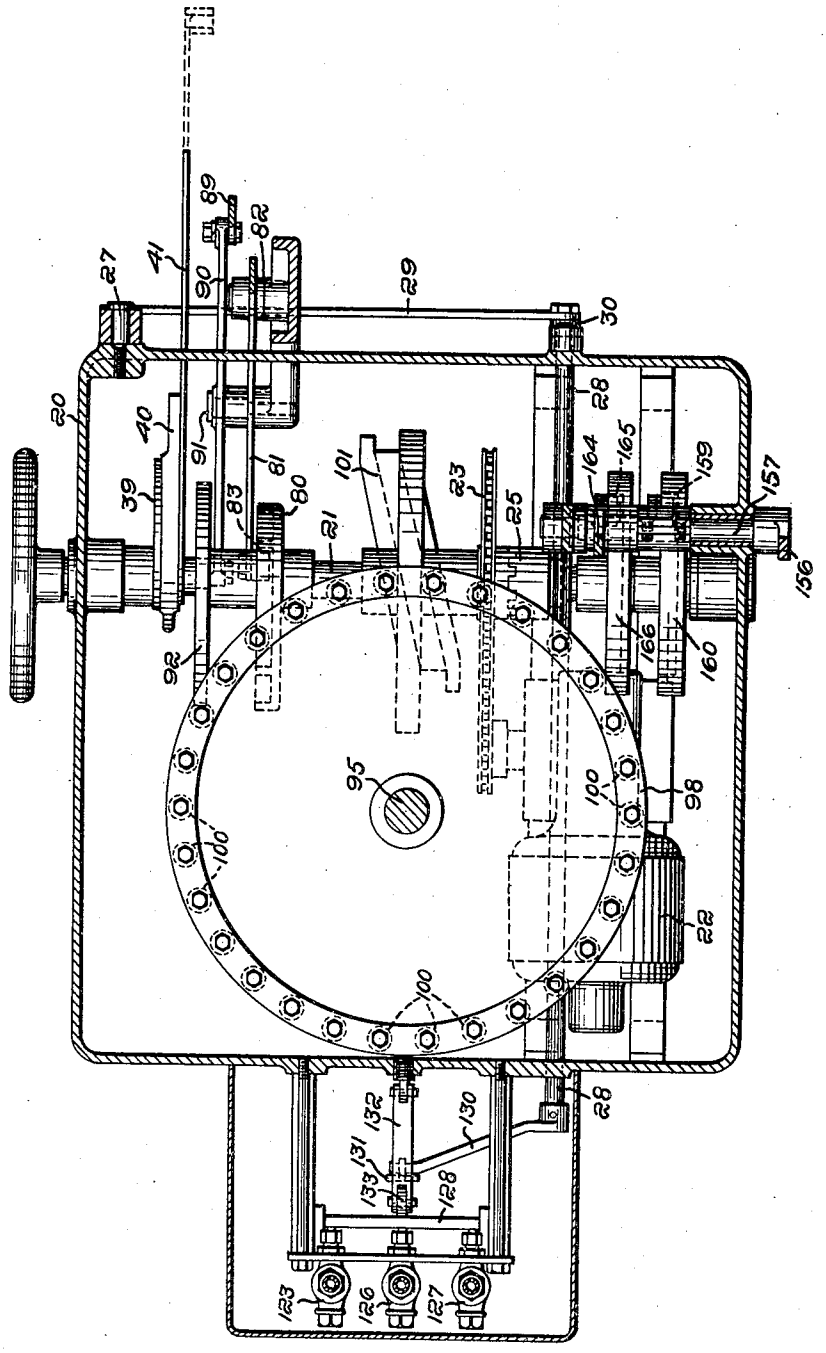


Fig. 11.

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Patented Apr. 18, 1944 2,347,057

UNITED STATES PATENT OFFICE

2,347,057

AMPOULE WASHER

Eino E. Lakso, Fitchburg, Mass.

Application March 28, 1941, Serial No. 385,594

22 Claims. (Cl. 141—7)

My invention relates to an ampoule washer and more especially to apparatus for cleansing and drying ampoules or other small containers.

As is well known in the art, the usual ampoule is provided with an elongated hollow slender neck through which the ampoule contents are introduced and dispensed, the neck being sealed to preserve the ampoule contents until such time as it is desired to use the same. Heretofore the cleansing and drying of ampoules has been accomplished by hand operations wherein the workman telescopes the slender open end of the ampoule neck over a minute tube through which cleansing fluids and finally dry sterile air are introduced into the interior of the ampoule to wash out foreign materials and finally to dry the ampoule. Owing to the small size of the opening in the neck of the usual ampoule, as well as the fact that the same is made of relatively thin fragile glass, there is constant danger of breakage of the ampoule necks during the assembly thereof on the tubes. Moreover, the application of the cleansing fluids and the drying of the ampoule depends entirely on the efficiency of the workman.

One of the more general objects of the present invention is to bring about a form of apparatus in which the washing, drying or other treatment of the ampoules may be accomplished with less danger of breakage and more certainty that the desired degree of cleanliness and dryness may be obtained.

In a more specific aspect, the object of the invention is to bring about a form of machine in which the introduction of the ampoules, assembly on the cleansing and drying tubes, washing and drying and final discharge from the machine may be carried out automatically and with a minimum amount of attention on the part of a workman.

To these and other ends the invention resides in the novel features and combinations of parts to be hereinafter described and claimed.

In the drawings,

Fig. 1 is a plan view of a preferred form of ampoule washer, according to the invention, the washer as shown being broken away in part to show certain internal features of construction.

Fig. 2 is an elevational view of the ampoule washer shown in Fig. 1;

Fig. 3 is a sectional view taken along line 3—3 of Fig. 1;

Fig. 4 is a sectional view taken along line 4—4 of Fig. 3;

Fig. 5 is a fragmentary view in elevation of certain features of the ampoule washer particularly those serving to eject the ampoules after the same are washed and dried.

Fig. 6 is a sectional view taken along line 6—6 of Fig. 1;

Fig. 7 is a plan view of the arrangement for feeding the ampoules into the machine, the latter being broken away in part to expose certain features of structure.

Fig. 8 is a sectional view taken along line 8—8 of Fig. 7;

Fig. 9 is an elevational view of the mechanism shown in Fig. 8 and is taken from the right hand end of such mechanism as shown in Fig. 8;

Fig. 10 is a sectional view taken along line 10—10 of Fig. 5;

Fig. 11 is a sectional view taken along line 11—11 of Fig. 3, and

Fig. 12 is a diagram showing the relative timing of the several motions of the parts of the machine.

In carrying out the invention I prefer to introduce the cleansing and drying fluids into the ampoules by means of tubes over which the ampoules are telescoped and for convenience in describing the invention the preferred form shown in the drawings may be roughly divided functionally into (1) an ampoule feed station whereat is located the mechanism for carrying the ampoules into the machine and telescoping the same over the tubes, (2) the mechanism for controlling the ampoules during the cleansing and drying of the same, (3) the mechanism for applying cleansing and drying agents to the ampoules, and (4) the mechanism for ejecting the cleansed ampoules from the machine. It will be understood, of course, that the above mechanisms are by no means independent of each other in their several operations but are so coordinated and related that each cooperates with the other to the end that the ampoules may pass into and through the machine without attention on the part of the workman operating the machine and centainty that the washing, drying or other operations will be fully carried out.

For the purpose of effecting operation of the several parts of the machine, there is provided in the main frame or base 20 a main shaft 21, which is driven by suitable power means, as motor 22, by means of chain 23, which passes over sprocket 24, the latter being mounted freely on shaft 21, a clutch element 25, splined on shaft 21, being engaged by the sprocket to effect rotation of the shaft. The axial motion of the clutch element

along the shaft into engagement with the sprocket is accomplished through the intermediary of a control lever 26 pivoted on the main frame at 27 and connected to rock shaft 28 by link 29 and crank 30, a yoke 31, fast on shaft 28 engaging the clutch element in groove 32 to bring about the movement of element.

Located on the right hand end of the machine, as viewed in Fig. 1, is the ampoule feeding station embodying mechanism for feeding the ampoules into the machine and telescoping the same over the fluid tubes. As shown, this mechanism takes the form of a pair of endless belts 33 and 34, which pass over pulleys 35 and 36, of which pulley 36 is mounted for free rotation on horizontal shaft 37 while pulley 35 is mounted fixedly on and driven by horizontal shaft 38. It will be noted that the shafts 37 and 38 are so positioned on the machine that the belts 33 and 34 are provided with substantial upper stretches, intermittent motion of the latter inwardly towards the center of the machine being produced by an eccentric 39 fast on shaft 21, the eccentric strap 40 being connected by a rod 41 to a crank arm 42 mounted on shaft 43 on the frame 20. A pawl 44 on crank arm 42 engages a ratchet 45, mounted for rotation on shaft 43, the ratchet 45 having a gear 46 attached thereto and meshing with a gear 47 keyed to and driving shaft 38. The relation of the "throw" of eccentric 39 and the pitch of gears 46 and 47 may be varied in the design of the machine to produce a desired length of travel of the belts during each period of movement thereof, a travel of 6" being sufficient for most purposes.

Mounted immediately above and paralleling the belts 33 and 34 are guideways 48, 49, 50 and 51, the guideways 48 and 49 being disposed in spaced relation above belt 33 while guideways 50 and 51 are disposed in spaced relation above belt 34. It will be observed that the guideways 48 and 49 are chamfered at their inner upper corners, as at 52 and 53, and cooperate to form horizontal V-shape ways in which the ampoules are placed by the workman to rest on the belt thereunder, the open ends of the ampoules being disposed pointing inwardly in the direction of travel of the belt. The guideways and belt are so adjusted (in a manner to be hereinafter described) that the ampoules rest on and are carried by the belt, the ampoules during such motion being guided by the guideways. The guideways 50 and 51 are likewise chamfered at their inner upper adjacent edges and in similar manner form V-shape ways which guide the ampoules resting on and carried along by belt 34. It will be understood without further description that the belts and ways support the ampoules in substantially horizontal position with their axes disposed substantially in alignment with the fluid tubes 54 and 55 when the latter are brought to rest in a position horizontally disposed at the inner ends of the ways. In order that such alignment of the ampoules and fluid tubes may be exact, and notwithstanding the diameters of the bodies of the ampoules, the guideways 48, 49, 50 and 51 are supported so that the guideways of each pair may be adjusted towards and away from one another. For this purpose guideways 48 and 50 are mounted on a horizontally directed transverse slide 57 while guideways 49 and 51 are mounted on a parallel slide 56, the slides at their outer ends being interconnected by means of a lever 58 pivoted on the slides and midway between the same on the supplemental frame 59, the lever extending outwardly at one end to be received in the groove 60 in screw 61 threaded in frame 59. It will be readily understood that as the screw 61 is threaded inwardly or outwardly in the frame, the lever 58 effects motion of the slides in opposite directions to produce motion of the guideways of each respective pair towards or away from one another. As a further aid in producing alignment of the ampoules on the belts with the fluid tubes, the supplemental frame is mounted for swinging movement about the shaft 38 and since the shaft 37 is mounted in the supplemental frame together with the guideways, slides and adjusting lever it will be apparent that upward or downward swinging movement of the frame will bring the forward ends of the ampoules on the belts into or out of alignment with the ends of the fluid tubes. For the purpose of moving the supplemental frame to bring the ampoules into alignment with the fluid tubes, an adjusting screw 64 is threaded in the boss 65, on the main frame 20, the inner end of the screw 64 bearing against a lug 66 on the supplemental frame, a spring plunger, also on the main frame, and designated by the reference numeral 67, bearing against the opposite side of the lug and holding the latter against the end of the screw. The screw serves to adjust the supplemental frame in an upward direction while the spring pressed plunger, aided by the weight of the supplemental frame and the parts mounted thereon, moves the frame downwardly.

While the arrangement for supporting the ampoule, as described above, brings the ampoules into reasonably good alignment with the ends of the fluid tubes, there is no certainty that irregularities in manufacture of the ampoules will not leave the open ends of the necks thereof out of alignment with the fluid tubes so that relative movement of the ampoules and tubes would not result in the latter being telescoped within the ampoules. With the above in mind, provision is made herein for effecting accurate alignment of the open ends of the ampoules with the tubes. To this end there are positioned, opposite the inner ends of the guideways and in alignment with the fluid tubes, guides or cones 68 and 69, each cone being bored horizontally in alignment with the tubes, the bores being of a diameter slightly larger than the fluid tubes so that the latter may be received therein. The cones are counterbored at their ends, as at 70 and 71, to form conical openings tapering inwardly. During the intermittent motions of the belts 33 and 34, the ampoules are advanced until their open ends are received in the conical openings 71, the forward ends of the necks engaging and being guided by the conical surfaces of the openings into alignment with the bores of the conical guides. When so positioned the conical guides and ampoules may be advanced relatively to the fluid tubes, the conical surfaces of the openings 70 guiding the tubes into the bores of the conical guides and thus into the open ends of the ampoules. The intermittent motion of the belts effects, of course, the motion of the ampoules with respect to the fluid tubes, the synchronized motion of the conical guides being produced by mechanism which will now be described.

It will be observed that the conical guides are each split in an axial horizontal plane into upper and lower halves, the upper halves of the guides being mounted on or forming a part of an arm 72 while the lower halves are mounted on or form a part of arm 73. Arm 72 is fixed on the inner end of hollow shaft 74, mounted for rotation in

the bearing 75 of guide frame or carriage 76 while arm 73 is fixed on the inner end of shaft 77, extending axially through shaft 74. Motion of the conical guides axially of the fluid tubes is produced by motion of carriage 76 along ways 78 and 79 on frame 20, ways 78 and 79 being parallel to the fluid tubes. Proper synchronized motion of the carriage 76 is produced by a cam 80 on shaft 21, a bell crank lever 81, pivoted on the frame 20 at 82, having a cam follower 83 at its lower end engaging the cam, the other end of the lever being bifurcated, as at 84, to straddle a pin or stud 85 on carriage 76. The cam 80, in this case, is an internal one and it will be readily understood by those skilled in the art that the synchronization of the motion of the neck guides or cones with the motion of the belts simply requires a proper shape and setting of cam 80 as well as the eccentric 39.

As soon as the ampoules have been advanced into position on the fluid tubes, the upper halves of the guides or cones are swung upwardly to release and clear the ampoules for further motion together with the fluid tubes while the lower halves are simultaneously swung downwardly for the same purpose. For this purpose there is mounted on the outer end of the hollow shaft 74 a gear 86 meshing with the teeth at one side of a vertically movable double rack 87, the shaft 77 extending through the gear 86 and having fixed on its outer end a gear 88 meshing with the other set of teeth on the rack. It will be apparent that motion of the rack upwardly or downwardly will effect rotation of the gears, and thus the arms and cones, in opposite directions. Upward movement of the rack 87 is produced by a link 89, connected at its lower end to one end of bell crank lever 90, the latter being pivoted at 91 on the frame 20 and having a cam follower at its opposite end engaging cam 92 on shaft 21, the upper end of the link being bifurcated and straddling a pin or stud 93 on rack 87. The upward motion of the rack serves to open the guides or cones, downward motion of the rack, and thus the closing of the neck guides, being produced by a spring 94 one end of which is attached to the stud 93, the other end being attached to the carriage 76. The action of the spring in moving the rack downwardly is controlled by the motion of link 89 but permits a certain amount of play between the link and stud so that the neck guides may be tightly closed and the carriage moved along its ways without interference from the link. The cam 92 is so shaped that the conical guides are opened as soon as they reach the forward limit of their motion with respect to the fluid tubes, the guides remaining open during the rearward motion of the carriage 76 and thereafter being again closed before the motion of the belts brings the next pair of ampoules into position to engage in the conical openings of the guides.

Upon reception of the ampoules on the fluid tubes, the ampoules and tubes are ready for further motion to bring about the cleansing and drying of the ampoules, the mechanism for producing this motion being as follows: Extending vertically upwardly through frame 20 and supported in suitable bearings therein is a shaft 95 on the upper end of which a disc-like head 96 is secured, as by nut or cap 97, the lower end of the shaft having fixed thereon a relatively large disc-like member 98. Evenly spaced around the peripheral edge of the disc 98 and extending downwardly therefrom are studs 99 on which are rollers 100, the number of studs and rollers corresponding to the number of pairs of fluid tubes supported by the head 96 (in a manner to be hereinafter described), the disc 98 and thus the head 96 being given an intermittent rotary motion by engagement of the rollers 100 by the cam 101 mounted on and driven by shaft 21. The cam 101 is so shaped that throughout the greater part of its periphery it is received between an adjacent pair of rollers to hold the disc 98 against motion, the disc 98 and head 96 bringing a pair of fluid tubes into position opposite the neck guides each time that the disc comes to rest.

Mounted on and extending radially outwardly from the head 96 are spaced arms 102 the outer ends of which are bored transversely to form bearings for the reduced outer ends of the hollow fluid tube spindles 103, the spindles being horizontally disposed one between the outer ends of each adjacent pair of arms 102. It will be noted that each spindle 103 is bored axially part way to one of its ends, as at 104, the outer end of the bore being plugged. Supported in and extending radially outwardly from the spindles in parallel relation are the spaced pairs of fluid tubes 54 and 55, the tubes of each pair communicating with the bore 104 of its respective spindle, each spindle likewise having a radially extending hollow nipple 105 mounted therein and communicating with the bore 104, each nipple having a flexible pipe or tube 106 mounted thereon and extending radially inwardly to a vertically extending hollow nipple 107 mounted in the ring 113, the nipples 107 being equally spaced circumferentially around the head 96 and extending downwardly therethrough. The nipples 107, tubes 106 and nipples 105 serve to introduce the cleansing and drying fluids into the hollow spindles 103 whence the fluids pass through the fluid tubes 54 and 55 into the ampoules received thereon. In order that the ampoules may not be displaced from the fluid tubes 54 and 55 during the application of the cleansing and drying fluids, and for other purposes which will appear hereinafter, the spindles 103 are swung, during the intermittent rotary motion of the head 96 to bring the fluid tubes into vertical position pointing upwardly with the ampoules received on the upper ends thereof. For this purpose each spindle is provided with a radial stud 108 extending radially outwardly therefrom at the opposite side from the nipple 105, the studs 108 engaging a tilting cam 109 supported beneath the spindles 103 on the walls of the bowl 110 carried on the upper side of the frame 20. The cam 109 throughout the greater part of its length is of ring-like form and provided with an upper face 111 on which the studs 108 rest to position the tubes 54 and 55 in vertical position. Near the conical guides the cam 109 is provided with a groove 112 into which the studs 108 pass, the groove being so shaped that the studs are swung downwardly into vertical position with the fluid tubes 54 and 55 horizontally disposed opposite the conical guides, the sides of the groove 112 preventing upward or downward motion of the tubes 54 and 55 at this time. The cam 101 gives the head 96 an intermittent motion in a counter-clockwise direction as viewed in Fig. 1 of the drawings, the groove 112 acting to swing the tubes 54 and 55 into vertical position as soon as they are moved away from the conical guides.

The nipples 107 pass somewhat freely downwardly through the head 96 and are mounted tightly in annular valve ring 113 which valve ring is pressed against the upper flat face 114 of the

distributor 115 by springs 116 mounted in the head 96 and bearing against the valve ring 113. The distributor 115 is ported, as at 117, 118 and 119, for the passage of the cleansing and drying fluids into the nipples 107 and thus through the tubes 106 and nipples 105 into the spindles 103 and into the tubes 54 and 55, the nipples 107 as they are carried around by the head 96 aligning with the ports successively. During the washing and drying of the ampoules the latter are held against excessive movement upwardly on the tubes 54 and 55 by the ringlike shield 120 secured in proper spaced relation above tubes 54 and 55 by the studs 121 extending upwardly from certain of the arms 102.

In the particular instance shown, three arcuate ports are provided in the distributor 115 of which port 117 is connected, by pipe 122 and other fittings, to a source of supply of washing fluids, the entrance of the fluids into the machine being controlled by valve 123. Port 118 is connected, by pipe 124 and suitable fittings, to a source of supply of sterile water, while port 119 is connected by pipe 125 to a source of hot dry sterile air. Valve 126 controls the admission of sterile water into the machine while valve 127 controls the application of dry air. The stems of the valves 123, 126 and 127 are engaged for simultaneous opening movement by a strap 128, the valves being closed when the machine is idle and opened when the machine is started through the intermediary of a crank arm 130 on the rocker shaft 28, the crank arm 130 being connected by link 131 to the lever 132, pivoted at its inner end on the frame 20, the outer end of the lever 132 having a roller 133 thereon which, upon upward movement of the arm 130, swings the strap about its supports to unseat the valves. It will be understood that motion of the rocker shaft 28 by lever 26 in a direction to bring the clutch on shaft 21 into engagement also serves to open the valves. If desired the exteriors of the ampoules may be washed and dried as by means of a spray head 134, straddling the shield and having downwardly depending pipes 135 thereon apertured to form nozzles directed towards the ampoules. The ampoules may also be dried and sterilized by the application of heat thereto as by means of the gas burner or other heating means 136. Those skilled in the art will understand that the number of ports in the distributor may be varied as desired as may the types of fluids which are handled by the machine in the cleansing of the ampoules.

After being washed and dried, the ampoules are ready to be discharged from the machine, which, in this case is effected automatically. For this purpose there is slidably mounted in each spindle 103, parallel to and immediately above and between the respective fluid tubes 54 and 55 thereon, an ejector rod 137, having a head 138 fixed on the outer end thereof and extending laterally towards the tubes 54 and 55, the head being slidably mounted on said tubes. The rods 137 and heads 138 are moved outwardly to push the ampoules off the tubes when the latter are in horizontal position and at rest over the discharge ramp 139, the tubes 54 and 55 having been swung down into horizontal position at this point by the tilting cam. For the purpose of actuating the ejector rods to eject the ampoules from the tubes, the ejector rods are each provided at its inner end with an ejector rod block 140, mounted for sliding movement along a guide rod 141 fixed in the respective spindles 103 and extending inwardly therefrom on the opposite side from the tubes 54 and 55 in a direction parallel to the ejector rods 137. Motion of the block 140, and thus the ejector rods, is obtained by engagement thereof with the horizontally movable slides 142 and 143 mounted in superposed relation in slideway 144 in frame 20, each slide having its inner end bent upwardly to form an abutment, such as 145 and 146, the abutments 145 and 146 receiving therebetween the downwardly depending abutment 147 on ejector rod block 140. Motion of the ejector rods outwardly is effected by motion of slide 142 in an outward direction while the ejector rods are returned to inoperative position by slide 143. For the purpose of effecting motion of slide 143, there is mounted in the outer end thereof and extending vertically upwardly a stud 148 received in the yoke 149 at one end of lever 150, pivoted on the frame 20 at 151 and having an arcuate extension 152 beyond the pivot, the extension receiving thereon an adjustable slide 153, the position of the slide on the extension being controlled by a screw 154 mounted for rotation in a lug at the outer end of the extension and threaded in a lug on the slide. The slide 153 is connected by means of link 155 to a crank arm 156 on shaft 157 mounted for rotation in the frame 20, a second crank arm 158 on the inner end of the shaft having a cam follower 159 thereon in engagement with the cam 160 on shaft 21. Motion of slide 142 is effected by a lever 161 pivoted at one end on frame 20, as at 151, the opposite end of the lever 161 having a yoke thereon straddling the stud 162 secured in and extending downwardly from the under side of slide 142. Movement of lever 161 is effected by link 163, one end of which is pivotally connected to the lever 161 between the ends thereof, the other end of the link being pivotally connected to the upper end of lever 164 pivotally supported between its ends on shaft 157, the lower end of lever 164 having a cam follower 165 thereon in contact with cam 166 on shaft 21.

During the rotary movement of the head 96, the tilting cam 109 brings the fluid tubes 54 and 55 into horizontal position just prior to the time that the abutment on the ejector rod block passes between the ejector slide abutments 145 and 146, the intermittent motion of the head 96 bringing the fluid tubes 54 and 55 to rest in the position shown particularly in Figs. 1 and 6 wherein the abutment 147 is between and in alignment with the abutments 145 and 146. In this position the slide 142 is actuated by its cam, through the connections described above, to effect movement of the abutment 145 outwardly, the abutment 145 engaging the abutment 147 and moving the ejector rod guide, ejector rod and head outwardly until the latter is at the end of the fluid tubes 54 and 55 whereupon the cam effects motion of the slide 142 back to its original position. The return motion of the ejector rod, head and guide is effected by slide 143 through engagement of its abutment 146 with the abutment 147 and actuation by its respective cam. It will be noted that the amount of movement of slide 143 may be regulated by adjustment of slide 153 along the arcuate extension 152, the inward movement of the slide 143 being greatest when the slide 153 is adjusted closest to the pivot 151. It will be noted that the extension 152 is curved along a line whose center of curvature is the upper end of crank arm 156, the slide 143 being brought to rest in the same position, when it is inoperative, for this reason. The adjustment of the

slide 153 on the extension 152 controls the amount of "throw" of the lever 150 and thus the amount of inward movement of the slide 143 and the ejector rods and heads. The ejector blocks 140 are each provided with a spring pressed plunger 167 engaging its respective guide rod 141, the plungers acting to hold the ejectors and especially the blocks thereof in the positions in which they are left by the slide 143. Thus the heads 138 form seats on which the ends of the ampoules may rest during the cleansing thereof, the amount of "throw" of lever 150 being so adjusted by movement of the slide 153 that the heads 138 will support the ampoules with their bottoms spaced from the ends of the fluid tubes so that the fluids may pass freely into the ampoules.

The operation of the machine as a whole will be readily understood from the above description but will be briefly summarized. The motor being rotated and the clutch thrown in, the belts will be advanced in an intermittent motion towards the fluid tubes on the head while the latter will be given an intermittent motion to bring the fluid tubes successively into alignment with the upper stretches of the belts. The ampoules are placed in the ampoule guideways with the open ends thereof pointed towards the fluid tubes whereupon the intermittent motion of the belts advances the ampoules along the guideways until the open ends are received in the conical openings in the guides, the latter together with the ampoules advancing in the direction of the fluid tubes until the ampoules are received thereon. As soon as the ampoules are received on the fluid tubes, the conical guides are opened to release the ampoules and the head indexed to bring the next pair of fluid tubes into alignment with the belts, the conical guides being returned to their initial position ready to receive and guide the next pair of ampoules on to the succeeding fluid tubes. It will be noted by reference to the chart shown in Fig. 12 that while the motion of the belts is initiated prior to the forward motion of the guides or cones, that the forwards motions of both cones and belts is arrested at the same time. Thus while the belts may bring the ampoule open ends or mouths into contact with the conical guides prior to any movement of the latter, there can be no motion of succeeding ampoules on the belts while the guides are being opened and returned to their initial positions, the succeeding ampoules being left at rest on the belts until the guides are ready to receive them.

As the head is rotated, the tilting cam swings the fluid tubes into vertical position under the shield, the ampoules resting on the ejector rod heads in which position the cleansing and drying fluids are introduced into the ampoules to cleanse and dry the same. The ampoules are carried around by the fluid tubes until the latter are swung down into horizontal position by the tilting cam at which time the ejectors are actuated by the ejector slides and the ampoules deposited on the ramp where they may pass into the container supported on the machine adjacent the ramp. The sequence of the several motions of the parts of the machine may be understood from reference to the chart of Fig. 12. It will be noted that the entire treatment of the ampoules in the machine is carried out automatically so that each ampoule will receive uniform treatment, the workman attending the machine simply being required to place the ampoules in the ampoule guideways.

While the preferred form of the machine has been described in great detail in order that those skilled in the art may understand the nature of the invention it will be understood that many of the details may be varied within the invention which is to be limited only by the scope of the appended claims.

What I claim is:

1. The combination in an ampoule washer of a tube for cleansing fluids, an endless belt for supporting an ampoule for motion towards the tube in substantially axial alignment therewith, means engaged by the advancing ampule to bring at least the open end thereof into exact alignment with the tube and means for effecting simultaneous motion of the ampoule and said means with respect to the tube to telescope the latter within the ampoule.

2. In an ampoule washer, a tube support, tubes on the support, an ampoule feeding station, said support and station being relatively movable one past the other, an ampoule mouth guiding element mounted at the feeding station, said ampoule mouth guiding element having a bore in axial alignment with but spaced from a tube, means for effecting relative motion of the element with respect to the tube to cause the tube to enter and pass the bore, means on said element for supporting the open end of an ampoule in axial alignment with the bore, means at the feeding station for feeding the ampoule when so supported to telescope the tube within the ampoule, means to retract and free the ampoule mouth guiding element from the ampoule and telescoped tube, and means to relatively move the tube support and station to bring another tube into the prior position of the first tube, whereby one ampoule mouth guiding element is effective to guide a plurality of ampoules in succession onto a succession of tubes as the tubes move relatively past the feeding station.

3. The combination according to claim 2 in which the means for feeding the ampoules includes an endless belt on which the ampoules rest.

4. The combination according to claim 2 in which the ampoule guiding element is provided with a conical surface, the axis of the conical surface being in general alignment with the axis of the bore.

5. The combination according to claim 2 in which the ampoule guiding element is provided with a conical tube receiving opening therein in axial alignment with the bore.

6. The combination in an ampoule washer of a tube support, a plurality of spaced fluid tubes on said support, means forming an ampoule support, means for effecting intermittent motion of the tube support to bring the tubes successively into alignment with ampoules on the ampoule support, means for effecting motion of the ampoules on the ampoule support towards the tubes in alignment therewith and separately movable means engageable by the ampoules and movable therewith during such motion to guide the open ends thereof on to the tubes, and means to move said last named means.

7. The combination according to claim 2 in which the ampoule guiding element is split axially into two halves and the retracting means includes means for effecting motion of the halves radially away from one another to release the ampoule when received on the tube.

8. The combination according to claim 6 characterized in that an endless belt constitutes the

means for supporting the ampoules and said second named means is arranged to give the belt an intermittent motion.

9. The combination according to claim 6 in which means is associated with the tubes for limiting the amount the tubes extend into the ampoules.

10. The combination according to claim 6 in which means is mounted on the tubes for effecting withdrawal of the tubes from the ampoules when the latter are washed.

11. The combination according to claim 6 in which means is mounted on the tubes for relative axial movement to support the ampoules with the tubes spaced from the bottoms thereof together with means for effecting motion of the last named means to strip the ampoules off the tubes when the ampoules are washed.

12. The combination in an ampoule washer of tubes having open ends, a traveling carrier for the tubes, an ampoule feed station past which the tube carrier travels, to present tubes in succession to the feed station, an ampoule mouth guide having a bore in axial alignment with a tube presented at the station, said guide being normally spaced from said tube and mounted at the station, means on said guide for supporting the mouth of an ampoule in alignment with said bore, means effective to simultaneously advance said guide and supported ampoule relatively toward the open end of said tube, whereby said tube will pass through said bore and enter the ampoule, means to retract and free the guide from the ampoule, and means to travel the carrier past the feeding station.

13. An ampoule washing machine comprising a tube support and an ampoule feed station, said support and station being mounted for relative movement one past the other, means associated with said ampoule feed station for advancing ampoules toward said tube support, an ampoule neck guide movable between said support and station in a direction generally normal to the direction of said relative movement, means on said guide to receive and relatively center ampoules and tubes whereby the same may telescope, and means freeing said guide from said tubes to leave said tube support free to relatively move therepast.

14. An ampoule washing machine comprising a carriage, tubes on said carriage, a stationary support, ampoule feeding means on the support to telescope ampoules on said tubes, split ampoule guide means for the telescoping action, means to move the split ampoule guide means apart to free the telescoped ampoule, means to move said carriage past said ampoule feeding means, said ampoule guide means being mounted on the support free of the carriage for successive operation on a succession of tubes, whereby but one ampoule guide is necessary to load ampoules on the tubes.

15. An ampoule washing machine comprising a carriage, tubes on said carriage, a relatively stationary ampoule feed station, means to intermittently move said carriage past said station, means to telescope ampoules on said tubes, means limiting the extent of the telescoping action so as to prevent the tubes contacting the bottoms of the ampoules, means actuating said limiting means to eject the ampoules from the tubes, and manual means effective to adjust the position of said limiting means in its limiting action to provide for telescoping various sizes of ampoules on said tubes.

16. An ampoule washing machine as recited in claim 15 wherein the limiting means comprises an element slidable along the tubes.

17. In an ampoule washing machine the combination of means forming a groove, means to feed ampoules along said groove, and means effective to adjust the width of said groove for various diameters of ampoules; with a carriage, tubes on said carriage adapted to receive ampoules, ampoule limiting means associated with said tubes to prevent total telescoping action of said ampoules, and means effective to adjust the position of said limiting means for various lengths of ampoules.

18. An ampoule washing machine comprising an endless horizontal carriage, a relatively stationary ampoule loading station, means traveling said carriage intermittently past said station, tubes on said carriage, said tubes being pivotally mounted thereon for swinging movement from horizontal to vertical positions, means to move said tubes from horizontal position at said station to vertical position therepast, and to return said tubes to horizontal position upon approach thereof to said station to complete a cycle of operation, endless felt means to feed successive ampoules at said station onto successive tubes, and means to pass cleansing fluids through said tubes in vertical positions thereof.

19. An ampoule washing machine as recited in claim 18 including means associated with said tubes to eject ampoules thereon upon said approach to the loading station.

20. An ampoule washing machine as recited in claim 13 wherein said ampoule neck guide is divided into two halves, and said guide freeing means including means for moving the halves away from each to accomplish the tube freeing function.

21. An ampoule washing machine as recited in claim 13 wherein said ampoule neck guide is provided with a bore for receiving both the ampoule neck and the tube, and said bore is formed conically at each end to provide the said ampoule and tube centering means.

22. The combination recited in claim 2 wherein the ampoule feeding element and guide element are multiple to load a plurality of ampoules on a plurality of tubes simultaneously.

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