

Jan. 11, 1966

G. W. BROWN ETAL

3,228,086

FINISHING MACHINE

Filed April 23, 1963

8 Sheets-Sheet 1

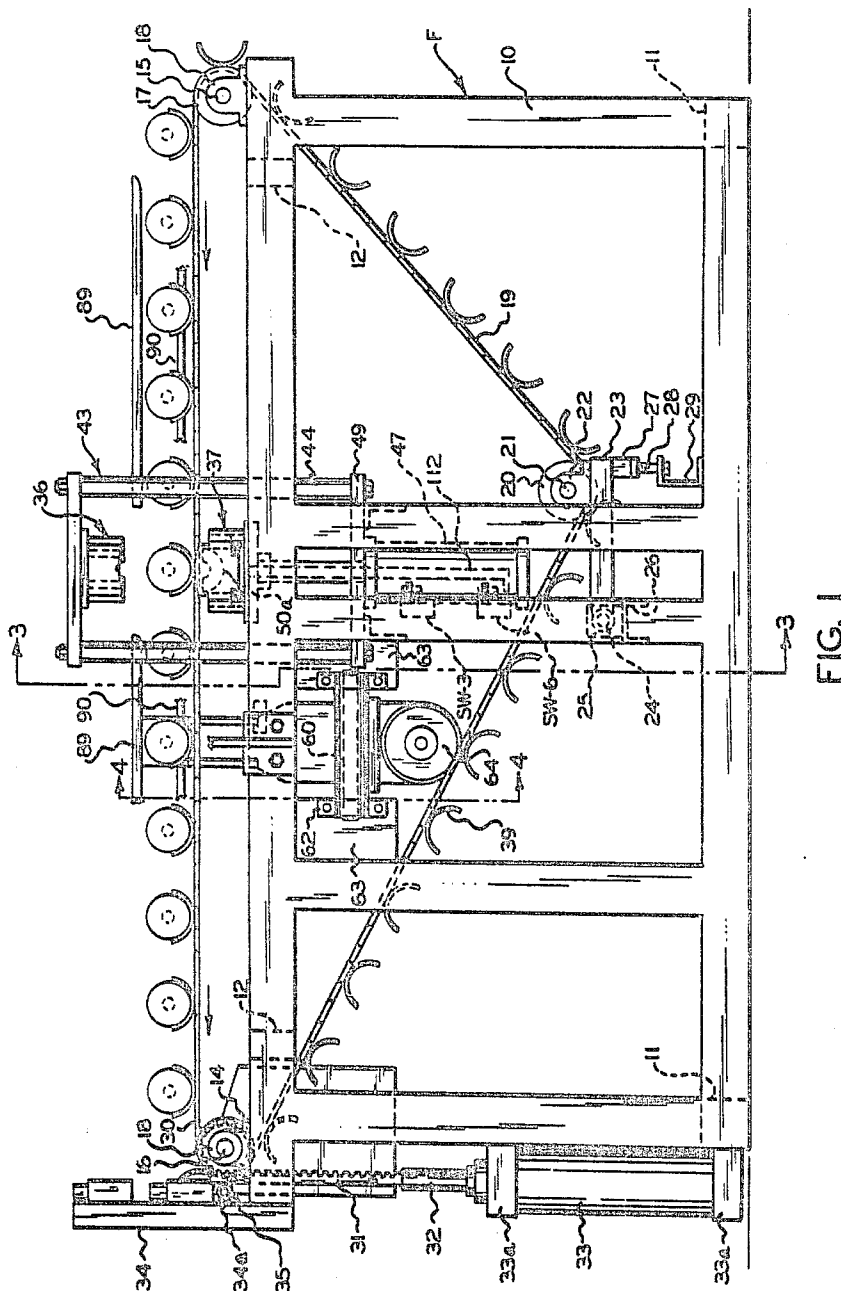


FIG. 1

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8 Sheets-Sheet 2

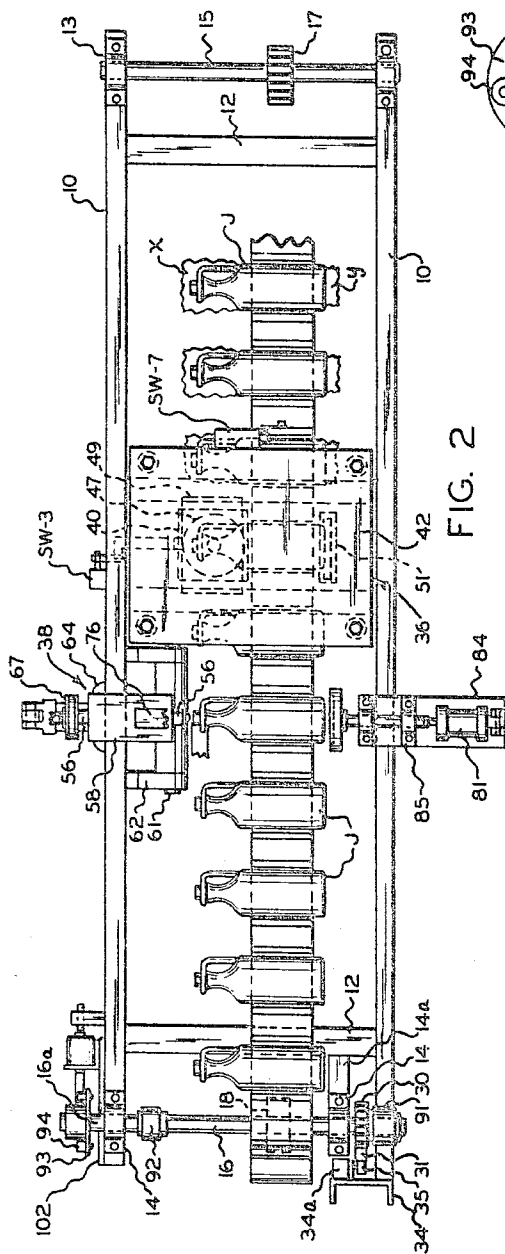


FIG. 2

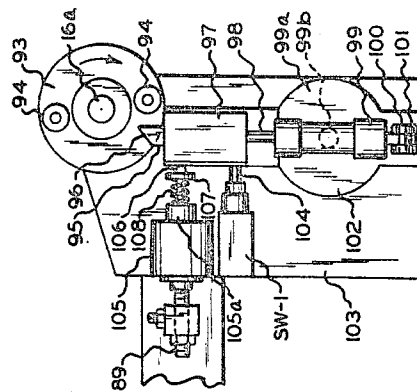


FIG. 5

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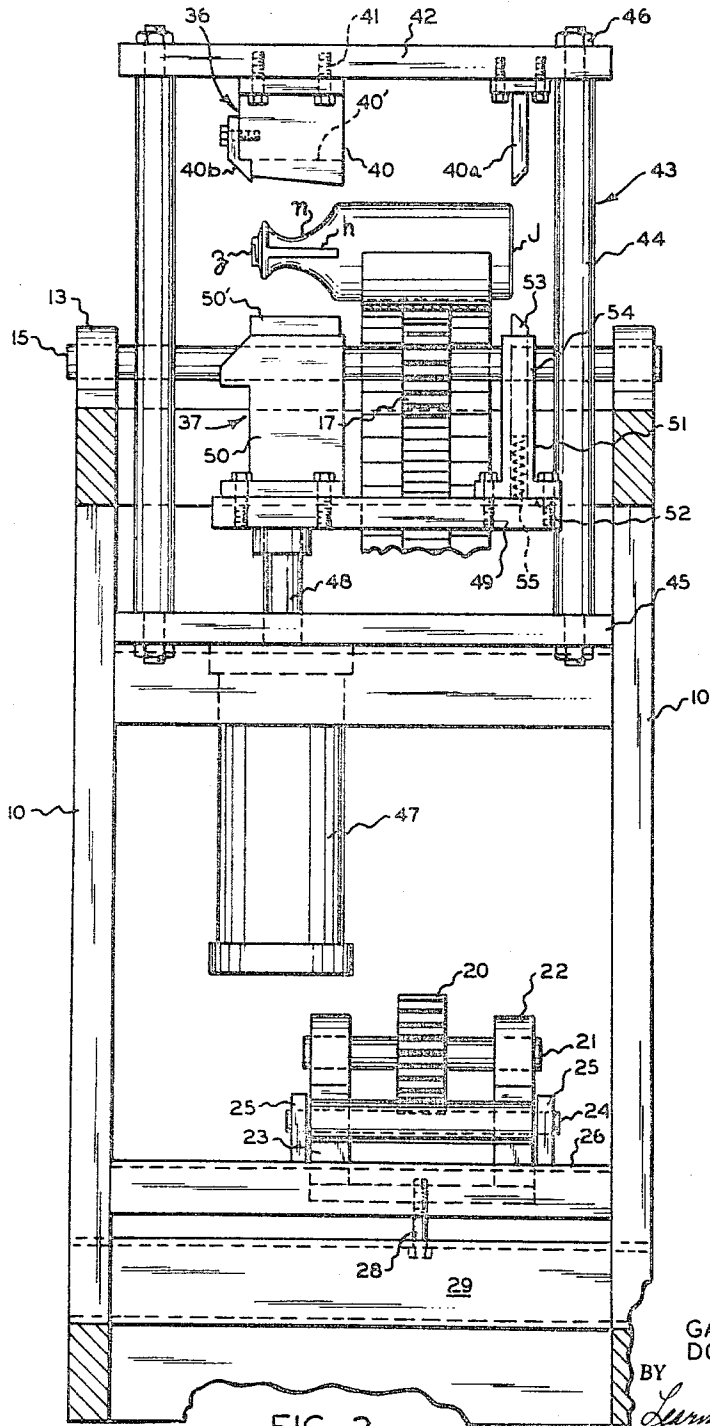
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8 Sheets-Sheet 3



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8 Sheets-Sheet 5

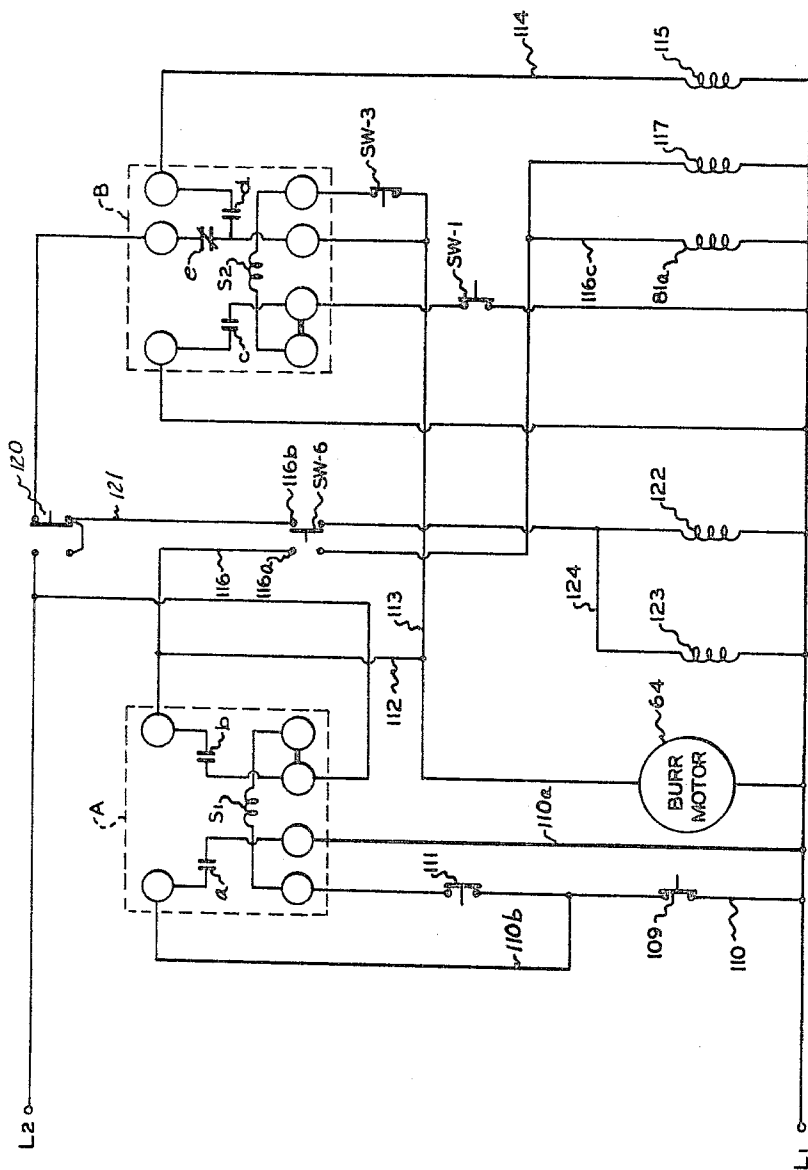


FIG. 7

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8 Sheets-Sheet 6

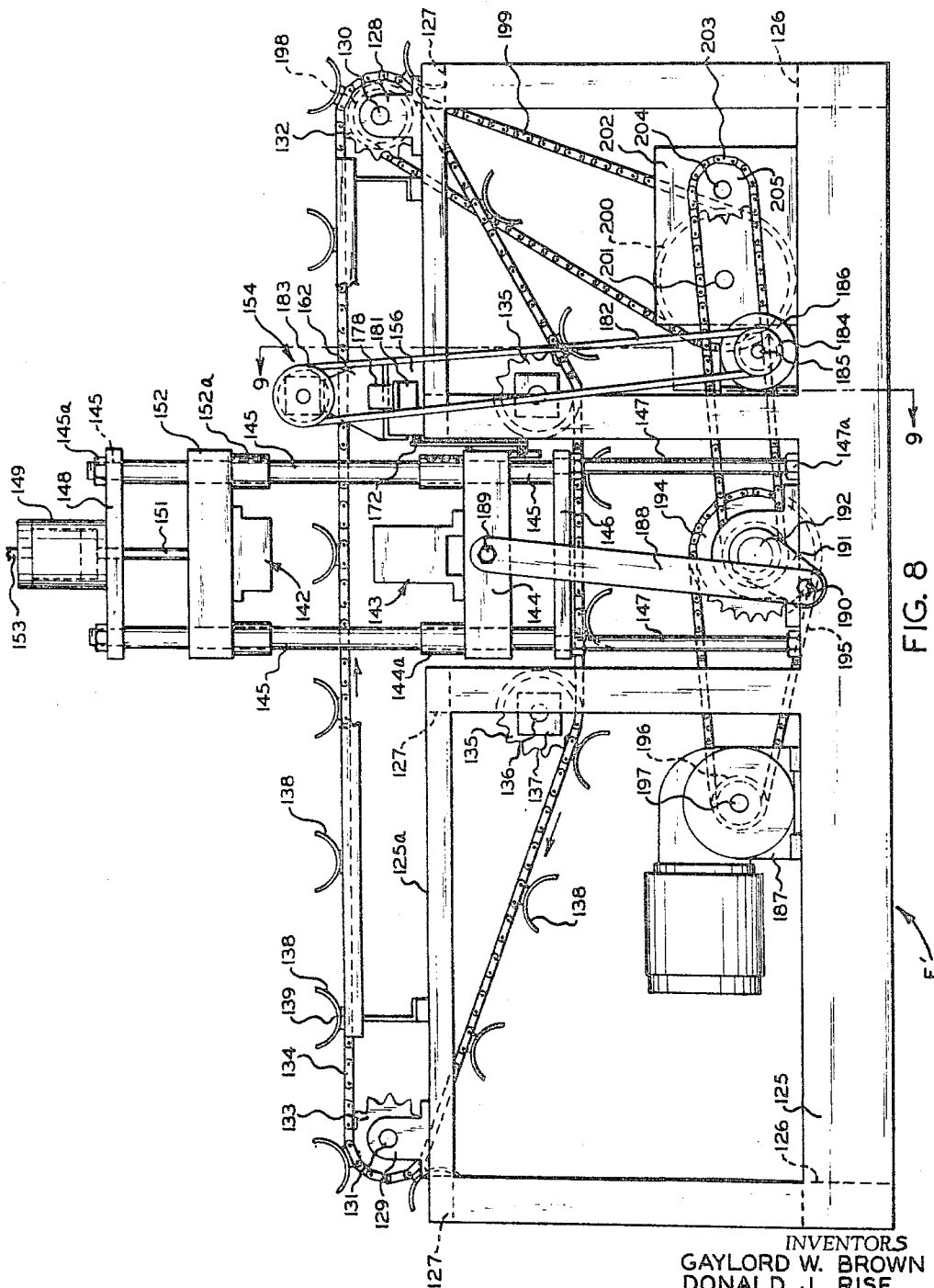


FIG. 8

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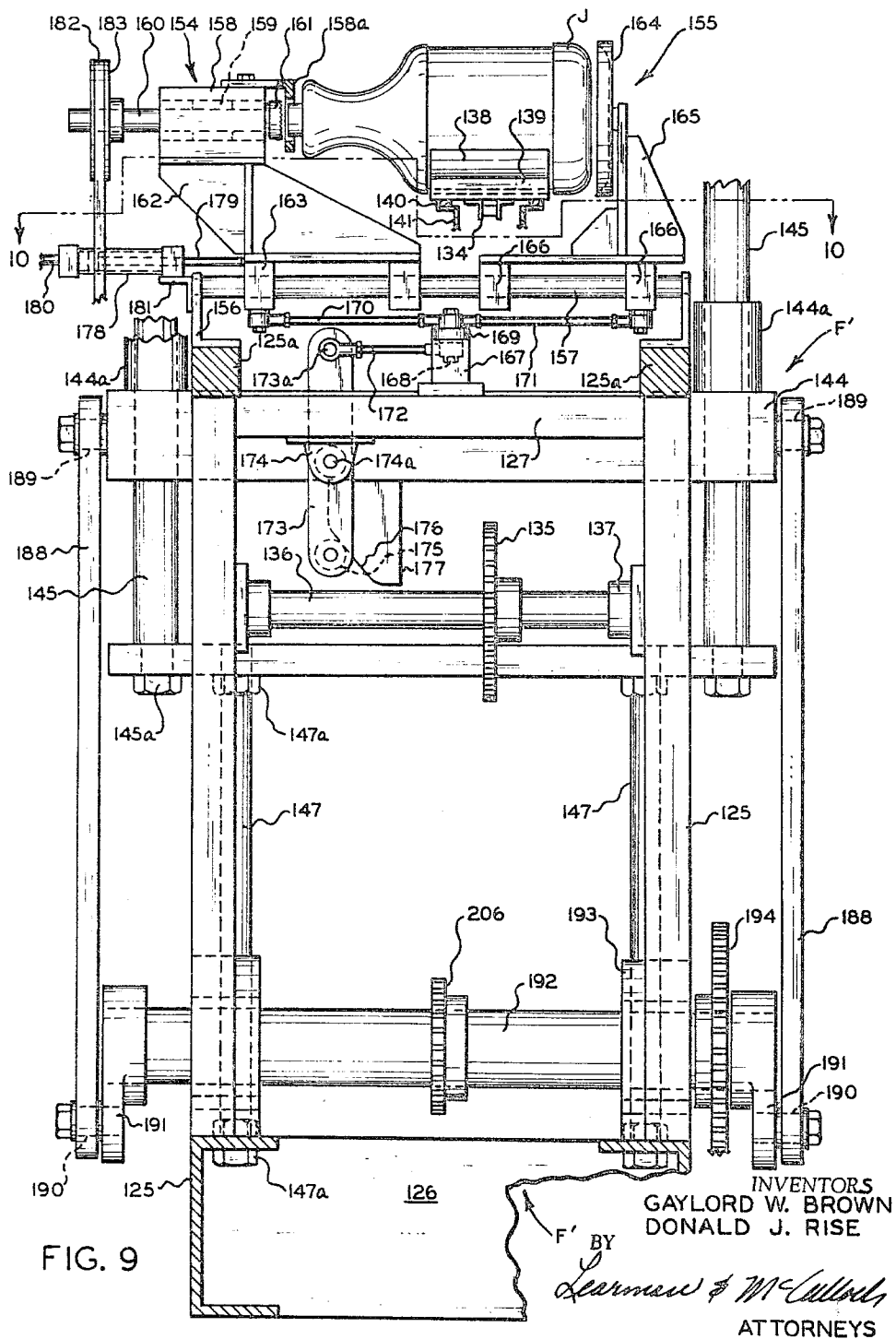
G. W. BROWN ET AL

3,228,086

FINISHING MACHINE

Filed April 23, 1963

8 Sheets-Sheet 7



Jan. 11, 1966

G. W. BROWN ET AL

3,228,086

FINISHING MACHINE

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8 Sheets-Sheet 8

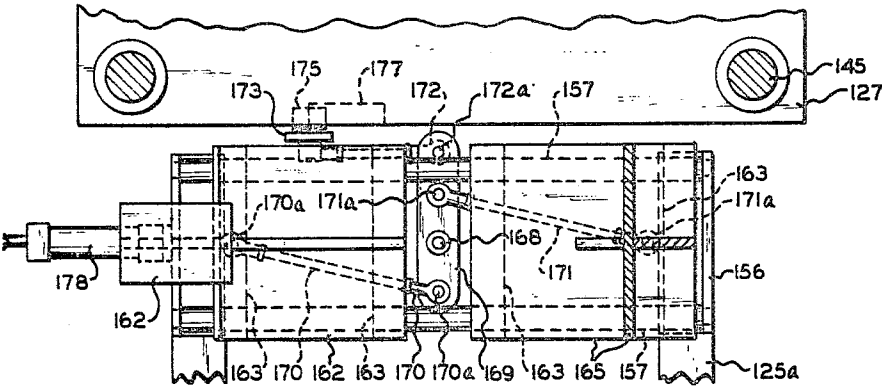


FIG. 10

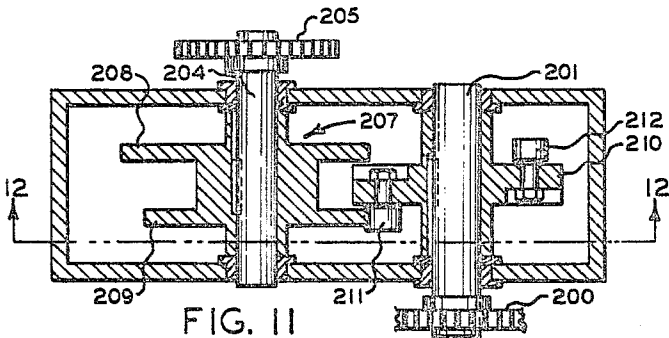


FIG. 11

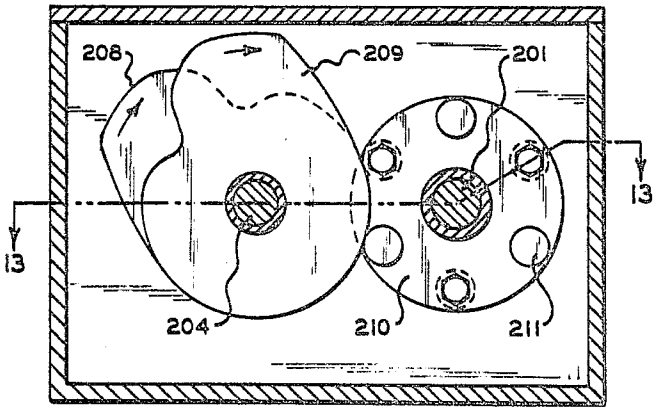


FIG. 12

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3,228,086

FINISHING MACHINE

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Filed Apr. 23, 1963, Ser. No. 275,159

22 Claims. (Cl. 29—33)

This application is a continuation-in-part of application Serial No. 203,836 filed June 20, 1962, now abandoned.

This invention relates to finishing machines and more particularly to machines for deflashing plastic containers or jars of the type illustrated in Design Patent No. 189,732, and for burring or facing the top edges of the necks thereof.

One of the prime objects of the invention is to design a relatively compact machine of the character described for efficiently and reliably removing the flash which remains usually around the neck portion and at the base of the jug-like containers.

Another object of the invention is to provide a machine which can be employed in the continuous processing of jars and which, while an indexing type machine, handles the jars rapidly enough so that it can be placed in a fabrication line without slowing or interfering with other operations which are performed.

Another object of the invention is to design a machine of an indexable nature which performs deflashing and burring operations simultaneously at a time when the jars or containers are stationary.

A further object of the invention is to provide a machine incorporating an indexable conveyor belt and both deflashing die mechanism and a deburring tool which operate in timed relation with the belt, the deburring tool including a part movable into and out of the mouth of the jar at a time when the conveyor is halted.

Another object of the invention is to provide mechanism of the character described in which movement of the dies and deburring tool toward the conveyor can occur only after the conveyor has fully indexed.

Another object of the invention is to provide a finishing machine in which air pressure is utilized to tend to prevent the entry into the jars of chips cut at the deburring station, to flush out any chips which do get into the jars, and to aid in the removal of a pilot member from the mouths of the jars after the finishing operations have been performed.

Briefly, the invention is concerned with an indexable conveyor including spaced apart carriers for the jars or containers which move the containers between deflashing or trimming dies and past a deburring station, the dies and deburring tool being moved to operative position in timed relation with the indexing movement of the conveyor and operating at a time when the conveyor is halted.

Other objects and advantages of the invention will be pointed out specifically or will become apparent from the following description when it is considered in conjunction with the appended claims and the accompanying drawings, in which:

FIGURE 1 is a side elevational view of the machine, plastic jars being shown in the saddles of the endless conveyor which moves from right to left as indicated by the arrows;

FIGURE 2 is a top plan view thereof;

FIGURE 3 is a transverse, sectional view on an enlarged scale taken on the line 3—3 of FIGURE 1;

FIGURE 4 is an enlarged, transverse, sectional view taken on the line 4—4 of FIGURE 1 with the deburring arbor in a different position in which it has advanced the burring tool into engagement with a jar;

2

FIGURE 5 is an enlarged, side elevational view illustrating the switch mechanism for initiating the movement of the die mechanism and burring tool assembly;

FIGURE 6 is a fragmentary, sectional view on an enlarged scale showing the burring tool in engagement with the mouth of a jar;

FIGURE 7 shows a typical electrical control circuit of the type which can be employed;

FIGURE 8 is a side elevational view of another embodiment of the machine;

FIGURE 9 is a transverse, sectional view on an enlarged scale, taken on the line 9—9 of FIGURE 8;

FIGURE 10 is a fragmentary, sectional, top plan view taken on the line 10—10 of FIGURE 9;

FIGURE 11 is a top plan view of drive transmitting means for moving the container supporting conveyor forwardly in increments of travel; and

FIGURE 12 is a sectional, side elevational view thereof, taken on the line 12—12 of FIGURE 11.

Referring now more particularly to the accompanying drawings, wherein preferred embodiments of the invention are shown for purposes of illustration, and in the first instance to FIGURES 1—3, a letter F generally indicates the box-like frame of the machine which, as shown, comprises side frame members 10 connected by bottom end beams 11 and upper cross beams 12. Spaced apart front bearings 13 and rear bearings 14 on the frame F support front and rear shafts 15 and 16, respectively, which mount front and rear sprockets 17 and 18, respectively, a support portion 14a mounting the one rear bearing 14 as shown. An endless table top conveyor 19 which may be of the type shown in Wynne et al. Patent No. 1,966,659 is trained around sprockets 17 and 18 and around an idler sprocket 20 mounted by a shaft 21 supported by bearings 22 on arms 23. The arms 23 are pivoted on a shaft 24 mounted by blocks 25 on a channel 26 which spans the lower midportion of the side frames 10. The arms 23 include a dependent portion 27 engaging an adjusting stop screw 28 which is threaded in a channel member 29, as shown in FIGURE 1.

Journalled on the rear conveyor shaft 16 for driving shaft 16 in one direction of rotation in a manner which will become apparent is a pinion 30 which is in mesh with a rack 31 fixed to the upper end of the piston rod 32 of a double acting, fluid pressure operated, drive cylinder 33. The cylinder 33, which is fixed to the one side frame F by bands 33a, can be a conventional, commercially available Miller A-61 solenoid operated, air cylinder or could be the well known Bellows commercial cylinder. Mounted on the rear end of the same side frame member 10 is a vertically extending channel member 34 having a block 34a on which a guide roller 35 is provided to maintain the vertical alignment of the rack 31 during its vertical travel.

In FIGURE 1 the rack 31 is shown in retracted or down position, as though it has just completed forwarding the conveyor 19, and in this position the upper and lower die assemblies generally designated 36 and 37, respectively (see FIGURES 1 and 3), are in inoperative position, as is the burring tool assembly generally designated 38 (see FIGURES 2 and 4). It will be seen that the conveyor 19 mounts a plurality of saddle members 39 which, as shown in FIGURE 2, convey jars J from right to left in FIGURES 1 and 2 through or between the dies 36 and 37 first of all, and thence past the burring tool assembly 38. As shown in FIGURE 2, the jars J, as they are fed into the machine at the right, include head flash portions x and base flash portions y, as a rule.

The die assemblies

While the specific configurations of the upper and lower die assemblies 36 and 37 which conform to the shape of

3

the jars J are not described in detail, it will be seen that the upper die assembly 36 comprises (see FIGURE 3) a head die 40 and a tail die 40a, both of which may be bolted, as at 41, to the top plate 42 of a die support frame generally designated 43 which also includes corner posts 44 and a lower plate 45 which is fixed to the side frame members 10. The ends of the posts 44 may be threaded as shown to receive the nuts 46. Fixed to the bottom plate 45 is a solenoid operated, air cylinder 47 of the same make as cylinder 33 which includes a piston rod 48 supporting a platen 49 which mounts the lower die assembly 37. The lower die assembly 37 similarly includes a head die 50 cooperable with the upper head die 40, and a tail die 51 cooperable with the upper tail die 40a, each of which can be similarly secured to the plate 49 by bolts 52. As shown particularly in FIGURE 3, the head dies 40 and 50 include saddle portions 40' and 50', respectively, which are configured to the shape of the neck portion or head of the jars J, the die 40 mounting a front cut-off knife portion 40b as shown which is substantially vertically in line with the terminal edges of the projecting threaded mouth portions z of the jars J, edges being provided on the dies 40 and 50 also to deflash the neck and handle portions n and h of the jars.

The lower tail die 51 comprises a blade 53 received in slot 54 (FIGURE 3) which is cushioned by a coil spring 55, as shown. When the piston rod 48 of the cylinder 47 is extended or raised, the lower dies 50 and 51 move upwardly to just barely engage the corresponding dies 40 and 40a and trim off the flash portions x and y shown in FIGURE 2.

The burring tool assembly

As shown particularly in FIGURES 2 and 4, the burring tool assembly, generally designated 38, comprises a burring tool arbor 56 having a reduced size, generally frusto-conical pilot end portion 56a (see FIGURE 6) and an annular burring tool 56b, the arbor 56 being mounted for rotation in bearings 57 mounted by a block 58 which is supported from an arm frame 59 as shown. For purposes of conveniently distinguishing the tool 56b from the deflashing dies, it has been referred to as a burring or deburring tool and also a cutting tool in the specification and claims, rather than as a deflashing tool. It is to be understood that the term "burring" or "deburring" as used in the specification and claims is intended to mean the removal or trimming of any rough edges or flash so as to provide the desired smooth surfaces on the mouths of the containers. The arm frame 59 includes a bearing portion 60 (FIGURE 2) for mounting the arm frame for pivotal movement on a shaft 61 which is supported by bearings 62 on the plates 63 which are secured on the one side frame member 10. A motor 64, which is mounted on the arm frame 59, drives the arbor 56 through the medium of a belt 65 trained around pulleys 66 and 67 on the motor armature shaft 68 and arbor 56, respectively. A bracket 69, secured to the side frame member 10 as shown in FIGURE 4, mounts a solenoid actuated, fluid pressure cylinder 70 which may be of the make previously described. The cylinder 70 is pivotally secured to the bracket 69 as at 71 and has its piston rod 72 pivotally connected to the arm frame 59 as at 73.

Air under pressure is supplied through a line 74 leading from a compressor tank or suitable source of air under pressure to a bore 75 which extends through the arbor 56 from end to end thereof and delivers air under pressure to the mouth of the jar J for purposes to be presently mentioned, when the arbor 56 is moved to extend its pilot 56a into the mouth z of a jar. Provided on the block 58 is an angular guide 76 which includes an opening 77 (FIGURE 6) for receiving the mouth portion z of the jar when the arm frame 59 moves forwardly to the position in which it is shown in FIGURE 4. Mounted opposite the opening 77 in the guide 76 and in axial alignment with it is a jar receiving member 78 which is fixed to a shaft 79 mounted by the piston rod 80 of a

4

conventional, single acting, solenoid energized, fluid pressure cylinder 81, the cylinder 81 being pivotally mounted as at 82 on a post 83 supported by a bracket 84 on the one side frame 10. Slide bearings 85 secured to the bracket 84 by bolts 86 support the shaft 79 for reciprocating movement and it will be seen that the shaft 79 is provided with a flange 87 which compresses a coil spring 88 when the arm 80 is moved outwardly by the cylinder 81 to engage the base of a jar J. Clearly, when the pressure fluid in cylinder 81 is permitted to bleed from the cylinder, the spring 88 will restore the rod 80 and member 78 to original position laterally outward of the path of the jars J.

Longitudinal guards 89 and 90 (see FIGURES 1 and 4) are provided for the machine, as shown. Also, so that the upward movement of piston rod 32 in returning rack 31 to a position for again indexing the conveyor belt 19 will not revolve conveyor drive shaft 16, a conventional Morse clutch of the type Model PB-6RH, which is identified herein at 91, is connected between the pinion 30 and shaft 16. The clutch 91, which is available in the marketplace, is so constructed that it will transmit rotation in one direction but not in the other, and in the present instance transmits only counterclockwise revolution of the pinion 30 in FIGURE 1 to the shaft 16. Also, a second Morse clutch of the type Model PB-SRH is employed as at 92 to transfer to a shaft 16a only the counterclockwise rotation of pinion 30 in FIGURE 1. The reason for the inclusion of clutch 92 will presently be apparent when the control mechanism is explained, and clutch 92 also functions as a brake to prevent the shaft 16 from rotating clockwise when pinion 30 is disengaged from the shaft 16 by the clutch 91. Of course, a Warner electric brake or the like could be used in conjunction with clutch 92.

It is desired that cylinder 70 be actuated to move the arbor 56 toward the jar J only when the rack 31 has completed its downward stroke and the jar J to be burred has come to rest opposite the guide 76. Mounted on the end of shaft 16a is a disk 93 (see FIGURES 2 and 5) having a pair of follower rollers 94 thereon at 180° intervals which are adapted to engage a slide 95 having an inclined edge 96. The slide 96 is mounted for reciprocal vertical travel by a slide housing 97 and is joined to the piston rod 98 of a solenoid actuated, air cylinder 99. The lower end of the cylinder 99 is pivotally mounted as at 100 to a clevis 101 on a plate 102 which also supports slide housing 97 and is pivotal on a plate 103 fixed to the one side frame 10. A cycle initiating limit switch SW-1 having a depressible, spring returned, circuit making pin or plunger 104 is fixed to the plate 103, as in an air cushioning dashpot device 105 having a depressible plunger 106. Provided on plunger 106 is a flange 107 which, when plunger 106 is depressed, compresses coil spring 108 against the housing portion 105a of the dashpot 105 and, when permitted to do so, the spring 108 will restore slide housing 97 to position, when disk 93 rotates to move a roller 94 into engagement with slide 96, the slide housing 97 is initially swung counterclockwise in FIGURE 5 about the pivot 99b to make the switch SW-1. Later, upon energization of cylinder 99, slide 96 is retracted and the roller 94 can move clockwise (in FIGURE 5) beyond the slide 96. Only clockwise motion in FIGURE 5 is transmitted by the clutch 92 to the disk 93 and thus upward movement of the rack 31 to restore it to operating position does not affect the disk 93. When the rack 31 is again moved downwardly, the roller 180° to the rear again engages slide 96 and cycle initiating switch SW-1 is again closed. An adjusting screw 109 is provided, as shown, for the dashpot device 105.

The control circuit

In FIGURE 7 a typical electrical control system of the type which may be employed is shown connected be-

5

tween line wires L-1 and L-2 which are connected with a source of power in the usual manner. As shown, start-stop relays A and B, which may be conventional Potter Brumfield relays, are provided, start-stop relay A having normally open contacts *a* and *b* which are used, and start-stop relay B having normally open contacts *c* and *d*, and normally closed contacts *e*, which are used. A start switch is shown at 109 in a line 110 with a stop switch 111 for breaking the circuit. When the start switch is depressed, relay A is energized through stop switch 111, the relay A including the usual holding coil *S*₁, which is maintained energized, when the start button is released, by the contacts *a* through circuit lines 110*a* and 110*b*. The second set of contacts *b* completes the circuit through lines 112 and 113 to energize relay B. When the contacts *d* of relay B are closed upon the energization of relay B, the circuit 114 is completed to the spring returned valve operated by solenoid 115 of the double acting cylinder 47. The contacts *c* complete the circuit through the relay coil of relay B to maintain the relay B energized. It will be seen that limit switch SW-6 (see FIGURE 1) is in the path of a dependent arm 112 on the die frame assembly 43 and has contacts 116*a* connected in a line 116 which when closed complete the circuit to the spring return valve operated by solenoid 117 of the double acting, burring cylinder 70 which forwards the burring arbor 56. When the plunger operated Mac Air Valve 119 in line 74 (see FIGURE 4) is opened by the arm frame 59 moving toward the jar opposite it and depressing spring return plunger 119*a*, air under pressure is supplied to bore 75. At the same time the advance solenoid 81*a* of cylinder 81 is energized to move member 78 forwardly. Solenoid 81*a* is in circuit line 116*c*. The burring tool motor 64 which is connected in line 113 runs as long as the contacts *a* remain closed. When the lower die members 50 and 53 meet the upper die members 40 and 40*a* a normally closed limit switch SW-3 (see FIGURE 1) which has contacts connected in line 113 is opened by the switch actuator 112 and opens the normally closed contacts *c* of relay B to deenergize the holding coil *S*₂ of relay B. This then opens normally open contacts *d* and breaks the circuit to the trim die solenoid 115 in circuit line 114 so that the lower die assembly 37 descends. When the trim die assembly 37 returns to original position, limit switch SW-6 is actuated by the arm 112 to open contacts 116*a* and break the circuit line 116 to the burring cylinder solenoid 117 to cause the cylinder 72 to retract the arbor 56 from the bottle or jar neck. At this time two-way air valve 119 is also closed to shut off the air flow through arbor 56. The closing of other normally open contacts 116*b* of switch SW-6 on the down stroke of switch actuator 112 completes a series circuit through contacts *b* of relay A, contacts *d* of relay B, and manual index switch 120 in line 121 to energize the solenoid 122 of double acting, rack actuating cylinder 33 which is in the "up" position, causing it to retract and index the saddles 39 one increment from right to left. At this time the solenoid 123 of index cylinder 99 which is connected in line 124 is energized to advance normally withdrawn slide or dog 95 but permit the disk 93 to travel one half a revolution. At the end of downward movement of rack 31 the next roller 94 is in position to again engage dog 96 to pivot housing 97 counterclockwise in FIGURE 5. Various safety interlock switches and guard safety switches may be used but form no part of the present invention and for the sake of clarity are not included.

The operation

In operation, jars J are manually or machine fed to the saddle members 39 at the right end of the machine in FIGURE 2 and are advanced in increments as noted through the die assemblies 36 and 37 and the deburring

6

tool assembly 38. Finally, the jars are discharged from the left end of the machine to a suitable conveyor or the like, the tilting of the saddle members 39 as they proceed around the sprocket 18 readily discharging the jars. When the machine is started by pressing start button 109, a jar J to be trimmed should be in position between die assemblies 36 and 37 and a jar J to be burred in position opposite the burring arbor 56. As noted, the energization of relays A and B energizes the solenoid 115 of the cylinder 47, which causes the platen 49 to move upwardly. As it does, limit switch SW-6 is actuated by the dependent actuator arm 112 to make the circuit to the solenoid 117 of the arbor forwarding cylinder 70 which moves the pilot 56*a* into the mouth *z* of the jar. The burring motor 64 was started at the time relay A was energized and rotation of the burring tool 56*b* effectively burrs the edge of the mouth portion *z* of the jar J which is in position, the guide 76 engaging the jar J in the first place as shown in FIGURE 6 and along with pilot 56*a* maintaining the mouth of the jar square to the axis of the burring tool 56*b*. The actuating of two-way air valve 119 when the arm frame 59 is swung inwardly releases air from the line 74 under a pressure of about 5 p.s.i. to the bore 75 in the arbor 56. The air creates a pressure in the jar which tends to prevent chips cut in the deburring operation from entering the jar and also to blow out any chips which manage to get in. At the time the valve 119 was energized the cylinder 81 was also energized to move the member 78 into engagement with the base of the jar J. The air pressure in jar J is also useful for blowing the jar J from the arbor 56*a* and guide 76 when the cylinders 70 and 81 are deenergized and aids the disengagement of the jar. Deenergization of the solenoid 115 of cylinder 47 occurs when the normally closed contacts of limit switch SW-3 are opened by the actuator 112. On the return stroke of the platen 49 and actuator 112 the limit switch SW-6 is again actuated and its first set of contacts 116*a* are opened to deenergize the solenoid 117 which permits the retraction of piston rod 72. The plunger of two-way air valve 119 is then released and solenoid 81*a* is deenergized. Valve 119 closes and the piston rod 80 is returned by the spring 88.

With the rack 31 having been returned to "up" position following opening of the contacts 116*b* on the upward stroke of platen 49, the making of switch SW-1 is possible upon the reclosing of the second set of contacts 116*b* of limit switch SW-6 on the down stroke of platen 49 to energize the solenoid 122 of cylinder 33. At this time, the solenoid 123 of indexing cylinder 99 is also energized to advance the dog 95 just after the adjacent roller 94 has cleared it. When the disk 93 has rotated 180° the next succeeding roller 94 engages the dog 95 to pivot the housing 97 and make limit switch SW-1. The making of limit switch SW-1 energizes the solenoid 115 of cylinder 47 once again through the contacts *d* of relay B. While double acting cylinders 33, 47, 70 and 99, of a type having single solenoids operating valves which are spring returned upon deenergization of the solenoids, have been described for the sake of convenience, it is to be understood that single acting cylinders in which the plungers are spring returned, or double acting cylinders having advance and retract solenoids, may be employed if desired.

Another embodiment of the invention

In FIGURES 8-12 we have illustrated a modified embodiment of the invention. In this embodiment of the invention a letter F' generally indicates the fabricated, box-like frame of the machine, which as shown may include side frame members 125 connected by bottom end beams 126 and upper cross beams 127. Spaced apart front bearings 128 and rear bearings 129 on the frame F' support front and rear shafts 130 and 131, respectively, which mount front and rear sprockets 132 and 133. An endless chain conveyor 134 is trained around sprockets

132 and 133, and around idler sprockets 135 mounted by shafts 136 supported by bearings 137 on the frame F'. Fixed at uniformly spaced apart intervals on the conveyor 134 are saddle members 138 which are adapted to convey and support the jars J in the same manner as previously, the saddles 138 being mounted on members 139 which attach to the links of the chain 134 as shown in FIGURE 9. Wear strips 140 can be secured to angle members 141 on the frame F' to function as longitudinally intermediate conveyor supports.

It will be seen that the upper run of the conveyor 134 which, as shown in FIGURE 2, conveys jars from left to right, travels between an upper die assembly 142 and a lower die assembly 143, the die assembly 143 being mounted on a lower platen 144 having slide bearing members 144a which support the platen 144 for vertical reciprocation on four vertical guide posts 145. The posts 145 are, in turn, supported on a platform 146 which is mounted on support members 147, as shown. Nut members 145a secure the reduced threaded ends of the posts 145 in position and similarly nut members 147a secure the reduced threaded ends of the posts 147. At their upper ends the guide posts 145 receive a die support plate 148 which mounts a fluid pressure cylinder 149 having a piston rod 151 which extends through the plate 148 into engagement with the plate member 152 on which the upper die assembly 142 is mounted, the upper plate 152 having slide bearings 152a, as shown. Air under a predetermined pressure is maintained in the cylinder 149 through a line 153 which is connected with a suitable source of air under pressure and functions to bias the die support plate 152 in the sense that it tends to maintain it in the position in which it is shown in FIGURE 8. In the event it is necessary, however, the die support plate 152 can, of course, move upwardly, so that there is no danger of damaging the dies 142 and 143 or associated mechanism if a foreign object, for instance, somehow finds its way to one of the saddle members 138.

Mounted forwardly of the die assemblies 142 and 143 a distance corresponding to the spacing between the longitudinal centers of the saddles 138 as previously is a burring tool assembly generally designated 154 and a co-operating, oppositely disposed container holding assembly generally designated 155. (See FIGURE 9.) Angle members 156, mounted on the top rails 125a of the side frames 125, support a pair of guide shafts 157 and it will be seen that each of the assemblies 154 and 155 is mounted on the guide shafts or rods 157 for movement in toward and out away from the jar J. The assembly 154 comprises a housing 158 having an internal bearing 159 journaling an arbor or spindle 160, there being a burring tool 161 mounted on the spindle 160, as before. Supporting the housing 158, which has a guide 158a, is a bracket 162 having dependent slide bearing members 163 which mount on the guide rods 157. The holder assembly 155 includes a holding plate 164 mounted by a bracket 165 which has dependent slide bearings 166 also mounted on the guide rods 157.

Pivotally mounted on a block 167 for swinging movements in a horizontal plane, as at 168 (see FIGURE 10), is a lever 169 and it will be seen that links 170 and 171, respectively, connect the lever 169 with a slide bearing 163 and 166, respectively, pins 170a and 171a pivotally connecting the links 170 and 171, as shown. Also pivotally connected with the lever 169, as at 172a, is a link 172 which pivotally connects to a lever 173, as at 173a, the lever 173 being pivotally mounted, as at 174a, by a bearing 174 depending from one of the cross frame members 127. On the lower end of lever 173 is a follower roller 175 which is adapted to be engaged by a cam surface 176 on a cam block 177 depending from the lower platen member 144, as shown in FIGURE 9. The assemblies 154 and 155 are urged inwardly toward one another by a fluid pressure cylinder 178 having a piston rod 179 in engagement with the bracket 163. Air under a predeter-

mined pressure is furnished to the cylinder 178 through a line 180 leading from a suitable source of air under pressure and it will be seen that an angle bracket 181 supports the cylinder 178 on the angle support 156.

The arbor 160 may be continuously driven by a belt 182 which is trained around the sheave 183 mounted on the arbor 160, and also around a sheave 184 (FIGURE 8) mounted on the armature shaft 185 of a suitable electric motor 186 on frame F'. Another, larger electric motor 187 is provided to drive the conveyor 134, to raise and lower the platen 144, and to move the assemblies 154 and 155 in properly timed synchronism. The motor 187 drives the platen 144 upwardly and downwardly through the medium of connecting arms or rods 188 which are pivotally connected at 189 and at 190 to the platen 144 and to crank arms 191, respectively, mounted on a shaft 192. The shaft 192, which is supported by bearings 193, mounts a sprocket 194, around which is trained a drive chain 195 which is also trained around a drive sprocket 196 mounted on the armature shaft 197 of the motor 187.

As noted, the motor 187 also drives the conveyor shaft 130, a sprocket 198 on shaft 130 being driven by a chain 199 trained around a sprocket 200 mounted on the output shaft 201 of a drive transmission mechanism 202. A chain 203 drives the input shaft 204 of the drive transmission mechanism 202 and is shown trained around a sprocket 205 on the shaft 204 and around a sprocket 206 on the shaft 192. Because the shaft 130 of the conveyor is driven from the same shaft 192 that moves the platen 144 upwardly and downwardly, plainly the conveyor 134 will be moved correlatively with the platen 144. Mounted on the input shaft 204 is a cam member generally designated 207 (FIGURES 11 and 12) which includes a pair of spaced apart cam members 208 and 209. Diametrically opposite the cam member 207 is a disk member 210 mounted on the output shaft 201, disk 210 mounting rollers 211 on the one side in the path of cam 209 and the same number of rollers 212 on its opposite side in the path of the cam 208. The configuration of the cams 208 and 209 and their speed of rotation are such that a single revolution of the input shaft 204 advances the output shaft 201 through a predetermined portion of a revolution and thence provides a dwell time until the lobes on the cams 208 and 209 again contact the rollers 212 and 211, respectively, and again move the output shaft 201.

The operation of the modified embodiment

In operation the cams 208 and 209 advance the output shaft 201, and accordingly the shaft 130, at a time when the crank arm 191 is near the bottom of its path of travel, and this advancement is equal to the spaced distance between the longitudinal centers of the saddle members 138. The conveyor 134 has come to rest by the time platen 144 has moved upwardly very far, and the jar to be deflashed is thus stationarily supported by the particular saddle member 138 when the die assembly 143 moves up into engagement with the die assembly 142. It is to be understood that the die assemblies 142 and 143 may be of the same configuration as those previously described and that there may be tail dies as well as head dies. In its travel upwardly, the cam block 177 is raised relative to the roller 175, and the air cylinder 178 is thus able to push the bracket 162 inwardly to bring the burring tool 161 into engagement with the neck of the jar J which is in stationary position adjacent the burring tool and holder plate assemblies 154 and 155, respectively. The axis of spindle 160 is spaced from the longitudinal center of the saddle 138 between die assemblies 142 and 143 a distance equal to the increment of movement of the chain 134. Because inward movement of the bracket 162 pivots lever 169 through the medium of link 170, the holder assembly 155 is also moved inwardly because of the connection of link 171 to the lever 169. Thus, at the same time that the deflashing operation is being performed during the

dwelling period of chain conveyor 134, the burring tool 161 is facing the neck of the jar J, the member 164 functioning to hold the jar J in position against the burring tool 161.

When the platen 144 descends, cam surface 176 engages roller 175 and pivots lever 173 clockwise (in FIGURE 9) to restore the position of lever 169, and this returns the assemblies 154 and 155 to laterally "out" position. In FIGURE 9 the mechanism is shown in a position in which the platen 144 is descending and the cam surface 176 has just engaged roller 175. It is not until the crank arms 191 are once again near the lower portion of the path of their travel that the cams 208 and 209 again advance the chain conveyor 134. By this time the die assemblies 142 and 143, and burring tool and holder assemblies 154 and 155, respectively, have all been moved to remote positions and do not interfere with the advance of the chain conveyor 134. Because the embodiment of the invention just described is mechanically synchronized and employs no electrical switches, it is in certain respects preferable to the first described embodiment of the invention.

It is to be understood that the drawings and descriptive matter are in all cases to be interpreted as merely illustrative of the principles of the invention, rather than as limiting the same in any way, since it is contemplated that various changes may be made in the various elements to achieve like results without departing from the spirit of the invention or the scope of the appended claims.

We claim:

1. In a finishing machine for plastic containers; frame means; vertically spaced apart, upper and lower deflashing die means thereon; conveyor means, with container carrying means thereon for disposing said containers on their sides crosswisely of the conveyor means, having a path of travel passing between said upper and lower die means; means for advancing said conveyor means; means for moving one of said die means a predetermined distance relative to the level of the conveyor means toward the other die means; cutting tool means supported by said frame means, downstream from said die means and at a predetermined incremental distance therefrom, at one side of the path of said containers for movement laterally to and from the mouths of the containers; and means for relatively revolving said cutting tool means and containers at a time when said die means is operative.

2. The combination defined in claim 1 in which said cutting tool means comprises a pilot plug for entering the mouths of the container and a burring portion thereon for facing the top of said containers; and means for revolving said tool means.

3. The combination defined in claim 1 in which said tool means is supported by shaft means; arm means pivotal on said frame means journals the shaft means and supports it from said to-and-from movement; drive means connects with said shaft means; and means is provided for swinging said arm means toward and away from said conveyor means in timed relation with the movement thereof.

4. The combination defined in claim 1 in which said tool means is tubular and means is provided for blowing air therethrough into the containers.

5. The combination defined in claim 1 in which yieldable container bracing means is mounted by said frame means opposite said tool means.

6. The combination defined in claim 1 in which means is provided for indexing said conveyor means; and means is provided for moving said cutting tool means in timed relation with the indexing of said conveyor means.

7. The combination defined in claim 1 in which one of said die means is yieldably mounted.

8. In a finishing machine for plastic containers; frame means; flash trimming die means thereon; conveyor means having a generally longitudinal path of travel for delivering the containers incrementally to said die means;

burring tool means supported by said frame means downstream an incremental distance from said die means adjacent the path of said containers; means supporting one of said conveyor means and burring tool means for relative transverse movement to bring the burring tool means to and from the mouths of the containers in timed relation with the movement of the die means; and means for relatively revolving said burring tool means and containers.

9. The combination defined in claim 8 in which said burring tool means comprises an arbor shaft having a tapered pilot on the end thereof for entering the mouth of a jar and a burring ring adjacent the pilot for facing the end of the jar mouth.

10. The combination defined in claim 9 in which said arbor shaft is tubular and means is energized to release air thereto when the pilot moves transversely.

11. In a trimming machine for plastic containers; frame means; conveyor means supported longitudinally thereon; container receiving means for said conveyor means; drive means including a drive shaft for moving said conveyor means; relatively movable die means for trimming flash from said containers through which said conveyor means passes the containers; indexing means on said drive shaft correlated with said drive means for initiating movement of said die means to deflash the exterior of a container at a time when said conveyor means is stationary; reciprocable rack means driving said drive shaft; and clutch means for transferring only movement of said rack means in one direction connected between said rack means and drive shaft; said indexing means comprising; disk means on said shaft; pivotally mounted withdrawable means in the path of said disk means; and cycle initiating switch means in the path of said withdrawable means connected to actuate said relatively movable die means when the disk means is revolved and said pivotally mounted withdrawable means are moved to actuate said switch means.

12. The combination defined in claim 11 in which a reciprocable rack means drives said drive shaft, and clutch means for transferring only movement of said rack means in one direction is connected between said rack means and drive shaft.

13. In a machine for finishing plastic containers; frame means; spaced apart deflashing die means thereon; conveyor means having a path of travel passing between said spaced apart die means; continuously driven driving means for moving said conveyor means forwardly; drive transmitting means interposed between said driving means and conveyor means operative to successively advance said conveyor and then provide a period of dwell; and means, correlated with said driving means, for moving said die means to deflash the exterior of a container during said period of dwell; one of said die means being mounted on platen means, and said drive transmission means comprising a crank arm and connecting arm connecting said driving means with said platen means.

14. In a machine for finishing plastic containers; frame means; a platen thereon; first die means on said platen; second die means spaced therefrom; conveyor means having a path of travel passing between said first and second die means; means mounting said platen on said frame means for movement in a path of travel toward and away from said second die means to deflash containers carried by said conveyor means; driving means for moving said platen in its path of travel; and fluid pressure biased means carrying said second die means.

15. In a machine for finishing plastic containers; frame means; spaced apart deflashing die means thereon; container conveyor means having a path of travel passing between said spaced apart die means; cutting tool means supported adjacent the path of said containers on the conveyor means for movement to and from an end of a container; means for moving said die means relatively to deflash the exterior of a container; and means actuated

in response to movement of said die means for moving said cutting tool means.

16. In a machine for finishing plastic containers; frame means; first and second deflashing die means in spaced apart relation thereon; container conveyor means on which the containers are disposed crosswise to the direction of travel, having a path of travel passing between said die means; cutting tool means mounted adjacent the path of said containers on the conveyor means for travel in to and out from the mouths of the containers; means for relatively revolving said cutting tool means and containers; platen means mounting one of said die means for movement toward and away from the other to deflash said containers; and link means connected to said cutting tool means and operative in response to movement of said platen means to cause said travel of said burring tool means.

17. The combination defined in claim 16 in which container holding means is mounted on said frame means opposite said burring tool means for movement in to and out from the bottom ends of said containers, and link means is connected to move said container holding means in unison with said burring tool means.

18. The combination defined in claim 16 in which cam means on said platen means controls movement of said link means.

19. The combination defined in claim 18 in which said link means comprises a pivotally supported lever and links leading from opposite ends thereof to each of said burring tool means and container holding means; means normally urging said burring tool means and container means in toward a container; and means connected to said lever disposed in the path of movement of said cam means and when engaged thereby moving said burring tool means and container holding means outwardly.

20. In a machine for finishing plastic containers; frame means; vertically spaced apart upper and lower deflashing dies thereon; longitudinally extending endless conveyor means having an upper run passing between said dies; longitudinally spaced saddles for carrying the containers crosswise to their path of travel; driving means; continuously driven drive transmitting cam means connected thereto and operative to successively advance said conveyor a predetermined increment of travel and then provide a period of dwell; vertically reciprocable platen means carrying the lower die; continuously driven crank arm and connecting rod means connected to said platen means and timed with the movement of said conveyor means to raise said platen means to engage said dies during said periods of dwell.

21. In a machine for finishing plastic containers; frame means; upper and lower deflashing dies thereon; conveyor means having a run passing between said dies; longitudinally spaced saddles for carrying the containers crosswise to their path of travel; driving means; continuously driven drive transmitting cam means connected thereto and operative to successively advance said conveyor a predetermined increment of distance and then provide a period of dwell; vertically reciprocable platen means car-

rying the lower die; means connected to said platen means and timed with the movement of said conveyor means to raise said platen means to engage said dies during said period of dwell; burring tool means adjacent the said run of the conveyor at a spaced incremental distance from said dies; means mounting said burring tool means for in and out crosswise travel relative to the containers on said conveyor; container holding means mounted opposite said burring tool means for in and out crosswise travel relative to the containers on said conveyor; pivotal central lever means swingable in a horizontal plane; link means connecting the ends of said lever means with each of said burring tool means and container holding means for in and out movement in unison when said lever means is pivoted; cam means carried by said platen means; means normally biasing said burring tool means and container holding means to inward position into engagement with the ends of a container; and actuating means on said frame means engaged by said cam means during downward travel of said platen means to pivot said lever means and move said burring tool means and container holding means outwardly.

22. In a machine for finishing plastic containers; frame means; longitudinally extending endless conveyor means having an upper run passing between said dies; longitudinally spaced members for carrying the containers crosswise to their path of travel; driving means; means connected thereto operative to successively advance said conveyor a predetermined increment and then provide a period of dwell; facing tool means adjacent the said run of the conveyor; means mounting said facing tool means for in and out crosswise travel relative to the containers on said conveyor; container holding means mounted opposite said facing tool means for in and out crosswise travel relative to the containers on said conveyor; lever means; link means connecting said lever means with each of said facing tool means and container holding means for in and out movement in unison when said lever means is actuated; and actuating means on said frame means to actuate said lever means and move said facing tool means and container holding means inwardly into engagement with opposite ends of a container during said periods of dwell, and for returning them.

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