

Jan. 8, 1963

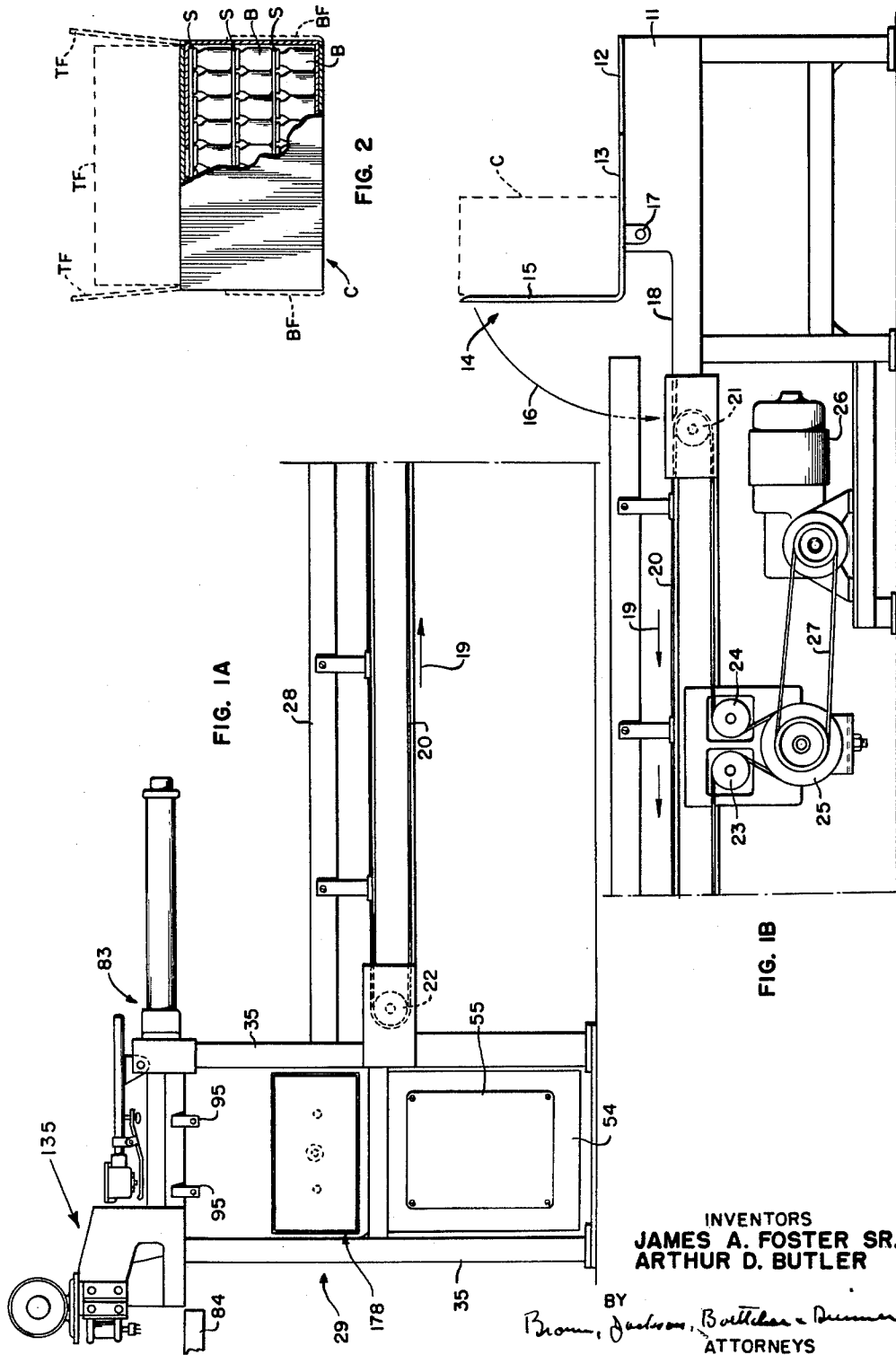
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UNLOADING DEVICE

Filed May 25, 1959

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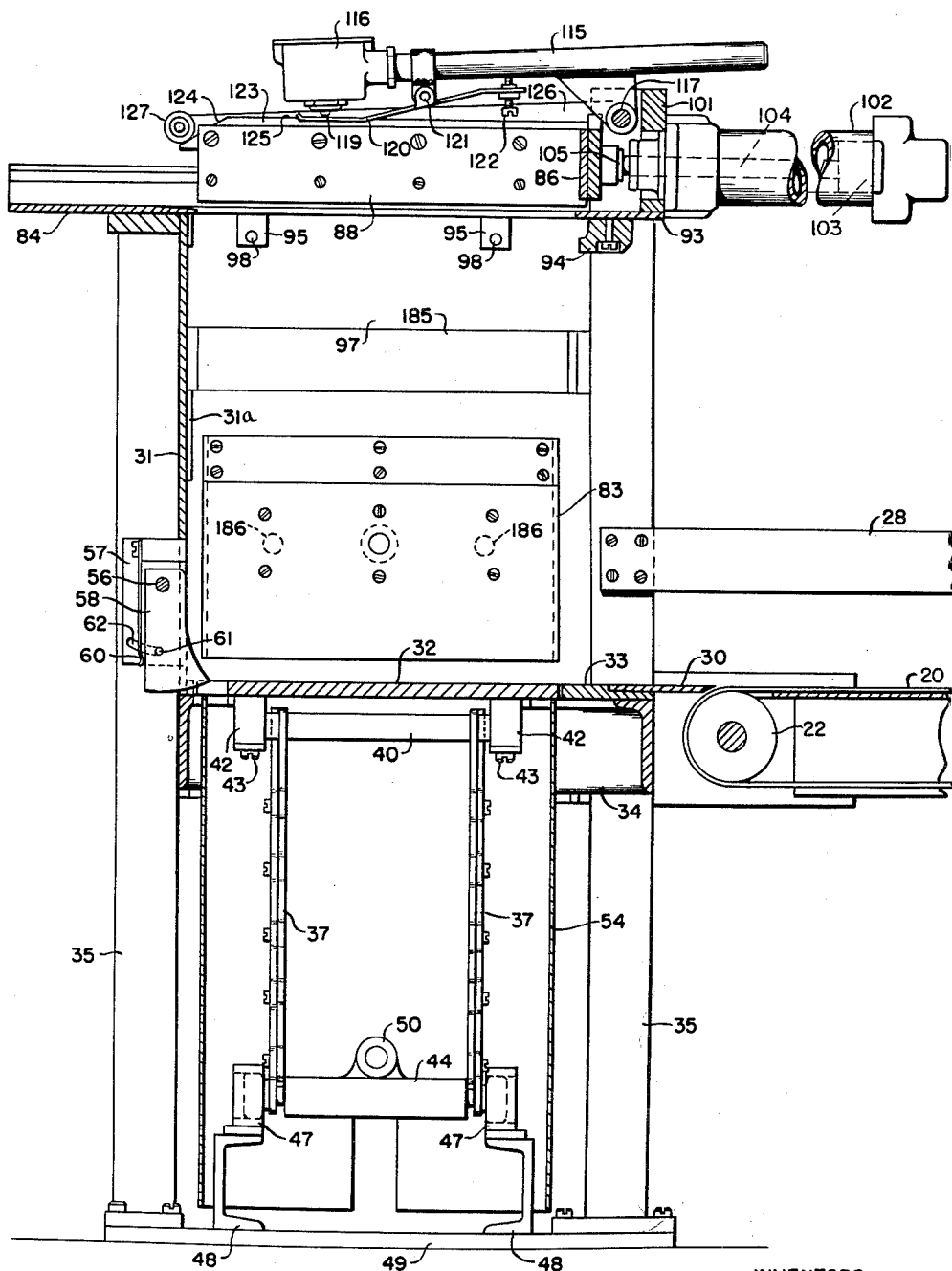


FIG. 3

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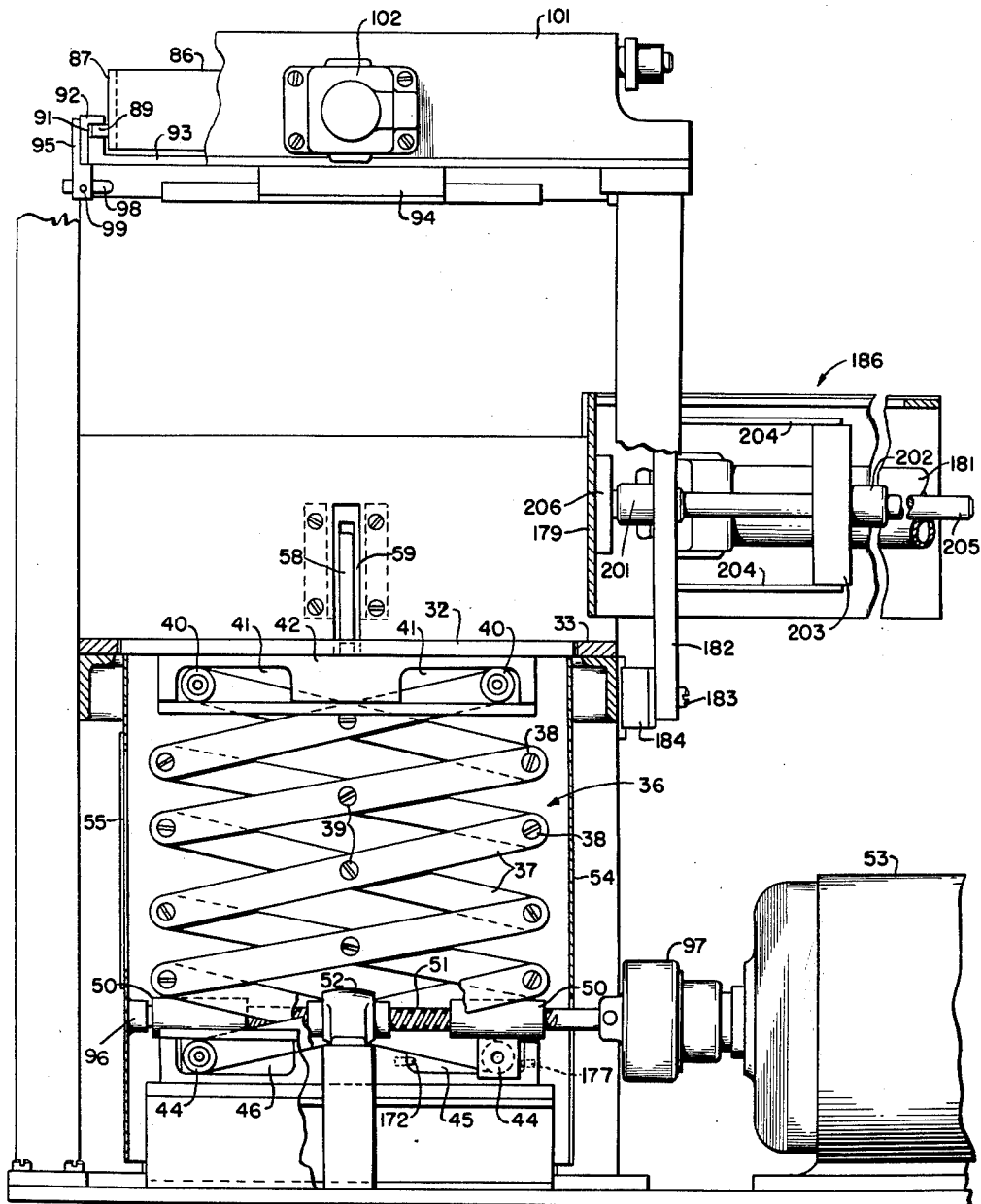


FIG. 4

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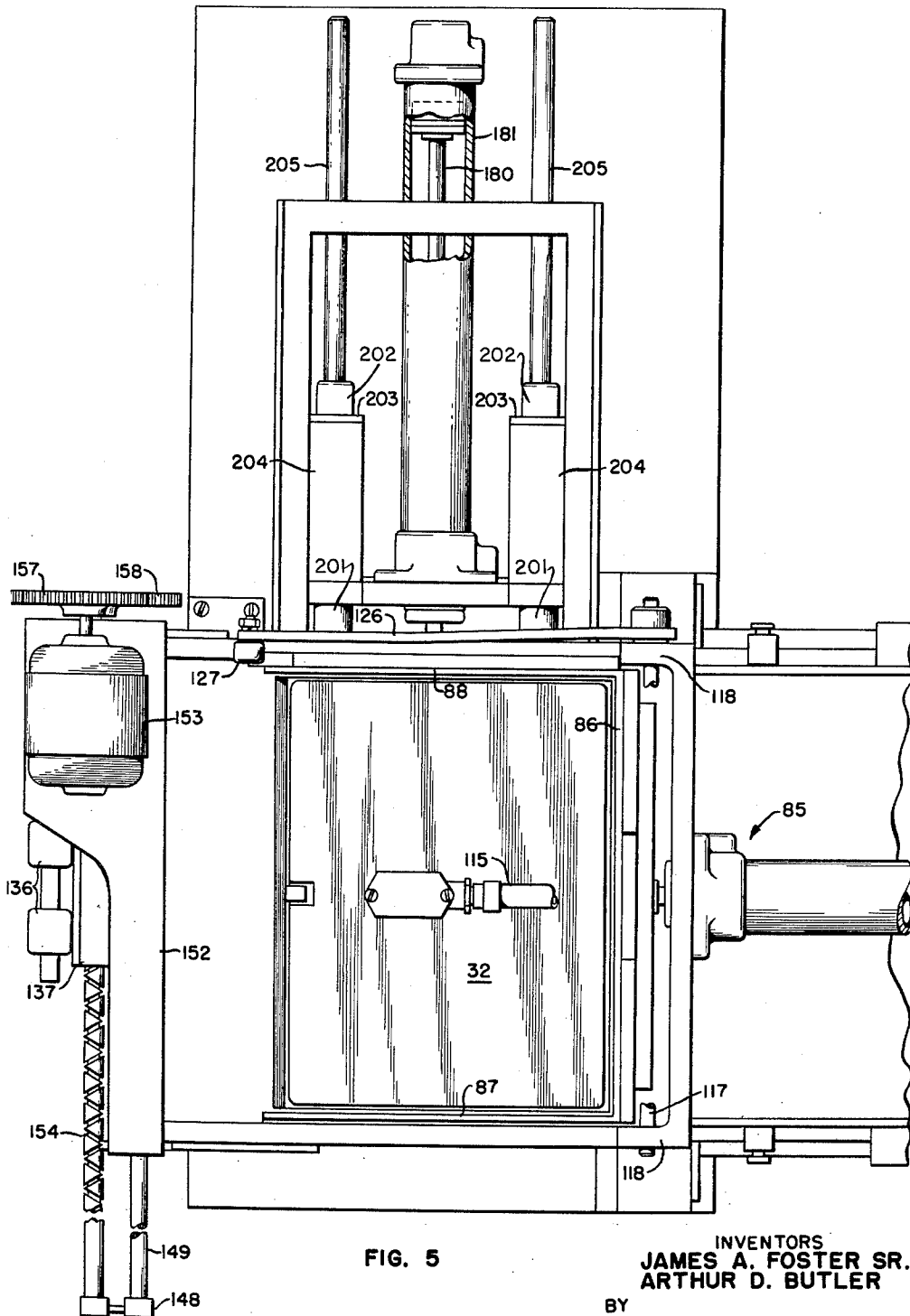
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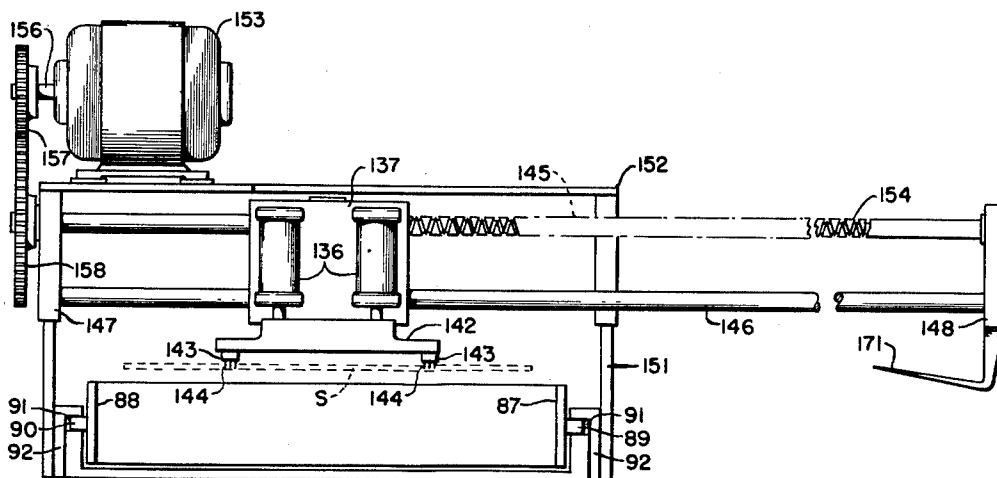


FIG. 6

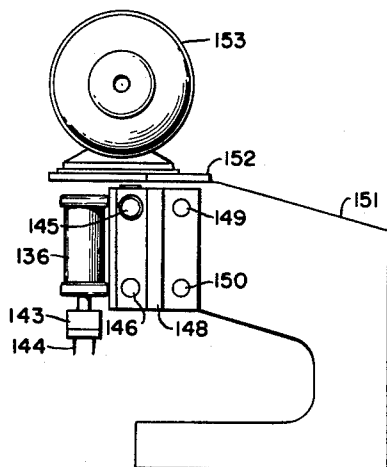


FIG. 7

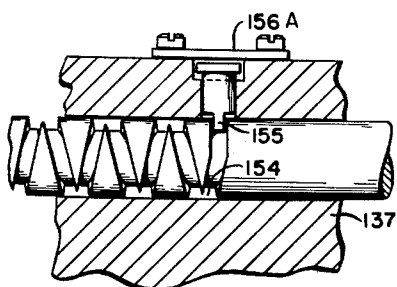


FIG. 8

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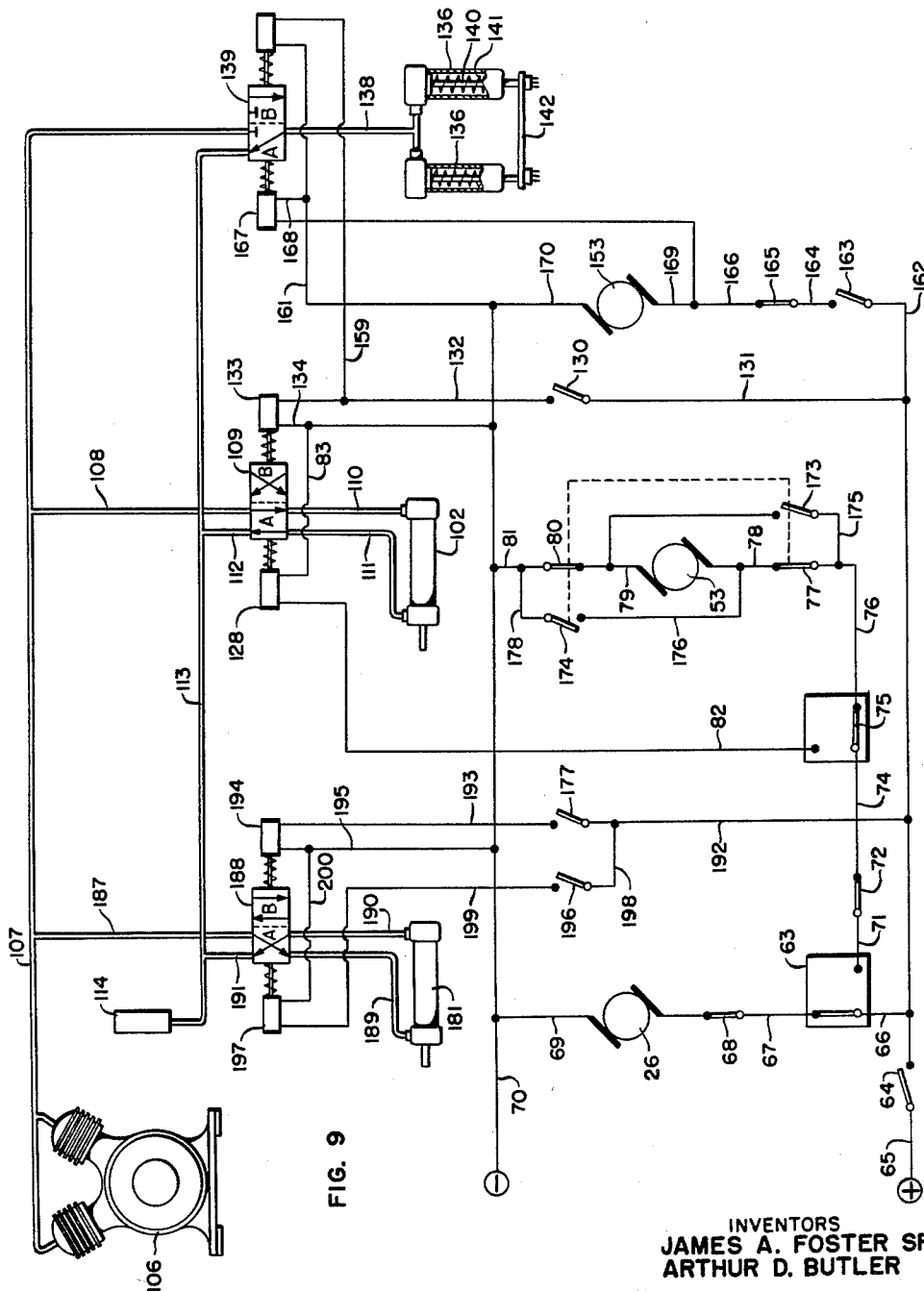
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6 Sheets-Sheet 6



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UNLOADING DEVICE

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Filed May 25, 1959, Ser. No. 815,446

4 Claims. (Cl. 214-310)

This invention relates to the packaging art and more particularly to novel and improved means and method for unloading bottles from a shipping carton or the like in which they have been packed.

Conventionally bottles are quantity-packed in cartons of corrugated paper or the like for convenience in shipping. Often, particularly when of sufficiently small size, the bottles are arranged by tiers within such cartons and between each tier is located a divider or spacer sheet of cardboard. Removing the thus tiered bottles from their shipping carton and setting them up in erect position ready for use, has normally been done by hand and constitutes a slow and tedious as well as expensive operation. Where a large number of bottles are needed to satisfy a manufacturer's daily packaging requirements, several employees may be needed on a full time basis just to unload the bottles from the shipping cartons. The bottles unloading operation alone in many instances consequently can represent a major portion of the packaging costs and so as to directly influence the total cost of the manufacturer's product.

Therefore, a principal object of the invention is to provide novel and improved means and method by which bottles may be efficiently, quickly and conveniently removed from a carton in which they are packed and at a low unit cost.

A further object of the present invention is to provide an essentially automatic device which will be useful, with a minimum of manual assistance, to unload bottles from their shipping cartons and present them in upright position ready for use in the succeeding steps of a packaging operation.

Another object of the invention is to provide such a bottle unloading device which will be useful to unload bottles, one tier at a time, from a shipping carton containing several tiers thereof.

Still another more specific object of the invention is to provide a device which will automatically and quickly remove one tier of bottles at a time from a carton having its bottom and top ends previously opened, presenting each tier of bottles in an upright erect position onto a receiving surface, removing the spacer sheets and disposing them to one side of the apparatus or device, and after each of the tiers and spacer sheets have thus been removed discharging the empty carton from the device readying it for the next carton of bottles to be unloaded.

Another object of the invention is to provide a device of the aforesaid character further having means for successively feeding cartons into position for said unloading operations as each emptied carton is discharged.

Other more specific but important objects of the invention are to provide such a device which will be simple to construct, operate and maintain, as well as being efficient, economical and practical in its operation.

In accordance with these objects, the invention comprises means and/or method involving an apparatus or device which, in order to be useful for unloading bottles from a packed carton thereof will include a narrow ledge of rectangular shape on which to set the bottom edge of each carton to be unloaded after its top and bottom ends have been opened and which device has an elevatable member surrounded by said ledge and level therewith on which to rest the bottles within the loaded but thus opened carton, said member being of a size slightly smaller than

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the internal size of the carton so as to be elevatable through the carton and to raise the bottles above the level of its opened top, together with a first means movable in a horizontal plane to move the bottles off the thus elevated support onto a receiving member, and further means to discharge the emptied carton from said ledge after said first means has been retracted and the elevatable member lowered to its starting position level with the ledge.

The invention further contemplates that such an apparatus or device will have additional means for picking up and removing spacer sheets such as aforementioned and furthermore that said several means and elevatable member will be so controlled that in unloading a carton containing tiers of bottles arranged with separating spacer sheets, the bottles will be removed one tier at a time and each spacer sheet will be removed before the next tier of bottles is moved to the receiving member.

It is also contemplated that the aforescribed bottles elevating, bottles pushing, spacer sheet pick up and removal and carton discharging means or parts of the invented device will perform their functions, in succession, automatically and as required to complete the unloading operation. Furthermore it is contemplated that said apparatus will include means under the control of the aforementioned operating parts to successively and automatically locate cartons on the receiving ledge and elevatable member as quickly as one carton is emptied of the bottles and discharged therefrom.

Thus in utilizing a device in accordance with the invention the operator's job will consist primarily in slitting or otherwise opening the top and bottom ends of the cartons and locating the thus opened cartons on the feeding means, the actual loading of the cartons on to the carton receiving ledge and elevatable member as well as the actual bottle unloading operations being carried out automatically and preferably at a rate controlled in accordance with the rate at which the operator can open the ends of the cartons and place them on the feeding means.

The invention furthermore contemplates novel means and method as will be hereafter described for minimizing the actual handling of the cartons in the process of opening the bottom and top ends thereof whereby to further increase the speed, convenience and general efficiency of the overall bottle unloading operation.

Many other objects, advantages and features of the invention will be apparent, or will readily become so, from the description of the invention which follows. Furthermore it is to be understood that the said description is not to be taken in a limiting sense but rather as illustrative of the invention, that which is new and patentable in the invention being defined by the appended claims.

Now referring to the several views shown in the accompanying sheets of drawing wherein like parts are identified by like reference numerals;

FIGURE 1A is a side elevational view of a device constructed in accordance with the invention;

FIGURE 1B is a continuation of FIGURE 1A;

FIGURE 2 shows in side elevation a shipping carton and which is partially fragmented to disclose the arrangement of bottles and spacer sheets packed therein;

FIGURE 3 is a vertical sectional view taken through the device and in the same plane as FIGURE 1A;

FIGURE 4 is a partially fragmented vertical sectional view taken through the device at substantially right angles to the plane shown in FIGURE 1;

FIGURE 5 is a top view of the device also partly fragmented;

FIGURE 6 is a fragmented elevational view taken from the left of FIGURE 1A and on an enlarged scale to illustrate the spacer card pick up and discharge mechanism;

FIGURE 7 is a view taken of the mechanism shown in FIGURE 6 and from the right hand side thereof;

FIGURE 8 is a fragmented view taken on a greatly enlarged scale to show how movement of the pick up device of FIGURE 6 is effected; and

FIGURE 9 is a schematic view of an electrical circuit and air system which operate the various mechanisms comprising the device.

Referring first to FIGURES 1A and 1B, an embodiment of the invention is there seen to comprise a table 11 having a working surface 12 at a convenient height on which the shipping cartons C filled with bottles may be located for opening their bottom ends. Such cartons will usually contain two or more tiers of bottles B and in FIGURE 2 a carton having three tiers of bottles is illustrated. Ordinarily, in packing the bottles into cartons, each tier is covered by a protective thickness of carboard S which also provides a surface on which the next layer or tier of bottles may be packed into the carton.

Preferably, each carton is prepared for the unloading operation by setting it on surface 12 with its bottom end up so that its bottom end flaps may be pulled apart first. The carton is then turned on its side, and, with its bottom end flaps BF folded back along the sides of the carton as illustrated by phantom lines in FIGURE 2, the carton is moved over onto surface portion 13 of the loading member 14 so that the now exposed bottom ends of the lower tier of bottles lie against the vertical portion 15 of said loading member. The position of the carton is shown by phantom lines in FIGURE 1B. Under the weight of the carton C, loading member 14 is pivoted in the direction indicated by arrow 16 about its hinged connection at 17 so as to locate portion 14 on surface 18 of said table 11. In this new position of loading member 14, carton C has been righted so that the top end of the carton is now uppermost. In this position, the top end flaps TF are pulled apart, and may be left in the upright position indicated by dotted lines in said FIGURE 2.

Immediately ahead of surface 18 is a continuous conveyor belt 20 which is driven about pulleys 21 and 22 in counterclockwise direction, as indicated by arrows 19. As illustrated in FIGURE 1B said drive may be accomplished by passing a section of said belt 20 over tension wheel 23, under drive wheel 25, and over wheel 24 which is adjacently spaced to wheel 23, drive wheel 25 being drivingly connected to a motor 26 as by a chain 27. Any other suitable arrangement for driving conveyor belt 20 may be employed.

The thus opened carton is pushed off portion 14 onto the conveyor belt 20 which carries the carton between spaced guide rails 28 to the bottle unloader indicated generally at 29. Under the urging of succeeding cartons which are similarly opened at their top and bottom ends and pushed onto conveyor belt 20 from loader 14, the foremost carton is moved off the belt onto the protruding lip 30 into the unloading device 29 where it comes to rest against wall 31 or abutment means 31A provided on said wall.

Turning now to FIGURES 3, 4 and 5, the unloading device 29 is seen to include an elevatable platform 32 of generally rectangular shape and of a size only slightly smaller than the inner dimensions of the carton of bottles which are to be unloaded. Surrounding said elevatable platform 32 is a narrow ledge 33 secured by a bracket 34 to spaced uprights 35, the upper surface of said ledge 33 being disposed in a plane substantially at the height of top level of the conveyor belt and to which ledge 33 the aforementioned lip 30 is fixedly secured. As seen best in FIGURE 4, the elevatable platform 32, in its lowered position, is held essentially flush with the surface of ledge 33 and as each carton is fed off belt 20 and against wall 31, it is located so that its lower edges rest on ledge 33 while the bottles within the carton rest on the elevatable platform 32.

Although any appropriate means may be used to elevate

platform 32 relative to ledge 33, in order to raise the bottles out through the thus located carton's top end, a scissor jack 36 such as shown best in FIGURES 3 and 4 has been found conveniently simple and easy to operate. Such a jack 36 will comprise two spaced sets of elements 37 pivotally connected together at their opposed ends as by means 38, and also at their midpoints by similar means 39. The outboard or free ends of the two uppermost of the thus pivotally connected elements 37 of each set are joined by a pair of rollers 40, 40 rotatably connected between said ends, said rollers 40, 40 having their opposite ends extending into horizontal cutouts 41, 41 provided in a pair of spaced race blocks 42, 42 fixedly mounted to the underside of platform 32 as by screws or bolts 43. The outboard or free ends of the lowermost pair of elements 37 in each set are also rotatably connected to the ends of a pair of rollers 44 and which rollers have their opposite ends riding in horizontally disposed cutouts 45 and 46 provided in a pair of race blocks 47, 47 fixed to supports 48 mounted on base 49 to which uprights 35 are preferably also bolted. Each of said rollers 44 as shown in FIGURE 4 has a sleeve portion 50 which is threadedly connected with a shaft 51 rotatably supported in an arbor 52 supported on said base 49 intermediate said pair of sleeves 50. The outboard end of said shaft 51 is shown rotatably supported in bearing 96 and its inboard end connected to the armature of a motor 53 through a friction clutch 97. Said shaft 51 is provided with right hand external threads to one side of the arbor 52 and with left hand external threads to the other side thereof. When rotated in one direction by the motor 53, said shaft 51 will therefore move the sleeves 50, 50 inwardly toward each other to effect elevation of platform 32 and when rotated in the opposite direction will move the sleeves 50, 50 further apart to lower platform 32. If desired, the mechanism embodying said jack 36 and its operating parts may be concealed by an enclosure wall 54 having an opening provided with a removable cover 55, through which opening access to the jack may be conveniently gained when required.

Pivotally mounted at 56 between a pair of members 57 fixed to wall 31 is a pawl 58 which protrudes through a slot 59 formed in said wall 31 under the tension of a spring 60 so as to be engaged by a carton C fed off the conveyor belt 20 and against abutment 31A on its supporting wall 31. Pawl 58, as seen in FIGURE 3, is provided with a pin 61 riding in arcuate slot 62 and which serves to actuate a switch indicated in FIGURE 9 at 63. Referring to said FIGURE 9, where electrical and air pressure circuits utilized in operation of the described device are shown in schematic form, when main switch 64 in power line 65 is closed, this completes a circuit through line 66, the mentioned switch 63 which is in its indicated closed position when pawl 58 is unengaged, line 67, normally closed switch 68, motor 26, and line 69 to power line 70. Motor 26 is thus energized to operate conveyor belt 20 and feed a carton C onto platform 32 and ledge 33. However, as soon as the carton engages pawl 58, switch 63 moves to its alternate position which opens the circuit through motor 26 to stop the conveyor belt and also completes a new circuit through line 71, normally closed relay switch 72, line 74, switch 75, line 76, normally closed switch 77, line 78, motor 53, line 79, normally closed switch 80, line 81 to power line 70. Motor 53 is thus energized so as to turn its shaft 51 in a direction which will cause jack 36 to raise platform 32.

Each carton C as it comes off the conveyor belt 20, as previously mentioned, is held snugly against wall 31 or abutment 31A by the succeeding line of cartons waiting on the conveyor belt to be fed into its place, wherefore the carton C remains on the ledge 33 as platform 32 is raised through the open bottom end of the carton C by jack 36 and moves the bottles up through the opened top end of the carton to a position where a tier of bottles B and its cardboard spacer S can be pushed to one side of

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the unloading device onto a receiving surface 84 and thence to a revolving turn table or the like for filling and/or other operations.

For this purpose, bottle pusher means indicated generally at 85 are utilized which comprise a U-shaped bottle catcher having a rear wall 86 and a pair of spaced side walls 87 and 88 disposed at substantially right angles to its rear wall 86. Said rear and sidewalls are dimensioned as seen in FIGURE 5 to approximate the shape of platform 32 and to include an area only slightly larger so as to encompass on three sides the tiers of bottles which are raised out of each carton C lodged on ledge 33. As seen best in FIGURES 4 and 6, said sidewalls 87 and 88 are provided with keys 89 and 90 which extend longitudinally along their outer side and are slidably confined within a pair of ways 91, 91 formed in members 92, 92. Said members 92, 92 are shown mounted on a supporting plate 93 secured between a pair of said uprights 35. Preferably flap stops are provided at 94 and 98 to resist raising of the carton C into the area of the bottle catcher represented by walls 86, 87 and 88. Flap stop 94 is shown bolted to the underside of plate 93 and serves to engage the rear one of carton top flaps TF. Flap stops 98 are shown as horizontally extending pins which are adjustably mounted in supports 95 bolted to way-forming members 92 and serve to engage the two side top flaps TF of the carton C. Set screws 99 adjustably secure said pins 98 in their respective supports 95.

Fixedly mounted on plate 93 is brace 101 which supports an air cylinder 102 including a reciprocal piston 103 having its stem 104 attached to wall 86 as at 105 (FIGURE 3). Referring to FIGURE 9, movement of piston 103 in air cylinder 102 is obtained by air directed under pressure from a compressor 106 through air conduit 107 to conduit 108 from whence it is directed by means of valve 109 when in position "A" through conduit 110 into cylinder 102 to one side of piston 103, air on the opposite side of piston 103 exiting via conduit 111, valve 109, conduit 112, conduit 113 and out through air muffler 114. This effects movement of the bottle pusher 85 along ways 91, 91 to push a tier of bottles raised by platform 32 into the confines of bottle catcher 86, 87, 88 onto the mentioned receiving surface 84. Thereupon the bottle catcher is returned by shifting valve 109 to its "B" operation position, whereby pressurized air from said compressor 106 is directed through conduit 111 into cylinder 102 on the opposite side of the piston 103 to return it to the illustrated position.

Actuation of said control valve 109 is obtained automatically by the following means. A feeler rod 115 supporting a switch box 116 at one end is pivotally mounted intermediate its ends on a pivot member 117 fixed at its opposite ends into angled end portions 118 of member 101. On the underside of switch box 116 is a contact 119 actuable by a feeler plate 120 which is pivotally connected intermediate its ends at 121 to feeler rod 115 and having a set screw 122 by which the plate 120 may be held out of engagement with contact 119. To sidewall 88 of the bottle pusher is secured a longitudinal cam 123 having an inclined surface 124 and a horizontal surface 125. Cooperating therewith is a pivot arm 126 pivotally mounted at one end on pivot rod 117 and carrying a cam follower 127 on its free end whereby as the bottle pusher is moved in a direction longitudinally of cam 123 so as to discharge a tier of bottles onto surface 84, it effects a rocking of arm 126.

Referring now to FIGURE 9, when the bottles have been raised by platform 32 sufficiently that a tier of bottles has entered the confines of the bottle catcher represented by walls 86, 87 and 88 so that the bottom of said bottles are above or at least level with the surface 84, their covering spacer sheet S has been brought against feeler plate 120 which engages contact 119. Engagement of contact 119 causes switch 116 to operate a relay not shown which opens switch 75 to motor 53 causing the

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motor to stop and the rise of platform 32 to be halted. Said relay also moves switch 75 to a second position where it completes a circuit through line 82, solenoid 128 and lines 83 and 134 to main line 70. Solenoid 128 thereupon actuates control valve 109 to its position "A," which admits air into cylinder 102 and causes piston 103 to move the bottle pusher 85 across the platform, to remove the tier of bottles and its overlying spacer sheet therefrom onto surface 84. As piston 103 advances the bottle pusher, switch 130 is closed by the upward rocking of arm 126. This completes a circuit from power line 65 through line 131, switch 130, line 132, solenoid 133, and line 134 to power line 70, which energizes solenoid 133, causing control valve 109 to be returned to its operating position "B" whereupon flow of pressurized air into cylinder 102 is reversed and piston 103 returns the bottle pusher to its first position. As the bottle pusher 85 thus discharges the bottles and spacer onto surface 84 and completes its cycle under the control of piston 103 in cylinder 102, plate 120 moves out of engagement with contact 119. This allows switch 116 to return to its original position whereupon switch 75 closes the circuit to motor 53 which again operates to raise platform 32 and cause a further tier of bottles to be raised through the open top of carton C into the confines of bottle catcher 86, 87, 88, whereupon feeler plate 120 is again urged against contact 119 to reactuate switch 116. The rise of the platform 32 is then stopped as before, and the process is repeated until all of the tiers of bottles have been raised out of the carton and discharged onto surface 84 by bottle pusher 85.

To remove the spacer sheet which covers each tier of bottles thus pushed onto receiving surface 84 means indicated generally at 135 (FIGURE 1A) are employed. Said means includes a pair of vertical air cylinders 136, 136 mounted on a carrier block 137 in spaced parallel relation which, as shown in FIGURE 9, are connectable by air conduit 138 to a control valve 139 having operation positions "A" and "B." Said control valve connects with conduit 107 to receive pressurized air from compressor 106 and also connects with conduit 113 to permit discharge of air through muffler 114. Reciprocally disposed within said cylinders 136 are pistons 140 held in retracted position within the cylinder by compressible springs 141. On the lower end of the stems of said pistons is supported a member 142 carrying buttons 143 having downwardly projecting pins 144 or other sharpened means which press into the cardboard spacer S when air admitted into the cylinder 136 forces the pistons downwardly against springs 140 and lifts the spacer off the bottles when the pistons 140 are returned by the springs. Said block 137, as seen in FIGURE 7, is mounted on a pair of spaced horizontal rods 145 and 146 secured at one end to a U-shaped plate 147 and at their opposite end to an end member 148. Said end plate 147 and member 148 further support a second pair of spaced rods 149, 150 located rearwardly and essentially parallel to said first mentioned rods. These second rods 149 and 150 pass through a second U-shaped plate 151 intermediate their ends, said second plate 151 and first plate 147 being fastened respectively to members 92 and with connection plate 152 forming a support for motor 153. As shown in FIGURE 6, rod 145 is provided with a continuous external thread 154 which spirals from a point midway between plates 147 and 151 out to adjacent the end plate 148, and then back on itself to the starting point to provide a continuous spiralling track thereabout. As shown in FIGURE 8, block 137 is provided with a dog 155, which is secured to the block by plate 156A and which engages external thread 154. Shaft 156 of motor 153 is provided with a pinion gear 157 which meshes with a second gear 158 on the end of rod 145. Consequently, when motor 153 is energized, rod 145 will rotate to drive block 137 outwardly along rods

145 and 146 toward end plate 143 and back to its starting point.

Now referring again to FIGURE 9, it will be understood that the lifting of arm 126 not only closes switch 130 to energize solenoid 133 to return the bottle pusher at the end of its stroke, but it also completes a circuit through line 159, to solenoid 160, line 161 to power line 70 to energize solenoid 160. Solenoid 160 when thus energized moves control valve 139 to its position "B" which allows air under pressure to enter cylinders 136 and forces block 142 downwardly against the pressure of springs 141, pressing pins 144 into the cardboard material of spacer sheet S which has now been located by the pusher means 85 therebeneath. The lifting of arm 126 also completes a second circuit from power line 65, line 162, switch 163 which closes with the closing of switch 130, line 164, normally closed switch 165, line 166, solenoid 167, line 168, line 161 to power line 70. The thus energized solenoid 167 returns control valve 139 to position "A" which allows air in cylinder 136 to escape and block 142 to be raised under the now permitted expanding action of springs 141. This effects lifting of the spacer sheet off the tier of bottles. Closing of switch 163 also completes a circuit from line 166 through line 169, motor 153 and line 170 to power line 70, to energize motor 153, whereupon the spacer sheet caught by pins 144 is carried to the right of FIGURE 6 where it is forced off pins 144 as it engages beneath an inclined finger 171 supported by plate 148, spacer sheet S dropping into a convenient receptacle not shown. As the bottle pusher 85 is returned to its starting position and arm 126 returns to its initial position rest, switches 130 and 163 open so that motor 153 is stopped by the time block 137 has returned to its starting position.

Once all of the tiers of bottles have been discharged from the carton and platform 32 raised to the maximum height permitted by extension of jack 36, roller 44 has moved along cutout 45 sufficient to engage a contact 172 (FIG. 4) which completes a control relay circuit to open switches 77 and 80 of the elevator motor 53 and to close switches 173 and 174 to complete a circuit from line 76, through line 175, line 79, motor 53, line 78, line 176 switch 174, line 178, to line 81 thus again energizing motor 53 but in reverse. Therefore, its shaft 51 rotates in the opposite direction causing sleeves 50 to spread apart which effects lowering of platform 32. When platform 32 has therefore been returned to its original position level with ledge 33, roller 44 in cutout 45 engages contact 177 (FIG. 4) energizing the carton pusher indicated generally at 186.

Turning now to FIGURE 4, the carton pusher is seen to comprise a member 179 fixed to the stem of a piston 180 operating in a horizontally disposed cylinder 181. Said cylinder 181 is shown mounted by appropriate means to a supporting plate 182 which in turn is secured as by bolts 183 to horizontal braces 184 and 185 which are connected to a pair of uprights 35, 35. Referring now to FIGURE 9, conduit line 187 admits pressurized air from conduit 107 into a control valve 188 having positions "A" and "B" which when in position "A," as illustrated, allows air from conduit 187 to proceed through conduit 189 into cylinder 181 while allowing air on the other side of the piston 180 to exit through conduit 190, valve 188, conduit 191 into discharge conduit 113. When the control valve is in position "B," the flow of air is reversed, so that pressurized air enters the cylinder 181 from conduit 190. In this latter position of the control valve, the piston 180 is actuated to cause the carton pusher 186 to move across platform 32 and ledge 33 to discharge the carton, and is returned by adjusting the control valve 188 to its normal position "A."

When roller 44 engages contact switch 177 on return of platform 32 to its lowered position, a circuit is completed from power line 65, through line 192, switch 177, line 193 solenoid 194, line 195 to power line 70. Solenoid 194 thus energized, adjusts control valve 188 to its

position "B" to drive wall 179 against the carton and discharge the same from ledge 33 at the end of its stroke. This action causes a further switch 196 to close a circuit from line 192 through solenoid 197 via line 198 switch 196, line 199, solenoid 197, line 200, line 195 to power line 70, thus energizing solenoid 197. Simultaneously, said action opens switch 177 which returns the control valve 188 to its position "A." The piston 180 thus reverses to return the carton pusher to its original location. Normally closed switch 72 in the circuit to motor 53 is held closed by the carton pusher when in its retracted position. However, closing of switch 177 which serves to actuate the carton pusher opens switch 72 to assure that the platform cannot rise until after the cycle of the carton pusher has been completed. For a similar reason, a normally closed switch 63 is provided in the circuit of the motor 26 which controls the conveyor belt 20. This switch is also opened simultaneously by movement of the piston 180 to its extended position and therefore prevents energization of the conveyor belt and feeding of a further carton into the unloading device before the carton pusher has returned. Discharge of the carton allows pawl 58 to return to its forward position under the action of its spring 60, causing switch 63 to open the circuit to motor 53 and close the circuit to motor 26 whereupon, as soon as switch 196 closes on return of the carton pusher, the conveyor belt will feed a further carton into the loading device to continue the operation.

Turning to FIGURES 4 and 5, preferably the carton pusher 186 is provided with a pair of guide rods 205 which extend parallel to piston 180 and are secured at one end to member 206 by which wall 179 is mounted on the stem of piston 180. These guide rods are slidably disposed in a pair of spaced sleeves 201 and 202, sleeves 201 being suitably mounted on wall 182 while sleeves 202 are supported in uprights 203 carried by braces 204 which are in turn secured to supporting plate 182. Any other suitable means for guiding the reciprocal movement of the carton pusher may be utilized.

It will, of course, be understood that the aforescribed electrical circuits are essentially schematic and that many refinements and variations therein may be had in accordance with the skill of the art in order to effect the desired automatic operation of the various elements making up the device. For example, rather than relying on mechanical operation of the various described switches, control relays may be built into the circuit in accordance with knowledge as is available to those skilled in the art to control and operate the switches. Moreover, the circuits may be modified to provide electrical components which will introduce time delays between the operations of the various switches to assure that the described operations will follow in the described sequence and required timed relation to assure the smoothest possible operating device. Moreover other modifications of said circuits may be afforded to permit independent operation of the various steps as, for example, to operate the carton pusher above, or to operate the bottle pusher alone. Instead of using compressed air to operate the cylinders, a hydraulic or other fluid system might be employed. Moreover, electric motors appropriately geared to the various pushers and other movable elements might be utilized in place of either air or fluid operated cylinders. It will be at once recognized that many other changes, modifications and/or rearrangements in the parts of the described device or steps in the operation thereof may be had within the spirit of the invention and are intended to be included therein as defined by the appended claims.

However, from the above description, it will be apparent that all of the objects of the invention, as well as the features and advantages thereof, have been demonstrated as being readily obtainable in a convenient, simple and practical manner.

Now having described our invention, we claim:

1. A device for unloading bottles from a carton packed with several tiers of bottles separated by spacer sheets,

said device comprising a support for a carton of said bottles having its top and bottom ends opened, said support including an elevatable surface on which the bottles contained in said carton will rest and surrounding means on which the edge of the carton will engage, energizable means for elevating said surface relative to the surrounding means and cartons supported thereby to move each tier of bottles out through and above the open top of the carton, pusher means operable in response to the elevating of said surface to move each tier of bottles as it is raised above the carton onto a receiving member, a first discharge means actuated by said pusher means to pick up and discharge a spacer sheet resting over the thus moved tier of bottles, means causing return of said elevatable surface to its initial position after removal of all of the tiers of bottles from said carton, and a second discharge means for removing the emptied carton from said support when the elevatable surface thereof returns to its initial position.

2. A device for unloading bottles from a carton packed with several tiers of bottles separated by spacer sheets, said device comprising a support for a carton of said bottles having its top and bottom ends opened, said support including an elevatable surface on which the bottles contained in said carton will alone rest and surrounding means on which the edge of the carton will only engage, energizable means for elevating said surface relative to the surrounding means and carton supported thereby to move a tier of bottles at a time out through and above the open top of the carton, pusher means operable in response to the elevating of said surface a distance sufficient to raise one tier of bottles out of the carton, said pusher means acting to move the thus raised tier of bottles to one side of the support and onto a receiving member, a first discharge means actuated by said pusher means to pick up and discharge a spacer sheet resting over the thus moved tier of bottles, means causing return of said elevatable surface to its initial position after removal of all of the tiers of bottles from said carton, and a second discharge means for removing the emptied carton from said support when the elevatable surface thereof returns to its initial position.

3. A device for unloading bottles from a carton packed with several tiers of bottles separated by spacer sheets, said device comprising a support, means for feeding onto said support a carton of said bottles having its top and bottom ends opened, said support including an elevatable surface on which the bottles contained in said carton will rest and means about said elevated surface in the form of a ledge on which the edge of the carton will engage, energizable means actuated by the positioning of a carton on said support for elevating said surface relative to the surrounding means and cartons supported thereby to move each tier of bottles out through and above the

open top of the carton, pusher means operable in response to the elevating of said surface to move each tier of bottles as it is raised above the carton onto a receiving member, a first discharge means actuated by said pusher means to pick up and discharge a spacer sheet resting over the thus moved tier of bottles, means causing return of said elevatable surface to its initial position after removal of all of the tiers of bottles from said carton, and a second discharge means for removing the emptied carton from said support when the elevatable surface thereof returns to its initial position.

4. A device for unloading bottles from a carton packed with several tiers of bottles separated by spacer sheets, said device comprising a support, means for feeding onto said support a carton of said bottles having its top and bottom ends opened, said support including an elevatable surface on which the bottles contained in said carton will rest and surrounding means on which the edge of the carton will engage, energizable means actuated by the positioning of a carton on said support for elevating said surface relative to the surrounding means and cartons supported thereby to move each tier of bottles out through and above the open top of the carton, pusher means operable in response to the elevating of said surface to move each tier of bottles as it is raised above the carton onto a receiving member, a first discharge means actuated by said pusher means to pick up and discharge a spacer sheet resting over the thus moved tier of bottles, means causing return of said elevatable surface to its initial position after removal of all of the tiers of bottles from said carton, and a second discharge means for removing the emptied carton from said support when the elevatable surface thereof returns to its initial position, said feeding means being actuated to feed a further carton of bottles onto said support to continue the process as each emptied carton is discharged from said support.

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