Oct. 7, 1930. N. F. SAVIANO 1,777,654

BOTTLE CONVEYING MACHINE

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Fig. 1.

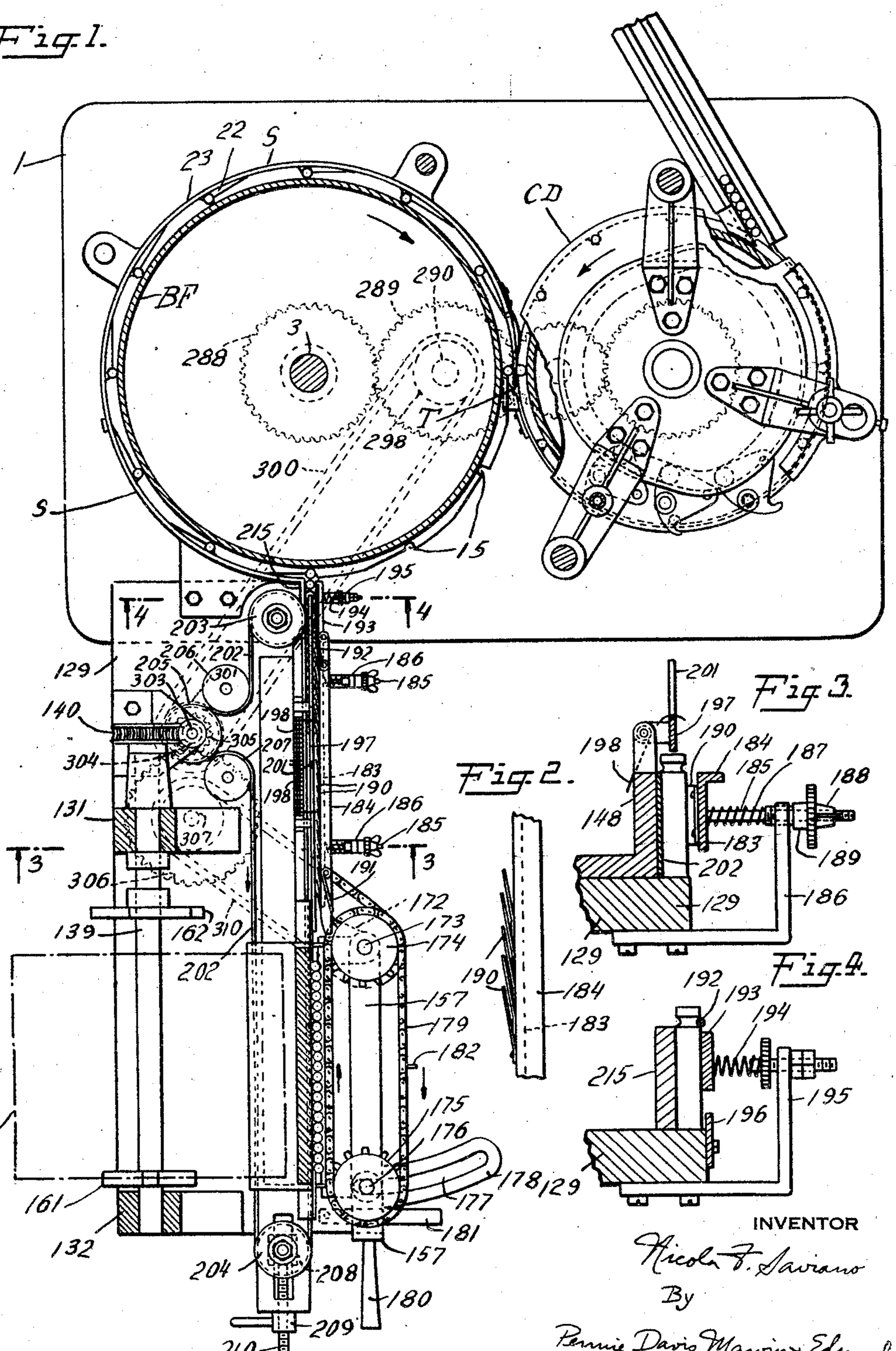

Fig. 2.

Fig. 3.

Fig. 4.

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Fig. 5.

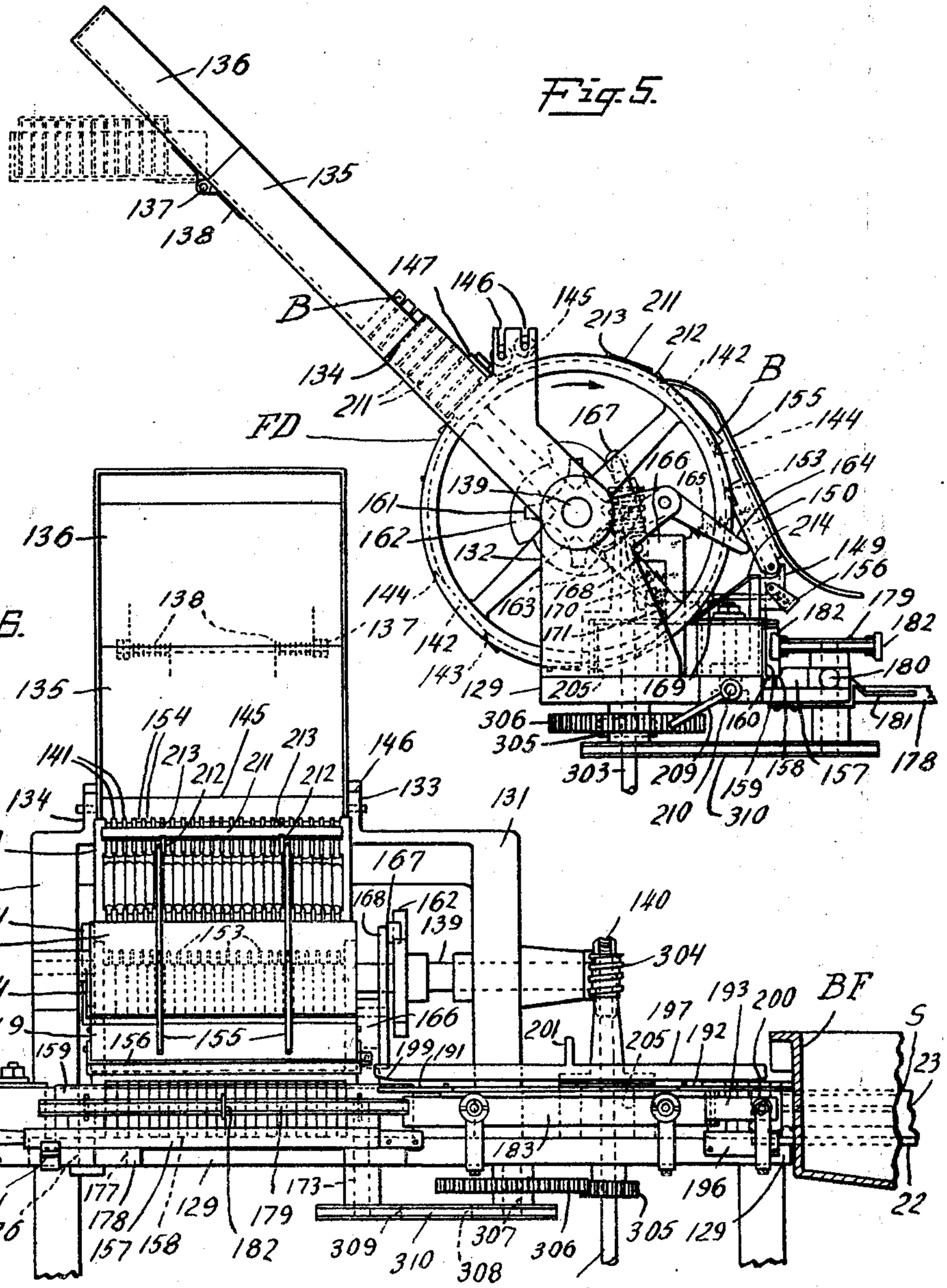

Fig. 6.

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Fig. 7.

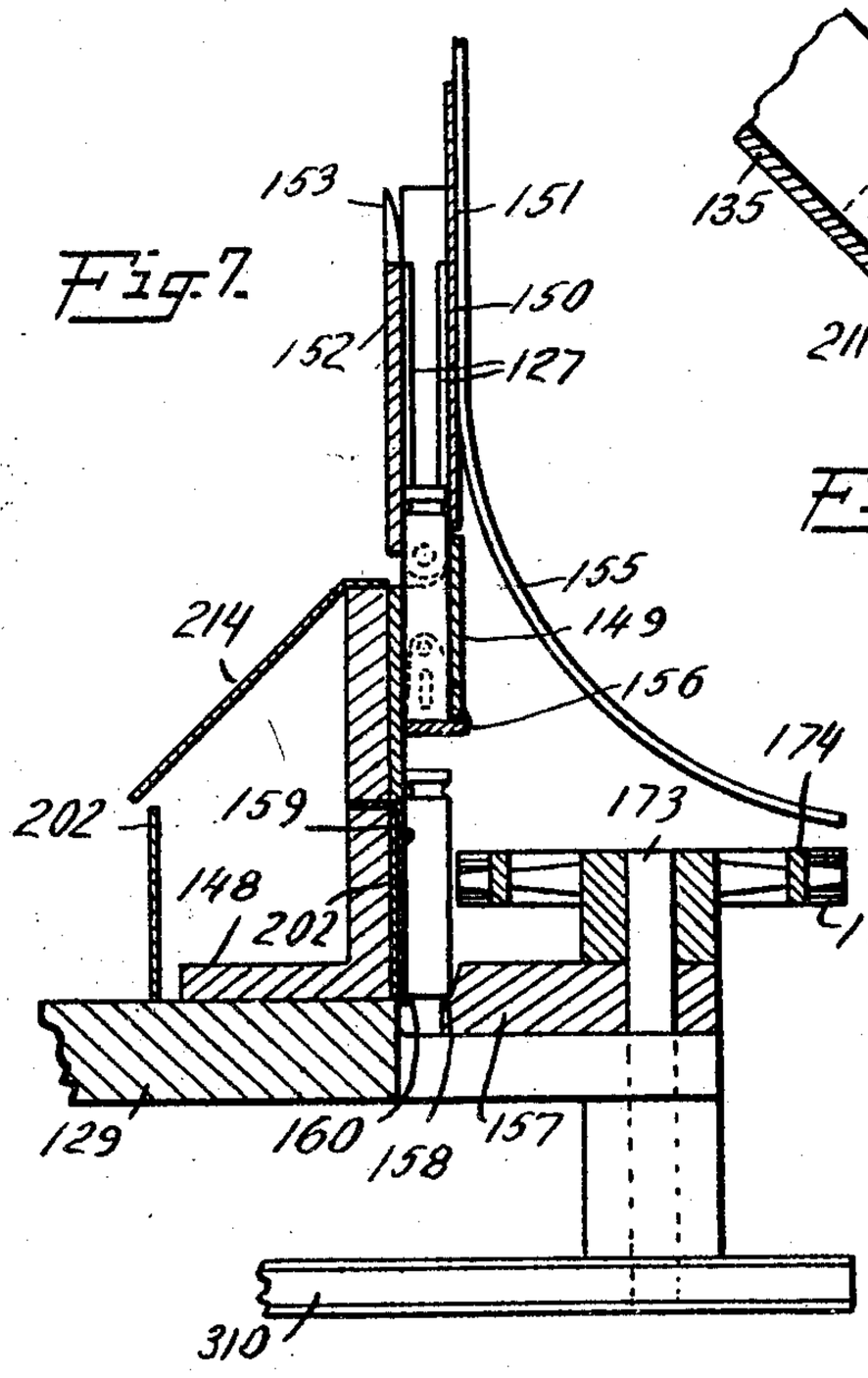


Fig. 8.

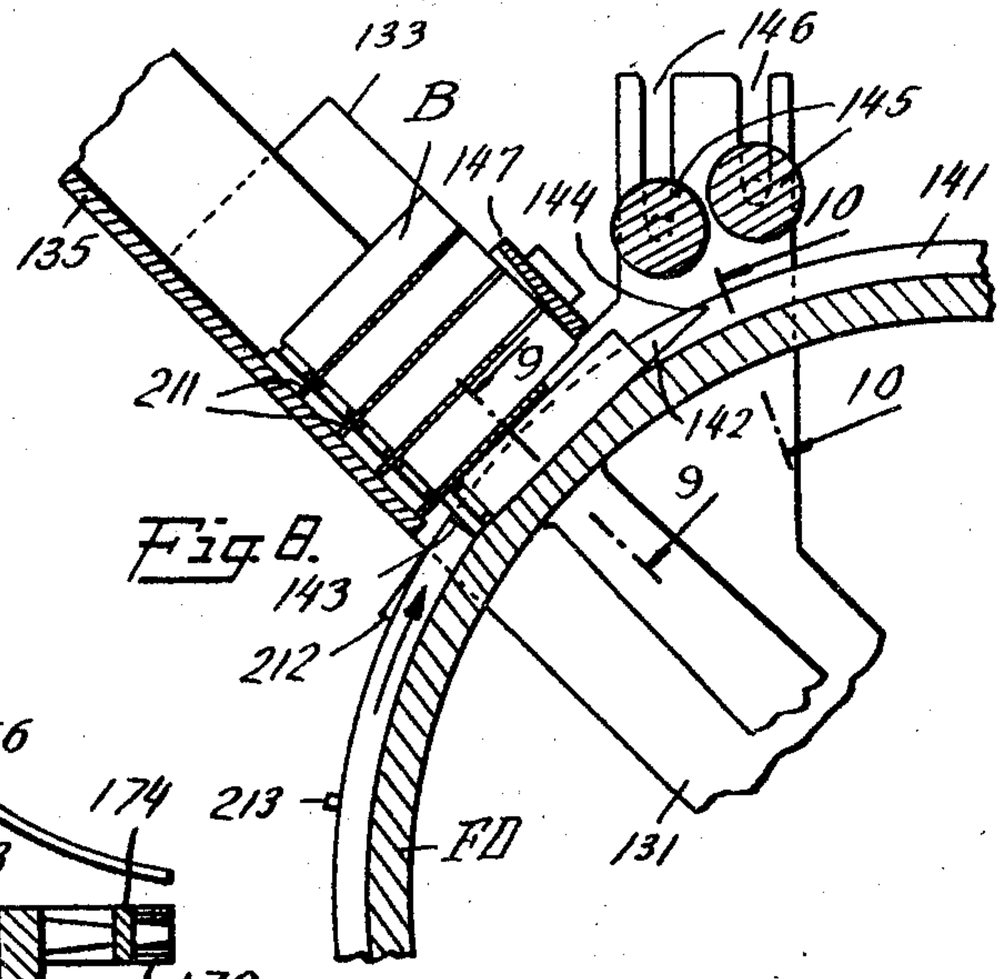


Fig. 11.

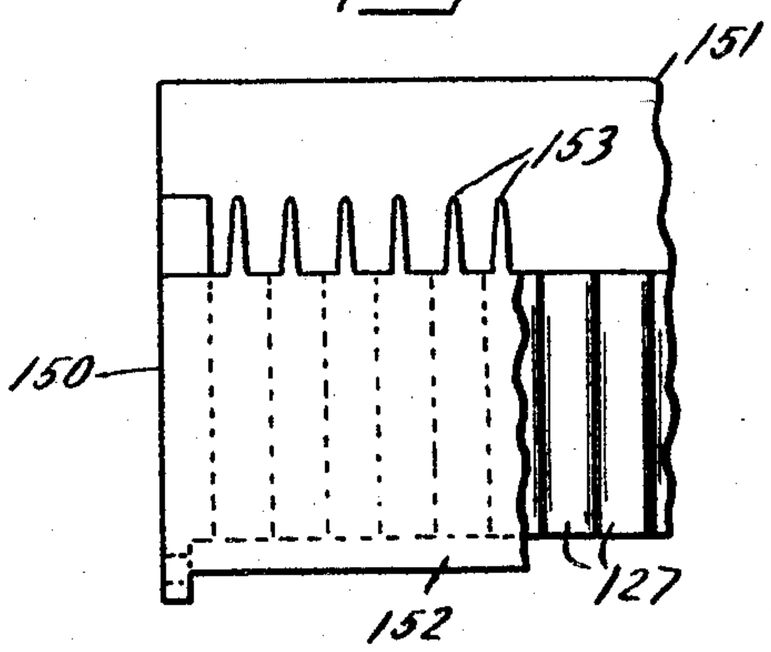


Fig. 9.

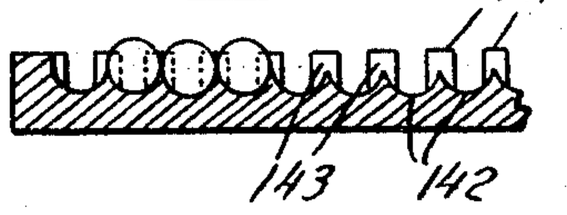
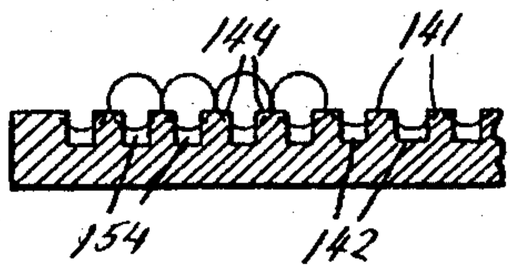


Fig. 10.



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UNITED STATES PATENT OFFICE

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BOTTLE-CONVEYING MACHINE

Original application filed October 19, 1926, Serial No. 142,537. Divided and this application filed July 12, 1928. Serial No. 292,258.

This invention relates to a bottle filling and corking machine, and more particularly concerns apparatus for automatically conveying bottles, vials or other containers to a mechanism for filling and closing such containers.

In the packing of large quantities of small articles, such as medical pills or pellets in small containers, such as bottles, it has been found economical and otherwise desirable to employ automatic packing machinery. It is essential that machinery of this type be arranged to perform the packing operations continuously and rapidly, and that the machine be capable of operating with a minimum amount of manual attention.

With the above and other considerations in mind, it is proposed in accordance with the present invention to provide bottle conveying apparatus for automatically and continuously delivering empty bottles, vials or other containers to a bottle filling device.

Various other specific objects, advantages and characteristic features of the present invention will become apparent as the description thereof progresses.

This application is a division of my copending application, Serial No. 142,537, filed October 19, 1926, Patent No. 1,710,074, in which the bottle filling mechanism is described and claimed. In another divisional application, Serial No. 292,260, filed July 12, 1928, I have claimed a bottle corking mechanism, and in still another divisional application, Serial No. 292,259, filed July 12, 1928, I have claimed the bottle feeding mechanism which removes the empty bottles from their packing containers and delivers them to the bottle conveying means of the present invention.

In describing the invention in detail, reference will be made to the accompanying drawings, in which;

Figure 1 is a plan view, partly in section, of the bottle feeding, filling and corking mechanisms;

Fig. 2 is an enlarged plan view of a portion of the bottle feeding guide plate;

Fig. 3 is a sectional view taken along the line 3—3 of Fig. 1 and viewed in the direction of the arrows;

Fig. 4 is a sectional view taken along the line 4—4 of Fig. 1 and viewed in the direction of the arrows;

Fig. 5 is a side elevation of the bottle feeding mechanism;

Fig. 6 is a front elevation of the bottle feeding mechanism;

Fig. 7 is an enlarged sectional view of a portion of the bottle feeding mechanism;

Fig. 8 is an enlarged sectional view of a portion of the bottle feeding drum and certain associative mechanisms;

Fig. 9 is a section of a portion of the bottle feeding drum taken along the line 9—9 of Fig. 8 and viewed in the direction of the arrows;

Fig. 10 is a section of the bottle feeding drum taken along the line 10—10 of Fig. 8 and viewed in the direction of the arrows; and

Fig. 11 is a side view of the bottle catching compartment, certain portions being broken away to show the interior construction thereof.

Referring to the drawings, and more particularly to Fig. 1, the bottle filling mechanism in connection with which the conveying apparatus of the present invention has been shown comprises generally a rotary bottle filling drum BF carried on a shaft 3 and having a plurality of bottle carrying notches 15 in the peripheral surface thereof. The bottle filling mechanism forms no part of the present invention and will not be described in detail herein, but it should be understood that the drum BF rotates continuously in the direction of the arrows and carries therewith a plurality of bottles in the notches 15, these bottles being filled during the rotation of the drum and being transferred to the corking mechanism CD at the point T. A stationary shelf S surrounds the drum BF, this shelf comprising a horizontal portion 22 and a vertical portion 23 for supporting and guiding the bottles as they pass around the drum.

The means for conveying the empty bottles to the bottle filling drum BF include a bottle feeding mechanism and a bottle con-

veying mechanism. As explained above, the bottle feeding mechanism has been claimed in a copending application. Since the bottle feeding and conveying mechanisms are closely related in their operation, they will both be described herein.

An outwardly extending feeding platform or table 129 is suitably secured to a main platform 1, the upper surface of the feeding platform being on a level with the horizontal portion 22 of the bottle feeding supporting shelf S on the bottle feeding drum BF. A pair of parallel upwardly extending brackets 131 and 132 are secured in spaced relation to the upper surface of the feeding platform 129 near its outer end as shown in Fig. 6, these brackets having angular offset portions 133 and 134 respectively. A bottle delivery chute 135 is secured between the offset portions 133 and 134 of the brackets 131 and 132, this chute being preferably formed of sheet metal and being disposed at an angle of approximately 45 degrees to the horizontal platform 129. The upper portion 136 of the chute 135 is hinged at 137 to swing downwardly to the position shown in broken lines in Fig. 5, the springs 138 being provided to normally maintain this portion 136 in alignment with the fixed portion 135 of the chute.

A bottle feeding drum FD is carried in a horizontal position on a shaft 139, which shaft is journaled in the brackets 131 and 132 and is driven through a worm wheel 140 as hereinafter described. The drum FD is provided on its outer surface with a plurality of parallel peripherally disposed ridges or extensions 141 as shown in Figs. 8, 9 and 10. The ridges 141 are cut away to form transverse rows of substantially semi-circular depressions 142 at points equally spaced about the periphery of the drum FD. The depressions 142 are somewhat longer than the length of the bottles to be filled, and are formed to present bottle retaining abutments or stops 143 and 144 at the opposite ends thereof as shown in Fig. 8. A pair of rollers 145 are loosely carried in the slots 146 formed in extensions of the brackets 131 and 132, these rollers serving to retain the bottles in the depressions 142 of the drum FD as they are carried away from the delivery chute 135. A tapered metal strip 147 rests on the ends of the bottles at the lower end of the delivery chute, and maintains them in alignment as they are picked off by the drum.

An angle frame 148 is secured to the feeding platform 129 adjacent to the drum FD, which frame carries a fixed bottle delivery compartment 149 having a vertical opening therethrough and extending across the face of the drum as shown in Figs. 5 and 6. A movable bottle catching compartment 150 is pivotally supported at its ends on the delivery compartment 149 and is arranged to swing from a position in which its upper edge bears on the face of the drum FD as shown in Fig. 5, to a position in which its central opening is in vertical alignment with the central opening through the compartment 149, as shown in Fig. 7. The bottle catching compartment 150, shown in detail in Figs. 7 and 11, comprises an outer wall 151 of appreciably greater height than that of the bottles, and an inner wall 152 having a row of upwardly extending fingers 153 on the upper edge thereof. The inner faces of the walls 151 and 152 are provided with oppositely disposed aligned grooves 127 which are shaped to conform with the outer walls of the bottles, these aligned grooves being arranged in alignment with the depressions 142 on the surface of the drum FD. The fingers 153 are spaced to rest in the grooves 154 between the ridges 141 on the drum FD when the compartment 150 is in the position shown in Fig. 5. A pair of elongated curved spring fingers 155 are suitably secured to the outer wall 151 of the bottle catching compartment 150, the upper ends of these fingers being arranged to rest in the grooves 154 on the drum FD when the compartment 150 is inclined against the drum as shown in Fig. 5. The opening at the lower end of the delivery compartment 149 is controlled by a gate 156, pivoted at the opposite ends of this compartment and adapted to be swung outwardly as shown in Fig. 5.

Directly below the opening in the compartment 149 is disposed a plate 157 extending across the face of the drum FD and having an offset extension or groove 158 thereon. Opposite and parallel to this plate 157 is a sheet metal shield 159, secured to the angle bracket 148 in any suitable manner, and having an inturned lower lip or shelf portion 160, disposed directly opposite the groove 158 in the plate 157. The groove 158 and the lip 160 are normally disposed a distance apart equal to the diameter of the bottles to be filled, so that when the bottles are dropped from the compartment 149 by the gate 156 they will drop to a position in which their bases rest between the groove 158 and the lip 160 as clearly shown in Fig. 7. The shield 159 is spaced a short distance away from the face of the angle bracket 148 for a purpose which will hereinafter appear.

The movements of the bottle catching compartment 150 and of the gate 156 are controlled respectively by two cams 161 and 162 fixed to the shaft 139 and rotating with the drum FD. The cam 161 is substantially star shaped, and engages a roller 163 carried by one arm of a bell crank lever 164, the other arm of which engages the inner wall 152 of the movable compartment 150, the bell crank lever 164 being pivotally mounted on an extension of the bracket 132 in any suitable manner. The compartment 150 is biased toward its angular or tilted position by means

of a spring 165 connected between this compartment and a bracket 166 as shown in Fig. 5. The cam 162 is provided with a notched cam surface which engages a roller 167 on one end of a lever 168, the other end of which engages the head of a plunger 169, the lever 168 being pivotally mounted on the bracket 166. The plunger 169 is slidably mounted in the bracket 166 and its outer end bears against a lug extending from one end of the gate 156. The lever 168 is biased by the spring 170 to a position in which its roller 167 engages the surface of the cam 162, and the plunger 169 is biased by a spring 171 to a position in which its head is in constant engagement with the lower end of the lever 168, the spring 170 being stronger than the spring 171.

The plate 157 is pivotally connected to an extension 172 of the platform 129 by a shaft 173, and carries two sprocket wheels 174 and 175, the wheel 174 being fixed to the shaft 173 and the wheel 175 being rotatably mounted on a stub shaft 176. The shaft 176 extends through a curved slot 177 in a fixed support 178. An endless feed chain 179 engages the sprocket wheels 174 and 175 and the wheels and chain are driven in the direction indicated by the arrow through the shaft 173 in a manner which will be hereinafter described. A handle 180 is preferably secured to the outer end of the plate 157, and this plate is held in the position shown by a spring catch 181 which may be released to permit the plate 157 to be swung outwardly away from the shelf 159 to release the bottles which may be held between these two members and in order to permit the cleaning, repair or adjustment of certain parts of the mechanism. The chain 179 carries a plurality of extensions 182, spaced along the chain a distance greater than the width of the bottle feeding drum FD.

Parallel with the angle frame 148 and extending from the sprocket wheel 174 to a point adjacent the filling drum BF, is a guide plate 183 having an outwardly extending flange 184 at its upper edge. The plate 183 is supported by rods 185, rigidly secured thereto and slidably engaging the brackets 186 which are suitably secured to the platform 129 as shown in Fig. 3. Coil springs 187 are provided on the rods 185 to force the plate 183 toward the angular bracket 148, the movement of the plate 183 being adjustably limited by means of the nuts 188, screw threaded on the rods 185, and the tension of the springs 187 being adjustable by means of the bushings 189 having a screw threaded engagement with the brackets 186. The interior face of the plate 183 is provided with a plurality of wide spring fingers 190, suitably secured thereto and inclined toward the angle bracket 148 as clearly shown in Fig. 2. Two additional spring fingers 191 and 192, are secured to the upper flange 184 of the plate 183 at the opposite ends thereof, these fingers extending away from the plate to guide the bottles as they come in to and out of engagement therewith. An extension 193 is pivotally mounted on the plate 183 at the end thereof adjacent the filling drum BF, this extension being pressed toward the angle bracket 148 by means of an adjustable spring 194 carried by a bracket 195 as shown in Fig. 4. A guide member 196 is secured to the outer edge of the platform 129 beneath the extension 193 and beyond the end of the plate 183 as clearly shown in Figs. 6 and 4. An upper guide strip 197 is pivotally secured to the top of the angle bracket 148 and is held in the position shown against suitable stops by means of coiled springs 198. The under surface of the strip 197 is cut away near its end at 199 and 200 as is clearly shown in Fig. 6, and a handle 201 is provided near the center of this strip in order that the strip may be swung back to give access to the space between the guide plate 183 and the angle bracket 148.

An endless belt 202 passes along the inner surface of the angle bracket 148, passing between the shield 159 and the angle bracket beneath the drum FD as shown in Fig. 7. The belt 202 is carried by a pair of aligned pulleys 203 and 204, rotatably carried on stub shafts at opposite ends of the platform 129, the belt being driven by a pulley 205 and being held in contact therewith by two idler pulleys 206 and 207. The belt 202 is driven in the direction of the arrow by the drive pulley 205 and the proper tension is maintained thereon by the adjustable block 208 carrying the pulley 204, the adjustment being made by the hand nut 209 engaging a threaded rod 210 secured to the block 208 as shown in Fig. 1.

An extension of the vertical portion 23 of the shelf S around the filling drum BF extends away from the drum in a direction tangent to the belt 202 where it engages the pulley 203, this extension forming a guiding wall 215 between the belt 202 and the drum BF.

In the operation of the bottle feeding mechanism, the bottles are first placed in the upper portion 136 of the bottle feeding chute 135, this portion 136 being preferably moved to the position shown in dotted lines in Fig. 5, and a carton of empty bottles being inverted therein as shown. The portion 136 of the chute is then allowed to swing back into the position in which it is aligned with the lower portion 135 of the chute, and the box of bottles is allowed to slide down adjacent to the surface of the feeding drum FD, at which point the box or container may be removed. The bottles now lie in parallel rows, there being the same number of bottles in each row as there are bottle receiving depressions 142 across the surface of the drum FD. The ta-

pered strip 147 aligns the rows of bottles, pushing any bottles which may be out of place into contact with the lower face of chute 135. Each row of bottles in turn is picked off by one of the rows of depressions 142 on the surface of the feeding drum FD, the rollers 145 holding the ends of the bottles from tilting out of the depressions due to the weight of the remaining bottles in the chute 135 bearing against the necks of the bottles in the depressions. The bottles are usually packed with cardboard strips 211, placed between the rows thereof, and these strips are caught between two pairs of extensions 212 and 213 fixed to the ridges 141 on the drum, these extensions being disposed between each row of depressions 142 as most clearly shown in Figs. 5 and 6.

As each row of bottles is carried around over the top of the drum FD, the bottles slide down to the leading end of the depressions 142 against the abutments 144 as shown in Fig. 5 and are finally picked off of the drum by the fingers 153 on the inner wall of the bottle catching compartment 150, which fingers pass under the edges of the bottles in the grooves 154 shown in Fig. 10. The cam 161 is designed to permit the bottle catching compartment 150 to swing against the drum as each row of bottles approaches this compartment, and the bottles slide into the interior of this compartment and are held therein by the angular relation between the compartment 150 and the bottle delivery compartment 149. At the same time that the bottles are dropped into the compartment 150, the cardboard strip 211 is picked off of the drum FD by the elongated spring fingers 155 and is allowed to drop down along these spring fingers and away from the machine at their lower ends. If it should occur that one of the cardboard strips 211 passes on under the spring fingers 155, this strip will drop against a shield 214 which is secured to the angle bracket 148 beneath the drum FD and which extends over the belt 202.

The compartment 150 is now moved to its vertical position by the cam 161, the gate 156 being simultaneously closed by the cam 162, and the row of bottles being dropped into the delivery compartment 149 and resting with their lower ends on this gate. As the mechanism continues to operate, the gate 156 is pushed outwardly by the cam 162, acting through its lever 168 and plunger 169, and the row of bottles is dropped to the level of the platform 129, the lower end of each bottle being held between the lip 160 on the shield 159 and the groove 158 on the plate 157. One of the extensions 182 on the feed chain 179 now engages the end bottle of the row as clearly shown in Fig. 5 and pushes the entire row along the shield 159 and into the space between the belt 202 and the guide plate 183, the bottles being pressed against the belt 202 by the spring fingers 190 and being rolled along toward the filling drum BF by the motion of the belt. As the bottles leave the chain 179 and come into contact with the plate 183 they are guided by means of the spring finger 191 which engages each bottle near the upper end thereof. In passing along the guide plate 183, being rolled thereon by the belt 202, there is some tendency for the bottles to creep upwardly, and this is prevented by the upper guide strip 197 which yieldingly engages the upper ends of the bottles and holds them in place. As the bottles pass out of contact with the guide plate 183, their necks and side walls respectively are engaged by the spring finger 192 and the spring pressed extension 193, their lower ends being held in proper position by the member 196.

At the end of the feeding platform 129 adjacent the filling drum BF, the bottles are pressed against the periphery of this filling drum and are picked off one by one and carried around the drum. The various parts of the feeding mechanism are so synchronized with one another that a bottle is always in contact with the surface of the filling drum, a fresh row of bottles being fed at regular intervals by the chain 179 into engagement with the belt 202.

The bottle filling drum BF is rotated by a shaft 3 which is suitably geared or otherwise connected to a source of power. A gear 288 is fixed to the shaft 3 and engages a gear 289 carried by a stub shaft 290. A sprocket 298 is fixed to the gear 289 and serves to drive a vertical shaft 303 through a chain 300 and a second sprocket 301. The shaft 303 passes through the platform 129 and drives the shaft 139 through the worm 304 and the worm gear 140. The shaft 303 is also fixed to the pulley 205 whereby the belt 202 is driven. A pinion 305 is fixed to the shaft 303 beneath the platform 129 and a gear 306 carried by a stub shaft 307 engages this pinion and drives the shaft 173 through the sprockets 308 and 309 and the chain 310.

It should be understood that the various elements comprising the driving means are arranged to properly synchronize the bottle filling and feeding mechanisms so that the feeding drum FD, delivery chain 179 and belt 202 cooperate to bring the required number of bottles to the filling drum BF to keep this drum continuously supplied.

By reasons of defects and irregularities in the bottles fed into the machine, it sometimes occurs that bottles are broken in being delivered from the feeding drum FD to the chain 179. When this occurs, the broken glass may be quickly removed by releasing the catch 181 and moving the pivotally supported plate 157 away from the shield 159, thus permitting the broken bottles to drop down free of the machine between these members. Also, if a broken or irregularly formed bottle passes

on along the belt 202, it may be reached and removed by swinging the hinged upper guide strip 197 back from the bottles.

The present invention has been described in connection with a single specific machine, and it should be clearly understood that the invention is not limited to the exact mechanical details or expedients shown, and that certain modifications, changes and omissions may be made in the machine without departing from the scope of the invention as defined in the appended claims.

I claim:

1. In a bottle feeding mechanism, a platform, an endless belt driven along said platform in a vertical position, a spring pressed guide plate parallel to said belt and spaced therefrom, means for successively arranging and delivering rows of bottles to the space between said belt and said guide plate, and spring pressed means disposed above the space between said belt and said guide plate for maintaining said bottles in contact with said platform as they are moved along said guide plate by said belt.

2. In a bottle feeding mechanism, a platform, an endless belt driven along said platform in a vertical position, a spring pressed guide plate parallel to said belt and spaced therefrom, means for successively arranging and delivering rows of bottles to the space between said belt and said guide plate, and an upper guide strip extending above the space between said belt and said guide plate for maintaining said bottles in contact with said platform as they are moved along said belt, said strip being movable to give access to the space between said belt and said plate.

In testimony whereof I affix my signature.

NICOLA F. SAVIANO.