Dec. 10, 1957 W. B. EDDISON ET AL 2,815,629

PULL-DOWN DEVICE

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FIG. 1.

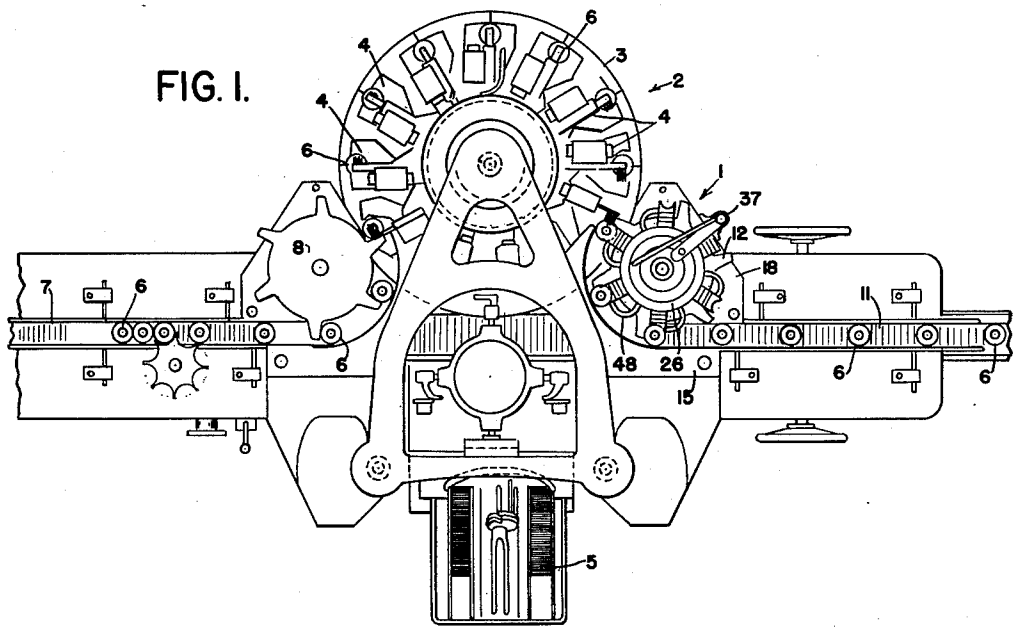


FIG. 4.

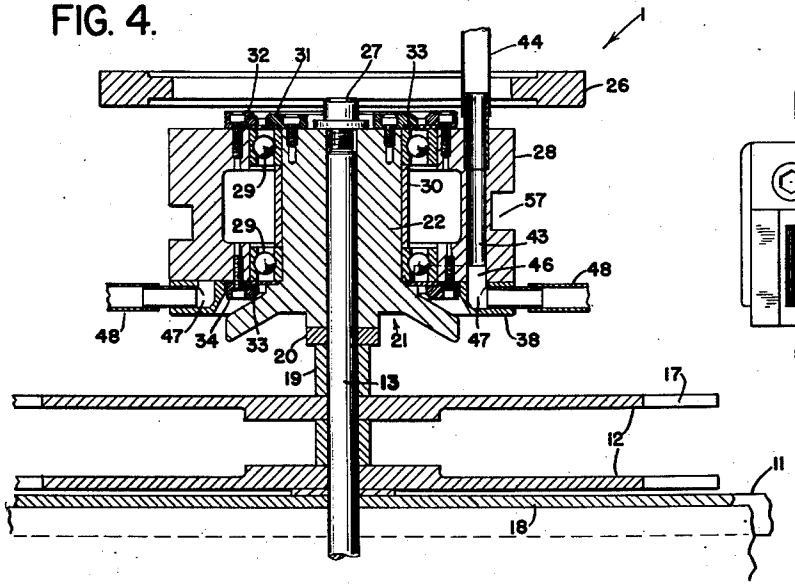
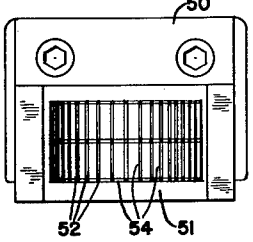


FIG. 5.



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FIG. 2.

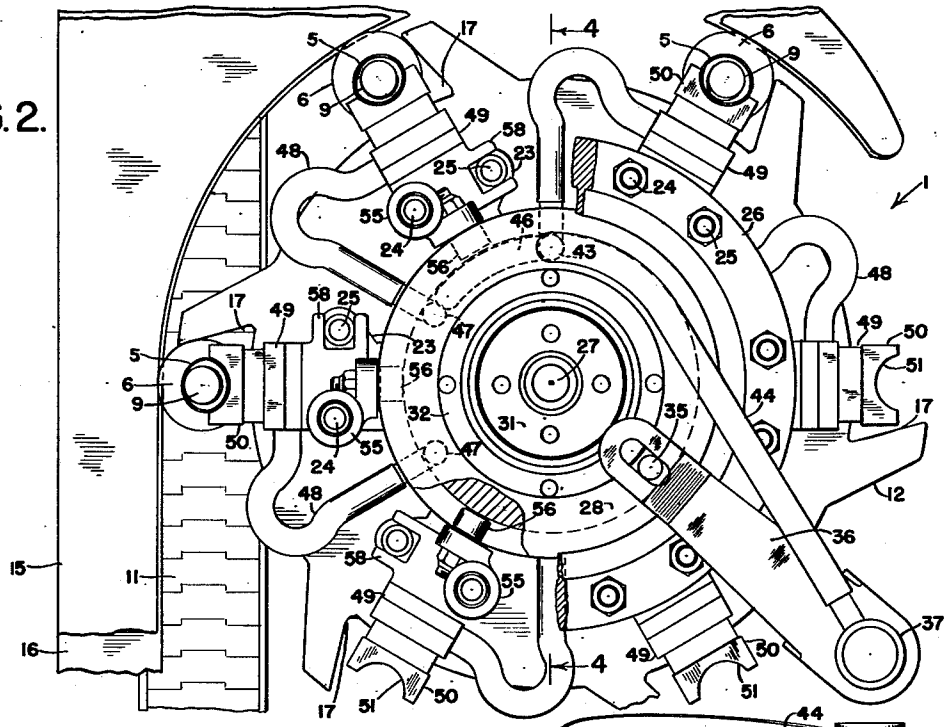
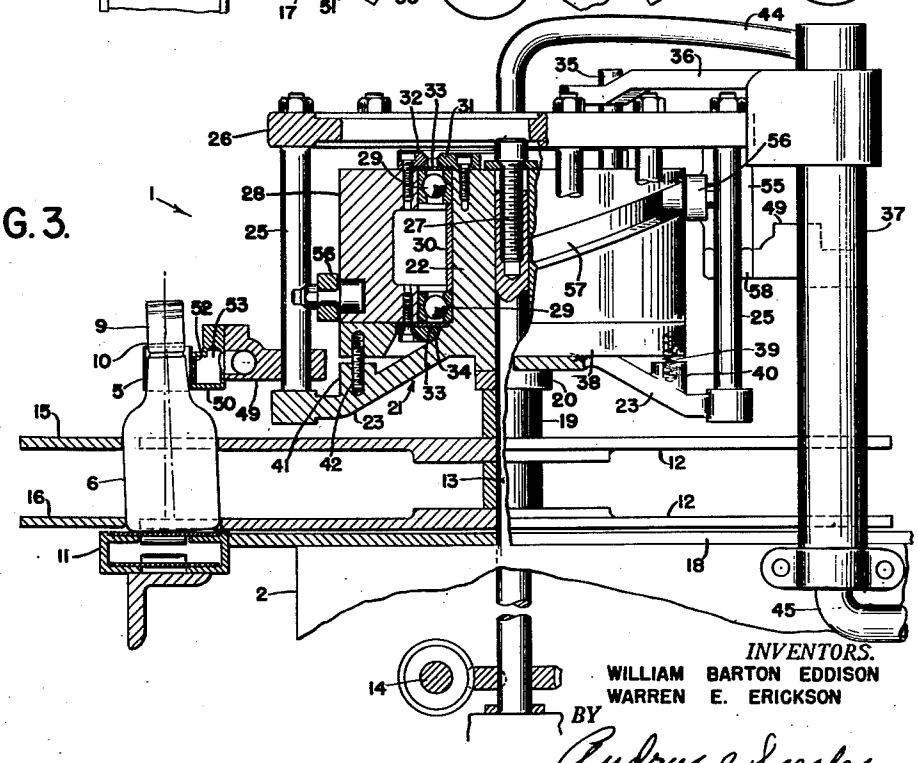


FIG. 3.



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FIG. 6.

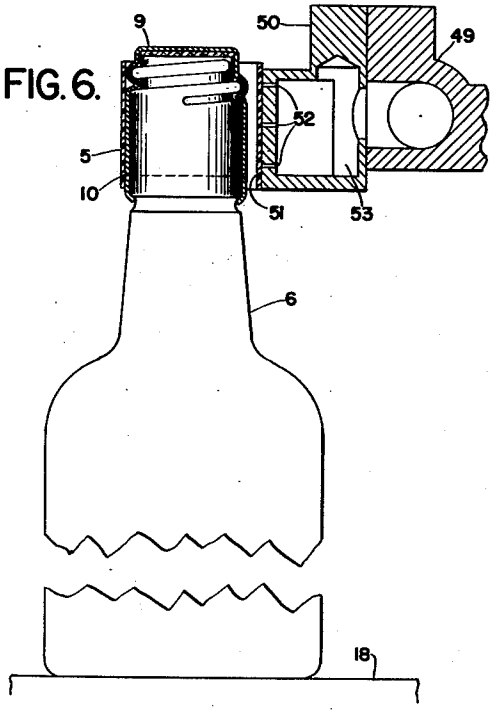


FIG. 7.

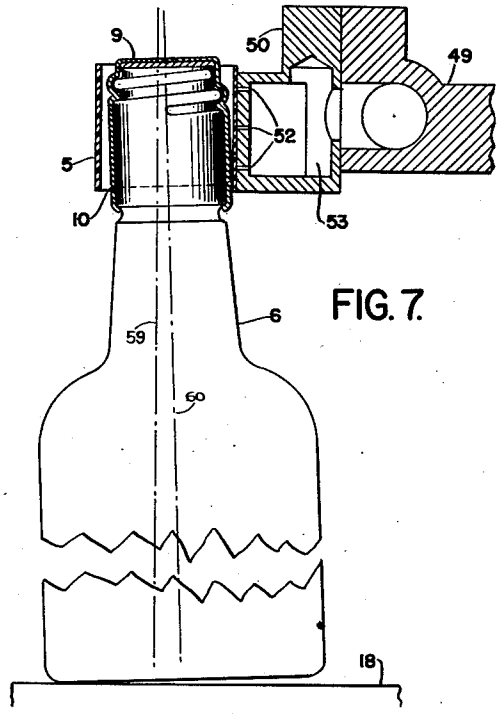
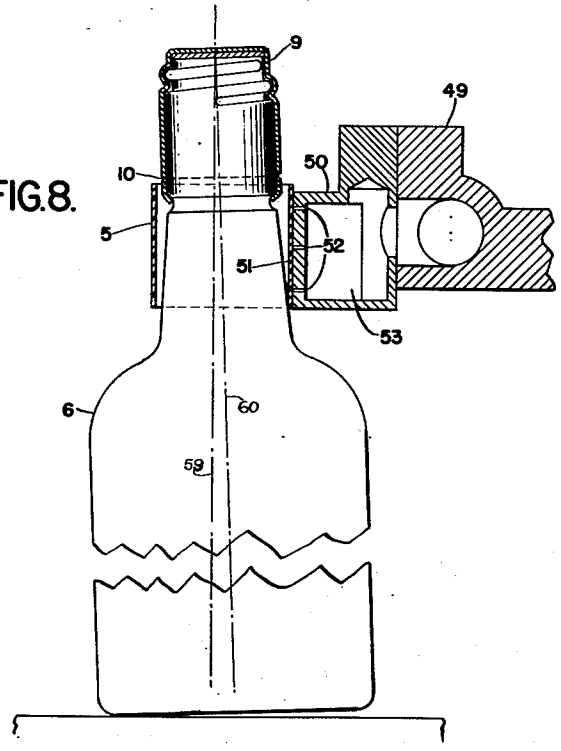


FIG. 8.



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PULL-DOWN DEVICE

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Application July 23, 1956, Serial No. 599,570

15 Claims. (Cl. 53—292)

This invention relates to a pull-down device, and more particularly to a seal pull-down device for use with machines adapted to apply tubular shrink-fit seals to containers such as bottles and the like.

Heretofore, in the application of seals to successively presented capped liquor bottles or the like, the seals have been positioned on the upper extremity of the bottle so that the upper edge of the seal extended slightly above the closure cap. The seal extended downwardly and beyond the lower edge of the cap, and when shrunk, it provided a tight seal between the cap and the bottle.

A machine for applying seals to bottles in a manner similar to that described above is disclosed in the copending application of the present inventors, Serial No. 416,184, filed March 15, 1954.

Recent developments in the bottle capping art have created problems in the application of the seals. Tamperproof caps are now in use which indicate to the purchaser whether the bottle has ever been opened. These caps are usually of the rolled, screw-on type and have a relatively thin-walled or weakened portion disposed circumferentially and spaced above the lower edge of the cap. When the bottle is to be opened and the upper portion of the cap is turned, the cap will break off at the weakened portion. The upper portion of the cap may then be removed, leaving the lower portion on the bottle.

The disposal of seals over the entire cap, including the weakened portion, would cause substantial difficulties in opening the bottle, since a seal would resist the breaking off of a cap. It would not be feasible to cut the seal circumferentially at the weakened portion, since there may be no ridge or other sufficient indication as to the exact placement of the latter.

The present invention solves the above-mentioned difficulties by providing a seal handling device for use with a seal applying machine and which pulls or moves the seal down over the cap until the upper edge of the seal is disposed at a predetermined position below the weakened portion of the cap. The seal does not interfere with breaking of the cap when the bottle is to be opened.

The seal is initially applied loosely by the seal applying machine. During the subsequent pull-down operation, it is essential that the seal is prevented from binding on the cap or bottle neck. The invention contemplates means to prevent such binding so that the seal may be easily moved down to its final position with substantially no interference.

The accompanying drawings illustrate the best mode presently contemplated by the inventors for carrying out the invention.

In the drawings:

Figure 1 is a top plan view of a machine for applying tubular seals to bottles and the like, and including the pull-down mechanism;

Fig. 2 is an enlarged top plan view of the seal pull-down mechanism with parts broken away and sectioned;

Fig. 3 is a side elevation of the pull-down mechanism with parts broken away and sectioned;

Fig. 4 is a vertical section of the mechanism taken on line 4—4 of Fig. 2;

Fig. 5 is a side elevation of a suction head and showing the suction surface;

Fig. 6 is a broken side elevation of a bottle in seal pull-down position showing binding of a seal to a bottle when means are not provided to prevent same;

Fig. 7 is a view similar to Fig. 6 and showing the bottle in tilted position to prevent binding, just prior to the pull-down operation; and

Fig. 8 is a view similar to Fig. 7 showing the position of the seal after the pull-down operation.

As shown in the drawings, the pull-down device 1 is adapted for use with a seal applying machine 2, such as that fully described in the copending application identified above. Machine 2 comprises, generally, a rotary table 3 having a plurality of seal applying heads 4 disposed thereabove and adapted to rotate with the table for applying seals 5 to capped bottles 6. The bottles are fed onto table 3 from an intake conveyor 7 through an intake pocket wheel 8. As bottles 6 move with table 3, heads 4 apply seals so that the upper edges of the seals are flush with or slightly above the upper surfaces of bottle caps 9.

As best shown in Figs. 6–8, caps 9 are of the tamperproof type which may be applied to the bottle in tubular form and then rolled inwardly against the bottle neck to conform to the contour of the threads on the neck. A relatively thin-walled portion 10 is disposed slightly above the lower edge of each cap 9, portion 10 being formed by making a circumferential cut partially through the cap wall or by any other suitable method. The lower edge of the cap may be rolled in under a suitable collar on the bottle neck, as shown in Figs. 6–8. The pull-down device 1 lowers the seals from their initial position as applied by heads 4 to a new position wherein the upper edges of seals 5 are disposed at any suitable position beneath portion 10.

Device 1 is placed between the discharge portion of table 3 and an outgoing discharge conveyor 11 and is adapted to move the bottles along a predetermined path. Device 1 comprises a pair of bottle discharge pocket wheels 12 mounted for rotation on a vertical shaft 13. Shaft 13 extends downwardly into machine 2 and may be driven off of the main drive shaft 14 thereof.

Upper and lower guide rails, 15 and 16 respectively, present curved edges to retain bottles 6 in corresponding pockets 17 as pocket wheels 12 rotate away from table 3 and toward conveyor 11 so that substantial horizontal movement of bottles 6 relative to their general circular direction of travel is prevented. A relatively smooth platform 18 is disposed between table 3 and conveyor 11 and horizontally therewith for vertical support of bottles 6 as they pass therebetween.

Shaft 13 extends upwardly from pocket wheels 12 and has a sleeve 19 fixedly mounted thereon slightly above the uppermost pocket wheel. An interchangeable spacer ring 20 is mounted for rotation with shaft 13 and rests on sleeve 19. Spacer 20 supports a pull-down spider 21 also mounted on shaft 13 and keyed thereto for rotation therewith.

Spider 21 has a hub portion 22 which is concentric with shaft 13. A plurality of spider arms 23 extend slightly downwardly and outwardly from the lower end portion of hub 22, with the outer end portion of each arm serving as the lower support for a pair of vertical guide rods 24 and 25 respectively, described more fully hereinafter. The upper ends of rods 24 and 25 are secured in substantially circumferential alignment by a stud ring 26 to which the rods are bolted.

Spider 21 is secured to shaft 13 by a tightening bolt 27 which passes downwardly through the vertical axial opening in the spider and into the upper end portion of shaft 13.

An annular cam valve body 28 is disposed concentrically around the hub portion of pull-down spider 21 and is adapted to remain in a fixed position relative to the rotary movement of spider 21. Rotation of spider 21 relative to cam valve 28 is enhanced by a pair of vertically spaced annular bearing members 29 disposed therebetween. Upper and lower bearing members 29 are spaced apart by a spacer band 30 disposed concentrically adjacent the outer midportion of hub 22. Upper member 29 is secured tightly against the upper edge of band 30 by inner and outer clamp rings 31 and 32 respectively. Inner ring 31 is bolted to hub 22 while outer ring 32 is bolted to cam valve 28. Annular sealing washers 33 are disposed between upper bearing 29 and clamp rings 31 and 32, and between lower bearing 29 and a lower clamp ring 34. Washers 33 will present little if any frictional resistance to ring 31 and spider 21 when the latter rotate relative to the washers. Lower bearing 29 is secured tightly against the lower edge of band 30 by clamp ring 34 which is bolted or otherwise secured to cam valve 28.

Cam valve 28 is prevented from rotating with spider 21 by an upwardly extending pin 35 disposed on the upper surface of valve 28 and with the pin mounted in the slotted inner end portion of a stationary arm 36. The outer end of arm 36 is clamped to one end of vertical hollow shaft 37, the other end portion of which is fixedly mounted to the frame of the sealing machine. If desired, other means may be utilized to hold arm 36 stationary.

A valve ring 38 is disposed adjacent the outer portion of the lower horizontal surface of cam valve 28 and is pressed up against the mating surface of valve 28 by a plurality of springs 39 vertically mounted between valve ring 38 and an upwardly extending boss 40 on each alternate spider arm 23. An upwardly extending boss 41 is disposed on each remaining spider arm 23 and receives a drive pin 42 which extends upwardly into an opening in valve ring 38. Drive pins 41 serve as the connection between valve ring 38 and spider 21 so they rotate together.

A vertical passageway 43 is disposed in cam valve 28 and is connected at its upper end to one end of a flexible conduit 44. The other end of conduit 44 is connected to hollow shaft 37, while the lower end of the latter is connected through a conduit 45 to a suitable vacuum source, not shown.

Passageway 43 passes downwardly through cam valve 28 and has a slot 46 therein which is adapted to register periodically with each of a plurality of spaced openings in the upper surface of valve ring 38. Each opening in ring 38 forms part of a chamber 47 which connects to an opening in the outer circumferential edge of ring 38, with the latter openings being connected to a suitable flexible conduit 48.

The number of chambers 47 correspond to the number of spider arms. Each conduit 48 passes from its respective chamber 47 to a brace member 49 mounted on guide rods 24 and 25 in a manner to be described. A suction head 50 is mounted on the outer vertical face of each brace 49 and has an arcuate concave surface 51 for presentation to a seal 5 which has already been applied to a bottle top. A plurality of openings 52 are disposed in the face of surface 51 and connect through a passageway 53 in head 50 and brace 49 to a conduit 48. Grooves 54 interconnect all the openings 52 so that a more uniform suction is applied to a seal 5.

Brace 49 has a vertical tubular portion 55 which is slidably mounted on guide rod 24. Portion 55 has a cam follower 56 thereon which is adapted to ride in a circumferential cam groove or surface 57 disposed in the outer face of cam valve 28. Brace 49 is kept from rotating

around guide rod 24 by a pair of spaced flanges 58 which receive guide rod 25 therebetween.

The orientation of cam groove 57 is such that, as spider 21 rotates, suction heads 50 will travel up and down with braces 49 on rods 24 and 25 as cam followers 56 follow the groove 57.

The spacing of chambers 47 is such that a chamber will register with passageway 43 when the suction head 50 to which the particular chamber is connected is at its uppermost position just prior to the seal pull-down operation. Changes in timing of the suction for the heads may be made by shifting the relative fixed position of cam valve 28 or by changing the size of slot 46. Shifting of cam valve 28 may be accomplished by turning arm 36 about shaft 37 thereby allowing pin 35 to shift in the slotted inner end portion of the arm.

Operation of the device is as follows:

Assume that heads 4 on machine 2 have applied seals 5 to a plurality of bottles 6 in succession, so that the upper edges of the seals are disposed adjacent the upper horizontal surface of caps 9. As bottles 6 travel clockwise around table 3, they approach and finally enter pockets 17 in pocket wheels 12, and are carried counterclockwise around a circle of which shaft 13 is the center.

As each bottle 6 enters a pocket 17, the seal 5 is engaged by the concave surface 51 of a suction head 50. Surface 51 surrounds approximately one-half of the seal's outer surface. As the bottle travels around in pocket 17, it is supported vertically by platform 18 and its lower outer wall portion is supported against substantial horizontal movement by lower pocket wheel 12 and the arcuate edge of lower rail 16.

When a bottle 6 enters a pocket 17 and is engaged by a head 50, slot 46 registers with a chamber 47 leading to the respective head so that suction is applied to approximately one-half of the face of the seal 5. As bottle 6 progresses counterclockwise, the head 50 will travel downwardly due to the positioning of cam groove 57 and will carry seal 5 with it, due to the suction applied. When the seal has reached the limit of desired downward movement, such as when the upper edge of the seal is beneath the thin-walled portion 10 but above the lower edge of cap 9, slot 46 no longer will register with a chamber 47 and the vacuum suction will be cut off at head 50.

Since each head 50 engages only one side of a seal 5, there may be instances where the suction applied would cause the seal to bulge away from the bottle neck on the head side, such as when a bottle is not truly cylindrical. This would cause the seal 5 to bind to the far side of the bottle, and hamper a smooth pull-down operation. This condition is illustrated in Fig. 6.

The pull-down device includes means to prevent such binding, said means operating to provide a firm intimate contact between the head side of each seal and the bottle and/or cap so that there is a maximum clearance or bulge on the free side.

Such means may operate to provide a relative horizontal shift between a bottle 6 and the respective head 50 so that surface 51 always presses the head side of the seal firmly against the bottle.

One shifting means is best illustrated in Figs. 3, 7 and 8, and contemplates placing the geometric center line 59 of each concave surface 51 radially outwardly of the central axis 60 of each vertically disposed bottle 6. In addition, the arcuate edge of upper rail 15 is disposed radially outwardly from a plane passing vertically upwardly from the arcuate edge of lower rail 16.

When a seal 5 is engaged by a head 50, the bottle will be tilted radially outwardly slightly, so that surface 51 presses seal 5 against the bottle to prevent slack on the head side and prevent binding on the free side. The seal may then be pulled downwardly on the bottle with substantially no interference.

After a seal 5 has been pulled down to its proper position, such as that shown in Fig. 8, and the suction is cut

off, each bottle 6 passes from its pocket 17 and onto discharge conveyor 11 where it travels to the next desired location.

The invention provides a novel means for displacing applied seals axially on a bottle to allow a more desirable placement thereof and for other purposes. The device is safe, easily adjustable and fast operating. Binding of the seals to the bottles during the pull-down operation is eliminated.

Various modes of carrying out the invention are contemplated as being within the scope of the following claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention.

We claim:

1. In combination with a machine for applying tubular seals to containers and the like and wherein said machine disposes the seals adjacent the upper extremity of the containers, mechanism disposed adjacent the discharge of said machine with said mechanism comprising, means to receive said containers from said machine and to move the containers along a predetermined path, and means disposed adjacent said first-named means to engage the seals initially disposed on the upper portions of said containers and to move the seals downwardly thereon to a predetermined position as the containers are being moved along said path.

2. In combination with a machine for applying tubular seals to containers and the like and wherein said machine disposes the seals adjacent the upper extremity of the containers, mechanism disposed adjacent the discharge of said machine with said mechanism comprising, means to receive said containers from said machine and to move the containers along a predetermined path, means disposed adjacent said receiving and moving means to engage the seals initially disposed on the upper portions of said containers and to move the seals downwardly thereon to a predetermined position as the containers travel along said path, and means to produce a relative shift between each container and said seal engaging means to prevent binding of the seals to the containers as the seals are moved downwardly.

3. In combination with a machine for applying tubular seals to containers and the like and wherein said machine disposes the seals adjacent the upper extremity of the containers, mechanism disposed adjacent the discharge of said machine with said mechanism comprising, means to receive each container in succession from said machine and to move the container along a predetermined path, means responsive to the movement of said receiving and moving means to engage one side of the seal initially disposed on the upper portion of a container and to move the seal downwardly thereon to a predetermined position as the container travels along said path, and means to produce a firm contact between the seal and the container adjacent said one side of the seal to provide clearance between the other side of the seal and the container to prevent binding of said other side of the seal to the container as the seal is moved downwardly.

4. In combination with a machine for applying tubular seals to containers and the like and wherein said machine disposes the seals adjacent the upper extremity of the containers, mechanism disposed adjacent the discharge of said machine with said mechanism comprising, means to receive each container in succession from said machine and to move the container along a predetermined path, means to support each container to prevent substantial horizontal and vertical movement thereof relative to the direction of travel of the container, means responsive to the movement of said receiving and moving means to engage one side of the seal initially disposed on the upper portion of a container and to move the seal downwardly thereon to a predetermined position as the container travels along said path, and means to tilt the container at an angle from the vertical to prevent binding of the other side of the seal to the container as the seal is moved downwardly, said container supporting means being disposed to allow said tilting.

5. In a mechanism of the class described for handling containers having tubular seals disposed thereon, at least one rotary pocket wheel for receiving a plurality of containers in succession and for moving the containers in a substantially circular path, guide means for retaining the containers in the pocket wheel, and means rotating with said pocket wheel for engaging the seal on each container and for displacing the seal from its initial position.

6. In a mechanism of the class described for handling containers having tubular seals disposed thereon, at least one rotary pocket wheel for receiving a plurality of containers in succession and for moving the containers in a substantially circular path, guide means for retaining the containers in the pocket wheel, means rotating with said pocket wheel for engaging the seal on each container and for displacing the seal from its initial position, and means to produce a substantial clearance between said seal and the side of the container opposite said seal engaging means to prevent binding of the seal to the container as the seal is displaced.

7. In a mechanism of the class described for handling containers having tubular seals disposed thereon, at least one rotary pocket wheel for receiving a plurality of containers in succession and for moving the containers in a substantially circular path, guide means for retaining the containers in the pocket wheel, means rotating with said pocket wheel for engaging the seal on each container and for displacing the seal from its initial position, and means to produce a relative shift between each container and said seal engaging means to prevent binding of the seal to the container as the seal is displaced.

8. In a mechanism of the class described for handling containers having tubular seals disposed thereon, at least one rotary pocket wheel for receiving a plurality of containers in succession and for moving the containers in a substantially circular path, guide means for retaining the containers in the pocket wheel, means rotating with said pocket wheel for engaging the seal on each container and for displacing the seal from its initial position, and means to tilt each container at an angle from the vertical to prevent binding of the seal to the container as the seal is displaced, said guide means being disposed to allow said tilting.

9. In a mechanism of the class described for handling containers having tubular seals disposed thereon, at least one rotary pocket wheel for receiving a plurality of containers in succession and for moving the containers in a substantially circular path, guide means for retaining the containers in the pocket wheel, a fixed cam, at least one cam follower adapted to follow said cam, and means responsive to the position of said cam follower for engaging the seal on each container and for displacing the seal from its initial position as the container travels with the pocket wheel.

10. In a mechanism of the class described for handling containers having tubular seals disposed thereon, at least one rotary pocket wheel mounted on a vertical shaft for receiving a plurality of containers in succession and for moving the containers in a substantially circular path, guide means for retaining the containers in the pocket wheel, a rotary spider mounted on said shaft, a cam body mounted concentrically with said spider and presenting a cam surface, means to prevent rotation of said cam body, at least one cam follower adapted to follow said cam surface, and at least one seal engaging head connected to said cam follower and mounted for rotation with said spider; the configuration of said cam surface being such that when the spider rotates, the cam follower and head will be displaced vertically to displace a seal from its initial position as the container travels in a circular path.

11. In a mechanism of the class described for handling

containers having tubular seals disposed thereon, at least one rotary pocket wheel mounted on a vertical shaft for receiving a plurality of containers in succession and for moving the containers in a substantially circular path, guide means for retaining the containers in the pocket wheel, a rotary spider mounted on said shaft, a cam body mounted concentrically with said spider and presenting a cam surface, means to prevent rotation of said cam body, at least one cam follower adapted to follow said cam surface, at least one seal engaging head connected to said cam follower and mounted for rotation with said spider, and valve means to supply suction to said seal to hold the latter in engagement with the head; the configuration of said cam surface being such that when the spider rotates, the cam follower and head will be displaced vertically to displace a seal from its initial position as the container travels in a circular path.

12. In a mechanism of the class described for handling containers having tubular seals disposed thereon, at least one rotary pocket wheel mounted on a vertical shaft for receiving a plurality of containers in succession and for moving the containers in a substantially circular path, guide means for retaining the containers in the pocket wheel, a rotary spider mounted on said shaft, a cam body mounted concentrically with said spider and presenting a cam surface, means to prevent rotation of said cam body, at least one cam follower adapted to follow said cam surface, and at least one seal engaging head connected to said cam follower and mounted for rotation with said spider; the configuration of said cam surface being such that when the spider rotates, the cam follower and head will be displaced vertically to displace a seal from its initial position as the container travels in a circular path; said head being disposed to produce firm contact between one side of a seal with the container to provide a substantial clearance between the other side of the seal and the container to prevent binding therebetween as the seal is displaced.

13. In a mechanism of the class described for handling containers having tubular seals disposed thereon, at least one rotary pocket wheel mounted on a vertical shaft for receiving a plurality of containers in succession and for moving the containers in a substantially circular path, guide means for retaining the containers in the pocket wheel, a rotary spider mounted on said shaft, a cam body mounted concentrically with said spider and presenting a cam surface, means to prevent rotation of said cam body, at least one cam follower adapted to follow said cam surface, and at least one seal engaging head connected to said cam follower and mounted for rotation with said spider; the configuration of said cam surface being such that when the spider rotates, the cam follower and head will be displaced vertically to displace a seal from its initial position as the container travels in a circular path; said head being disposed to tilt the container at an angle from the vertical to prevent binding of a seal to a container as the seal is displaced.

14. In a mechanism of the class described for handling containers having tubular seals disposed thereon, at least one rotary pocket wheel mounted on a vertical rotary shaft for receiving a plurality of containers in succession and for moving the containers in a substantially circular path, guide means for retaining the containers in the pocket wheel, a rotary spider mounted for rotation with said shaft and having a hub and a plurality of outwardly extending arms, a cam body mounted concentrically with the hub of said spider and presenting a cam surface, said cam body having a passageway therein with the latter connected to a vacuum source, a plurality of cam followers adapted to follow said surface, means to prevent rotation of said cam body, valve means mounted for rotation with said spider and having a plurality of passageways therein for successive registration with said first-named passageway during rotation of said shaft, a plurality of seal engaging heads connected to said cam followers and mounted for rotation with said spider, each head having suction means thereon for holding a seal and with said suction means connected to one of said second-named passageways; the configuration of said cam surface being such that when the spider rotates, the cam follower and head will be displaced vertically to displace a seal from its initial position as the container travels in a circular path.

15. In a mechanism of the class described for handling containers having tubular seals disposed thereon, at least one rotary pocket wheel mounted on a vertical rotary shaft for receiving a plurality of containers in succession and for moving the containers in a substantially circular path, guide means for retaining the containers in the pocket wheel, a rotary spider mounted for rotation with said shaft and having a hub and a plurality of outwardly extending arms, a cam body mounted concentrically with the hub of said spider aand presenting a cam surface, a plurality of cam followers adapted to follow said surface, means to prevent rotation of said cam body, a plurality of vertically movable seal engaging heads with each head connected to a cam follower and mounted adjacent one of said arms for rotation therewith; the configuration of said cam surface being such that when the spider rotates, each cam follower and head will be displaced vertically; and means timed with the rotation of said spider and with the position of said cam followers to apply suction through each successive head to a seal so that vertical displacement of a head will cause vertical displacement of a seal from the latter's initial position.

No references cited.