Aug. 16, 1966 S. HARRIS ETAL 3,266,213

BOTTLE WRAPPING APPARATUS

Filed March 15, 1963 2 Sheets-Sheet 1

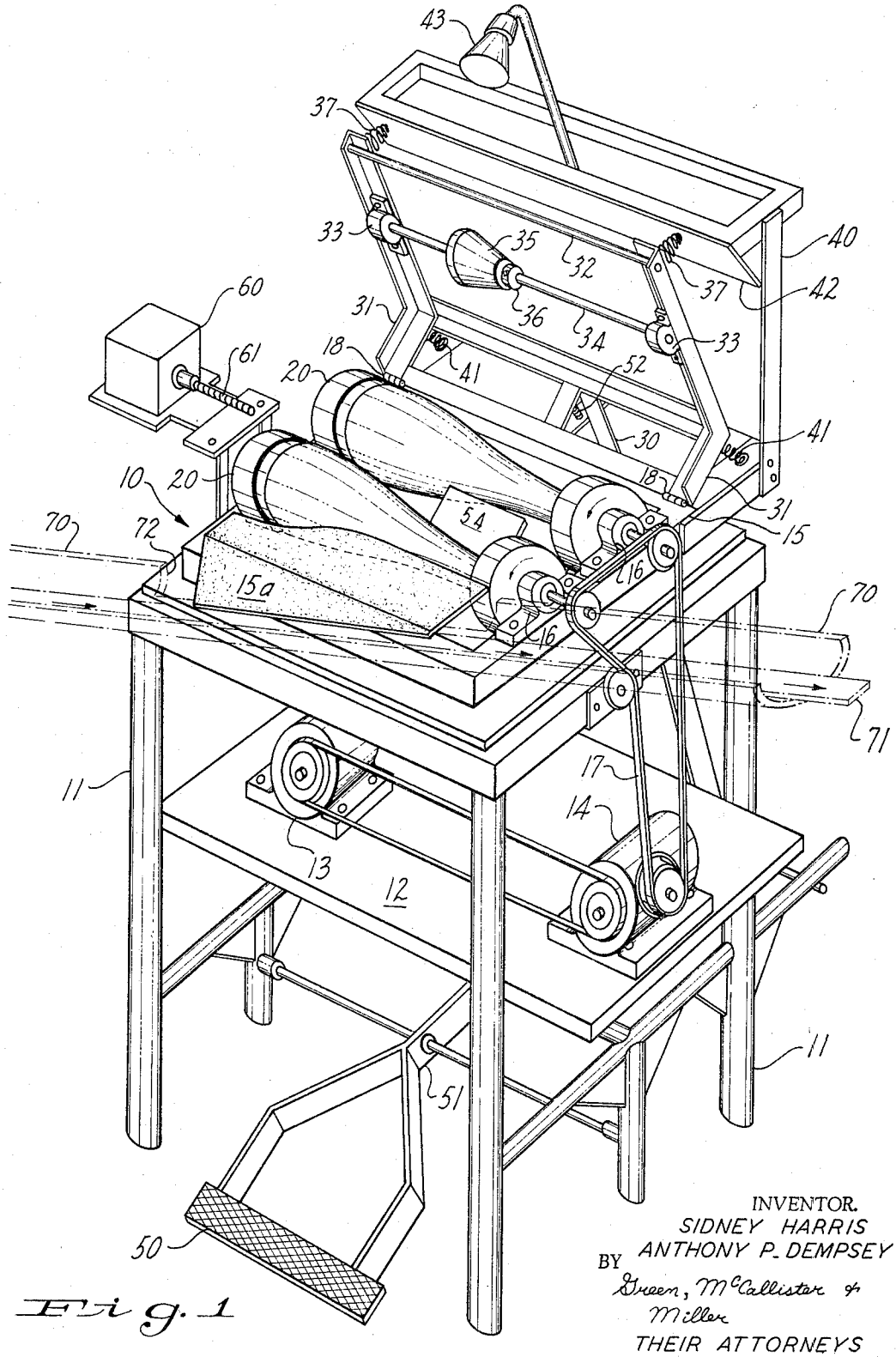


Fig. 1

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Filed March 15, 1963 2 Sheets-Sheet 2

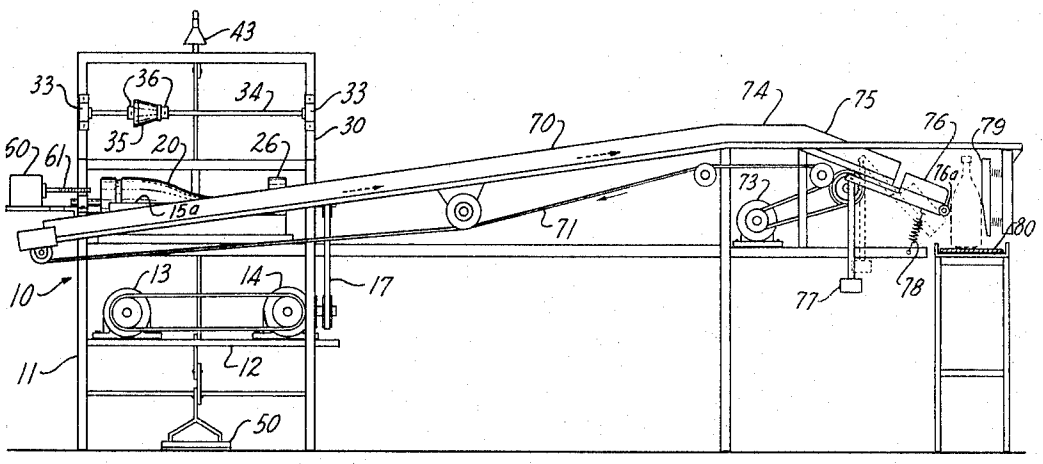


Fig. 2

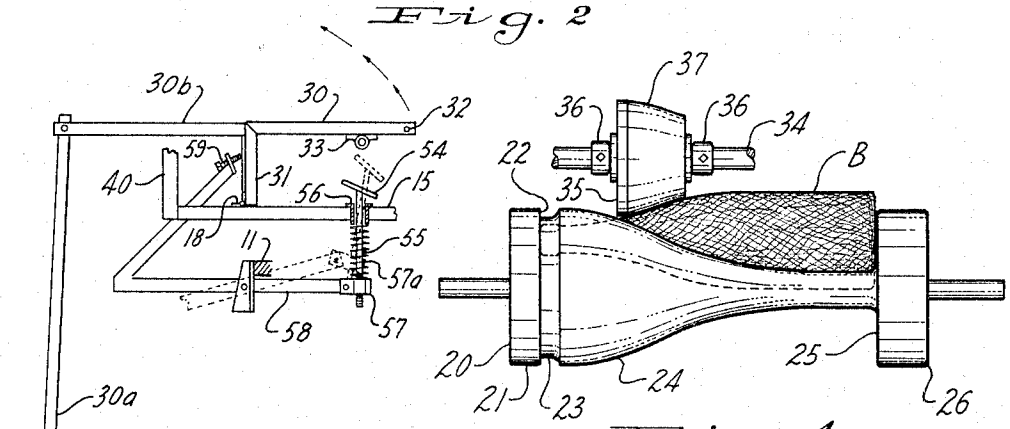


Fig. 4

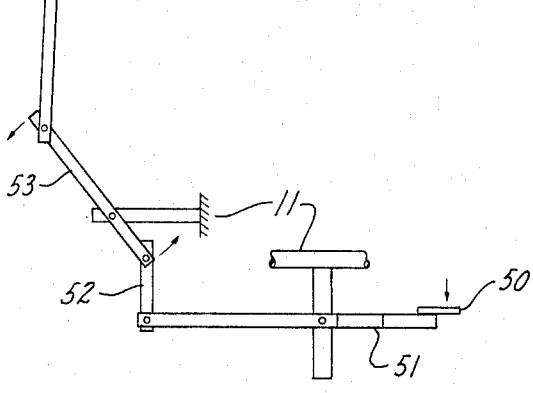


Fig. 3

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United States Patent Office 3,266,213 Patented August 16, 1966

3,266,213

BOTTLE WRAPPING APPARATUS

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Filed Mar. 15, 1963, Ser. No. 265,397
17 Claims. (Cl. 53—49)

This invention relates to semi-automatic equipment for wrapping a deformable cover about a body of revolution. More particularly, this invention relates to apparatus for tightening a decorative metallic foil cover into an enclosing-conforming relationship with a beverage bottle.

In the past, beverage bottles have been decorated by closely fitting decorative paper or metallic foil covers. Such decoration has, for the most part, been limited to more expensive beverages, such as champagne and imported beer, partly because of the high cost of labor required to manually apply a foil cover neatly and tightly to a bottle.

In our co-pending application Serial No. 147,331, filed October 24, 1961, now Patent No. 3,121,647 and entitled "Bottle Wrapping Apparatus," we disclose semi-automatic apparatus for applying a film of molten wax to a bottle cover on a production basis. According to our prior disclosure, the waxed cover, after being hand rolled about the bottle to be wrapped, was tightened by hand, from an initially cylindrical shape, to a tight bottle-conforming shape about the bottom, neck and top portions of the bottle. This hand operation produced non-uniform wrappings that were often bunched, torn or loose and required a relatively large amount of wrapping time and, therefore, labor cost.

It has thus been an object of our invention to fully investigate the production efficiency and quality control problems associated with the operation of wrapping beverage bottles with metallic foil;

Another object of our invention has been to provide apparatus that will mold a deformable envelope into a conforming relationship with a body of revolution having an irregular axial cross-section.

Another important object of our invention has been to provide semi-automatic equipment that can be efficiently used at moderate production levels for smoothly tightening an initially cylindrical foil cover about all portions of an ordinary beverage bottle;

A further object of our invention has been to provide semi-automatic cover-tightening equipment that is practically foolproof in operation, so that it can be operated by unskilled labor;

A further important object of our invention has been to provide cover-tightening machinery that is especially adapted to be used in conjunction with the cover-waxing apparatus of our co-pending application Serial No. 147,331 that produces bottles having a waxed cylindrical foil wrapping thereon.

A still further object of our invention has been to provide conveyor means for use with our cover-tightening equipment that will receive a wrapped bottle in an axially horizontal orientation from the tightening equipment, and deliver it to labeling and packaging equipment in an upright or axially vertical orientation without injuring the wrapping;

These and other important objects of our invention will appear to those skilled in the art upon reading and understanding the following disclosure of our inventive concepts and an illustrative embodiment thereof.

One phase of our invention involves the use of a pair of driven cover forming rollers that each have an accurately contoured surface which is generally complementary to the contours, including the flat ends, of a bottle to be wrapped. A bottle to which a cylindrical cover has been applied will thus accurately locate itself with respect to the driving rollers making the operation of the machine as a whole practically foolproof.

Another phase of our invention relates to the use of a bottle-driven, slightly compressible tapered idler hold-down roll that frictionally engages the cover along a short portion of an elongated bottle neck to apply a smooth compression-twisting force to the entire bottle contour and thereby draw an initially cylindrical cover into tight smooth attractive engagement with the bottle. We have found that the tightness of the bottle wrapping can be controlled by adjusting the relative position of the idler roll along the bottle neck. Thus the roll is located at a large diameter portion of the bottle neck to increase the cover tightness and is located at a small diameter portion, near the lid, to lessen the cover tightness. To further insure foolproof operation of our equipment, we provide stop means to positively position the hold-down roll vertically with respect to the contoured driving rollers.

A further phase of our invention relates to the use of semi-automatic start, stop, bottle ejection, and conveyor means whereby operation of the driving rollers of the wrapping apparatus is initiated by closing the machine and is terminated when the machine is opened by means that also ejects the wrapped bottle. To prevent damage to the bottle covers when a conveyor is employed to move wrapped bottles to a further processing station, we find it desirable to interconnect the conveyor's operation with starting of the wrapping machinery. This interconnection causes the conveyor to be stationary when receiving a bottle from the cover-tightening device, and permits the wrapped bottle to come to rest on the conveyor before the conveyor begins to move the bottle, thus preventing slippage between the conveyor and the bottle that could result in tearing or other disfiguring of the foil wrapper.

Bottle labeling and crating equipment is designed to handle bottles in an upright orientation; however, the preferred embodiment of our invention delivers wrapped bottles in an on-side orientation. Accordingly, we have conceived and developed a simple and inexpensive conveyor that will rotate an on-side bottle 90° to an upright position without damaging its foil cover. Our conveyor includes an elongated trough that is longitudinally upwardly concave. A thin conveyor belt moves along the bottom of the trough to raise the bottle to an elevated position with respect to the level of our tightening equipment and also of standard bottle labeling and crating equipment. Moving along the trough, the bottle is gently turned over an apex such that frictional control over the bottle is maintained at all times. The downstream end of the conveyor is provided with a counterbalanced pivoting trough extension member that rotates downwardly under the influence of the weight of the bottle, to deliver the bottle at an angle onto a second conveyor and adjacent a vertical backing plate. When the weight of the bottle moves off of the counterbalanced extension member, the extension member pivots upwardly carrying its downstream end upwardly along the side of the bottle, thus setting the bottle upright. It is thus seen that the bottle's own weight is employed as the motivating factor in operating the set-up mechanism. To avoid damage to the foil cover by the bottle set-up mechanism, the downstream end of the pivoted trough extension member is provided with a roller.

These phases or inventive concepts of our invention will be better understood by referring to the specific illustrative embodiment of our invention shown in the accompanying drawings of which:

FIGURE 1 is a perspective view of cover-tightening apparatus constructed in accordance with our invention;

FIGURE 2 is a reduced scale front elevational view of the apparatus of FIGURE 1, showing also conveyor apparatus that is employed in conjunction therewith;

FIGURE 3 is a fragmental left-hand elevational view of the apparatus shown in FIGURE 1 showing the operative relationship of certain moving parts of that apparatus; and

FIGURE 4 is an enlarged fragmental front elevational view of a portion of the apparatus shown in FIGURE 1 showing the cover-tightening and forming rolls of the apparatus in their operative position with respect to a bottle being wrapped.

Turning now more specifically to the drawings, in FIGURE 1 there is shown bottle cover-tightening apparatus **10** that has a vertically standing support means or frame **11**. A drive mounting board or platform **12** is securely attached to the frame **11** intermediate of its height and support means for driving the apparatus. The drive means shown in the drawings comprises an electric motor **13** and a gear box or transmission **14** that is operatively connected thereto. A generally horizontal waist level wrapping station or working table **15** supports two pair of axially-aligned bearings **16**. The bearings **16** rotatably support a pair of horizontally-axially-extending identical cover forming drive rollers **20** that each have an axial contour that is substantially complementary to the contour of the bottle to be wrapped. The drive rollers **20** are operatively connected to the gear box **14** by suitable remote power transmitting means such as a chain and sprocket transmission or a belt and pulley mechanism **17** whereby the drive rollers **20** will be rotatively driven in the same direction by the motor **13**.

An idler roll support means or top frame **30** is pivotally connected to the table **15** by a pair of hinges **18**, and is thus movable from the open or inoperative position shown in FIGURE 1, to the closed or operative position shown in FIGURE 3. The top frame has a pair of angle side bars **31**, which, as best shown in FIGURE 3 positively limit its downward position and thereby insure a reproducible cover tightness. The side bars **31** are connected at their forward end by a grip member or handle bar **32** that extends therebetween. The top frame **30** is provided with a pair of bearings **33** that rotatably support an idler rod or shaft **34**. Bottle holding or hold-down means such as a tapered idler roll **35** is connected to the shaft **34** for rotation therewith and is adjustably positionable lengthwise thereof by an opposed pair of roll-end-located sleeves **36** that are connected to the shaft **34** by set screws. The idler roll **35** is constructed of cork or other high-friction, slightly compressible material and has a tapered or cone-like surface **37** (see FIGURE 4) that is shaped to conform generally to a small longitudinal segment of the neck of a bottle B. The idler roll **35** when in its operative position adjacent the contoured driving rollers **20**, as shown in FIGURE 4, holds the bottle B and its prepositioned wrapper or cover in compressive contact therewith. By engaging the tapered surface of the bottle B, as shown in FIGURE 4, the idler roll **35** additionally induces a compressive-twisting action on the cover, along the bottle neck to further enhance the cover forming operation.

The set screw held sleeves **36** permit lengthwise adjustment of the idler roll **35** for increasing or decreasing the bottle cover tightness. For example, the idler roll **35** would be moved to the right of FIGURE 1 to increase the cover tightness and, conversely, it would be moved to the left of FIGURE 1 to produce a somewhat looser cover.

A back frame or buffer **40** is rigidly connected to the table **15** and extends upwardly from a back portion thereof adjacent the open position of the top frame **30**. The back frame **40** has a pair of cushion means or buffer springs **41** mounted thereon and facing a cooperating portion of the top frame **30** for yieldably limiting its upward movement. The back frame **40** also has an angled buffer plate or stop member **42** that is yieldably engaged by a pair of cushion means or springs **37** that extend backwardly-outwardly from the top frame **30**. A lamp **43** mounted on the back frame **40**, is directed onto the rollers **20** to illuminate the work area of the machine.

Returning now to the rollers **20** as more clearly illustrated in the enlarged view of FIGURE 4, these rollers are seen to each comprise a cylindrical top end portion **21** that terminates inwardly in an inwardly facing right angled flange or bottle top-forming portion **22**. An annular groove or bottle collar-forming portion **23** extends toward the right of the machine from the top-forming portion **22** and is smoothly connected to an elongated tapered or bottle side-wall-forming portion **24**. The bottle side-wall-forming portion **24** has a contour that is substantially complementary to the long contour of bottles to be wrapped. The bottle side-wall-forming portions **24** terminate, at their right end, in an inwardly facing right angled flange or bottom wall-forming portion **25** that extends radially-outwardly to a cylindrical bottom end portion **26**. It will be appreciated that a bottle B positioned cooperatively upon or between the rollers **20** will closely engage the rollers from the left-end, top flange **22** to the right-end, bottom flange **25** and that proper location of the bottle on the rollers **20** is practically foolproof.

FIGURE 3 shows a linkage for raising the top frame **30** in response to operation of a foot pedal or treadle **50** by the machine operator when a bottle cover has been tightened. The top frame actuating linkage includes a pedal support link **51** that is pivotally connected intermediate its ends to the frame **11** and carries the pedal **50** at one end, a generally vertical transfer link **52** that is connected at its lower end to the other end of the pedal support link **51**, a reversing link **53** that is pivotally connected intermediate its ends to the frame **11** and is connected at one end to the upper end of the transfer link **52**, and suitable top frame connecting linkage **30***a* and **30***b* that are operatively connected to the other end of the reversing link **53** whereby motion of the link **53** is transferred to the top frame **30**. The reversing link **53** transforms the upward movement of the left end of the pedal support link **51** into a downward movement that is required to pivot the top frame **30** counter-clockwise about the hinges **18**.

A bottle ejection finger or inclined plate **54** (see FIGURES 1 and 3) is positioned between the rollers **20** for upward and outward movement in response to hand movement of the top frame **30** or foot depression of the foot pedal **50**. The inclined plate **54** is securely mounted on the upper end of a rod **55** (FIGURE 3) that extends through and is slidably-rotatably supported by a loose vertically extending bushing or guide portion **56** of the working table **15**. The lower end of the rod **55** is adjustably connected to a horizontally-extending short tilting link **57** and a compression buffer spring **57***a* is operatively positioned between the table **15** and the tilting link **57**. A main rotating linkage or motion supply means **58** is pivotally connected to the frame **11** for rotation in a vertical plane. The right-hand end of the main rotating linkage **58** is rotatably secured (as shown in FIGURE 2) to the left-hand or rearward end of the tilting link **57**, such that when the right-hand end of the linkage **58** moves vertically above its pivotal mounting on the frame **11**, the tilting link **57** will move upwardly and tilt slightly clockwise as shown by the broken lines. This motion causes the rod **55** and the inclined bottle ejection finger **54** to move upwardly and outwardly or slightly to the right, thus ejecting a wrapped bottle B from the drive rolls **20**. The other end of the main rotating link **58** is provided with adjustable feeler means such as a screw **59** for following movement of the top frame **30** and thereby interconnecting the movement of the top frame **30** with the operation of the ejection finger **54**.

Returning to FIGURE 1, there is shown a micro switch or other top frame position sensing means **60** having a feeler **61** that is engaged by the top frame **30** when it is in the down or operative position. The micro switch **60**

is operatively connected to the motor **13** by electrical conduit (not shown) to control its operation and thereby free the machine operator's hands from the job of actuating a switch.

The operation of the apparatus thus far described is as follows:

The machine is in its open position as shown in FIGURE 1 and a bottle has been preliminarily prepared by hand rolling it into a waxed aluminum foil cover. The cover is crushed slightly by hand around the bottle neck and the thus prepared bottle is placed onto the rollers **20** with its cap portion at the left of FIGURE 1. The operator grasps the handle bar **32** of the top frame **30** and brings the idler roll **35** into engagement with the foil cover as shown in FIGURE 4. As the top frame **30** is pivoted downwardly, the bottle ejection finger **54** moves downwardly by gravity, permitting the prepared bottle and cover to fall into full complementary engagement with the rollers **20**. As the top frame **30** is moved further, it engages the feeler **61** of the micro switch **60**, thus initiating operation of the motor **13** and causing the drive rollers **20** to rotate. The idler roll **35** will hold the bottle in intimate contact with the drive rollers thus causing a twisting compression of the foil cover about the bottle by the top, collar, side-wall, and bottom-forming portions **22**, **23**, **24** and **25** of the rollers **20**. The cover will thus be tightened and smoothed onto the contour of the bottle. When the tightening has been completed, the machine operator steps on the pedal **50** to actuate the top frame raising linkage, thereby moving the top frame **30** to its original or open position and discontinuing the contact between the top frame **30** and the micro switch feeler **61** thus terminating the operation of the motor **13**. As the top frame moves towards its open position, the feeler screw **59** of the bottle ejection linkage will follow and the bottle ejection plate **54** will move upwardly and slightly forwardly between the rollers **20**, engage the bottle and push it into an inclined pathway **15***a* which delivers the wrapped bottle from the tightening apparatus.

Preferably our cover tightening equipment is used in conjunction with a power conveyor such as illustrated in FIGURE 2 that is provided with means for standing the bottle upright. The conveyor has a longitudinally upwardly concave stationary bottle guide means or trough **70** along the bottom of which moves a thin conveyor belt **71** for moving a horizontally-oriented bottle to an elevated position above a receiving table or second conveyor **80**. The trough **70** includes a cut-out portion **72** (see FIGURE 1) adjacent the cover tightening equipment for receiving bottles as they are ejected by the inclined plate **54**. The working table **15** is provided with a slightly flexible downwardly inclined cantilevered chute or bottle delivery means **15***a* over which the bottles roll after being ejected from the rollers **20**. Preferably the right-hand end of the chute **15***a* is substantially flush or level with the directly adjacent portion of the belt **71** within the trough **70** to minimize the fall distance between the chute and the belt. The conveyor belt **71** is driven by a motor **73** (FIGURE 2) whose operation is preferably interconnected by means of the micro switch **60** to the operation of the cover tightening equipment, such that the belt **71** is driven to move a bottle upwardly only during the time that the cover is being tightened about a subsequent bottle. This interconnection permits an ejected bottle to come to rest on the conveyor belt **71** while the belt is stationary, thus avoiding cover damage caused by slippage between the belt and the cover.

The conveyor trough **70** includes adjacent its discharge or right-hand end as shown in FIGURE 2, a level portion or dwell **74** and a downwardly-inclined turning portion **75** that moves the conveyed bottles over the apex gently, so as to maintain frictional control of the bottle by the belt **71** at all times. A bottle stand-up rotating table or trough extension member **76** is pivotally supported adjacent the discharge end of the downwardly inclined portion **75** of the trough **70**. A cover protecting nylon roller **76***a* is rotatably mounted on the downstream or vertically moving end of the trough extension member **76**. The trough extension member **76** is yieldably supported or counterbalanced to a normally upwardly pivoted position by a vertically movable pivotally connected weight **77** and an opposed tension spring **78**. Thus, when a bottle is delivered by the belt **71** from the downwardly inclined portion **75** of the trough **70**, its weight rotates the trough extension member **76** downwardly as shown by the broken lines in FIGURE 2, and the bottle moves onto the receiving table **80** at an angle greater than about 30° to the horizontal. As the weight of the bottle moves off of the pivoted trough extension member **76**, the extension member is returned upwardly by the counterweight **77** and the roller **76***a* moves upwardly along the side of the bottle to complete the stand-up operation. To insure that the bottle is not turned past its upright orientation by the moving roller **76***a*, a backing member or vertically-extending abutment plate **79** is adjustably positioned in an opposed relation to the trough extension member **76**.

A bottle wrapped in our tightening apparatus can thus be received horizontally by our conveyor and gently placed upright on a second conveyor to move into conventional labeling and crating equipment.

From the foregoing description, it will be seen that we have provided relatively simple and inexpensive but substantially foolproof semi-automatic equipment that will neatly tighten a deformable cover into an attractive conforming relationship with a beverage bottle or other body of revolution. It will also be appreciated that we have provided a simple bottle set up conveyor that makes our cover tightening machine usable in an automatic assembly line with standard bottle labeling and crating equipment.

Having thus described our inventive concepts and an illustrative embodiment thereof, we claim:

1. In semi-automatic equipment for wrapping a metallic foil cover about a bottle that has a tapered neck portion; apparatus for tightening a cover that is prepositioned about the bottle comprising: a frame, a generally horizontal working table supported by said frame, a pair of contoured, horizontally-extending drive rollers rotatably mounted on said table for cooperatively receiving the bottle and prepositioned cover thereupon, means for rotatably driving said driver rollers about their axes, an idler roll having at least a partially tapered longitudinal contour, means supported by said frame supporting said idler roll having at least a partially tapered longitudinal contour, means supported by said frame supporting said idler roll for movement between an operative position wherein said idler roll is adjacent said pair of drive rollers and an inoperative position, said idler roll support means operatively carrying said idler roll for permitting rotation of said idler roll about an axis that is parallel to the axes of said driving rollers.

2. Apparatus as defined in claim **1** wherein said idler roll is constructed of a slightly compressible material and has a surface having a high coefficient of friction.

3. Apparatus as defined in claim **1** wherein said idler roll is constructed of cork.

4. In semi-automatic equipment for wrapping a metallic foil cover about a bottle that has a tapered neck portion; apparatus for tightening a cover that is prepositioned about the bottle comprising: a frame, a generally horizontal working table supported by said frame, a pair of contoured horizontally-extending drive rollers rotatably mounted on said table for cooperatively receiving the bottle and prepositioned cover thereupon, means for rotatably driving said driver rollers about their axes, selectively operable means for ejecting a bottle from its position upon said drive rollers, said working table having an inclined pathway for delivering a bottle ejected by said last named means from the cover tightening apparatus,

an idler roll having at least a partially tapered longitudinal contour, means supported by said frame supporting said idler roll for movement between an operative position wherein said idler roll is adjacent said pair of drive rollers and an inoperative position, means operatively connecting said idler roll to said idler roll support means for permitting rotation of said idler roll about an axis that is parallel to the axes of the drive rollers.

5. Apparatus as defined in claim 4 wherein said selectively operable bottle ejecting means comprises a bottle ejection finger that is positioned between said drive rollers, a vertically extending rod supportingly-connected at its upper end to said finger and at its lower end to a horizontally-extending tilting link, means carried by said working table for slidably-rotatably supporting said rod intermediate its ends, and means for moving said tilting link upwardly and rearwardly to cause said bottle ejection finger to move upwardly and forwardly with respect to said working table.

6. Apparatus as defined in claim 5 wherein said tilting link moving means comprises a main rotating link that is pivotally supported by said frame for rotative movement in a vertical plane, said main rotating link being pivotally connected to said tilting link rearwardly of the connection of said rod thereto.

7. Apparatus as defined in claim 4 further comprising: means operatively interconnecting said bottle ejecting means and said idler roll support means, such that movement of said idler roll support means to its inoperative position moves said bottle ejecting means to its bottle ejecting position.

8. Apparatus as defined in claim 7 further comprising: means responsive to said idler roll support means being in its operative position for controlling said roller driving means to cause operation thereof.

9. Apparatus as defined in claim 7 further comprising: closing and opening switch means for energizing and de-energizing said roller driving means, means positioning said switch means in the path of movement of said idler roll between its operative and inoperative positions, and said switch means being constructed and arranged to close when said idler roll is moved to its operative position for energizing said roller driving means and to open when said idler roll is moved to its inoperative position for de-energizing said roller driving means.

10. In semi-automatic equipment for wrapping a metallic foil cover about a bottle that has a flat top portion, a collar portion, a contoured side-wall portion, and a bottom portion; apparatus for tightening a cover that is prepositioned about the bottle comprising: a frame, a generally horizontal working table supported by said frame, a pair of substantially identical horizontally-axially-extending drive rollers rotatably mounted on said working table, each of said drive rollers having in serial orientation an annular flange for forming the top portion of the bottle cover, an annular groove portion for forming the collar portion of the bottle cover, an elongated contoured portion for forming the side wall portion of the bottle cover and a second annular flange portion for forming the bottom portion of the bottle cover, means for rotatably driving said rollers about their axes, an idler roll having at least a partially tapered longitudinal contour, means supported by said frame supporting said idler roll for movement between an operative position wherein said idler roll is adjacent said pair of drive rolls for contacting a segment of the side wall portion of the bottle cover and an inoperative position, said idler roll being rotatably mounted on said idler roll support means.

11. In semi-automatic equipment for wrapping a metallic foil cover about a bottle that has a tapered neck portion; apparatus for tightening a cover that is prepositioned about the bottle comprising: a frame, a generally horizontal working table supported by said frame, a pair of contoured horizontally-axially-extending drive rollers rotatably mounted on said table for cooperatively receiving the bottle and prepositioned cover thereupon, means for rotatably driving said drive rollers about their axes, an idler roll having at least a partially tapered longitudinal contour, means supported by said frame supporting said idler roll for movement to and from an operative position wherein said idler roll is adjacent said drive rollers, said idler roll support means including an abutment for positively positioning said idler roll in its operative position and further including bearing means operatively connected to said idler roll to permit its rotation about an axis.

12. In semi-automatic equipment for preparing a beverage bottle for market; improved apparatus comprising:

(A) means for tightening a prepositioned metallic foil cover about a bottle that has a tapered neck portion; said cover tightening means having,
  (1) a frame
  (2) a generally horizontal working table supported by said frame and having an inclined delivery pathway,
  (3) a pair of contoured horizontally-extending drive rollers rotatably mounted on said working table for cooperatively receiving the bottle and prepositioned cover thereupon,
  (4) means for rotatably driving said drive rollers about their axes,
  (5) an idler roll having at least a partially tapered longitudinal contour,
  (6) means supported by said frame supporting said idler roll for movement between an operative position wherein said idler roll is adjacent said pair of drive rollers and an inoperative position,
  (7) and means responsive to said idler roll being moved to an inoperative position for ejecting a bottle from said drive rollers onto said inclined delivery pathway of said working table.

13. Apparatus as defined in claim 12 wherein, said drive rollers are tapered longitudinally and are constructed and arranged to define a bottle-receiving recess therebetween, and said drive rollers have peripheral flanges adjacent their opposite ends to position a bottle therebetween within the recess.

14. Apparatus as defined in claim 13 further comprising: ejector means carried by said working table and operatively positioned beneath the recess for moving a bottle out of position therein after a cover tightening operation, conveying means positioned adjacent said driving rollers and adapted to receive the bottle when it is ejected by said ejector means, and means cooperating with said ejector means to stop the operation of said conveying means when a bottle is being delivered by said ejector means thereto.

15. Apparatus as defined in claim 13 wherein said means for supporting said idler roll has means for resiliently holding said roll in its operative position in substantial alignment with the recess between said pair of drive rollers.

16. In semi-automatic equipment for wrapping a deformable cover about a bottle; apparatus for tightening a cover that is prepositioned about the bottle comprising: a pair of driving rollers each having an axial contour that is substantially complementary to the contour of the bottle to be wrapped, means mounting said rollers for rotation about parallel longitudinal axes, means for rotatably driving said drive rollers about their axes, bottle-holding means positionable adjacent said driving rollers for operatively engaging the prepositioned cover on the bottle to hold the bottle and cover in contact with said driving rollers, and an idler roll that is at least partially tapered in longitudinal contour and is constructed of a slightly compressible material with the surface thereof having a relatively high coefficient of friction.

17. Apparatus as defined in claim 16 wherein means positions said idler roll for rotation about an axis substantially parallel to the axes of said driving rollers.

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