Sept. 12, 1967 H. S. FISHER ETAL 3,340,591

BOTTLE COLLAR APPLYING MECHANISM

Filed June 23, 1964 5 Sheets-Sheet 1

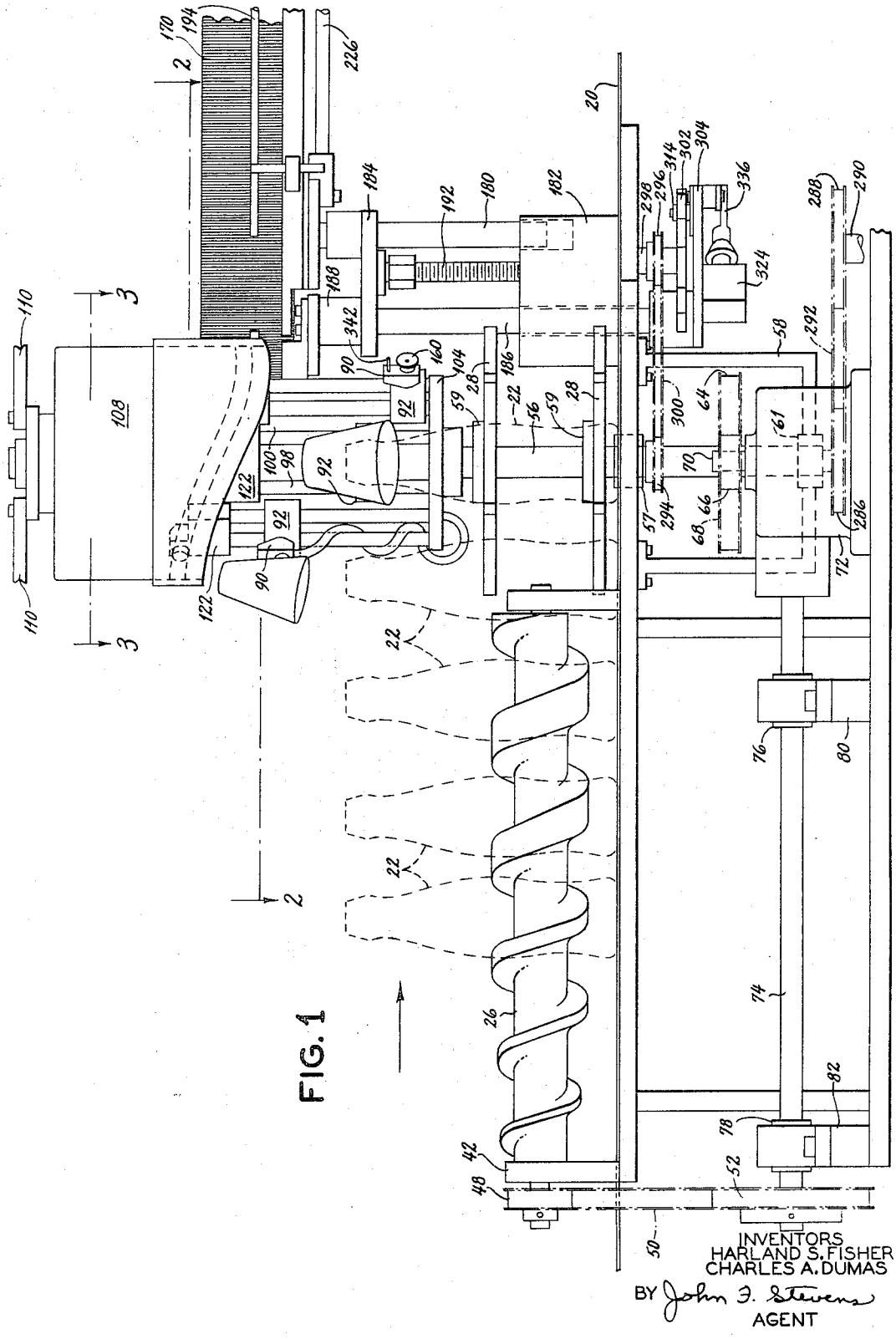


FIG. 1

INVENTORS
HARLAND S. FISHER
CHARLES A. DUMAS
BY John J. Stevens
AGENT

Sept. 12, 1967 H. S. FISHER ETAL 3,340,591

BOTTLE COLLAR APPLYING MECHANISM

Filed June 23, 1964 5 Sheets-Sheet 2

FIG. 2

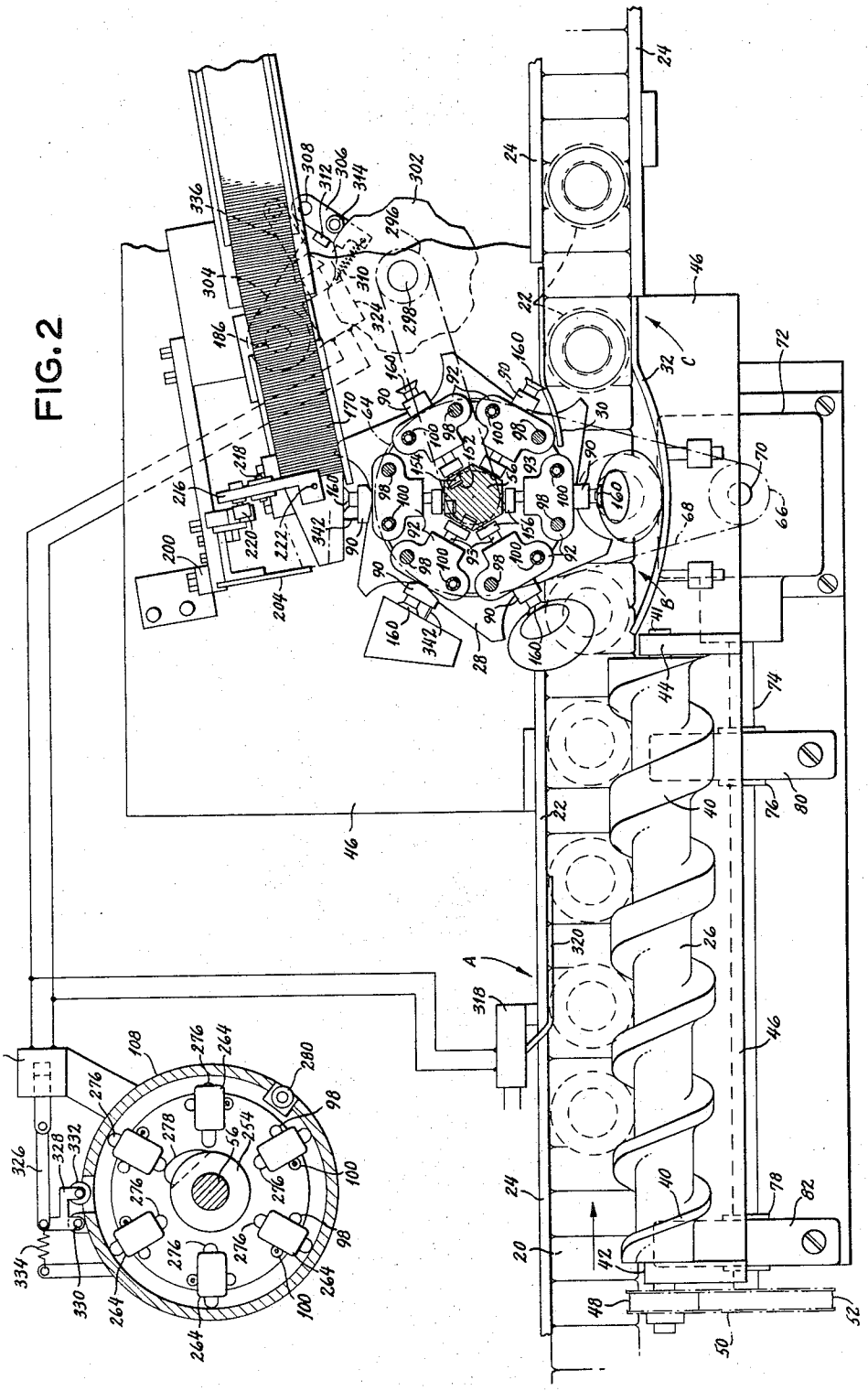


FIG. 3

BOTTLE COLLAR APPLYING MECHANISM

Filed June 23, 1964 5 Sheets-Sheet 3

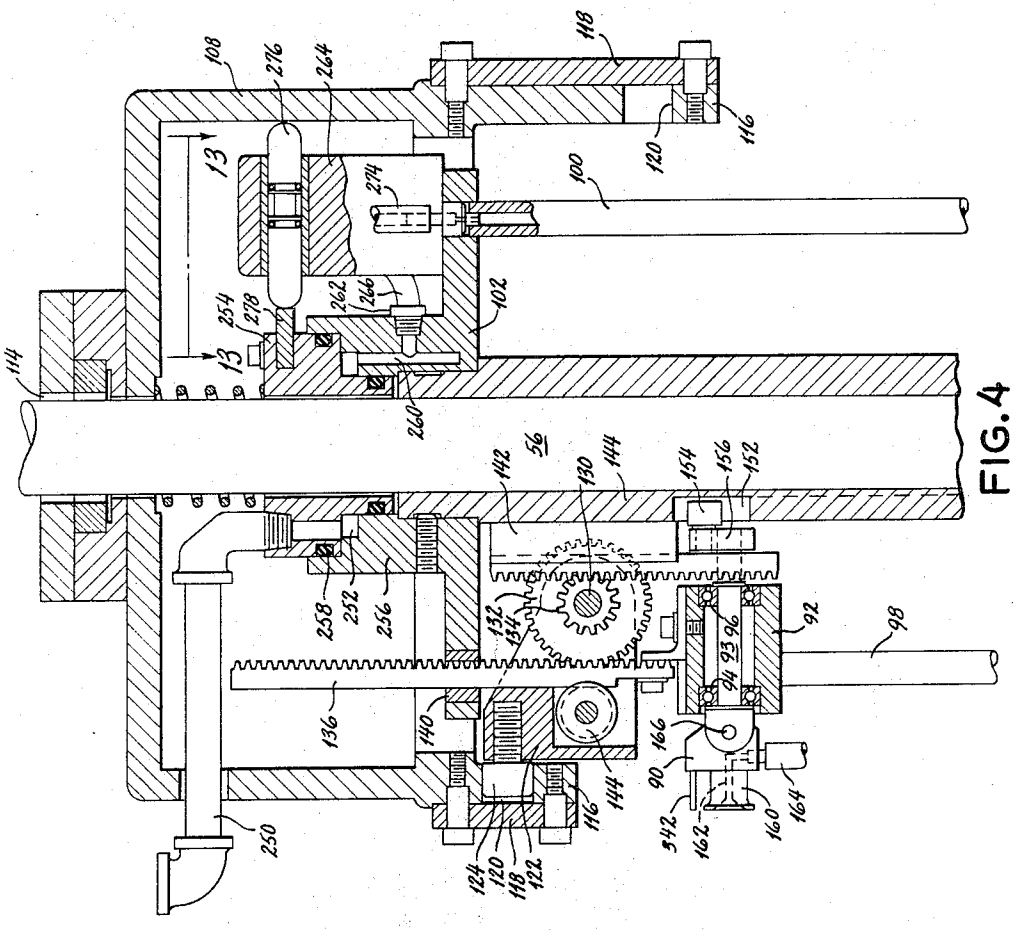


FIG. 4

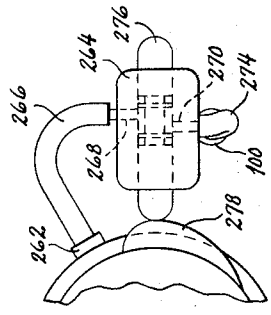


FIG. 13

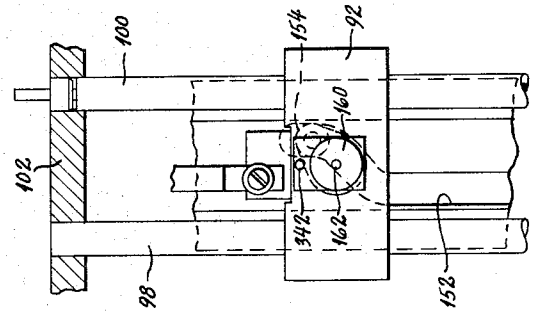


FIG. 5

BOTTLE COLLAR APPLYING MECHANISM

Filed June 23, 1964 5 Sheets-Sheet 4

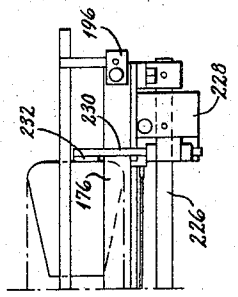


FIG. 6

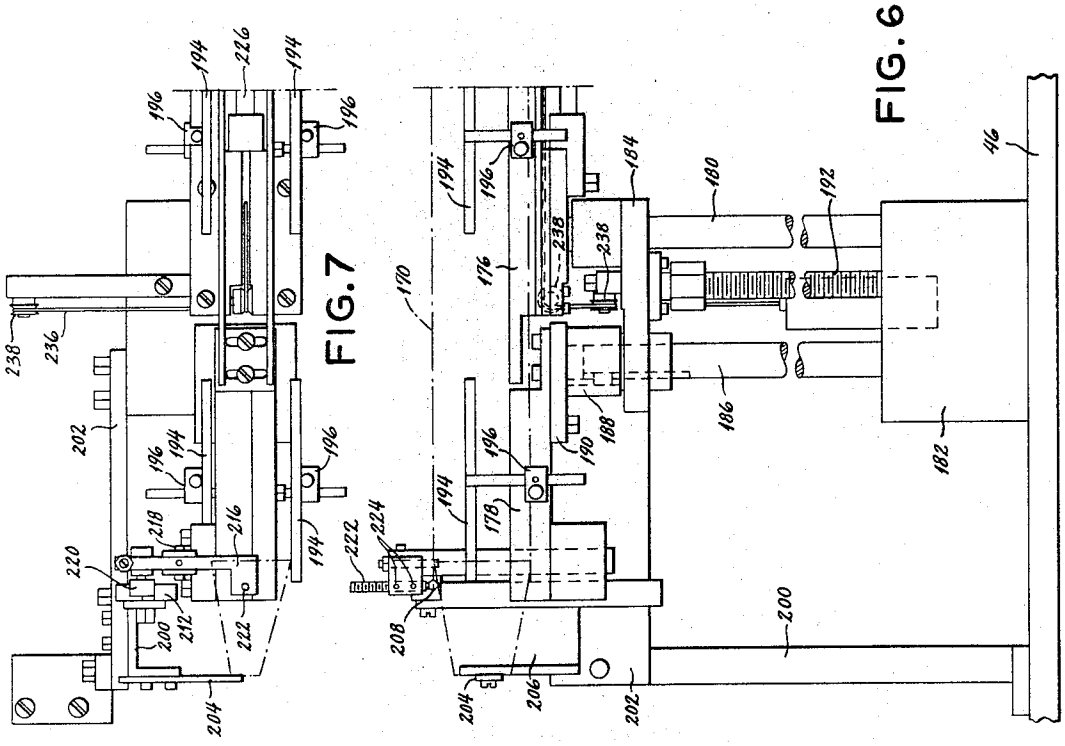


FIG. 7

FIG. 8

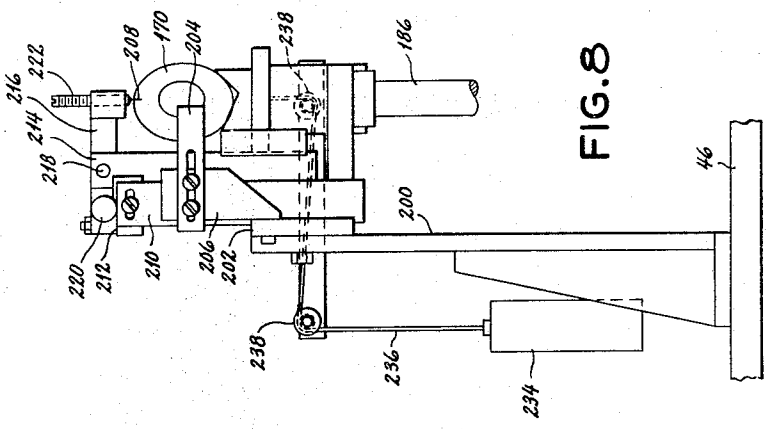


FIG.9

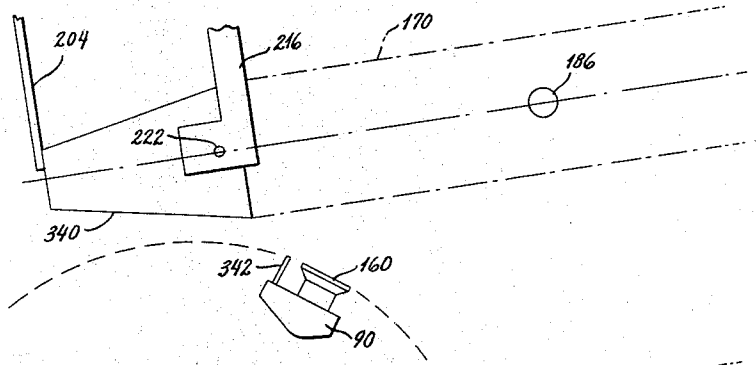


FIG.10

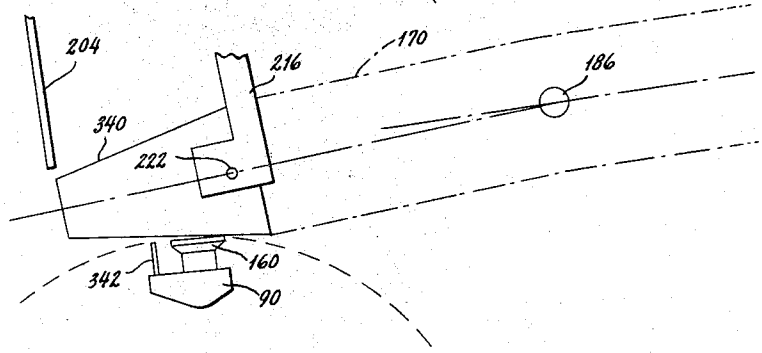


FIG.11

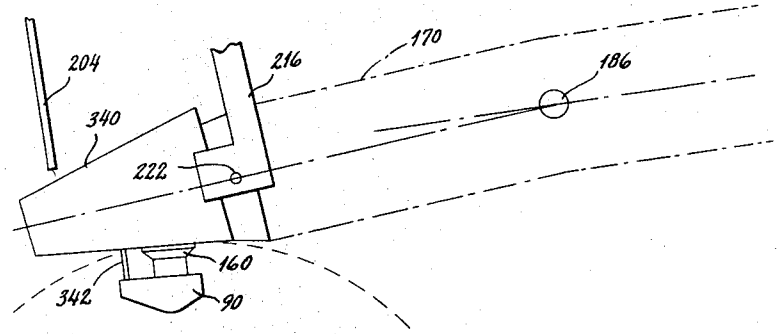
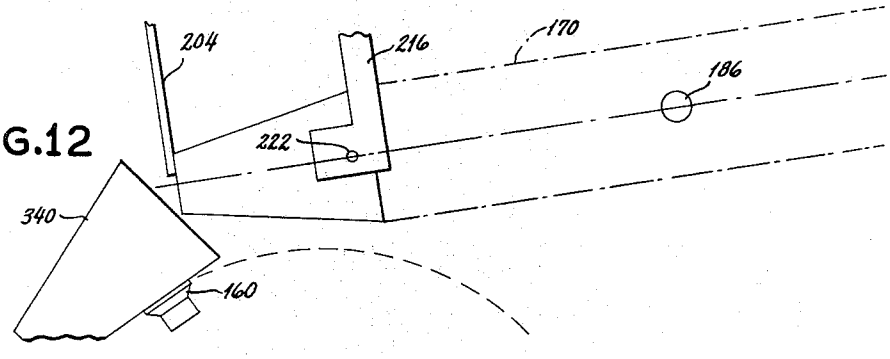


FIG.12



United States Patent Office 3,340,591
Patented Sept. 12, 1967

3,340,591

BOTTLE COLLAR APPLYING MECHANISM

Harland S. Fisher, Longmeadow, and Charles A. Dumas, Westfield, Mass., assignors to United States Envelope Company, Springfield, Mass., a corporation of Maine

Filed June 23, 1964, Ser. No. 377,361
19 Claims. (Cl. 29—208)

ABSTRACT OF THE DISCLOSURE

A mechanism is provided for applying generally conically shaped collars of paper or the like to the neck portions of bottles. A supply of collars, arranged in nested condition, is stored in a magazine with their axes generally horizontal. A rotating collar handling device moves in a circular path in a horizontal plane and withdraws collars from the end of the magazine. The magazine is arranged so that the axis of the nested collars is generally tangential to the circular path of movement of the collar handling device and as a collar is withdrawn it moves along such axis. After a collar is completely withdrawn from the magazine the collar handling device operates to rotate the collar 90° to orient its axis vertically with the larger end of the collar lowermost, and the device is then moved downwardly to move the collar over the neck of the bottle positioned therebelow. The discharge end portion of the magazine is oscillated toward and away from the path of the collar handling device to facilitate the gripping of a collar by the device.

This invention relates generally to mechanism for applying labels to bottles or the like moving along a conveyor. More specifically, this invention relates to mechanism for applying circular labels, such as truncated conical collars (hereinafter referred to as collars), to the neck portion of bottles as they are moved at high rates of speed along a conveyor.

This invention has particular application in the collaring of bottles containing beverages, foods, dairy products, household products, etc. Collars of paper or other flexible material having advertising or decorative matter carried thereon which conform generally to the neck portion of such bottles have seen rather prominent acceptance in these bottling fields. The fact that manual labor had to be used extensively for the application of the collars to the bottles has kept the use of these collars at a minimum. Bottles, after they have passed through the filling and capping machines, are normally carried directly to a station for crating or boxing. The path over which these bottles travel on their way to the crating or boxing station is usually relatively straight, and movement of the bottles is normally effected by a belt on which the bottles rest in an upright condition, often with irregular spacing, or at times, perhaps no spacing at all. Bottles commonly are carried along the conveyor at speeds of around 100–200 per minute, but some of the faster lines move the bottles along at speeds of 300 per minute and even higher. Needless to say, at the higher speeds, it is impractical, if not impossible, to manually apply a collar to the bottles under these conditions.

Several major fields of difficulty are encountered when attempting to mechanically apply the collars to the necks of bottles moving at these high speeds. First, the collars are received in the bottling plant in nested stacks, and must be removed from the nest singularly for application to the bottles. Considerable maneuvering of the collars is necessary, because the collars must be removed from the nest small end first and applied to the bottles large end first. Thus, collars removed from the nest must be turned and realigned before application to the neck of the bottles.

Another problem is concerned with stripping or successively withdrawing the end collar from the nest. This end collar must be grasped firmly and separated from the rest of the nested stack, while the stack behind this end collar is held back. This problem is amplified by the fact that the collar's shape does not lend itself to easy handling.

Once the collar has been successfully separated from the nest of collars, and aligned for application to the neck of a bottle, the collar must be moved in a particular direction relative to the neck of the bottle for a predetermined distance; thus, not dropping, but positively carrying the collar over the neck of the bottle to a position where the top or small end of the collar is below the top of the bottle. Dropping the collar to the neck of the bottle is unsatisfactory in the fields of use contemplated by this invention because the collar is designed so that the small end thereof is very nearly the size of the cap or top of the bottle, or even smaller if an expandable feature is provided on the collar. Thus, positive placement of the collar to the neck of the bottles is essential, rather than dependence upon gravity to cause the collar to drop in place. At speeds of 250 bottles per minute the entire cycle of separating the collar from the rest of the nest, alignment, and placing it over the neck of the bottle must take place in about one fourth of a second. Needless to say, it is imperative that the collaring machine be able to handle bottles as fast as they are moved along the conveyor, and not restrict the flow of bottles.

It is also necessary that the collaring machine does not depend on the speed of the conveyor or the spacing of the bottles thereon for successful operation. The bottles are randomly spaced, and the speed of the bottles moving past the collaring machine varies from time to time, because it is not unusual for the bottles to back up on the conveyor, as trouble sometimes develops at the crating station, resulting in a variation in bottle speed anywhere from a standstill to a full speed. It has also been found that the conveyor is frequently wider than the diameter of the bottles being conveyed. This condition results in considerable variation in the lateral position of the bottles. It is apparent, therefore, that the bottle collaring machine must readily adapt itself to changes which occur in the bottling line.

Bottle collar applying machines of the past have had certain drawbacks which would not permit them to operate in the speed range contemplated by this invention. For instance, mechanisms have been suggested which drop a collar over the bottle to be collared during a brief pause in the movement of the bottle. Such detainment in the movement of the bottles cannot be tolerated in modern high speed bottling lines. Several mechanisms have been suggested which allow the collar to be dropped to the neck of the bottle, which, as explained hereinbefore, is unsuitable for the purposes contemplated by this invention. An excessive number of reciprocating movements or mechanisms is objectionable as being detrimental to high speed, smooth operation.

It is an object of the present invention to provide a mechanism for and method of collaring bottles which overcomes the objectionable characteristics of previous machines, by the use of rotary mechanism capable of speeds far in excess of any known previous machines or methods.

It is a further object of the present invention to provide a mechanism for and method of collaring bottles without stopping movement of the bottles during the collaring process.

It is also an object of this invention to provide an improved and dependable mechanism and method for singularly separating and withdrawing successive end collars from the nest at a very high rate of speed, while holding back the stack of collars behind the one being withdrawn.

It is a still further object of this invention to provide mechanism for coordinating movement of the collar and bottle to be collared so that the collar may be placed on the neck of the bottle while it continues to move at its normal high rate of speed.

Various other objects and advantages will appear from the description which follows of one embodiment of the invention, and the novel features will be particularly pointed out hereinafter in connection with the appended claims.

Generally, the machine according to this invention includes a carriage mechanism rotatable about a vertical axis beside the bottle conveyor. Mechanism for synchronizing movement of the bottles with movement of the rotary carriage is provided. The rotary carriage is provided with a plurality of collar handling mechanisms which pick up collars at one station adjacent the circular path of the collar handling mechanisms. In another portion of the path of the collar handling mechanisms, movement of the collar handling devices and the bottles is synchronized. During the synchronized portion of the movement, the collar handling devices lower and apply the collar to the neck portion of the bottle in place directly below it. Withdrawal of the successive collars from the nest of collars is accomplished through the use of novel means, and the entire operation according to use of the present invention is a continuous motion.

In the drawings:

FIGURE 1 is a front elevation view of the bottle collaring machine in its position adjacent the bottle conveyor.

FIGURE 2 is a plan view in section, taken substantially along line **2—2** of FIGURE 1.

FIGURE 3 is a plan view in section, taken substantially along line **3—3** of FIGURE 1.

FIGURE 4 is an enlarged elevation view in section of the carriage assembly of the machine.

FIGURE 5 is an enlarged partial elevation view looking in the direction of the line **5—5** in FIGURE 4.

FIGURE 6 is a side elevation view of the magazine assembly for holding a supply of nested collars.

FIGURE 7 is a partial plan view of the magazine assembly.

FIGURE 8 is an elevation view of the magazine assembly, looking towards the discharge end of the magazine.

FIGURES 9 through 12 inclusive are schematic sequence views showing the removal of the end collar from the nest in the magazine by the collar handling devices.

FIGURE 13 is a partial plan view taken substantially along line **13—13** of FIGURE 4 showing the valving arrangement for the vacuum lines.

General

Referring to the drawings, the general relation of the bottle collaring machine to the bottle conveyor may be best seen in FIGURES 1 and 2. An endless conveyor **20** for carrying the bottles **22** from left to right as viewed in FIGURES 1 and 2 is normally provided in bottling plants for carrying bottles from one position to another, such as, for example, from the filling and capping machine (not shown) which would normally be to the left in FIGURES 1 and 2, to a boxing, or crating machine (not shown) which would normally be at the right. Side rails **24** insure that the bottles remain on the conveyor during movement. The conveyor **20** is normally made slippery by the application thereto of a soapy or oily substance, thereby reserving enough friction for the conveyor to move the bottles when there is no obstruction in the way of the bottles, but allowing the conveyor to freely slide under the bottles when the bottles contact an interfering object.

The machine according to this invention may be located at any suitable position along the conveyor **20** by removing a section of the side rails **24**. Parts of the machine assembly will take the place of the removed sections. The bottles **22**, actually move through three sections of the machine, i.e., first through the timing section A, then through the collaring section B, and lastly through the discharge section C.

Bottles are fed along the conveyor **20** in the direction of the arrow into the begining of the timing section A. The bottles are generally randomly spaced on the conveyor **20**, but the screw conveyor **26** serves to space the bottles and move them at a controlled speed into the collaring section B. Bottles are moved through the collaring section B by the slotted, disc-like wheels **28**, and are caused to be removed from the slotted wheels **28** by the stripper plate **30** which guides the bottles completely back on the conveyor **20** at the discharge section C. The rotation of the timing screw conveyor **26** is synchronized with the rotation of the slotted wheels **28** such that the bottles contained in each "slot" of the screw **26** will be inserted into a corresponding slot of the wheels **28**. The bottles carried by the wheels **28** are caused to detour from their normal straight-line movement, through an arc in section B, due to the circular shape of the wheels **28**. Thus, it is necessary to provide a curved guide rail **32** along the outside of the path of the bottles moving through section B. In some instances, depending on the amount of divergence of the bottles from the conveyor **20** at section B, it may become necessary to provide a bottom supporting plate (not shown) to aid the conveyor in supporting the bottles **22**, as they are moved through the arc in section B.

As mentioned previously, the rotating timing screw conveyor **26** and the rotating disc-like slotted wheels **28** are synchronized so that successive bottles will be inserted into successive slots on the wheels **28** in the collaring section B. The speed of the timing screw conveyor **26** and the wheels **28** are also timed in relation to the number of bottles being moved along the conveyor at any given time, so as to prevent any excessive build-up of bottles at the entrance to the timing screw **26**, but yet, prevent an excessive number of skips in bottles moving through the positions on the screw **26** and the slotted wheels **28**. Since the number of bottles moving along the conveyor is fairly regular, even though the spacing of the bottles has been referred to as random, the speed of the machine can be adjusted for maximum efficiency without difficulty.

The collaring machine according to this invention is unique in its flexibility. It may be supported adjacent the conveyor by a simple floor stand. Means may be provided on the floor stand for raising or lowering the machine to suit different conveyor heights. Very little alteration need be made on the existing conveyor to make it ready for accommodating the machine according to this invention. The parts of the machine which handle the bottles can very easily be removed from their operating positions and the guide rails replaced so the conveyor can be run without the collaring machine. The parts of the machine which handle the bottles, i.e., the screw conveyor **26**, and the slotted disc wheels **28** may very easily be changed so as to handle bottles of various sizes.

Bottle moving mechanism

As the bottles **22** move down the conveyor **20** in the direction of the arrow, they contact the infeed end of the screw conveyor **26**. Such screw conveyors are well known in the art and are normally provided with a spiraling land area **40** which increases gradually in width from the infeed to the discharge end thereof, defining slots between adjacent land areas for receiving bottles **22** and controlling movement thereof into the slotted wheels **28**. The shaft **41**, to which the screw conveyor is mounted, is rotatably mounted in the two end supports **42** and **44**, which are fixed to the main horizontal frame plate **46**. Horizontal frame plate **46** is, in turn, supported from the floor by frame means (not shown). Sprocket wheel **48** is fixed to shaft **41**, and has trained about in the chain **50** which is driven from sprocket wheel **52**. The drive train will be described in more detail hereinafter. Thus, as the screw conveyor **26** is rotated, bottles will be received in

the first slot adjacent the infeed end thereof and carried towards the slotted wheels **28**. During this movement of the bottles, they are supported from the bottom by the conveyor **20**, but movement is controlled by the screw conveyor **26** instead of the movement of the belt conveyor **20**.

The slotted wheels **28** for conveying the bottles through the collaring section B form part of a rotary carriage assembly, and are fixed for rotation with the vertical shaft **56**, which is the main and central shaft of the rotary carriage assembly. Two plates **28** are provided with the slots of each in vertical alignment with the slots of the other. By providing two wheels **28**, better control is had over the bottles, and tipping over is prevented. The lower wheel **28** is mounted just above the level of the conveyor **20** so as to contact the bottles **22** near the bottom. The upper wheel **28** is mounted at a convenient height which may be near the mid-portion of the bottles **22**. The wheels **28** may be mounted to shaft **56** by any convenient means, but it is desirable that the wheels be easily removable from the shaft **56** so that wheels **28** may be changed for different size bottles. One desirable way of mounting the wheels **28** is to make each wheel in halves, i.e., split along a diametrical line, and then fixing the halves to the flanges **59** carried by the shaft **56**. The flanges **59** may be raised or lowered along the axis of shaft **56** by convenient adjusting means.

As stated hereinbefore, the screw conveyor **26** and the slotted wheels **28** are synchronized, and are rotated in timed relationship such that when a bottle **26** is discharged from the end slot of the screw conveyor **26**, slots in wheels **28** are approaching the so-discharged bottle. It is then immediately picked up by the wheels **28** and carried in an arc through the collaring section B. The bottle in the succeeding slot of the screw conveyor **26** is then in position to be picked up by the succeeding slots in the wheels **28**, and so on, so that bottles **22** are continuously fed into the successive slots of the wheels **28** by the screw conveyor **26**.

Means for synchronizing rotation of the timing screw **26** with the wheels **28** are provided by the drive train. Sprocket wheel **64** is fixed to the shaft **56**, and drives sprocket wheel **66** by means of the chain **68**. Sprocket wheel **66** is fixed to shaft **70** which drives a pair of miter gears (not shown) in box **72**. The output shaft **74** of the miter gear box **72** is rotatably mounted in the bearings **76** and **78**, which are supported by brackets **80** and **82** from horizontal plate **46**. Sprocket wheel **52**, which drives sprocket wheel **48** by means of chain **50**, is fixed to shaft **74** for rotation therewith. Thus, there is a positive drive train between the main vertical shaft **56** and the screw conveyor **26**, allowing positive timing between the two bottle movers.

As best shown in FIGURE 2, the bottles must be removed from their positions in the slotted wheels **28** and again directed back on the conveyor **20** for normal movement therewith. This occurs in the discharge section C, where the curved path of the bottles in the collaring section B blends into the straight path of the conveyor **20**. To cause the bottles to be removed from the slots in the wheels **28** and to be deflected back onto the conveyor **20**, a stripper plate or bar **30** is provided to cause the desired deflection of the bottles **22** as they enter the discharge section C.

Rotary carriage and collar magazine

As the bottles pass through the collaring section B, means are provided for placing collars on the neck portion of the bottles **22** by a carriage assembly mounted on shaft **56**. Shaft **56** is mounted in the frame plate **46** for rotation about a vertical axis by means of bearing **57**, and in the bridge-frame **58** by means of bearing **61**. The carriage assembly contains a plurality of angularly spaced collar handling devices **90** which serve to pick up collars from a supply source, orient the collars into position for placing over the bottles **22**, and then carry them in an axial direction in relation to the neck of the bottle a distance sufficient to allow the small end of the collar to clear the top of the bottle **22**. The collar handling devices **90** move in a circular path when the shaft **56** is rotated and are located at the same angular positions as the slots in the wheels **28**. Also, the collar handling devices are spaced radially from the axis of shaft **56** a distance such that a collar held thereby is in vertical alignment with a bottle in the slot of the wheels **28** directly below. The collar handling devices **90** are rotatably mounted in the blocks **92** by means of the shaft **93** supported by bearings **94** and **96**. Each block **92** is slidably mounted on a pair of vertical rods **98** and **100**. The pairs of vertical rods **98** and **100** are held in their vertical position by their attachment to the upper and lower horizontal circular plates **102** and **104** respectively, which are fixed to shaft **56** for rotation therewith. Each of the blocks **92** is free to slide up and down on the rods **98** and **100**, and suitable bushings (not shown) are provided to permit easy sliding.

The vertical movement of the blocks **92** which carry collar handling devices **90** is necessary to permit the collars to be carried in a vertical direction over the top of a bottle in the slot below. Since there is no relative rotation about shaft **56** between the collar handling devices **90** and the bottles **22** in the slot below, the collar may easily be carried over the neck of the bottle during rotation of the carriage assembly in the collaring section B. To lower the collars carried by the handling devices **90**, cam driven linkages are provided to cause lowering of each block **92** when passing through the collaring section B, as well as other necessary vertical movements which are required of the collar handling devices **90** during operation of the machine. A stationary, inverted drumlike housing **108** is provided near the upper extent of the vertical shaft **56**. The housing **108** is supported in its position by several supporting arms **110** rigidly mounted to the horizontal frame plate **46**. Shaft **56** is rotatably mounted in the housing **108** by means of a suitable bushing **114**. The lower edge of the housing **108** is provided with a suitable contour, and a similarly contoured ring **116** is supported below the lower edge of the drum, and spaced therefrom by means of the ring **118**, providing a cam track **120**. The upper actuating blocks **122**, which are also slidably mounted on each pair of rods **98** and **100** by suitable bushings (not shown) directly above each of the lower blocks **92**, are provided with a cam roller **124** rotatably attached thereto. As the shaft **56** is rotated, the cam rollers **124** roll around the cam track **120**, raising or lowering the actuating blocks **122** on the rods **98** and **100** at predetermined points around the path of travel.

Suitable linkages between each of the upper actuating blocks **122** and the lower blocks **92** which carry the collar handling devices **90** are provided so that the vertical travel of the actuating blocks **122** amplifies the travel of the lower blocks **92**. Thus, as an example, for two or three inches of travel of the upper actuating blocks **122**, the lower blocks may travel five or six inches, or about the amount of travel generally required to guide a collar over the neck of a bottle. To provide this amplification of travel in the lower block **92**, a suitable rack and pinion mechanism is provided between each actuating block **122** and lower block **92**. Shaft **130** which is rotatably mounted on each block **122** is provided with two pinion gears **132** and **134** keyed thereto. Pinion **132** meshes with rack **136** which is fixed to the lower block **92** by the bracket **138** and suitably supported in the upper plate **102** by bushing **140**. Pinion **134** meshes with the rack **142** which is fixed to the hub structure **144**. Accordingly, as the cam roller **124** moves the block **122** downwardly, the pinions also move down and rotate shaft **130** by means of the meshing of small pinion **134** with the fixed rack **142**. Shaft **130** in turn rotates pinion **132**, thereby lowering the rack **136**, and the lower block **92**. Backing roller **144** serves to provide rigidity to the rack **136**. It will be understood that

even though only one of these mechanisms are shown in FIGURE 4 for simplicity, a similar mechanism is provided for each of the collar handling devices **90**.

Collars are picked up from the supply magazine at approximately a position diametrically opposite the collaring section C, as best shown in FIGURE 2. The collars must be removed from the nest by pulling them in an axial direction from the nest, and tangentially to the direction of travel of the collar handling devices **90**. The collars must therefore be turned approximately 90° so that the axis of the collar assumes a generally vertical position, rather than its horizontal position as it is when originally removed from the nest. Means for so-rotating the collar during the initial portion of its down-travel i.e., during the time the block **122** is beginning its downward movement from its uppermost position, is provided; as best shown in FIGURES 4 and 5. The hub structure **144** which is fixed to shaft **56** is provided with cam tracks **152** at angular positions corresponding to the several blocks **92**. The cam tracks extend in a generally vertical direction, longitudinally of the axis of the shaft **56**, and contain the cam roll **154**. Cam roll **154** is rotatably mounted on lever **156** which is fixed to the shaft **93**. As the block **92** is lowered on the rods **98** and **100**, the curvature near the top of the cam track **152** causes the cam roller **154** to turn the lever **156**, thereby rotating shaft **93**. The shaft **93** serves to rotate the collar handling device **90** which brings the collar carried thereby into position for placing over the neck of a bottle.

The collar handling devices **90** are provided with resilient cups **160** of soft rubber, or similar material, fixed thereto for gripping and holding the collars. Vacuum is supplied to the cups at predetermined times, by means hereinafter described, for gripping and releasing the collars at the desired times. The collar handling devices **90** are provided with an opening **162** leading from the flexible tube **164** to the cups **160** for transmitting vacuum thereto.

The collar handling devices **90** are pivotly mounted at the ends of rods **93** so that their angular position may be adjusted when collars having different degrees of taper are being used. It is most desirable to lower the collars over the bottles by moving them in a direction such that the longitudinal axis of the collars is approximately vertical. The collar handling devices **90** must therefore be adjusted so that the face of the cups **160** conform to the taper of the collars when their axes are vertical. The devices **90** may accordingly be rotated about pin **166** until the most suitable angle is reached, and then tightened in this position by a suitable set screw (not shown).

Collar magazine and collar pick up

During rotation of the carriage assembly in a counterclockwise direction as viewed in FIGURE 2, the collar handling devices **90** successively withdraw the collars lying in the end position of the nest **170**, and move them around to the collaring section B. Each time a collar handling device **90** passes the end of the nest **170**, a collar is withdrawn, resulting in a continuous rotary pick-up or stripping operation. In the drawings, the rotary carriage assembly is shown as having six collar handling devices. Of course, more or less may be provided on the machine as required in particular circumstances.

As the carriage mechanism rotates to bring the successive collar handling devices into angular position at the end of the magazine **170**, the cam track **120** is straight and at a level such that the collar handling devices will be at a vertical position corresponding to the end of the nest **170**. Such travel in a horizontal plane must be begun at least slightly before the pick-up station is reached, and should continue until the collar being removed is completely stripped from the nest **170**. Actually, such travel in a horizontal plane will probably continue until a bottle is moved into position just under the collar handling device.

The collars in the nest **170** are commonly tightly nested. It is a feature of this invention to provide special means and mechanism for separating or stripping the successive end collars, one by one, from the nest **170** by the collar handling devices **90**. The cups **160** carried by the devices **90** are provided with vacuum from a time just previous to entering the pick up position until the time the collar has been placed on the neck of the bottle.

To insure that a collar will be picked up each time a collar handling device **90** comes into pick up position, and that only a single collar will be picked up, a special magazine and gate at the discharge end of the magazine are provided, and, in addition, the end collar in the nest **170** must be intercepted by the flexible cup **160** in a particular manner.

The special magazine provides for the rhythmatic oscillation of the end of the magazine into and out of pick-up position, illustrated in the full line position in FIGURE 2, and an outer position, illustrated in the dot-and-dash line of the same figure, in which the end of the nest **170** is spaced from the path of the collar handling devices **90**. The collar magazine is shown in its relation to the rest of the machine in FIGURE 2. However, FIGURES 6, 7, and 8 illustrate the magazine and discharge end gate mechanism in greater detail.

The nest of collars **170** is supported in a trough-like holder having a stationary section **176** and an oscillating section **178**. The stationary section **176** is supported by means of the vertical shaft **180** slidably mounted in the block **182** which is fixed to the frame plate **46**. The bracket **184** is fixed to shaft **180**, and the shaft **186** is rotatably mounted in bracket **184**. The shaft **186** is, however, keyed to the stub shaft **188** rotatably mounted to the bracket **184** on the upper side thereof. The stub shaft **188** is fixed, by means of plate **190** to the underside of the oscillating magazine portion **178**. Shaft **186** is journalled in the block **182** and is provided with an oscillating movement by means hereinafter described. Oscillation of shaft **186** therefore causes the section **178** of the magazine to oscillate because of the key connection between shaft **186** and stub shaft **188**. Both sections **176** and **178** of the magazine may be raised and lowered in unison to provide correct positioning of the walls of various sizes of collars to the path of the collar handling devices **90**. Means for raising and lowering the magazine assembly relative to the supporting plate **46** is provided by the threaded shaft **192**, which, when turned, raises or lowers in the block **182**.

The nest of collars **170** is held in the magazine in the V-shaped sections **176** and **178** and the upper rails **194**, which are connected to the sections **176** and **178** at the brackets **196**. The screws **198** may be loosened to permit adjustment of rails **194**, and then retightened.

The nest of collars **170** is thus held in a horizontal position, resting in the V of the supporting magazine sections **176** and **178**, and assisted by the upper rails **194**. The longitudinal centerline of the nest **170** is straight except for the angular movement of the collars resting in the oscillating section **178** relative to the stationary portion of the nest **170** resting in the stationary section **176**. Oscillation of the end section **176** of the magazine also causes momentary separation of the collars in the nest at the pivot point, thereby loosening them from the tightly nested condition in which they are received from the manufacturer.

Pressure is applied to the end of the nest **170** by means to be described hereinafter. However, means must be provided at the gate or discharge end of the magazine to hold the collars back and resist the pressure being exerted thereon from the other end. Means for alternately positively restraining and yieldably restraining the collars are provided at the discharge end or gate of the magazine. The term "yieldably restraining" is, as herein used, intended to mean holding the nest of collars back at the discharge end by an amount sufficient to prevent the collars from being discharged from the magazine by the force exerted at the other end, but allowing single collars

to be withdrawn by the positive withdrawing action of the collar handling devices **90**. To accomplish this, an upright supporting arm **200** is fastened to the frame plate **46** to hold the support plate **202** in position, which in turn also holds the stop bar **204** in position, by means of bracket **206**, to bear against the end of the nest of collars **170** when the end of the nest is in its outermost position relative to the path of the collar handling devices. However, the stop bar **204** is in a position such as not to interfere with the nest of collars **170** when the oscillating movement of the magazine brings the end of the nest into position with the path of the collar handling devices **90**. Stop bar **204** can be laterally adjusted to accommodate different sizes of collars.

To yieldably restrain the collars when the oscillating portion of the magazine is moved inwardly away from influence thereon by the stop bar **204**, a sharp blade **208** is brought into contact with the end-most collar in nest **170** near the larger rim thereof. The pressure exerted by the point of the blade **208** on the end collar in the nest is sufficient to hold the collars in the magazine, but when a collar handling device grasps the wall of the end collar and begins to move it in an axial direction, the tip of the blade **208** cuts through this collar and comes to rest on the next collar to be withdrawn. Generally, the tip of the blade **208** should be positioned so that it rests about 3/16-inch from the larger end of the end-most collar in the nest **170**.

Means for alternately raising the blade **208** out of contact with the end collar in the nest **170** and into contact therewith as the section **178** is oscillated, is provided. The support plate **202** also holds the upright member **210** in position, the top edge of which is provided with an irregular surface **212** for acting as a cam. The upright member **214** is fixed to the oscillating section **178** of the magazine. Rocker arm **216** is pivotally mounted to upright member **214** at a pin **218**. A cam roller **220** is rotatably mounted to the rocker arm **216** and rides on the cam **212** when the oscillating section **178** is moved.

At the other end of the rocker arm **216**, there is mounted a blade holder **222**, which holds the blade **208**. The blade holder **222** may be raised or lowered by loosening the set screws **224**, adjusting, and retightening. When the oscillating section **178** is in its outward position relative to the path of the collar handling devices **90**, and the collars are restrained by the stop bar **204**, the cam roller **220** is in its lower position holding the knife blade away from the end collar in the nest **170**. However, when the section **178** oscillates inwardly, away from the stop bar **204**, the cam roller **220** immediately rises on the cam track, thereby lowering the blade **208** into contact with the end collar in the nest **170**.

Means for applying pressure to the end of the nest **170** to cause the collars to feed toward the discharge end are also provided. Extending below and parallel to the stationary section **176** of the magazine is a rod **226**, on which block **228** is slidably mounted. An upright supporting element **230** holds bar **232** across the magazine in a position so as to bear against the larger end of the collars in the nest **170**. The weight **234** is attached to block **228** by means of cable **236**, which runs over several pulleys **238**, tending to urge it in the direction of the gate or discharge end of the magazine.

The relative positions of the oscillating section of the nest **170** and the path of the collar handling devices **90** are probably best shown in FIGURES 9 through 12 inclusive. The nest **170** must be so positioned, and the angle of the flexible cup **160** must be such that when the nest moves in towards the path of the collar handling devices **90**, contact between the collar and the devices **90** will be made slightly before the nest reaches the end of its inward stroke, and that contact be initially made by the trailing side of the flexible cup **160**. This insures that friction will not cause the cups **160** to buckle. Further inward movement of the nest causes complete contact to be made between the cup **160** and the collar, so that the suction supplied to cup **160** can firmly grasp the collar.

Vacuum system

Means for supplying vacuum to the cups **160**, and for cutting the vacuum on and off at predetermined times, are also provided in the machine according to this invention. As the carriage assembly rotates, successive collar handling devices **90** bring the suction cups **160** into contact with the end-most collar in the nest **170** to pick up this end-most collar. Subsequently, after the collar handling devices **90** have been rotated around to the collaring section B, the collars which are carried thereby are applied to the necks of bottles in the slots in vertical alignment therewith. Just prior to pick-up of the collar from the nest **170**, vacuum must be provided to the cups **160**. At the end of the collaring section B, where the collar has been completely carried over the neck of the bottle being collared, the vacuum must be cut off to release the collar carried thereby.

Vacuum is provided from a supply source (not shown) to the pipe **250** extending through an opening in housing **108**. The pipe **250** communicates with the circular vacuum chamber **252**, through the stationary member **254**. The rotary hub **256** is fixed to shaft **56** for movement therewith. The O-ring **258** provides a suitable vacuum seal from the atmosphere between the stationary member **254** and the rotary hub **256**. In the rotary hub **256**, there are a number of openings **260**, corresponding to the number of collar handling devices **90**, communicating with the vacuum chamber **252** and leading to outer connections **262**. There are also a number of valves **264** corresponding to the number of collar handling devices **90** mounted on the rotary plate **102** which is fixed to shaft **56**. The valves **264** are located at angular positions between adjacent collar handling devices **90**, as can be seen by comparing FIGURES 2 and 3. The tube **266** leading from each of the connections **262** to an adjacent valve **264** communicates vacuum to one side of the valve **264** and into the opening **268** thereof. The opening **270** in the other side of the valve **264** leads to a piece of tubing **274** which in turn leads to the vertical hollow shafts **100** directly behind, or trailing the valve **264**, in terms of the rotary movement thereof. The piece of flexible tubing **164** leads from the lower ends of the hollow rods **100** to the collar handling devices **90**. The openings **162** allow the vacuum from tubes **164** to communicate directly with the flexible cups **160**.

Each of the valves **264** contain a cam operated spool **276** which determines whether or not vacuum is supplied to the flexible cups **160** at any given time, by either allowing communication between the openings **268** and **270** in the valves, or blocking one of the openings so that it is prevented from communicating with the other. A cam plate **278** is fixed to the stationary member **254**, and positioned such as to push the spools **276** to their outer position in relation to the axis of rotation, or the shaft **56**, at a point just before the flexible cup **160** controlled by that particular spool reaches collar pick-up position. This outer position of the spool, as shown in FIGURE 14, allows communication between the openings **268** and **270**, providing vacuum to the cups **160**. To push the spool inward in relation to the shaft **56**, cam plate **280** which is fixed to the inside of the housing **108**, is provided at an angular position such as to push the spools in to block the communication between openings **268** and **270** at a time when the cup **160** which it controls, has completely carried the collar held thereby over the neck of the bottle being collared.

Drive mechanism

The main shaft **56** is driven by means of sprocket wheel **286** operatively connected to the sprocket wheel **288** on driving shaft **290** by means of the chain **292**.

Shaft 290 may be driven, through speed reducers, from an electric motor, or any other convenient means. The mechanism for driving and synchronizing the screw conveyor 26 from the shaft 56 through the sprocket wheels 64 and 66 and the chain 68 has been described hereinbefore.

Sprocket wheel 294, also fixed to shaft 56, drives the sprocket wheel 296 fixed to shaft 298, by means of chain 300. Shaft 298 is rotably mounted in the frame plate 46, and has keyed thereto the cam 302 for oscillating section 178 of the collar magazine. The arm 304 is keyed to shaft 186. The lever 306 is pivotaly mounted on arm 304 by means of pin 308. Spring 310 urges the lever 306 into contact with stop block 312, and spring means (not shown) are provided for urging arm 304 in a clockwise direction as viewed in FIGURE 2. Normally, therefore, the cam follower 314 is in contact with the cam 302, so that rotation of cam 302 causes arm 304 and the shaft 186 to which it is keyed, to oscillate. This results in the oscillation of section 178 of the magazine.

Bottle skip detector and collar skipping device

Normally, each of the slots in the screw conveyor 26 will be occupied by a bottle 22. However, occasionally the spacing of bottles feeding into the screw conveyor 26 will be such that a bottle will be skipped in one or more of the slots in conveyor 26. When such a skip occurs, there is obviously no bottle to occupy the corresponding slot in the wheels 28. When this condition exists, there will be no collar picked up by the collar handling device 90 directly above that empty slot.

Switch 318 is mounted adjacent the bottle conveyor 20, and is provided with the elongated operating lever 320 extending partially into the path of the bottles 22 being moved by the screw conveyor 26. Normally, lever 320 is held depressed by the bottles, allowing switch 318 to stay open. However, when there is an empty slot in the screw conveyor 26, lever 320 is permitted to swing out because there is no bottle to hold it depressed. This causes switch 318 to close, energizing solenoids 322 and 324. When solenoid 322 is energized, the rod 326 rotates the lever 328 clockwise about pivot point 330 as viewed in FIGURE 3. This causes the roller 332 rotably mounted on lever 328 to swing into the path of the approaching valve spool 276, thereby closing off the vacuum to the cup 160 of the collar handling device 90 moving into collar pick-up position. Normally, spring 334 holds the lever 328 in position such that roller 332 will be outside the path of the valve spools 276.

At the same time that solenoid 322 is energized, solenoid 324 is also energized. Solenoid 324 is connected to the lever 306 by means of rod 336. Spring 310 normally holds the lever 306 in a position such that roller 314 will stay in contact with the cam 302. However, when solenoid 324 which is mounted on the oscillating arm 304 is energized, rod 336 rotates lever 306 counterclockwise about pivot point 308 as viewed in FIGURE 2, pulling the roller 314 away from the cam 302. Thus, the oscillating arm 304 holds the section 178 of the collar magazine in its "out" position, whereby the cup 160 on the collar handling device 90 about to move into collar pick-up position will not contact the end collar in the nest 170. The solenoids 322 and 324 remain energized until the slots in the screw conveyor 26 are again occupied. The lever 320 will then be depressed again by the bottles filling the slots, to open switch 318, allowing the solenoids 322 and 324 to assume their de-energized position.

The position of the lever 320 must be such that it will detect the absence of a bottle in the slot corresponding to the collar handling device 90 which would normally handle the collar for the bottle in that particular slot. For instance, in FIGURE 2, one collar handling device is exactly in collar pick-up position. The lever 320 must control the solenoids 322 and 324 for the collar handling device 90 just behind the one in pick-up position. It can readily be determined which slot on the screw conveyor 26 corresponds to the slot in wheels 28 in alignment with that particular handling device 90. The lever 320 should be controlled by the presence or absence of a bottle in that particular slot of screw conveyor 26.

Operation

Ordinarily, there is a continuous flow of somewhat randomly spaced bottles into the screw conveyor 26. The collaring machine is adjusted to run as closely as possible at a speed which will handle the quantity of bottles moving along the conveyor 20 without having bottle back-ups or empty spaces in the machine. By having the rotation of the screw conveyor 26 synchronized with rotation of the assembly carrying the collar handling devices 90, so that bottles 22 are fed from the discharge of the screw conveyor 26 into the slots of the wheels 28, a smooth operation can be maintained.

The rotary carriage assembly, which is centered about vertical shaft 56 contains several equally spaced collar handling devices 90, each of which pick up successive end collars from the nest 170 as they move past it. FIGURES 9 through 12 inclusive illustrate in successive sequence views the manner in which the end collar 340 is picked up or stripped from the nest 170. The collar handling devices 90 are fixed in their radial position with reference to the shaft 56, but have means for being moved in a vertical direction or axially of the shaft 56. The collar handlng devices 90 also have means to be rotated about their own axes, as hereinbefore described. In FIGURE 9, the magazine section 178 has not begun to pivot inwardly to intersect the path of the collar handling device 90, and the nest 170 is held in the magazine at the discharge end by the stop bar 204. As the collar handling device 90 approaches pick-up position, however, the oscillating magazine section pivots with shaft 186 towards the path of the flexible cup 160 carried by the collar handling device 90. In FIGURE 10, the end of the nest 170 has moved away from the stop bar 204, and is held back by the blade 208. The inward movement of the oscillating magazine section is shown by the nest centerlines converging at shaft 186.

It is important in this invention, for the positive pick-up or stripping of the collars, that the wall of the collar and the flexible cup 160 intersect in the position shown in FIGURE 10, i.e., that the trailing edge of the cup 160 contact the wall of the end collar 340 initially. Such contact prevents buckling of the cup 160 which must be of a flexible material to conform to the contour of the wall of the collar. The drag, or friction of the cup 160 as it makes contact with collar 340, causes the cup to quickly grasp the wall of the collar, at which point the collar firmly becomes held by suction. Thus, proper positioning must be attained between the magazine holding nest 170 and the path of the collar handling devices 90, as well as regulating the timing of the oscillation of the magazine section 178 to insure that the trailing edge of the cup 160 contacts the wall of the collar 340 initially. After this initial contact, the magazine should continue moving inward until full contact of the face of the cup 160 with the wall of the collar 340 is made. At this point, the vacuum in the cup 160 firmly grasps the collar, and the collar moves with the collar handling device in its circular path. When the collar 340 begins its movement away from the nest 170, the knife blade 208 is holding the nest of collars back, and a small slit is made in the larger rim of collar 340 while the blade 208 comes to rest on the next collar in the nest 170 to be stripped, as best shown in FIGURE 11. In FIGURE 12, the collar 340 continues movement with the collar handling device 90, and the magazine section 178 moves back to its original position in front of the stop 204 as the blade 208 is lifted from the end collar in the nest.

It has also been found to be desirable to mount a small pin 342 on the collar handling devices 90 just ahead of

the leading edge of the flexible cup **160**. Pin **342** serves to clear the way for the cup **160** in case the collars in the nest **170** become misaligned, so that the cup **160** will not buckle from premature contact with the collar.

After the collar has been stripped from the nest, it is moved around in the counterclockwise direction as viewed in FIGURE 2. The collar handling device **90** continues to hold the collar with its axis horizontal until it moves into an angular position, where a bottle **22** is fed into the slot directly in alignment therebelow. At this point, the cam track **120** begins to lower the collar over the bottle below. As the collar begins to lower, the cam track **152** causes the collar handling device **90** to turn on its axis so that the longitudinal axis of the collar becomes generally vertical. The collar handling device **90** continues to be lowered by the cam track **120** until the top of the collar is well over the top of the bottle being collared. At this point, the bottle is in, or near the discharge section C of the machine, and the vacuum to the cup **160** is released. The collared bottle then moves out from the slot in the wheels **28** and completely back on the conveyor. The cam track **120** then causes the collar handling device **90** to rise back to the level of the nest of collars **170** and in doing so, the cam track **152** also rotates the collar handling device on its axis to a position for picking up another collar.

It will be understood that various changes in the details, materials, steps and arrangements of parts, which have been herein described and illustrated in order to explain the nature of the invention, may be made by those skilled in the art within the principle and scope of the invention as expressed in the appended claims.

We claim:

1. A machine for applying a collar to the top neck portion of a bottle moving along a conveyor comprising:

(a) a collar handling device having a substantially circular path of movement for accepting a collar from a supply source and subsequently guiding it over the neck portion of a bottle and releasing it, said collar handling device having means for grasping a collar when contact is made therewith,

(b) means for positively controlling movement of said bottle through an arc, in approximately vertical alignment with said collar handling device,

(c) a collar magazine having a discharge end in close proximity to a point on the path of said collar handling device, and oriented such as to discharge collars from a nest, small-end-first in a direction substantially tangent to the path of movement of said collar handling device, and

(d) means causing said collar handling device to remove a collar from said magazine as it passes the discharge end thereof including means for oscillating the discharge end of said magazine radially inward and outward relative to the path of said collar handling device and in timed relation therewith, such that the wall of the end collar in said magazine is moved into intersecting position with the path of said collar handling device at approximately the instant of arrival of said collar handling device.

2. A machine according to claim **1** in which the collar handling device is provided with resilient, deformable vacuum collar grasping means.

3. A machine according to claim **2** in which the collar grasping means is provided with a pin-like member adjacent the leading edge thereof of approximately the same radial extent as said grasping means for clearing the path for said grasping means, thereby preventing premature contact of said grasping means with said collar and subsequent buckling of said grasping means.

4. A machine for applying a collar to the top neck portion of bottles moving along a conveyor comprising:

(a) a collar handling device having a substantially circular path of movement for accepting a collar from a supply source and subsequently guiding it over the neck portion of a bottle and releasing it, said collar handling device having means for grasping a collar when contact is made therewith,

(b) means for positively controlling movement of said bottle through an arc, in approximately vertical alignment with said collar handling device,

(c) a collar magazine having a discharge end in close proximity to a point on the path of said collar handling device, and oriented such as to discharge collars from a nest, small-end-first in a direction substantially tangent to the path of movement of said collar handling device, said magazine having a stationary section, and a horizontal section pivotly mounted on a substantially vertical axis, and

(d) means causing said collar handling device to remove a collar from said magazine as it passes the discharge end thereof including means for oscillating the discharge end of said magazine radially inward and outward relative to the path of said collar handling device and in timed relation therewith, such that the wall of the end collar in said magazine is moved into intersecting position with the path of said collar handling device at approximately the instant of arrival of said collar handling device.

5. A machine according to claim **4** in which the discharge end of said magazine is provided with means for alternately positively restraining discharge and yieldably restraining discharge of collars from said magazine in timed relation with the arrival of said collar handling device.

6. A machine according to claim **4** in which the discharge end of said magazine is provided with a blade movable into contact with the end-most collar adjacent its larger rim and in timed relation to the movement of said magazine's dispensing end into intersecting position with the path of said collar handling device, and an element movable into positive restraining position with the end-most collar in said magazine in timed relation to the movement of said dispensing end out of intersecting position with the path of said collar handling device.

7. A machine according to claim **4** in which the collar handling device is provided with resilient, deformable, vacuum collar grasping means, and includes a rigid, pin-like member adjacent the leading edge thereof of approximately the same radial extent as said grasping means for clearing the path of movement, thereby preventing buckling of the grasping means.

8. A machine for applying collars to the top neck portion of bottles moving along a conveyor comprising:

(a) a carriage assembly rotatable about a vertical axis,

(b) a plurality of collar handling devices provided with collar grasping means angularly spaced around said carrier assembly,

(c) a bottle conveyor rotatable about the same vertical axis as said carriage assembly and having bottle holding slots at the same angular positions as said collar handling devices, the center of the bottle positions being of a slightly greater radial extent than said collar handling devices,

(d) a collar magazine having a discharge end in close proximity to a point on the path of said collar handling devices, and oriented such as to discharge collars from a nest, small-end-first in a direction substantially tangent to the path of movement of said collar handling devices, and

(e) means causing each of said collar handling devices to remove a collar from said magazine as it passes the discharge end thereof including means for oscillating the discharge end of said magazine radially inward and outward relative to the path of said collar handling device and in timed relation therewith, such that the wall of the end collar in said magazine is moved into intersecting position with the path of said collar handling devices at approximately the instant of arrival of said collar handling devices.

9. A machine according to claim 8 in which the collar handling devices are provided with resilient, deformable, vacuum collar grasping means and include a pin-like member adjacent the leading edge thereof of approximately the same radial extent as said grasping means for clearing the path for said grasping means, thereby preventing premature contact of said grasping means with said collar and subsequent buckling of said grasping means.

10. A machine for applying collars to the top neck portion of bottles moving along a horizontal conveyor comprising:

(a) a carriage assembly rotatable about a vertical axis adjacent said conveyor,

(b) a wheel below said carriage assembly having spaced, peripheral slots for receiving and positively controlling movement of said bottles through an arc, said wheel being rotatable about sadi vertical axis in timed relation to said carriage assembly,

(c) collar handling devices movably mounted on said carriage assembly in substantially vertical alignment with the peripheral slots of said wheels,

(d) means for transferring collars to said collar handling devices as they pass a predetermined point in their circular movement such that the collars are held with their axes horizontal and small end ahead,

(e) means for rotating the collar handling devices relative to said carriage approximately 90° so that the collar carried thereby is positioned with its axis vertical and large end down, and

(f) means for moving the collar handling devices approximately vertically downward relative to a bottle in a slot below, and releasing the collar upon clearing the top of the bottle.

11. A machine according to claim 10 in which the collar handling devices are provided with resilient, deformable vacuum collar grasping means and means for cutting the vacuum on and off at predetermined times.

12. A machine for applying collars to the top neck portion of bottles moving along a horizontal conveyor comprising:

(a) a carriage assembly rotatable about a vertical axis adjacent said conveyor,

(b) a wheel below said carriage having spaced, peripheral slots for receiving and positively controlling movement of said bottles through an arc, said wheel being rotatable about said vertical axis in timed relation to said carriage assembly,

(c) collar handling devices movably mounted on said carriage assembly in substantially vertical alignment with the peripheral slots of said wheel,

(d) a collar magazine having a discharge end in close proximity to a point on the path of said collar handling devices, and oriented such as to discharge collars from a nest, small-end-first in a direction substantially tangent to the path of movement of said collar handling devices,

(e) means causing said collar handling devices to remove collars from said magazine as they pass the discharge end thereof including means for oscillating the discharge end of said magazine radially inward and outward relative to the path of said collar handling devices and in timed relation therewith, such that the wall of the end collar in said magazine is moved into intersecting position with the path of said collar handling devices at approximately the instant of arrival of a collar handling device,

(f) means for rotating the collar handling devices relative to said carriage approximately 90° so that the collar carried thereby is positioned with its axis vertical and large end down, and

(g) means for moving the collar handling devices approximately vertically downward relative to a bottle in a slot below, and releasing the collar upon clearing the top of the bottle.

13. A machine according to claim 12 in which the collar handling devices are provided with resilient, deformable, vacuum collar grasping means, means for cutting the vacuum on and off at predetermined times, and a pin-like member adjacent the leading edge of the collar grasping means of approximately the same radial extent as said grasping means, thereby preventing premature contact of said grasping devices with said collar and subsequent buckling of said grasping means.

14. A machine according to claim 12 in which the discharge end of said magazine is provided with means for alternately positively restraining discharge and yieldably restraining discharge of collars from said magazine in timed relation with the arrival of said collar handling device.

15. A machine according to claim 12 in which the discharge end of said magazine is provided with a blade movable into contact with the end-most collar adjacent its larger rim in timed relation to the movement of said magazine's discharge end into intersecting position with the path of said collar handling device, and an element movable into positive restraining position with the end-most collar in said magazine in timed relation to the movement of said dispensing end out of intersecting position with the path of said collar handling devices.

16. A machine for applying collars to the top neck portions of bottles moving along a conveyor, said machine comprising supply means providing a source of collars such as aforesaid located above said bottles, means for withdrawing collars from said supply means and including a collar handling device movable in a circular path in a horizontal plane, said handling device having means thereon for engaging and gripping a collar in said magazine and for withdrawing such collar from said magazine in a substantially tangential direction relative to the path of said handling device and in approximately an axial direction with respect to said collar with its smaller end leading as said device moves past said supply means while moving in said circular path, means for rotating said collar handling device approximately 90° about a generally horizontal axis after withdrawing a collar from said magazine and as it continues in its circular path of movement so as to position said withdrawn collar with its axis approximately vertical and with its larger end lowermost, means for thereafter moving said collar handling device vertically downwardly relative to said bottles so as to pass said collar over the top of one of said bottles, and means for thereafter conditioning said collar handling device to release said collar.

17. A machine for applying collars to the top neck portions of bottles moving along a horizontal conveyor, said machine comprising a magazine located above said bottles for holding a plurality of collars such as aforesaid arranged in nested condition, a collar handling device supported for rotation in a circular path in a horizontal plane, said magazine being arranged adjacent the path of said collar handling device and having a discharge end portion from which collars may be withdrawn in a direction substantially tangential to said path of movement and with their small ends leading, means for oscillating said discharge end of said magazine radially toward and away from said circular path of movement of said collar handling device in such timed relation with the movement of said handling device that said discharge end of said magazine is moved radially inwardly toward the axis of said circular path as said handling device approaches said magazine so that a collar is brought into engagement with said handling device as it moves past said magazine, means on said handling device for gripping the collar so brought into engagement therewith and for withdrawing such collar from said magaine as said device moves therepast, means for rotating said handling device 90° about a generally horizontal axis after passing said magazine so that the axis of the collar gripped thereby is positioned generally vertically with its larger end lowermost, means for

thereafter moving said collar handling device downwardly to move the collar gripped thereby over the top of a bottle positioned therebelow, and means for conditioning said gripping device to thereafter release the collar gripped thereby.

18. A mechanism for withdrawing generally conical collars from a nest thereof for subsequent application to a bottle, said mechanism comprising a magazine for holding a nest of such collars in such a manner as to expose the outside surface of the end collar of such nest, a collar handling device having a deformable, resilient, vacuum cup for grasping a collar, means for moving said collar handling device in a path generally parallel to the centerline of the nest of collars in said magazine so as to initially intercept said outside surface of said end collar with only the trailing edge of said collar grasping cup, and means for thereafter moving said magazine to change the angle of inclination between said center line of said nest of collars and said path of movement of said collar handling device and to thereby bring said outside surface of said end collar into full contact with said collar grasping cup.

19. A mechanism as defined in claim 18 further characterized by means for holding back said nest of collars in said magazine while permitting said end collar to be stripped therefrom, said later means comprising a knife blade engageable with said outer surface of said end collar and arranged with its axis generally radial to said centerline of said nest of collars.

References Cited

UNITED STATES PATENTS

1,971,576	8/1934	Nelson	29—208
2,962,846	12/1960	Marindin	53—67
3,267,566	8/1966	Ouellette	29—208

JOHN F. CAMPBELL, *Primary Examiner.*

THOMAS H. EAGER, *Examiner.*