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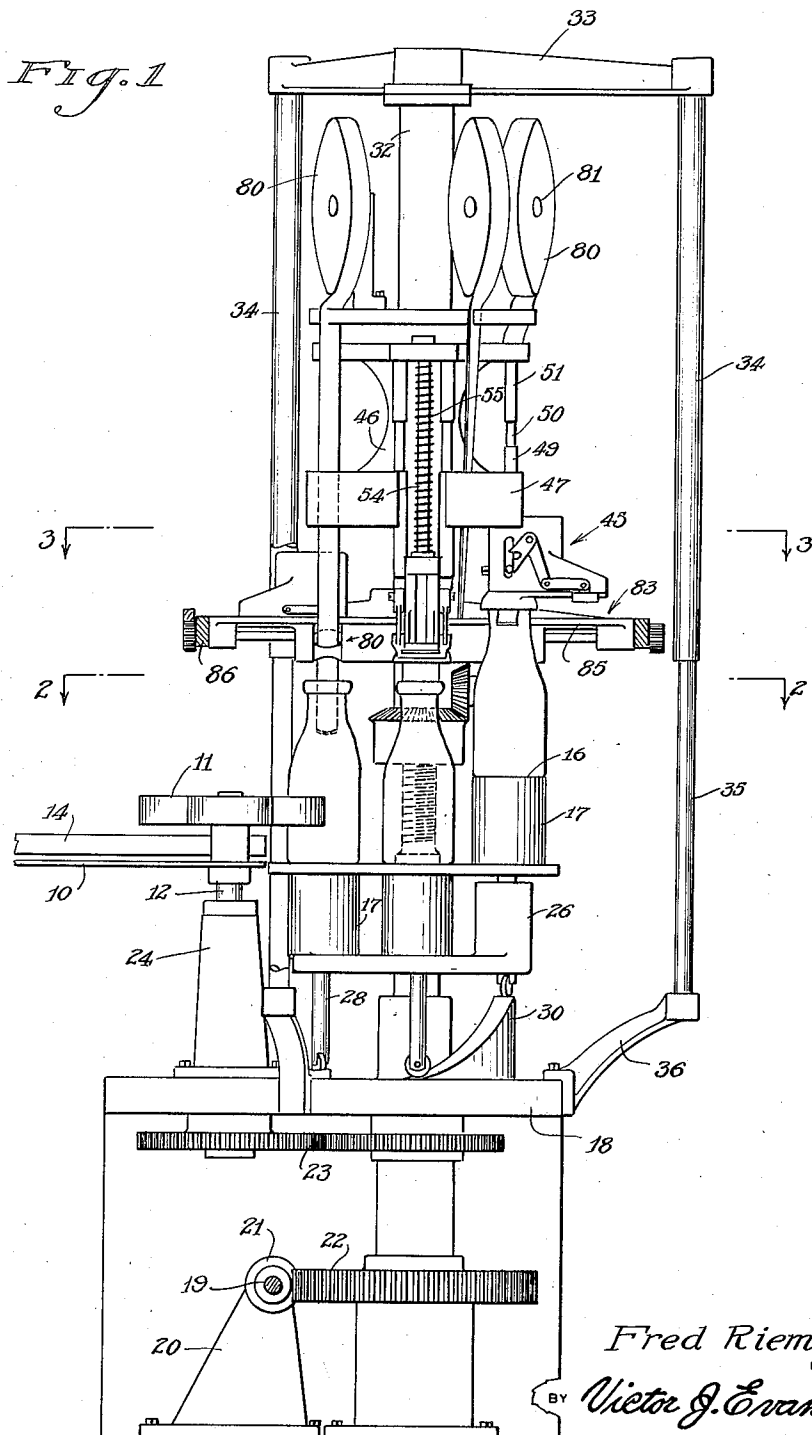
F. RIEMER

2,097,383

BOTTLE CAPPING AND LABELING MACHINE

Filed March 23, 1936

4 Sheets-Sheet 1



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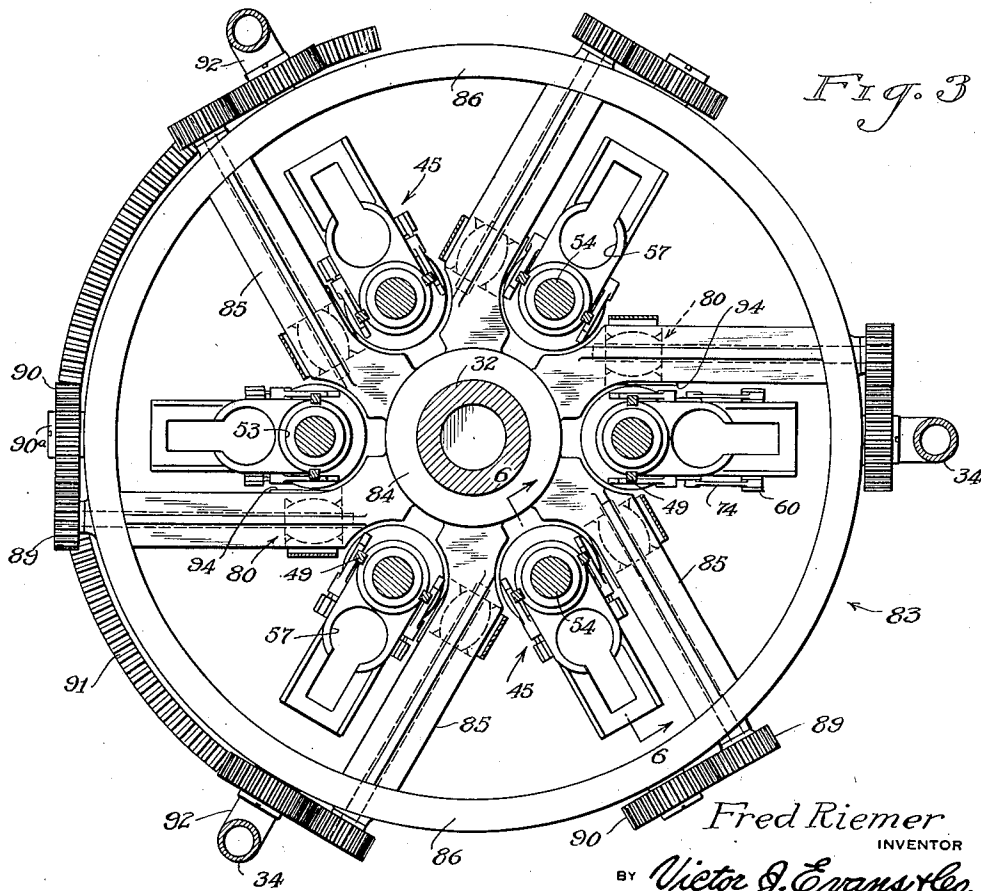
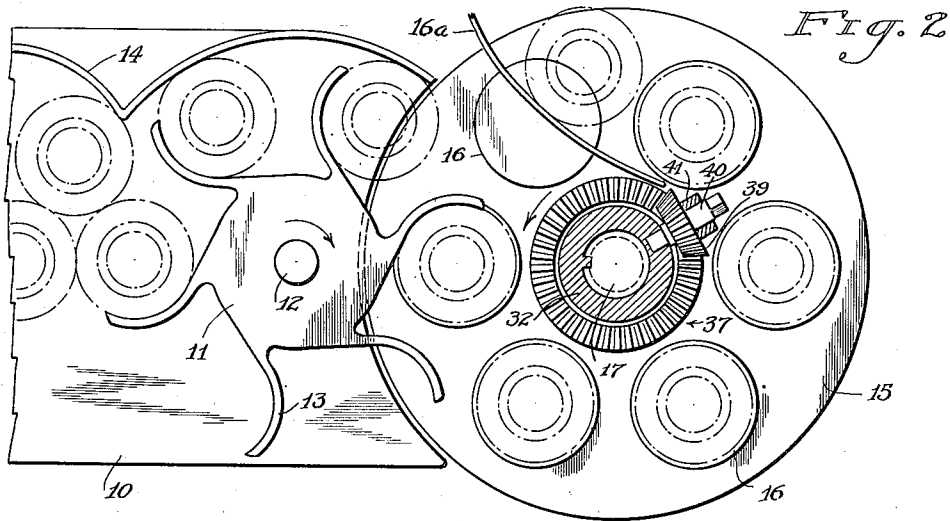
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BOTTLE CAPPING AND LABELING MACHINE

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4 Sheets-Sheet 2



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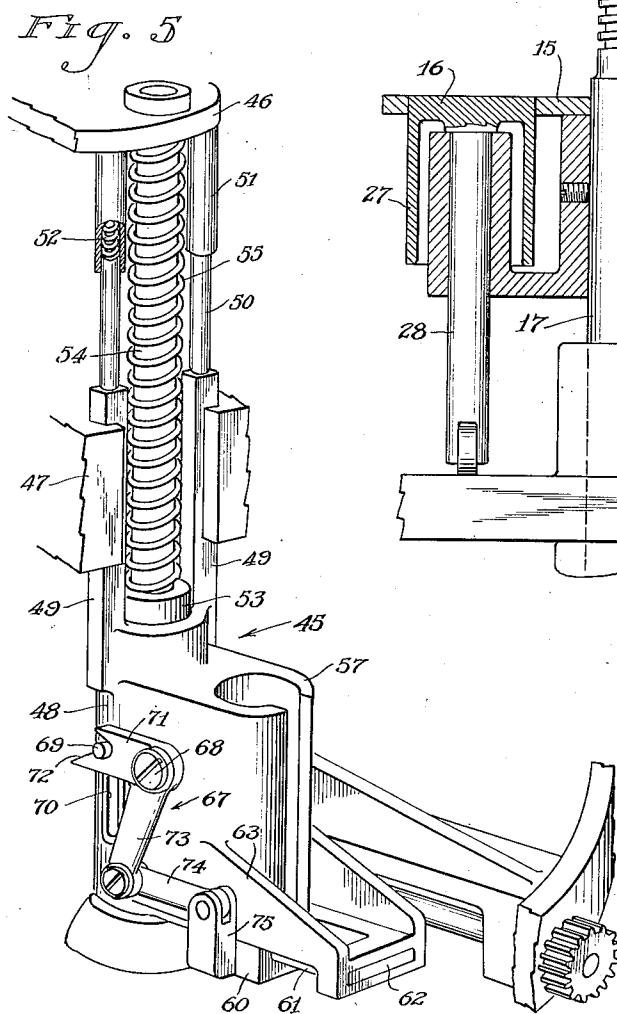
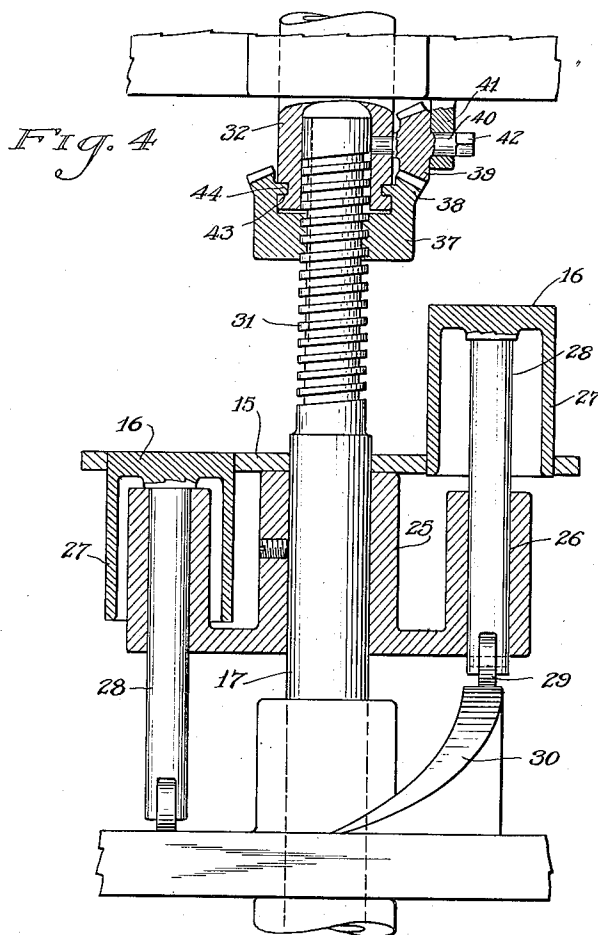
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BOTTLE CAPPING AND LABELING MACHINE

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4 Sheets-Sheet 3



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BOTTLE CAPPING AND LABELING MACHINE

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Fig. 6

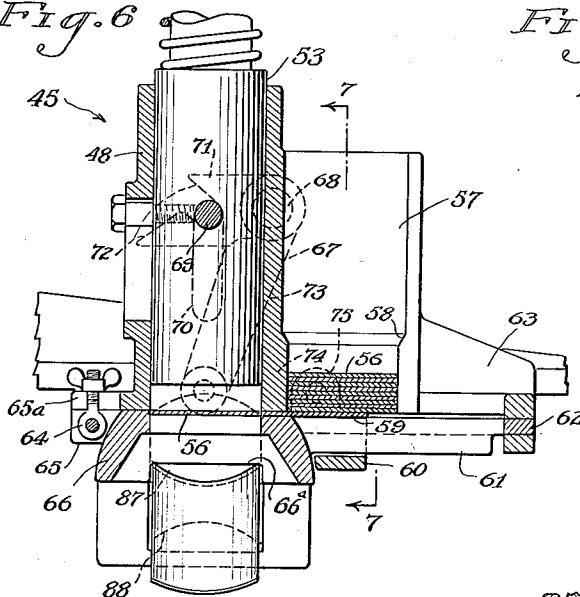


Fig. 7

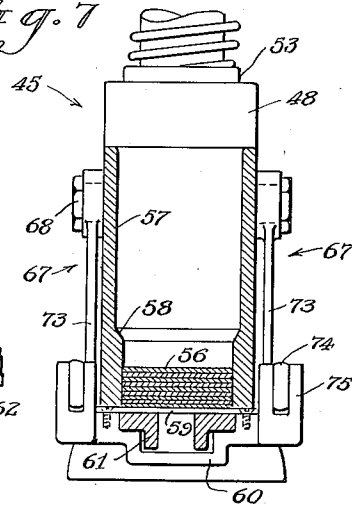


Fig. 8

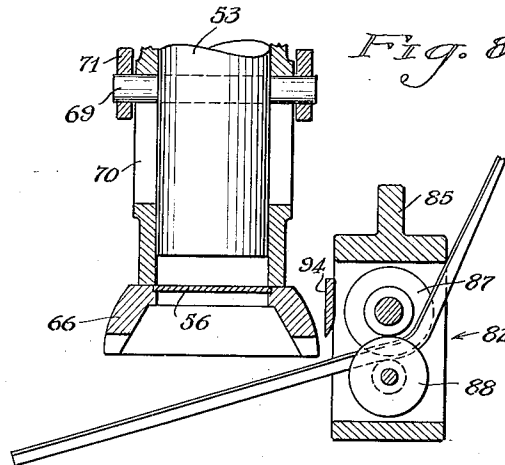
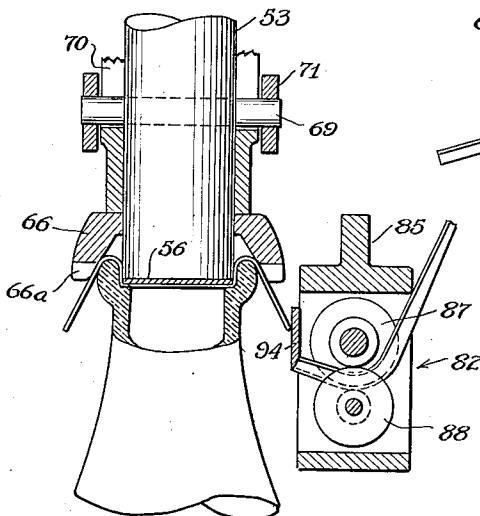


Fig. 9



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2,097,383

BOTTLE CAPPING AND LABELING MACHINE

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Application March 23, 1936, Serial No. 70,453

4 Claims. (Cl. 226—80)

This invention relates to machines for capping bottles and more particularly to milk bottle capping machines which, in addition to placing the cap onto the bottle, simultaneously install a ribbon under the bottle cap with the ends of the ribbon projecting from either side of the bottle neck to present a conspicuous label to identify the contents of the bottle.

The general object of my invention is to provide a capping machine adapted particularly for the sealing of milk bottles, the novel arrangement of the mechanism of which assures the continuous operation of the machine at high speeds such, for example, as capping 200 bottles per minute.

A further object of my invention is to provide a machine of the character indicated which may be readily adapted by a simple adjustment to the handling of the several standard sizes of milk bottles, such as half-pints, pints and quarts.

Another object of my invention is to provide a bottle capping machine which will readily accommodate bottles of the same capacity but varying slightly in their dimensions, the capping unit of my machine being so constructed and mounted as to assure against any breakage of the bottles.

A more specific object of my invention is to provide in a machine of this character, means by which a supplementary ribbon-like label may be installed simultaneously with the capping of the bottle, the ribbon installing means being so arranged as to readily permit its disconnection so that the machine may function to install the usual bottle cap without the supplementary label.

The invention will be fully and comprehensively understood from a consideration of the following detailed description when read in connection with the accompanying drawings which form part of the application, with the understanding, however, that the improvement is capable of extended application and is not confined to the exact showing of the drawings nor to the precise construction described and, therefore, such changes and modifications may be made therein as do not affect the spirit of the invention nor exceed the scope thereof as expressed in the appended claims.

In the drawings:

Fig. 1 is a side elevational view of my entire milk bottle capping and labeling machine and showing in general the arrangement of the driving mechanism, the bottle conveying and

handling means, and the supply of the paper for the ribbon labels.

Fig. 2 is a horizontal section taken on line 2—2 of Fig. 1, illustrating the method of conveying the bottles to the machine and the discharge of the bottles.

Fig. 3 is a horizontal sectional view taken on line 3—3 of Fig. 1, showing the arrangement of the capping and labeling units of my machine.

Fig. 4 is a fragmentary central sectional view, partly in elevation, showing the bottle raising means and the mechanism for adjusting my machine to accommodate various sizes of bottles.

Fig. 5 is a fragmentary perspective view of the bottle capping and labeling unit of my machine.

Fig. 6 is a central vertical section thru the capping and labeling unit taken on line 6—6 of Fig. 3.

Fig. 7 is a transverse vertical sectional view taken on the staggered line 7—7 of Fig. 6; and

Figs. 8 and 9 are fragmentary sectional views thru the capping and labeling unit and illustrating two stages in the process of capping a bottle and simultaneously installing a label on same, Fig. 8 showing the mechanism at the beginning of the process and Fig. 9 showing the mechanism having completed the process.

To facilitate a thorough understanding of the functioning of my machine in the capping and affixing of a ribbon-like label to the bottle a general description of the operation of my machine now follows. It will be observed after a detailed description of the apparatus is had that my machine is arranged for rotary operation around a common center and comprises a series of capping units adapted to be revolved coordinately with the revolution of the bottles to be capped, the units being operated progressively during one revolution of the machine to accomplish in one revolution the complete operation of capping the bottle and affixing the label.

Each of the mentioned capping units is provided with a paper ribbon feed mechanism by which the required amount of paper is fed in such manner as to be disposed in a projected position over the bottle to be capped prior to the capping operation. Consequently, during the functioning of the capping unit in installing the cap into the bottle the mentioned paper ribbon is engaged between the bottle cap and the recess of the bottle. At the completion of the operation the paper ribbon thus affixed onto the bottle is severed from the paper stock and the bottle is thereafter delivered to a receiving table.

The bottles to be capped and labeled are delivered to a table or platform 10 where they are disposed in upright position and urged by suitable means in the general direction of a star feeder wheel 11. The feeder wheel 11 is mounted for horizontal rotation, being carried on a vertical shaft 12 and comprises a series of radial arms 13, the ends of which are arcuately formed to fit the periphery of the bottles to be handled. The radial disposition of the arms 13 presents a series of pockets into each one of which a single bottle is delivered. Consequently, as the wheel 11 is rotated in the direction of the arrow shown in Fig. 2, a bottle to be capped is engaged by each of the arms 13 and conveyed in an arcuate path to be delivered to the capping machine proper. The table 10 at one side thereof is provided with a suitably shaped fence 14 by which to guide the bottles in the desired path of travel.

As aforeindicated, the capping and labeling operation of my machine is accomplished by revolving each of the bottles in the machine, the capping and labeling operation being actuated by axially raising the bottle bodily into the capping unit. To effect these motions of the bottle a turn-table 15 is provided, as shown more clearly in Figs. 2 and 4. The turn-table 15 is equipped with an annularly arranged series of platforms 16 onto each of which a bottle is delivered by means of the star wheel 11. When the complete operation has been attained the capped and labeled bottle is delivered from the machine by means of an arcuately formed rail 16a against which the capped bottles engage during their annular travel so that same are caused to be guided off the platforms 16 and the turn-table 15 to be delivered onto a suitable receiving table.

The turn-table 15 is carried and rotationally driven by a main vertical shaft 17 disposed centrally in the machine, which shaft is journaled in a base frame 18 in which frame suitable drive mechanism is arranged. The entire machine is driven by suitable means such as an electric motor operatively connected to a drive shaft 19, the latter being journaled in a bearing 20. Onto the shaft 19 is affixed a worm gear 21 which meshes with a spur gear 22, the latter being fixedly mounted on the main shaft 17. The star wheel 11 is rotated in synchronized relation to the rotation of the main shaft 17 by means of the spur gearing 23, one gear of which is secured to a depending portion of the shaft 12, the other gear being fixedly mounted on the main shaft 17. The star wheel shaft 12, being arranged for vertical rotation, is journaled in a bracket 24.

Below the turn-table 15 is arranged a guide frame 25 comprising a series of guide bearings 26 by which each of the platforms 16 are guided in their vertical motion. The platforms 16 are each slidably mounted in suitable apertures in the turn-table 15 and are provided with a depending cylindrical apron 27 by which to assure the maintenance of this portion of the machine in a sanitary condition. A guide rod 28 projects from each of the platforms 16 within the apron 27 to be journaled in the guide bearing 26. On the lower end of each of the guide rods 28 is mounted a roller 29. The function of the platforms 16 and their associated rods 28 and rollers 29 is to raise the bottle into the capping unit at one point during the revolution of the bottle, by which action the capping unit is actuated to accomplish the operations of capping the bottle and affixing the ribbon label. The rollers 29 normally ride on the top plate of the base 18 and at the de-

sired point in the cycle of operation a cam 30 is provided presenting an inclined plane over which the rollers 29 may ride to effect the desired raising of the platforms 16.

The main drive shaft 17 terminates at its upper end in a threaded portion 31, at which point the shaft 17 is slidably coupled to a tubular shaft 32, the latter being keyed to the shaft 17 to permit axial movement only relative to the same. The tubular shaft 32 extends thru the top of the machine where same is journaled in a spider frame 33 comprising a plurality of radial arms. From each of the mentioned arms slide tubes 34 depend, the latter being arranged to telescope with vertical rods 35. The rods 35 are supported on suitable brackets 36 extending radially from the base frame 18 and together with the rods 35 afford a guiding structure for the upper portion of the machine. The telescoping of the rods 35 into the tubes 34 permits of adjusting the upper portion of the machine so that same may be set to suit the particular size of bottle to be capped. Specifically, the mentioned adjustment effects the desired vertical distance between the bottom of the series of capping units and the turn-table 15.

The means effecting the elevation of the upper portion of the machine is illustrated in detail in Figs. 2 and 4 and comprises a threaded nut 37 threadedly engaged on the portion 31 of the shaft 17. Integral with the nut 37 is formed a bevel gear 38, the latter being in mesh with a pinion 39. The pinion 39 is fixed to a shaft 40, the inner end of which is journaled in a recess formed in the tubular shaft 32, the opposite end being journaled in a bracket 41. The shaft 40 projects beyond the bracket 41 to provide a squared end 42 onto which a suitable tool may be engaged to rotate the gear 39. In the lower end of the shaft 32 is cut an annular groove 43 in which a circular key 44 integral with the nut 37 is disposed, thereby retaining the shaft 32 in operable relation to the nut 37. By rotating the gear 39 the nut 37 is turned on the shaft 17, of which the threaded portion 31 causes the elevation or lowering of the nut 37 and the corresponding regulation of the upper portion of the machine, particularly the capping units thereof.

The general arrangement of the capping and labeling units will now be described, during which attention is directed particularly to Figs. 1, 3 and 5. A suitable number of capping units indicated by numeral 45 are annularly arranged about the center of the machine and are supported for vertical sliding on a turret frame 46, the latter being fixed to the shaft 32 and provided with radially extending slide brackets 47. The body of the capping units 45 comprises a tubular casing 48 from which extends upwardly slide bars 49 which are retained in suitable grooves formed in the slide brackets 47. From the upper end of each of the slide bars 49 project rods 50, which rods telescope into guide tubes 51 depending from the upper portion of the turret frame 46. Suitable compression springs 52 are disposed in the tubes 51 to urge the rods 50 downwardly. A capping plunger 53 slides within the casing 48 of the capping unit 45 and is provided with an axially extending plunger rod 54 around which a compression spring 55 is arranged. The upper end of the plunger rod 54 is slidably journaled in the upper portion of the turret frame 46. The spring 55 is arranged to urge the plunger 53 downwardly and should be somewhat stronger than the combined pressure of the springs 52 for reasons hereinafter described.

Attention is now directed to Figs. 5 to 9, inclusive, for a detail description of the capping and label affixing units 45. The primary functions of these units, as aforeindicated, is to feed a single bottle cap from a suitable magazine into position below the capping plunger, the relative lowering of which pushes the cap into the recess in the neck of the bottle. The mentioned bottle caps, indicated by numeral 56, are retained in a vertical stack in the tubular magazine 57, the latter being disposed adjacent the tubular casing 48 of the capping unit. The interior of the magazine 57 is of ample size at its upper portion to permit the convenient placement of an adequate stack of bottle caps 56, which interior diminishes at the shoulder 58 to a diameter suitable to support the lower caps 56 in substantial vertical alignment. The lowermost bottle cap 56 is moved into position below the capping plunger 53 by means of a reciprocating ejector plate 59 which is supported on and actuated by a reciprocating cross head 60. The blade 59 and the cross head 60 are slidably mounted on a slide frame 61, the latter being retained on the bottom of the capping unit 45 by a tongue 62 engaged in a slot formed in a bracket 63 extending from the body of the magazine 57. The opposite end of the slide frame 61 is removably secured to the capping unit 45 by a screw and wing nut 64, the screw being pivoted to lugs 65 integral with the slide frame 61, the nut engaging with a flange 65a projecting from the casing 48. Integral with the slide frame 61 and disposed to depend from the casing 48 is arranged a guide bell 66, the function of which is to align a bottle during the raising of the latter into position below the capping plunger 53.

The actuation of the cross head 60 and the corresponding feeding of the bottle caps 56 is accomplished by means of a bell crank lever 67 which is fulcrumed on suitable stud screws 68 affixed to the casing 48. A pin 69 extends transversely thru the center of the plunger 53 to project from each side thereof thru suitable slots 70 in the casing 48. An arm 71 forming part of the lever 67 is provided with cam shoulders 72 so arranged that by the lowering of the pin 69 relative to the casing 48 the lever 67 actuates the cross head 60 to a retracted position so that the ejector blade 59 carried thereon is disposed behind the lowermost of the bottle caps 56 in the magazine 57. This motion is transmitted thru an arm 73 forming part of the bell crank lever 67 and a link 74, the latter flexibly connecting the end of the arm 73 with ears 75 formed on the cross head 60.

It is also to be noted that the capping units 45 accomplish the installation of a ribbon-like label coactively with the placement of the bottle cap into the bottle. The paper stock forming the mentioned labels is fed from rolls 80 suitably supported on the top of the turret frame 46, as shown in Fig. 1, on spindles 81, which spindles are provided with frictional means for retarding the free rotation of the rolls 80. The strip of paper stock extending from the rolls 80 is fed downwardly thru suitable guide-ways formed in the turret frame 46 and passes thru feed rollers 82. The support for the feed rollers 82 and their associated drive mechanism is accomplished by means of a horizontal wheel-like frame 83, shown more clearly in Fig. 3. The frame 83 comprises a hub 84 secured to the tubular shaft 32 and a series of radial arms or spokes 85, the ends of the latter being joined by a circular band 86.

Each set of feed rollers 82 comprises an upper

roller 87 and a lower roller 88, the respective shafts of which are journaled in the spokes 85. The upper roller 87 is preferably convex on its periphery, the periphery of the lower roller 88 being concave to conform to the roller 87, see Fig. 6. Preferably, I employ the upper roller 87 as the drive roller. Correspondingly, the lower roller 88, being constructed of a resilient material, acts as a contact roller to effect the secure gripping of the paper during the feeding thereof. The shaft of the roller 87 is therefore extended beyond the periphery of the band 86, at which end is affixed a pinion gear 89. An idler gear 90, being in mesh with the pinion gear 89, is rotatably supported on a stud shaft 90a projecting from the band 86.

It is to be noted here that the paper stock to make up the ribbon-like label is fed to a suitable length to project over the bottle to be capped, see Fig. 8, which feeding is accomplished during one complete revolution of the machine, specifically during the arc of rotation defined by the sector of an arcuate gear rack 91 shown in Fig. 3. The gear rack 91, with which the idler gears 90 mesh, is suitably supported from brackets 92 extending from the vertical tubes 34 and is so oriented from the capping operating point as to effect the feeding of the desired amount of paper previous to the actuation of the capping operation, so that just before the bottle to be capped is to be raised by the cam 30 the paper for the label is projected over the bottle, as shown in Fig. 8. To assure that the projecting portion of the paper be held in a straight projecting line, the same is caused to assume a transversely concave form by the joint effect of the feed rollers 82.

A detail description of the simultaneous capping and labeling operations will now be had, during which attention is directed particularly to Figs. 6 to 9, inclusive. For purposes of clarity we may assume that one of the bottles being rotated in the machine has arrived at the position where its respective lifting roller 29 is about to engage the incline of the cam 30. This position may be taken as the beginning of the capping and labeling operation, it being noted however that in this position the labeling paper is projected over the bottle, as shown in Fig. 8. Accordingly, it is to be observed that one of the bottle caps 56 has been fed to position below the capping plunger 53 by the previous actuation of the ejector blade 59 and the associated mechanism including the bell crank 67.

From this point the mentioned bottle rotates a predetermined angular distance, during which the respective roller 29 is riding up the cam 30 and the bottle is therefore being raised axially on its platform 16. During the raising of the bottle to be capped the rim of same comes into contact with the projected label stock and is thereafter inserted into the depending bell 66, the tapered interior of which effects an accurate centering of the bottle in relation to the capping plunger 53. To assure the unobstructed action of the label stock during the succeeding portion of the operation the rim of the bell 66 is grooved out at diametrically opposite portions forming recesses 66a of a width adequate to permit the entrance of the paper stock. As the bottle continues to rise, the casing 48 of the capping unit 45 is caused to be raised against the pressure of the springs 52, the capping plunger 53 however remaining stationary. As the raising of the casing 48 continues the bottle cap 56 disposed there-

in comes in contact with the capping plunger 53 and is thereby inserted into the recess of the bottle neck. Coactively with this operation the ribbon label being disposed between the cap 56 and the bottle is caused to be engaged between these members as the cap 56 is completely installed in the bottle. As this operation attains completion the ribbon label is severed from the paper stock by the engagement of same with a stationary knife 94, which knife is secured to the spoke 85 being disposed in front of the feed rollers 82. The cutting edge of the knife 94 is inclined horizontally so that the cutting of the paper stock is gradually effected to assure against the tearing of same.

To avoid breakage of the bottles during the capping operation, such as caused by the variations in the height of the bottle, the capping plunger 53 is resiliently mounted so that when a bottle of excessive height is being capped the plunger spring 55 is accordingly compressed.

The complete capping operation having been accomplished, the capped bottle is then lowered on its platform 16 as the respective roller 29 rides down the cam 30. During this lowering the capping unit 45 resumes its former low position. Accordingly, as the casing 45 is lowered the pin 69, see Fig. 6, is relatively raised since the capping plunger 53 on which the pin 69 is carried remains substantially stationary. This relative motion of the pin 69 engaging in the cammed surfaces 72 of the bell crank 67 effects the preliminary feeding of a bottle cap 56 into position below the capping plunger 53, specifically by causing the forward motion of the blade 59 which engages with the lowermost cap 56 in the magazine 57 and slides same to the mentioned position. This position of the associated capping feed mechanism is illustrated in Fig. 6, in which position the mechanism remains until the accomplishment of the capping operation.

The continued rotation of the turn-table 15 causes the capped bottle to come into engagement with the arcuate rail 16a by which the capped bottle is discharged from the machine to a suitable platform provided for this purpose.

What is claimed as new is:

1. In a bottle capping machine, the combination of a plurality of capping units, means for supporting a plurality of bottles beneath said capping units, means for revolving said capping units and said supporting means in unison, said capping units comprising cap feeding means and means for feeding a ribbon to each of said capping units, and means actuated by the travel of said capping units for actuation of said ribbon feeding means and comprising feed rollers adjacent said capping units and disposed to project the free end of said ribbon between one of said capping units and a bottle to be capped, a gear operatively connected to one of said rollers and

a stationary gear rack adapted to mesh with said gear during the travel of said capping units.

2. In a bottle capping machine, the combination of a plurality of capping units, means for supporting a plurality of bottles beneath said capping units, means for revolving said capping units and said supporting means in unison, said capping units comprising cap feeding means and means for feeding a ribbon to each of said capping units, and means actuated by the travel of said capping units for actuation of said ribbon feeding means and comprising feed rollers adjacent said capping units and disposed to project the free end of said ribbon between one of said capping units and a bottle to be capped, a gear operatively connected to one of said rollers and a stationary gear rack adapted to mesh with said gear during the travel of said capping units, said rollers being convex and concave, respectively, whereby to transversely bow the projected portion of said ribbon.

3. In a bottle capping machine, the combination of a plurality of capping units carried on a rotatable frame, means for supporting a plurality of bottles beneath said capping units, means for revolving said capping unit frame and said bottle supporting means in unison, said capping units comprising cap feeding means and means for feeding a ribbon to each of said capping units and actuated by rotation of said frame and comprising a pair of feed rollers presenting respectively convex and concave peripheries, a substantially radial shaft journaled in said frame and coupled to one of said feed rollers, a gear secured to said shaft, and a stationary arcuate gear rack concentrically disposed relative to the axis of rotation of said frame and adapted to mesh with said gear during rotation of said frame whereby to drive said feed rollers.

4. In a bottle capping machine, the combination of a plurality of capping units, means for supporting a plurality of bottles beneath said capping units, means for revolving said capping units and said supporting means in unison, said capping units comprising cap feeding means and means for feeding a ribbon to each of said capping units, means for raising a bottle into engagement with said capping unit to accomplish the capping process, means actuated by the travel of said capping units for actuation of said ribbon feeding means and comprising feed rollers adjacent said capping units and disposed to project the free end of said ribbon between one of said capping units and a bottle to be capped, a gear operatively connected to one of said rollers, a stationary gear rack adapted to mesh with said gear during the travel of said capping units, and a cutting element disposed between said feed rollers and said capping unit adapted to sever the ribbon during raising of said bottle.

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