Jan. 9, 1934. O. N. TEVANDER 1,942,885

BOTTLE CAPPING MACHINE

Filed Dec. 26, 1925 4 Sheets-Sheet 1

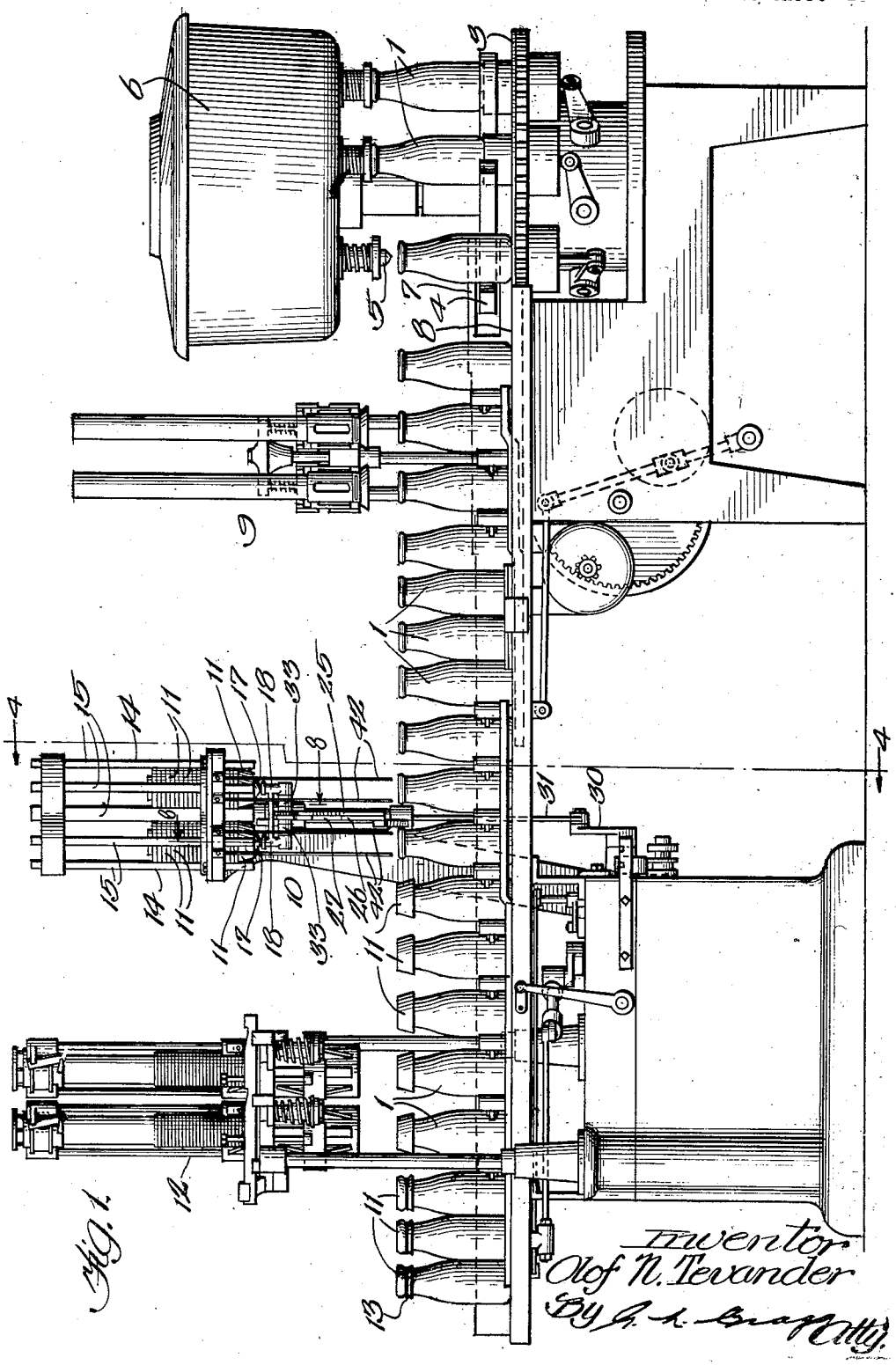


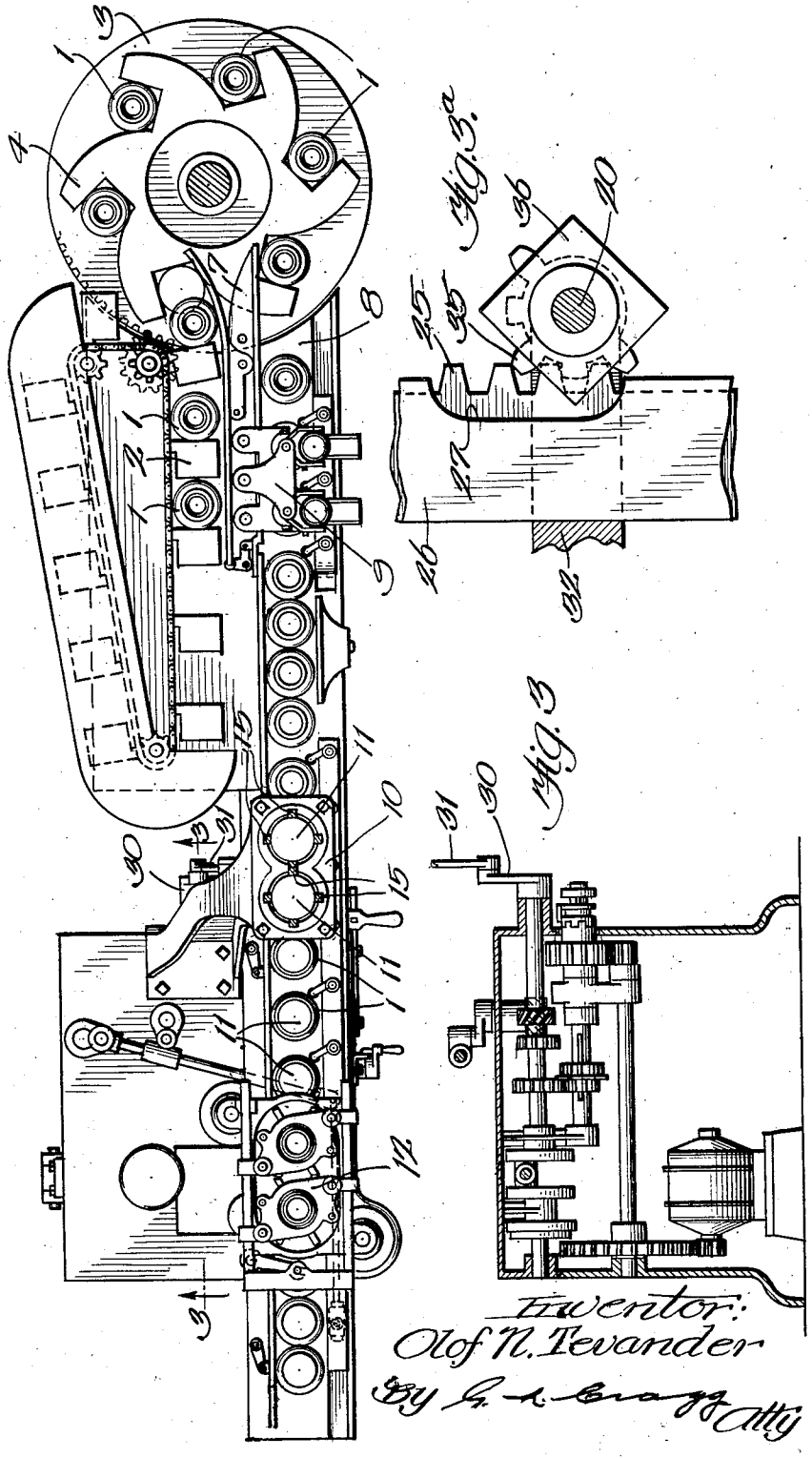
Fig. 1.

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Filed Dec. 26, 1925 4 Sheets-Sheet 2



Jan. 9, 1934. O. N. TEVANDER 1,942,885

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Filed Dec. 26, 1925 4 Sheets-Sheet 3

Fig. 4

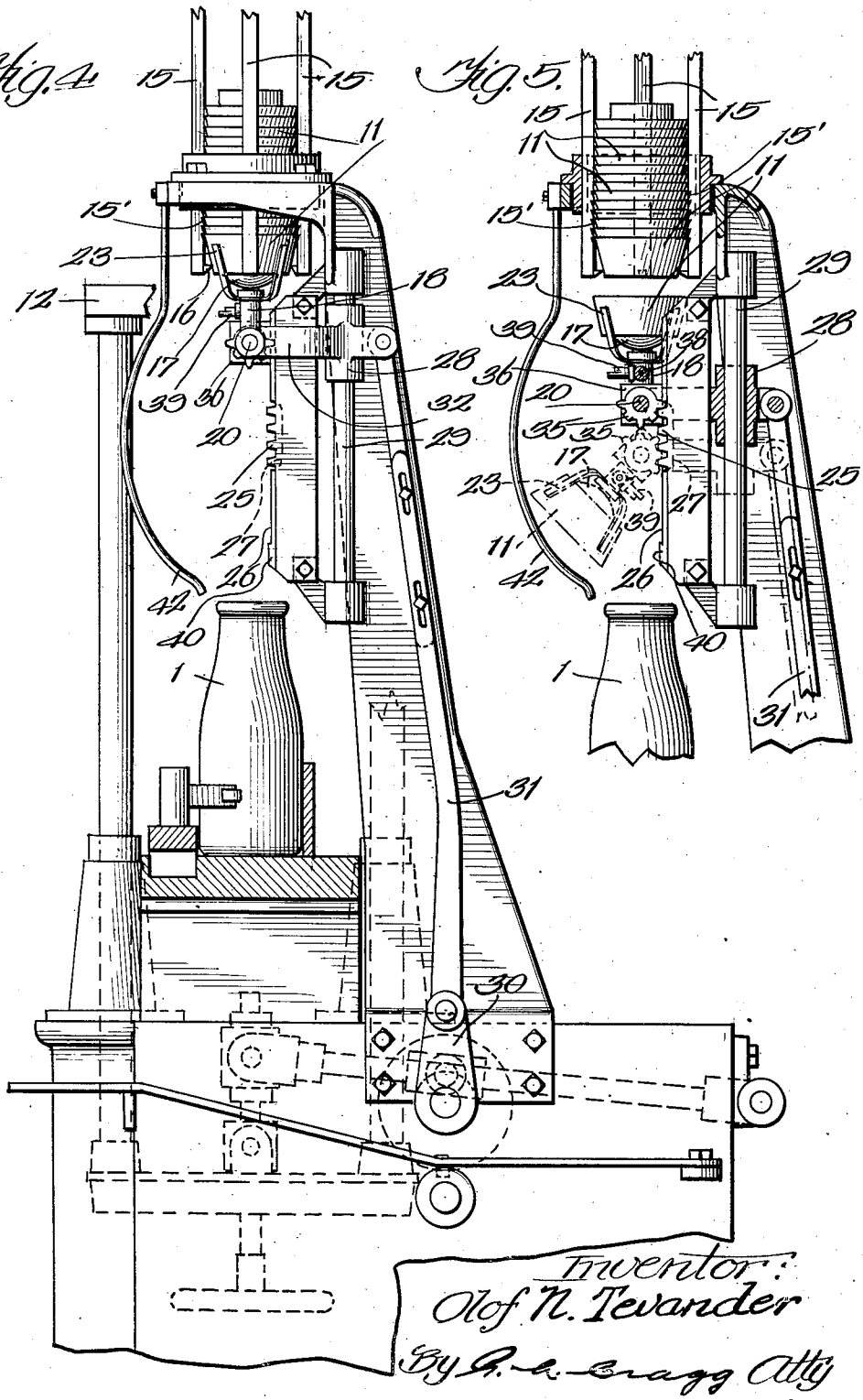


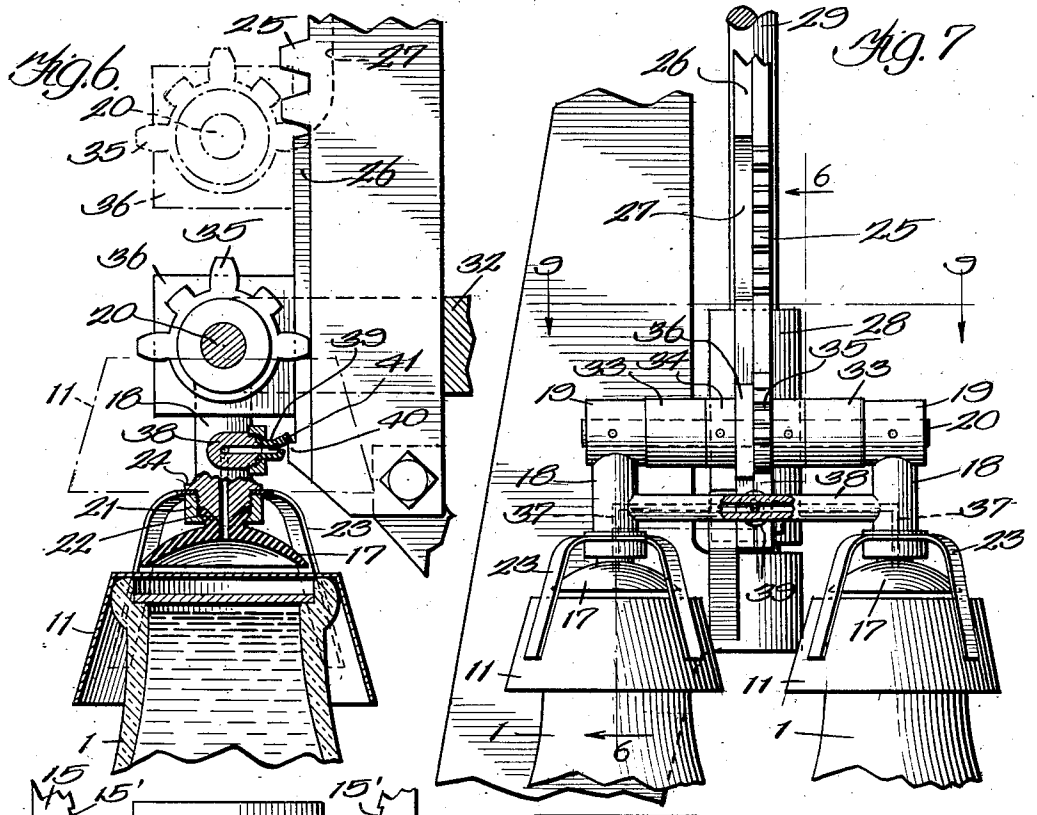
Fig. 5.

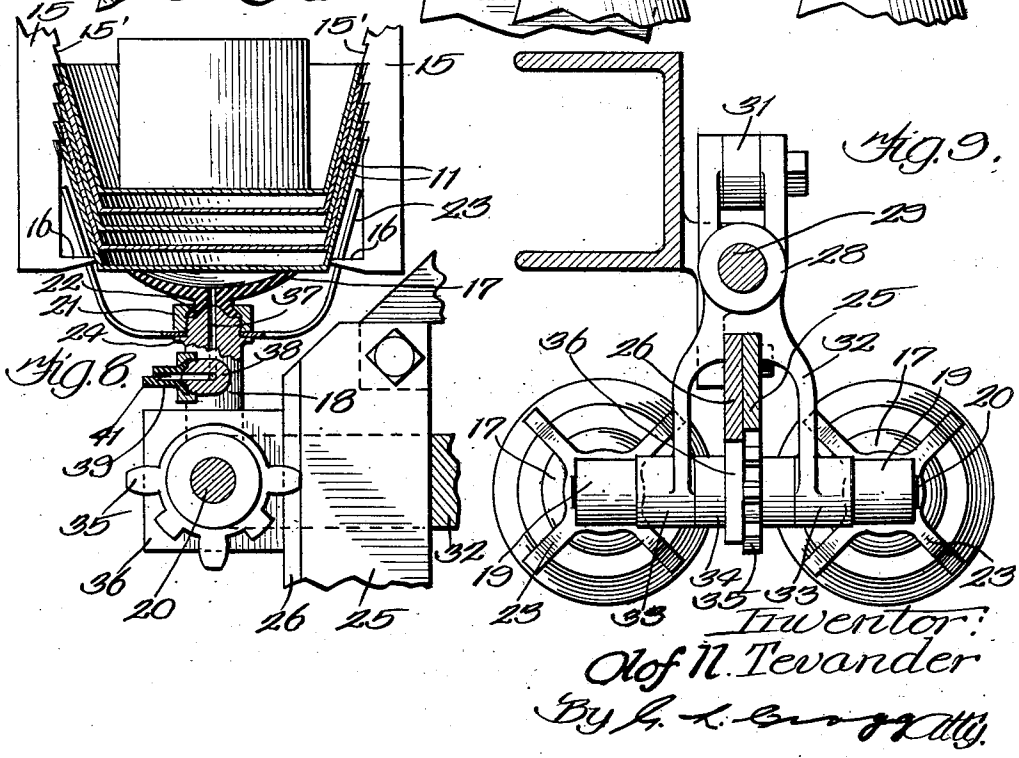
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BOTTLE CAPPING MACHINE

Filed Dec. 26, 1925 4 Sheets-Sheet 4





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Patented Jan. 9, 1934

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UNITED STATES PATENT OFFICE

1,942,885

BOTTLE CAPPING MACHINE

Olof N. Tevander, Chicago, Ill., assignor to Standard Cap & Seal Corporation, Chicago, Ill., a corporation of Virginia

Application December 26, 1925
Serial No. 77,850

7 Claims. (Cl. 226—88.1)

My invention relates to machines for applying closures to bottles, such as milk bottles, and is inclusive of a bottle positioner, a closure positioner, a closure seizing member, means for moving said member back and forth between the closure positioner and the location of the bottle mouths defined by the bottle positioner and means for releasing each closure when conveyed to the bottle mouth.

As I have actually embodied my invention, it is employed for transferring closures that are in the form of skirted caps, the positioner for the caps holding the same in an inverted position above the position of the bottle, the cap holder serving to prevent material upward movement of the cap being seized and permitting the withdrawal of the cap from its positioner by the seizing device.

In the preferred embodiment of the invention, the closure positioner is in the form of a magazine having serrations which prevent upward movement of the caps and permit downward movement thereof.

The closure or cap seizing member is desirably in the nature of a suction cup, the means for moving the suction cup serving also to press the cup against the closure being seized whereby suction is effected which causes the cap to adhere to the cup. A vent valve for the cup is desirably employed, this valve being opened as the suction is established and thereafter being closed. A relief vent valve is also employed, preferably in addition to the other, which is opened when the cap has been applied to a bottle thereupon to cause the suction to cease and thereby allow the cap to remain upon the bottle. Where skirted caps are employed, the bottles are conveyed to a banding machine which applies bands around the cap skirts beneath the rims of the bottle mouths.

The invention will be more fully explained in connection with the accompanying drawings in which Fig. 1 is a side elevation of a machine employing well-known mechanism for filling bottles, applying disc closures to the bottle mouths, and thereafter applying other closures in the form of skirted caps, the cap placing mechanism of my invention being also shown in addition to the illustrated mechanism of the prior art; Fig. 2 is a plan view of the machine illustrated in Fig. 1 with a portion removed and another portion shown in section; Fig. 3 is a sectional view on line 3—3 of Fig. 2; Fig. 3a is a side elevation of a part of the mechanism; Fig. 4 is a sectional view on line 4—4 of Fig. 1; Fig. 5 is a view showing a part of the mechanism of Fig. 4 with portions in altered positions and other portions in section; Fig. 6 is a view, on a larger scale, of a part of the mechanism illustrated in Figs. 4 and 5 with portions in section and in changed positions; Fig. 7 is a side view of the structure as it appears in Fig. 6, parts being broken away; Fig. 8 is a sectional view, on a larger scale, on line 8—8 of Fig. 1; and Fig. 9 is a sectional plan view on line 9—9 of Fig. 7.

The bottles 1 that are empty are fed by a conveyor 2 upon the table 3 on which the bottles are positioned by a star wheel 4, as is well-known by those familiar with the art, the bottles being located in register with the valved outlets 5 in the bottom of the milk holding tank 6. The deflector 7 serves to direct the bottles from the table 3 upon a deck 8 along which the bottles are caused to travel, the bottles being first momentarily arrested in their travel below the disc closure applying mechanism generally illustrated at 9, next below the skirted cap applying mechanism of my invention generally illustrated at 10 and serving to place the skirted caps 11 upon the bottles, and finally below the band applying mechanism generally illustrated at 12, which serves to place the bands 13 around the cap skirts and to crimp the bands when thus applied.

All of the mechanism thus far referred to except the cap applying mechanism illustrated at 10, are so well-known to those familiar with the art as to require no further description. The cap applying mechanism is desirably inclusive of two upright cap-holding magazines 14 which are located abreast and in the line of travel of the bottles, the mechanism to be described serving to place caps upon two bottles at a time. In the preferred embodiment of the invention, the bottles that are having caps placed thereon are supported by the deck 8 in positions vertically beneath the magazines and in register with the caps contained in the magazines, these caps being transferred, one by one, from the magazines to the bottles. With this arrangement of the magazines, the caps, in nested relation, are held in inverted positions thereby. Each magazine is desirably inclusive of four upright bars 15 which are equally spaced apart in a circle surrounding the caps. These bars are formed with prongs 16 which engage intermediate portions of the cap skirts, these prongs serving to position the lowermost cap in readiness to be seized for transfer to the mouth of the underlying bottle. The bars 15 are serrated upon the sides thereof that are engaged by the cap skirts, the serrations having horizontal faces and faces which slope upwardly and outwardly from the horizontal faces. The serrations thus sloping and arranged,

permit the inverted skirted caps to be supplied to the magazines but hold the caps against upward pressure as the lowermost caps are being seized for transfer to the bottles. The cap seizing members are desirably in the nature of rubber suction cups 17 arranged in a pair. The stems 18 of these cups have terminating sleeve portions 19 which receive a horizontal shaft 20 to which the sleeves are secured. The cup stems 18 are desirably metallic and are threaded adjacent the cups to receive nuts 21 which serve to clamp the base portions 22 of the cups into assembly with the cup stems 18. The nuts 21 desirably also serve to clamp the tapered cap centering device 23 against the shoulders 24 upon said stems. In Figs. 4 and 8, a suction cup is shown in the act of seizing a cap, the centering device 23 serving to locate the cap undergoing seizure centrally with respect to the cup, said cup being desirably arranged to engage the bottom of the lowermost cap. When the cup has seized the cap, by means hereinafter more particularly described, it is moved downwardly from the position of Fig. 4 to the position indicated in full lines by Fig. 5 and is subsequently turned as indicated by dotted lines in Figures 5 and 6 into register with the underlying bottle and then lowered upon the bottle with the bottom of the cup upon the top of the bottle as indicated by full lines in Figure 6. When two bottles have thus been capped, they are transferred to the band applying machine illustrated at 12 in Fig. 1 which operates thereon in a manner well-understood.

The mechanism for moving the suction cup from the position occupied by the lowermost skirted cap seized by the cup to the position occupied by the bottle mouth is desirably inclusive of a stationary upright rack bar 25 having an untoothed bar 26 alongside of it and formed with a recess 27 coextensive with the toothed portion of said rack bar. A cross head 28 is arranged to travel vertically upon the upright rod 29 and is reciprocated along this rod by means of the rotated crank 30 operating upon the cross head through a link 31. This cross head has a yoke portion 32, whose ends are shaped into bearings 33 in which the aforesaid horizontal shaft 20 is journaled. A sleeve 34 is disposed between the bearings 33 and is fixed upon the central portion of the shaft 20. This sleeve carries a mutilated pinion 35 and a square block 36 along side of this pinion. The pinion 35 is adapted to mesh with the teeth upon the rack bar 25 and the square block 36 is close beside the pinion and in the plane of the bar 26. When the cross head 28 is in its intermediate position, the pinion 35 is in mesh with the rack bar. While the pinion and rack bar are in mesh and the cross head is in vertical movement, the shaft 20 is rotated to rotate the block 36, the rotation of this block being permitted by the recess 27 in the bar 26. When the pinion is moved out of mesh with the rack bar, a side of the block 36 will be in full sliding engagement with the bar 26 either above or below the recess 27 according to the direction in which the cross head is being moved. When the cross head is being moved upwardly, the block 36 so engages the bar 26 as to place the suction cups 17 above the cross head and in register with the magazines. After the cups are thus initially placed in register with the magazines, they are moved upwardly in straight lines into contact with the bottom walls of the lowermost caps in the magazines, the cups then seizing the caps by suction preferably by the aid of the instrumentalities hereinafter described. Having seized the caps, the cups are lowered, upon downward movement of the cross head, carrying with them the caps seized thereby, these caps being withdrawn from between the prongs 16 singly, the serrations 15' in the bars 15 of the magazines preventing material upward movement of the caps as they are undergoing seizure. The cups are moved vertically downward until the pinion 35 reengages the rack bar 25 whereupon the shaft 20 is turned to bring the cups below the cross head 28 and in vertical alignment with the bottle mouths, the block 36 engaging the bar 26 below the recess 27 when the pinion 35 loses its meshing engagement with the rack bar, the block 36, in further downward movement of the cross head, maintaining sliding engagement with the bar 26 so that the caps seized by the cups are placed upon the bottle mouths that are in vertical alignment with the magazines.

I desirably provide a vent passage 37 which communicates with the interiors of the suction cups through the cup bottoms, this passage being continued through the cup stems 18 and the hollow bridge portion 38 joining these stems. This bridge portion carries a vent valve 39 in the nature of a split rubber nipple which spreads apart at its split when the air is pressed through the vent passage 37 as the cups are pressed against the bottoms of the caps being seized. When the seizing operation ceases, the valve 39 will automatically close to maintain the established suction. This suction is maintained during the downward travel of the cups and the caps seized thereby and until the caps have been placed nearly in their lowermost positions upon the bottles. When the caps are nearing the lower limit of their travel, a stationary lug 40 carried by the bar 26 engages the overhanging lip 41 of the valve, the lug opening the valve to permit the access of air to the passage 37 in order to relieve the vacuum in the cups to thereby permit the release of the cap from the cups. When the return upward movement of the cups is initiated, the valve lip 41 will leave the lug 40 to cut off the passage 37 from the external air at this point. The rods 42 will direct any caps that fall from the cups toward and upon the bottles on which these caps may be properly placed by hand.

Changes may be made without departing from the invention.

Having thus described my invention, I claim:

1. In a machine for applying closures to receptacles, a receptacle support, a closure magazine, a vacuum cup movable between two positions in one of which it is adapted to seize a closure from said magazine and in the other of which it is adapted to deliver a closure seized from said magazine to a receptacle positioned on said support, a normally closed valve fixed with respect to said cup movable therewith and adapted to be opened by the pressure of air in said cup to permit escape of air therefrom when said cup in its first mentioned position is engaged with a closure to be withdrawn from said magazine, and a stop device with which said valve is engageable to effect opening movement thereof to break the vacuum in said cup when the latter is in its second aforementioned position.

2. In mechanism of the class described, a vacuum cup movable between an article seizing position and an article delivery position, a normally closed outwardly opening check valve connected with said cup, said cup being formed of yield-

able material whereby it is adapted, by pressure against an article, to be deformed to expel air therefrom through said valve and whereby its inherent tendency to assume a normal form results, following deformation thereof, in a partial vacuum being created therein to retain the article thereagainst, and means for opening said valve when said cup reaches its second mentioned position.

3. In a machine of the character disclosed including a support; a magazine carried by said support and adapted to contain a supply of juxtaposed articles; a hollow flexible article transpositioning member; means for moving said hollow flexible member into contact with a lowermost article in said magazine; means effective at the time of contact of said hollow flexible member with said article whereby an extrusion of air from said hollow flexible member is effected; means for moving said hollow flexible member and one of said articles away from said magazine; and means located in the path of movement of said hollow flexible member for admitting air to said hollow flexible member upon the latter reaching a predetermined position to effect a release of the article carried thereby.

4. In a machine of the character disclosed including a support; a magazine carried by said support and adapted to contain a supply of nested articles; a distortable cup-shaped article transpositioning member; means for reciprocating said cup-shaped member with respect to said magazine; means cooperating with said cup-shaped member for effecting an extrusion of air from said member at the establishment of contact of said member and the lowermost article in said magazine; said reciprocating means adapted to move said member and said article away from said magazine; and means located in the path of movement of said cup-shaped member for admitting air thereto upon the latter reaching a predetermined position to effect a release of the article carried thereby.

5. In a mechanism of the class described, a support; a magazine carried by said support adapted to contain a plurality of nested articles; means associated with said magazine for normally retaining the articles therein; a distortable cup; means for moving said cup between an article seizing position and an article delivery position; means effective at the time of contact of said distortable cup with a lowermost article in said magazine whereby an extrusion of air from said cup is effected establishing a hermetic seal therewith for withdrawing an article past said article retaining means; and means cooperating with said cup for admitting air thereto upon the latter reaching its second mentioned position to effect a release of the article carried thereby.

6. In a mechanism of the class described, a support; a magazine carried by said support adapted to contain a plurality of nested articles; means associated with said magazine for loosely retaining the articles therein; a distortable cup; means for moving said cup between an article seizing position and an article delivery position; means effective at the time of contact of said distortable cup with a lowermost article in said magazine whereby an extrusion of air from said cup is effected, said cup being distorted at the time of contact with one of said articles for establishing a hermetic seal therewith whereby movement of said cup from said article seizing position withdraws a lowermost article past said retaining means; and means in the path of movement of said cup between article seizing and delivery positions for admitting air thereto to effect a release of the article carried thereby.

7. In a mechanism of the class described, a support; a magazine carried by said support adapted to contain a plurality of juxtaposed articles; means associated with said magazine for normally retaining the articles in said magazine; a distortable article transpositioning member; means for moving said member between an article seizing position and an article delivery position; means effective at the time of contact of said distortable member with an article in said magazine for establishing a differential pressure within said member establishing a seal with said article for carrying the same past said article retaining means; and means cooperating with said member for admitting air thereto upon movement of the member to a different position, effecting a release of the article carried thereby.

OLOF N. TEVANDER.