Feb. 14, 1956 F. A. RAY 2,734,674

BOTTLE CAP FEEDING MECHANISM

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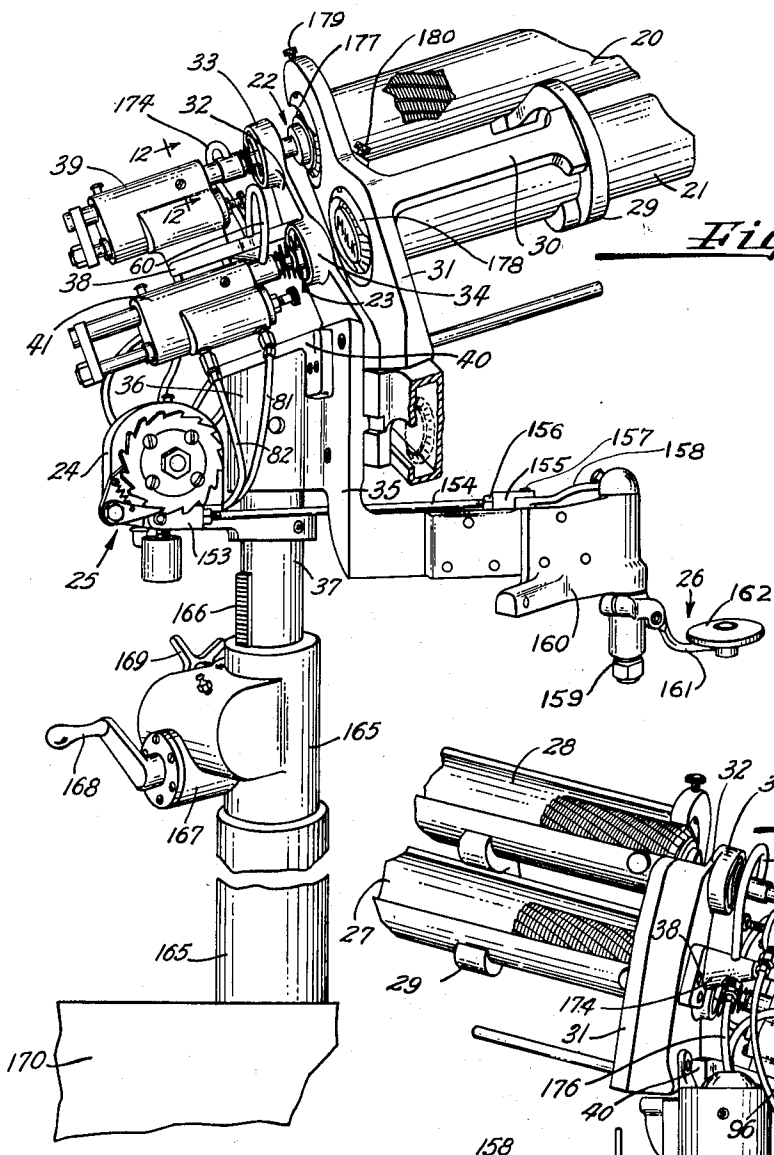


Fig. 1

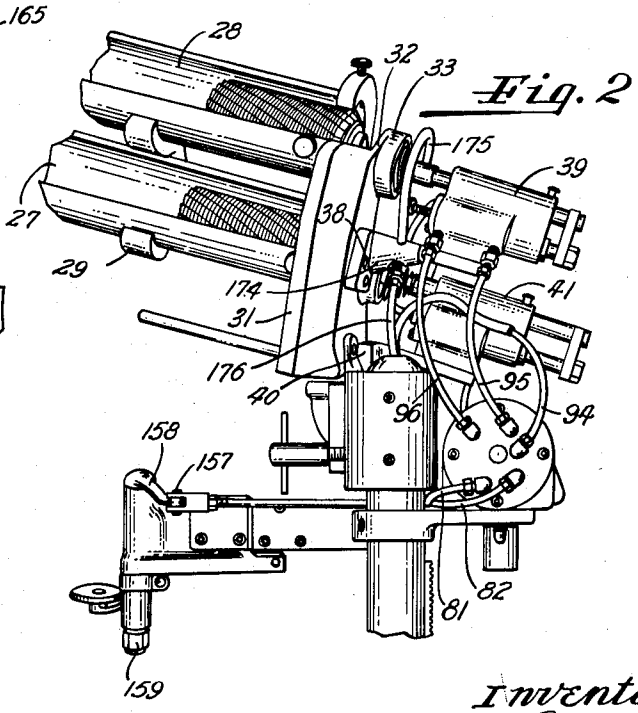


Fig. 2

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Fig. 3

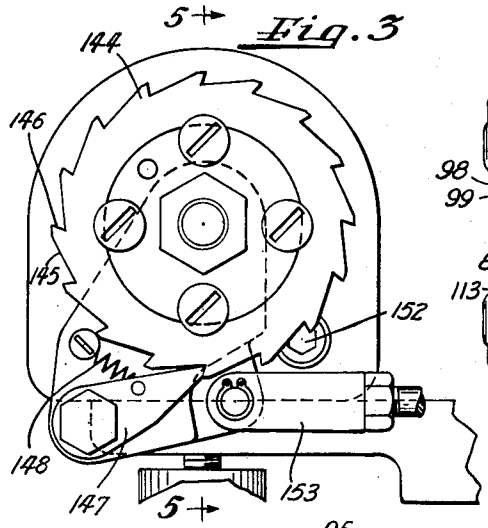


Fig. 5

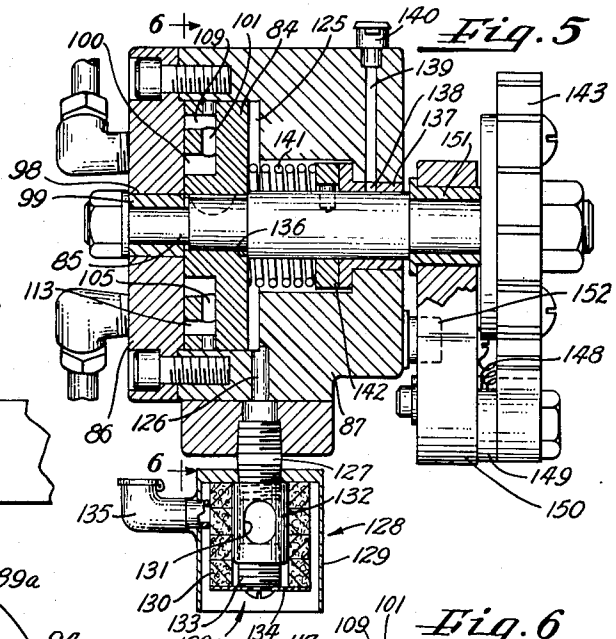


Fig. 4

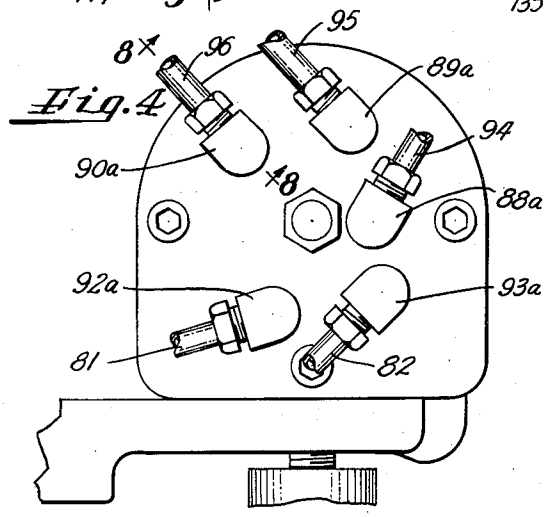


Fig. 6

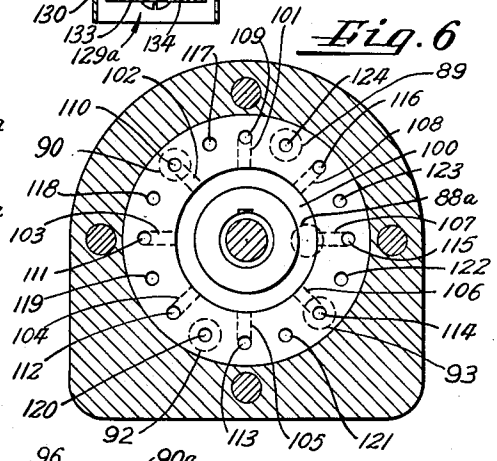


Fig. 7

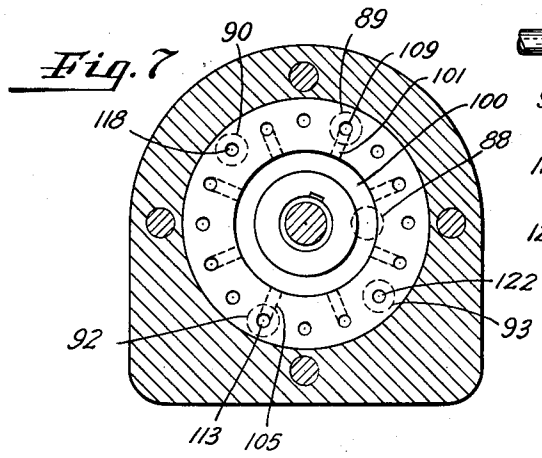


Fig. 8

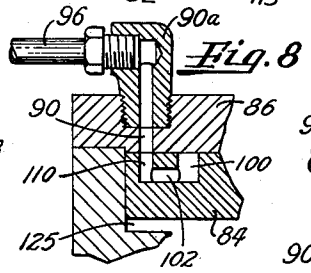
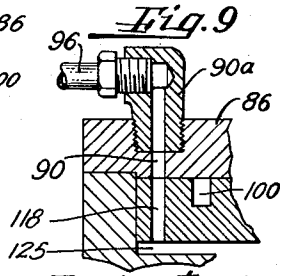


Fig. 9



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Fig. 10

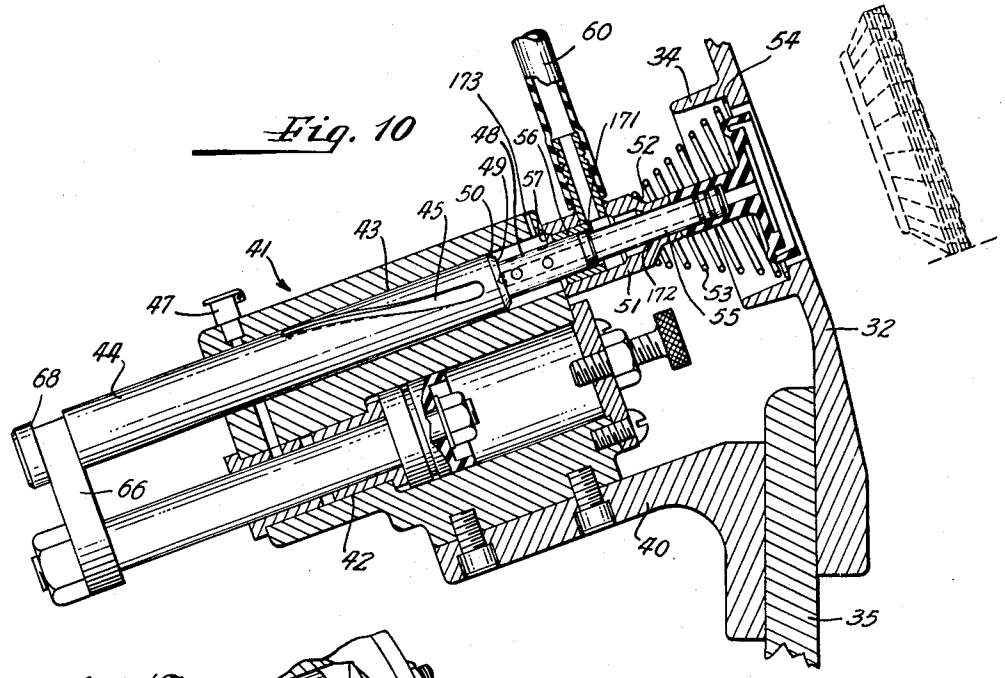


Fig. 13

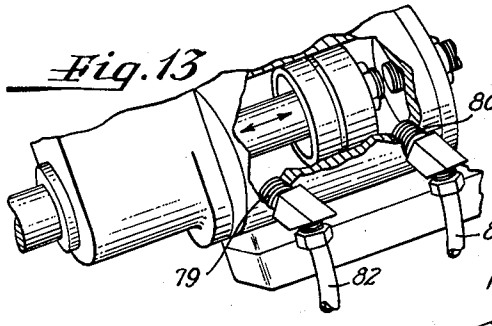
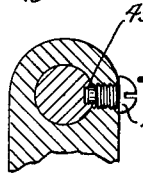


Fig. 11

Fig. 12



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United States Patent Office 2,734,674 Patented Feb. 14, 1956

2,734,674

BOTTLE CAP FEEDING MECHANISM

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Application November 5, 1951, Serial No. 254,832

14 Claims. (Cl. 226—88.1)

This invention relates to a mechanism for feeding articles from stacks of the articles to an article carrier and in particular to such a mechanism for feeding hood-type bottle caps in a dairy bottle capping mechanism.

It is an object of this invention to provide a novel article feeding mechanism for removing articles from stacks of the articles automatically in response to the advance of article carriers past the feeding mechanism.

It is also an object of this invention to automatically feed individual bottle caps to the capping station at a greater speed than heretofore obtainable, so as to provide a cap feeding mechanism which is readily adapted to use with high speed bottle cappers.

Another object of this invention is to provide a mechanism for removing individual bottle caps alternately from separate stacks automatically in timed relation with the advance of bottles to the capping position.

Another object of this invention is to provide a novel pneumatically operated mechanism for removing individual bottle caps from a stack.

Another object of this invention is to provide a novel pneumatically operated mechanism for removing individual bottle caps from a stack, which mechanism is actuated automatically in response to the advance of bottles to the capping position.

A further object of this invention is to provide a bottle cap feeding mechanism which includes a control valve actuated successively in response to the advance of bottles to the capping position and which is operative to effect removal of individual caps alternately from separate stacks of caps.

A still further object of this invention is to provide a novel control valve for an article feeding mechanism which is operative to control in a novel manner the reciprocation of pistons which operate the article feeding mechanism.

Other and further objects and advantages of the invention will be apparent from the following description of a preferred embodiment thereof, directed specifically to a mechanism which is particularly adapted for use with a dairy bottle capping machine.

In the drawings:

Figure 1 is a front view in perspective of the bottle cap feeder of the present invention;

Fig. 2 is a rear view in perspective of the device of Figure 1;

Fig. 3 is a front view of the ratchet mechanism and control valve for the pneumatically operated mechanism for removing individual caps from the stacks of caps;

Fig. 4 is a rear view of the ratchet and control valve of Fig. 3, showing the inlet and outlet conduit connections to the control valve;

Fig. 5 is a longitudinal section along the line 5—5 in Fig. 3, illustrating the internal structure of the control valve and its interconnection with the ratchet mechanism, with the ratchet disk shown in elevation;

Fig. 6 is a cross-sectional view of the control valve in one position thereof, taken along the line 6—6 in Fig. 5;

Fig. 7 is a view similar to Fig. 6 after the valve has been actuated by the ratchet mechanism to its next position;

Fig. 8 is a fragmentary section along the line 8—8 in Fig. 4 and illustrates the communication between the control valve and an outlet conduit leading to the pneumatically operated cap removing mechanism, when the control valve is in the position of Fig. 6;

Fig. 9 is a view similar to Fig. 8, with the control valve in the position of Fig. 7;

Fig. 10 is a longitudinal sectional view of the pneumatically-operated mechanism for removing caps from one stack, with the mechanism in its inoperative position retracted from engagement with the stack of caps;

Fig. 11 is a view similar to Fig. 10 and showing the pneumatically-operated mechanism positioned to engage the first cap in the stack of caps for removing that cap from the stack;

Fig. 12 is a section along the line 12—12 in Figure 1, and

Fig. 13 is a perspective view, partly broken away, of the air cylinder which controls the removal of caps from a stack.

The present invention embodies improvements in the general type of cap feeding mechanism shown in U. S. Patent 2,349,523 to Rudolph Sonnenberg and enables the cap feeding mechanism to operate successfully with high speed cappers.

Referring to the drawings, the present invention in its broad outline includes a pair of inclined magazines 20, 21 at which are located stacks of articles, here shown as hood-type bottle caps, pneumatically-operated article selectors, here in the form of suction cup plungers 22, 23, for removing individual caps from the respective stacks, a control valve 24 for operating the suction cup plungers alternately in sequence, a ratchet mechanism 25 controlling the operation of the control valve, and an actuator 26 interposed in the path of movement of the article carriers, here shown as bottles which are to be capped, and operative when engaged by a bottle to actuate the ratchet mechanism for effecting removal of a cap from one of the stacks.

As best seen in Fig. 2 each of the magazines 20, 21 is of tubular formation and is inclined downwardly toward the cap removing mechanism. Wide slots 27, 28, respectively, extend along the length of the magazines at the upper sides thereof to permit ready observation of the stacked bottle caps in the magazines. The bottle caps per se are of the hood type. In general, these caps include a flat mouth spanning portion and a surrounding skirt portion formed with circumferentially arranged pleats which are inclined angularly. When stacked in nested relation, each successive cap is displaced angularly in the direction of the pleats by an amount equal to the thickness of the cap so that the pleats progress helically around the stack along the magazine. A bracket member 29 supports the magazines intermediate their lengths and is carried by an arm 30, which extends lengthwise of the magazines and at its other end is secured to an upstanding wall 31. The wall 31 is apertured to receive the lower ends of the magazines. The wall 31 carries a pair of crescent shaped fingers 177, 178 located at the lower ends of the magazines and protruding slightly into the path stacked bottle caps so as to normally retard the caps from dropping out through the lower ends of the magazines. Adjustment screws 179 and 180 are provided for adjusting the positions of these retarding fingers.

Another upstanding wall 32 is attached to the wall 31 and provides a pair of annular portions 33 and 34 in spaced relation from the lower ends of the respective magazines and at a lower level. These annular portions define passageways through which the suction cup plungers

are adapted to reciprocate for moving into engagement with the lowermost cap in the adjacent stack and for withdrawing that cap from the stack.

At its lower end the wall **32** is rigidly attached to a feed cylinder bracket **35**, which is formed with a tubular neck **36** for attachment to the supporting post **37**. The post **37** is hollow and is vertically adjustable along a hollow standard **165** by means of a rack **166** carried on the post **37** and a gear (not shown) within the protruding housing portion **167** which may be driven by the handle **168**. A set screw **169** is provided for locking the post **37** in the position to which it has been adjusted. A pair of separate conduits (not shown) extend downward through the post **37** and standard **165** into communication with two separate vacuum pumps mounted in the base housing **170**. A bracket **38** attached to the wall **32** and extending rearwardly therefrom and downward at an angle supports the air cylinder **39** for the upper suction cup plunger **22**. A bracket **40** is attached to the feed cylinder bracket **35** to extend rearwardly and downwardly therefrom, and supports the air cylinder **41** for the lower suction cup plunger **23**.

The lower air cylinder and suction cup plunger **41**, **23** will now be described in detail, particular reference being had to Figs. 10–13. The upper air cylinder and suction cup plunger are identical in construction and mode of operation, and hence, need not be described in detail also.

The casing of air cylinder **41** is formed with a pair of elongated bores **42**, **43** extending upwardly in the direction of the annular member **34**. The upper bore **43** slidably receives a reciprocable rod **44** which is formed with a helical slot **45** extending lengthwise along its periphery and receiving the inner end of a screw **46** (Fig. 12) threadedly received in the casing of the air cylinder. Because of this engagement of the screw **46** in the helical slot **45**, the rod is caused to rotate a certain amount as it moves lengthwise in the bore **43**. This helical slot causes the suction cup plunger to turn in the same direction as the helical pleat formation of the stacked bottle caps, so that when the suction cup plunger is retracted it easily untwists the lowermost cap from nested relation with the stack of caps. An oil cup **47** communicates with the bore **43** for lubricating the movement of rod **44** therein. One or more transverse passages **173** extends through the cylinder **41** adjacent the front end thereof for effecting communication between the bore **43** and atmosphere.

A valving plunger **48** is carried on the forward upper end of rod **43** and extends beyond the front wall of the air cylinder casing in an upward direction aligned with the axis of the adjacent magazine. The valving plunger **48** is of smaller cross-section than the rod **43**, and at its juncture therewith there is formed a transverse shoulder **49** which terminates in an annular beveled surface **50** on the front end of the rod **43**. A generally tubular sleeve member **51** slidably receives the forward end of the plunger **48** beyond the bore **43**. The sleeve member **51** is formed with an external beveled shoulder **52** against which one end of the compression coil spring **53** seats. At its other end the coil spring seats against a shoulder **54** formed on the annular member **34**, so that the sleeve **51** is resiliently urged by spring **53** to seat against the front face of the air cylinder casing. Forward of the external shoulder **52** the sleeve **51** is formed with a relatively small internal bore to snugly slidably receive the smaller forward end **55** of the plunger **48**. A cylindrical bearing bushing **56** is carried in the enlarged bore portion at the rear end of the sleeve **51** to snugly slidably receive the larger rear portion of the plunger **48**. At its rear extremity, the sleeve **51** is formed with an internal annular bevel **57** which is dimensioned to form a snug seat for the beveled shoulder **50** on rod **44**, whereby to define the forward limit of movement of the plunger **48** relative to the sleeve **51**. Another beveled shoulder **171** located forwardly on the plunger **48** snugly seats against an internal beveled shoulder **172** on the sleeve **51** in the extreme forward limit of movement of the plunger **48** relative to the sleeve.

At its upper side the sleeve **51** is formed with a hole **58** into which the tube **59** is secured in air-tight fashion. A flexible air conduit **60** is attached to the tube **59** to thereby communicate with the internal bore in the sleeve **51** forward of the bearing **56** therein. The plunger **48** at its forward end carries a suction cup **61** of flexible, resilient material, such as rubber or the like, which is formed with an axial bore **62**. The plunger **48** is also formed with an internal axial bore **63**, which communicates with the bore in the suction cup. A first series of radial ports **64** is formed in the plunger at its enlarged portion and effect communication between the axial plunger bore **63** and the exterior of the plunger **48**. A similar series of radial ports **65** is formed in the plunger **48** closer toward its rear end.

When the rod **44** is moved forward to bring the suction cup **61** into engagement with the lowermost cap in the stack, the sleeve **51** is pushed forward to compress the spring **53**, after which the plunger portion **48** continues to move forward relative to the sleeve **51**. In the extreme forward position of the plunger **48** relative to the sleeve **51** (Fig. 11) the ports **64** are aligned with the tube **59** to effect communication between the air hose **60** and the suction cup passage **62**. In this position of the plunger **48**, the rear shoulder **50** and the forward shoulder **171** are seated respectively against the complementary beveled seats **57** and **172** on the sleeve **51**, to prevent any leakage around the plunger. Also in this position of the plunger, the ports **65** are snugly surrounded by the bearing bushing **56** to prevent any leakage thereat.

When the rod **44** is retracted, the compressed spring **53** initially moves the sleeve **51** back into abutment against the forward end of the cylinder **41**, after which the plunger portion **48** continues to move relative to the sleeve **51**. As the rear radial passages **65** in the plunger **48** move into the bore **43** they establish communication between suction cup passage **62** and the passage **173** in the cylinder **41** leading to atmosphere, thereby collapsing the suction effect of the suction cup **61** for release of the cap carried thereby.

The flexible conduit **60** at its end remote from the sleeve **51** is attached to a hollow fitting **174**. A similar flexible conduit **175** extends from the fitting **174** to the upper suction cup plunger **22**. For establishing communication between the conduits **60** and **175** and the vacuum pump there is provided a conduit **176** extending from the fitting **174** into communication with a first one of the separate conduits in the hollow post **37** leading to the first vacuum pump. Thus, the first vacuum pump is connected continuously to establish a vacuum at the suction cups, and the vacuum thereat is determined by the described valving action of the plunger **48**.

For actuating the suction cup plunger **23** back and forth between its forward and retracted positions, the rod **44** at its rear end is attached by means of a rigid strap **66** to a piston plunger **67**. The connecting strap **66** is snugly received within a reduced neck portion **68** on the rod **44** so that longitudinal movement of the piston plunger **67** imparts longitudinal movement to the rod **44**, while at the same time the rod **44** is permitted to turn about its longitudinal axis during its longitudinal movement. The position of strap **66** is controlled by a nut **69**, which is adjustable along the threaded rear end of the piston plunger **67** to permit adjustment between the interconnected plungers **67** and **44**. At its forward end the piston plunger carries a dual faced piston head **70**, which is slidably snugly within the cylinder bore **71**. A bearing **72** is seated within the smaller portion of the bore **42** and snugly receives the piston plunger **67** for reciprocation back and forth. An enlarged transverse shoulder **74** on the bearing **72** abuts against the internal

shoulder formed at the juncture of the smaller portion of the bore 42 with the larger piston bore 71. A similar bearing 75 is located at the rear end of the bore 73 and is formed with a transverse bore 76 communicating with the oil cup 47 for lubricating the reciprocatory movement of the plunger 67. A screw 77 extends through the front cover plate 78 and at its inner end defines an adjustable stop limiting the forward movement of the piston plunger. As best seen in Fig. 13, a pair of separate spaced inlets 79, 80 are located on opposite sides of the piston head and communicate with separate air conduits 81, 82 for actuating the piston head back and forth within the bore 71.

For controlling the reciprocation of both of the suction cup plungers 22, 23, there is provided a single control valve and ratchet mechanism, shown in detail in Figs. 3–9. The valve includes a rotor 84 keyed to a shaft 85. A face plate 86, which encloses the rotor 84 within the valve housing 87, is formed with a central aperture 98 which receives a bearing bushing 99, which supports for rotation the reduced diameter end of the valve shaft 85. As best seen in Figs. 4, 6 and 7, the face plate includes five ports 88, 89, 90, 92 and 93 communicating with the fittings 88*a*, 89*a*, 90*a*, 92*a* and 93*a* leading to the respective air conduits 94, 95, 96, 81 and 82. The conduit 94 leads to the second one of the separate conduits extending downward through the post 37 and standard 165 into communication with the second suction pump. The conduits 81 and 82 lead respectively to opposite sides of the piston head which actuates the suction cup plunger 23, as described. The conduits 95 and 96 lead respectively to opposite sides of the piston head which actuates the suction cup plunger 22 in a manner identical with the described arrangement for actuating the suction cup plunger 23. Thus, the second vacuum pump is operative to control the reciprocation of the suction cup plungers 22 and 23 in accordance with the position of the valve rotor 84, as will be described in more detail hereinafter.

As best seen in Figs. 6 and 7, the valve rotor is formed with a central annular passage 100 which at all times communicates with the face plate port 88. A plurality of radially extending passages 101, 102, 103, 104, 105, 106, 107 and 108 communicate with the annular passage 100 at points spaced evenly therearound and spaced axially inward from the face plate 86. At their radially outer extremities the radial passages 101—108 in the rotor communicate respectively with passages 109, 110, 111, 112, 113, 114, 115 and 116, which extend axially and terminate at the adjacent back face of the face plate 86. At the same radial distance from the rotor axis and midway between pairs of the axial passages 109—116, there are provided a plurality of axial passages 117, 118, 119, 120, 121, 122, 123 and 124 which extend entirely through the rotor 84 and communicate with an annular passage 125 at the back of the rotor. The various axial passages 109—124 are positioned to communicate selectively with the valve ports 89, 90, 92 and 93, as will appear hereinafter.

At its lower end, the rear annular passage 125 behind the valve rotor communicates with a port 126 in the valve casing. A threaded nipple fitting 127 communicates with the port 126 and with an air filter 128 suspended below the valve casing. The air filter includes a thimble-shaped housing 129 open at its lower end for the intake of air. A plurality of annular felt filters 130 are interposed between the air intake opening 129*a* at the bottom of the filter housing 129 and the inlets 131 in the tubular coupling 132, which communicate with the nipple 127. The coupling 132 is threaded onto the lower end of nipple 127. A screw 133 carrying a transverse lower plate 134 for retaining the felt filters 130 in place is threadedly received in the lower end of coupling 132. An oil cup 135 extends transversely outward from the air filter casing 129 and is positioned to communicate with the exterior of the felt filters 130 for supplying oil thereto.

The rotor shaft 85 is formed with a transverse shoulder 136 abutting against the rear face of the rotor 84, and is slightly enlarged therebehind. A shouldered bearing 137 is seated at the rear of the valve casing in the bore for the rotor shaft 85 to support the latter for rotation. A radial passage 138 is formed in the bearing 137 and communicates through the radial passage 139 in the valve casing with an oil cup 140, whereby to permit lubrication of the rotor shaft 85. A coil spring 141 is under compression between the rear face of the rotor 84 and a washer 142 keyed to the rotor shaft. This coil spring is operative to resiliently urge the rotor 84 forward against the adjacent back face of the face plate 86 and to provide the annular passage 125 behind the rotor.

The turning of the rotor shaft 85 is controlled by a ratchet disk 143 secured to the rotor shaft. The ratchet disk is formed with a plurality of circumferential teeth 144, corresponding in number and position to the axial passages 109—124 in the control valve rotor. Each of the ratchet teeth 144 is formed with a long, gradually inclined side 145 and a short, steep undercut side 146.

A pawl 147 is resiliently urged by a coil spring 148 into engagement with the adjacent tooth on the ratchet disk. By its engagement against the steep side 146 on the adjacent ratchet tooth, the pawl 147 prevents rotation of the ratchet disk clockwise in Fig. 3. The pawl 147 is mounted rigidly on a shaft 149, which in turn is secured to the lower end of plate 150 rotatably carried on the rotor shaft 85 by means of a bearing 151. Rotary movement of the plate 150 counterclockwise in Fig. 3 is limited by a transversely extending bolt 152 secured to the rear of the control valve casing.

A horizontal arm 153 is secured to the lower end of plate 150 and extends transversely outward therefrom, just below the adjacent teeth on the ratchet disk. At its outer end the arm 153 carries a nut which threadedly receives one end of the connecting rod 154. At its other end the connecting rod is received in a fitting 155, a lock nut 156 being provided to permit relative adjustment of the connecting rod and the fitting 155. By means of a vertical pin 157, the fitting 155 is pivotally connected to a generally horizontal arm 158 which is united to the vertical shaft 159. Shaft 159 is rotatably carried by an extension bracket 160 secured to the feed cylinder bracket 35. A lower outwardly extending arm 161 mounted on the shaft 159 carries a rotatably mounted wheel 162, which is normally spring pressed (by means not shown) to project into the path of bottles advancing to the capping position.

In the operation of this valve actuating mechanism, when a bottle advances to the capping position it engages the wheel 162 and turns the arm 161 to rotate the vertical shaft 159. This rotation of the shaft 159 causes the connecting rod 154 to be retracted, which causes the pawl 147 carried on the plate 150 to rotate the ratchet disk 143 angularly (counterclockwise in Fig. 3) to the next position. Thus, each time a bottle advances to the capping position, the valve rotor is rotated one-sixteenth of a revolution.

In the operation of the suction cup plungers 22, 23, the control valve therefor, and the actuating mechanism for the control valve, assume that initially the control valve rotor 84 is in the position shown in Fig. 6. In this position, communication is established between the conduit 96 and the second vacuum pump through the fitting 90*a*, face plate port 90, axial rotor passage 110, radial rotor passage 102, the central annular rotor passage 100, face plate port 88, fitting 88*a*, and conduit 94 leading to the second conduit within the post 37 and standard 165 which communicates with the second vacuum pump. This communication between the conduit 96 and the second vacuum pump establishes a vacuum at the front side of the piston head which controls the

reciprocation of the upper suction cup plunger 22. At the same time, communication between the rear of this piston head and the atmosphere is established through the conduit 95, fitting 89a, the passage 124 extending entirely through the valve rotor 84, passage 125 at the back of the rotor, passage 126, and the air filter 128 communicating with the atmosphere. Therefore, atmospheric pressure is established at the rear of the piston head which controls the upper suction cup plunger 22, while a vacuum is established at the front side of said piston head, so that the upper suction cup plunger 22 is moved forward into engagement with the lowermost bottle cap in the adjacent stack. Also, at this position of the valve rotor the lower suction cup plunger 23 is retracted by means of the establishment of a vacuum at the rear of the piston head 70, which controls the position of the suction cup plunger 23, and atmospheric pressure at the front side of the same piston head. Thus, the conduit 82 leading to the rear of the piston head 70 communicates with the second vacuum pump through the fitting 93a, face plate passage 93, radial rotor passage 114, axial rotor passage 106, the central annular rotor passage 100, face plate port 88, fitting 88a, and conduit 94 leading to the second vacuum pump. The conduit 81 leading to the front side of the piston head 70 communicates with the atmosphere through the fitting 92a, face plate port 92, the axial passage 120 extending entirely through the rotor, passage 125 behind the rotor, passage 126, and the air filter 128 communicating with the atmosphere.

When the next bottle advances toward the capping position, it actuates the ratchet disk to move angularly (counterclockwise in Fig. 3) to the next position. The valve rotor is thereby moved one-sixteenth of a turn (clockwise in Figs. 6 and 7) to the position shown in Fig. 7. This movement of the valve rotor causes the upper suction cup plunger 22 to be retracted and the lower suction cup plunger 23 to be moved forward to engage the lowermost bottle cap in the adjacent stack. In this next position of the rotor, the upper suction cup, plunger 22 is retracted by establishing atmospheric pressure at the front side of the corresponding piston head and a vacuum at the rear of that piston head. Thus, from the rear of this piston head communication is established with the second vacuum pump through the conduit 95, fitting 89a, face plate passage 89, axial rotor passage 109, radial rotor passage 101, central annular rotor passage 100, face plate passage 88, fitting 88a, and conduit 94 leading to the second vacuum pump. From the front side of the same piston head communication is established with the atmosphere through the conduit 96, fitting 90a, face plate passage 90, axial passage 118 extending entirely through the rotor, passage 125 behind the rotor, housing passage 126, and the air filter 128 which communicates with the atmosphere. Also, at this position of the valve rotor, the lower suction cup plunger 23 is moved forward by establishing a vacuum at the front side of the corresponding piston head and atmospheric pressure at the rear side of that piston head. Thus, from the front side of this piston head communication is established with the second vacuum pump through the conduit 81, fitting 92a, face plate passage 92, axial rotor passage 113, radial rotor passage 105, and the central annular rotor passage 100, face plate passage 88, fitting 88a, and conduit 94 leading to the second vacuum pump. From the rear side of the piston head communication is established with the atmosphere through the conduit 82, fitting 93a, face plate passage 93, axial passage 122 extending completely through the rotor, passage 125 behind the rotor, valve housing passage 126, and air filter 128 communicating with the atmosphere.

Then when the next bottle moves toward capping position, the valve rotor is again advanced one-sixteenth of a turn. In the next position of the valve rotor, which will not be described in detail, the upper suction cup plunger 22 is moved forward to engage the lowermost bottle cap in the adjacent stack and the lower suction cup plunger 23 is retracted. Thus, as successive bottles advance to the capping station the suction cup plungers 22 and 23 are actuated in alternate succession to remove caps from the adjacent stacks, and the caps are removed from the stacks at the same overall rate at which the bottles advanced to the capping station.

While the foregoing description is directed specifically to a mechanism for removing stacked bottle caps for use in a bottle capping mechanism, it is to be understood that this invention is susceptible of use wherever it is desired to remove stacked articles automatically. The embodiment herein shown and described illustrates only one of the uses to which this invention may be put. It is to be understood also that various changes and modifications of the specifically illustrated form of the invention may be resorted to which fall within the spirit and scope of this invention.

I claim:

1. In a feeding mechanism for feeding articles from a plurality of separate stacks of the articles onto article carriers, the combination of a plurality of article selectors operative to engage said articles and remove them from the stacks, actuating means operative to effect actuation of said article selectors in cyclic succession, and means actuated in response to the advance of article carriers past the feeding mechanism operative to control the operation of said actuating means to effect the successive actuation of said article selectors in timed relation with the advance of article carriers past the feeding mechanism.

2. In a feeding mechanism for feeding articles one at a time from a pair of separate stacks of the articles onto article carriers, the combination of a pair of article selectors operative to engage said articles and remove them one at a time from the stacks, actuating means operative to effect alternate actuation of said article selectors, and means actuated in response to the advance of article carriers past the feeding mechanism operative to control the operation of said actuating means to effect the individual actuation of one or the other of said article selectors in alternate succession each time an article carrier moves past the feeding station.

3. In a feeding mechanism for feeding articles from a plurality of separate stacks of the articles onto article carriers, the combination of a plurality of article selectors operative to engage said articles and remove them from the stacks, fluid pressure means for actuating said article selectors, a control valve operative to control the operation of said fluid pressure means to effect actuation of said article selectors in cyclic succession, and means actuated in response to the advance of article carriers past the feeding mechanism operative to control the operation of said control valve to effect the successive actuation of said article selectors in timed relation with the advance of article carriers past the feeding mechanism.

4. In a feeding mechanism for feeding articles from a pair of separate stacks of the articles onto article carriers, the combination of a pair of article selectors operative to engage said articles and remove them one at a time from the stacks, pneumatic means operative to effect the actuation of said article selectors for removing articles one at a time from the stacks, a control valve operative to control the operation of said pneumatic means to effect alternate actuation of said article selectors, and means actuated in response to the advance of article carriers past the feeding mechanism operative to control the operation of said control valve to effect the individual actuation of one or the other of said article selectors in alternate succession each time an article carrier moves past the feeding station.

5. In a bottle capping mechanism, a feeding mechanism for removing bottle caps from a pair of separate stacks thereof comprising: a pair of reciprocable suction cup plungers operative when moved forward to engage

the adjacent cap in the corresponding stack and operative when retracted to withdraw said cap from the stack, a pair of reciprocable pistons operative respectively to control the positions of said plungers, a control valve communicating with said pistons at opposite sides thereof operative to establish a vacuum and atmospheric pressure respectively at opposite sides of said pistons, and means actuated in response to the advance of a bottle toward the capping position operative to actuate said valve to reverse the vacuum and atmospheric pressure connections to said pistons for reciprocating the pistons in alternate succession.

6. In a bottle capping mechanism, a feeding mechanism for removing bottle caps from a pair of separate stacks thereof comprising: a pair of reciprocable suction cup plungers operative when moved forward to engage the adjacent cap in the corresponding stack and operative when retracted to withdraw said cap from the stack, a pair of reciprocable pistons operative respectively to control the positions of said plungers, a control valve communicating with said pistons at opposite sides thereof, a rotor in said control valve operative to establish a vacuum and atmospheric pressure respectively at opposite sides of said pistons, and means actuated in response to the advance of a bottle toward the capping position operative to turn said rotor angularly within the valve to reverse the vacuum and atmospheric pressure connections to said pistons for moving the pistons simultaneously in opposite directions.

7. In a feeding mechanism for removing articles from a pair of separate stacks of the articles, the combination of a pair of movable article selectors operative to engage said articles and remove them one at a time from the stacks, a pair of reciprocable pistons operative respectively to control the positions of said plungers, a vacuum pump, a control valve communicating with said pistons at opposite sides thereof and communicating with said pump, said control valve including a rotor formed with a first passage which communicates with the vacuum pump in all positions of the rotor, said rotor also being formed with a plurality of separate passages communicating with said first rotor passage and communicating selectively with said pistons depending upon the rotor position, said rotor also being formed with a plurality of separate passages communicating with the atmosphere in all positions of the rotor and communicating selectively with said pistons depending upon the rotor position, said rotor being operative to establish a vacuum and atmospheric pressure respectively at opposite sides of the pistons and to reverse said vacuum and atmospheric pressure connections to the pistons upon movement of the rotor to its next position.

8. In a feeding mechanism for removing articles from a plurality of separate stacks of articles, the combination of a plurality of movable article selectors operative to engage said articles and remove them one at a time from the stacks, means for pneumatically actuating said article selectors, and a control valve operative to control the operation of said means, said control valve comprising a front face plate formed with a plurality of circumferentially arranged passages extending therethrough, a rotor positioned behind said face plate and having its front face abutting thereagainst, said rotor being formed with an annular passage in its front face positioned to communicate with a vacuum passage in said face plate in all positions of the rotor, said rotor being formed with a plurality of circumferentially spaced axial passages terminating at the front face of the rotor and a plurality of radially extending passages effecting communication between said annular rotor passage and said axial rotor passages, said axial rotor passages being positioned to communicate selectively with said circumferentially arranged face plate passages to effect selective communication between said vacuum passage and certain of said circumferentially arranged face plate passages depending upon the rotor position, and said rotor also being formed with a plurality of circumferentially arranged axial passages extending entirely through said rotor and communicating with an air inlet passage at the back side of the rotor, said last mentioned axial rotor passages being positioned to communicate selectively with said circumferentially arranged face plate passages to effect selective communication between said air inlet passage and certain of said circumferentially arranged face plate passages depending upon the rotor position.

9. A control valve comprising a front face plate formed with a plurality of circumferentially arranged passages extending therethrough, a rotor positioned behind said face plate and having its front face abutting thereagainst, said rotor being formed with an annular passage in its front face positioned to communicate with a vacuum passage in said face plate in all positions of the rotor, said rotor being formed with a plurality of circumferentially spaced axial passages terminating at the front face of the rotor and a plurality of radially extending passages effecting communication between said annular rotor passages and said axial rotor passages, said axial rotor passages being positioned to communicate selectively with said circumferentially arranged face plate passages to effect selective communication between said vacuum passage and certain of said circumferentially arranged face plate passages depending upon the rotor position, and said rotor also being formed with a plurality of circumferentially arranged axial passages extending entirely through said rotor and communicating with an air inlet passage at the back side of the rotor, said last mentioned axial rotor passages being positioned to communicate selectively with said circumferentially arranged face plate passages to effect selective communication between said air inlet passage and certain of said circumferentially arranged face plate passages depending upon the rotor position.

10. A control valve comprising a front face plate formed with a plurality of circumferentially arranged passages extending therethrough, a rotor positioned behind said face plate and having its front face abutting thereagainst, said rotor being formed with an annular passage in its front face positioned to communicate with a vacuum passage in the face plate in all positions of the rotor, said rotor also being formed with a plurality of separate internal passages communicating with said annular passage and terminating in a plurality of circumferentially arranged ports in the front face of the rotor positioned to communicate selectively with said circumferentially arranged face plate passages to effect communication between said vacuum passage and certain of said circumferentially arranged face plate passages depending upon the rotor position, and said rotor also being formed with a plurality of passages extending therethrough communicating with an air inlet passage at the back side of the rotor and terminating in a circumferentially arranged series of ports in the front face of the rotor positioned to communicate selectively with said circumferentially arranged face plate passages to effect communication between said air passage and certain of said circumferentially arranged face plate passages depending upon the rotor position.

11. In a feeding mechanism for removing articles from a plurality of separate sources of the articles, the combination of a plurality of movable article selectors operative to engage said articles and remove them from said sources, means for pneumatically actuating said article selectors, and a control valve operative to control the operation of said means, said control valve comprising a front face plate formed with a first passage extending therethrough communicating with a first means for establishing a predetermined pneumatic pressure, said face plate also being formed with a plurality of circumferentially arranged passages extending therethrough and communicating with said means for actuating the article selectors, a rotor positioned behind said face plate, said rotor

being formed with a passage in its front face positioned to communicate with said first face plate passage in all positions of the rotor, said rotor also being formed with a plurality of separate internal passages communicating with said passage in the front face of the rotor and terminating in a plurality of circumferentially arranged ports in the front face of the rotor positioned to communicate selectively with said circumferentially arranged face plate passages to effect communication between said first means for establishing a predetermined pneumatic pressure and certain of said circumferentially arranged face plate passages depending upon the rotor position, and said rotor also being formed with a plurality of passages extending completely therethrough communicating with a passage at the back side of the rotor leading to a second means for establishing a different predetermined pneumatic pressure, said last-mentioned rotor passages terminating in a circumferentially arranged series of ports in the front face of the rotor positioned to communicate selectively with said circumferentially arranged face plate passages to effect communication between said second means for establishing a predetermined pneumatic pressure and certain of said circumferentially arranged face plate passages depending upon the rotor position.

12. In a feeding mechanism for removing articles from a pair of separate stacks of articles, the combination of a pair of article selectors each associated with one of said stacks and mounted for movement toward and away from the associated stack, means on each of said article selectors operative in response to movement of the respective selector toward its associated stack to engage an article in the stack and operative in response to movement of the selector away from its stack to remove said article from the stack, pneumatically actuated means for reciprocating said selectors, a control valve operable between successive positions and adapted in one position thereof to apply pressure to said pneumatically operated means to move one of said selectors toward its stack and simultaneously move the other selector away from its stack and in the succeeding position thereof to move said one selector away from its stack and simultaneously move said other selector toward its stack, and means for moving said control valve between successive positions.

13. In a feeding mechanism for removing articles from a pair of separate stacks and for depositing the articles on article carriers, the combination of a pair of article selectors each associated with one of said stacks and mounted for movement toward and away from the associated stack, means on each of said article selectors

operative in response to movement of the respective selector toward its associated stack to engage an article in the stack and operative in response to movement of the respective selector away from the stack to remove said article from the stack, operating means actuatable to simultaneously move one of said selectors toward its associated stack and the other selector away from its associated stack, and means actuated in response to the advance of article carriers past the feeding mechanism for actuating the operating means to effect movement of each of said article selectors in opposite directions in timed relation to the advance of article carriers past the feeding mechanism.

14. In a feeding mechanism for removing articles from a pair of separate stacks and for depositing the articles on article carriers, the combination of a pair of article selectors each associated with one of said stacks and mounted for movement toward and away from its associated stack, means on each of said selectors operative in response to movement of the respective selector toward its associated stack to engage an article in the stack and operative in response to movement of the respective selector away from the stack to remove said article from the stack, a reciprocable piston individual to each article selector operative to control the position of the article selector, a control valve movable between preselected positions and operative in one position to apply fluid pressure to said pistons to simultaneously move said article selectors in opposite directions and operative in a second position to apply fluid pressure to said pistons and reverse the direction of movement of said article selectors, and means actuated in response to the advance of article carriers past the feeding mechanism for moving said control valve between said preselected positions to effect movement of each of the article selectors in opposite directions in timed relation to the advance of the article carriers past the feeding mechanism.

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