G. A. & M. HENDRICKSON.

BOTTLING MACHINE.

APPLICATION FILED JAN. 30, 1915.

1,179,372.

Patented Apr. 11, 1916.

3 SHEETS—SHEET 1.

Fig. 1

A-A

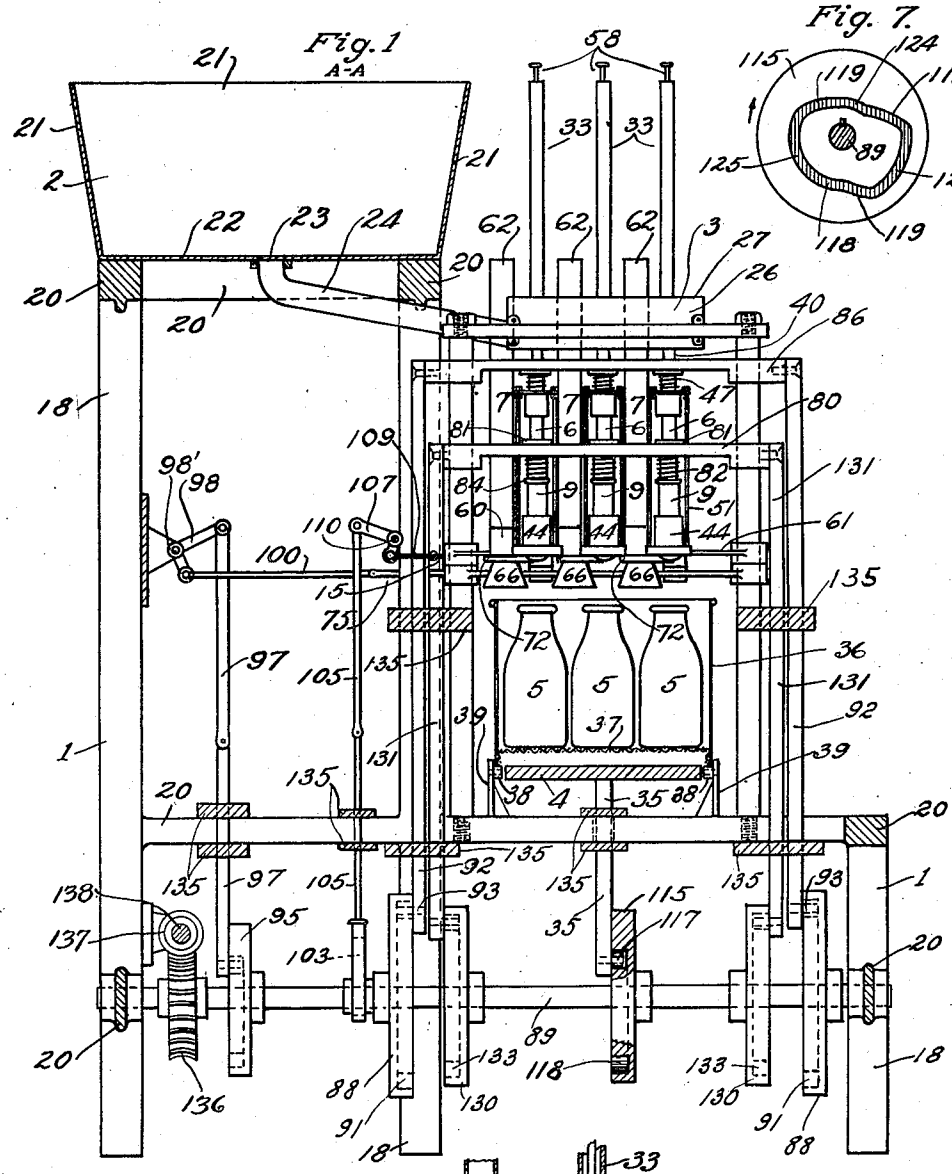
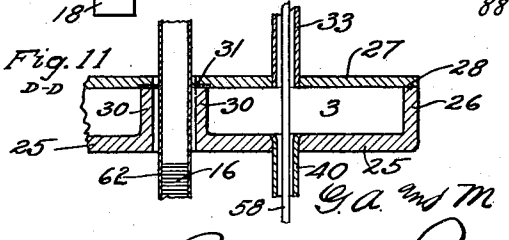


Fig. 7.

Fig. 11

D-D



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BOTTLING MACHINE.

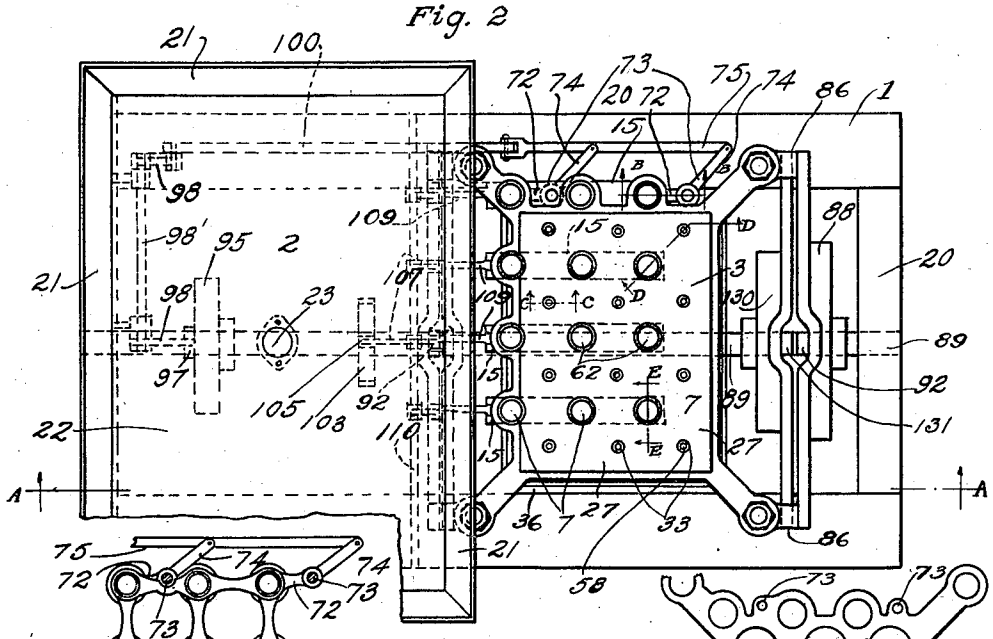
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3 SHEETS—SHEET 2.

Fig. 2



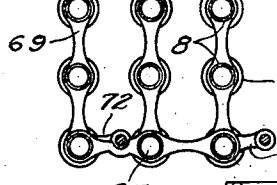


Fig. 8

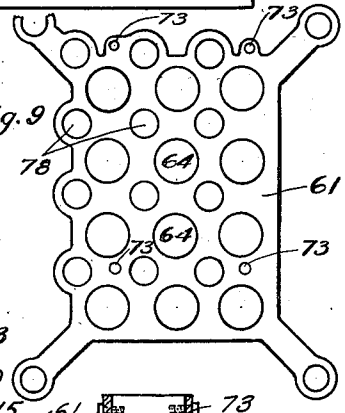


Fig. 9

Fig. 3

Fig. 10.

Fig. 12

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3 SHEETS—SHEET 3.

Fig. 4.

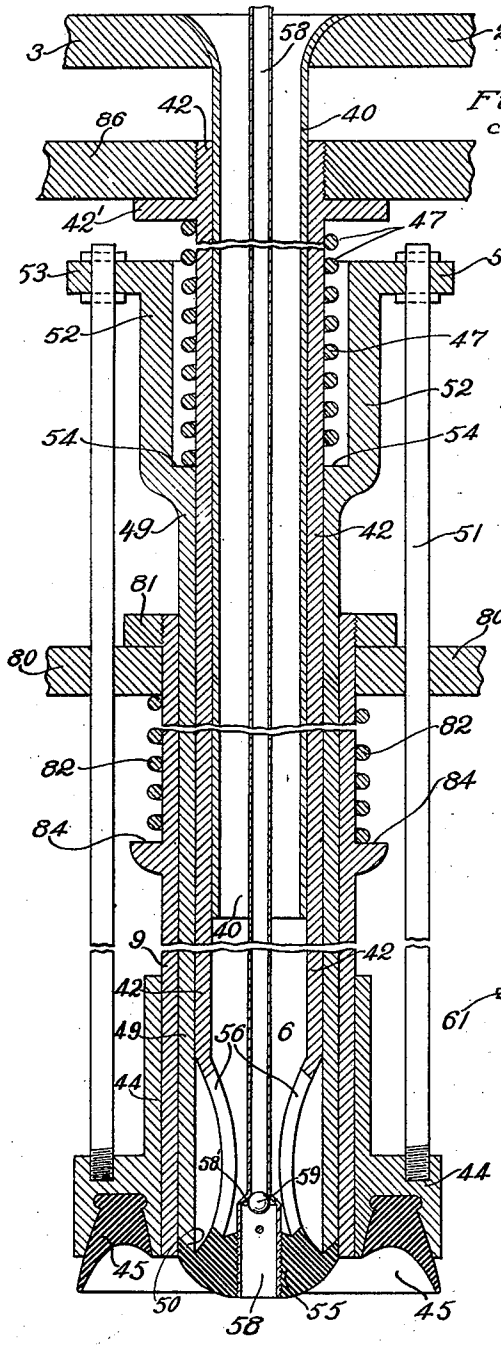


Fig. 5.

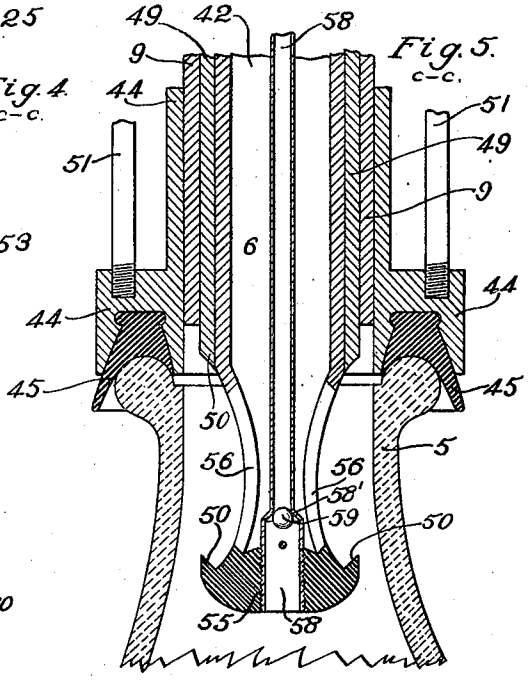
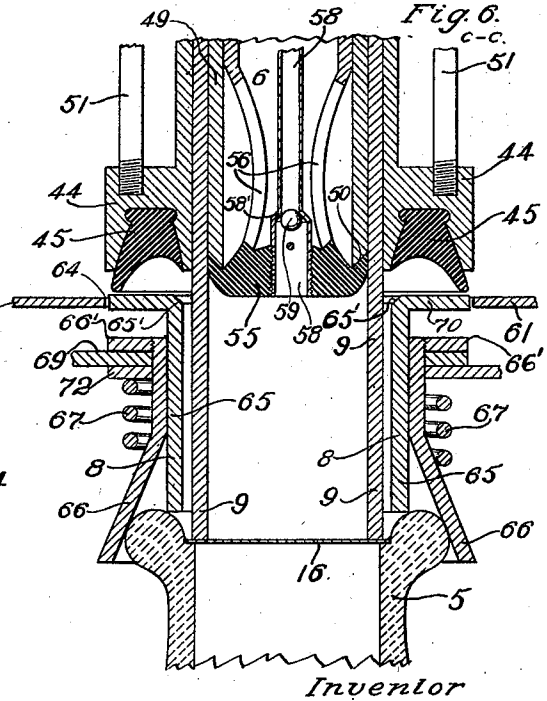


Fig. 6.



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UNITED STATES PATENT OFFICE.

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BOTTLING-MACHINE.

1,179,372. Specification of Letters Patent. Patented Apr. 11, 1916.

Application filed January 30, 1915. Serial No. 5,216.

To all whom it may concern:

Be it known that we, GUSTAF ALFRED HENDRICKSON and MARTIN HENDRICKSON, citizens of the United States of America, and residents of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Bottling-Machines, of which the following is a specification.

The main objects of this invention are to provide an improved form of automatic bottling machine, more particularly for milk; to provide improved forms of mechanism therefor, and to coörganize the same as a whole so as to produce a compact and efficient machine of few parts and simple construction, adapted for accurate and rapid work and facility of operation, which shall require only few and slight movements of the bottles in the machine, which shall not require more than one attendant and which shall be easily accessible in all its parts for thorough care and cleaning as required especially in the milk business.

Claims covering the capping means and also case feeding means are contained in our copending application Serial No. 82,852, filed March 8, 1916.

An illustrative embodiment of this invention is shown in the accompanying drawings, in which—

Figure 1 is a vertical section of the machine approximately on the line A—A of Fig. 2. Fig. 2 is a fragmentary top plan view of the machine. Fig. 3 is an enlarged fragmentary cross-section of the machine on the line B—B of Fig. 2, showing particularly the principal features of the capper feed mechanism. Fig. 4 is an enlarged fragmentary section of the machine taken axially through one of the bottle filling tubes on the line C—C of Fig. 2, the filler being in its normal raised position. Fig. 5 is an enlarged fragmentary axial section on the line C—C of Fig. 2, showing the lower end of one of the supply tubes in its bottle filling position. Fig. 6 is an enlarged fragmentary axial section on the line C—C of Fig. 2, showing one of the filler tubes in its raised position and the corresponding capper in its lowered position. Fig. 7 is a side view of the cam which raises and lowers the bottle supporting platform. Fig. 8 is a plan of the frame which carries the combined cap-guides and centering bells. Fig. 9 is a plan of the stationary frame plate at the foot of the cap magazines. Fig. 10 is a plan of one of the four cap feeders. Fig. 11 is a section on the line D—D of Fig. 2 showing a detail of the bulkhead. Fig. 12 is an axial section on the line E—E of Fig. 2 at the base of a cap magazine.

In the construction shown, the machine comprises a stationary frame 1, on which there is mounted a milk supply tank 2, a bulkhead 3 connected with said tank, a platform 4 for the bottles 5, filling means 6 communicating with said bulkhead, cap magazines 7, capping means including oscillatory guides 8 and plungers 9, means 15 for feeding caps 16 one at a time from each magazine to its respective guide 8, and correlated mechanisms for operating the several said members automatically.

The frame 1 may be of any suitable construction adapted for supporting the several parts and mechanisms above mentioned and hereinafter more fully described. Said frame comprises mainly a plurality of uprights 18 and cross-members 20 rigidly jointed together.

The tank or reservoir 2 is mounted at the top of an upwardly projecting part of the frame at one side of and above the rest of the machine, and comprises sides 21 and a bottom 22 having an outlet 23 communicating with the discharge tube 24 which leads to the distributing chamber or bulkhead 3 disposed at one side of said tank.

The distributing bulkhead 3 for the fillers 6 is relatively shallow and is disposed horizontally over the bottling apparatus. It comprises a bottom 25, sides 26, and a detachable cover 27, secured normally in place, the joint for said cover having a gasket 28. Said bulkhead has perforations in its base for the discharge of liquid as will be more fully described. Apertures are provided extending entirely through said bulkhead, which apertures have walls 30, the upper edges of which are provided with gaskets 31, to fit against the cover 27, said apertures being provided to accommodate the cap magazines 7 hereinafter described. Said cover 27 is provided also with a plurality of small perforations in which are fixed small tubes 33 corresponding in number and location with the filling tubes. Said tubes 33 communicate with the bulkhead and project upward to a height substantially level

with the top of the liquid reservoir, the purpose of said tubes being hereinafter more fully explained.

The platform 4 is carried by supporting means 35, by which it may be raised and lowered automatically as required. The empty bottles 5 are first placed in open boxes or cases 36 having perforated or mesh bottoms 37, each box containing the number of bottles for which the particular machine is adapted, which in this instance is twelve. Means are provided for sliding said boxes into and out of the machine over said platform, as on rollers 38 carried by brackets 39 on the frame of the machine, as shown in Fig. 1. When the platform 4 is raised, it bears on the box bottom and supports the bottles firmly during the filling and capping process, the platform bearing upward directly on the bottom 37 without lifting the sides of the box.

The filling means 6 comprises a plurality of tubes projecting downwardly from said bulkhead, one for each bottle, the number in this instance being twelve. Each of said tubes is telescopic in character, the upper part or section 40 being attached tightly to the bottom at a corresponding perforation in the under side of the bulkhead with which it communicates, and the lower part 42 being reciprocatable downwardly and upwardly to and from its bottle filling position respectively.

Combined centering and closure means for the bottles are associated telescopically with the filling tubes, each comprising an annular member 44 surrounding the lower end of the filling tube, and having a bell shaped centering and cushion member 45, preferably in the form of a soft rubber gasket adapted to fit tightly over the mouth of the bottle so as to center the latter and prevent leakage of milk during the filling operation. Valve means hereinafter described are used for lifting said member 44 with the tube 42 when the filling operation is completed and also yieldable means 47 for forcing said closure member into tight contact with the bottle when the tube 42 is lowered. The capping plunger 9, hereinafter described, is disposed slidably between a valve cylinder 49 and closure member 44 in liquid tight relation. The lifting means for said closure member 44 comprises the valve cylinder 49 fitting slidably over said tube 42 and within said plunger 9, which cylinder is seated normally at its lower end on an upwardly facing annular shoulder or seat 50 on the tip of said tube, and rods 51 connecting said member 44 with the upper end of said cylinder 49, which is enlarged at 52 and provided with lugs 53 for attaching said rods. The coiled spring 47 surrounds the upper part of tube 42 and seats at its lower end against the shoulder 54 of cylinder 49 and at its upper end against a flange 42′ on tube 42 so as to urge the closure member 44 downward and also permit the tube 42 to continue downward when member 44 has reached its seat on the bottle mouth and the valve cylinder 49 is thereby arrested. Such further lowering of the tube 42 opens the discharge ports 56, and permits the liquid to flow into the bottle.

Valve mechanism for each filling tube is provided as follows: The lower end of each tube 42 is closed at the bottom 55, but has lateral apertures 56 closed normally by the lower part of said cylinder 49. When the tube 42 enters the bottle the withholding of cylinder 49 by the cap closure member 44 serves to open the valve ports 56, which, however, are closed automatically by the subsequent rising of tube 42 within the cylinder 49 which seats normally on the shoulder 50.

In order that the air in the bottle may pass out freely when the liquid enters, there is provided in the filling tube 42 a long narrow air tube 58, having its lower end fitted tightly to the tube bottom 55 in registry with a perforation therein, and having its upper end disposed in one of the tubes 33 projecting at all times above the upper surface level of the liquid in the tank 2. A float valve 59 is held in the lower part of tube 58 which is enlarged and has a downwardly facing valve seat 58′. This valve prevents liquid from rising in the air vent 58 when the bottle is full.

Each of the cap magazines 7 comprises a cylindrical base member 60 mounted rigidly by means of the plate 61 and an interchangeable cylindrical member 62 fitting upon and readily removable from the base 60, the lower end of cylinder 62 fitting telescopically within the upward flange 63 of member 60. The interchangeable members 62 project upwardly through the apertures in bulkhead 3, and may be interchanged manually by lifting and lowering the same through the sleeves 30. The caps 16 fit loosely in each magazine and feed downward by gravity, subject to removal successively by certain automatic feed mechanism hereinafter described.

Each of the guide means 8 comprises a vertically disposed cylindrical member 65 associated with which at its lower end in vertically slidable relation is an outwardly-flanged and downwardly facing bell-shaped member 66 adapted to fit over and center the top of the bottle to be capped when such bottle is thrust upward thereunder. In order to compensate for limited variation in the height of the bottles, said guide member is provided with yielding means 67 arranged to urge the centering "bell" 66 downwardly, but permitting the same to rise somewhat according to the height of the

bottle, a coiled spring disposed about said guide member being preferred.

The bell 66 has a top flange 66′ screwed thereto by which it is supported. When the members 65 and 66 are swung over the bottle and the latter raised, they both fit against the bottle top and are each lifted more or less according to the shape and height of the bottle, and may rise through the frame plate perforation 64 through which the feeder tube 42 and capper 9 project when each is operated. Each cylinder 65 is somewhat smaller than the caps 16, so that the latter are prevented from dropping through prematurely. The upper end of cylinder 65 is enlarged at 65′ so as to receive and hold a cap loosely until pushed down by plunger 9.

Means are provided for swinging said guide members each from its normal position adjacent to but eccentric with respect to its cap-magazine respectively to its discharge position over the bottle to be capped and in registry with the perforation 64 in plate 61 and back again. Said carrying means in this instance comprises a frame 69 of rectangular shape formed with twelve apertures in which the said guide members are mounted, and each cylinder 65 has a top flange 70 seated on said frame. The frame 69 is oscillatably mounted on a set of four arms 72 swinging on fixed pivots 73. Two of said members 72 are provided with actuating arms 74 disposed at an angle with respect to the frame supporting arms and forming therewith substantially a pair of bell crank levers. The free ends of said actuating arms are connected to a rod 75 which is actuated and controlled, as hereinafter described, to rock said arms through a suitable angle depending upon the precise relative position of the pivots 73, cap feeders 15 and plungers 9. (See Fig. 2).

The cap feeding means 15 for each magazine is reciprocating in its action, and in this instance comprises a thin plate of somewhat less thickness than the caps, said plate being disposed cross-wise of the frame 1 and extending beneath a row of three magazines. Each plate has perforations 77 spaced apart according to the spacing of said magazines, each of the apertures being substantially equal to the inner diameter of the magazine 7, so as to readily receive the caps successively. Means are provided for sliding each plate forward sufficiently to bring each of its apertures into registry with the corresponding guides 8 in their retracted or normal position. The caps carried in said apertures drop through the perforations 78 in the frame plate 61, and into the upper ends 65′ of the guide cylinders 65. The said plates 15 are then restored automatically to their normal position and each perforation receives another cap ready to repeat the operation. The actuating means for the feed plates 15 drives them all simultaneously, which means is hereinafter described more fully. The movement is small, being not more than half the diameter of a cap.

Each of the cap affixing plungers 9 is cylindrical and fits closely within the closure ring 44 and about the valve cylinder 49 in telescopic relation thereto. Said plungers 9 are all actuated and controlled by a vertically movable horizontal frame or table 80 to which they are secured in yielding relation. Each plunger fits slidably in a vertical perforation in said frame, and is prevented from complete withdrawal downward therefrom by means of a shoulder on its upper end, a threaded flange or ring 81 being used in this instance. Said plunger is urged downward by yielding means, as for instance a coiled spring 82 acting between the under side of said frame, and a shoulder 84 on said plunger beneath said frame. The plunger frame 80 is below the tops of the valve cylinders 49 and is formed to clear the bottle closure control rods 51, said frame in this instance being perforated therefor.

Mechanism for controlling the filling means 6 is provided comprising a frame or table 86 which is movable vertically subject to automatic control. The movable member 42 of each filling tube is secured rigidly to said table, and may be screwed into a threaded perforation therein, as shown in Fig. 4.

Means for lowering and raising the filler tube frame 86 comprise automatically operated mechanism including in this instance a pair of like cam members 88 fixed in spaced relation on the horizontal power shaft 89, said members each being preferably in the form of a disk with a cam slot 91 in one of its radially disposed faces. Cooperating with each of said disks is a vertically disposed rod 92 with a cam-engaging shoulder or pivot 93 on its lower end and having its upper end connected to said table 86, by which means a vertical reciprocating movement is produced. Power for driving the shaft 89 may be transmitted thereto by any suitable means, such as a gear 136 and worm 137 mounted on driving shaft 138.

Oscillating mechanism is provided for the frame 69 which carries the cap guides 8, said mechanism including in this instance a cam disk 95 fixed to the driving shaft 89 and a jointed rod 97 coacting therewith and extending upward to one arm of a bell crank lever 98, the arms of which are fixed on opposite ends of a journaled shaft 98′. From the other arm of lever 98 a link 100 extends to said rod 75 pivoted to the lever arms 74.

For operating the cap feeder mechanism

there is provided in this instance an eccentric wheel 103 fixed to the shaft 89, said wheel being connected by means of a jointed pitman rod 105 to one arm of a bell crank lever 107 which lever also comprises a pivot shaft 110 and four other arms which are in turn connected by rods 109 to the cap feed plates 15.

Means for lifting the bottle platform are provided comprising a cam disk 115 fixed on said driving shaft 89 and the upwardly projecting rod 35 having on its lower end a laterally projecting stud 117 fitting in the cam groove 118 of said disk, the platform 4 being supported on the upper end of said rod. Said cam slot 118 is formed with inclined parts 119 connecting three main stages 124, 125, and 126 substantially concentric with shaft 89, whereby in operation the platform is first raised from its normal lowermost position to an intermediate position at which it bears against and supports the box bottom while the bottles are filled, and then after the filling tubes have been raised and the cap guides swung into position over the bottles the platform, lifting the box therewith, is raised to its uppermost position, and after the caps have been affixed the platform is lowered directly to its lowermost position and the box left on the rollers 38.

The mechanism for controlling the cap affixing plungers 9 comprises a pair of like cam disks 130 fixed to the shaft 89, and a pair of vertically disposed rods 131 disposed on opposite sides of the filling mechanism, the lower ends of which rods are provided with studs coacting with the cam slots 133 on said disks, and the upper ends being fixed to the table 80 which lifts and lowers the cap plungers 9. Said cams 130 are formed so as to lower the cappers 9 part way with the fillers 42 sufficiently to maintain a liquid-tight joint with respect to the closures 44, and when tubes 42 are raised the cams 130 drive the plungers 9 down alone.

Guide means for the vertical operating rods 92, 97, 105, 116 and 131 are provided, cross bars 135 fixed to the frame 1 being shown in this instance, said bars being provided with bearings to limit the movement to vertical reciprocation.

The several said actuating means fixed on the driving shaft 89 are so related with respect to their relative angular operating positions on said shaft that the several bottling operations are carried out in a definite predetermined order substantially as follows: 1. The cam 115 raises the platform 4 to its intermediate or filling position to support the bottles without raising them. 2. The cams 88 then operate to lower the tubes 42 and closure members 44 for filling the bottles and thereupon restore the same. 3. The guide oscillating cam 95 then swings the frame 69 forward to place the guides and centering bells over the bottles and in registry with plungers 9. 4. Cam 115 then raises the platform 4 to its uppermost or capping position. 5. The capping cams 130 then lower the plungers and immediately restore the same. 6. The cam 95 then restores the guides to their normal position adjacent to the cap magazines. 7. The cam 115 then lowers platform 4 to its normal lowermost position to exchange boxes 36. 8. The eccentric member 103 then moves the cap feeder plates 15 forward to deposit a cap in each of the guide cylinders 65 ready for the next operation. This last mentioned operation may take place during the time that the boxes are being exchanged, the eccentric actuating means being timed accordingly. Some of the other operations may be more or less simultaneous or overlapping, depending on the relative setting of the cams.

The operation of the bottling machine is as follows: The attendant slides a box filled with empty bottles into the machine, which thereupon runs through its several operations automatically, as above enumerated. As soon as the platform is lowered after the capping operation, the box containing the filled bottles is removed either manually by the operator or otherwise, and is replaced by another box containing empty bottles.

With this machine it is possible to adjust the time sequence of the several operations and the speed of the machine so as to make the operation continuous and subject to the control of a single operator.

Some of the advantages to be noted for this machine are its compactness and facility to operate by a single attendant, the only attention normally required being to feed the boxes of empty bottles onto the platform 4 and remove the same as soon as filled. Two important features of improvement over machines heretofore used are the great reduction of amplitude in platform movement and the provision for vertical movement of the filling and capping tubes as set forth.

Although but one specific embodiment of this invention has been herein shown and described, it will be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of this invention as defined by the following claims.

We claim—

1. A bottling machine, comprising in combination means for holding in place the bottles to be filled, means for feeding liquid to the bottles, means for feeding caps into place over the bottles, tubular means fitting tightly about said liquid feeding means for applying said caps to the bottles, both of said means for feeding liquid and applying the caps being vertically coaxial and reciprocatable alternately with respect to each other

and separate means for operating said filling and capping means independently of each other.

2. A bottling machine comprising in combination a bottle holder, liquid feeding means disposed vertically over and coaxial with the bottle, mechanism for lowering and raising said feeding means, vertically disposed guide means movable laterally to a position coaxial with and immediately over the bottle alternately with respect to the movement of said liquid feeding means, means for supplying caps to said guide means when the latter is retracted, and plunger means concentric with said liquid feeding means and movable alternately with respect thereto for applying the caps brought forward by said guide means successively to the bottles when they have been filled.

3. A bottling machine comprising in combination a frame and a plurality of mutually reciprocatable cylindrical members disposed vertically and fitting closely one within another and including an outer member formed and adapted to fit tightly against the mouth of a bottle to be filled, an inner member having an opening at its lower end for discharging liquid into the bottle, and an intermediate member movable downward to project beyond the said outer and inner members when the latter are drawn upward, said intermediate member being formed to fit substantially within the mouth of the bottle for driving a cap into place for closing the bottle.

4. In a bottling machine, a frame, means for filling the bottles, a cap magazine beside said filling means, and a capping mechanism comprising a vertical hollow guide member, means for carrying said guide member to and fro between said magazine and a position concentric with and over the bottle, means movable horizontally between said magazine and carrying means for delivering caps successively to the latter when said carrying means is retracted, and a cylindrical plunger movable downward through said carrying means when the latter is advanced for applying the cap carried thereby to the bottle, said plunger being concentric with said filling means.

5. In a bottling machine, a combined filler and cap affixer comprising a plurality of coaxial cylindrical members superposed diametrically one over another in tight fitting relation and including an inner or liquid feeding tube, an outer or closure member for the bottle, an intermediate or cap affixing plunger, and actuating means for said feeding tube and closure member and for said plunger respectively, said means having a common driving member and said means having a predetermined relative sequence for each complete bottling operation.

6. In a bottling machine in combination a distributing bulkhead, a plurality of telescopic sectional filling tubes connected to the underside thereof, a platform for bottles beneath said tubes, means for lowering and raising the lower sections of said tubes, means for raising and lowering said platform, means for feeding caps to a position over the bottles, and means operatable downwardly for applying the caps to the bottles.

7. A bottling machine, comprising in combination means for holding in place the bottles to be filled, means for feeding liquid to the bottles, cap feeding means comprising a cylindrical cap guide proper, a bottle centering bell mounted telescopically thereon and yielding means for urging said bell downward, and means for applying said caps to the bottles, both of said means for feeding liquid and applying the caps being vertically coaxial.

8. A bottling machine, comprising in combination means for holding in place the bottles to be filled, means for feeding liquid to the bottles, cap feeding means comprising a cap guide cylinder in combination with a bottle centering bell concentric therewith and fitting telescopically thereon, each having an outward flange at its upper end respectively, and supporting means bearing normally against the under side of the flange of the bell member, and means for applying said caps to the bottles, both of said means for feeding liquid and applying the caps being vertically coaxial.

Signed at Chicago this 28th day of January 1915.

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