No. 648,006. Patented Apr. 24, 1900.

J. G. WARREN.

BOTTLE FILLING MACHINE.

(Application filed Mar. 6, 1899. Renewed Dec. 1, 1899.)

(No Model.) 8 Sheets—Sheet 1.

FIG. 1.

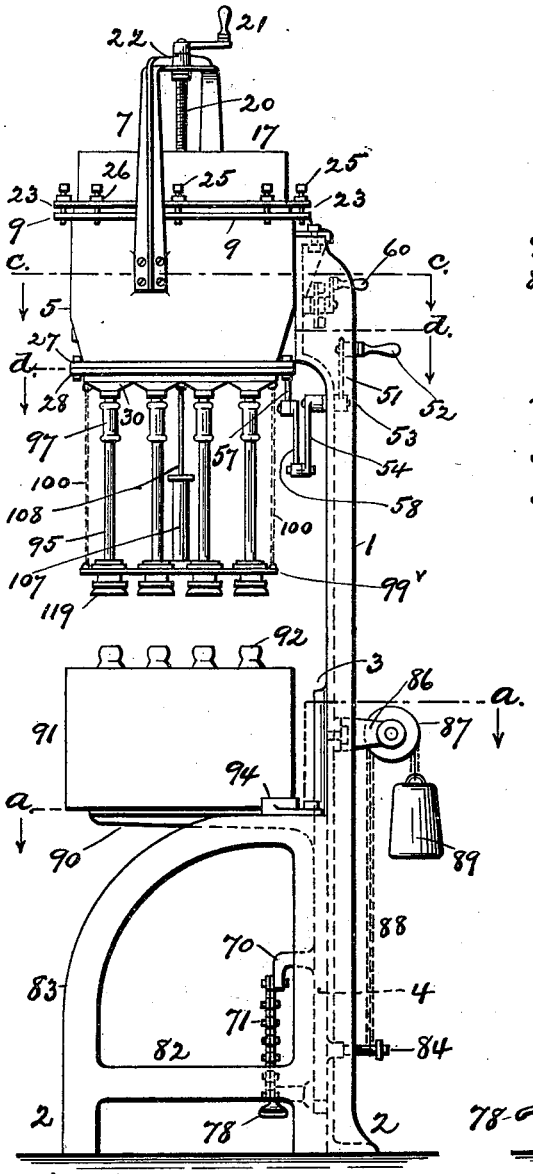
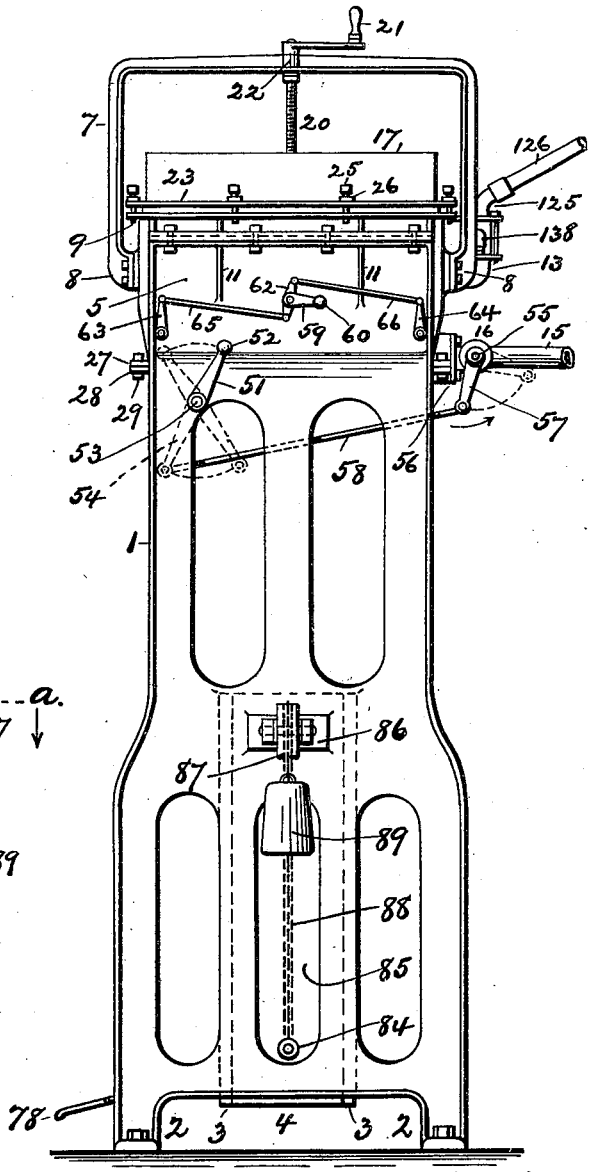


FIG. 2.



WITNESSES.

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FIG. 3.

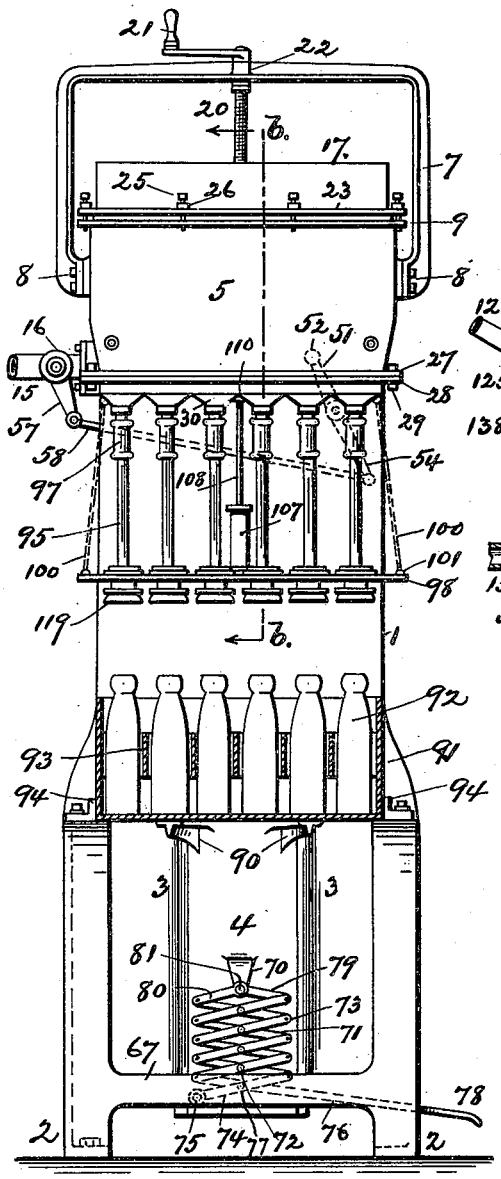
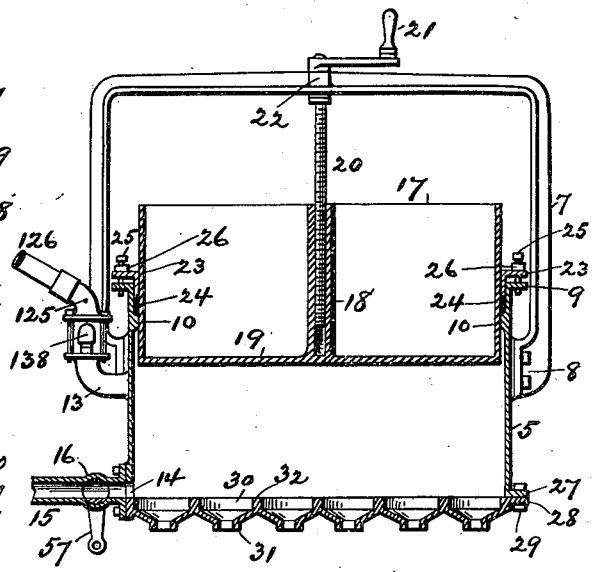


FIG. 4.



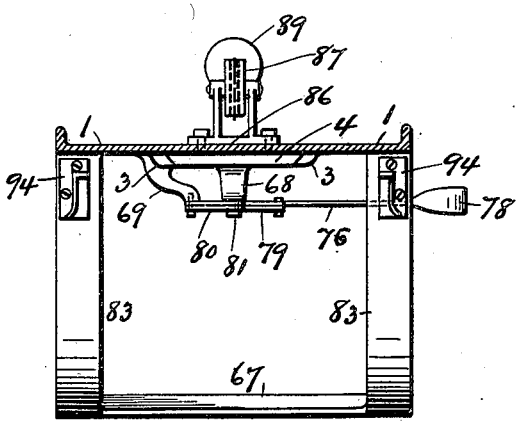


FIG. 5.

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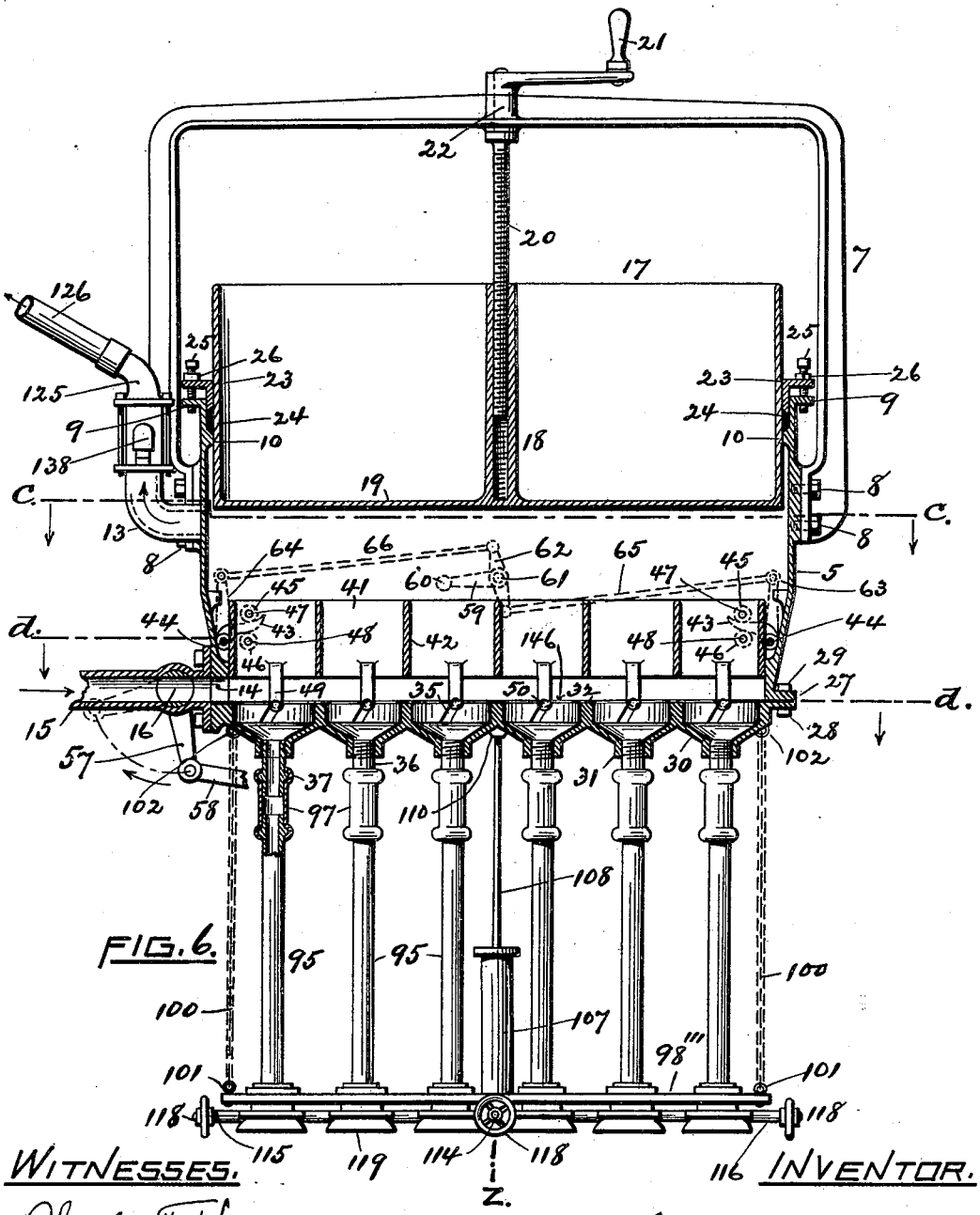

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(No Model.) 8 Sheets—Sheet 4.

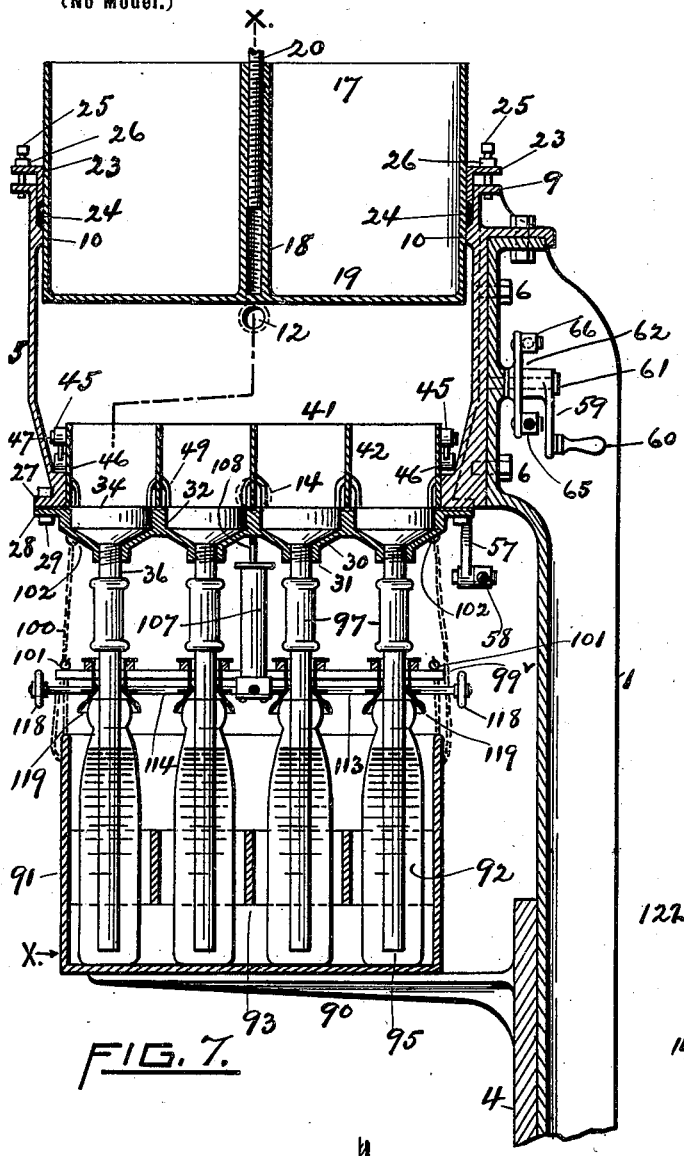

FIG. 7.

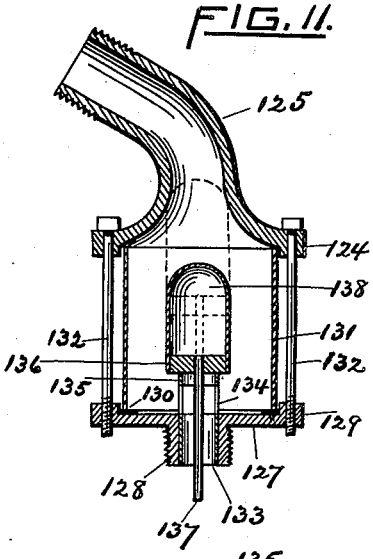

FIG. 11.

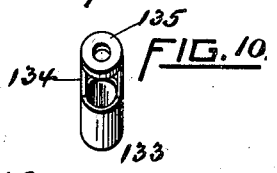

FIG. 10.

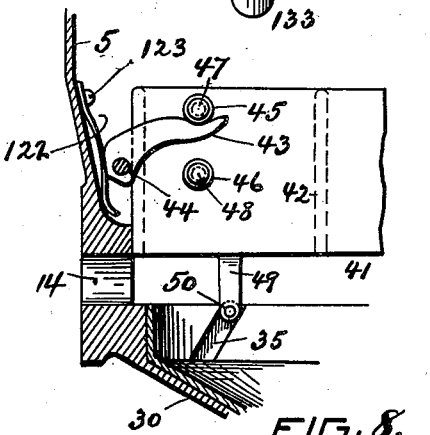

FIG. 8.

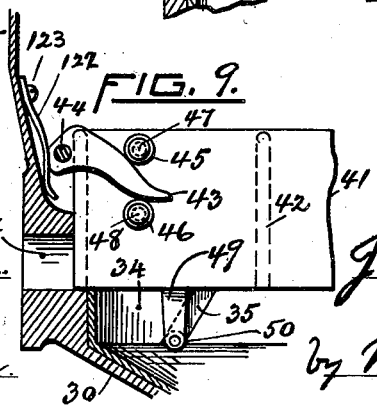

FIG. 9.

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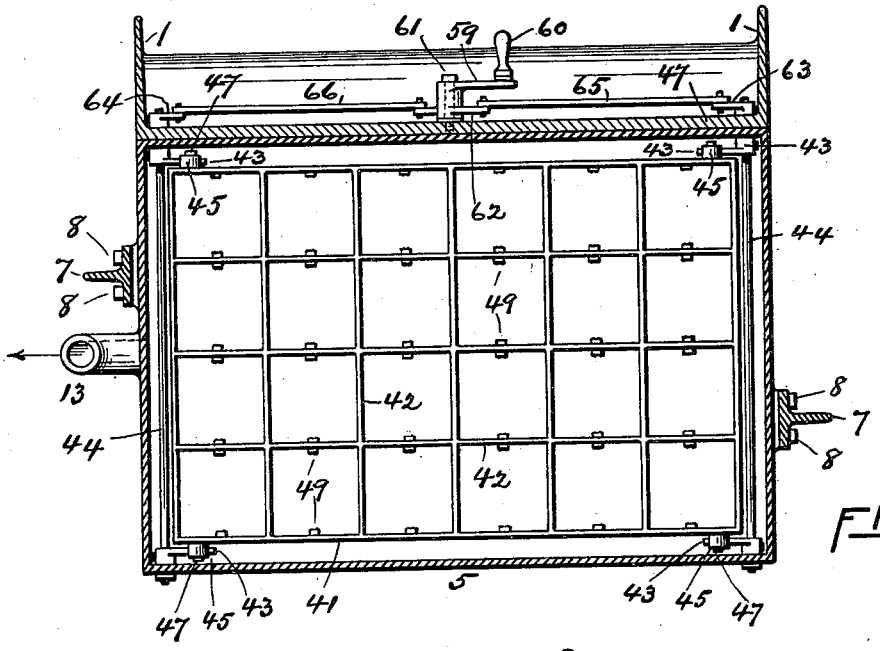

FIG. 12.

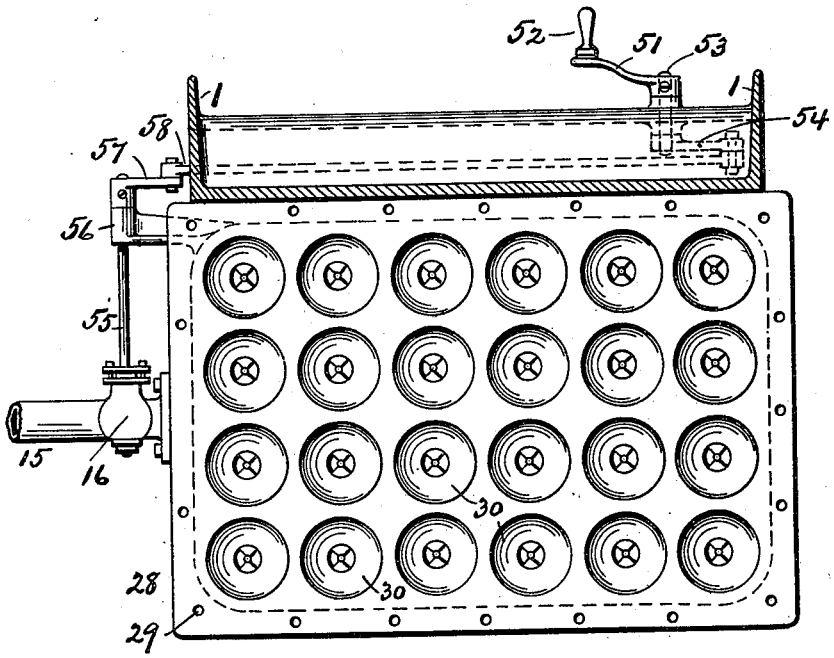

FIG. 13.

WITNESSES.

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(No Model.) 8 Sheets—Sheet 6.

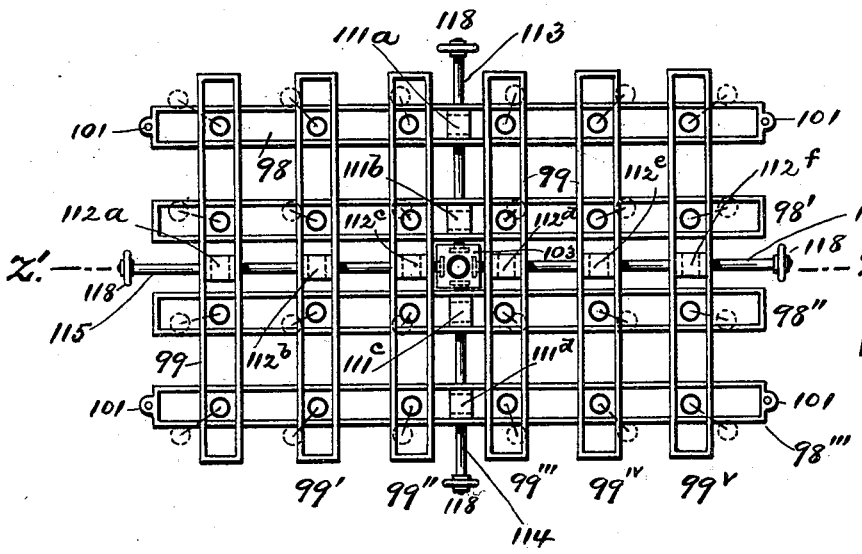

FIG. 14.

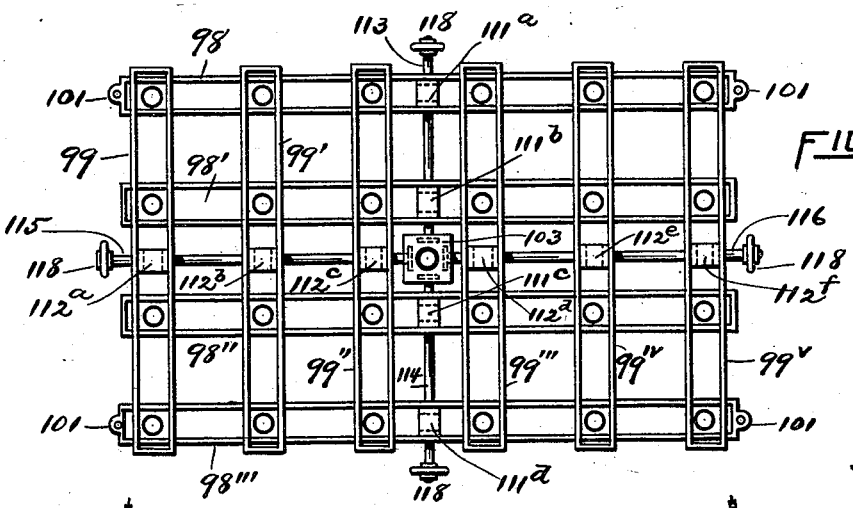

FIG. 15.

FIG. 16.

WITNESSES.

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(No Model.) 8 Sheets—Sheet 7.

FIG. 18.

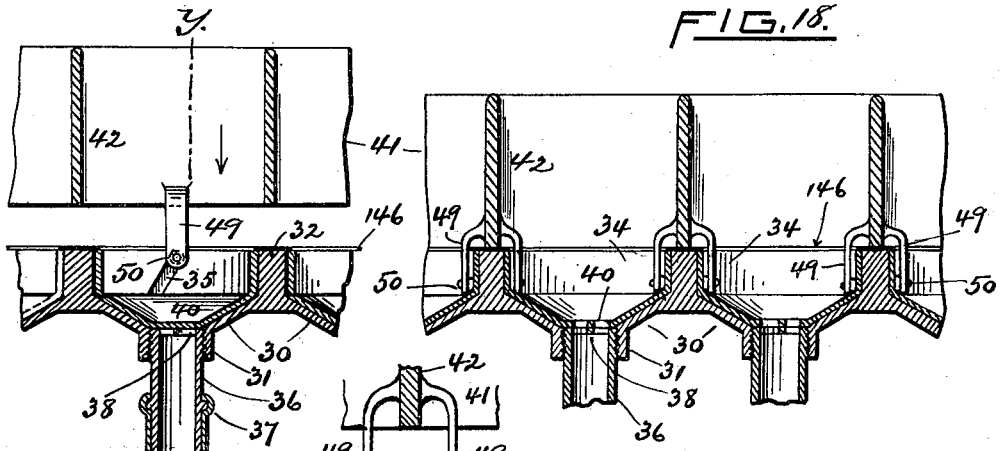

FIG. 19.

FIG. 20.

FIG. 21.

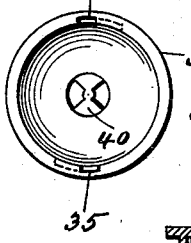

FIG. 22.

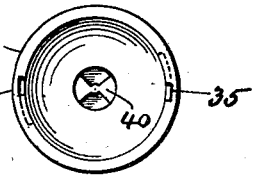

FIG. 17.

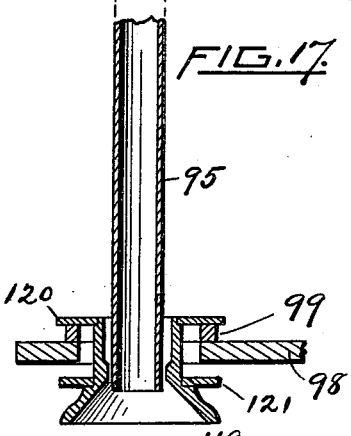

FIG. 23.

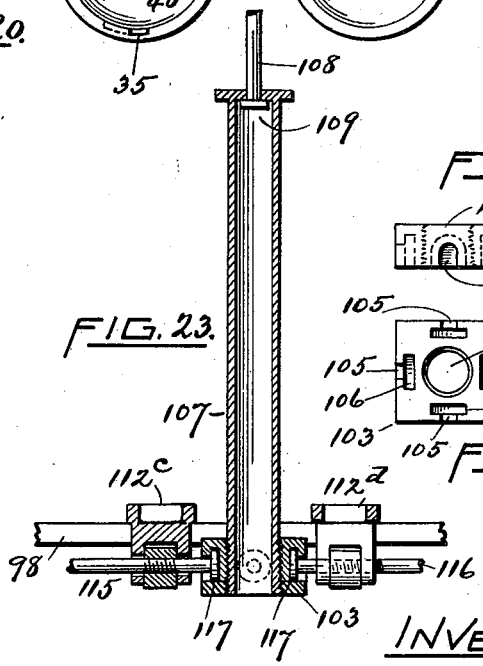

FIG. 24.

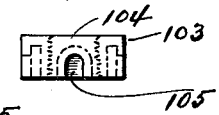

FIG. 25.

WITNESSES.

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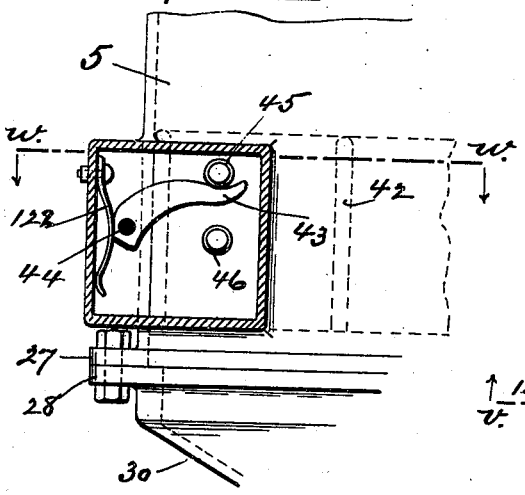
(No Model.) (Application filed Mar. 6, 1899. Renewed Dec. 1, 1899.)

8 Sheets—Sheet 8.

FIG. 26.



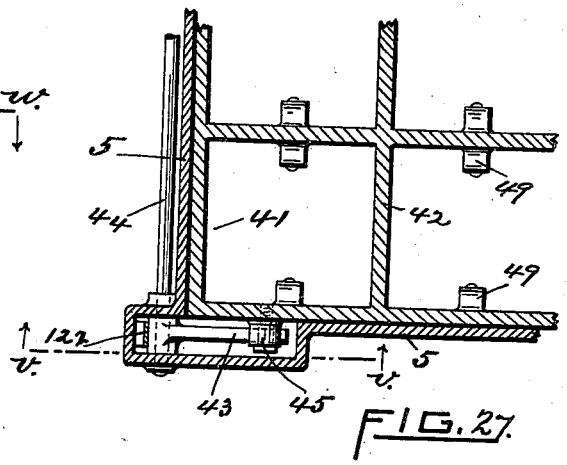
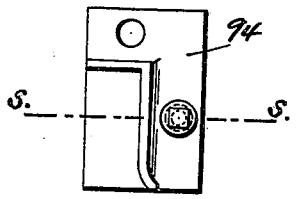


FIG. 27.

FIG. 28.



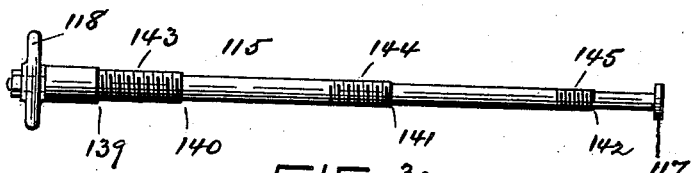


FIG. 30.

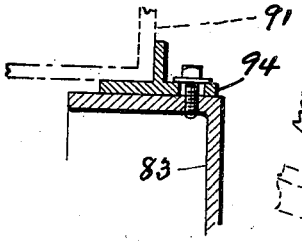


FIG. 29.

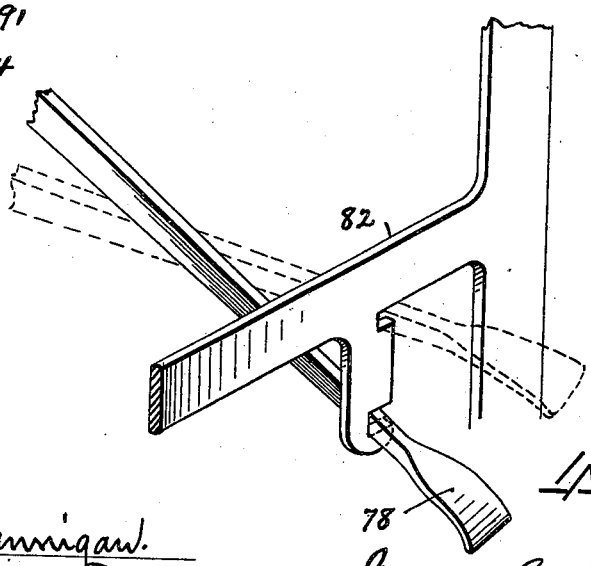


FIG. 31.

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By Warren R. Pierce

Atty.

UNITED STATES PATENT OFFICE.

JAMES G. WARREN, OF PROVIDENCE, RHODE ISLAND.

BOTTLE-FILLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 648,006, dated April 24, 1900.

Application filed March 6, 1899. Renewed December 1, 1899. Serial No. 738,911. (No model.)

To all whom it may concern:

Be it known that I, JAMES G. WARREN, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Bottle-Filling Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

Like numerals indicate like parts.

Figure 1 is a side elevation of my improved bottling-machine. Fig. 2 is a rear elevation of the same, showing the back of the machine. Fig. 3 is a front elevation of said machine. Fig. 4 is a central longitudinal vertical section of a modified form of the tank in combination with the filling and discharging means, as also the adjustable measuring device. Fig. 5 is a top plan view of the mechanism for locating, lifting, and lowering the crate which holds the bottles as seen on line *a a* of Fig. 1. Fig. 6 is an enlarged view, partly in elevation and partly in vertical section, on line *x x* of Fig. 7, showing in elevation the yoke and measure-adjusting crank and screw, the foam-tube and indicator, the bottle-filling pipes, the expansible frame for holding said pipes, and the bell-centering mechanism for the same, together with the chains and guide-rod and tube for said frame and the adjusting-screws for the expansion and contracting of said frame, and in section, as aforesaid, the tank and movable divider therein, the measuring device, the sockets in the bottom of the tank, the rotary valves in said sockets, respectively, together with means for operating said valves, the flexible sleeves in tubes connecting the bottle-filling tubes with the discharge-pipes of said sockets, and also the supply-pipe for the filling of said tank. Fig. 7 is a sectional view as seen on line *b b* of Fig. 3, the bottles and pipes for filling the same being shown in elevation. Fig. 8 is a view in elevation of the devices for raising and lowering the divider and operating the rotary cup-valves, together with portions of the divider, tank, sockets, and valves. In this view the divider is in its elevated position. Fig. 9 is a view in elevation of the same devices shown in Fig. 8 with the parts in position when the divider has been lowered. Fig. 10 is a perspective view of the supporter of the bulb-valve of the indicator. Fig. 11 is a central vertical section of the indicator. Fig. 12 is a view, partly in top plan and partly in cross-section, on line *c c* of Figs. 1 and 6, of the divider and mechanism for lifting and lowering the same within the tank. Fig. 13 is a view, partly in top plan and partly in cross-section, on line *d d* of Figs. 1 and 6, of the tank-bottom and the sockets and rotary cup-valves therein and of the supply-pipe and its valve and means to operate the last-named valve. Fig. 14 is a top plan of the bell-centering frame and means for operating the same. The frame is here shown as adjusted for a crate of twenty-four pint bottles. Fig. 15 is a top plan of the same as seen when expanded or adjusted for a crate of twenty-four quart bottles. Fig. 16 is a front elevation of said frame and of the screws for adjusting the same. Fig. 17 is a vertical section showing a socket in the tank-bottom, a discharging-tube therefrom, a bottle-filling pipe, an elastic or flexible sleeve connecting said tube and pipe, a centering-bell, and the frame supporting the same, and also, in elevation, the divider, the rotary valve in the said socket, and means to operate said valve, the divider being shown in its elevated position and the valve closed. This view is on section-line *x x* of Fig. 7. Fig. 18 is a vertical section on line *y* of Fig. 17, showing the divider in its lowest position and valves opened. Fig. 19 shows in elevation the fingers and stud-pins of the divider. Fig. 20 is a top plan of the fixed portion of the discharge-valve which is in the upper end of the discharge-tube. Fig. 21 is a top plan of the rotary part of the discharge-valve, which I designate the "cup-valve," the same being mounted and movable in a socket of the tank-bottom. Fig. 22 shows in top plan said rotary or cup valve with the fixed part of the valve beneath the same in position when the valve is closed. Fig. 23 is a view as seen on section-line *z* of Fig. 6 and on section-line *z' z'* of Fig. 14, which are in the same plane, of a portion of the bell-centering frame, the guide-rod and tube, the central hub-block, nuts, nut-holders, and screw-rods for adjusting said frame for bottles of different sizes. Fig. 24 is a side elevation of said hub-block. Fig. 25 is a top plan of the same. Fig. 26 is a view, partly in elevation and

partly in section, on line *v v* of Fig. 27, showing the tank and divider with the lifting-finger, friction-rollers, and spring, the last-three-named parts being contained in a box-like extension at the corner of the tank, which is cast therewith. Fig. 27 is a top view of the lifting-finger and its shaft and of the upper friction-roller, together with a view on section-line *w w* of Fig. 26 of the divider and of the tank with its said box-like extension at the corner thereof. Fig. 28 is a top plan view of the adjustable guide-plate for locating the crate. Fig. 29 is a sectional view of the same on line *s s* of Fig. 28, together with a portion of the leg of the machine and the set-screw. Fig. 30 is a side elevation of one of the screw-rods for operating the expansible frame which holds the centering-bells. Fig. 31 is a perspective view of the stop for holding the treadle in its upper and lower positions.

My invention relates to machines for filling a number of bottles simultaneously and equally with a liquid, and it is especially useful in the bottling of liquids which foam or effervesce.

My invention is an improvement upon the bottling-machine shown and described in my application for Letters Patent, Serial No. 672,566; and it consists of the novel construction and combination of the several elements or parts hereinafter particularly described, and specifically set forth in the claims.

In the drawings, 1 represents the frame or standard of the machine and which rests upon the feet 2. On the inner surface of the frame or standard 1 and arranged vertically and parallel with each other are ways or guides 3, between which a slide 4 is vertically movable. A rectangular tank 5 is secured to said standard or frame 1 by bolts 6. A yoke 7 is fastened by bolts 8 to the tank 5 and extends diagonally across and over the top of said tank. The tank 5 has its upper edge all around bent at a right angle to form a flange 9, which is tapped at intervals to receive screws, and on the inner surface of the walls of said tank, near its upper edge, is an inwardly-extending ledge or ridge 10. The tank 5 has ribs 11 on its longer sides to stiffen it and to strengthen the flange 9. The tank 5 is perforated at one side thereof, about midway of its height, as shown at 12, for the reception of a foam-pipe 13 and also on one side, near its bottom, as shown at 14, for the reception of a supply-pipe 15. The pipe 15 has a valve 16 and conducts the liquid to the tank 5 from a keg, reservoir, or other source of supply. A rectangular piston 17, having a central tubular post 18, which is screw-threaded on the inside, and a closed bottom 19 and an open top, fits in the tank 5, bearing against the edge of the ridge or ledge 10, and is vertically movable in said tank by means of the screw 20, which is turned by the crank 21, the latter being centrally and rotatably mounted in an enlargement or boss 22 of the yoke 7 and fastened upon the screw 20. A gasket 23, having a bent flange, extends around the piston 17 on the outside and serves, in combination with the interior ridge 10 of the tank 5, to confine and suitably compress the packing 24, thus preventing any escape of the liquid over the top of the tank. This compression of the packing 24 is effected by means of the screws 25, which pass through the flange of the gasket 23 and through the flange 9 of the tank 5 and which are held in their adjusted position by the check-nuts 26.

The vertical walls of the tank 5 have the external flange 27. Said walls flare inwardly somewhat, as shown in section in Fig. 6, and are thickened near their bottom and finished with a vertical inner surface, as seen in said figure. If desired, said walls of the tank 5 may project at the corners of the tank, as shown in Figs. 26 and 27, to form box-like extensions.

The bottom of the tank 5 is a separate piece having an exterior flange 28, by which it is fastened to the flange 27 of the walls of the tank 5 by the bolts 29. The tank-bottom has a series of conically-shaped depressions or sockets 30, each of which has an interiorly-screw-threaded discharge-port 31. Between said depressions or sockets 30 are the walls 32.

In each socket or depression 30 is mounted a rotatable cup-valve 34, the shape of which is illustrated in Figs. 17, 18, 20, and 21, and having a diagonal groove 35 in the inside thereof. A discharge-tube 36, screw-threaded at its upper end, enters and fits into the port 31 of the socket 30. It has an annular shoulder or ridge 37, and fastened within the top of said tube is the fixed member of a valve consisting of a circular plate 38, with two quadrant-shaped apertures 39 therein arranged diametrically. A rivet or screw 40 passes through the center of the bottom of the cup-valve 34 and through the center of the circular plate or disk 38. In the bottom of each cup-valve 34 are two diametrically-arranged quadrant-shaped apertures of the same size as those of the disk 38 and registrable therewith when moved upon the rivet or screw 40 of the disk 38, and when said cup-valve is turned a quarter-revolution the cup-valves 34 are kept in position by means of a thin plate 146, which is of the same area and dimensions as the tank-bottom illustated in Fig. 13 and provided with circular apertures of a diameter slightly less than the diameters of the sockets 30 in said figure. This thin plate, as seen in Figs. 6, 17, and 18, rests upon the top surfaces of the walls 32 between the sockets and overhangs the edges of said sockets, as plainly seen in Figs. 17 and 18, thereby preventing the rise of said cup-valves 34 out of the sockets 30.

A divider 41 consists of a rectangular frame having cross-partitions 42 of the same height and arranged in equal spaces and running lengthwise and crosswise to form square compartments of equal size. The divider 41 is open at the top and bottom. It is supported

by the four fingers 43, which are fastened on shafts 44, and they are each in contact with two friction-rollers 45 46, which are mounted rotatably on pivots 47 48, extending from the outside of the divider 41 near the corners thereof. The divider 41 is vertically movable in the tank 5 and fits into the same, as fully shown in Figs. 6 and 7. In Fig. 6 the divider 41 is shown in its extreme elevated position, and in Fig. 7 it is seen with its bottom edge (and with the bottom edges of its partitions 42) resting upon the upper surface of the walls 32, which are between the sockets or depressions 30. The arrangement of the compartments of this divider is best shown in Fig. 12. In Figs. 26 and 27 I show said lifting-fingers 43 and rollers 45 46 as contained within a box-like extension at each corner, respectively, of the tank 5.

From the partitions 42 of the divider there are in each compartment two oppositely-arranged fingers 49, each having stud-pins 50 at their lower ends arranged as shown in Figs. 6, 9, 10, 17, 18, and 19. Said stud-pins 50 enter into the diagonal grooves 35 of the cup-valves 34.

A crank 51, having a handle 52, is mounted upon a shaft 53, which extends through the side of the machine. (See Figs. 1 and 2.) Fastened upon the shaft 53 and moved by it is mounted an arm or lever 54. The valve 16 of the supply-pipe 15 has a stem or shaft 55, the end of which passes through a bracket 56, which is fastened on the flange 28 of the tank-bottom. A lever-arm 57 is fastened on and is movable by the stem or shaft 55, and a link or rod 58 is pivoted at its ends to the lever-arms 54 and 57, respectively. A crank 59, having a handle 60, is mounted upon a stud or pin 61, which extends from the side of the tank 5. A cross-arm 62 is centrally mounted rotatably upon the stud or pin 61 and is integral with and movable by and with the crank 59. On the shafts 44, which extend through the opposite sides of the tank 5, as shown in Fig. 12, the lifting-fingers 43 are fixed, as also lever-arms 63 64. A link or rod 65 is pivotally connected at each end with the lever-arm 63 and cross-arm 62, and a link or rod 66 is pivotally connected at each end with the lever-arm 64 and cross-arm 62, as seen in Fig. 2. A cross-bar 67 connects the legs of the machine, Figs. 3 and 5. On the slide 4 is a bracket 68, and from the frame of the machine extends a bracket 69 also, Fig. 5. Another bracket 70 extends from the slide 4, as seen in Fig. 1. Lazy-tongs 71 have their members pivoted, as shown at 72 73, the lower member 74 being pivoted at 75 to the bracket 69, Fig. 5, the member 76 being pivoted to the member 74 at 77 and extending forward to form a treadle 78. The upper members 79 80 are pivoted at 81 to the bracket 70 of the slide 4. Cross-bars 82 connect the frame 1 and legs 83 of the machine near the bottom, as seen in Fig. 1. If desired, guides or ways may be furnished to confine the lazy-tongs to a vertical plane of movement. A hanger may be formed on the cross-bar 82, as shown in Fig. 31, and provided with two slots, into which the treadle 78 may be moved when at its upper or lower position and so be held and locked in place.

On the outer side of the slide 4 is a stud or pin 84, which projects through an opening 85 in the frame 1 of the machine, Figs. 1 and 2. A bracket 86 is bolted to the frame, Fig. 5, and a pulley 87 is rotatably mounted therein. A chain 88 is fastened at one end to the stud or pin 84 of the slide 4 and passes over said pulley. On the opposite end of the chain is a weight 89. Brackets 90 extend from the slide 4, near the top, and serve to support the crate 91, which contains the bottles 92 in the compartments therein formed by the partitions 93. The crates are accurately located in position by means of the guides 94 upon the upper surface of the rounding legs 83. These guides 94 may be made adjustable by means of large holes or slots, (see Figs. 28 and 29,) through which set-screws are inserted, entering screw-holes in the legs 83 of the machine, and thus they are capable of receiving and locating crates of different sizes. A bottle-filling pipe 95 has near its top an annular ridge 96, and a flexible tube or sleeve 97, preferably of india-rubber, connects the pipe 95 to the discharge-tube 36 by passing and stretching over the annular ridges 96 and 37 thereof, respectively, leaving a considerable space between the upper end of the pipe 95 and the lower end of the tube 36, as seen in Fig. 17. Each of the ports 31 of the sockets 30 has a discharge-tube 36, and each discharge-tube 36 has a filling-pipe 95, connected to and continuous with it by a flexible tube or sleeve 97, as shown.

A frame composed of oblong rectangular open bars 98, 98′, 98″, 98‴, 99, 99′, 99″, 99‴, 99^{IV}, and 99^{V}, crossing each other at right angles, (see Fig. 15,) is supported by chains 100, fastened at their lower ends through eyes 101 of the bars 98 98‴ and at their upper ends by eyes 102 to the tank-bottom. A square block or hub 103 has a central circular aperture 104, which is screw-threaded, and on each of its four sides and extending along its bottom a groove 105, chambered at its inner end, as shown at 106. The circular opening 104 engages by its screw-threads a guide-tube 107, whose bottom is screw-threaded to allow such engagement. The upper end of the guide-tube 107 has a centrally-perforated cover or cap screwed thereto, and a guide-rod 108, having a head 109, which is inside the guide-tube 107, Fig. 23, extends up to and is screwed into a boss 110 of the tank-bottom, Fig. 6.

On the bars 98, 98′, 98″, and 98‴, respectively, are fastened nut-holders 111^{a}, 111^{b}, 111^{c}, and 111^{d}, and on the bars 99, 99′, 99″, 99‴, 99^{IV}, and 99^{V}, respectively, are fastened nut-holders 112^{a}, 112^{b}, 112^{c}, 112^{d}, 112^{e}, and 112^{f}. In each of said nut-holders is a nut (see Fig. 23) held thereby from rotating. Said nuts are tapped with screw-threads of dif-

ferent pitches, as follows: The nuts held by the nut-holders 111^a and 111^d have the same coarse pitch and the nuts held by the nut-holders 111^b and 111^c have the same fine pitch. The nuts held by the nut-holders 112^a and 112^f have the same very coarse pitch, the nuts held by the nut-holders 112^b and 112^e have the same moderately-coarse pitch, and the nuts held by the nut-holders 112^c and 112^d have the same fine pitch. A screw-rod 113, having two screw-threaded portions, passes through the nuts of the nut-holders 111^a and 111^b with threads of the same pitch as said nuts, respectively, and a similar screw-rod 114, having two screw-threaded portions, passes through the nuts of the nut-holders 111^c and 111^d with threads of the same pitch as said nuts, respectively. A screw-rod 115, having three screw-threaded portions, passes through the nuts of the nut-holders 112^a, 112^b, and 112^c with threads of the same pitch as said nuts, respectively, and a screw-rod 116, having three screw-threaded portions, passes through the nuts of the nut-holders 112^d, 112^e, and 112^f with threads of the same pitch as said nuts, respectively. Each of the screw-rods 113, 114, 115, and 116 has a small round head 117, Fig. 23, which fits loosely in and is confined in the chambers 106, respectively, of the grooves 105, respectively, of the square hub or block 103. Each of said screw-rods has a handle or knob 118 at its outer end. The screw-rod 115 (as also 116) is made, as seen in Fig. 30, of differing diameters and has four shoulders 139, 140, 141, and 142, the former of which serves to limit the outer travel of the cross-bars, and also has the screw-threaded portions 143, 144, and 145 of various pitches, as above stated. The screw-rods 113 and 114 are made in like manner, except that they have three shoulders instead of four and have two screw-threaded portions instead of three.

At the bottom of each filling-pipe 95 is loosely fitted a centering-bell 119, having a central aperture for the reception of the lower end of said pipe. The centering-bell is placed in the open spaces of the bars 98 99, &c., at the points where they cross. A flange 120 of the bell 119 extends over the cross-bars 99, as seen in Fig. 17, and a washer 121, resting on a shoulder of said bell, limits its upward movement.

Each lifting-finger 43 has at its heel two substantially-straight portions on the edge thereof, inclined to each other at an angle, as seen in Figs. 8 and 9, and a flat spring 122, fastened to the inside of the tank by a bolt or screw 123, has its lower free portion in forcible contact against one or the other of said straight portions of the edge of the lifting-finger 43 to hold said finger in position at both the upper and lower limits of its movement.

The indicator has a top portion 124 with a bent neck or tube 125, to which a pipe 126 is secured leading to the keg, reservoir, or other source of supply (not shown) to allow the foam to pass over into the top of the keg again. It also has a lower circular and centrally-perforated disk or plate 127, with a central tube or pipe 128, which is screw-threaded on the outside, Fig. 11. This tube or pipe 128 screws upon the end of the bent pipe 13, Fig. 6. The disk 127 has an annular flange 129, within which, all around, is a packing-ring 130. (Shown in Fig. 11 by heavy lines.) A cylindrical glass tube or receptacle 131 is held between the top portion 124 and disk 127 of the indicator by bolts 132, which pass through said top portion and disk, and a packing-ring may be inserted between the glass cylinder and top portion, if necessary. A pipe 133 is supported by and movable in the tube 128 and has two extensions 134, on the top of which is a centrally-perforated disk 135, Figs. 10 and 11. On the top of this disk 135 rests another disk 136, which has a stem 137 passing down through the central perforation of the disk 135. A rubber or other bulb or float valve 138, with a hemispherical end, is supported by the disk 136 and fastened thereto.

Having thus described the parts of my improved bottle-filling machine, I will now proceed to explain its operation.

The liquid which is to be bottled is contained in a keg or other reservoir (not shown) and flows therefrom through the supply-pipe 15, Fig. 6, the valve 16 being then open, as shown in said figure. The liquid flows through the valve 16 into the tank 5 and fills the same. The quantity of liquid which the tank 5 is capable of holding is determined by the piston 19, which serves as a displacement-plug, being adjustable by means of the screw 20. Said screw 20 is moved by the handle 21 and engages with the screw-threaded tube 18. The distance to which the piston 19 descends into the tank determines the quantity of the liquid contents of the tank—as, for example, if it is desired to fill twenty-four quart bottles at each operation of the machine the capacity of the tank (including the pipe 13) should be fixed by the piston 19 as six gallons. While the liquid is running into the tank the valves 34 38 are of course closed. When the liquid flows up into the tube 13 and glass tube 131, (through the pipe 133 and its openings between the extensions 134,) it causes the float-valve 138 to rise (by the buoyancy of said float-valve) until the rounded end thereof closes the bent tube or neck 125, as indicated in dotted lines in Fig. 11, and thus shows the solid liquor (the foam having passed over) and indicates that the tank is full. When the tank 5 has been sufficiently filled, (and this can be ascertained by watching the rise of the liquid in the glass cylinder of the indicator, as above described, until the bulb 138 of the float-valve has risen to fill the opening of the bent pipe or neck 125,) the valve 16 of the supply-pipe 15 must be closed by turning it ninety degrees from the position shown in Fig. 6. This is done by means of the handle 52 of the crank 51. (See Figs. 1, 2, 3, and 13.)

The handle 52 is brought by the hand of the attendant from the position shown in solid lines in Fig. 2 to the position shown in dotted lines in said figure, the result being that by the lever-arm 54, moved by the crank 51 and also by the link or rod 58, the lever-arm 57 is carried from the position shown in solid lines in said figure to the position shown in dotted lines therein. This movement of the lever-arm 57 turns the stem 55 of the valve 16 (see Fig. 13) a quarter-revolution and causes the valve 16 to close the supply-pipe 15. The crate of bottles is then raised into position for the filling operation. The crate 91, having the bottles 92 therein, is carried by hand and placed on the brackets 90. Said crate is accurately located by means of the guides 94, Fig. 5, as the attendant pushes the crate inwardly into position. He then depresses the treadle 78 by his foot, and this moves the lazy-tongs 71 and extends them upwardly, so that the slide 4, to the bracket 70 of which the lazy-tongs 71 are pivotally fastened, (see Fig. 1,) moves up along the guides or ways 3 of the standard or frame 1. The slide 4, by its brackets 90, carries by this upward movement the crate 91 from the position shown in Fig. 1 to the position shown in Fig. 7. This upward movement of the slide 4 with its load is facilitated by the weight or counterpoise 89, which is on the end of the chain 88, the latter being fastened at its lower end to the stud or pin 84 of the slide 4 and passing up over the pulley 87. The counterpoise 89 should be a little less in weight than the weight of the crate, bottles, and slide, so that comparatively little pressure upon the treadle 78 will be sufficient to raise the crate and bottles to the position shown in Fig. 7. As the crate 91 rises the noses of the bottles 92 enter up into the flaring mouths of the centering-bells 119, respectively, and so are guided to the lower ends of the filling-pipes 95. The pipes 95 when once introduced, as aforesaid, into the neck of the bottles extend down into the bottles as the bottles continue to ascend until, as shown in Fig. 7, the lower ends of said pipes 95 reach nearly to the bottom of the bottles, respectively. The divider 41 is then operated to divide the whole quantity of the liquid contained in the tank 5 into as many equal parts as there are compartments in the divider, it being seen and understood that the number of compartments is the same as the number of bottles to be filled—in the drawings shown to be twenty-four. This result is accomplished by means of the handle 60 of the crank 59. (See Figs. 1, 2, 6, 7, and 12.) By moving the handle 60 the cross-arm 62 is correspondingly moved, and this by the links or rods 65 and 66 moves the lever-arms 63 and 64, respectively, and these lever-arms 63 and 64 partially rotate the shafts 44 in unison. (See Fig. 12.) The shafts 44 move the lifting-fingers 43, and these, bearing against the friction-rollers 45 46, which are rotatable on studs 47 48 of the divider 41, cause a vertical movement of the divider 41 in the tank 5 downward until the bottom edge of the divider 41 rests upon the walls 32, which separate the sockets or depressions 30 of the tank-bottom one from another. The result of this movement of the divider 41 is that it, together with its partitions 42, forms, with said sockets 30 of the tank-bottom, a series of separate receptacles for the liquid, the divider and its partitions passing down through the liquid and equally dividing it thereby into as many parts as there are compartments in the divider. The liquid is discharged from the compartments of the divider into the bottles through the cup-valves 34, which are operated as follows: When the divider 41 descends, as above described, it carries downward with it the fingers 49, the stud-pins 50 of which, moving down within the diagonal grooves 35 of the cup-valves 34, cause said cup-valves 34 to turn ninety degrees upon the pivots 40, respectively, so that the openings of the said cup-valves, which before were closed by the diametrical web of the disk 38, respectively, as shown in Fig. 22, now register with the openings 39 of said disk, and the liquid then flows down through said valves into the filling-pipes 95 and fills the bottles 92. When the divider 41 first comes in contact by its edge with the walls 32 between the sockets or cups 30 of the tank-bottom, the level of the liquid in the tank 5 is of course above the top of said divider; but as the liquid is discharging through the valves 34 and pipes 95 into the bottles the level of the liquid comes below the top of the divider, and thereafter the liquid in each compartment is separated by the partitions 42 from that in all the other compartments, and so is equally divided. So much of the liquid as is at first above the top of the divider is also, however, equally divided, because, although its level is lowering by the discharge, said portion of the liquid, like all the rest of it, must pass through the compartments and be equally divided thereby before it can be discharged into the bottles. The machine should be so accurately placed that the liquid in the tank shall at all times have its level parallel with the bottom of said tank. When all the liquid in the tank 5 has been thus divided and discharged into the bottles, the attendant reduces the pressure of his foot upon the treadle 78, and as the weight of the filled bottles, the crate, and slides is somewhat counterbalanced by the weight 89 they descend as quickly as the attendant allows. The crate 91 is then removed by hand and another crate of bottles is put upon the brackets 90 for the next operation. The attendant then moves the handle 60 of the crank 59 to its first position and as a result the lifting-fingers 43 raise the divider to its former position, and the fingers 49 of said divider by their stud-pins 50 operating in the diagonal grooves of the cup-valves 34, respectively, rotate said valves ninety degrees, and so close them, as at first. A new quantity of liquid is then ad-

mitted to the tank 5 for the next operation by moving the handle 52 of the crank 51 to its first position, thus opening the valve 16 in the pipe 15, as before.

By the devices shown in Figs. 14 and 15 I am able to adjust the frame for the centering-bells so that I can adapt the machine to filling bottles of different capacities—as, for example, for quart or pint bottles. Fig. 14 shows said frame when adjusted for a crate of twenty-four pint bottles. The circles at the intersections of the open bars, drawn in solid lines, represent the filling-tubes 95 in cross-section. When a crate of twenty-four quart bottles is used, the frame must be expanded both lengthwise and crosswise, and said filling-tubes must be moved from the positions shown in Fig. 14 by solid circles to the positions shown in said figure 14 by dotted circles, the direction and length of such movement being indicated by the lines which connect said circles. This adjustment is accomplished by use of the screw-rods 113, 114, 115, and 116, respectively. The screw-rod 113 being rotated by the hand of the attendant to unscrew the same draws by its coarse-pitched threads engaging with the nut in the nut-holder 111^a the bar 98 from the position shown in Fig. 14 to the position shown in Fig. 15, and at the same time, by its fine-pitched threads engaging with the nut in the nut-holders 111^b, the bar 98′ from the position shown in Fig. 14 to the position shown in Fig. 15. In like manner the screw-rod 14 moves the bars 98″ and 98‴ and the screw-rod 115 moves the bars 99, 99′, and 99″ and the screw-rod 116 moves the bars 99‴, 99^{iv}, and 99^{v}, there being, as shown, three varieties of thread-pitches on the screw-rods 115 and 116, with nuts in the nut-holders corresponding thereto and engaging therewith. The flexible sleeve or tube 97, connecting the tube 36 and filling-pipe 95, is made sufficiently long and is sufficiently flexible to allow the pipes 95 to enter the bottles, notwithstanding that the bottles are farther apart.

I claim as a novel and useful invention and desire to secure by Letters Patent—

1. In a bottle-filling machine, the combination of a tank having discharge-ports arranged in equal spaces in the bottom thereof, valves in said ports, respectively, a divider movable in said tank and made with partitions forming a number of equal compartments corresponding in position with said ports, respectively, and constituting, when in contact with the tank-bottom, a series of receptacles of equal capacity, fingers projecting from said divider and its partitions and provided with means to operate said valves, substantially as specified.

2. In a bottle-filling machine, the combination of a tank, the bottom of which is made with a series of equidistant, conical sockets or depressions, a discharge-port in the bottom of each socket and a discharge-pipe in each of said ports, a rotary cup-valve in each of said sockets, capable of opening into the discharge-port thereof and provided with diagonal grooves on the sides thereof, a divider made with partitions forming equal compartments, corresponding in position with said sockets, fingers extending from said divider and partitions and each provided with a stud engaging that cup-valve which is beneath it in the diagonal groove thereof, substantially as described.

3. In a bottle-filling machine, the combination of a tank, a supply-pipe connecting the same with a source of supply, a yoke extending across the top of said tank, a piston movable in said tank and having a central screw-threaded portion, a screw extending through said yoke into the screw-threaded portion of the piston, discharge-ports in the bottom of the tank arranged in equal spaces, valves in said ports, respectively, a divider movable in said tank and made with partitions forming a number of equal compartments corresponding in position with said ports, respectively, and constituting, when in contact with the tank-bottom, a series of receptacles of equal capacity, fingers projecting from said divider and its partitions and provided with means to operate said valves, substantially as specified.

4. In a bottle-filling machine, the combination of a tank, a supply-pipe connecting the same with a source of supply, a yoke extending across the top of said tank, a piston movable in said tank and having a central screw-threaded portion, a screw extending through said yoke into the screw-threaded portion of the piston, a tank-bottom made with a series of equidistant, conical sockets or depressions, a discharge-port in the bottom of each socket and a discharge-pipe in each of said ports, a rotary cup-valve in each of said sockets capable of opening into the discharge-port thereof and provided with diagonal grooves on the sides thereof, a divider made with partitions forming equal compartments, corresponding in position with said sockets, fingers extending from said divider and partitions and each provided with a stud engaging that cup-valve which is beneath it in the diagonal groove thereof, substantially as described.

5. The expansible frame for bottle-filling machines, consisting of a series of open bars crossed by a series of other open bars, a central square hub or block having grooves and sockets on the sides thereof, nut-holders upon said bars at the intersections thereof, respectively, nuts in said holders, and screw-rods engageable with said nuts, respectively, and having heads which are engageable with said central hub or block in the grooves and sockets thereof, substantially as set forth.

6. The expansible frame for bottle-filling machines, consisting of a series of open bars, crossed by a series of other open bars, a central square hub or block having grooves and sockets on the sides thereof, nut-holders upon said bars at the intersections thereof, respectively, nuts in said holders, the threads of

the outer nuts being coarse-pitched and the threads of the inner nuts being fine-pitched and the threads of the intermediate nuts having a medium pitch, and screw-rods, having threads of pitches corresponding to those of said nuts, respectively, and engageable therewith and having heads which are engageable with said central hub or block in the grooves and sockets thereof, substantially as shown.

7. In a bottle-filling machine, the combination of a tank having ports through the bottom, discharge-tubes in said ports, filling-pipes, flexible tubes or sleeves connecting said discharge-tubes and filling-pipes, centering-bells through which the filling-pipes pass, and an expansible frame for said centering-bells, consisting of a series of open bars, crossed by a series of other open bars, a central square hub or block having grooves and sockets in the sides thereof, nut-holders upon said bars at the intersections thereof, respectively, nuts in said holders, the threads of the outer nuts being coarse-pitched and the threads of the inner nuts being fine-pitched, and screw-rods, having threads of pitches corresponding to those of the said nuts, respectively, and engageable therewith and having heads which are engageable with said central hub or block in the grooves and sockets thereof, substantially as specified.

8. In a bottle-filling machine having a tank with a bottom made in a series of circular sockets, each of which has a discharge-port, a rotary cup-valve in each of said sockets, adapted to turn either to close said port or to open into the same, a metallic plate of the same area as the tank-bottom and provided with circular openings, each of a diameter somewhat less than the diameter of said sockets and corresponding in location with said sockets so as to slightly overhang the edge of the contiguous sockets, respectively, and operating to confine said rotary cup-valves within the sockets of the tank-bottom, and screw-bolts passing through said tank, tank-bottom and metallic plate and fastening them together, substantially as shown.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES G. WARREN.

Witnesses:
ANNIE E. PERCE,
WARREN R. PERCE.