April 3, 1934. A. CALLESON 1,953,643

FILLING MACHINE

Filed Aug. 31, 1928 8 Sheets-Sheet 1

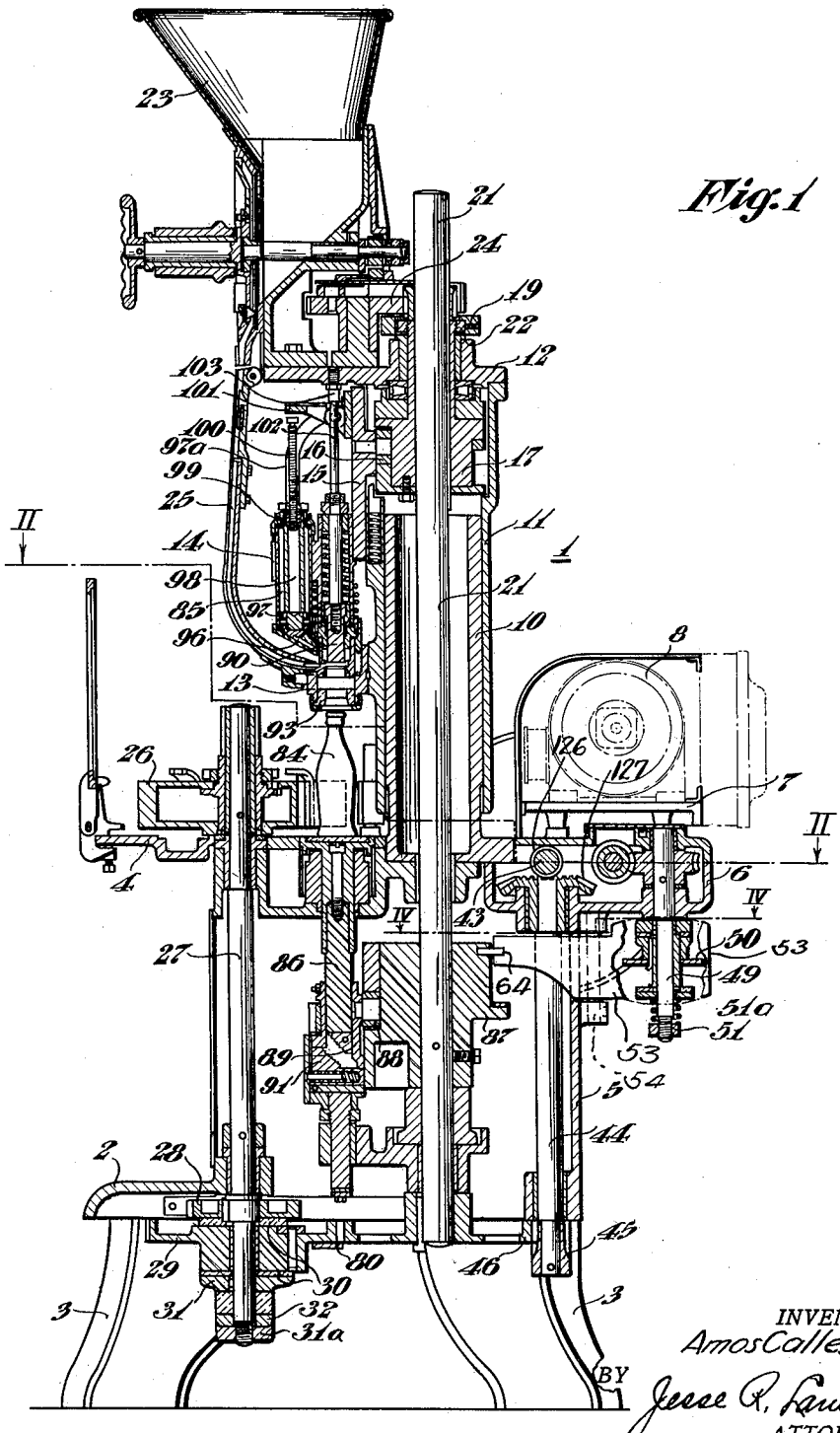


Fig. 1

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FILLING MACHINE

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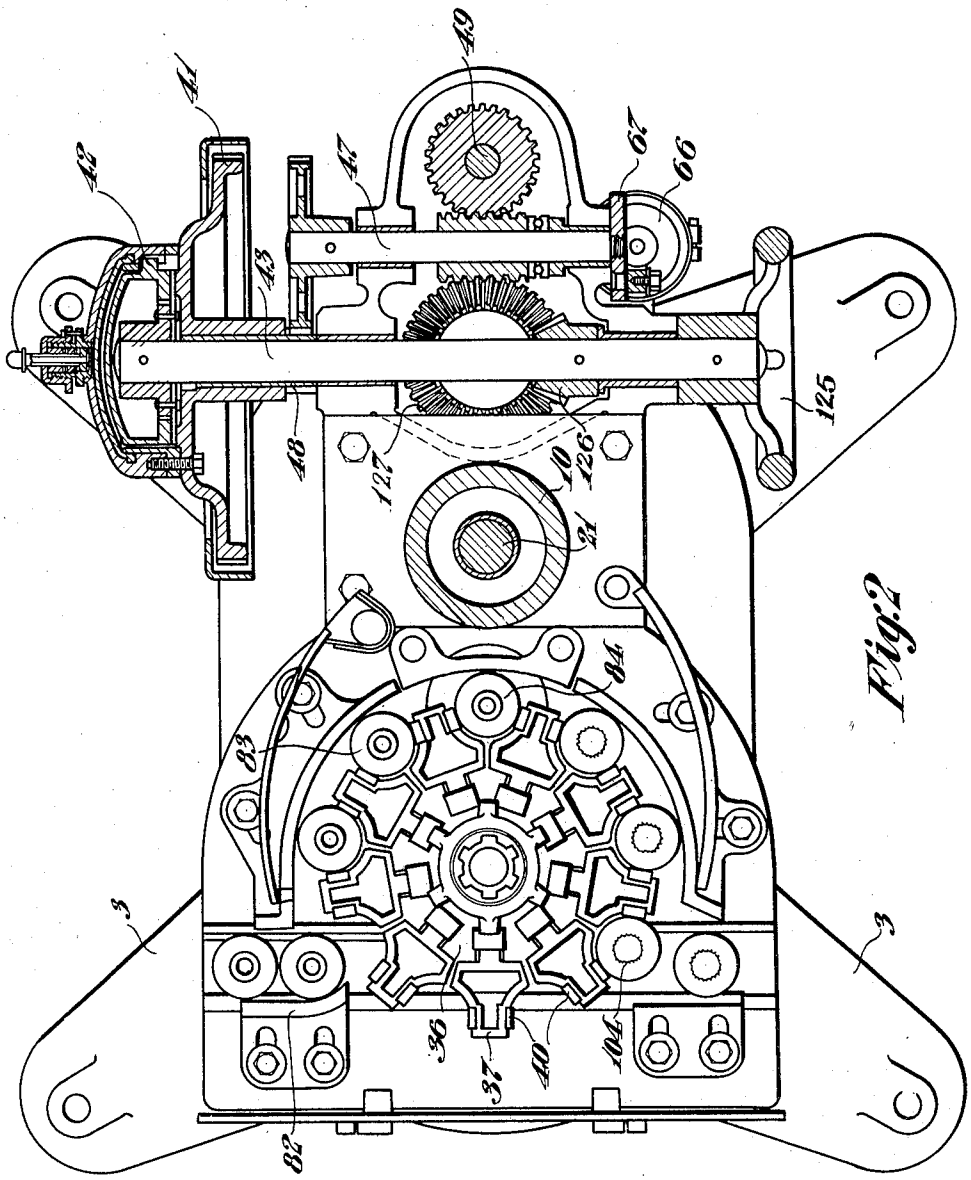


Fig. 2

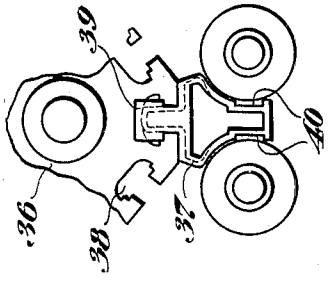


Fig. 3

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FILLING MACHINE

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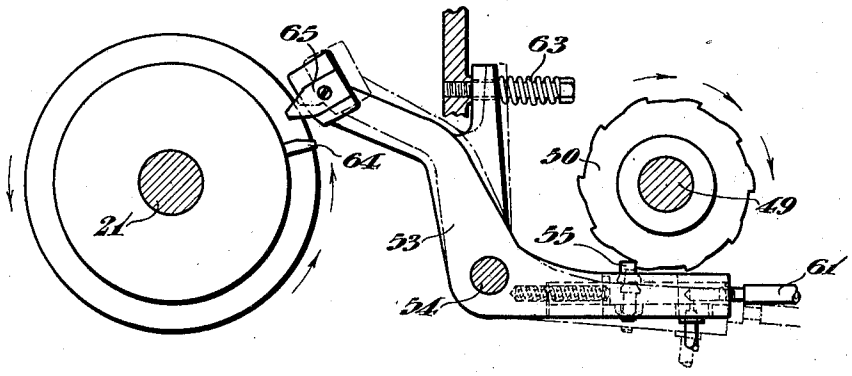


Fig. 4

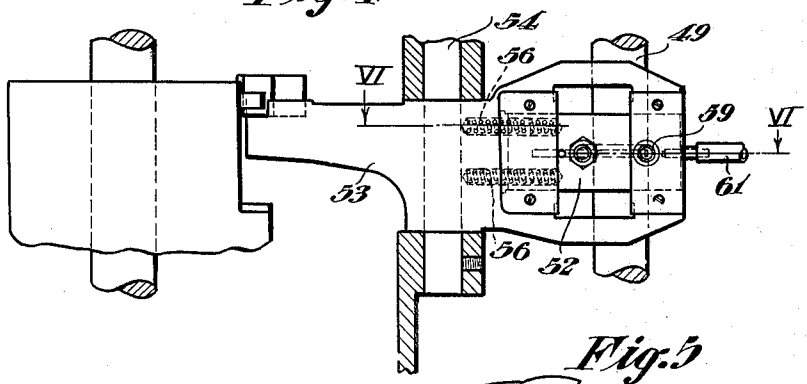


Fig. 5

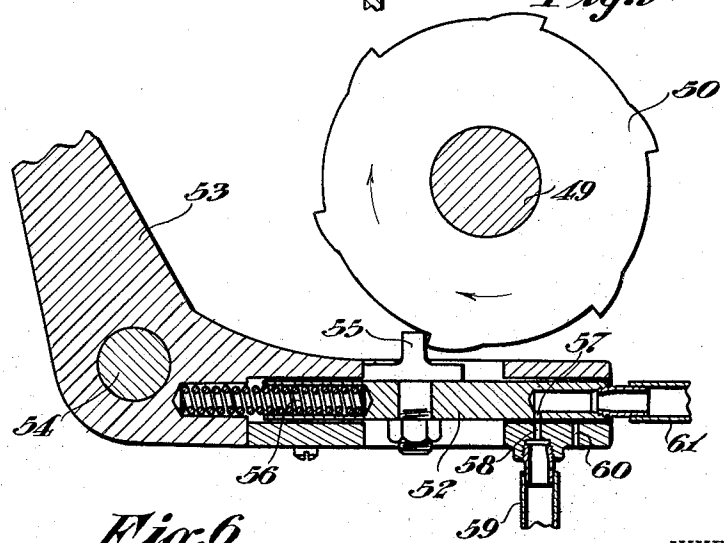


Fig. 6

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FILLING MACHINE

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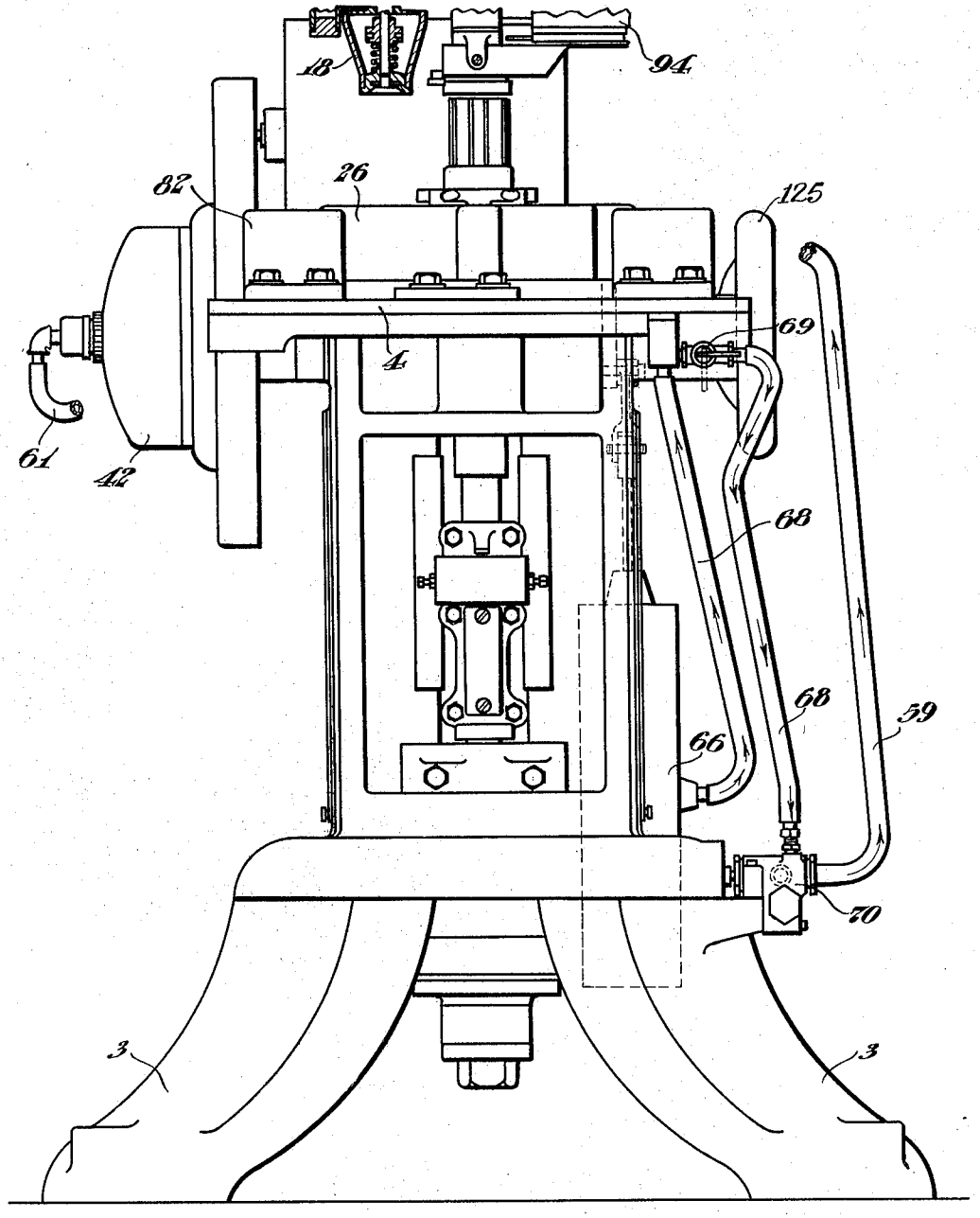


Fig. 7

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FILLING MACHINE

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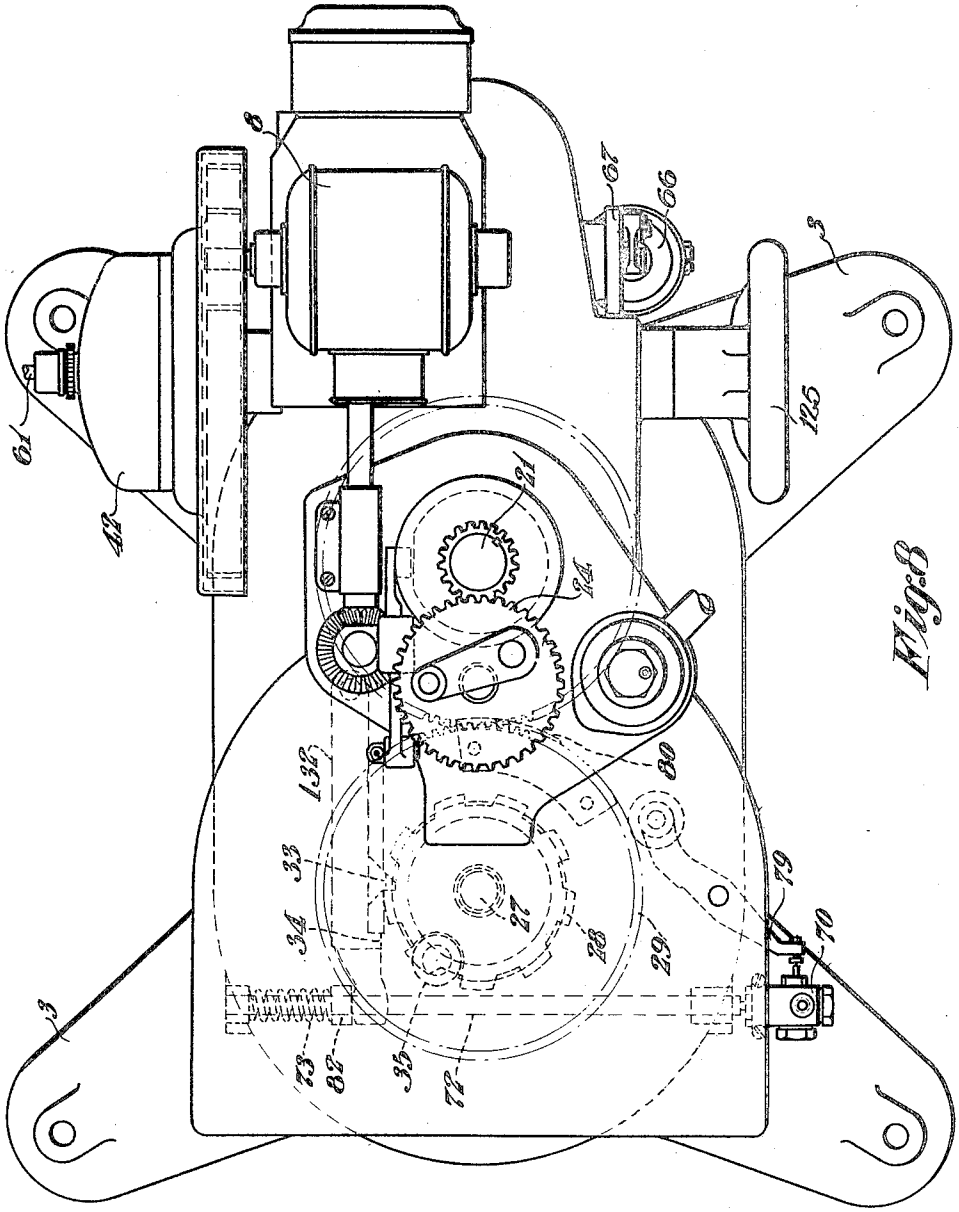


Fig. 8

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FILLING MACHINE

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Fig. 9

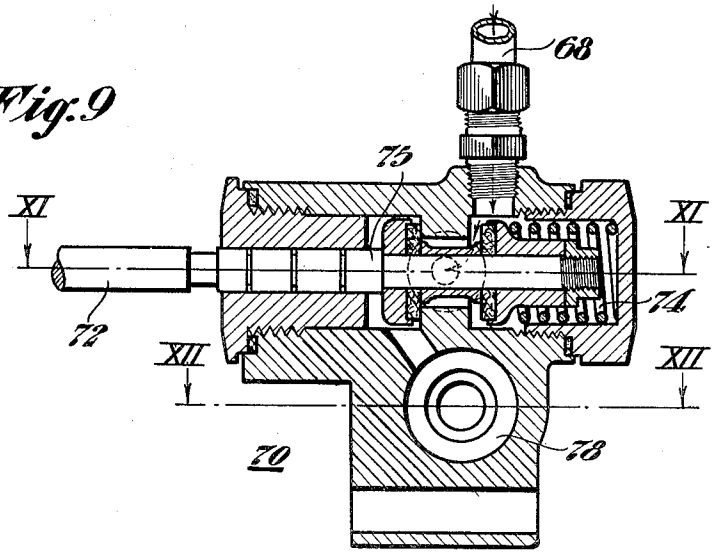
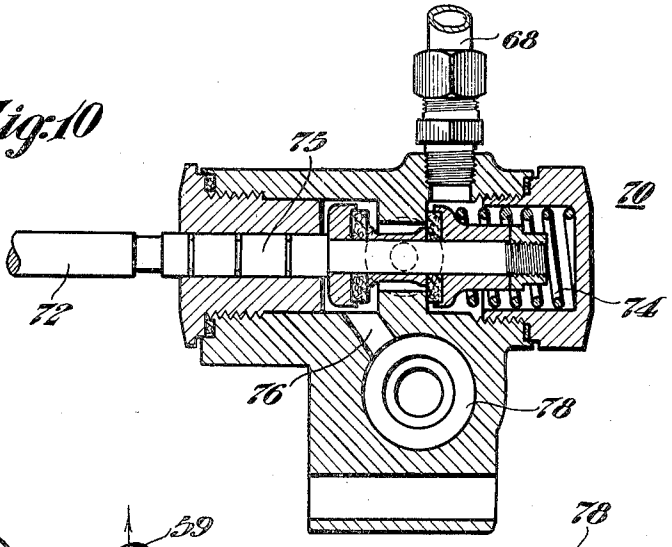


Fig. 10



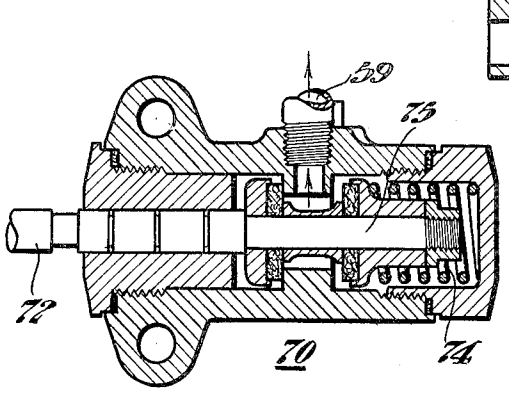


Fig. 11

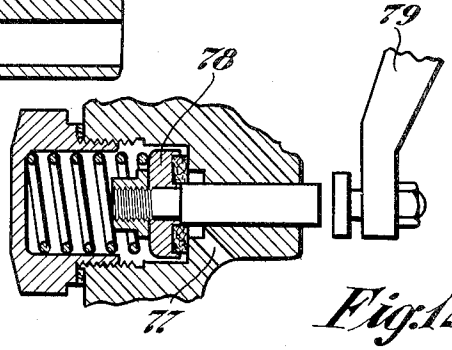


Fig. 12

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FILLING MACHINE

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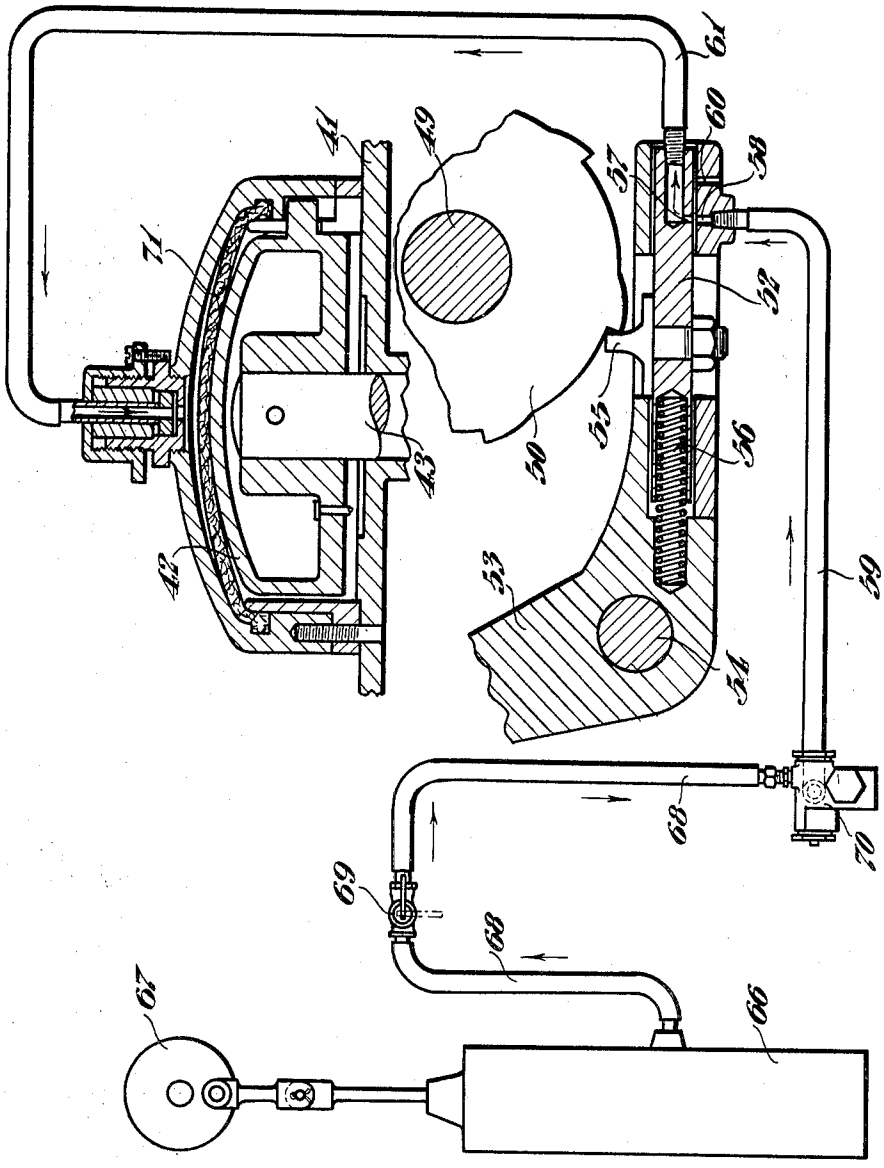


Fig. 13

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FILLING MACHINE

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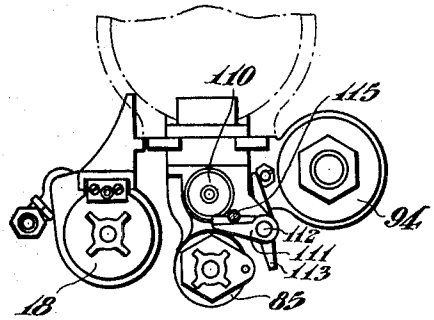


Fig. 15

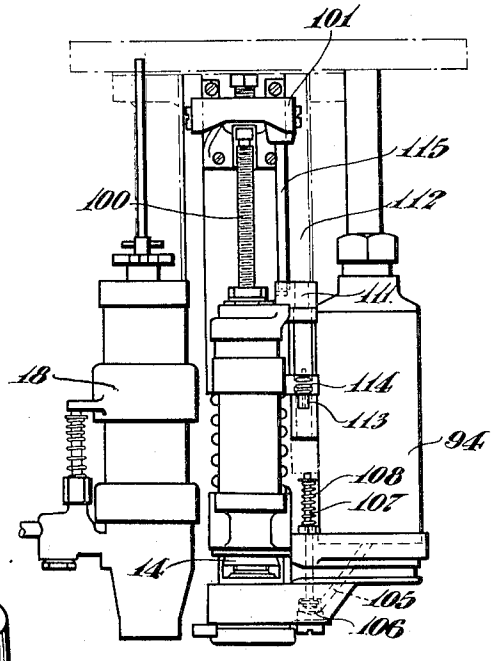


Fig. 14

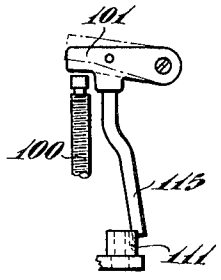


Fig. 16

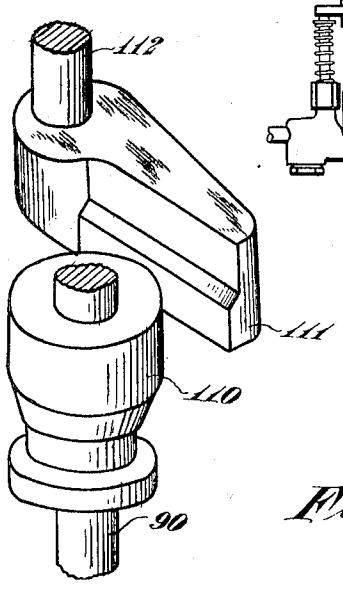


Fig. 17

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Patented Apr. 3, 1934

1,953,643

UNITED STATES PATENT OFFICE

1,953,643

FILLING MACHINE

Amos Calleson, Merrick, N. Y., assignor, by mesne assignments, to Crown Cork & Seal Company, Inc., Baltimore, Md., a corporation of New York

Application August 31, 1928, Serial No. 303,182

16 Claims. (Cl. 226—77)

My invention relates to filling machines and particularly to automatic bottling machines.

An object of my invention is to provide a filling machine that will operate automatically to fill bottles substantially without any breakage.

A further object of my invention is to provide a safety arrangement by means of which the obstruction of the bottle turret by a bottle or other body operates to stop the filling machine, and by means of which the machine cannot be started unless the turret is in proper registry.

A further object of my invention is to provide a filling machine in which the time for filling bottles of different capacities may be accurately adapted to the varying requirements.

A further object of my invention is to provide a filling machine which operates at constant speed to feed bottles for the filling operation but which may be stopped for periods substantially proportional to the capacity of the bottles being filled whereby the machine operates at its maximum efficiency, regardless of size of bottles being filled.

A further object of my invention is to provide a turret mechanism in which upward movement with the bottle lift is substantially eliminated and the inertia to be overcome in operating the filling machine is materially reduced.

A further object of my invention is to provide a filling machine which will automatically stop in case a bottle is not properly placed in position under the filling head or a bottle fails to be released from the filling head at the proper time.

A still further object of my invention is to provide a mechanism for automatically cutting off the liquid supply to a bottle when the latter is filled to a predetermined level.

Other objects will be apparent from an understanding of the principles of construction and operation of the apparatus of my invention.

The filling machine of my invention comprises in a preferred form a single filling head by means of which bottles are successively filled as they are temporarily held in position in their paths of movement through the machine and past the filling head. The bottles are actuated by a rotatable turret in a step-by-step movement relative to the continuous movement of the machine through a cycle but the machine stops for a period sufficient to fill the bottle under the filling head. Operation is then automatically resumed to place the next bottle in position.

The length of the filling period or dwell is timed in accordance with the size of the bottles being used. To change the time permitted for filling, a toothed disc is replaced by another disc having the required number of teeth to adapt the cycle of operations to the capacity of the bottles being filled.

The filling machine is power-operated. The connection to a continuously rotating motor is controlled by a fluid-pressure clutch which is automatically controlled by the timing disc to provide intermittent operation of the machine, as stated above. The fluid-pressure connections of the clutch are interlocked with the timing or dwell mechanism and also with the turret-operating mechanism. The turret has a friction grip connection to its driving mechanism.

The latter connection provides a safety feature in that the machine stops whenever a bottle is not properly delivered to the filling head or when a bottle hangs or sticks in the filling head. Breakage of bottles and the resultant delays and waste of materials is thus substantially entirely avoided.

The turret for actuating the bottles into and out of operative position is provided with vertically slidable end portions or arms which move with the corresponding bottle when the latter is carried up or down by the bottle lift. This arrangement renders it unnecessary to lift the entire turret and thereby slide it with respect to the other bottles not being lifted, as has been the previous practice.

In the accompanying drawings,

Figure 1 is a view in vertical section of the filling machine of my invention;

Fig. 2 is a view, partially in plan and partially in section on line II—II of Fig. 1;

Fig. 3 is a plan view in enlarged detail of a portion of the bottle turret with bottles in operative relation thereto;

Figs. 4 and 5 are respectively views in section on line IV—IV of Fig. 1 and in elevation of parts of the timing or dwell control mechanism, parts of Fig. 5 being in section;

Fig. 6 is an enlarged sectional view taken on line VI—VI of Fig. 5;

Fig. 7 is an elevational view of the lower portion of the filling machine illustrating the fluid pressure system, parts of which are broken away and a portion of the syruper head being shown in section;

Fig. 8 is a top plan view of the machine of Fig. 1, the crown hopper and certain of the upper parts being removed;

Figs. 9, 10, 11 and 12 are enlarged sectional views of the automatic stop mechanism for interlocking the fluid-pressure control system and

certain of the movable parts of the filling machine;

Fig. 13 is a partially diagrammatic view of the essential portions of the fluid-pressure control system, parts being shown in section;

Figs. 14 and 15 are respectively side elevational and top plan views of the filling and crowning mechanism and the associated automatic cut-off for the liquid supply; and

Figs. 16 and 17 are fragmentary views of certain details of the cut-off mechanism.

Referring to the drawings, a filling machine 1 comprises a stationary portion including a base 2 that is mounted on legs 3 and which carries a table 4 for the bottles fed to the machine and taken therefrom after being filled. A rear bracket 5 with a cover 6 enclose the driving and control mechanisms and support a plate 7 for a driving motor 8.

The upper portion of the machine 1 comprises a hollow central post 10 which supports the other parts of this portion. These parts comprise a vertically adjustable sleeve 11 which fits over the post 10, a top plate 12, a filling head 13 and a crowning head 14 that is secured to a slide 15. The slide 15 is mounted on the sleeve 11 and is connected by a roller 16 to a rotatable cam 17. A syruper head 18, only a portion of which appears in Fig. 7, is also operated by means of a cam 19 (Fig. 1).

A main drive shaft 21 which extends vertically from the greater portion of the length of the machine, is connected to the motor 8 through mechanism to be later described. The shaft 21 extends through the post 10 and the cam 17 is splined to the shaft 21 for rotation therewith and for vertical adjustment thereon when the sleeve 11 is adjusted in its vertical position. The cam 19 is carried on a bushing 22 mounted on the cam 17.

A crown hopper 23 is supported by the plate 12 and its movable element is driven by gear mechanism 24 connected to the main shaft 21. The hopper 23 supplies crowns to the crowning head 14 through a chute 25.

A bottle feeding turret 26 is keyed on a shaft 27 that carries a ratchet wheel 28 having nine teeth corresponding in number to that of the pockets of the turret. The shaft 27 and its connected parts are yieldingly driven by means of a gear 29 which is driven by a gear train connected with the motor 8 through the fluid pressure friction clutch, the operation of which will be hereinafter described. The gear 29 is loosely mounted on the shaft 27, and two friction discs 30, one of which is connected to a collar 31 slidably keyed to the shaft 27 and the other of which is connected to the ratchet wheel 28 and adapted to engage the hub of the gear 29 in accordance with the adjustment of a nut 31*a* to compress a rubber ring 32.

This friction connection between the gear 29 and the shaft 27 permits the continuous rotation of the gear 29 with the machine while the shaft 27 and its connected parts including the turret may be held stationary when the ratchet 28 is engaged by a stop lever 132 having a tooth 33 which normally projects into the path of the ratchet teeth. The stop lever has a cam surface 34 which is adapted to be momentarily engaged by a release roller 35 mounted on gear 29. The lever 132 is thus disengaged to permit the movement of the ratchet for a distance of one tooth whereupon it is again held by the stop lever during a revolution of the gear 29.

Accordingly, the continuous rotation of the gear 29 with the machine produces an intermittent or step-by-step movement of the turret 26 in the ratio of 1 to 9 which places one bottle under the filling head for each cycle or revolution of the machine. This cycle corresponds to the filling of one bottle.

The details of the turret 26 will now be described with reference to Figs. 2 and 3. It comprises a central body portion 36 in the form of a polygonal hollow casting. Around its periphery and extending radially outward are nine bottle-engaging arms or segments 37 that are slidably connected to the main casting 36 by means of T-slots 38 whereby the segments 37 may move vertically with respect to the casting 36. A top plate 39 limits the downward movement of each segment. The relatively narrow arm portions are provided with fabric or rubber blocks 40 for yieldingly engaging the bottles to prevent breakage and noise.

The driving mechanism comprises the motor 8 and a gear 41 which is connected to a friction clutch 42 that is operated by compressed air. The clutch 42 is connected to a horizontal shaft 43 which has a connection through bevel gears 126 and 127 to a vertical shaft 44, the shaft 44 being connected to the main driving shaft 21 by gears 45 and 46, respectively, on the lower ends of these shafts. The gear 29 for driving the shaft 27 and the turret 26 is connected to the gear 46 on the main shaft 21.

A pump shaft 47 that is driven from a bushing 48 on the shaft 43 and connected to the gear 41, operates worm gear mechanism to drive a vertical shaft 49 which carries a toothed disc 50 for controlling the timing or dwell mechanism. This disc, which is shown in Figs. 4 and 6, has, for example, six teeth but the disc is removable from the shaft 49 and may be replaced by a disc having more or less teeth according as the size of the bottles to be filled is smaller or larger, as the case may be. A thumb nut 51 and a spring 51*a* hold the disc 50 in position on the shaft 49 to be frictionally driven by it. The disc 50 may be removed to substitute another disc having any desired number of teeth.

The friction connection of the disc 50 to the shaft 49 is so adjusted that the disc is rotated by the shaft under normal conditions but may be held stationary while the shaft 49 rotates.

Referring particularly to Figs. 4, 5 and 6, the timing disc 50 is adapted to co-operate with a timing slide 52 that is carried by a timing lever 53 pivoted at 54. The slide 52 has a lug 55 for engaging a tooth of the disc 50 whereby the slide may be actuated to the left against the force of springs 56.

The slide 52 controls the position of a port 57 which, in its extreme left position, registers with an opening 58 into a pipe line 59 and in its extreme right position registers with an exhaust port 60. Accordingly, the slide controls the admission of air into a flexible pipe line 61 or the exhaust of air from the latter in accordance with the position of the port 57. The pipe 61 is connected to the clutch 42, the operation of which is accordingly controlled by the slide 52.

A spring 63 normally holds the lever 53 in such position that the lug 55 may be engaged by the disc 50 but it is periodically rocked away from the disc 50 by a projecting cam 64 which engages a cam block 65 on the other end of the lever 53. The cam 64 is carried by the main shaft 21 and the lever is therefore tripped once each revolution of the main shaft. The position of the lever

53 in its tripped position is shown in dotted lines, Fig. 4.

The disc 50 rotates while the machine is stationary during the filling of a bottle but is held stationary by the lug 55 against the force of its friction connection to the shaft 49 while the machine is rotating to place another bottle in position, the disc being released when the lever 53 is rocked to disengage the lug 55 from the disc.

The fluid pressure system of the machine, shown in Figs. 7 and 13, comprises a combined compressor and tank 66 that is mounted on the machine 1 and operated by a crank disc 67, on the shaft 47. A pipe line 68 having a cut-off valve 69 is connected to an automatic stop mechanism 70. The pipe line 59 is connected to the timing slide valve mechanism 52 for controlling admission of air through the pipe line 61 to press against the flexible member or diaphragm 71 of the clutch 42 to establish a driving connection between the motor-driven gear 41 and the shaft 43.

Reference may now be had to Fig. 8, in which the general arrangement of connections of the automatic stop mechanism is shown and to Figs. 9, 10, 11 and 12, in which the automatic stop valve mechanism 70 is illustrated in enlarged detail. The valve mechanism 70 is controlled in part by a push rod 72 that is normally held in its extreme right position, as shown in Figs. 8, 9 and 11, by a spring 73. The spring 73 is opposed by a weaker spring 74 within the valve casing.

When the valve stem 75 is held in the position shown in Figs. 9 and 11, the air supply line 68 is connected to the pipe line 59 and air is supplied to the clutch 42 as controlled by the slide valve mechanism 52. When the valve stem 75 is in its extreme left position, as shown in Fig. 10, communication between the pipe lines 68 and 59 is cut off and the pipe 59 is connected through a port 76 to an exhaust port 77 that is normally closed by a valve 78. This does not in the normal operation of the machine exhaust the pressure on the clutch 42, but, on the other hand, maintains such pressure. By the movement of the push rod 72 to the extreme left position, the pressure is cut off from the tank 66. However, the pressure from the clutch is put in direct connection through the exhaust port 76 with the exhaust valve 78 which is normally held closed.

The valve 78 is opened for short periods by a cam lever 79 that is operated by a cam 80 secured to the under face of gear 29. The cam 80 is so located on the gear 29 that in the normal operation of the machine this cam comes in contact with the lever 79 immediately after the release roller 35 has passed the tooth 33 on the stop lever 132, and the rod 72 by the action of the spring 73 has restored the valve mechanism 70 to its normal position so that the pressure may pass from the line 68 through the valve 70 into the line 59.

The push rod 72 for controlling the valve stem 75 is periodically actuated to the left by the stop lever 132 that engages a collar 82 on the push rod 72, the stop lever being actuated by the release roller 35 on the gear 29. The lever 132 and push rod 72 cannot return until the ratchet 28 has rotated a distance of one tooth or one-ninth of a revolution. During this period of rotation of the turret 26, the valve stem 75 cuts off the air supply to pipe 59 but the valve 78 closes the exhaust port 77 and the air pressure on the clutch 42 is not affected.

The valve 78 is arranged to open the exhaust port immediately after the movement of the turret should have been completed so that if the turret has not then completed its movement by reason of obstruction or other cause and has prevented the valve stem from being returned to its normal position, the air is instantly exhausted from the clutch and the machine is stopped. If, on the other hand, the parts have operated in normal sequence, the opening of the exhaust port has no effect, as the air supply is not at that time connected to it.

In other words, the exhaust port 77 is adapted to be opened only when the valve stem 75 is in position to disconnect it from the air supply. But if the return of the valve stem to this position is delayed, the safety stop mechanism is instantly effective to prevent damage.

To start the machine, the motor 8 operates the compressor 66 until a desired pressure is secured. The cut-off valve 69 is opened and the diaphragm 71 is caused to press against its coacting clutch member connected to the shaft 43 to drive the machine through the several gears and shafts previously described.

It will be understood that the motor 8, the gear 41, the shaft 47 and the shaft 49 rotate continuously during the time that the machine is in use entirely independently of the intermittent or step-by-step movement of the shaft 43 and its connected parts produced by the fluid-pressure system. Accordingly, the compressor 66 and the timing mechanism are actuated continuously by the motor 8. Bottles are fed to the machine in a usual manner and are deflected by a guide 82 into the pockets of the turret 26 which rotates clockwise as viewed in Fig. 2, with an intermittent or step-by-step movement.

In the first operative position of a bottle, that occupied by the bottle 83, Fig. 2, it receives a measured amount of syrup from the syruper head 18 while the previous bottle is being filled. This operation is automatic and the details of the syruper head and its operation constitute no part of the present invention.

The next step of the turret 26 places the bottle under the filling head to be filled with carbonated water and crowned. This position is occupied by the bottle 84, Fig. 2. At this time, the crowning head 14 and an automatic air chamber 85 are in their highest positions as determined by the cam 17 and the slide 15 and at which time a crown has been supplied to the crowning head by the chute 25 in a usual manner.

The cam 17 then lowers the slide 15 until the crowning head 14 is near its lowermost position. At the same time, a bottle lift plunger 86, that is operated by a lower cam 87, a roller 88 and a compensator slide 89, lifts the bottle 84 to force the crown and a plunger 90 upward in the crowning head where both are yieldingly retained. Upward movement of the bottle stops and further upward movement of the compensator slide 89 causes an adjustment of the compensator block 91 in accordance with the height of the bottle to be filled.

Further rotation of the cam 87 lowers the slide 89 and the bottle 84 to the filling position and instantly the crowning head 14 is lowered by the upper cam 17 to compress a throat rubber 93 to seal the bottle in the filling head. This downward movement also operates suitable valve mechanism to admit carbonated water under desired pressure from an adjacent supply tank 94, only a portion of which is shown in Fig. 7. This tank is supplied from the usual carbonator (not shown).

At substantially the instant that the filling operation starts, the machine is stopped by the operation of the timing lever by the cam 64 which permits the slide 52 to move to the right, Fig. 6, and exhaust the air from the clutch 42. The timing disc 50 then rotates with the shaft 49, the filling period or dwell being determined by the time required for it to advance the next tooth in engagement with the lug 55.

The air chamber 85, which is connected to the filling head 13 by a port 96, has a piston 97, the bottom area of which is materially greater than the top area because of the employment of a relatively large tubular piston stem 98. The piston 97 is normally in its lowermost position in the chamber 85 and is held there by pressure of the water supply which is connected to the top of the chamber by means of a flexible pipe 97*a*.

When water flows into the bottle through the filling head, the pressure in the bottle rapidly builds up until it nears that of the supply pressure whereupon the piston 97 rises by reason of the differential areas of its upper and lower sides. The piston 97 and the tubular stem 98, the latter extending through a packing 99 in the top of the air chamber, rise and the water above the piston 97 is forced back through the pipe 97*a* into the supply line. The air from the bottle follows the piston 97 in its upward movement. When an adjustable screw 100 meets a pivotally mounted abutment, the liquid supply is cut off by a mechanism to be hereinafter described.

The upper slide 15 is then raised slightly by the upper cam to insure that the water is cut off in case the automatic cut-off has not yet operated, and to release the throat rubber. The upper cam then operates on a horizontal portion of its surface during the crowning operation which follows immediately.

The bottle is then lifted by the lower cam 87 to receive a crown by means of the plunger 90 and the crowning head 14.

The filled bottle is ejected from the filling head by the spring-pressed plunger 90. If the latter should fail for any reason to eject the bottle, the latter is positively ejected when an extension 102 on the plunger 90 engages an abutment 103 in the upward movement of the crowning head 14.

Simultaneously with the completion of the filling operation of the bottle, the timing disc 50 has reached the end of its intermittent or dwell movement while the bottle is being filled and one of its notches engages the lug 55 of the slide 52 to again start the operation of the turret to advance the bottles to their succeeding positions.

When a filled bottle is ejected from the filling head 13, the compressed air escapes from the air chamber 85 and the piston is again forced down by the pressure of the supply line on the upper side of the piston. The air chamber is then in readiness for the succeeding filling operation.

The foregoing cycle of operations occurs in connection with the filling of each bottle, the time required for the filling operation being relatively short. The filled bottles are actuated by the turret 36 to approximately the position occupied by the bottle 104 whereupon they are removed by any suitable or usual conveying mechanism (not shown).

Reference may now be had to Figs. 14, 15, 16 and 17, in which is illustrated the details of the valve-operating mechanisms for controlling the supply of liquid to the bottles.

As best shown in Figs. 14 and 15, the filling head 13, crowning head 14, syruper head 18, air retreat chamber 85 and supply tank 94 are mounted in closely adjacent positions. The supply tank 94 is connected to the filling head 13 by means of a port 105 that is controlled by a valve 106 having a vertical stem 107 that is normally held in its closed position by a spring 108.

The valve 106 is controlled by a mechanism comprising a cam 110 that is mounted on the plunger 90, an arm 111 having an inclined face for coacting with the cam 110, a vertical rod 112 which carries the arm 111 at its upper end and a second arm 113 at its lower end that is adapted when in a certain angular position to engage the valve stem 107. A spring 114 normally biases the rod 112 and its connected arms 111 and 113 into such angular position that the arm 111 presses against the cam 110.

The operation of the valve-controlling mechanism to supply liquid to a bottle being filled is as follows: When the cap plunger 90 is raised during the initial position of a bottle, as previously described, the cam 110 rises and, in its uppermost position, an annular grove therein permits the arm 111 to be moved inwardly with respect to the cam by the spring 114. That is, the arm 111, the rod 112 and the arm 113 move in a clockwise direction, as viewed in Fig. 15, to such position that the arm 113 is directly above the valve stem 107. Accordingly, upon the subsequent downward movement of the crowning head 14, which carries the rod 112 and its associated parts, the valve 106 is operated to admit liquid under pressure from the supply tank 94 to the filling head 13. The upward movement of the crowning head 14 at the end of the filling operation of the bottle will permit the valve 106 to close to cut off the supply of liquid, regardless of the angular position of the arm 113.

When the liquid in the bottle reaches a predetermined level, as indicated by the position of the screw-threaded extension 100 of the air retreat chamber, the extension 100 engages a movable abutment 101, to which is connected a downwardly extending rod 115, the lower end of which is adapted to engage the arm 111. When the abutment 101 is moved upwardly, the rod 115 swings outwardly, as viewed in Fig. 16, to move the arm 111, the rod 112 and the arm 113 in a counter-clockwise direction, as viewed in Fig. 15, to cause the arm 113 to release the valve stem 107. The spring 108 immediately raises the valve stem 107 to its upper or closed position to cut off the liquid supplied to the bottle.

Accordingly, the supply of liquid to a bottle being filled may be controlled by the cycle of the machine in case the dwell ends before the automatic cut-off has operated or the automatic cut-off will operate if the predetermined level is reached before the filling cycle has ended.

The automatic cut-off mechanism is particularly valuable, also, in case the machine has stopped for any cause while a bottle is partially filled. In such case, slight leakages may cause the bottle to be filled to excess since the machine is not in operation. However, the automatic cut-off mechanism will operate in any event to cut off the liquid supply and prevent an excess amount of liquid being supplied to the bottle being filled. It will be appreciated that this feature is very valuable in connection with multiple head machines in which a number of bottles are always in various stages of the filling cycle.

While the machine is functioning properly, the arm 132 will be raised by the roller 35 at one point

of the revolution of the gear 29 so as to permit the shaft 27 and the turret to receive a one-ninth revolution through the friction device 30. If the turret is permitted to make a full one-ninth revolution, notwithstanding the continued rotation of the gear 29, the ratchet 28 and the shaft 27 will be stopped by the re-engagement of the tooth 33 upon the lever 132 with the succeeding tooth of the ratchet 28. Consequently, the valve rod will be positioned to the left only momentarily, since the movement of the arm 132 to permit the engagement of the tooth 33 with the ratchet permits the movement of the rod 72 to the right. With movement of the rod 72 to the left, delivery of fluid pressure to the line 59 is interrupted, but the pressure operative upon the clutch mechanism 41 and 42 is maintained, thus continuing the application of power to the machine. This is because the valve 77—78 is normally closed, and is not opened under normal conditions until the ratchet 28 and the turret have substantially completed their one-ninth revolution. If, for any reason whatever, the turret and its shaft 27 and the ratchet 28 is not permitted to complete its full one-ninth revolution, fluid pressure to the clutch mechanism 41—42 will be interrupted and the line 59 will be vented to atmosphere in a manner to make the clutch inoperative and cause the stoppage of the entire machine. This is due to the fact that fluid pressure in the line 59 is cut off so long as the tooth 33 upon the lever 132 is not permitted to re-engage the next tooth on the ratchet 28.

With each revolution of the gear 29, the tooth 33 is disengaged from the ratchet 28 momentarily by the roller 35, and said roller passes from its engagement with the lever 132 before the cam 80 engages the lever 79. As the roller 35 passes from its engagement with the member 132, the valve rod 72 is permitted to be moved to the right, Fig. 8, by its spring 73, provided a tooth of the ratchet 28 is not so positioned as to prevent movement of said lever. The machine, however, will not be stopped until the cam 80 acts upon the valve 77 to vent the pressure in the line 59, while the position of the valve stem is such as to interrupt the connection between said line and the source of fluid pressure.

Normally, the relation of parts is such that even though the rod 72 be moved to the left to interrupt the connection between the clutch members 41 and 42 and the source of fluid pressure, the machine will continue to operate until the valve 77 has been actuated to vent the line 59, and if, in the normal operation of the machine, the communication between the source of fluid pressure and the line 59 is restored, before the cam 80 becomes operative, the machine will continue to operate under the control of the disk 50 and the mechanisms associated therewith.

In the normal operation of the machine, the tooth 33 arrests movement of the shaft 27 and the turret carried thereby upon the completition of each one-ninth revolution of said turret, and once during each full revolution of the gear 29. The roller 35, therefore acts to release the ratchet 28 to permit movement of the turret, and if, for any reason, movement of the turret should be prevented, such as by clogging thereof, the arm 132 will be held by one of the squared teeth of the ratchet 28 in a manner to control the fluid pressure through the rod 72 in the manner described.

The machine may be stopped at any time without stopping the motor by simply closing the valve 69, the clutch 42 being disengaged when the exhaust valve 60 is opened.

To clear an obstruction and to again secure the relative positions of the parts, the machine may be operated by the hand-wheel 125 and bevel gears 126 and 127 to release the bottle or other device and to actuate the turret 36 and its connected parts to their normal relative positions whereby the safety mechanism will permit the normal sequence of operation.

To change the length of time that the machine is stationary during the filling operation, or, in other words, to change the length of the period of dwell to adapt the operation to bottles of different capacities, the disc 50 is removed and a disc having an appropriate number of teeth is substituted therefor. If the bottles are larger than those previously being filled, a disc with fewer notches will be selected in order that the angular distance between the notches may be greater and thus cause the machine to be stationary for a longer period. On the other hand, if the bottles are smaller, a disc with a greater number of notches will be selected in order that the filling period or dwell may be correspondingly shorter.

The filling machine of my invention operates automatically to fill bottles economically because the time for filling is adapted to the capacities of the bottles. Also, by reason of the safety devices, there will be little or no breakage of bottles in case they are out of position.

By reason of the arrangement whereby if the turret is obstructed the machine will substantially instantly stop insures not only minimum breakage of bottles but also prevents damage to the machine under such circumstances. The various safety provisions also prevent loss of syrup and carbonated water since the machine will automatically stop in case a bottle is not in proper position under the filling head. Much time is also saved by the avoidance of breakage since, in such cases, it is necessary to clear a filling machine of the pieces of glass or other materials that may interfere with its operation.

The foregoing and other advantages will be apparent to those skilled in the art of automatic bottling machines. The details of my invention may be variously modified and the scope of my invention is not to be limited to the preferred embodiment shown and described herein, except as expressed in the claims.

I claim:

1. A filling machine comprising mechanism for controlling the position of, and the supply of liquid to containers to be filled, a power device having a driving connection thereto and fluid-pressure means for controlling said driving connection and a timing device operated by said power device for controlling the fluid-pressure means.

2. A filling machine comprising mechanism for controlling the position of, and the supply of liquid to containers to be filled, a power device having a driving connection thereto and fluid-pressure means for controlling said driving connection, a timing device operated by said power device for maintaining said driving connection during a portion of the filling cycle of a container and means operated by said mechanism for breaking said driving connection for a period, the length of which is determined by said timing device.

3. A filling machine comprising mechanism for controlling the position of, and the supply of liquid to containers to be filled, a power device having a driving connection thereto and fluid-pressure means for controlling said driving connection, a timing mechanism comprising a member having spaced projections for controlling said power device and operated by said power device to periodically establish said driving connection and operated by said mechanism to break said driving connection while a container is being filled.

4. A filling machine comprising mechanism for controlling the position of, and the supply of liquid to containers to be filled, a power device having a driving connection thereto and fluid-pressure means for controlling said driving connection, said fluid-pressure means comprising a supply line having a valve therein, a timing device operated by said power device to open said valve to establish said driving connection, means operable at a predetermined point in the cycle of said mechanism to cause said timing device to release said valve and break said driving connection, said timing device opening said valve again at the end of a predetermined period.

5. A filling machine comprising a driven mechanism, a constantly rotating motor having a detachable connection thereto, means for controlling said connection comprising a fluid-pressure supply line having a valve therein, a timing device for controlling said valve and having a friction connection to said motor, said timing device having spaced members for engaging said valve and thereby retaining said timing device stationary while said mechanism is operated by said motor and means carried by said mechanism for periodically disengaging said valve from said timing device to stop said mechanism and to permit said device to move until another member has again engaged said valve to start said machine.

6. A filling machine comprising driving means therefor including a fluid-pressure driving connection, mechanism for controlling the position of containers to be filled and mechanism for controlling the filling of said containers, a source of fluid pressure, a pipe line between said source and said fluid pressure driving connection, a valve mechanism in said line, means operative by said driving mechanism intermittently actuating said valve connection, a second valve mechanism in said line, and means operative by the mechanism for controlling the position of the containers, whereby upon the failure of said mechanism for controlling the position of containers said pipe line will be connected with atmosphere to make said fluid pressure connection inoperative.

7. A filling machine comprising driving means therefor including a fluid pressure driving connection, mechanism for controlling the position of containers to be filled and mechanism for controlling the filling of said containers, a source of fluid pressure, a pipe line between said source and said fluid pressure driving connection, a valve mechanism in said line, means operative by said driving mechanism intermittently actuating said valve connection, a second valve mechanism in said line, means operative by the mechanism for controlling the position of the containers, whereby upon the failure of said mechanism for controlling the position of containers said pipe line will be connected with atmosphere to make said fluid pressure connection inoperative, another valve mechanism in said line, and further means operative by said mechanism for controlling the position of containers whereby simultaneously with the venting of said line, the supply of fluid pressure thereto will be interrupted.

8. A filling machine comprising means for actuating containers into and out of operative position, means for filling said containers, fluid-pressure controlled driving means for said actuating means and said filling means, said actuating means and said filling means having a yielding connection therebetween, and means for rendering said driving means ineffective when said actuating means is obstructed.

9. A filling machine comprising movable mechanism, a driving mechanism, means whereby power from said driving mechanism is applied to said movable mechanism, said movable mechanism comprising a turret and means whereby movement of said turret may be stopped, a movable member co-operating with said last named means, means carried by said driving mechanism whereby said member is alternately moved into and out of operative engagement with said last named means to cause said turret to operate in a step-by-step manner during continuous movement of other portions of said mechanism and means for stopping the operation of said driving mechanism in the event of the failure of said member to operatively engage the means with which it co-operates due to delay in the movement of said turret.

10. A filling machine comprising a filling head, mechanism for controlling the filling of containers in said head, a turret for actuating containers into and out of filling position, said turret being connected to said mechanism for step-by-step movement thereby, a power device for said mechanism, fluid-pressure means, and co-operating means carried by said turret and contained in said fluid pressure means, whereby said fluid pressure means will be made inoperative in the event of an improper actuation of said turret.

11. A filling machine comprising a filling head, means for actuating a plurality of containers to bring them successively into and out of filling position in relation to said filling head, said actuating means being movable intermittently relatively to the filling head, means for driving the actuating means and actuating said filling head, and fluid-pressure devices for controlling the application of power to said driving means.

12. A filling machine comprising mechanism for filling a bottle when placed in filling position, a bottle turret geared to said mechanism but having a friction driving connection thereto, means permitting limited step-by-step movement of said turret relative to continuous movement of said mechanism, a timing device for periodically stopping said machine while a container is being filled and means for stopping the operation of said machine if said turret does not operate in proper sequence.

13. A filling machine comprising mechanism for moving bottles into and out of filling position and for effecting the filling of said bottles, means for driving said mechanism, timing mechanism for periodically rendering said driving means ineffective, and means for rendering said driving means inoperative in case of an improper movement of the mechanism for moving bottles into an outer filling position.

14. A filling machine comprising mechanism for moving bottles into and out of filling position and for effecting the filling of said bottles, a fluid

pressure system for controlling the driving connection between said mechanism and said driving means, a timing mechanism for controlling said fluid-pressure system to disconnect said driving means for predetermined periods for filling bottles and means interlocked with said mechanism for similarly controlling said fluid-pressure system in case of an improper movement of the mechanism for moving bottles into an outer filling position.

15. A filling machine comprising a filling head and moving parts including a bottle turret and a bottle lift all connected to operate in proper sequence to position and to fill a bottle, a constantly rotating power device for actuating the moving parts of said machine, a fluid-pressure controlled friction clutch for connecting said power device to said moving parts, a timing mechanism for maintaining the engagement of said clutch during a cycle of said moving parts and for effecting the disengagement of said clutch and the stopping of said machine for predetermined periods while a bottle is being filled whereupon it again causes the engagement of said clutch and the operation of said machine to present a succeeding bottle for filling.

16. A filling machine embodying therein a mechanism for effecting the filling of bottles, a turret moving bottles into and out of the operative relation to said mechanism, actuating means for said mechanism, a driving mechanism between said actuating means and said turret including a friction clutch, means operative upon said turret whereby an intermittent movement is imparted thereto through said friction clutch, a source of power, a fluid pressure connection between said source of power and said actuating means, a source of fluid pressure, a pipe line between said source and said fluid pressure connection, a valve mechanism in said line, means carried by said actuating mechanism and operative upon said valve mechanism, whereby said fluid pressure connection is intermittently made inoperative, a second valve mechanism, and means actuated by the means for causing intermittent operation of said turret operative upon said valve mechanism to make said fluid pressure connection inoperative in the event of an improper actuation of said turret.

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