May 18, 1937. S. R. HOWARD 2,080,482

CONTAINER FILLING MACHINE

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Fig. 1

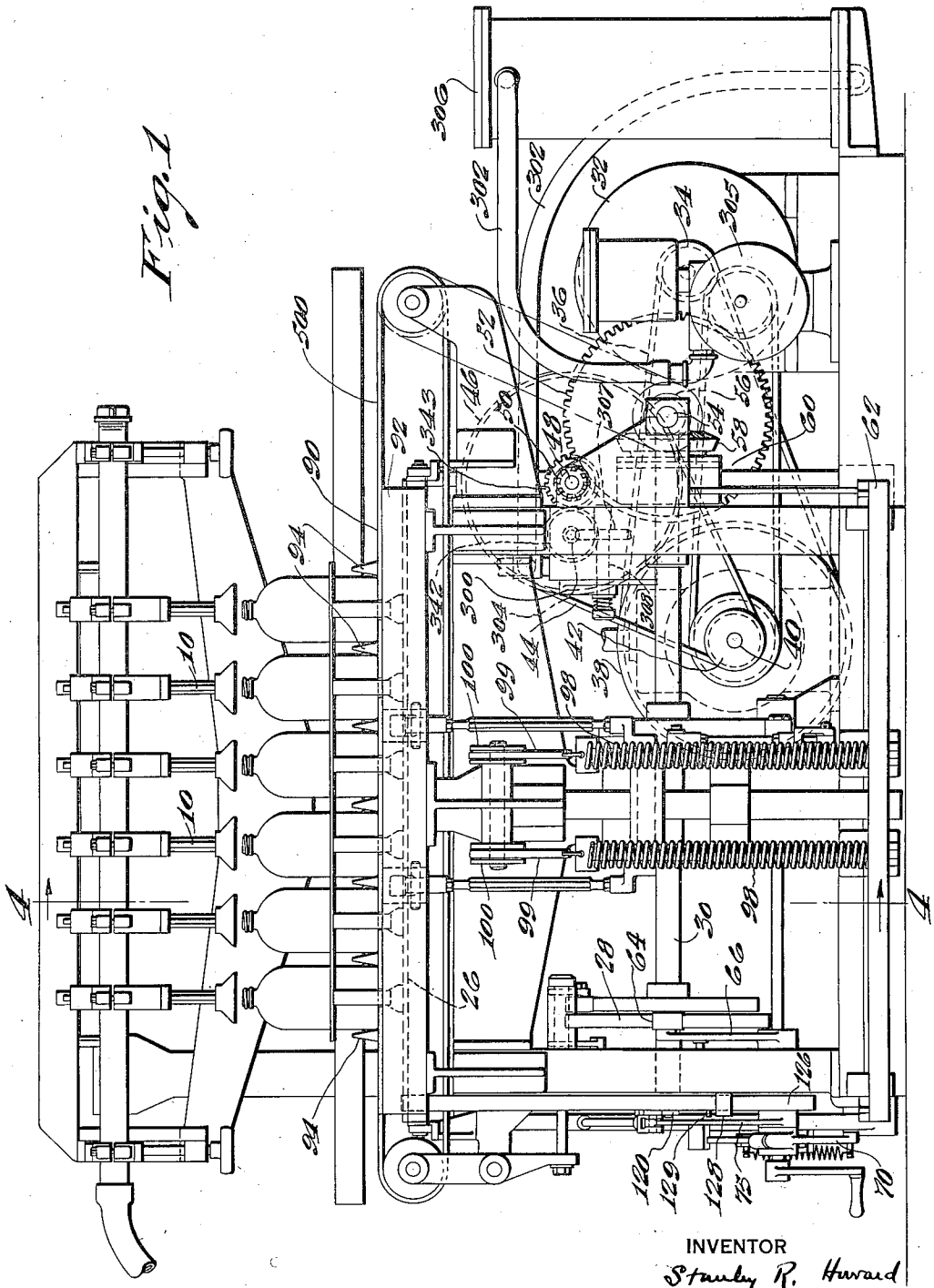

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Fig. 2

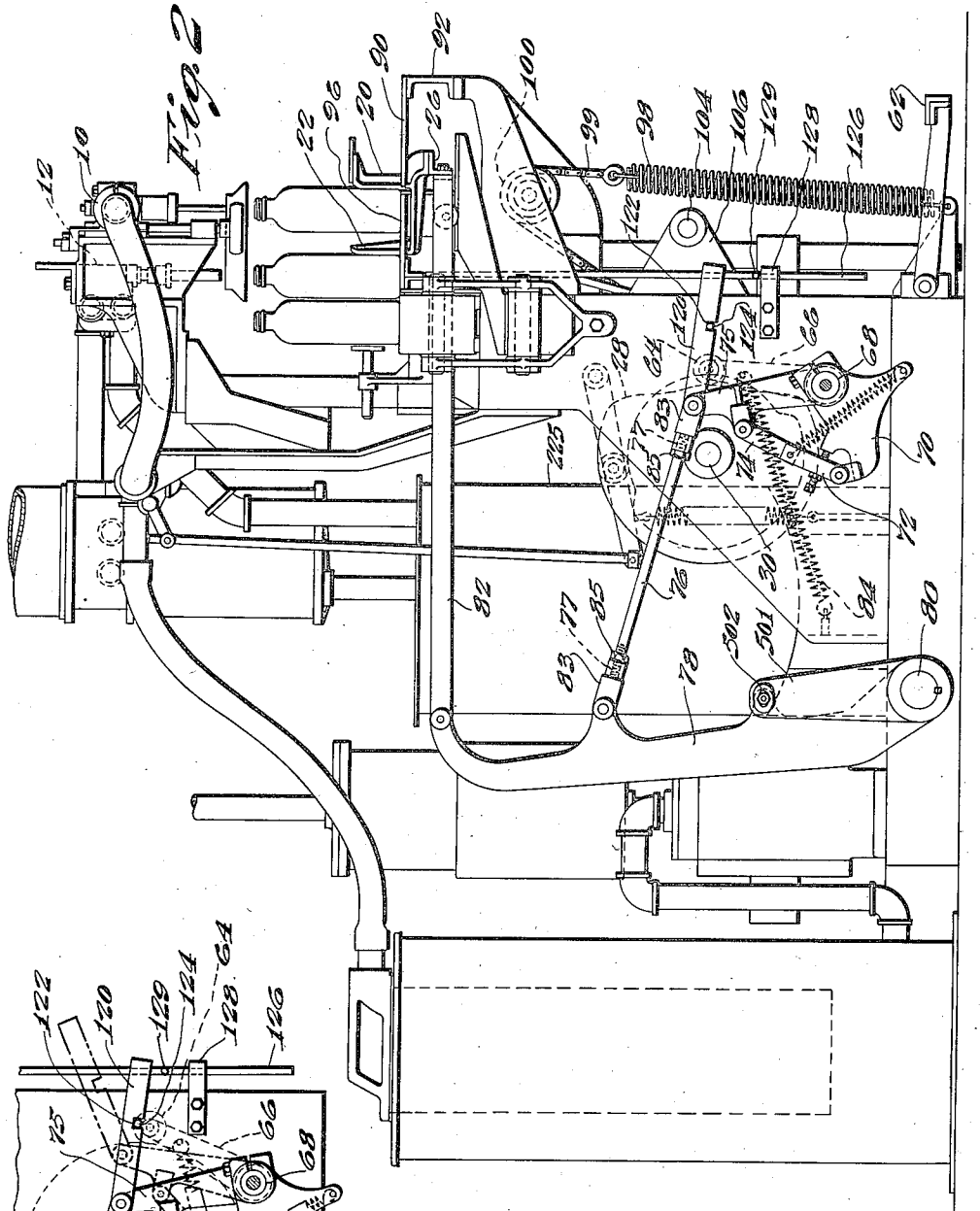

Fig. 3

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Fig. 4

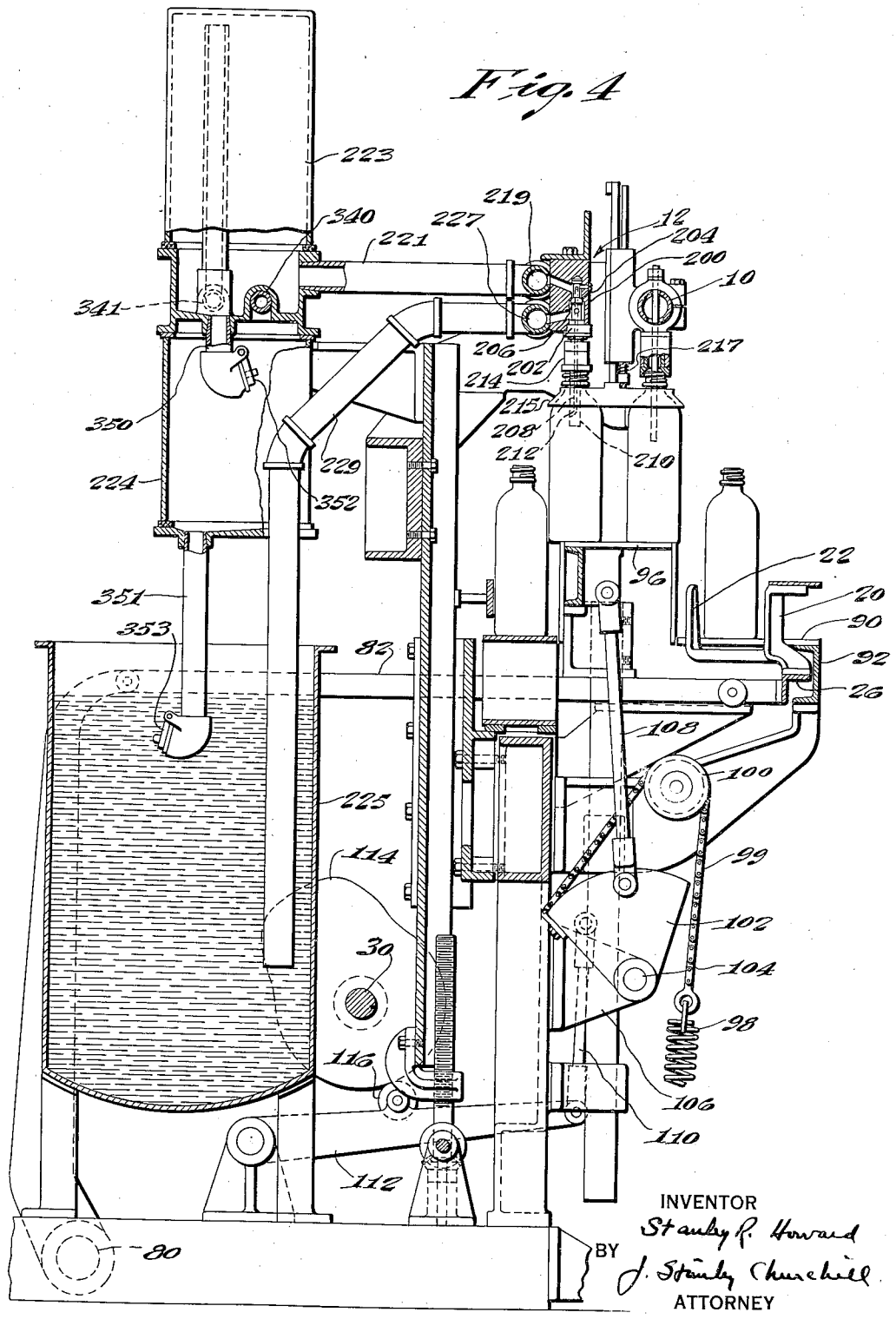

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Fig. 6

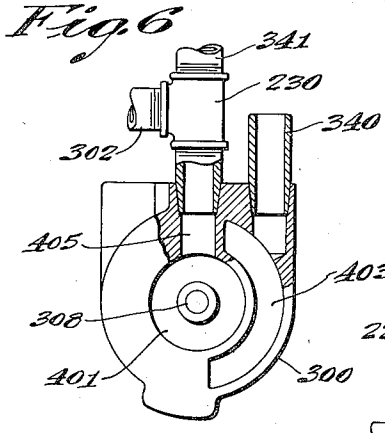
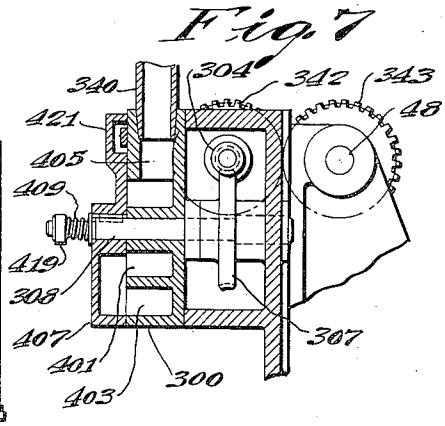


Fig. 7



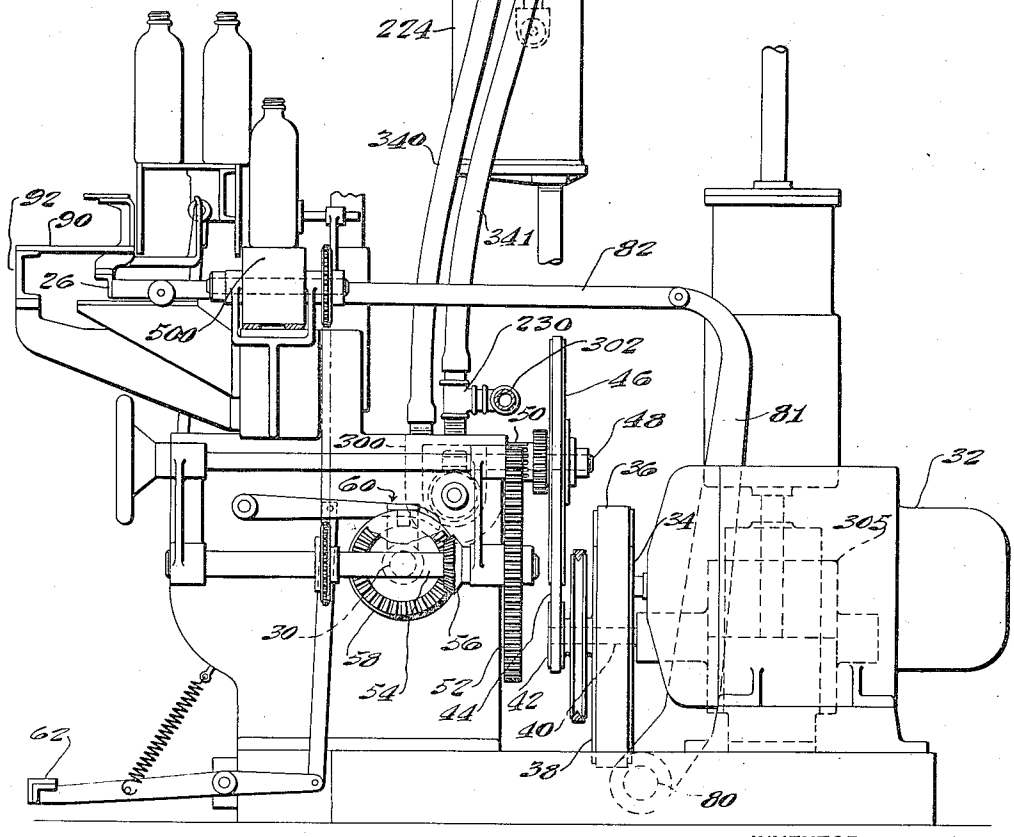


Fig. 5

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UNITED STATES PATENT OFFICE

2,080,482

CONTAINER FILLING MACHINE

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Application November 6, 1935, Serial No. 48,522

3 Claims. (Cl. 226—68)

This invention relates to a container filling machine, and more particularly to a machine for cleaning and filling containers.

In general, the object of the invention is to provide a novel and highly efficient machine for cleaning and filling bottles in a rapid, economical and efficient manner.

A further and more specific object of the invention is to provide a machine for cleaning and filling containers such as bottles, in which provision is made for enabling the machine to operate upon containers of different sizes with minimum adjustment of the various operating mechanisms of the machine to the end that minimum time may be lost in preparing the machine for operation upon containers of different size.

Another object of the invention is to provide a novel filling machine for filling containers in which provision is made for handling the overflow and returning it to the supply tank by novel and highly efficient mechanism.

With these objects in view, and such others as may hereinafter appear, the invention consists in the filling machine, in the filling and cleaning machine, and in the various structures, arrangements and combinations of parts hereinafter described and particularly defined in the claims at the end of this specification.

In the drawings, illustrating the preferred embodiment of the invention, Fig. 1 is a side elevation of the filling and cleaning machine; Fig. 2 is an end elevation of the machine shown in Fig. 1; Fig. 3 is a detail of control mechanism to be referred to; Fig. 4 is a sectional view taken on the line 4—4 of Fig. 1; Fig. 5 is an end elevation of the machine viewed from the right of Fig. 1; and Figs. 6 and 7 are details in partial elevation and section of the vacuum control valve to be referred to.

In general, the different features of the invention are illustrated herein as embodied in a machine for cleaning and filling bottles, although as will be hereinafter pointed out certain features of the invention may be used with advantage in a filling machine alone, and other features of the invention may be used in connection with other machines in which it is desired to convey receptacles and the like into operative position with respect to various operating instrumentalities.

Referring to the drawings, in the illustrated machine 10 represents a cleaning head which may and preferably will comprise a cleaning head operable on the vacuum principle, such as is disclosed in the patent to Newey No. 1,977,138, and 12 represents a filling head also preferably operable upon the vacuum principle, such as is disclosed in the patent to Pennock No. 1,737,677. Provision is made in the machine for evacuating the containers by suction applied to the cleaning and filling heads 10, 12, as will be described, so that when the containers are brought into sealing engagement with the filling and cleaning heads the suction created within the containers is utilized to draw in a stream of air into the containers to be cleaned to perform the cleaning operation, and the liquid is drawn into the containers to be filled from a supply tank in accordance with the general principles of operation of the Newey and Pennock patents respectively, to which reference may be made for a complete description thereof.

In order that the present machine may operate in a rapid and efficient manner, the machine is provided with a plurality of container pusher members, one set 20 of which is adapted to engage and move one set of containers into a position beneath the cleaning nozzles 10. A second set of pushers 22 is adapted to engage and move the previously cleaned containers from cleaning to filling position beneath the filling nozzles 12. The pusher members 20, 22 are connected together, and as herein shown the machine is provided with a number of sets of these pusher members corresponding to the number of cleaning or filling heads in the machine. The pusher members of each set are as stated connected together and are mounted upon a crossbar 26 extended lengthwise of the front of the machine. The crossbar 26 is arranged to be moved to advance the pusher members 20, 22 by an operating cam 28 on a cam shaft 30, and the operating cam 28 is arranged to be driven from a driving motor 32 through connections including a pulley 34 on the motor shaft, a belt 36 by which the pulley 34 is connected to a large pulley 38 upon a counter shaft 40, and thence through a pulley 42 also mounted upon the counter shaft, see Fig. 5, and belt 44 to a large pulley 46 upon a cross shaft 48. The latter is geared through the gears 50, 52 to a second cross shaft 54 connected by a pair of beveled gears 56, 58 to the cam shaft 30 extending lengthwise of the machine. The second beveled gear 58 is loosely mounted on the cam shaft 30 and is connected thereto under the control of the operator by a one-revolution clutch of any usual or preferred construction and indicated generally at 60. As illustrated herein, the one-revolution clutch 60 is arranged to be operated by the operator upon the depression of the treadle 62

connected, as illustrated, through a linkage to the one revolution clutch.

Referring to Figs. 2 and 3, the operating cam 28 has cooperating with it a cam roll 64 mounted upon a cam arm 66 secured to a short shaft 68, and the latter has also secured thereon a segmental shaped piece 70 operatively connected by the members 72, 74, of a toggle to a connecting arm 75 loose upon the short shaft, as illustrated in Fig. 2. The connecting arm 75 is pivoted to a link 76 by which it is connected to an arm 78 secured upon a longitudinal shaft 80 journalled in suitable bearings in the machine frame and to which a similar arm 81 is secured at the second end thereof. The arms 78, 81 are connected by bars 82 to the pusher cross-bar 26 at near the opposite ends thereof. In this manner the cam operates through the cam roller and cam arm and through the segmental shaped piece and toggle to rock the loosely mounted arm 75, and thence through the described link, arms and bars to effect the return movement of the crossbar 26, and the pushers 20, 22 carried thereby, through a definite stroke. The parts are advanced to operating position by the spring 84 connected to the cam arm 66.

In order to adjust the initial starting point from which the pusher members 20, 22 are advanced through the definite stroke corresponding to the throw of the cam 28, the link 76 is preferably of an adjustable construction, and as herein shown comprises a known form of adjustable connecting rod 76 having end pieces 83 arranged to be screwed upon the threaded ends of the rod 77 to lengthen or shorten the same and locking nuts 85 for maintaining the parts in their adjusted position. In order to provide additional adjustment of the initial starting point, a second adjustment is provided, see Fig. 2, which comprises an arm 501 fixed to the longitudinal shaft 80 and which is adjustably secured to the loosely mounted arm 78. A slot 502 is provided in the arm 501 to relatively adjust the position of the arm 78. It may also be desirable to adjust the position of the clamped lever 75 on the stud shaft 68 to correspond to the adjustment of the arm 78.

In the operation of the machine, a row of containers such as bottles are positioned by the operator or otherwise in front of the outer set of pusher members 20, and the bottles in this position are supported upon a slotted plate 90 mounted upon a bracket 92 secured to the machine frame, and during the advance of the pusher members 20, the row of bottles is moved by the individual outer pusher members between guide members 94 onto the surface of an elevator 96 which in its lowered position is substantially flush with the slotted plate 90.

Provision is made for elevating the elevator to lift the bottles into sealing engagement with the cleaning and filling heads, such position being shown in Fig. 4. As herein shown, the bottle elevator 96 is lifted by two springs 98 each connected by a chain 99 running over an idler wheel 100 to a segmental member 102 mounted upon a shaft 104 journalled in suitable bearings in brackets 106 projecting from the front of the machine frame, and the member 102 has pivotally connected to it one end of a connecting rod 108, the second end of which is connected to the elevator. The segmental member 102 is also connected through a second connecting rod 110 and cam lever 112 to an operating cam 114 on the main cam shaft 30. A cam roll 116 carried by the cam lever 112 cooperates with the face of the cam 114, and in the operation of the machine the cam functions to lower the elevator and the springs 98 to lift the elevator when permitted to do so by the cam.

In order to prevent the operation of the pushers 20, 22, in the event that the elevator 96 encounters abnormal resistance in its upward movement, a safety device is provided, herein shown as comprising a latch bar 120 carried by and pivotally connected to the upper end of the member 75. The latch bar 120 has an engaging notch 122 formed in its under side which normally rests over a pin 124 secured to the machine frame and by which the movement of the member 75 is prevented until the latch bar is elevated by the elevator 96, as will now be described. The elevator 96 is provided with a bar or rod 126 depending therefrom and guided in its movement by a guide member 128 secured to the machine frame, and the rod 126 is provided with a pin 129 arranged to project into the path of the latch bar 120 and to lift the same from the full to the dotted line position, shown in detail in Fig. 3, during the movement of the elevator through such portion of the stroke as will preclude the possibility of the occurrence of a jam or abnormal resistance to the continued movement of the elevator through the remainder of its stroke. During the operation of the machine, as the latching bar 120 is lifted to its dotted line position (Fig. 3) by the elevator, indicating the occurrence of no abnormal resistance to the movement of the elevator, and consequently indicating the fact that there will be no jam between the bottle and the filling or cleaning heads, then the member 75 is free to turn upon the shaft 68 and the toggle 72, 74 remains in its closed position. In the event, however, that a jam does occur between a bottle and its head, due for example to faulty centering of the bottle, or for any other reason, then the latch member 120 remains in engagement with its locking pin 124 and in the full line position shown in Fig. 3, so that upon movement of the segmental piece 70 by the cam 28 the toggle is broken and the advance of the pusher members 20, 22 is consequently prevented.

As previously stated, the containers, hereinafter referred to as bottles, are filled with the filling liquid in accordance with the well-known vacuum method of filling forming the subject matter of the Pennock patent above referred to. As herein shown, the machine is provided with a plurality of the cleaning and filling heads 10 and 12, see Fig. 1, and each filling head 12 includes a nozzle block 200 mounted upon a cross member of the machine frame and a valve member 202 slidably disposed within each nozzle block. The nozzle block is provided with a valve seat 204 cooperating with the valve member 206 formed on the valve member 202. The valve member 202 is provided with an air nozzle 208 mounted within an outer liquid nozzle 210, and both nozzles are fixed to the valve member 202 to form an integral part thereof. The lower end of the air nozzle 208 communicates with the hole 212 in the side of the liquid nozzle, as shown. The outer nozzle 210 is provided with a sealing collar 214, and a guide member 215 is provided with a spring 217 for maintaining it in a lowered position. The air nozzle 208 of each filling block is connected to a manifold 219 by a hole in the air nozzle and a connecting passage, and the latter is connected by a conduit 221 to the upper compartment 223 of an overflow trap or bowl, see Fig. 4. The liquid nozzle 210 is con-

nected to the liquid supply tank **225** by a hole in the liquid nozzle and a connecting passage in the block leading to a manifold **227** from which a pipe line **229** extends downwardly and terminates in the lower portion of the supply tank **225**.

Referring now to Figs. 1, 6 and 7, the machine is provided with a valve **300** connected by pipes **302** to a vacuum pump indicated generally at **305**, and the vacuum pump may comprise any of the known types now upon the market. An intermediate vacuum chamber **306** is included in the pipe line **302** to assist in maintaining an ample vacuum. The valve **300** is adapted to be operated by the worm **304**, see Fig. 7, which is arranged to cooperate with a worm wheel **307** on the valve shaft **308**. The valve is connected to the vacuum chambers **223** and **224** by connecting pipes **340, 341**. The worm **304** and consequently the valve member **407** of the valve is arranged to be driven by cooperating gears **342, 343**, the latter being upon the shaft **48**, see Fig. 1. The bottoms of the valve chambers **223** and **224** are provided with depending pipes **350, 351**, having check valves **352, 353**. The upper chamber **223** is under vacuum at all times during the operation of the machine and the valve **300** is arranged to be positively operated to alternately connect and disconnect the lower chamber **224** with the source of vacuum and to alternately open and close the chamber **224** to atmospheric pressure, so that at the end of a filling operation the excess liquid from the containers being filled is drawn through the air nozzle **208** and through the manifold **219** and pipe **221** into the upper chamber.

Thereafter, when the lower chamber is connected to the vacuum through the valve **300**, the liquid from the upper chamber will pass downwardly through the drain pipe **350** into the lower chamber. Subsequently, when the lower chamber is subjected to atmospheric pressure, the accumulated liquid therein passes through the second drain pipe **351** down to the liquid supply tank **225**.

In order to secure this result, the valve **300** is preferably constructed, as illustrated in detail in Figs. 6 and 7, and is provided with two chambers **401, 403**. The chamber **401** is cylindrical in shape and is connected by a port **405** to the pipe **302** which, as above stated, is connected to the source of vacuum. It will be noted that the pipe **341**, which establishes the vacuum in the upper chamber **223**, is directly connected to the source of vacuum through a fitting **230** mounted above the valve **300**, and therefore vacuum is maintained in the upper chamber at all times independent of the valve **300**. The chamber **403** is connected to the pipe **340**, which controls the vacuum in the lower chamber **224**. The valve chambers **401, 403** are alternately connected and disconnected by a rotatable closure and by-pass valve member **407**, yieldingly held against the face of the valve **300** by a spring **409** and collar **419** on the valve shaft, as shown. The closure member **407** is keyed to the shaft to rotate therewith and to be capable of movement longitudinally thereof. In operation, the central chamber **401** is connected with the chamber **403** during the rotation of the valve member through substantially one-half of a cycle, thus establishing suction within the lower chamber **224** of the overflow trap. During the remaining half cycle the chamber **403** is closed to the vacuum and provision is made for connecting the chamber **403** with the atmosphere during this half of the cycle, and for this purpose a second and usual by-pass **421** open to the atmosphere is provided in the rotatable valve member **407** to admit air, so that the liquid in the lower chamber may be drawn off into the tank **225** by gravity.

After the bottles have been cleaned and filled in the manner above described, the elevator returns to its initial position and at the next operation of the machine the row of filled bottles is discharged onto a discharge conveyor **500** by a row of previously cleaned bottles and are thus removed from the machine.

While the preferred embodiments of the present invention have been herein illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention, what is claimed is:—

1. In a machine of the character described, in combination, an operating head, container elevating means, means for moving containers onto said elevating means when the latter is in a retracted position, and a safety device for preventing the operation of said container moving means in the event that the elevator encounters undue resistance in its movement toward the operating head.

2. In a machine of the character described, in combination, an operating head, a container supporting member, means for relatively moving the operating head and container supporting member to present a container to the operating member, container moving means for moving containers onto the supporting member, and a safety device for preventing the operation of said container moving means in the event that undue resistance is encountered in the aforesaid relative movement of the operating member and the container supporting member.

3. In a machine of the character described, in combination, a cleaning head, a filling head, an elevator for moving containers into position to be cleaned and filled, container moving means for moving containers onto said elevating means, and a safety device controlled by the elevator for preventing the operation of said container moving means in the event that undue resistance is encountered by said elevator in its movement.

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