Dec. 22, 1953 R. DÉTREZ 2,663,479

FLUID OPERATED FILLING VALVE MECHANISM
UTILIZING VARYING FLUID PRESSURES

Filed Aug. 6, 1949 4 Sheets-Sheet 1

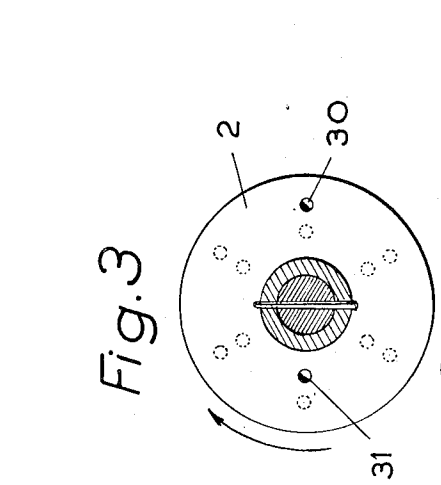


Fig. 3

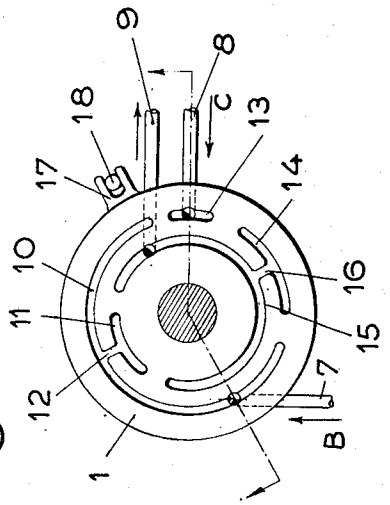


Fig. 2

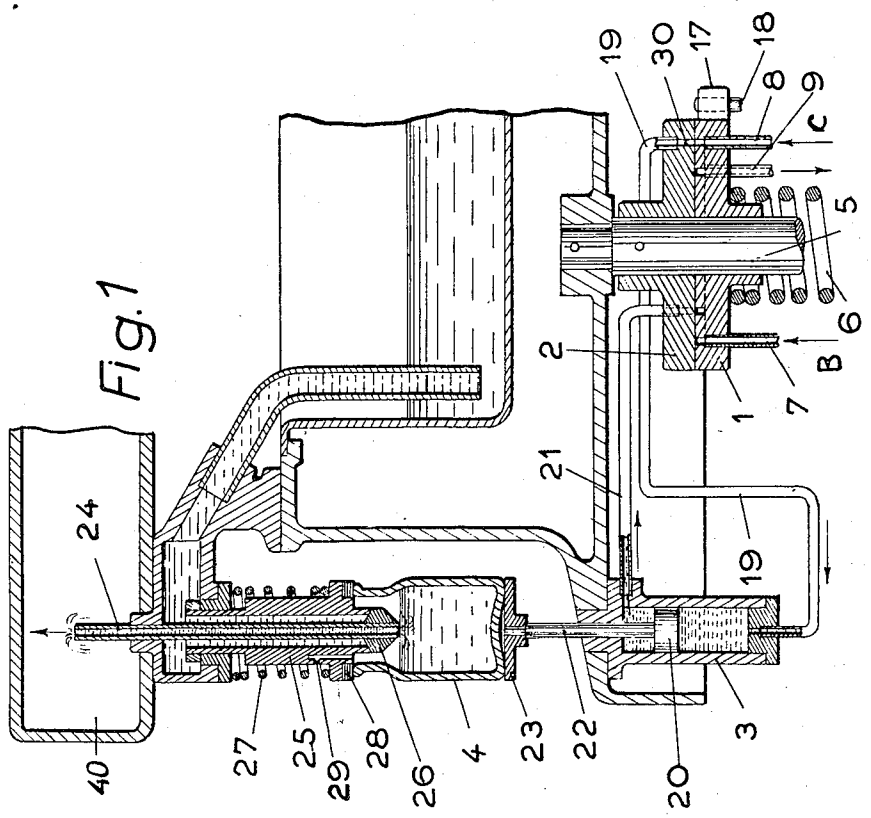


Fig. 1

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Fig. 5

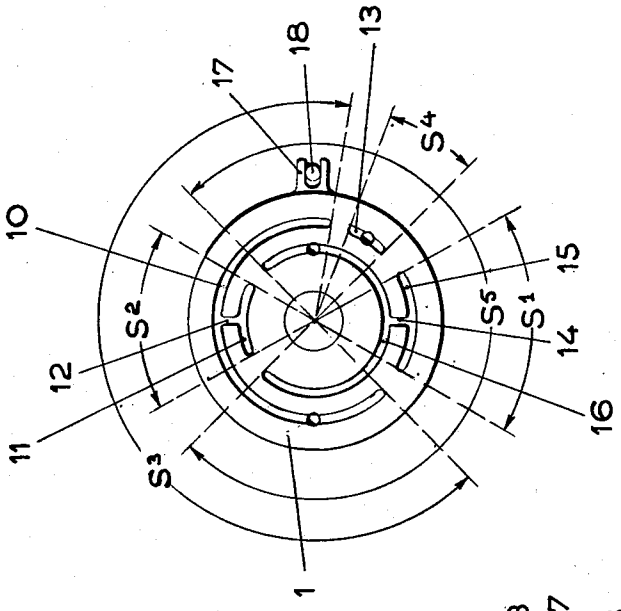
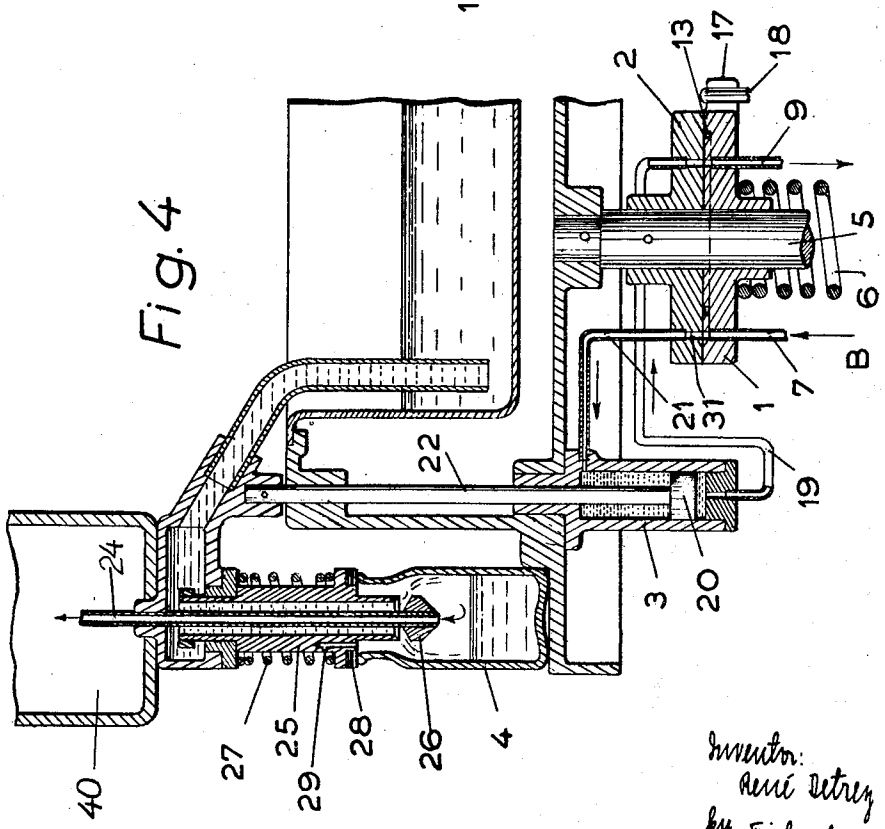


Fig. 4



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FLUID OPERATED FILLING VALVE MECHANISM
UTILIZING VARYING FLUID PRESSURES

Filed Aug. 6, 1949 4 Sheets-Sheet 3

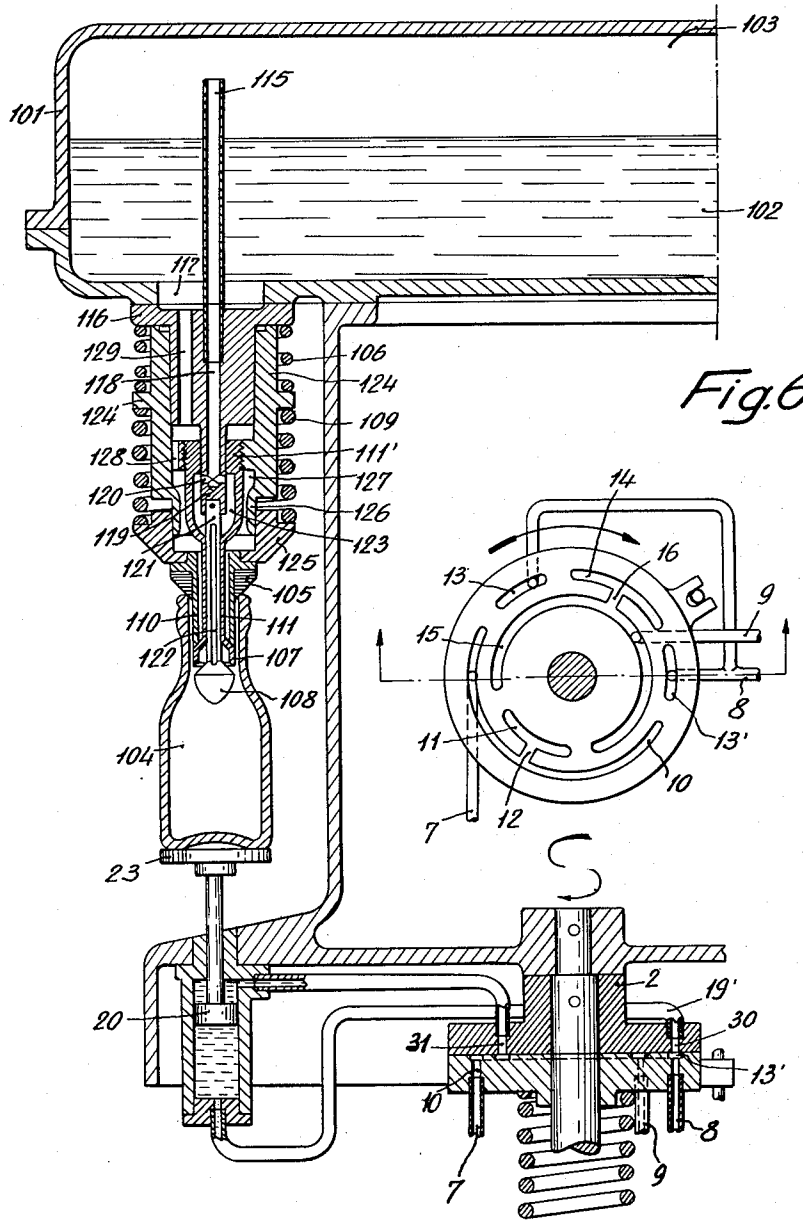


Fig.6

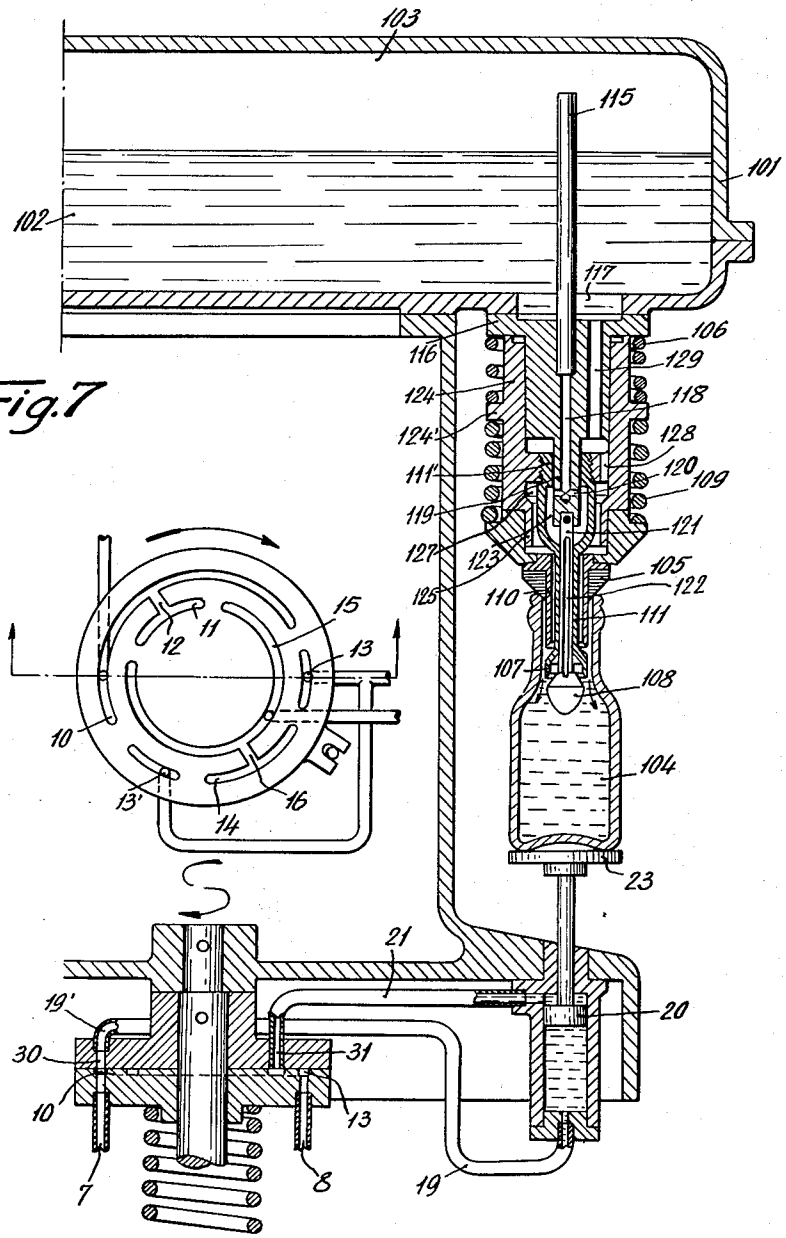
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FLUID OPERATED FILLING VALVE MECHANISM
UTILIZING VARYING FLUID PRESSURES

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Fig.7



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FLUID OPERATED FILLING VALVE MECHANISM UTILIZING VARYING FLUID PRESSURES

René Détrez, Nogent-sur-Marne, France

Application August 6, 1949, Serial No. 108,928

Claims priority, application France August 9, 1948

24 Claims. (Cl. 226—98)

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My invention has for its object a machine for filling bottles and the like containers, the filling nozzles of the machines being provided at least with:

(*a*) a member carried by said filling nozzle and closing the neck of the container to be filled during the filling stage thereof,

(*b*) a pipe or channel feeding the liquid into the container during the filling stage.

(*c*) a tube for setting the inside of the container to be filled in communication either with the inside of the vacuum chamber of the machine considered or with the inside of the chamber of any compressed gas of said machine;

The invention relates to those filling machines that include moreover either means for moving the container or containers to be filled towards or away from the filling nozzle or else a similar movement of the filling nozzle or nozzles with reference to the container or containers.

The invention relies on the principle of applying a plurality of different pressures in succession for urging the neck of the container to be filled against the closing member carried by the filling nozzle, generally made of rubber or the like plastic material; these different and successive pressures are associated with the relative movement through which the container is moved towards or away from the filling nozzle in a manner such that each of the successive different pressures may correspond to one of the stages required for the complete execution of the filling operation desired.

The invention is of considerable interest in a large number of cases inasmuch as it provides for the possibility of giving each of the separate stages defined by the succession of different pressures associated with the relative movement between the container and the filling nozzle, a duration as long as may be required.

This feature is of great advantage in the case of machines filling containers through application of vacuum with a liquid that shows a tendency to frothing as the invention allows in this case leaving the neck of the filled container in fluidtight contact with the member closing the filling nozzle, the liquid feeding channel being closed as long as may be required. This leaves enough time for the suction in the nozzle to absorb the froth or excess liquid to be found in the container. Such an application is of particular interest in the case of machines filling milk bottles chiefly when the liquid is bottled at a low temperature and has consequently a tendency to froth.

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The above mentioned feature is also important in the case of machines adapted to fill bottles with beer, lemonade or the like sparkling drinks which are generally of the so-called counter pressure or isobarometric type, the nozzles of said machines being adapted to open and close in a plurality of successive steps:

The first step appears as a consequence of the pressure exerted by the neck of the container to be filled against the closing member for said container carried by the filling nozzle so as to open the tube communicating with the inside of the nozzle with reference to the inside of the chamber of the filling machine that contains a gas under pressure such as CO_2.

The second step is then provided again through the pressure of the neck of the receiver to be filled against the closing member of the container carried by the filling nozzle, which has for its result an uncovering of another opening in the nozzle that allows then the flow of the liquid into said container to be filled.

Such an improvement may for instance be incorporated to machines provided with filling nozzles of the type disclosed in my prior French patent, filed on December 21, 1944 and entitled "Filling Nozzles for Machines Adapted to Fill Bottles, Flasks and the Like Containers," the lower pressure in the arrangement considered having for its result to overcome first the resistance of the spring closing the valve controlling the pipe connection between the inside of the container to be filled with the inside of the machine considered that contains CO_2 or the like gas under pressure, the higher pressure having for its object to overcome the resistance of the spring closing the valve controlling the actual admission of liquid into the container to be filled.

According to my invention, the bottle filling machine of the type disclosed in the opening paragraph of the present specification is provided with means for associating a plurality of different successive pressures with a view to urging the neck of the container to be filled against the member closing said neck and carried by the filling nozzle, said pressures being applied in succession in predetermined relationship with the relative movement between the container and the filling nozzle against the antagonistic pressure of one or more springs opposing the opening of ports provided in the nozzle under the action of said pressures.

Further it is possible to use two different pressures for urging the neck of the container to be filled against the member closing said neck which

is carried by the filling nozzle, the higher of these two pressures being higher than the antagonistic pressure of the spring controlling the closing of the filling pipe and having for its object overcoming the resistance of said spring and consequently opening said filling pipe for a predetermined duration; the lowest of the two different pressures considered being on the contrary less than the antagonistic pressure of the spring mentioned hereinabove and being substituted afterwards for the higher pressure, such reduction in the pressure allowing the closing of the filling pipe under the pressure of the antagonistic spring, the neck of the filled container remaining then and for a predetermined duration in fluidtight contact with the closing member carried by the filling nozzle; the relative movement of the container away from the closing member considered corresponding to the termination of any pressure urging the neck against its closing member.

My invention is also applicable to a vacuum operated filling machine wherein the higher pressure urging the neck against the closing member is exerted first so as to open the filling channel while the lower pressure is then substituted therefor after the filling stage, the neck of the filled container remaining in fluidtight contact for a predetermined duration with the closing member carried by the filling nozzle, said duration corresponding to the time required for sucking in the excess liquid or the froth that may be found in the container.

According to a further object of my invention, there are provided one or more ports or vents, the total cross-section of which is substantially less than that of the tube connecting the inside of the container to be filled with the vacuum chamber of the filling machine; said vents are provided in the filling channel in a manner such that said vents allow a slight entrance of air into the unfilled space of the container during the closing stage of the filling and while the filled container remains in contact with the closing member carried by the filling nozzle under the action of the lower of the two operating pressures; the slight entrance of air thus allowed has chiefly for its purpose to further the suction of the overflow or froth to be found in the filled container.

My invention is also applicable to a filling machine operating through counter-pressure wherein the lower pressure is first exerted so as to overcome the resistance of a first antagonistic spring that exerts a thrust on the member controlling the connection between the inside of the container to be filled with the inside of the chamber of the machine containing the gas under pressure; consequently, this opens for a predetermined duration the pipe providing said connection while the higher pressure exerted after said connection is provided overcomes the resistance of a second antagonistic spring that is more powerful than the first one and exerts its thrust on a member controlling the admission of liquid into the container to be filled and consequently allows for a predetermined duration the flow of liquid into same.

Lastly, the different successive pressures applied are obtained at the desired moment for each container to be filled by a distributor for fluid under pressure feeding a double acting cylinder, the piston of which is secured either to the carrier of said container in the case of a movement of the latter with reference to the nozzle or to the nozzle in the case of the latter being movable with reference to the container. The distributor considered is provided with channels for receiving and transmitting the fluid under different pressures and it distributes the fluid in succession and in a predetermined sequence under different pressures, each of said successive distributions of the fluid under a different pressure having an equally predetermined duration.

It is very important to note that the application of different successive pressures for urging the container neck against the closing member carried by the filling nozzle is associated with relative movements of the container with reference to the nozzle and these movements can only be obtained in practice through standard mechanical members. It will be remarked on the other hand that for sake of brevity, I will use hereinafter the expression "relative movement between the container and the filling nozzle" so as to show that the invention is applicable both to machines wherein the container is movable and to those wherein the filling nozzle is movable.

Various embodiments of the invention are described hereinafter, reference being made to the diagrammatic accompanying drawings, the examples given forming mere non-limiting exemplifications of the invention.

The figures of the drawings are fragmentary views of rotary filling machines incorporating my invention and wherein the nozzle and the carrier for the container rotate in unison with the machine; but of course my invention is applicable as well to other filling machines such as rectilinear filling machines and generally speaking to any filling machine, whether automatic or otherwise and whatever the number of their nozzles. In accompanying drawings:

Fig. 1 is an elevational sectional view of a vacuum operated filling nozzle wherein the container is movable, the nozzle being associated with members transmitting different and successive pressures to the container for urging the container neck against the closing member carried by said nozzle.

Fig. 2 is a plan view of the stationary part of the distributor of fluid under pressure appearing in Fig. 1 as constituting the member transmitting two different successive pressures for urging the container neck against the closing member.

Fig. 3 is a plan view of the rotating part of the said distributor carrying the feeding pipes for distributor of fluid under pressure considered, the carrier of the container that is movable.

Fig. 4 is an elevational view of a vacuum operated filling nozzle adapted to move with reference to the container and associated with the means transmitting to the closing member a succession of different pressures as above.

Fig. 5 is a plan view of the stationary portion of the distributor appearing in Fig. 4 and constituting a member transmitting the different above mentioned pressures for urging the closing member considered against the neck of said container.

Fig. 6 is an elevational view, partly in section, of a filling machine constructed in accordance with my invention and adapted to operate through counter-pressure.

Fig. 7 is a view of the structure shown in Fig. 6 in a different operative position of the machine.

In Figs. 1, 2, and 3 the members illustrated are the stator 1 of the distributor of fluid under pressure, the rotor 2 thereof and 3 the double acting cylinder, the piston 20 of which gives the

container 4 its movement with reference to the filling nozzle.

The stationary stator 1 that is freely mounted on the shaft 5 is urged against the rotor 2 keyed to the shaft 5, through a spring 6 or equivalent part.

7 designates the pipe feeding the stator 1 with fluid under high pressure while 8 designates a similar pipe feeding the same fluid under a reduced pressure to the stator 1. In this example, the expression "high" means a pressure above that of the antagonistic spring described hereinafter while "low pressure" means a pressure less than that of said antagonistic spring. 9 designates a pipe for the outlet of the fluid passing out of the stator 1.

In the above mentioned distributor stator, the concentric annular channels 10 and 11 communicate with the channel 12 and are constantly fed by the pipe 7 with fluid under high pressure.

The channel 13 is not connected with the other channels (Fig. 2) and it is fed separately by the pipe 8 with fluid under low pressure.

The concentric channels 14 and 15 communicate with one another through the channel 16. They receive no fluid under pressure and serve only as a passage for the liquid delivered the output pipe 9 with which they are in constant connection.

It should be noticed that the stator 1 may be held fast against rotation by means of a projection 17 carried by it and adapted to engage a stop 18 rigid with a stationary part of the machine that is not illustrated.

In Fig. 1, the pipe 19 operates in alternation to send fluid under high and low pressure underneath the piston 20 of the cylinder and to receive from underneath said piston the fluid urged towards the distributor.

The pipe 21 sends similarly in alternation high pressure fluid to the other side of the piston 20 and receives from said piston side the fluid to be delivered towards the distributor.

In said Fig. 1, the piston rod 22 carries the container to be filled 4 through the agency of a carrier 23. On the other hand, the filling nozzle includes a tube 24 connecting the inside of the container with the inside of a vacuum chamber 40 while a pipe 25 serves for the admission of liquid and is closed by a closing valve 26 rigid with the tube 24 and the neck of the container to be filled is closed by the member 28 rigid with said pipe 25. The latter slides to a slight extent longitudinally of the pipe 24 against the action of the spring 27.

Small vents or ports 29 are provided optionally in the wall of the pipe 25 feeding the liquid. The cross-section of these vents is much smaller than the cross-section of the tube 24 so as to exert no substantial action on the suction exerted by the tube 24.

They serve as disclosed for furthering the return into said tube 24 of the froth or excess of liquid that may be found at the end of the filling stage in the filled container. Moreover it is possible in certain cases for these vents to prevent adherence through suction of the container neck against its closing member 28.

The operation of the arrangement illustrated in Figs. 1, 2 and 3 is as follows. In the first place, it should be noticed that Fig. 1 and Fig. 2 correspond to the stage of application of low pressure on the neck of the container to urge it against the closing member carried by the filling nozzle.

This stage is defined by the angular location of the rotor 2 with reference to the stator 1. As a matter of fact, by reason of the rotary movement of the rotor, the end 19' of the pipe 19 connected with the port 30 of the rotor (Fig. 3) registers at this moment with the channel 13 fed through the pipe 8, fed in its turn by the low pressure supply that is not illustrated and may be constituted by a pump, accumulator or the like means.

Consequently the fluid under low pressure passes through 8—30—19' and 19 and acts on the underside of the piston 20 but this pressure is less than that required for overcoming the pressure of the spring 27 and the neck of the container 4 is urged fluidtightly against the closing member 28 without it being possible for the latter to be raised.

The fluid that is delivered through the other side of the piston 20 passes through the pipe 21 and then back through the port 31 of the rotor registering with it and then through the channel 15 and the exhaust pipe 9 connected with said channel.

The stage corresponding to application of high pressure for filling the container is prior to the application of low pressure and is executed as follows: the port 30 of the rotor 2 was lying first in front of the beginning of the channel 10 that is fed in its turn through the channel 7 feeding high pressure fluid. From this moment onwards and throughout the movement of the port 30 over the channel 10, the fluid under pressure is sent into the cylinder 3 through the pipe 19 and exerts said pressure on the underside of the piston 20 that transmits it to the container, the neck of which is urged against the closing member carried by the filling nozzle. But at this moment, the pressure against said member being higher than that of the antagonistic spring 27, the latter yields and the pipe 25 is no longer closed by the valve 26, whereby the filling operation may be executed.

The stage corresponding to the movement of the filled container with reference to the filling nozzle follows the two preceding stages. It is defined by the passage of the port 31 of the rotor 2 in front of the channel 11 that is fed through the pipe 7 communicating with it through the channels 12 and 10.

At this moment, the fluid under pressure passes through 7—10—12 and 11 and through 31 and the channel 21 so as to reach the upper side of the piston 21 to constrain the latter to sink. At the same time, the fluid delivered by said piston 20 passes downwardly through 19, 30, 14 (registering with 30) 16 and 15 and lastly through 9 that is connected with the channel 15.

The example illustrated in Figs. 4 and 5 is similar to that illustrated in the preceding figures except for the fact that the nozzle 24—25 moves with reference to the container 4 to be filled that assumes a stationary level, the stage illustrated being that corresponding to the filling of the container.

In Figs. 4 and 5, the same members have retained the same reference numbers as precedingly and the operation is as follows:

By reason of the rotary movement of the rotor 2 with reference to the stator 1, the end of the pipe 21 connected with the opening 31 of said rotor has come into register with the channel 10 fed through the pipe 7, fed in its turn by the high pressure source that is not illustrated. Consequently the high pressure fluid passes through

7—10—31—21 into the cylinder 3 above the piston 20. The latter, the rod 22 of which is rigid with the filling nozzle constrains said nozzle to move into the container to be filled and the closing member 28 carried by said nozzle engages the neck of said container.

But as the distributor for fluid under pressure is at this moment in the stage at which it distributes high pressure fluid, the action exerted by the upper part of the filling nozzle on the spring 27 overcomes the resistance of the latter so that said spring 27 yields, the feeding pipe 25 is no longer in contact with the valve 26 and the filling operation may begin.

This operation continues as long as the port 31 remains in communication with the channel 10. At the same time, the fluid delivered by the piston 20 passes first through the pipe 19 and then through the port 30 and the channel 15 with which 30 communicates and finally into the exhaust pipe 9 connected with the channel 15. The stage following the application of high pressure on the closing member carried by the nozzle for urging same on the container neck consists in the application of low pressure. The latter has the same action as in the preceding example except for the fact that the nozzle body 24 moves away from the container instead of the container moving away from the nozzle, and the circulation of fluid under low pressure is as follows: the fluid arrives into the distributor through the pipe 8 that is not shown in Fig. 4 although shown in corresponding Fig. 1. It flows through the channel 13 and through the pipe 21 registering and communicating then with channel 13 in the same manner as 19 with reference to 30 and to 8 in the case of Fig. 1.

The low pressure fluid will then arrive into the cylinder 3 but said pressure is less than that required for overcoming the spring 27 and the expansion of said spring produces the above mentioned movement of the nozzle body away from the container without permitting the closing member 28 to relinquish its fluidtight contact with the nozzle of the filled container, the low pressure prevailing in the cylinder 3 above the piston 20 providing said contact.

The stage corresponding to the movement of the filling nozzle away from the filled container follows the two preceding stages. It is defined by the passage of the port 30 of the rotor 2 in register with the channel 11 that is fed in its turn by the channels 12 and 10 receiving the fluid under pressure from the pipe 7. At the same time, the fluid delivered upwardly by the piston 20 passes through 21, the port 31, the channels 14—16 and 15 and lastly through 9 that is connected with the channel 15.

Of course, the succession of operations as described hereinabove is defined by the direction of rotation of the rotor 2 illustrated by the arrow A. In the case of a machine rotating in the opposite direction, the operation would be reversed.

It will be noted that in Fig. 5, the different sectors of the angular movement of the rotor have been refereneed as follows, in correspondency with the different above-mentioned stages: the sector S1 corresponds to the delivery stage of the fluid during the movement of the container away from the filling vat and to the duration of said movement.

The sector S2 of same angular size corresponds to the same stage during which fluid under high pressure is delivered into the cylinder 3 for furthering said delivery stage.

The sector S3 corresponds to the stage of high pressure delivery into the cylinder 3 at the end of the relative movement of the container towards the filling nozzle.

The sector S4 corresponds to the stage of low pressure delivery into the cylinder 3, said pressure replacing the preceding pressure on the same side of the piston 20 during the closing stage of the filling pipe.

The sector S5 is the longest of all and corresponds in angular value to the sum of the sectors S3 and S4 together with the inoperative sector between said S3 sectors and S4. It provides for the output from the cylinder while the piston 20 is operative and during the filling operation and the suction of the overflow liquid.

In the preceding examples it should be noted that the pressure of the fluid is always exerted in the direction of the arrows B and C but that at the moment of the transition between high and low pressure, the low pressure fluid is urged into the feed pipe until the antagonistic spring 27 has expanded.

In the accompanying figures, it should also be noted that the location of the connection of the pipe 7 with the channels 10—11 and 12 is irrelevant, provided said pipe 7 leads to one of said channels and delivers fluid thereto. The same is the case for the pipe 9 which may be connected with any of the channels 14—15 and 16.

In contradistinction, the pipe 8 can be connected only with the channel 13.

When the invention is applied to filling machines operating through counter-pressure, the sequence of the phases is established in conformity with the operations to be executed and in particular, it may be as follows:

A low pressure stage urging the container against the closing member associated during the relative movement of the container towards the nozzle, so as to make the inside of the container communicate with the inside of the machine chamber, that contains the gas under pressure.

A high pressure stage associated with the relative movement of the container towards the nozzle and opening during a predetermined duration the liquid feeding pipe.

A low pressure stage associated with the same movement of the container towards the nozzle while the container is held in fluid tight contact with the closing member carried by the nozzle, the liquid feeding pipe being closed and the pipe connecting the inside of the container with the inside of the chamber containing gas under pressure remaining open.

Cancellation of the operative pressure and moving of the filled container away from the filling nozzle.

In the case of this application, the arrangement of the members transmitting the pressures is similar to those disclosed precedingly except for the fact that the channel 10 is made shorter and that the beginning of said channel is replaced by a second small channel separate from the channel 10 and arranged symmetrically in line with the channel 14, said small second channel corresponding to the first low pressure stage above disclosed.

Figs. 6 and 7 show two different positions of an apparatus constructed in accordance with the present invention and adapted to operate through a counter-pressure. Tank 101 is pro-

vided with a liquid 102 therein, such as beer, for example, and the space 103 above the liquid in the tank is filled with a gas under pressure, such as, for example, carbon dioxide. As is clear from Figs. 6 and 7, an elongated tube 115 has a top open end located in the space 103. This tube 115 is fixed at its bottom end to a member 116 covering an opening 117 in the bottom of tank 101 and formed with a bore 118 which is a continuation of and communicates with the tube 115. Member 116 has a bottom extension 119 formed with radial bores 120 communicating with the bore 118. To the bottom end of extension 119 is fixed an elongated guide member 121 formed with one or more grooves 122 and carrying at its bottom end an enlargement 108. A tubular member 111 has a lower portion slidably mounted on member 121 and an upper portion 111' slidably engaging the extension 119, this member 111 being enlarged just below the upper portion 111' thereof to form a space 123 located about the bores 120 and the top end of grooves 122, as is clearly evident from Fig. 6. The lower end of member 111 is formed with an enlargement 107 adapted to engage enlargement 108 for closing the passage of gas from space 103 to the interior of bottle 104 through the tube 115, bore 118, bores 120, space 123, and grooves 122. When enlargement 107 of member 111 is spaced from member 108, as illustrated in Figs. 6 and 7, the interior of bottle 104 is in communication with space 103 through the above-described path. The upper end 111' of member 111 is threadedly connected to member 124 which is mounted for sliding movement along member 116, and spring 106 engages at one end thereof member 116 and at the opposite end thereof a flange 124' of member 124 to urge the latter and member 111 therewith toward enlargement 108 so as to tend to maintain enlargement 107 of member 111 against enlargement 109 to prevent flow of gas from space 103.

A tubular member 110 is fixedly connected to a circular member 125 which is mounted for sliding movement along the lower end portion 126 of member 124, this member 110 forming between itself and member 111 an annular space communicating with the space 127 defined by members 124, 125 and the portion of member 111 beneath the top end 111' thereof. This space 127 communicates through a bore 128, formed in member 124, and a bore 129, formed in member 116, with the bottom of tank 101 so that liquid 102 is free to fall through bores 129 and 128 and fill the space 127 and the annular space between members 110 and 111. A spring 109, stronger than spring 106, bears at one end against member 125 and at an opposite end against flange 124' to urge the bottom end of member 110 against enlargement 107 of member 111, as shown in Fig. 6, to prevent liquid 102 from flowing from tank 101. Located about member 110 is a sealing ring 105 adapted to engage the mouth of a bottle 104 which is to be filled.

The piston means 20 and the valve means and hydraulic circuit connected thereto are identical with the structure shown in Fig. 1.

When rotatably mounted valve member 2 is in the position where low pressure line 7 communicates with the piston 20, the support 23 moves the bottle 104 against the sealing means 105 with a force great enough to overcome the force of spring 106 but not great enough to overcome the force of spring 109 so that enlargement 107 is thereby moved upwardly away from the enlargement 108 to the position shown in Fig. 6 so as to permit gas in space 103 to flow into bottle 104, as described above, and wash any air out of the bottle. In this way the trapping of any air bubbles between the liquid which flows into the bottle and the sides of the bottle is avoided.

Upon continued rotation of valve member 2, the high pressure line 8 is placed in communication with piston 20 so as to move, with a force greater than that of spring 109, support 23 and bottle 104 thereon against the action of spring 109, thereby axially moving member 110 upwardly away from enlargement 107 to the position shown in Fig. 7, so that liquid 102 may flow by gravity through bores 129 and 128, through space 127 and the annular space between members 110 and 111 and into the bottle 104.

Upon further rotation of valve member 102, high pressure line 8 is cut off from piston 20 so that spring 109 then moves tubular member 110 back to the position shown in Fig. 6 where the flow of liquid 102 is cut off. The hydraulic fluid is then permitted to flow through discharge line 9 to permit support 23 to be lowered for the removal of bottle 104.

In the present description, the term "fluid" has been used for designating the medium used for transmitting different pressures and movements through the above mentioned distributor, said fluid may be constituted by compressed air or the like gas under pressure. It may also be constituted by a liquid such as oil for hydraulic movements, said latter arrangement being preferred.

Of course, the distributor considered may be of any type whatever such as a disc, cone, cylinder, valve or the like type, provided it allows the successive application of the different pressures required for urging the neck of the container to be filled against the closing member carried by the filling nozzle, said different pressures being associated as disclosed hereinabove.

It is even possible to apply the different operative pressures otherwise than through a fluid under different pressures. However this latter solution is the most convenient chiefly in the case where the invention is applied to vacuum operated filling machines.

In this case, as a matter of fact, the distribution of fluid under different pressures, preferably under hydraulic control as disclosed, allows filling in any haphazard sequence containers even of varying heights without the duration and amplitude of the operative stage under low pressure being modified through said differences. This is due on one hand to the fact that the closing of the filling channel is produced between application of high and of low pressure and is always provided by a relative movement of same amplitude whatever may be the height of the filled containers; on the other hand, the duration of the suction stage for the excess liquid or froth is also of constant amplitude whatever the height of the containers.

What I claim is:

1. A bottle filling apparatus comprising, in combination, a first chamber portion; a second chamber portion containing a liquid to be filled into the bottles; first duct means communicating with said first chamber portion; second duct means communicating with said second chamber portion; valve means associated with said second duct means for opening and closing the

same; means for supporting the bottle to be filled adjacent to said first and second duct means; first pressure actuated means for placing the bottle to be filled into communication only with said first duct means and in position to communicate with said second duct means when said valve means is open; and second pressure actuated means for opening said valve means so that said second duct means communicates with said bottle to permit the liquid to flow therein.

2. A bottle filling apparatus comprising, in combination, a first chamber portion; a second chamber portion containing a liquid to be filled into the bottles; first duct means communicating with said first chamber portion; second duct means communicating with said second chamber portion; valve means associated with said second duct means to close and open the same; means for supporting the bottle to be filled adjacent to said first and second duct means; first pressure actuated means for placing the bottle to be filled into communication only with said first duct means and in position to communicate with said second duct means when said valve means is open; and second pressure actuated means of a higher pressure than said first pressure actuated means for opening said valve means so that said second duct means communicates with said bottle to permit the liquid to flow therein.

3. A bottle filling apparatus comprising, in combination, a first chamber portion; a second chamber portion containing a liquid to be filled into the bottles; first duct means communicating with said first chamber portion and comprising a first elongated tubular portion; second duct means communicating with said second chamber portion and comprising a second elongated tubular portion of greater diameter than said first elongated tubular portion and mounted concentrically about said first elongated tubular portion so as to provide an annular space between said first and second tubular portions; valve means associated with said second duct means to close and open the same; means for supporting the bottle to be filled adjacent to said first and second duct means, said valve means comprising an enlarged portion located adjacent to an end of said first elongated tubular portion and abutting against an end of said second tubular portion so as to close said annular space and means for movably mounting said tubular portions with respect to each other so as to displace said enlarged portion from said end of said second tubular portion so as to open said annular space; first pressure actuated means for placing the bottle to be filled into communication only with said first duct means and in position to communicate with said second duct means when said valve means is open; and second pressure actuated means of a higher pressure than said first pressure actuated means for opening said valve means so that said second duct means communicates with said bottle to permit the liquid to flow therein.

4. A bottle filling apparatus comprising, in combination, a first chamber portion; a second chamber portion containing a liquid therein to be filled into the bottles; means for supporting a bottle to be filled in a position adjacent to said chamber portions; a first elongated tubular member mounted with one end thereof opening into said first chamber portion and with the other end thereof opening into the bottle when it is located on said support means, said other end of said first tubular member having an enlargement located thereon; a second elongated tubular member of larger diameter than said first elongated tubular member and mounted concentrically about said first tubular member to provide an annular space between said first and second tubular members, said second tubular member having a pair of open end portions one of which is located in abutting engagement with said enlargement on said first tubular member so as to close said annular space; duct means communicating with the other open end portion of said second tubular member and with said second chamber portion so that the liquid therein may flow into said annular space; means for slidably mounting said second tubular member for axial movement with respect to said first tubular member; sealing means located about and fixedly connected to said second tubular member to sealingly engage the mouth of the bottle being filled; first pressure actuated means for locating a bottle on said supporting means with its mouth in sealing engagement with said sealing means, whereby the interior of the bottle is then only in communication with said first tubular member and the interior of said first chamber portion; and second pressure actuated means greater than said first pressure actuated means for moving said first and second tubular members with respect to each other so as to separate said enlargement from said one open end portion of said second tubular member while the mouth of the bottle remains in sealing engagement with said sealing means, whereby the liquid in said second chamber portion may then flow through said duct means and said annular space into said bottle.

5. A bottle filling apparatus comprising, in combination, a first chamber portion; a second chamber portion containing a liquid therein to be filled into the bottles; means for supporting a bottle to be filled in a position adjacent to said chamber portions; a first elongated tubular member mounted with one end thereof opening into said first chamber portion and with the other end thereof opening into the bottle when it is located on said support means, the other end of said first tubular member having an enlargement located thereon; a second elongated tubular member of larger diameter than said first elongated tubular member and mounted concentrically about said first tubular member to provide an annular space between said first and second tubular members, said second tubular member having a pair of open end portions one of which is located in abutment with said enlargement on said first tubular member so as to close said annular space; duct means communicating with the other open end portion of said second tubular member and with said second chamber portion so that the liquid therein may flow into said annular space; means for slidably mounting said second tubular member for axial movement with respect to said first tubular member; sealing means located about and fixedly connected to said second tubular member to sealingly engage the mouth of the bottle being filled; first pressure actuated means for locating a bottle on said support means with its mouth in sealing engagement with said sealing means, whereby the interior of the bottle is then only in communication with said first tubular member and the interior of said first chamber portion; and second pressure actuated means greater than said first pressure actuated means for moving said first and second tubular members with respect to each other so as to separate said enlargement from

said one open end portion of said second tubular member while the mouth of the bottle remains in sealing engagement with said sealing means, whereby the liquid in said second chamber portion may then flow through said duct means and said annular space into said bottle, said first and second pressure actuated means comprising a hydraulic circuit having a valve means therein for admitting in one position thereof hydraulic fluid into the hydraulic circuit at a first pressure and for admitting in another position thereof hydraulic fluid into the hydraulic circuit at a second pressure which is higher than said first pressure.

6. A bottle filling apparatus comprising, in combination, a first chamber portion; a second chamber portion containing a liquid therein to be filled into the bottles; means for supporting a bottle to be filled in a position adjacent to said chamber portions; a first elongated tubular member mounted with one end thereof opening into said first chamber portion and with the other end thereof opening into the bottle when it is located on said support means, the other end of said first tubular member having an enlargement located thereon; a second elongated tubular member of larger diameter than said first elongated tubular member and mounted concentrically about said first tubular member to provide an annular space between said first and second tubular members, said second tubular member having a pair of open end portions one of which is located in abutting engagement with said enlargement on said first tubular member so as to close said annular space; duct means communicating with the other open end portion of said second tubular member and with said second chamber portion so that the liquid therein may flow into said annular space; means for slidably mounting said second tubular member for axial movement with respect to said first tubular member; sealing means located about and fixedly connected to said second tubular member to sealingly engage the mouth of the bottle being filled; spring means mounted about said second tubular member and engaging said sealing means to urge the same with said second tubular member in a direction toward sealing engagement with a bottle mounted on said support means and for urging said one end portion of said second tubular member in the direction of engagement with said enlargement on said first tubular member; first pressure actuated means for locating a bottle on said support means with its mouth in sealing engagement with said sealing means, whereby the interior of the bottle is then only in communication with said first tubular member and the interior of said first chamber portion; and second pressure actuated means greater than said first pressure actuated means for moving said first and second tubular members with respect to each other and against the action of said spring means so as to separate said enlargement from said one open end portion of said second tubular member while the mouth of the bottle remains in sealing engagement with said sealing means, whereby the liquid in said second chamber portion may then flow through said duct means and said annular space into said bottle, said first and second pressure actuated means comprising a hydraulic circuit having a valve means therein for admitting in one position thereof hydraulic fluid into the hydraulic circuit at a first pressure and for admitting in another position thereof hydraulic fluid into the hydraulic circuit at a second pressure which is higher than said first pressure.

7. A bottle filling apparatus comprising, in combination, a first chamber portion; a second chamber portion containing a liquid therein to be filled into the bottles; a first support member located adjacent to said chamber portions for supporting a bottle to be filled; a first elongated tubular member mounted with one end thereof opening into said first chamber portion and with the other end thereof opening into a bottle when it is located on said first support member, the other end of said first tubular member having an enlargement located thereon; a second elongated tubular member of larger diameter than said first elongated tubular member and mounted concentrically about said first tubular member to provide an annular space between said first and second tubular members, said second tubular member having a pair of open end portions one of which is located in abutting engagement with said enlargement on said first tubular member so as to close said annular space; duct means communicating with the other open end portion of said second tubular member and with said second chamber portion so that the liquid therein may flow into said annular space; means for slidably mounting said second tubular member for axial movement with respect to said first tubular member; sealing means located about and fixedly connected to said second tubular member to sealingly engage the mouth of a bottle being filled; spring means mounted about said second tubular member and engaging said sealing means to urge the same with said second tubular member in a direction toward sealing engagement with the mouth of a bottle mounted on said first support member and for urging said one open end portion of said second tubular member in the direction of engagement with said enlargement on said first tubular member; a second support member connected to said duct means to support the same; hydraulic piston means connected to one of said support members for moving it with respect to the other of said support members; hydraulic circuit means connected to said hydraulic piston means for conveying hydraulic fluid to and from said piston means; valve means mounted in said hydraulic circuit means for controlling the flow of fluid therethrough, to thereby control the hydraulic piston means, said valve means comprising a stationary valve member and a rotatably mounted valve member engaging said stationary valve member, said stationary valve member being formed with at least two separate arcuate recesses, means for supplying hydraulic fluid at a first pressure to one of said recesses, said first pressure being too small to overcome the force of said spring means, means for supplying hydraulic fluid at a second pressure which is substantially greater than said first pressure to the other of said recesses, said second pressure being great enough to overcome the force of said spring means, said rotatably mounted valve member being formed with at least one opening passing therethrough which is in registry with only said one of said recesses when it is rotated through a first part of a revolution and which is in registry with only the other of said recesses when it is rotated through a second part of a revolution different and separate from said first part, said opening in said rotatably mounted valve member being connected to said hydraulic circuit

means so that said opening communicates with said hydraulic piston means.

8. A bottle filling apparatus comprising, in combination, a vacuum chamber; a reservoir containing a fluid to be filled into a bottle; a support means for a bottle to be filled located adjacent to said vacuum chamber and reservoir; a fixedly mounted first tubular member having one end thereof opening into said vacuum chamber, said first tubular member extending toward said support means so that the other end thereof is located for opening into a bottle mounted on said support means, said other end of said first tubular member having an enlargement formed thereon; a second elongated tubular member of larger diameter than said first elongated tubular member and mounted concentrically about said first elongated tubular member so as to provide an annular space between said first and second tubular members; means for slidably mounting said second tubular member for axial movement with respect to said first tubular member; spring means mounted about and connected to said second tubular member for urging the same in a direction in which one end thereof abuts against said enlargement of said first tubular member so as to close said annular space; duct means opening at one end thereof into the liquid in said reservoir and opening at the other end thereof into the other end of said second tubular member, whereby the liquid may flow from said reservoir through said duct means and into said annular space; sealing means located about said second tubular member and fixedly connected thereto for sealing engagement with the mouth of a bottle located on said support means; hydraulic piston means fixedly connected to said support means for moving said support means toward and away from said tubular members; a hydraulic circuit means for conveying fluid to and from said piston means so as to move the same; a first rotatably mounted valve member formed with at least one opening passing therethrough and connected to said hydraulic circuit means for communication with said piston means; a second stationary valve member formed with at least two separate arcuate recesses one of which registers with said opening when said rotatably mounted valve member is moved through a first part of a revolution and the other of which registers with said opening in said rotatably mounted valve member when it is moved through a second part of a revolution, said second valve member being formed with first and second passages communicating with said recesses, respectively; means for supplying fluid at a pressure insufficient to overcome the force of said spring means to said first passage; and means for supplying a fluid at a pressure great enough to overcome the force of said spring means to said second passage.

9. A bottle filling apparatus comprising, in combination, a vacuum chamber; a reservoir containing a fluid to be filled into a bottle; a fixedly mounted support means for a bottle to be filled located adjacent to said vacuum chamber and reservoir; a fixedly mounted first tubular member having one end thereof opening into said vacuum chamber, said first tubular member extending toward said support means so that the other end thereof is located for opening into a bottle mounted on said support means, said other end of said first tubular member having an enlargement formed thereon; a second elongated tubular member of larger diameter than said first elongated tubular member and mounted concentrically about said first elongated tubular member so as to provide an annular space between said first and second tubular members; means for slidably mounting said second tubular member for axial movement with respect to said first tubular member; spring means mounted about and connected to said second tubular member for urging the same in a direction in which one end thereof abuts against said enlargement of said first tubular member so as to close said annular space; duct means opening at one end thereof into the liquid in said reservoir and opening at the other end thereof into the other end of said second tubular member, whereby the liquid may flow from said reservoir through said duct means and into said annular space; movably mounted support means connected to said duct means for supporting the same; sealing means located about said second tubular member and fixedly connected thereto for sealing engagement with the mouth of a bottle located on said fixedly mounted support means; hydraulic piston means fixedly connected to said movably mounted support means for moving said movably mounted support means and said duct means, tubular members and vacuum chamber connected thereto toward and away from said fixedly mounted support member; a hydraulic circuit means for conveying fluid to and from said piston means so as to move the same; a first rotatably mounted valve member formed with at least one opening passing therethrough and connected to said hydraulic circuit means for communication with said piston means; a second stationary valve member formed with at least two separate arcuate recesses one of which registers with said opening when said rotatably mounted valve member is moved through a first part of a revolution and the other of which registers with said opening in said rotatably mounted valve member when it is moved through a second part of a revolution, said second valve member being formed with first and second passages communicating with said recesses, respectively; means for supplying fluid at a pressure insufficient to overcome the force of said spring means to said first passage; and means for supplying a fluid at a pressure great enough to overcome the force of said spring means to said second passage.

10. A bottle filling apparatus comprising, in combination, a tank containing a liquid in a lower part thereof to be filled into bottles and containing a gas under pressure in the space above the liquid; a movably mounted support for a bottle to be filled located adjacent to said tank; tubular means having one open end portion located in said space above the liquid and having another end portion formed with an enlargement located adjacent to said support and adapted to be located within a bottle mounted on the support, said tubular means comprising a first tubular member slidably mounted for axial movement, located above said enlargement and being formed with an enlarged open end adapted to engage said enlargement for closing said first tubular means; first spring means operatively connected to said slidably mounted first tubular member for urging said enlarged open end thereof into engagement with said enlargement; a second tubular member of larger diameter than said first tubular member and located concentrically thereabout to provide an annular space between said first and second tubular members, said second tubular member being slidably mounted for axial movement

with respect to said first tubular member and having one open end portion adapted to engage said enlarged end of said first tubular member for closing said annular space; duct means communicating at one end with the other open end of said second tubular member and communicating at its other end with the bottom of said tank to permit the liquid to flow through said duct means and into said annular space by gravity; second spring means of substantially greater strength than said first spring means operatively connected to said second tubular member for urging said one open end thereof into engagement with said enlarged end of said first tubular member; sealing means fixedly mounted about said second tubular member and adapted to engage the mouth of a bottle mounted on said support; hydraulic piston means connected to said support for moving the same toward and away from said sealing means and said tubular members; hydraulic circuit means for conveying fluid to and from said piston means for actuating the same; a rotatably mounted valve member formed with at least one opening passing therethrough and communicating with said hydraulic circuit so that said opening communicates through said hydraulic circuit with said piston means; a stationary valve member formed with at least two separate arcuate recesses one of which registers with said opening during a first part of a revolution of said rotatably mounted valve member and the other of which registers with said opening during a second part of a revolution of said rotatably mounted valve member, said stationary valve member being formed with first and second passages extending therethrough and communicating with said recesses, respectively; means for supplying fluid to said first passage at a pressure great enough to overcome the force of said first spring means but insufficient to overcome the force of said second spring means; and means for supplying fluid to said second passage at a pressure great enough to overcome the force of said second spring means.

11. A bottle filling apparatus comprising, in combination, a filling spout member; first duct means in said filling spout member; second duct means in said filling spout member; valve means associated with said first duct means, being formed in part by an end of the latter, and having an open position permitting passage of fluid through said first duct means and a closed position preventing passage of fluid through said first duct means; resilient means operatively connected to said valve means to urge the same into said closed position thereof; a supporting member for supporting a bottle to be filled with its mouth adjacent to said spout member; first pressure actuated means for moving one of said members toward the other of said members to hold the mouth of a bottle supported by said supporting member in a filling position communicating with said second duct means in said spout member and adapted to communicate with said first duct means when said valve means is in said open position thereof; and second pressure actuated means operatively connected to said valve means for opening the same after said first pressure actuated means has moved said one member towards said other member to hold the mouth of the bottle in said filling position.

12. A bottle filling apparatus, comprising, in combination, a filling spout member having a sealing face; first duct means in said filling spout member; second duct means in said filling spout member; valve means associated with said first duct means, being formed in part by an end of the latter, and having an open position permitting passage of a fluid through said first duct means and a closed position preventing passage of fluid through said first duct means; resilient means permanently tending to keep said valve means in said closed position thereof; a supporting member for supporting a bottle to be filled with its mouth adjacent to said sealing face of said spout member; first pressure actuated means for moving one of said members toward the other of said members to hold the bottle supported by said supporting member in close contact, at the mouth thereof, with said sealing face of said spout member, communicating with said second duct means, and in position to communicate with said first duct means when said valve means is open; and second pressure actuated means for opening said valve means after said first pressure actuated means has moved said one member towards said other member and the mouth of the bottle is thereby pressed against the sealing face of the spout member.

13. A bottle filling apparatus, comprising, in combination, a filling spout member having a sealing face; first duct means in said filling spout member; second duct means in said filling spout member; valve means associated with said first duct means, being formed in part by an end of the latter, and having an open position permitting passage of a fluid through said first duct means and a closed position preventing passage of fluid through said first duct means; resilient means permanently tending to keep said valve means in said closed position thereof; a supporting member for supporting a bottle to be filled with its mouth adjacent to said sealing face of said spout member; first pressure actuated means of a lesser force than said resilient means, for moving one of said members toward the other of said members to hold the bottle supported by said supporting member in close contact, at the mouth thereof, with said sealing face of said spout member, communicating with said second duct means, and in position to communicate with said first duct means when said valve means is open; and second pressure actuated means, of a greater force than said resilient means, for opening said valve means after said first pressure actuated means has moved said one member towards said other member and the mouth of the bottle is thereby pressed against the sealing face of the spout member.

14. A bottle filling apparatus, comprising, in combination, a filling spout member having a sealing face; first duct means in said filling spout member; second duct means in said filling spout member; valve means associated with said first duct means, being formed in part by an end of the latter, and having an open position permitting passage of a fluid through said first duct means and a closed position preventing passage of fluid through said first duct means; resilient means permanently tending to keep said valve means in said closed position thereof; a supporting member for supporting a bottle to be filled with its mouth adjacent to said sealing face of said spout member; pressure means applied to said members; and means regulating said pressure means for applying a first force to move one of said members toward the other of said members to hold the bottle supported by said supporting member in close contact, at the mouth thereof, with said sealing face of said spout member,

communicating with said second duct means, and in position to communicate with said first duct means when said valve means is open, and for then applying a second force to open said valve means, and, after applying said second force, for again applying said first force for a predetermined period so that said valve means closes and said bottle mouth is maintained in contact with said sealing face of said spout member during said predetermined period.

15. Apparatus as defined in claim 14 and wherein said filling spout member is formed with at least one passage extending through the same adjacent to said first duct means and communicating with the outer atmosphere about said filling spout member so that air will enter the mouth of the bottle during said predetermined period.

16. Apparatus as defined in claim 14 and wherein a reservoir, adapted to contain a liquid to be filled into a bottle, communicates with said first duct means and a vacuum chamber communicates with said second duct means.

17. Apparatus as defined in claim 14, and wherein a tank, adapted to contain a liquid to be filled into a bottle and a gas under pressure above the liquid, communicates at a lower part thereof with said first duct means, so that a liquid in said tank may flow through said first duct means, and at an upper part thereof with said second duct means, so that a gas above the liquid in said tank may flow through said second duct means.

18. Apparatus as defined in claim 14 and wherein said pressure means comprises a piston connected to said support member, a cylinder enclosing said piston for reciprocating movement therein so as to move said support member and a bottle carried thereby, and a fluid circuit communicating with said cylinder and comprising a valve means for supplying fluid to said cylinder at pressures corresponding to said first and second forces.

19. Apparatus as defined in claim 14 and wherein said pressure means comprises a piston connected to said filling spout member, a cylinder enclosing said piston for reciprocating movement therein so as to move said filling spout member toward and away from said supporting member, and a fluid circuit communicating with said cylinder and comprising a valve means for supplying fluid to said cylinder at pressures corresponding to said first and second forces.

20. Apparatus as defined in claim 14 and wherein a tank, adapted to contain a liquid to be filled into a bottle and a gas under pressure above the liquid, communicates at a lower part thereof with said first duct means, so that a liquid in said tank may flow through said first duct means, and at an upper part thereof with said second duct means, so that a gas above the liquid in said tank may flow through said second duct means, and wherein an additional valve means is associated with said second duct means to control the flow of gas therethrough.

21. A container filling apparatus comprising, in combination, a filling spout; a holding member for holding a container to be filled with its mouth adjacent to said spout; a supporting member supporting said filling spout for movement in a direction toward and away from said holding member; forcing means permanently tending to move said filling spout, relative to said supporting member, in a direction toward said holding member; duct means in said filling spout; valve means in said filling spout associated with said duct means, one of said means being stationary and the other of said means being movable together with said filling spout so that said valve means is in closed position when said filling spout is moved towards said holding member and in open position when said filling spout is moved away from said holding member; and pressure actuated means for moving one of said members toward the other of said members so as to first press together the open end of a container held by said holding member and said filling spout and thereafter to move said filling spout relative to said supporting member against the action of said forcing means from a position moved toward said holding member into a position moved away from said holding member, thereby opening said valve means while holding said container and filling spout pressed together.

22. A container filling apparatus comprising, in combination, a filling spout; a holding member for holding a container to be filled with its mouth adjacent to said spout; a supporting member supporting said filling spout for movement in a direction toward and away from said holding member; forcing means permanently tending to move said filling spout, relative to said supporting member, in a direction toward said holding member; duct means in said filling spout; valve means in said filling spout associated with said duct means, one of said means being stationary and the other of said means being movable together with said filling spout so that said valve means is in closed position when said filling spout is moved towards said holding member and in open position when said filling spout is moved away from said holding member; first pressure actuated means of a lesser force than said forcing means for moving one of said members toward the other of said members so as to press together the open end of a container held by said holding member and said filling spout; and second pressure actuated means of a greater force than said forcing means for moving said filling spout relative to said supporting member against the action of said forcing means from a position moved toward said holding member into a position moved away from said holding member thereby opening said valve means while holding said container and filling spout pressed together.

23. A container filling apparatus comprising, in combination, a filling spout; a holding member for holding a container to be filled with its mouth adjacent to said spout; a supporting member supporting said filling spout for movement in a direction toward and away from said holding member; resilient means permanently tending to move said filling spout, relative to said supporting member, in a direction toward said holding member; duct means in said filling spout; valve means in said filling spout associated with said duct means, one of said means being stationary and the other of said means being movable together with said filling spout so that said valve means is in closed position when said filling spout is moved towards said holding member and in open position when said filling spout is moved away from said holding member; first pressure actuated means of a lesser force than said resilient means for moving one of said members toward the other of said members so as to press together the open end of a container held by said holding member and said filling spout; and second pressure actuated means of a greater force than said resilient means for moving said filling spout relative to said supporting member against the action of said resilient means from a position moved toward

said holding member into a position moved away from said holding member thereby opening said valve means while holding said container and filling spout pressed together.

24. A container filling apparatus comprising, in combination, a filling spout having a sealing face; a holding member for holding a container to be filled with its mouth adjacent to said sealing face of said spout; a supporting member supporting said filling spout for movement in a direction toward and away from said holding member; resilient means permanently tending to move said filling spout, relative to said supporting member, in a direction toward said holding member; duct means in said filling spout; valve means in said filling spout associated with said duct means, one of said means being stationary and the other of said means being movable together with said filling spout so that said valve means is in closed position when said filling spout is moved toward said holding member and in open position when said filling spout is moved away from said holding member; first pressure actuated means of a lesser force than said resilient means for moving one of said members toward the other of said members so as to press together the open end of a container held by said holding member and said

sealing face of said filling spout; and second pressure actuated means of a greater force than said resilient means for moving said filling spout relative to said supporting member against the action of said resilient means from a position moved toward said holding member into a position moved away from said holding member thereby opening said valve means while holding said container and said sealing face of said filling spout pressed together.

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