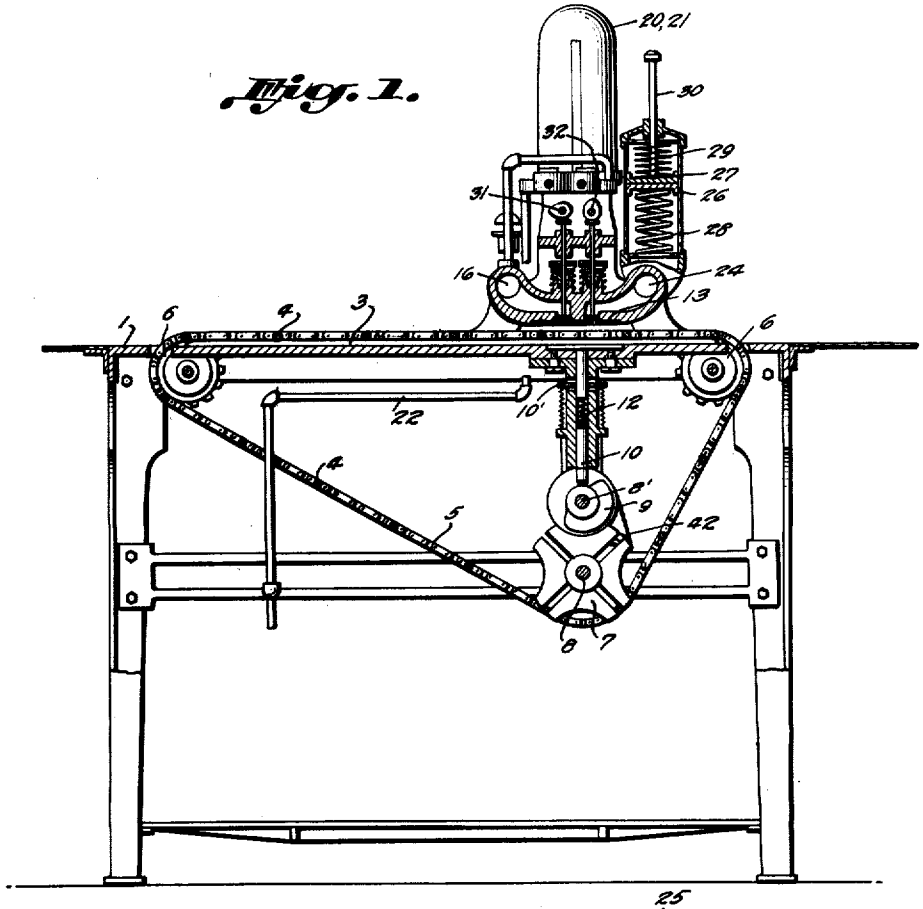
Aug. 12, 1941. 2,252,291

F. P. DOS SANTOS MENDONÇA ET AL

AUTOMATIC APPARATUS FOR FILLING CANS BY VACUUM

Filed Oct. 15, 1938 3 Sheets-Sheet 1

Fig. 1.



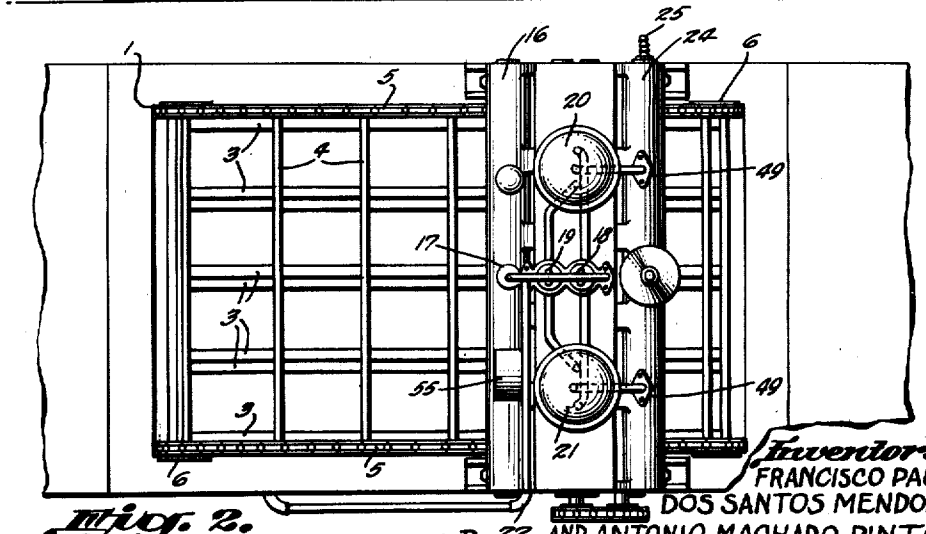


Fig. 2.

Inventors:
FRANCISCO PAULO
DOS SANTOS MENDONCA
AND ANTONIO MACHADO PINTO
By Haseltine Lake & Co. Attorneys.

Aug. 12, 1941. 2,252,291

F. P. DOS SANTOS MENDONÇA ET AL

AUTOMATIC APPARATUS FOR FILLING CANS BY VACUUM

Filed Oct. 15, 1938 3 Sheets-Sheet 2

Fig. 3.

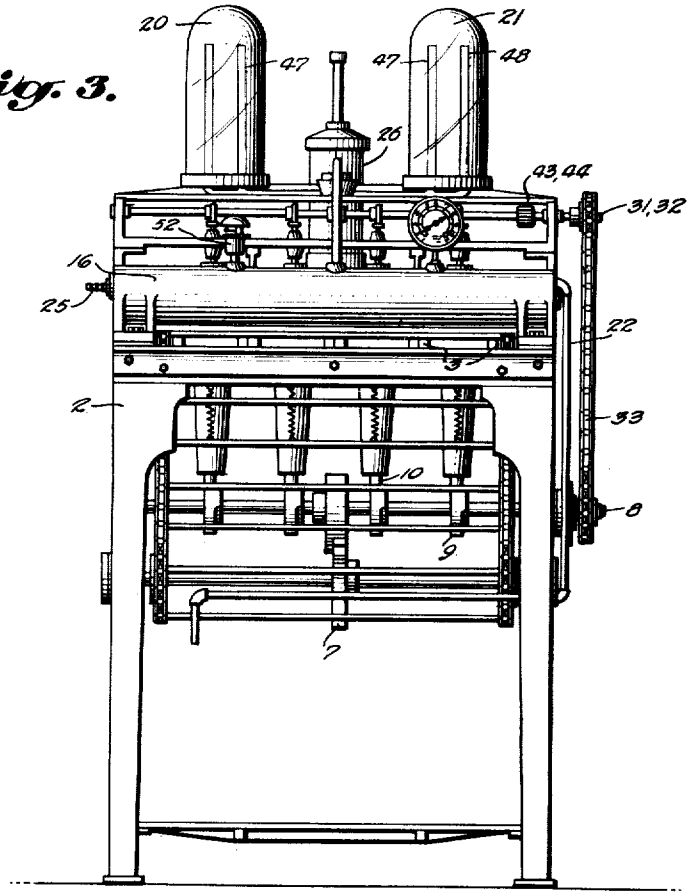
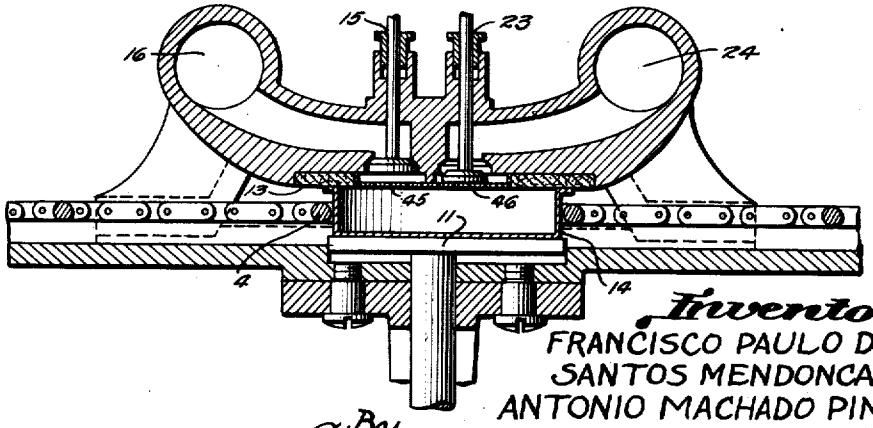


Fig. 4.



Inventors:
FRANCISCO PAULO DOS SANTOS MENDONCA AND ANTONIO MACHADO PINTO

By Haseltine, Lake & Co. Attorneys

Aug. 12, 1941. 2,252,291

F. P. DOS SANTOS MENDONÇA ET AL

AUTOMATIC APPARATUS FOR FILLING CANS BY VACUUM

Filed Oct. 15, 1938 3 Sheets-Sheet 3

Fig. 5.

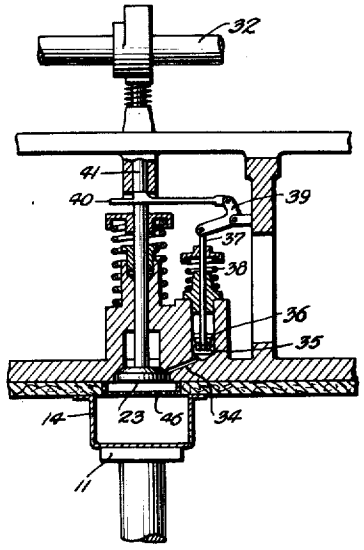
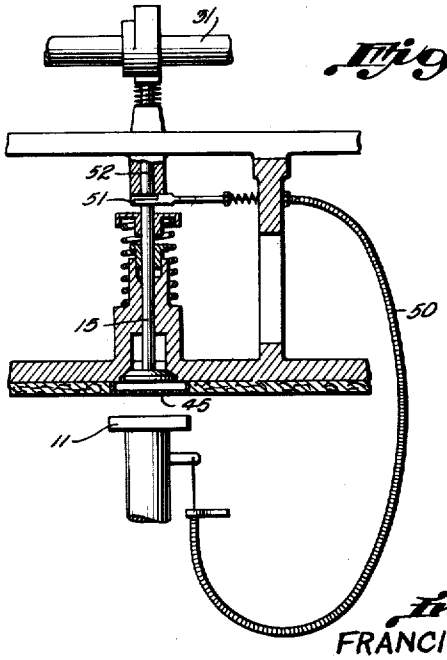


Fig. 6.



Inventors:
FRANCISCO PAULO DOS SANTOS MENDONCA AND ANTONIO MACHADO PINTO

By Haseltine, Lake & Co.
Attorneys

Patented Aug. 12, 1941

2,252,291

UNITED STATES PATENT OFFICE

2,252,291

AUTOMATIC APPARATUS FOR FILLING CANS BY VACUUM

Francisco Paulo dos Santos Mendonça and Antonio Machado Pinto, Lisbon, Portugal

Application October 15, 1938, Serial No. 235,260

8 Claims. (Cl. 226—116)

This is a continuation-in-part of our co-pending application Serial No. 144,116, filed May 22, 1937.

To avoid the inconveniences the conventional way of filling preserve tins or other containers with oil or other liquid presents, several solutions have been proposed, and several apparatus, more or less complicated have been designed, with a view to obtain a quicker filling, a better soaking of the product and to reduce the loss of liquid.

The object of the present invention is precisely an apparatus or automatic machine for filling preserve tins or similar containers with any liquid such as oil, syrup, etc., using the vacuum action to obtain the introduction of the liquid.

The apparatus is intended, namely, for filling preserved fish tins, the fish having already been put into the tins, when these are carried to the filling apparatus.

This apparatus automatically extracts the air from the container, and after that, due to the sub-atmospheric pressure originated in it, the liquid enters in same, thoroughly soaking the product, fish for example, previously put into the container, as above. So that the filling is quickly obtained, the soaking of the product is complete and there is no loss of liquid, since only the amount exactly required is introduced.

Figure 1 shows a sectional view of an apparatus embodying the invention,

Figure 2 is a top plan view of the apparatus,

Figure 3 is a front view of the apparatus,

Figure 4 is a horizontal section taken through the valves and distributors,

Figure 5 is a section through one liquid supply valve showing the means to control its motion,

Figure 6 is a section through one exhaust valve showing the means to control its motion.

Throughout the views, the same references indicate the same or like parts.

In the practice of our invention a table or frame structure comprising a rectangular top or platform 1 provided with corner supporting legs 2 is provided with a plurality of guide bars serving as tracks for guiding the movement of containers to be filled on the machine. A series of spaced transverse bars 4 shiftable along the guide bars are connected at their ends to two endless chains 5 which pass over pinions 6 and are driven in intermittent fashion by engagement of the transverse bars with the rotatable Maltese cross 7 mounted upon a shaft 8. Slightly below the general level of the platform 1 is located a group of plates 11, resting on said platform in the track formed by the guide bars 3 in a group, each of the plates being provided with a depending rod 10 by which the same can be raised vertically, the rod passing in each case through a hole in the platform. Each plate 11 is rigid with its respective rod 10 which passes down through the platform 1, the rod in each case being supported on one of a group of cams 9 mounted on a shaft 8'. Rotation of this shaft and the cams causes a periodic raising of the rods 10 and their plates 11 while compressing springs 12. Transversely through each rod a pin 10' is passed to which tension springs 12 are attached at one end, said springs being attached at their lower ends to depending portions of the plates 11 through which the rods 10 pass and tend to press the plates upwardly in resilient manner. The drive shaft 8' can, of course, be driven by any type of prime mover, and carries a pin 42 engaging with one after the other of the slots of the Maltese cross on a shaft 8 so as to rotate the same with its shaft 7 intermittently and impart a quarter turn thereto for each revolution of the drive shaft, while the cams 9 will raise the rods 10 and allow the springs 12 to raise the plates 11 once during each revolution of said shaft. Thus the transverse rods 4 upon chains 5 will be given a step by step motion across table or platform 1 about their pinions or sprockets 6.

Above the plates 11 upon platform 1 are located devices for filling the cans or containers which are passed through the machine, one such device for each plate. Each such device, is best shown in Figure 4, consists of a closing plate 13 against which the container 14 to be filled is pressed by the plate 11 beneath the same, said closing plate having two apertures, one of which is controlled by a valve 15 capable of controlling the communication of a low pressure distributor 16 with the interior of the container through a strainer 45 in the valve chamber, while the other aperture is controlled by the valve 23 through a strainer 46 and controls the flow of liquid from the liquid distributor 24. The low pressure distributor 16 is of course connected to air suction apparatus by means of a pipe 17 provided with the cocks 18 and 19 and reservoirs 20 and 21 and pipe 22, making it possible to store any liquid which may be drawn up by suction and by opening the cocks to return the same to the system, thus avoiding waste, and particularly preventing any liquid from reaching the exhauster where it might cause damage. An alarm device 62 of a sonorous type may be included to warn of abnormal variations in the low pressure system as perfect vacuum is of course not desired in the containers.

The liquid distributor 24 which is connected with the closing plate 13 is adapted to receive liquid or filling fluid from any exterior reservoir through piping connected to the inlet 25; said distributor is also connected with a hollow cylinder 26 within which is a piston 27 having guide stem or rod 30, said piston being provided with opposed compensating springs 28 and 29 within the chamber in the interior of the hollow cylinder 26. The purpose of the piston 27 within the chamber of cylinder 26 is to promptly and instantaneously supply the amount of liquid required to completely fill containers pressing against closing plates located above plates 11 when suction has been applied to the containers by the opening of valve 15 and successive opening of liquid supply valve 23, this, however, being done automatically as will appear.

Two rotatable shafts 31 and 32 coupled by pinions 43 and 44 and driven by shaft 8' through a chain 33 are provided with control cams for actuating valves 15 and 23. Rotation of the shafts will of course tend to open valves 15 and 23, but as particularly illustrated in Figure 5, an additional control device is included which serves either to allow or to prevent opening of the liquid supply valve 23 by the cam shaft 32, said device comprising a cylinder 35, communicating through a channel 34, with the closing plate in a position adjacent to valve 23, and a piston 36 having a rod 37 raised by a spring 38.

The piston rod serves to operate a lever 39 and a key 40 slidable between the valve rod of valve 23 and a rod 41 which will either release or block the action of cam shaft 32 upon the intermediate rod 41 so that the latter will either push said rod of valve 23, or will be prevented from doing so, all according to the position of piston 36. When the air contained in the space 35 is not exhausted, owing to a leaky can, the rod 37 is pulled upwards by the action of the spring 38 and the valve 23 will not be pushed downwards. In other words, if a receptacle to be filled has a hole in it, suction will not produce a perfect vacuum, and the piston 36 will then rise due to the action of the spring 38, while the member 40 is shifted to the right, with the result that the rod 41 can not displace the valve 23 downwards for the introduction of liquid.

In analogous fashion a somewhat similarly controlled device as that shown in Figure 5 is illustrated in Figure 6 for allowing or preventing the operation of the low pressure valve 15, said device comprising a Bowden transmission 50 attached at one side to a key 51 so as to directly control the position of this key so that said key which by being interposed between the valve stem of valve 15 and an intermediate rod 52, directly operated by cam shaft 31, will allow operation of valve 15 by said cam shaft through rod 52, or will prevent such operation if said key 51 is not interposed between the valve stem and said intermediate rod. It is thus seen that if a container is located upon plate 11 the Bowden transmission will cause the valve to be opened by cam shaft 31, but if there is no container upon said plate this plate will not cause said transmission to allow operation of the valve 15. In other words, if the plate has no container in position thereon, said plate is shifted upward to an exaggerated degree and draws the inner cable within 50 so as to move member 51 to the right, so that valve stem 15 is not operated but remains idle even when the short shaft 52 is operated by the cam on shaft 31.

If motive power is applied to the drive shaft 8' so as to rotate the same continuously at the same speed, the Maltese cross 7 is of course intermittently operated, step by step, so that corresponding movement of the chains 5 and transverse bars will occur, and this will correspondingly move containers intended to be filled along the platform, and located in the spaces between the bars 4 and between the tracks 3, with a result that these containers are individually fed to the operating devices and located one after the other upon plate 11, beneath the closing plate 13 and filled with liquid. Inasmuch as the Maltese cross supplies a stationary interval for each container while it is located upon the plate 11, the raising of said latter plate against the closing plate, with a simultaneous rotation of cam shafts 31 and 32 driven through chain 33 from shaft 8' so that said latter cam shafts will tend to operate first the stem of valve 15 so as to open said valve at the moment when cam 9, rod 10 and springs 12, as well as plate 11, have raised the containers into tight relation with respect to closing plate 13, thereby causing a partial vacuum immediately to be created in the container from low pressure distributor 16. Due to the presence of the container on plate 11, the safety operating device as shown and described with reference to Figure 6 will be caused to operate normally through the Bowden transmission 50 as the key 51 will become interposed between the stem of valve 15 and the auxiliary stem 52 so as to transmit the impulse of the cam shaft 31, whereby the valve 15 is caused to open with the result just described that a partial vacuum will be created in the container after which said valve will promptly close. The timing of the cam shafts 31 and 32 is sufficiently successive so that when cam shaft 31 has ceased to influence valve 15 and the same has closed, the valve 23 will be opened from cam shaft 32 so as to allow liquid filling fluid to be drawn into the container so as to fill the vacuum therein about the solid material which partly fills the same. The suction existing in the container will cause substantial, instant filling of all the voids in the container without causing any overflow and impregnating the mass of material within the same.

However, if there is any defect or leak in the container the necessary degree of vacuum in said container is not obtainable and as already mentioned, the operation of cam shaft 32 will not communicate any movement to the valve 15 which will thus remain closed, and therefore opening of the liquid supply valve 23 must also be avoided. In this case, the compensated piston 36 in the chamber 35 which communicates with the interior of the container by means of channel 34 is operated by spring 38 and this acting on rod 37 and lever 39 will cause a key 40 to be displaced so as to prevent action of cam shaft 32 from operating valve 23 through the rod 41 with the result that valve 23 will not open and no liquid will even begin to enter the container if it is not perfectly tight. A saving in liquid and efficient control of the conditions of the containers is thus accomplished.

Of course if the container is in good condition, the vacuum produced through the temporary operation of valve 15 will remain until valve 23 has operated, so that the filling of the container with liquid will occur, after which the cam shaft 32 will of course release the stem of the latter valve so as to close all communication between the container and the liquid distributor 24.

After closure of the liquid supply valve 23, the

cam 9 on shaft 8' also ceases to influence plate 11 so that the latter will recede or descend to its normal position of rest upon platform 1, with the container located upon the same which is thereby released from contact with the closing plate 13. At this stage the Maltese cross again causes the transverse bars 4 and chain 5 to advance a step, so as to move the filled container on to the platform 1, within the limits of the track 3 toward the output end of the machine, while a succeeding container is simultaneously placed in position upon the plate 11 when another operating cycle immediately begins.

It may be mentioned that in the apparatus shown, the operations occur simultaneously in several containers, but this is merely an obvious modification of the operations occurring in one container and is not necessarily limited to two or four, or any other number, but may be whatever number is practicable according to the size of the machine.

It may be remarked that after the first operation some liquid used for filling may remain above valve 15, and as it is not advisable to have this liquid carried along by suction and reach the aspirator or suction apparatus because it might damage the latter and also because this would be wasteful, a reservoir is interposed between the low pressure distributor 16 and said suction apparatus.

In the case shown, this reservoir consists of two glass bell jars 20 and 21. These bells are used in rotation by manipulating the four-way cocks 18 and 19 operatively connected in such manner that when one bell is in service and also inserted between the low pressure distributor and the suction device, the other bell communicates with the atmosphere and its contents can be piped to the liquid distributor 24. According to the arrangement of pipes 47 and 48, all the liquid residue that has been carried along is deposited in the interior of the bell.

It may be mentioned that the sudden pull of the liquid in the containers necessitates in the liquid collector the arrangement of a device which, forming a reservoir, may at the same time operate as a buffer or damper. In the present case, this device consists of a pipe connected directly to the liquid distributor 24 in the interior of which the piston 27 is maintained in equilibrium by the springs 28 and 29 as described.

Whenever defective containers are encountered, abnormal variations of low pressure occur which register on a gage 55 placed on the low pressure distributor but as the indications of this manometer are visual only and would require special attention, the machine is also provided with an alarm device 62 that is operated by the abnormal variations of vacuum and sounds an alarm, thus revealing the passing of an imperfect container and the necessity of separating it from the others at the outlet portion of the machine.

It is a matter of fact that the apparatus as specified can be used for filling containers of any size or form, through a convenient adjustment, and replacement of some parts by others that fit these containers.

What we claim and desire to secure by Letters Patent of the United States is:

1. Automatic apparatus for filling with liquid the voids in containers into which solid products have previously been introduced comprising a closing plate, resilient means for pressing the open end of the container against said plate, there being two orifices in said plate, a valve controlling each orifice, a low pressure distributor connected to one of said valve controlled orifices, a liquid distributor connected to the other of said valve controlled orifices, means for actuating the valves for opening and closing said valves alternately, and means controlled by the resilient means for normally pressing the container against the closing plate for preventing actuation of the valve connected with the low pressure distributor when no container is in position to be filled.

2. Automatic apparatus for filling with liquid the voids in containers into which solid products have previously been introduced comprising a closing plate, resilient means for pressing the open end of the container against said plate, there being two orifices in said plate, a valve controlling each orifice, a low pressure distributor connected to one of said valve controlled orifices, a liquid distributor connected to the other of said valve controlled orifices, means for actuating the valves for opening and closing said valves alternately, and means for preventing actuation of the valve connected with the liquid distributor when the desired degree of vacuum is not present in the container.

3. Automatic apparatus for filling with liquid the voids in containers into which solid products have previously been introduced comprising a closing plate, resilient means for pressing the open end of the container against said plate, there being two orifices in said plate, a valve controlling each orifice, a low pressure distributor connected to one of said valve controlled orifices, a liquid distributor connected to the other of said valve controlled orifices, means for actuating the valves for opening and closing said valves alternately, means controlled by the resilient means for normally pressing the container against the closing plate for preventing actuation of the valve connected with the low pressure distributor when no container is in position to be filled, and means for preventing actuation of the valve connected with the liquid distributor when the desired degree of vacuum is not present in the container.

4. Automatic apparatus for filling with liquid the voids in containers into which solid products have previously been introduced comprising a closing plate, means for pressing the open end of the container against said plate, there being two orifices in said plate, valves controlling said orifices, a low pressure distributor connected to one of said valve controlled orifices, a liquid distributor connected to the other of said valve controlled orifices, a valve stem on each valve, cam controlled means for actuating said valves alternately, a shiftable member normally interposed between and establishing operative connection with the stem of the low pressure controlling valve and its cam controlled actuating means, and means for withdrawing said shiftable member to interrupt said operative connection when no container is in position to be filled.

5. Automatic apparatus for filling with liquid the voids in containers into which solid products have previously been introduced comprising a closing plate, means for pressing the open end of the container against said plate, there being two orifices in said plate, valves controlling said orifices, a low pressure distributor connected to one of said valve controlled orifices, a liquid distributor connected to the other of said valve controlled orifices, a valve stem in each valve, cam controlled means for actuating said valves alternately, a member normally interposed be-

tween and establishing operative connection with the liquid supply control valve and its cam controlled actuating means, and means operative when the degree of vacuum falls below a predetermined amount to withdraw said member to prevent the opening of the liquid supply valve.

6. Automatic apparatus for filling with liquid the voids in containers into which solid products have previously been introduced comprising a closing plate, means for pressing the open end of the container against said plate, there being two orifices in said plate, valves controlling said orifices, a low pressure distributor connected to one of said valve controlled orifices, a liquid distributor connected to the other of said valve controlled orifices, a valve stem in each valve, cam controlled means for actuating said valves alternately, a member normally interposed between and establishing operative connection with the stem of the low pressure controlling valve and its cam controlled actuating means, means for withdrawing said member to interrupt said operative connection when no container is in position to be filled, a member normally interposed between and establishing operative connection with the liquid supply control valve and its cam controlled actuating means, and means operative when the degree of vacuum falls below a predetermined amount to withdraw said member to prevent the opening of the liquid supply valve.

7. Apparatus in accordance with claim 4, wherein the means for withdrawing the shiftable member comprises a Bowden wire connection between the said member and the means for normally pressing the container against the closing plate.

8. Automatic apparatus for filling with liquid the voids in containers into which solid products have previously been introduced comprising a closing plate, pressing means for pressing the edges of the open end of the container tightly against said plate, there being two orifices in said plate, valves controlling said orifices, a low pressure distributor connected to one of said valve controlled orifices, a liquid distributor connected to the other of said valve controlled orifices, means for actuating said valves for opening and closing said orifices alternately, and means operating independently of and avoiding interference with regular operation of the apparatus, capable of preventing opening of the valve communicating with the low pressure distributor when a container is lacking against the closing plate, and means operated by the movement of the pressing means directly preventing the opening of said valve.

FRANCISCO PAULO DOS SANTOS MENDONÇA.
ANTONIO MACHADO PINTO.