March 25, 1930. A. K. MALMQUIST 1,751,642

ART OF CANNING

Filed Aug. 2, 1927 3 Sheets-Sheet 1

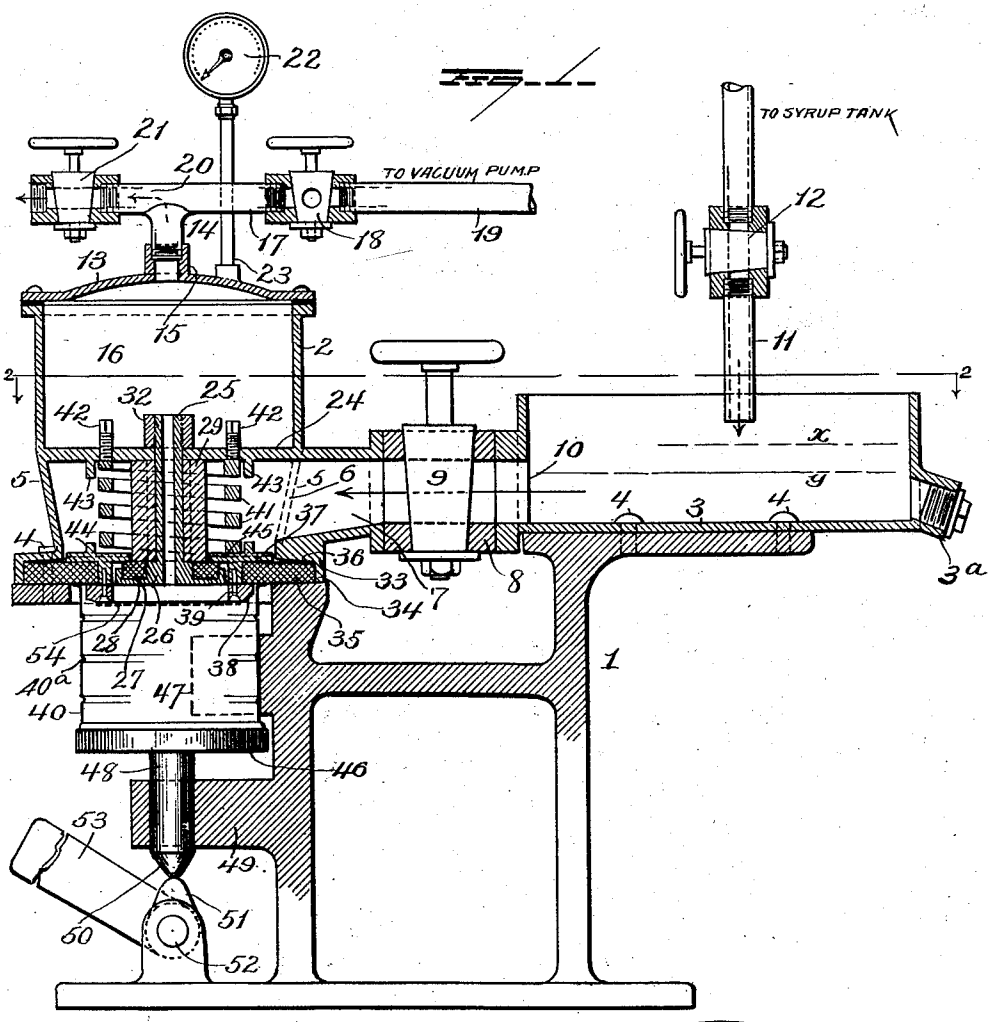
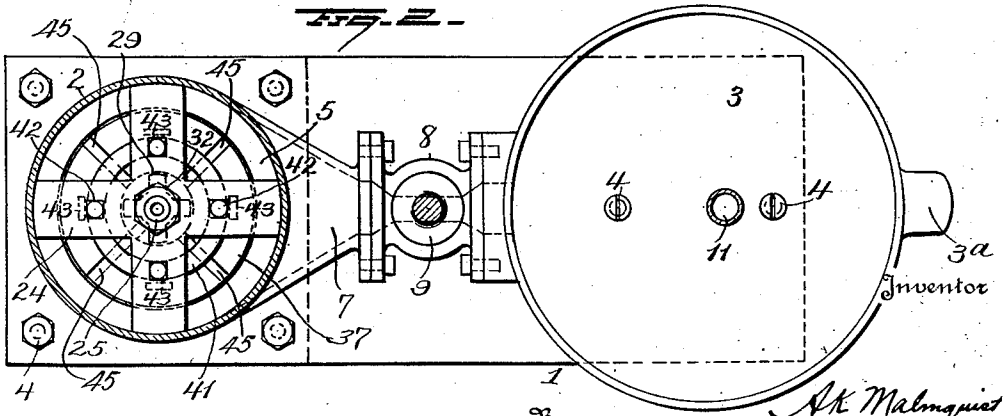


Fig. 2.



Inventor

A. K. Malmquist

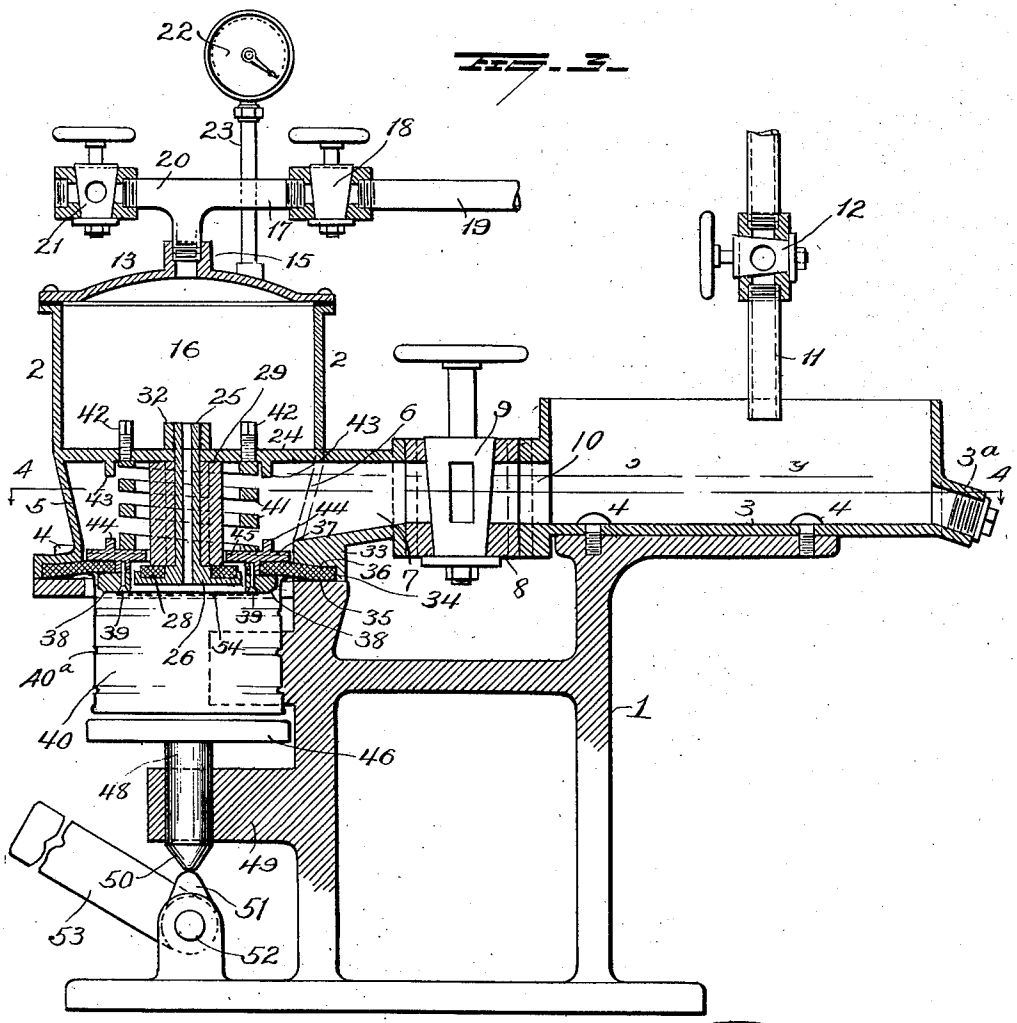
By Seymour & Bright

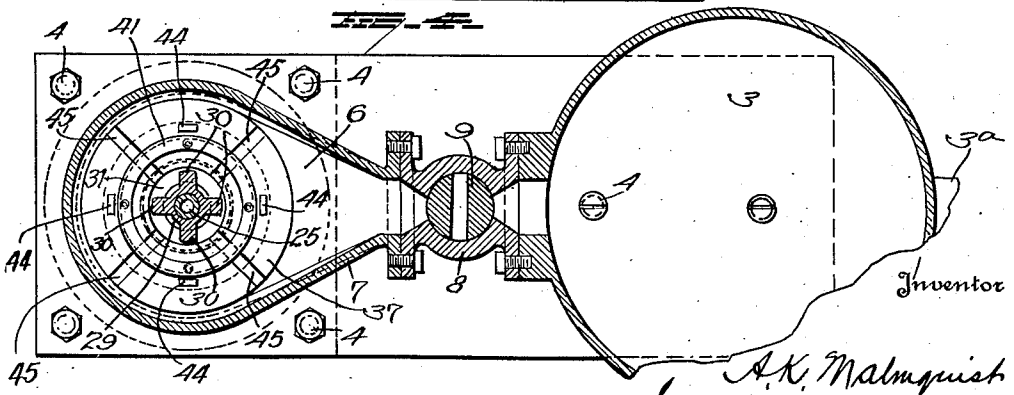
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Fig. 5.

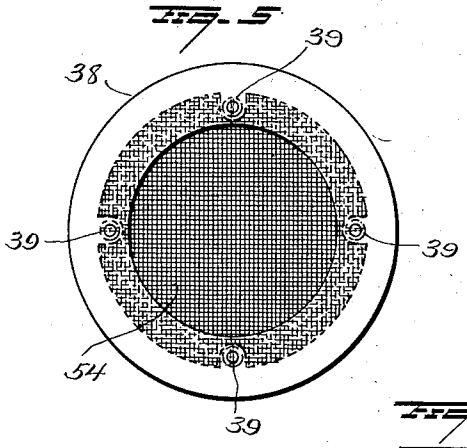


Fig. 6.

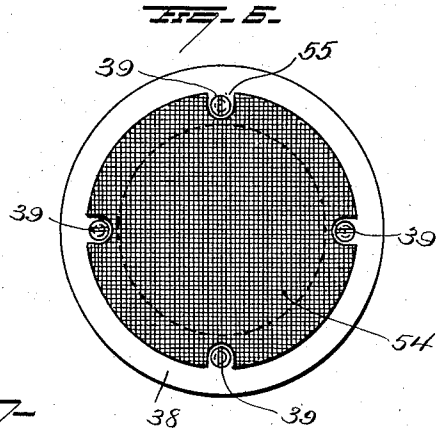


Fig. 7.

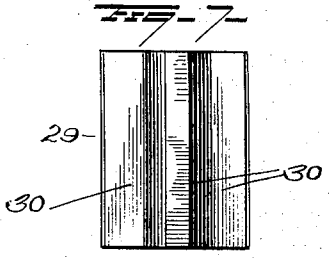


Fig. 8.

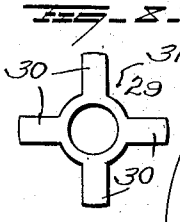


Fig. 9.

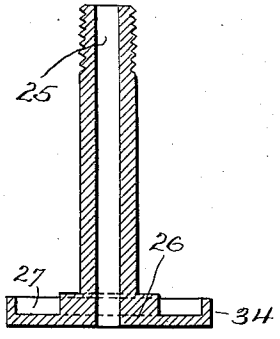


Fig. 11.

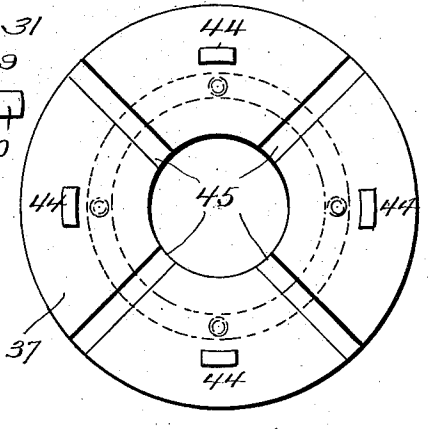


Fig. 10.

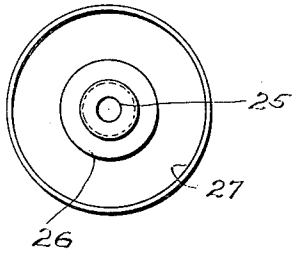
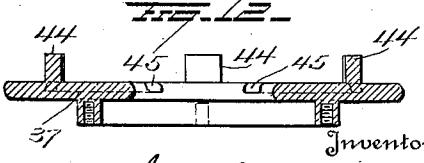


Fig. 12.



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Patented Mar. 25, 1930 1,751,642

UNITED STATES PATENT OFFICE

ADOLPH K. MALMQUIST, OF SOUTH BELLINGHAM, WASHINGTON

ART OF CANNING

Application filed August 2, 1927. Serial No. 210,127.

This invention relates to improvements in the art of canning and more particularly to the canning of materials including liquid, in vacuum, especially when liquids are introduced into cans which contain solid food.

One object of the present invention is to create a vacuous condition in an exposed can and to utilize the suction of the vacuum-creating element to cause liquid to flow into the can.

A further object is to utilize the suction to cause liquid to enter the can and to penetrate solid food therein and to effect by the same suction, vacuumizing of the can and the pores of the solid food.

A further object is to maintain a can closed against external atmosphere; to vacuumize the can and its contents, and to effect a flow of liquid to completely fill the can, simultaneously and from a common source of suction.

A further object is to fill cans in vacuum with liquid, that air will be removed from the liquid as it flows into the can.

With these and other objects in view, the invention consists in certain novel features as hereinafter set forth and pointed out in the claims.

In the accompanying drawings;

Figure 1 is a vertical sectional view, illustrating an embodiment of the invention, the parts being in the positions which they assume prior to the operation of filling a can;

Figure 2 is a horizontal sectional view on the line 2—2 of Figure 1;

Figure 3 is a vertical sectional view with the parts in the positions which they assume when the apparatus is in operation to fill a can;

Figure 4 is a horizontal sectional view on the line 4—4 of Figure 3;

Figures 5 and 6 illustrate the screen and the ring which carries it;

Figures 7 and 8 are detail views of the spacing member through which the suction tube passes;

Figures 9 and 10 are views of the suction tube and valve seat, and

Figures 11 and 12 are detail views of the valve controlling communication between the syrup chamber and a can.

Suitable framework is indicated at 1 and upon this framework, a container 2 and a tank 3 (having a drain outlet 3^a) are located in spaced relation to each other,—said container and tank being rigidly secured to the framework by means of fastening devices indicated at 4. A valve is provided for the bottom of the container as hereinafter explained. I prefer to make the lower portion of the container 2, tapering in form as at 5 and the wall of this tapering portion of the container is provided with a comparatively large opening 6. With this opening, the larger end of a tapering neck 7 communicates, the smaller end of the latter being connected with the casing 8 of a valve 9 and this valve casing also communicates with an outlet port or opening 10 in the tank 3. The tank 3 is supplied with liquid (syrup for example) through a pipe 11 from a suitable source of supply, such as a large tank or reservoir (not shown) preferably located on a higher level, and in this pipe, a valve 12 is provided to control the flow of syrup to the tank 3.

It is apparent that if the tank 3 contained syrup approximately to the level indicated by the line x in Figure 1 and the valve 9 is open, syrup will flow from the tank 3 to the container 2 and approximately fill the lower tapering portion of the latter. As a matter of fact, the valve 9 would be kept open until the syrup in the tank 3 and in the tapering lower portion of the container 2 reaches approximately the level indicated by the line y in Figure 1. The proportions of the tapering lower portion of the container 2 are such

that it will contain somewhat more than sufficient syrup to fill one can.

The container 2 is provided on its top with a cover 13 suitably secured and packed to provide an air tight closure. A T-shaped pipe fitting 14 is connected with a nipple 15 on the cover 13 and thereby communicates with the chamber 16 formed by the upper portion of the container 2. The branch 17 of said pipe fitting is connected through a valve 18 and suitable pipe connections 19 with a vacuum pump or tank not shown. The other branch 20 of said pipe fitting is provided with a vacuum relief valve 21. A vacuum gage 22 is connected by a suitable pipe 23 and through the cover 13 with the chamber 16 in the container 2. At or near the juncture of the upper portion of the container 2 with the lower tapering portion thereof, a spider 24 is located and may comprise four members integral with the walls of said container. The central portion of this spider is provided with an opening for the passage of a suction tube 25 which extends to the lower end of the tapering portion of container 2 where it is provided with a head 26 having an annular groove 27 containing a valve seat 28 of rubber or other suitable material. A sleeve or spacing member 29 is located between the central portion of the spider 24 and the head 26 at the lower end of the vacuum tube 25, said sleeve having a plurality of vertical ribs 30 which overlie the valve seat 28 and the spaces 31 between the ribs 30 afford ports for the passage of liquid. The suction tube 25 passes through the sleeve 29 and extends upwardly above the spider 24, its upper portion being threaded for the reception of a nut 32.

The lower portion or base 33 of the container 2 is provided with a recess 34 in which the peripheral portion of a ring 35 of rubber or other flexible material is located. The bottom of the recess 34 is formed by the framework 1 and the upper wall of said recess is beveled or flared as indicated at 36 so that the inner portion of said ring will be permitted to move upwardly. The ring 35 constitutes a flexible carrier for a valve 37, a portion of said valve resting upon the flexible ring 35, and a ring 38, secured to the valve by fastening devices 39, engages the under face of the flexible carrier ring 35 and thus the valve is attached to said carrier ring. The valve 37 is annular in form and encircles the spacing sleeve 29, the inner portion of said valve being adapted to rest upon the valve seat 28 carried by the head 26 and thus close communication between the syrup chamber of the container 2 and a can 40 disposed below the same, as presently explained. The valve 37 is maintained normally on its seat by means of a spring 41 surrounding the spacing member 29,—the lower end of said spring bearing against the valve and the upper portion against the lower end of screws 42 carried by the spider 24. By means of these screws the tension of the spring 41 may be adjusted. The spider 24 is provided with depending lugs 43 to maintain the upper portion of the spring in proper position and lugs 44 on the valve 37 perform a similar function for the lower portion of the spring. The valve 37 is provided with a plurality of grooves 45 to permit ready passage of syrup under the lower end of the spring on its way to the exit ports.

The can 40 to be filled will be located upon a platform 46 and a guide 47 for the can may be provided on the framework 1 above the platform. The platform 46 is provided with a depending shank 48 which passes freely through an opening in an arm 49 projecting from the framework 1 and the lower end of this shank is preferably beveled or made tapering as at 50 and is engaged by a tapering or beveled cam 51 carried by a short shaft 52 and in the embodiment of the invention shown in the drawings, this shaft is provided with an operating lever 53.

In order to prevent any foreign matter entering the can with the syrup, a screen 54 may be provided. This screen may be soldered or otherwise secured to ring 38 and it may be notched as at 55 for the accommodation of the heads of fastening devices 39.

When a can, open at its top and containing solid food, has been placed upon the platform 46, operation of the lever 53 will cause the platform and hence the can to be raised and the open upper end of the can to be pressed against the rubber ring 35, the latter thus serving as a pad or seat for the open end of the can as well as a flexible carrier for the valve 37. When the can shall have been thus raised and seated at its upper end against the ring or pad 35 it will surround the ring 38, the latter thus entering the can and being of such thickness as to be approximately equal to the space in the can displaced by the cap subsequently applied thereto. The valve 37 being closed, the can when seated against the ring 35 will be closed air-tight against external atmosphere, except through the suction tube 25 when the valve 21 is open. This latter valve is, however, closed during the operation of filling a can and the can is maintained closed against all external atmosphere, since the chamber 16 will be exhausted, as hereinafter explained.

The valve 12 will be opened to permit flow of syrup to the tank 3 until the syrup in the tank reaches a level approximately as indicated by the line x. The valve 12 may now be closed as shown in Figure 3 and the valve 9 opened as shown in Figure 1,—the valve 21 being also open at this time. Syrup will now flow from the tank 3 to the lower portion of the container 2 until the level of the syrup in the tank and container becomes approximately as indicated by the line y, when the valve 9 may be closed. The

lower portion of the container 2 will now contain a quantity of syrup which is somewhat more than sufficient to fill the can.

It may be stated that instead of raising and seating the open end of the can prior to the running of a charge of syrup into the container 2, the order in which these operations are performed may be reversed, but both operations must be performed before the chamber 16 of the container is vacuumized.

The valve 21 may now be closed and the valve 18 moved from the closed position shown in Figure 1 to the open position shown in Figure 3. The opening of the valve 18 will connect the upper chamber 16 of the container 2 with the vacuum pump or tank, and the said chamber (16) over the syrup in the lower portion of said container, will become exhausted. By reason of the connection of the chamber 16 with the can, through the suction tube 25, a suction on the can and its contents will be created. The action of this suction will be to raise the can from the platform 46 as shown in Figure 3, and the added pressure of the can against the flexible ring will cause said ring to flex and carry the valve 37 against the resistance of the spring 41, from the closed position shown in Figure 1 to the open position shown in Figure 3. The valve 37 being now open the syrup may flow from the lower portion of the container 2 to the can. By reason of the suction through the suction tube 25, the can and its contents will be vacuumized before the valve 37 opens, and after the valve opens, there will still continue a suction through the vacuum tube, which will augment the flow of syrup to the can to completely fill the can with syrup and at the same time exhaust air from the syrup as it flows from the container to the can.

During the above described filling operations, the parts will be in the positions shown in Figure 3, but when said filling shall have been completed, the valves 18 and 21 will be shifted so that the former will be closed and the latter open as shown in Figure 1. The vacuous condition in the chamber 16 of container 2 will now be released and hence the suction through the tube 25 will be discontinued. The filled can will, therefore, drop to the platform and the valve 37 will be closed by the action of the spring 41.

The exhaustion of air from the can and its contents, including the syrup, is accomplished by employing a high vacuum, and there will be a condition of high vacuum within the can and its contents and the can will be filled to the cap when the latter is applied. The danger of collapsing of the can is therefore greatly reduced but to safeguard against possible collapsing of the can by external atmospheric pressure, it might be found desirable to employ cans reinforced, preferably by two or more beads 40^a.

I have found that to accomplish the efficient filling of the can with liquid, it is important that the bore of the suction tube have a proper capacity as compared to area of the body of syrup in the container, the capacity of the syrup ports controlled by the valve 37; the degree of vacuum in the chamber 16 and the capacity of the can to be filled. If the bore of the suction tube 25 be too small, sufficient suction would not be had to raise the can and the valve 37 against the resistance of the spring 41 and hence said valve would not be opened. On the other hand, if the bore of the suction tube be too large, the result would be that while the valve 37 would be opened, the syrup (or a large portion of it) passing the valve 37 would flow upwardly through the suction tube and thus return to the body of syrup in the container instead of properly entering the can.

Experience has shown that the capacity of the suction tube 25 should be less than the capacity of the ports or passages between the syrup container 2 and the can when the valve 37 shall have been opened by the suction through the tube 25 as caused by the high vacuum in the chamber 16. The lifting power created by the suction for raising the can on the valve 37 will be controlled by the size of the bore of the tube 25. If a twenty-nine inch vacuum be maintained in the chamber 16 over the syrup in the container 2, the proper suction on the can to raise the valve 37 will be brought about by reducing the suction on the can sufficiently below the suction of the twenty-nine inch vacuum in the chamber 16, to prevent syrup from shunting past the can and returning to the syrup supply chamber in the container 2. I have found that if the tube 25 be made with a bore having one-fourth inch diameter in a machine such as hereinbefore described, the operations of filling a can as hereinbefore described, will be efficiently accomplished.

By maintaining the suction created by a twenty-nine inch vacuum, constant during the filling operation, air contained in the syrup will, to a great extent, be withdrawn, so that the degree of vacuum in the filled can will be very high (approximately 26 or 27 inches) as compared to the degree of vacuum obtained in cans filled by previous methods in which approximately one-half of the degree of the original vacuum employed, was lost on account of the entrance of air into the can with the syrup.

Having fully described my invention what I claim as new and desire to secure by Letters-Patent, is:—

1. In apparatus for filling cans, the combination of a container having a liquid chamber and a superimposed vacuum chamber, a valve for normally closing the bottom of the liquid chamber, a flexible carrier pad for said valve, a ring secured to the under side of the valve and connecting the same to said

pad, means to raise an open can and causing the upper end thereof to engage the carrier pad around the ring and cause closing of the upper end of the can, a tube passing vertically through the liquid chamber with its lower end adjacent and concentric with said ring and its upper end in the vacuum chamber, and means whereby the vacuum chamber may be subjected to suction.

2. In apparatus for filling cans, the combination of a container having upper and lower communicating chambers, means whereby the upper chamber may be subjected to suction, a suction tube communicating with said upper chamber and open at its lower end, a valve seat carried by said tube, a valve normally seated on said valve seat, a flexible carrier pad for said valve concentric with and spaced annularly from the valve seat, a ring secured to the under side of the valve and clamping the pad thereto, means for applying the open upper end of a can to said flexible carrier pad around the ring and under the valve and suction tube, and means for supplying the lower chamber of the container with liquid.

3. In apparatus for filling cans, the combination of a container having upper and lower communicating chambers, means whereby the upper chamber may be subjected to controlled suction, a suction tube communicating with said upper chamber and open at its lower end, a valve seat carried by said tube, a valve normally seated on said valve seat, a flexible carrier pad for said valve, means for applying the open upper end of a can to said flexible carrier pad and under the valve and suction tube, means for supplying the lower chamber of the container with liquid, a spring normally holding said valve on its seat, and means for adjusting the tension of said spring.

4. In apparatus for filling cans, the combination of a container having upper and lower communicating chambers, means whereby the upper chamber may be subjected to controlled suction, a suction tube communicating with said upper chamber and open at its lower end, a spider through which the upper portion of the suction tube passes, a nut on said tube above the spider, a spacing member between said spider and the valve seat at the lower end of the suction tube, said spacing member having vertical ribs, a valve seat carried by said tube, a valve normally seated on said valve seat, a flexible carrier pad for said valve, means for applying the open upper end of a can to said flexible carrier pad and under the valve and suction tube, and means for supplying the lower chamber of the container with liquid.

5. In apparatus for filling cans, the combination of a container having upper and lower communicating chambers, means whereby the upper chamber may be subjected to controlled suction, a suction tube communicating with said upper chamber and open at its lower end, a valve seat carried by said tube, a valve normally seated on said valve seat, a flexible carrier pad for said valve, a ring secured to said valve and engaging the under face of said carrier pad and adapted to enter the open upper end of a can, means for applying the open upper end of a can to said flexible carrier pad and under the valve and suction tube, and means for supplying the lower chamber of the container with liquid.

6. In apparatus for filling cans, the combination of a container having upper and lower communicating chambers, means whereby the upper chamber may be subjected to controlled suction, a suction tube communicating with said upper chamber and open at its lower end, a valve seat carried by said tube, a valve normally seated on said valve seat, a flexible carrier pad for said valve, a ring secured to said valve and engaging the under face of said carrier pad and adapted to enter the open end of a can, a screen secured to the under side of and covering the entire area of said ring, means for applying the open upper end of a can to said flexible carrier pad and under the valve and suction tube, and means for supplying the lower chamber of the container with liquid.

7. In apparatus for filling cans, the combination of a container having upper and lower communicating chambers, means whereby the upper chamber may be subjected to controlled suction, a suction tube communicating with said upper chamber and open at its lower end, a valve seat carried by said tube, a valve normally seated on said valve seat, a flexible carrier pad for said valve, means for applying the open upper end of a can to said flexible carrier pad and under the valve and suction tube, a tank, means for controlling supply of liquid to said tank, and a valved connection between said tank and the lower chamber of the container.

8. In apparatus for filling cans, the combination of a container having upper and lower communicating chambers, means whereby the upper chamber may be subjected to controlled suction, means whereby said upper chamber may be rendered open to the atmosphere, a suction tube communicating with said upper chamber and open at its lower end, a valve seat carried by said tube, a valve normally seated on said valve seat, a flexible carrier pad for said valve, means for applying the open upper end of a can to said flexible carrier pad and under the valve and suction tube, and means for supplying the lower chamber of the container with liquid.

9. In apparatus for filling cans with liq-

uid, a container having a lower liquid chamber, an upper suction chamber, a constantly open means of communication between the suction chamber and the space below the container, a valve normally closing the bottom of the container around said communication means, means for disposing an open-top can against the bottom of said valve, and means whereby the suction chamber may be subjected to suction whereby to exhaust air from the can and open the valve to permit flow of liquid into the can.

In testimony whereof, I have signed this specification.

ADOLPH K. MALMQUIST.