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FILLING MACHINE HAVING A FLEXIBLE BAG ENCLOSURE WITH
SPACED RIBS TO PROVIDE A BAG SUPPORT AND
PASSAGEWAYS EXTERNALLY OF THE BAG
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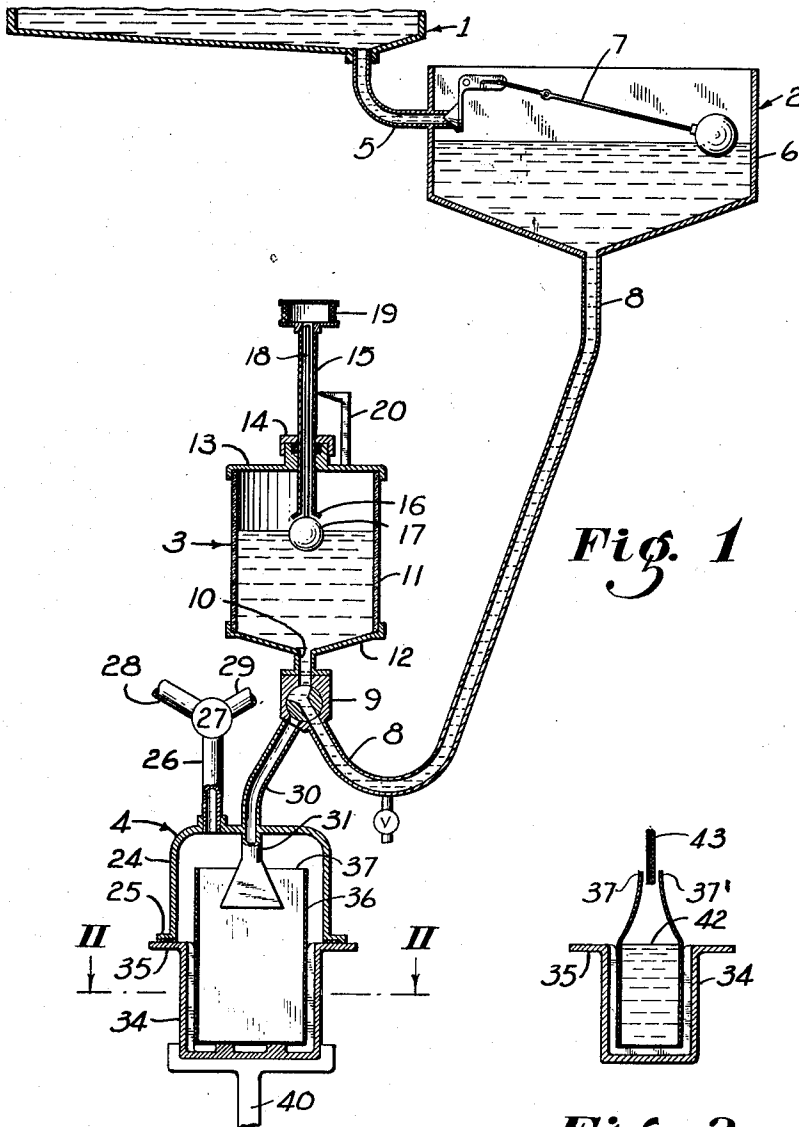


Fig. 1

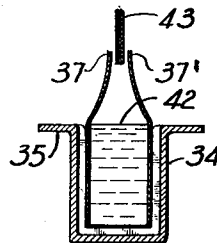


Fig. 3

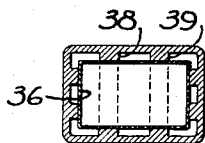


Fig. 2

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FILLING MACHINE HAVING A FLEXIBLE BAG
ENCLOSURE WITH SPACED RIBS TO PRO-
VIDE A BAG SUPPORT AND PASSAGEWAYS
EXTERNALLY OF THE BAG

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3 Claims. (Cl. 226—58)

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This invention pertains to a machine for filling flexible, collapsible bags with a liquid or virtually liquid material. The invention also relates to a machine and devices whereby the handling and filling of bags with a virtually liquid material is accomplished accurately, expeditiously and efficiently.

The subject matter of the present invention is to be distinguished from prior methods of filling containers in that the present invention relates to the use of containers made of a flexible, collapsible material. The bags or containers of the present invention are generally made of sheet material such as paper (which is either impregnated or coated with suitable compositions) or sheet material made from any one of a variety of plastics, resinous compounds, polymers, co-polymers, etc., such as, for example, cellulosic derivatives including cellophane, polyvinyl compounds, styrene polymers, cumarone-indene-type resins, nylon, or the like. The bags, moreover, may be laminated and include a thin sheet of aluminum or other foil. At all events, the bags are collapsible, readily deformable, flexible, liquid tight, and preferably capable of being sealed by the application of pressure, or heat and pressure.

Bags of the above described character are filled with liquid or virtually liquid materials in accordance with this invention and then sealed. The sealed bag is ordinarily then inserted into a relatively rigid carton which protects the bag from accidental puncturing during shipment, handling, etc.

The invention also contemplates an apparatus whereby the liquid is deaerated during the filling step. Many materials such as, for example, orange juice, apple butter, berry purees, milk and other food stuffs deteriorate upon storage and such deterioration appears to be accelerated because of the presence of occluded air. In the process of the present invention these various liquids are deaerated during the filling step and since the bag is subsequently sealed so as to be virtually hermetic, the contents retain their potency and initial qualities for a very protracted period of time.

It is an object of the present invention, therefore, to disclose and provide an apparatus for handling and filling flexible bags with a liquid material.

A further object is to provide an apparatus arranged to employ suction or vacuum not only for the purpose of filling a container but also to facilitate the introduction of liquid into the container, thereby obviating the necessity of pumping food stuffs.

An object of the invention, moreover, is to disclose and provide devices which facilitate the

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filling of a flexible bag and subsequent sealing thereof.

A still further object is to disclose and provide a machine which insures the introduction of a predetermined or measured amount of liquid into a bag.

These and other objects will become apparent to those skilled in the art from the following detailed description, reference being had for purposes of illustration to the appended drawings which diagrammatically illustrate one form or arrangement of apparatus which may be employed.

In the drawings:

Fig. 1 is a side elevation of a measuring and filling device.

Fig. 2 is a horizontal section taken along the plane II—II of Fig. 1.

Fig. 3 is a vertical section taken through a movable portion of a housing illustrating a step preliminary to sealing of the bag.

Generally stated, the method of the present invention comprises placing a formed, open, collapsible, flexible bag of liquid-tight material into a vacuumizing zone, reducing the pressure around and within the open bag in said zone, separately measuring a desired quantity of liquid in a measuring zone, withdrawing the measured quantity of liquid into the vacuumizing zone by means of the reduced pressure in the latter zone, discharging the liquid into the bag while maintaining a reduced pressure in the vacuumizing zone so as to deaerate the liquid and fill the bag, then restoring the pressure in the vacuumizing zone to atmospheric, removing the open, filled bag therefrom, displacing what little air there may be immediately above the liquid within the bag with an inert gas, and hermetically sealing the edges of the bag. It is to be understood that not all of these steps need necessarily be carried out.

In the appended drawings a source of liquid material is indicated at 1, a fluid pressure or hydrostatic head control device is indicated at 2, a measuring device is indicated at 3, and a vacuumizing and filling device is generally indicated at 4. It is to be understood that any suitable source of liquid may be used. If, for example, orange juice is being handled, the source 1 may consist of a tank to which the burred or extracted juice is fed. In some instances the juice may be flash pasteurized or it may be subjected to a de-oiling operation before being introduced into the supply tank 1. At all events, such supply preferably is conveyed by means of conduit 5 to the pressure control or hydrostatic head control device 2. This device may be a pressure-regulating valve or it may consist of a float tank 6, the inlet from conduit 5 into the tank being controlled by means of a float arm 7 and suitable linkage. The out-

let line 8 from this device 2 leads to the measuring apparatus 3 preferably through a three-way valve 9 by means of which communication is established with the bottom port 10 of the measuring device. This device may be cylindrical having side walls 11 of glass, a conical bottom portion 12 and a top 13. Extending through a suitable adjustable gland 14 carried by the top is a tube 15 provided with a flared lower end 16 adapted to snugly fit and seat upon a float ball 17 carried by the lower end of a guide rod 18 loosely extending through the tube 15. The upper end of the tube 15 may be provided with an air filter 19. The outer surface of the tube 15 may be provided with indices, a stationary index member 20 carried by the top 13 cooperating with such indices.

It will be evident that when the valve 9 is in the position shown in Fig. 1, liquid from the supply 1 and control device 2 may pass through conduit 8 into the measuring device 3. The float 17 rides upwardly on the surface of the liquid admitted into the measuring cylinder 11 and eventually seats upon and closes the lower inlet to the tube 15. Escape of air from the upper portion of the measuring chamber is thus discontinued and further inflow of liquid ceases. Since the tube 15 is vertically adjustable, the measuring device 3 may be used to positively measure and fill up with any desired or predetermined amount of liquid. The supply through conduit 8 is under a constant hydrostatic head and therefore there is no tendency for the air above the liquid in the measuring cylinder 3 to be subjected to a variable degree of compression.

The vacuumizing, deaerating and filling device comprises a stationary housing portion 24 provided with an open bottom and an outwardly extending flange 25 which forms a seat around the open bottom. A suitable gasket may be carried by such seat. The stationary housing portion 24 is connected by means of conduit 26 with a three-way valve 27 having one branch 28 leading to a source of vacuum or suction and an outlet branch 29 in communication with the air. The upper housing portion 24 is also provided with a port connected as by means of conduit 30 with the three-way valve 9, said conduit leading through the port into a filling nozzle 31 provided with some means arranged to expose an extended surface of liquid being discharged therefrom. In the embodiment illustrated, the end of filling nozzle 31 is shown flattened or provided with a fish-tail type of nozzle adapted to discharge the liquid in the form of a relatively thin but wide ribbon-like stream.

The filling chamber also includes a movable housing portion, such as 34, provided with an open top and an edge 35 arranged to contact the seat 25 and form a tight seal therewith. The movable housing portion 34 is arranged to support a flexible, collapsible bag of the character previously described, this bag being shown provided with upstanding walls 36, the upper open edge of the bag being indicated at 37. The movable housing portion 34 is arranged not only to support the bag 36 but to permit air to pass completely therearound and to accomplish this result, the housing portion 34 may be provided with a plurality of inwardly extending ridges or ways 38, 39, etc.

The movable housing portions 34 may be of varying sizes arranged to support and carry bags of different capacity. Means should also be provided for bringing the movable housing portions

34 into contact with the seat 25 and such means may include a vertically movable support 40 operated in any suitable manner either manually, by foot pressure, or automatically.

It is to be understood that the bags 36 are ordinarily received in a flattened condition and by means of suitable machines (not shown but known to the art) the bags are opened and formed into an upstanding, open-ended bag and placed within movable housings such as 34. These movable housings together with their bags are then brought into contact with the stationary housing portion 24 for the performance of the filling and deaerating operation.

The depth of each housing portion 34 is so arranged that it supports the open bag 36 with the upper portion of the bag extending above the lip 35 whereby the filling nozzle 31 actually extends into the upper open end of the bag when such bag is in the filling device 4.

The operation of the measuring device 3 has been described hereinbefore. While a suitable quantity of liquid material is being measured by the device 3 and after an empty, open, formed, collapsible bag carried by a movable housing portion 34 has been brought into contact with the seat 25 of the stationary housing 24, the valve 27 is adjusted so as to place the filling device 4 in communication with a source of vacuum or suction. Pressure within the filling device 4 is thus reduced to below atmospheric, the extent or degree of vacuum thus created within the filling chamber ordinarily ranging between about 18 inches and 26 inches of mercury. The movable housing portion 34 is kept in seating contact with the lip 25 by reason of the reduced pressure within the chamber.

After a suitable quantity of liquid has been measured by the device 3 and a desired vacuum exists within the filling device 4, the valve 9 is operated so as to place the measuring device 3 in communication with the filling nozzle 31 through conduit 30. The liquid is withdrawn from the measuring cylinder 11 by the vacuum within the filling chamber 4 and is discharged into the open, upstanding, collapsible bag 36 through the nozzle 31. During such discharge the liquid is deaerated since the valve 27 is still in position communicating the filling chamber with the source of suction.

It is to be noted that a subatmospheric pressure exists completely around the bag 36 so that although the bag is of limp, flexible and collapsible material, it does not collapse by reason of the vacuum within the chamber 4. Moreover, the filling nozzle 31 does not fill the entire cross-sectional area of the open end of the bag 36 so that the continued reduced pressure within the chamber effectively deaerates the liquid being supplied to the bag.

During this filling operation the float 17 descends with the lowering level of the liquid within the measuring cylinder 11, thereby admitting air into the upper portion of the cylinder through tube 15 and air filter 19. As the last liquid from the measuring device 3 falls through inlet 21 into the bag, the reduced pressure within the chamber is broken by the admission of air through the line 30, valve 9, port 10, tube 15 and air filter 19. Valve 27 may also be turned so as to place the filling chamber 4 in communication with the air inlet line 20, thereby discontinuing the application of suction to the filling chamber. As soon as atmospheric pressure is restored within the filling chamber, the seal

between lips 25 and 35 is broken and the movable housing portion 34 may descend with its supported and partially filled bag.

The movable housing portion with its filled bag may then be moved away and a new movable housing portion with an empty bag again brought into position. Fig. 3 shows a movable housing portion 34 with a filled bag, the liquid level being indicated at 42. As previously stated, the housing portions 34 are of different sizes and widths so as to accommodate bags of different capacity and preferably such housing portions are of a size that the liquid level 42 in a filled bag is in the same plane as the lips 35, thereby facilitating the subsequent bag-sealing operation.

Ordinarily the first operation is to spread the open upper portion of the bag in one direction so as to bring the upper edges 37 and 37' relatively close together. Concurrently with this operation a small quantity of inert gas, such as nitrogen or carbon dioxide, may be introduced into the upper portion of a bag as by means of a nozzle 43, whereupon what little air may be contained in the upper portion of the bag above the liquid level 42 is displaced and the bag may then be sealed by means of heated rollers, folding devices, or the like, the plane of the lips 35 facilitating the folding and sealing operations by establishing a working level correlated to the level of the liquid within the bag.

It will be noted that in the arrangement above described the liquid or virtually liquid material which is being bagged is not pumped but is transferred from the supply tank or source to the measuring device and to the bag by means of gravity and vacuum. Since most of the liquids are foodstuffs, they are not contaminated by passage through gear pumps or other devices which may introduce mineral impurities, oil from leaking journals or bearings, etc. The use of vacuum for withdrawing the measured quantity from the measuring device 3 into the bag is particularly desirable where the material is of a pulpy, viscous or thick consistency as is the case with many fruit and berry products. The use of vacuum to withdraw the liquid prevents dripping of small amounts of liquid from the nozzle and renders the operation both clean and accurate.

I claim:

1. An apparatus for filling flexible, collapsible bags with a liquid under vacuum comprising: a measuring device including a container provided with a single port in the bottom thereof; a three-way valve connected to said container port; means for supplying liquid to said container through said valve at below a predetermined pressure head; a vacuumizing and filling device comprising a stationary housing portion having an open bottom and a seat around said open bottom; a movable housing portion having an open top and an edge portion adapted to contact said seat, said movable portion having spaced downwardly extending ribs on internal vertical walls and transverse spaced ribs on a bottom wall thereof, said spaced ribs on said walls defining a plurality of continuous connected passageways whereby a flexible bag may be supported on said ribs while being filled in a vacuum zone; a filling spout in the stationary housing portion in position to extend into a flexible bag supported by the movable portion; a suction port in the stationary housing; selectively operable means for

connecting the suction port to suction and to atmosphere and conduit means between said filling spout and the valve and said measuring container.

2. A vacuumizing and filling device for flexible, normally collapsible bags comprising: a stationary housing portion having an open bottom and a seat around said open bottom; a movable housing portion having an open top and an edge portion adapted to contact said seat; said movable portion having spaced downwardly extending ribs on internal vertical walls and transverse spaced ribs on the bottom wall thereof; said spaced ribs defining a plurality of continuous connected passageways for pressure equalization between the interior and exterior of a flexible collapsible bag supported on said ribs within said portion while being filled in a vacuum zone; a filling spout in the stationary housing portion in position to extend into an open bag supported by the movable portion; valved means for supplying liquid to the filling spout and for connecting the filling spout to atmosphere upon completion of a filling operation; a suction port in the stationary housing; and selectively operable means for connecting said port to suction and to atmosphere.

3. A vacuumizing and filling device for flexible, normally collapsible bags comprising: a stationary housing portion having an open bottom and a seat around said open bottom; a movable housing portion having an open top and an edge portion adapted to contact said seat, said movable portion having spaced ribs on internal wall surfaces thereof for defining a plurality of continuous connected passageways arranged to extend downwardly and beneath a flexible bag supported on said ribs while being filled in a vacuum zone; a filling spout in the stationary housing portion in position to extend into an opened flexible bag supported by the movable portion, said filling spout having an elongated opening arranged to expose an extended surface of liquid discharged therefrom; valved means for supplying liquid to the filling spout; a suction port in the stationary housing; and selectively operable means for connecting said port to suction and to atmosphere.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
598,345	Kellom	Feb. 1, 1898
921,654	Rein	May 11, 1909
1,025,717	Phelps	May 7, 1912
1,037,824	Fasting	Sept. 3, 1912
1,825,039	Aspden	Sept. 29, 1931
1,978,913	Ricci	Oct. 30, 1934
2,022,656	Du Plantier	Dec. 3, 1935
2,059,455	Hoar	Nov. 3, 1936
2,126,563	Lee	Aug. 9, 1938
2,241,943	Berch	May 13, 1941
2,380,903	Ray	July 31, 1945
2,412,167	Minaker	Dec. 3, 1946
2,428,598	Weaver	Oct. 7, 1947

FOREIGN PATENTS

Number	Country	Date
288,407	Germany	Nov. 1, 1915
634,569	Germany	Aug. 29, 1936