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APPARATUS FOR FILLING

Filed June 21, 1940

Fig. 1.

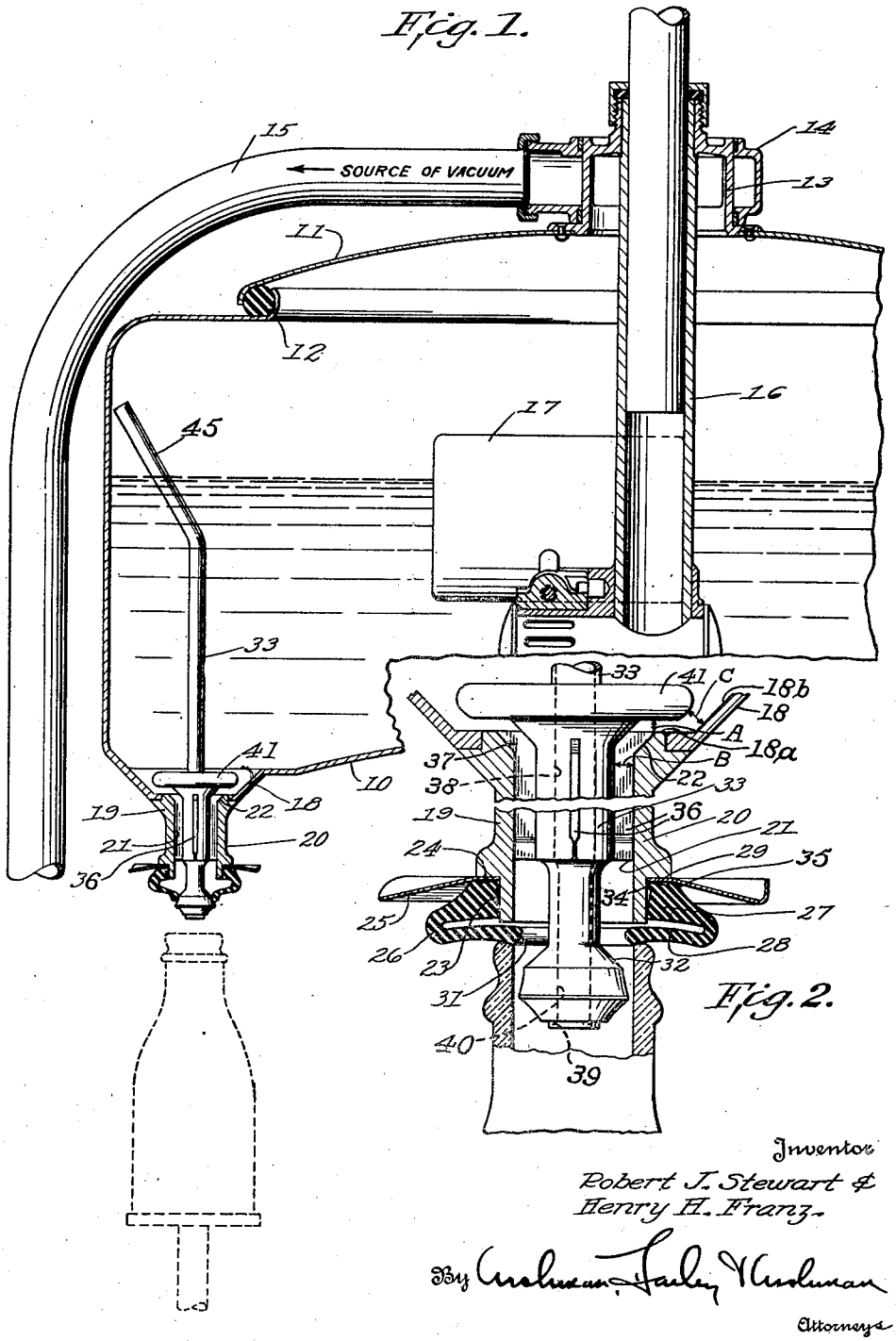


Fig. 2.

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APPARATUS FOR FILLING

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14 Claims. (Cl. 226—116)

This invention relates to apparatus for filling, and more particularly, to mechanisms for filling milk containers. The present application is a continuation in part of our application for Filling structure, Serial No. 215,680, filed June 24, 1938.

In machines heretofore used for filling milk containers, it has been the practice to provide a rotary reservoir having downwardly extending filling nozzles or heads. The bottles or other containers to be filled are conveyed to and positioned on suitable platforms below these filling heads and, as the reservoir revolves, each bottle is raised until its mouth engages a depending filling head. The engagement between the bottle and head is operative to open a valve structure usually built into the filling head, and the opening of the valve permits gravity flow of milk from the reservoir into the bottle. The air which would otherwise be trapped in the bottle and prevent the free flow of milk is vented through an unobstructed vent tube generally extending vertically and centrally through the filling head with the upper end of the tube extending above the milk in the reservoir. Thus the air in the bottle is forced by the in-flowing milk to pass through the vent and into the top of the reservoir which is at atmospheric pressure.

It will be appreciated that with such a construction, usually termed a "gravity filler," the speed with which a bottle may be filled is limited by reason of the fact that the in-flowing milk must push the air trapped in the bottle upwardly through the vent.

Another necessary element of this gravity filling equipment is the provision of a displacement member on the lower end portion of the air vent tube which is positioned within the neck of the bottle. This displacement member must be provided because during the filling cycle, the milk will flow into the bottle until it is filled and will then continue to flow upwardly in the air vent tube until the latter is filled to the same level as the surrounding liquid in the reservoir or tank. When the bottle has reached the end of the filling cycle and is moved downwardly from the filling head, thus permitting the filling valve to close, the milk in the open vent tube will flow downwardly into the bottle. The volume displaced by the displacement member in the bottle is just equal to the volume of liquid that has flowed into the vent. Therefore, when the bottle on the platform has been lowered away from the filling head until the displacement member has been wholly withdrawn from its neck, the liquid flowing from the vent tube into the bottle neck will completely fill it to the desired level.

In other words, the volume of the displacement member must be equal to the capacity of the vent tube, plus the volume of the air space to be purposely left in the mouth of the bottle, above the milk, after the bottle has been filled to the desired level. If every bottle is to be filled accurately to the same level, the level of the liquid in the reservoir must be controlled to a fine degree, because if the level varies to any extent, the volume of liquid that will flow into the vent tube in the filling process will vary, and as the displacement member always provides the same volume in the bottle that must be filled, any difference in volume of liquid which flows back out of the vent tube will be apparent in the level to which the bottle is finally filled. Therefore, with this displacement type of gravity filling head, an extremely accurate control of the liquid level in the reservoir must be maintained.

The limitation of the size of the displacement member and the diameter of the bore of the vent tube, in addition to requiring a fine adjustment of the level of the liquid in the reservoir, also restrict the quantity of liquid that may be contained in the reservoir. The diameter of the vent tube bore must be large enough to permit a free flow of air therethrough. It is evident that the volume of liquid which will flow into the bore during the filling process is directly related to the diameter of the bore and the level to which the liquid will flow into the vent tube is governed by the level of liquid maintained in the reservoir. With the type of apparatus above described it has been necessary to maintain this level relatively low in order that a too large volume of liquid will not flow into the vent and thus require an unduly large displacement member.

It will be observed that by the above arrangement time is consumed in filling the space previously occupied by the displacement member and there is nothing to prevent the unsanitary dripping of milk from the filling heads.

In addition to the gravity flow milk filling machines discussed above, another type in general use includes a vacuum tank above the bottle platform and provided with filling heads which are connected both to the vacuum tank and to a milk tank positioned at a point below the bottle platform, with a flow line angled to a point above the filling heads extending between the milk tank and the filling heads. By this arrangement, the positioning of a bottle in contact with a filling head causes a vacuum circuit to be closed between the vacuum tank and the milk tank so that milk will be drawn upwardly from the latter through the angled passage and into the bottle. When the bottle is moved downwardly, the vacuum line to the milk tank will be broken. This will cause the milk in the outlet portion of the angled flow line to flow downwardly into the bottle to fill the space previously filled by the usual filling head diplacement member, while milk and foam already in the filling head vent

tube will be drawn upwardly into the vacuum tank.

The above method also has the disadvantage of requiring time to have the space occupied by the displacement member filled with milk during the final portion of the filling cycle. Also, there will be dripping of milk from the angled passage after a bottle is removed therefrom.

Other arrangements used to fill milk involve the use of an extremely high vacuum of the order of approximately fifteen inches of mercury, the principal idea of such arrangements being to keep the milk isolated from air. The difficulty with such an arrangement is that unless the milk is to be prevented from increasing its bulk, due to the exertion of such a high vacuum upon its natural air content, a plurality of tanks must be provided, thereby greatly complicating the filling apparatus. Also, milk under such a high vacuum is in a rather unstable condition and readily tends to foam, particularly when it is sucked or drawn into a bottle and thereby impacts with a bottle surface. The use of such a high vacuum also causes difficulty in releasing the bottles from the filling heads. In fact, a vacuum of only three or four inches of mercury will cause bottles to adhere to the filling heads.

In addition to the above disadvantages of the prior machines and their methods, there is another problem peculiar to the filling of milk which they have entirely failed to overcome. That is, when milk is flowed into a bottle from a point above the bottle, it foams to a substantial extent and some time is required to displace this foam with solid milk. The prior machines and methods have approached this problem by flowing the milk as rapidly as possible with the idea that the more rapid the flow of the milk the more quickly the bottle will be filled with solid milk. This theory, while entirely logical, completely overlooks the fact that the rapid flow of the milk, resulting in a sharpened impact with the bottle, induces a greater amount of foaming than would be the case if the milk is flowed at somewhat reduced velocity.

We have discovered that if the filling is so performed that the milk will flow into the bottle in an ample stream but at reduced velocity, less foaming will occur, and since less foam must therefore be removed before filling is completed, the time required for filling will be markedly reduced.

For example, the usual milk filler requires eight or nine seconds to fill a quart bottle with solid milk by following the prior system of flowing the milk as rapidly as possible into the bottle with no restriction on velocity. We have found that by flowing the milk in a stream of the same cross-sectional area as previously used, but with less velocity, less foam is produced. As a result little or not time is required to remove foam, and the same bottle can be filled with solid milk in approximately six seconds.

The principal object of the present invention is the provision of a method and apparatus for rapidly filling milk containers in an entirely sanitary manner.

The method whereby the above object is obtained may be generally described as establishing within the milk reservoir and the container a vacuum having a measurement just slightly greater than the head of the milk in the reservoir. For example, if the milk has a head of twelve inches at the filling heads, a vacuum equal to eighteen inches of milk will be entirely sufficient; in fact, less vacuum is usually ample. The milk is then flowed from the reservoir into the container in a stream of the usual volume but with the stream impeded by a baffle or a tortuous path so that it will flow with a velocity somewhat lower than that with which it would ordinarily flow under the same head with unrestricted passages.

A vacuum of twelve inches of milk corresponds to a vacuum of only one inch of mercury.

The present method, involving the use of a vacuum effect in the milk reservoir above the bottles, entirely prevents all dripping of milk or leakage from the reservoir at any point. In other words, at any point where dripping or leakage might occur, air is tending to enter the reservoir and milk obviously cannot escape. Furthermore, the use of such an arrangement with an extremely low vacuum effect enables continuously open vent tubes of small bore to be used, thereby reducing the size of the vacuum pump required.

The ability to use vent tubes of small diameter is also due to the fact that the only function of the vent tubes is to draw surplus milk and foam up into the reservoir immediately the bottle is moved out of contact with the filling head. That is, in milk fillers of the gravity type discussed above, the milk which flowed into the vent tube was used to fill the space previously occupied in the bottle by the displacement member, and it was desirable to have the vent tube of large diameter in order to enable this replacing flow to occur as quickly as possible. Since the vent tubes of our invention do not have this function, they may be of smaller bore. Furthermore, the use of small vent tubes reduces the air velocity of air in the filling tank and decreases the possibility of milk being atomized and drawn to the vacuum pump.

The use of a vacuum in the milk reservoir to quickly draw surplus milk and foam up into the milk reservoir, for which only a very low vacuum is required, is to be distinguished from the prior use of a vacuum in a tank above the filling head for the purpose of lifting milk from a reservoir below the bottle. That is, in the prior construction, the degree of vacuum was gauged according to the distance which the milk had to be lifted from the reservoir below the bottle, whereas by our invention, the vacuum is merely for the purpose of quickly lifting surplus milk back into the reservoir above the bottle. It is also to be noted that the use of the vacuum effect in the present method has no purpose whatever in controlling the rate of filling a container, but is simply used to maintain a fixed head of milk, whereas the prior arrangements discussed immediately above which use the vacuum to lift the milk from a point below the bottle determine the rate of filling by the rate of vacuum. In other words, in such prior fillers the rate of vacuum was increased in order to more quickly lift the milk from a point below the bottle.

It has also previously been proposed to use milk filling machines including a milk reservoir above the bottles, with a vacuum condition within the reservoir. Also, the filling heads of these machines have been provided with vent tubes. However, these vent tubes were provided with valves adapted to be closed as soon as a bottle moved downwardly from the filling head. These prior arrangements, therefore, cannot function to immediately draw surplus milk through the vent

tube up into the filling reservoir when the bottles move from the filling head due to the fact that the vent tube is then immediately closed. Because of this, any surplus milk moving up into the vent tube simply remains there until a second bottle is placed under the filling head. The dropping of such milk into the bottle, of course, increases the tendency toward foaming, particularly during the early stage of the filling of the bottle.

The invention further contemplates the use of a vent tube of such form as to further prevent foaming and atomization of returned milk. The usual practice is to have the vent tubes extending vertically toward the top wall of the filling tank with the result that milk moving from the vent tube is directed against such top wall, resulting in foaming and atomization, some of the atomized particles being drawn into the vacuum pump. By the present invention, each vent tube has its upper portion inclined toward the side of the filling tank at such an angle as to prevent splash and thereby atomization and also to reduce foam production in the filling reservoir.

The features of the present invention whereby foaming is reduced permits a filling tank of smaller size to be used. Prior milk filling machines have been provided with relatively large filling tanks, for example, with the usual fourteen head filling machine a filling tank of thirty-three gallons displacement is provided in order to accommodate the large volume of foam returned from the bottles and produced in the filling tank by the contact of the returned stream upon the top wall of the filling tank. By the use of our invention it is found that a filling tank of only twenty-seven gallons capacity need be provided with a fourteen head machine.

It is also to be noted that the reduction of foam within the filling tank is highly desirable from the standpoint of sanitation, since foam within the filling tank represents a tremendous amount of air-exposed surface which results in aerating and thereby contaminating the pasteurized milk.

Another object of the present invention is to provide a milk filling apparatus of extreme simplicity and which includes a minimum number of parts.

It is to be noted that in milk handling equipment, simplicity is the ultimate design consideration, because less time is consumed in the operation of cleaning and sterilizing equipment that has few parts and is of simple construction. As sterilization may be performed several times in one day and, as every part of the dairy equipment that comes in contact with the milk must be so cleansed, the time required for cleaning has a marked bearing upon the cost of handling milk.

A still further object of the invention is to provide a readily removable deformable valve element of the type disclosed in the patent to Robert J. Stewart, for Filling apparatus, No. 2,127,892, issued August 23, 1938, and to further improve upon the structure disclosed in that patent.

Other objects and advantages will be apparent from the following specification and drawing, wherein—

Figure 1 is a vertical section through the filling tank and a filling head and shows a bottle on its platform about to engage and open the filling valve, and

Figure 2 is an enlarged vertical section through a filling head showing the neck of a bottle in filling position with the valve of the filling head in fully opened position.

The filling machine here disclosed has a liquid supply reservoir **10** mounted for rotary movement in any well known manner. A cover **11** is provided which has a substantially air-tight engagement with the edges of the aperture **12** in the upper wall of the reservoir. Cover **11** includes an apertured boss **13** which rotates with the cover **11** within a fitting **14** connected to a vacuum line **15** whereby a low pressure condition is established within the upper portion of the reservoir **10** above the surface of the milk therein. Milk is delivered to the reservoir **10** through any suitable pipe system including a tube **16** supported within the central and upper portion of the boss **13** and having a float valve **17** connected at its lower end so that flow of milk into the reservoir will be controlled by float **17** to maintain the reservoir filled to a predetermined point as indicated in Figure 1.

The reservoir **10** is provided with a series of circumferentially spaced depressions or pockets **18** including bottom walls **18***a* and inclined surfaces **18***b*. Each pocket has welded therein a collar or shell **19** forming a part of a filling head. Each pocket **18** and the associated shell **19** thereby form a tube.

Each shell **19** is of generally cylindrical form and is provided with a straight bore **21** which is bevelled at its upper edge as indicated at **22**. The wall of each shell is reduced in thickness at its lower end as indicated at **23** to provide a downwardly facing shoulder **24**. A substantially flat washer **25** of known type and formed of thin metal contacts with the shoulder **24** and extends outwardly to receive all condensation which might otherwise drip into a bottle. A deformable valve element **26** is positioned upon the reduced portion **23** with its upper surface in contact with the collar **25**. Valve element **26** is formed of resilient material such as rubber and includes a relatively thick walled neck portion **27** which surrounds the reduced portion **23** of shell **19** and contacts with the collar **25**. Each valve element also includes a depending and inwardly extending thin walled bulbiform lower portion **28** which normally has its lower edge **31** seated upon a conical seat **32** formed at the lower end of the vent tube **33** as described in said Stewart Patent No. 2,127,892.

At the upper end of the bore through the neck portion **27**, there is provided an annular ridge **34**. By this arrangement, the bore of the neck portion does not have contact with the portion **23** of shell **19** over its entire area, but only at the extreme lower portion of the bore and at the ridge **34**. The upper surface of the neck portion **27** is also provided with an upwardly facing shoulder **35** at a point spaced from the bore through the neck portion. This shoulder bears upon the under surface of the collar **25**.

The provision of the ridges **34** and **35** on valve element **26** urges the lower edge of its neck bore toward firm engagement with the surface **23** so that no milk can flow between the valve element and surface **23** when the valve is flexed as shown in Figure 2.

Vent tube **33** is fitted within the bore **21** of shell **19**, being centered within the shell by means of ribs **36** which are outwardly extended at their upper ends to provide inclined shoulders **37** to bear upon the bevelled surface **22** at the upper inner edge of shell **19**.

As is described in the said patent of Robert J. Stewart, the deformable valve element **26** will nor-

mally be held seated upon the valve seat portion 32 of the corresponding vent tube 33, but when a bottle is raised to have its lip contact with the lower portion of the valve element as shown in Figure 2, this portion will be lifted from seat 32 so that milk may flow downwardly into the bottle in an annular stream.

Each vent tube 33 is of relatively small diameter and has a correspondingly small bore 38 so as to reduce the cross sectional volume of the milk which may be drawn up into it. The lower end of the bore 38 is tapered as indicated at 39, this tapered portion extending into a restricted portion 40 of bore 38. Restriction 40 is preferably provided for the purpose of reducing the size of the aperture through which air may flow when no bottle is beneath the head and also to further prevent dripping of milk from the vent tube.

A flange or washer 41 is provided upon the tube 33 at such point that the under wall of the flange or washer will be spaced from the upper surface of the bottom wall 18a of the pocket 18 by a distance which would be not less than one-sixteenth of an inch so as not to be clogged by butterfat particles in buttermilk, the rate of flow being controlled by the spacing at this point. The outer edge of the flange element is preferably rounded in vertical cross section. The upper rounded edge of the flange defines the inner wall of a converging annular mouth leading to the annular passage C—A—B between the other portions of the flange and opposed walls of the pocket 18. It will be observed that the ribs 36 terminate at a point adjacent the downwardly inclined portion of the flange 41.

By the above arrangement, the flange 41 comprises a baffle or obstruction in the path of downwardly moving milk and, with the opposed walls 18a and 18b of the pocket 18, forms a tortuous passage for the milk. Movement of the milk through this passage naturally decreases its velocity by friction and turbulence. By having the restriction at the point A with a larger space below the same as at point B, turbulence is increased. It will therefore be observed that though the tortuous passage thus provided will deliver to the space B between the outer wall of the vent tube and the inner wall of the bore of shell 19 a supply of milk to fill the capacity of that space, such milk will move into the space at a reduced velocity, so that it will drop with less force into the bottle. The portion of the tortuous passage between the under-surface of the bottom wall 18a of pocket 18 forms a horizontal course in the tortuous passage. This horizontal course, which naturally causes the stream to deviate from the vertical, increases turbulence in the stream.

As soon as the lip of a bottle is sealed against the portion 28, the air contained in the bottle will be drawn upwardly through the constantly open vent tube by reason of the low pressure area maintained above the liquid in the reservoir. As the bottle moves further and opens the valve, the liquid above the valve will flow through the passage provided between the shell 19 and the vent tube 33 under the influence of gravity. However, because of the fact that the milk must move through the tortuous passage C—A—B, its velocity will be decreased so that the milk will not flow downwardly at a speed entirely commensurate with its head. The liquid moving down through the filling head will strike the conical seat 32 of the vent tube and will be deflected toward the wall of the bottle. This will prevent the mouth of the vent tube 33 from being obstructed during the filling process.

It will be noted that each pocket 18 and the associated shell 19 form an outer tube element, while vent tube 33 forms an inner tube element, the opposed surfaces of the two tube elements defining an annular passage.

When the bottle has been completely filled, milk will flow up into the vent tube to the level of the body of liquid in the filling tank. The pressure acting on the surface of the liquid in the filling tank and that on the surface of the liquid in the vent tube being equal, the flow condition of liquid will momentarily be balanced.

After the bottle is completely filled and the above described static condition is obtained, the bottle platform will lower the bottle away from the filling head. Such static condition will be maintained until the bottle has been lowered so far that the seal between the bulbiform portion of the valve and the lip of the bottle is broken, at which moment the valve will already have been closed to further flow. Breaking of the seal between the bottle lip and the valve will permit atmospheric pressure to enter the neck of the bottle. It is to be noted that the vacuum maintained in the filling tank is preferably only of sufficient degree to cause the milk in the vent tube to be drawn up into the reservoir or, in other words, pushed up into the reservoir by the atmospheric pressure acting through the lower end of the vent tube.

It will be noted that the upper portion 45 of vent tube 33 is inclined outwardly to lie at an obtuse angle to the side wall of reservoir 10. Because of this, milk projected from the upper end of tube 33 will strike the side wall of the reservoir at an obtuse angle and will flow quietly down the reservoir wall, thereby preventing splash and atomization, and assisting in holding foam to a minimum.

When the bottle has been completely lowered away from the valve, the vent tube will, of course, be open to atmosphere and maintained open until another bottle moves into filling position beneath that filling head. The restriction 40 in the vent tube insures against the dripping from the vent tube of any liquid that might cling to the wall of the bore of the tube and also reduces the volume of the air stream which may pass through it.

It will be observed that the present method, eliminating the necessity of a large displacement member at the bottom of the vent tube, provides faster filling because it is not necessary for any liquid to move downwardly through the vent tube to fill the space previously occupied by a displacement member.

As a bottle moves downwardly from the position shown in Figure 2 to permit the valve 26 to close, milk will simultaneously fill the space in the mouth of the bottle occupied by the lower end of the vent tube. In this manner, full filling of the bottle is assured.

As has been stated above, the degree of vacuum or low pressure maintained through the line 15 is preferably relatively low, being only sufficient to draw up into the filling tank the milk which flows up into the vent tube. It is found that the vacuum will be ample if it is only 50% higher than the head of the milk in the filling tank. For example, if the milk is maintained to a depth of twelve inches in the filling tank and thereby has a head of twelve inches at the filling valve, a vacuum equal to eighteen inches of milk will be entirely sufficient. In fact, in most installa-

tions a vacuum only about two inches higher than the head of milk will be sufficient. A vacuum corresponding to the twelve inches of milk is equal to one inch of mercury vacuum and it will therefore be appreciated that the degree of vacuum above the head of milk used by the present method is extremely low.

The use of a low vacuum as described above prevents the milk from flowing too rapidly into the bottle and thereby minimizes foaming. As has been indicated above, the provision of a tortuous passage for flow of the milk through each filling head further reduces the velocity of flow of the milk without restricting the size of the flow passage. Provision of an extremely low vacuum has the further advantage of preventing the high percentage of air normally in milk from being expanded. Such expansion tends to create foaming, particularly when the milk contacts with the bottle during filling or when it moves upwardly through the vent tube **33** into contact with the filling tank wall.

It is found that by reducing the foaming of the milk as occurs with our method, the necessity of a large filling tank is obviated. Most prior filling machines are equipped with a relatively large filling tank, primarily to accommodate the foam which forms in the tank during the filling process. Since the present method inhibits foaming to a substantial degree, it is not necessary to provide as large a filling tank. For example, prior machines provided with filling tanks including fourteen filling heads are normally of a capacity of thirty-three gallons while by our method a fourteen head machine filling tank need only be of twenty-seven gallons capacity. The reduction of foam within the filling tank obviously is a great advantage from the standpoint of sanitation because foam tremendously increases the surface area exposed to air and contamination.

Because of the fact that the present method reduces foaming to a minimum, it is possible to fill a bottle much more rapidly with solid milk. As has heretofore been stated, prior filling methods, using a rapid flow of milk into the bottle, have resulted in foaming and a substantial proportion of the filling time has been occupied in withdrawing foam from the bottle and replacing the same with milk, the time required for a quart bottle being from eight to nine seconds. Because the present method inhibits foaming, it insures that the bottle will fill rapidly with solid milk, a quart bottle usually requiring about six seconds for filling. The ability to fill faster with solid milk by the present method is due entirely to the fact that we flow the usual volume of milk but at a lower velocity, this low velocity being due to the fact that the milk stream, while of normal cross section, must move about a baffle, or in a tortuous path.

It may be stated that because of the lowered velocity of the milk flowing into the bottle by the present method such small foam bubbles as may form around the lower portion of the vent tube **33** and between the extreme lower end of the vent tube and the mouth of the bottle can rise quickly into the tank through the incoming stream of milk. Removal of foam bubbles from this area has been extremely difficult with prior methods and machines because of the high velocity and head of the descending milk.

The bore of the vent tube which may be used with the present method is extremely small. Heretofore it has been necessary to provide a large vent tube of the order of nine-sixteenths of an inch in diameter to quickly draw foam into the filling tank from the bottle. Reducing the size of the vent tube to approximately seven-sixteenths of an inch at its smallest portion, as may be done with the present method, particularly with the vacuum system, has the material advantage of enabling the vacuum pump to be of small capacity. Also, the smaller the diameter of the vent tube, the smaller the quantity of milk which will be in the tube after the bottle is filled and the less possibility there is of such milk foaming when it contacts with the filling reservoir wall. Vent tubes of reduced size also reduce the air velocity in the upper portion of the filling tank, thereby decreasing the tendency toward carrying atomized milk from the filling tank toward the vacuum pump.

Since each vent tube is open to atmosphere during the short interval between the removal and delivery of bottles, it is desirable to reduce flow through the same as much as possible. The use of constantly open vent tubes in itself has numerous advantages over prior machines because such tubes eliminate valves and insure that surplus milk will be instantly drawn upwardly into the filling tank. The use of a low pressure condition in the filling tank also has inherent advantages serving to give faster and more accurate filling, as well as prevent the filling of imperfect bottles.

It will be observed that the use of a very slight vacuum of the degree defined above permits the present machine to operate with only a single tank for the milk, whereas machines operating under a higher vacuum must be provided with a series of reservoirs in order to avoid exerting too high a vacuum directly upon the surface of a body of milk. Our use of a constantly open vent tube likewise eliminates the necessity of a plurality of tanks at different pressures, as well as eliminating a series of valves as pointed out above.

The terminology used in the specification is for the purpose of description and not of limitation, the scope of the invention being indicated by the claims.

Furthermore, while the embodiment of the invention specifically described herein refers to the filling of milk it will be observed that at least a number of features of the invention are entirely applicable to the handling of other liquids.

We claim:

1. In a filling machine, a reservoir, means to maintain a body of liquid in the reservoir and an uninterrupted low pressure condition above the surface of such liquid, a filling head communicating with the liquid containing portion of the reservoir, said filling head including a valve to control the flow of liquid from the reservoir, and a continuously open vent tube adapted to communicate at its lower end with a container positioned beneath the filling head, the upper end of the tube being continually open to the upper portion of the reservoir, the bore of said vent tube including a restriction to prevent dripping.

2. In a rotary filling machine, a reservoir having a centrally apertured cover, means to maintain a body of liquid in the reservoir including a liquid supply pipe, and means to maintain a low pressure condition above the surface of such liquid including a suction head concentric with said pipe and disposed vertically through said centrally apertured cover into said reservoir, a

filling head communicating with the liquid containing portion of the reservoir, said filling head including a shell, a resilient valve adapted to be carried by said shell to control the flow of liquid from the reservoir, and an open vent tube adapted to communicate at its lower end with a container positioned beneath the filling head, the upper end of the tube being continually open to the upper portion of the reservoir, the lower end of said vent tube being enlarged to provide a seat for said resilient valve and being also provided with bottle centering means, and the bore of said vent tube being reduced adjacent its lowermost end.

3. In a filling machine, a filling reservoir including a bottom wall and a vertically extending side wall, a filling head in said bottom wall including an outlet flow valve, a vent tube in said filling head, said vent tube extending upwardly through said filling head and having at least its upper portion inclined toward the side wall of said filling reservoir so as to project liquid moving from the tube against said side wall at an obtuse angle with respect to said side wall.

4. In a milk filling machine, a milk reservoir, a filling head including a valve to control downward flow of milk to a container positioned beneath the filling head, the filling head including concentric inner and outer tubes positioned to define between them an annular milk flow and foam return passage, said inner tube serving as a vent tube, one of said tubes having a radially extending baffle thereon within said passage and spaced above its lower end and projecting into the annular passage, the other of said tubes being so formed adjacent said baffle that, in vertical section, its annular passage surface will substantially conform to the vertical sectional outline of said baffle to define a tortuous path including a substantially horizontal course which path will produce turbulence in and exert friction upon the milk to reduce its velocity and enable such foam as is created in the container to readily rise through the descending milk stream.

5. In a milk filling machine, a milk reservoir, a filling head including a valve to control downward flow of milk to a container positioned beneath the filling head, the filling head including concentric inner and outer tubes positioned to define between them an annular milk flow and foam return passage, said inner tube serving as a vent tube, and having a radially projecting baffle on its outer surface within said passage and spaced above its lower end, the inner surface of said outer tube being enlarged in diameter adjacent and opposite said radially projecting baffle so that such portion of the inner surface of the outer tube will substantially conform to but be spaced from said radial baffle to define a tortuous path including a substantially horizontal course which will produce turbulence in and exert friction upon the milk to reduce its velocity and enable such foam as is created in the container to readily rise through the descending milk stream.

6. In a milk filling machine, a structure of the character described in claim 4 wherein the space between said inner tube and said outer tube is more restricted at one portion along said baffle than at another portion along said baffle.

7. In a milk filling machine, a structure of the character described in claim 4, wherein the space between the lower surface of said radial baffle on said inner tube and the opposed conforming surface of said outer tube is less than at other opposed portions of said tubes.

8. In a milk filling machine, a structure of the character described in claim 5 wherein the space between said inner tube and said outer tube is more restricted at one portion along said baffle than at another portion along said baffle.

9. In a milk filling machine, a structure of the character described in claim 5, wherein the space between the lower surface of said radial baffle on said inner tube and the opposed conforming surface of said outer tube is less than at other opposed portions of said tubes.

10. In a milk filling machine, the combination with a structure of the character described in claim 4, of means to maintain a vacuum condition in the milk reservoir sufficient to draw surplus milk upwardly through said inner tube.

11. In a milk filling machine, the combination with a structure of the character described in claim 5, of means to maintain a vacuum condition in the milk reservoir sufficient to draw surplus milk upwardly through said inner tube.

12. In a milk filling machine, a milk reservoir, a filling head including a valve to control downward flow of milk to a container positioned beneath the filling head, the filling head including concentric inner and outer tubes positioned to respectively define the inner and outer surfaces of an annular milk flow and foam return passage, said outer tube including a circular wall of relatively large diameter at its upper end, a substantially horizontal and annular wall at the lower end of said first-named wall portion, and a vertical circular wall of reduced diameter extending downwardly from the inner edge of said annular horizontal wall, said inner tube having a radially projecting flange positioned within said large-diametered circular wall, the lower surface of said flange being spaced above said horizontal wall and its diameter being greater than the diameter of said vertical reduced-diameter circular wall so as to define a tortuous path adjacent said flange which will produce turbulence in and exert friction upon the milk to reduce its velocity and enable such foam as is created in the container to readily rise through the descending milk stream.

13. In a milk filling machine, a structure of the character described in claim 12 wherein the space between said inner tube and said outer tube is more restricted at one portion along said flange than at another portion along said flange.

14. In a milk filling machine, a structure of the character described in claim 12 wherein the space between the lower surface of said flange on the inner tube and said horizontal surface of said outer tube is more restricted than at other opposed portions of said tubes.

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