March 28, 1967 C. M. BELL 3,311,141

BOTTLE FILLING APPARATUS

Filed Feb. 3, 1964 2 Sheets-Sheet 1

FIG. 1

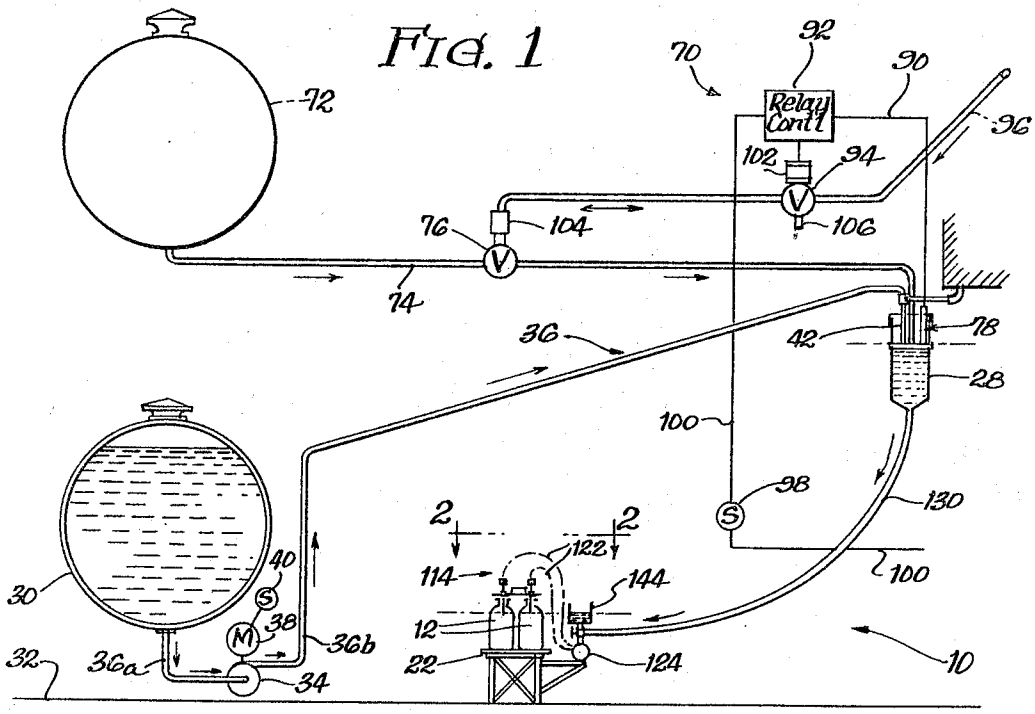
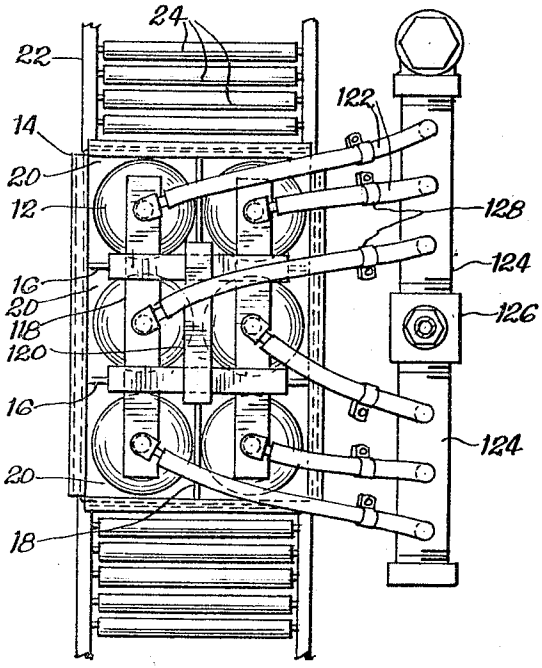


FIG. 2



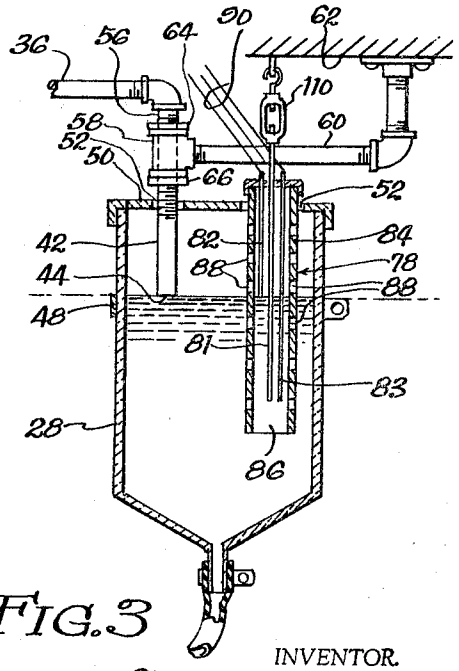


FIG. 3

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BOTTLE FILLING APPARATUS

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FIG. 4

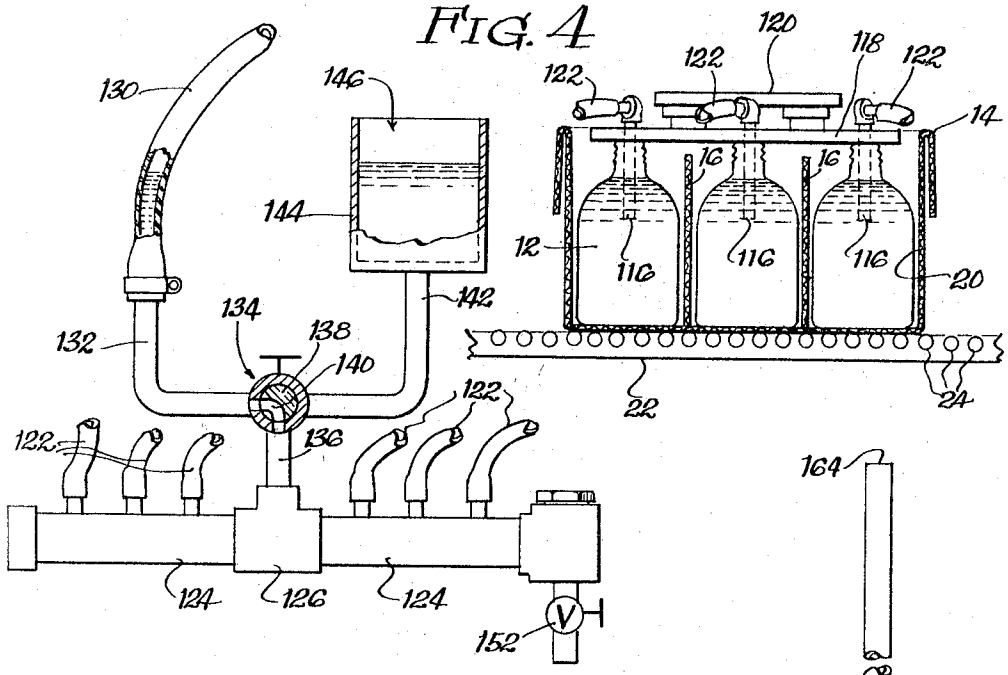
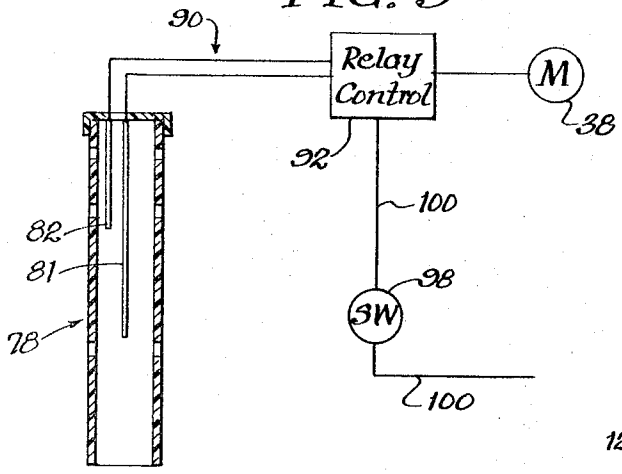


FIG. 5



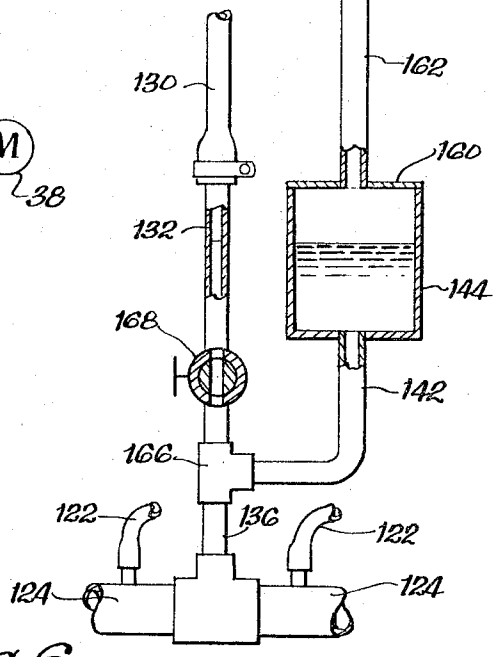


FIG. 6

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BOTTLE FILLING APPARATUS

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Filed Feb. 3, 1964, Ser. No. 341,924
10 Claims. (Cl. 141—244)

This invention relates to an apparatus for filling bottles or any other containers of uniform size or capacity and uniform shape or form. The invention pertains particularly to an apparatus which is arranged so that a plurality of bottles or other containers may be filled simultaneously.

Thus, one object of the present invention is to provide a new and improved apparatus whereby a plurality of bottles or the like may be filled simultaneously, preferably while the bottles are received in a case, carton or other container, in which the bottles are to be packaged for shipment.

A further object is to provide such a new and improved bottle filling apparatus which is adapted to fill the bottles or the like with a high degree of accuracy, so as to obviate any possibility that any of the bottles will be insufficiently filled.

It is a further object to provide a new and improved apparatus whereby all of the bottles are automatically filled to the same level, by virtue of a siphon arrangement whereby the liquid is brought to the same level in all of the bottles.

Another object is to provide a new and improved bottle filling apparatus which is constructed so that the spigots through which the bottles are filled may be withdrawn from the bottles without any substantial loss of the liquid and without causing the bottles to become unequally filled.

A further object is to provide a bottle filling apparatus which employs a measuring tank, for measuring out the liquid to be delivered to the bottles, together with new and improved means for filling the measuring tank with a predetermined quantity of the liquid.

It is a further object to provide a new and improved apparatus of the foregoing character, in which the level of the liquid in the measuring tank is automatically and positively adjusted by a siphonic action.

Further objects and advantages of the present invention will appear from the following description taken with the accompanying drawings in which:

FIG. 1 is a diagrammatic elevational view of a bottle filling apparatus to be described as an illustrative embodiment of the present invention.

FIG. 2 is a fragmentary plan view, taken generally as indicated by the line 2—2 in FIG. 1, to show the bottle filling head.

FIG. 3 is an enlarged elevational section taken through the measuring tank.

FIG. 4 is an enlarged diagrammatic elevational section of the bottle filling head and the associated components.

FIG. 5 is a diagrammatic view showing a modified construction.

FIG. 6 is a fragmentary diagrammatic view showing another modified construction.

It will be seen that FIG. 1 illustrates a bottle filling apparatus **10** whereby a plurality of bottles **12** may be filled simultaneously with any desired liquid, such as liquid bleach or ammonia, for example. Preferably, the bottles **12** are received in a case or carton **14** while they are being filled. After the filling operation has been completed, the bottles may be closed, and then the case **14** may also be closed so that the bottles may be shipped therein. The illustrated carton or case **14** is provided with a plurality of dividers or partitions **16** and **18** for dividing the case into a series of compartments **20** adapted to hold the individual bottles **12**. As shown, the case **14** is supported on a horizontal conveyor **22** which comprises a series of

closely spaced rollers **24**. The conveyor **22** greatly facilitates the movement of the successive cases **14**, both before and after the bottles are filled. If desired, some or all of the rollers **24** may be power driven, but it is normally sufficient that the rollers be freely rotatable, so that the case **14** may be moved manually along the conveyor **22** with great ease.

The illustrated case **14** is adapted to hold six of the bottles **12**, but it will be understood that any desired number of bottles may be filled simultaneously in accordance with the present invention. Moreover, bottles of any desired size may be employed.

The illustrated bottle filling apparatus **10** employs an elevated measuring tank or receptacle **28** which is adapted to be filled to a predetermined level so that the liquid to be delivered to the bottles **12** will be accurately measured. The measuring tank **28** is filled with a quantity of liquid corresponding to the total quantity of liquid to be delivered to all of the bottles **12** in each successive case **14**. Thus, for example, assuming that the bottles **12** are one gallon bottles, the measuring tank **28** will be filled to a level such that it will contain six gallons.

In the illustrated apparatus, the liquid to be delivered to the measuring tank **28** is preferably withdrawn from a storage tank **30** which may be many times larger in capacity than the measuring tank **28**. As shown, the measuring tank **28** is elevated substantially above the level of the floor **32** so that the liquid will flow rapidly by gravity from the measuring tank **28** into the bottles **12** when the controls are properly manipulated. The illustrated storage tank **30** is above the level of the floor **32** but is at a lower elevation than the measuring tank **28**. Thus, a pump **34** is employed to pump the liquid from the storage tank **30** into the measuring tank **28**. The pump **34** is connected into a conduit or pipe **36** which leads from the lower portion of the storage tank **30** to the upper portion of the measuring tank **28**. The pipe **36** has a first portion **36***a* which extends between the storage tank **30** and the suction side of the pump **34**. Moreover, the pipe **36** has a second portion **36***b* which extends from the discharge side of the pump **34** to the measuring tank **28**. Preferably, the pump **34** is of the centrifugal type, or some other type which does not displace the liquid positively, but is nevertheless effective to pump the liquid when the pump is in operation. The pump **34** may be driven by a motor or engine **38**. The operation of the pump **34** is controlled by means of a switch or other control **40**. In this case, the switch **40** is connected to the motor **38** and is adapted to control the operation thereof.

The upper end of the pipe **36** is connected to a filler pipe or spigot **42** which extends downwardly into the upper end of the measuring tank **28**. The upper end of the filler pipe **42** is connected to the upper end of the pipe **36**. The filler pipe **42** has a lower end **44** which projects part way downwardly into the measuring tank **28**. The lower end **44** of the filler pipe **42** is at the level to which it desired to fill the measuring tank **28**.

When the measuring tank **28** is to be filled, the switch **40** is operated so as to energize the pump **34**. The liquid is delivered into the measuring tank **28** through the filler pipe **42**. The pump **34** is kept in operation until the liquid rises in the measuring tank **28** to a level substantially above the lower end **44** of the filler pipe **42**. The pump **34** is then stopped. The tank **28** is preferably provided with a horizontal band **48** or some other marking representing the desired level of the liquid. The illustrated band **48** is clamped around the outside of the tank **28**, which is cylindrical in shape. The tank **28** is preferably made of transparent material or at least with a transparent portion so that the liquid in the tank can be seen. By watching the level of the liquid relative to the band

48, the operator may readily stop the pump 34 after the liquid has risen above the band.

After the pump 34 has been stopped, the liquid automatically flows backwards through the pump 34 by siphonic action. The liquid also flows backwards through the pipe 36 and the filler pipe 42. The backward flow carries the liquid out of the elevated measuring tank 28 and into the storage tank 30 by siphonic action. During the backward flow of the liquid, the lower end 44 of the filler pipe 42 is immersed in the liquid which is in the measuring tank 28, so that the pipes 36 and 42 and the pump 34 constitute a siphon system which is entirely filled with liquid. The backward flow continues until the liquid in the measuring tank 28 drops to substantially the same level as the lower end 44 of the filler pipe 42, whereupon air can enter the lower end of the pipe 42. The entry of the air stops the backward siphoning of the liquid so that no more liquid is withdrawn from the measuring tank 28 through the filler pipe 42.

The pump 34 should be of a type which will permit the backward flow of the liquid when the pump is stopped. A centrifugal pump has this ability to permit backward flow. It is for this reason that it is preferred to utilize a centrifugal pump.

The upper end of the measuring tank 28 should be open to the atmosphere. The upper end of the illustrated tank 28 is provided with a cover 50, but one or more openings 52 are provided in the cover so that the inside of the tank will be in communication with the atmosphere at the upper end of the tank. The filler pipe 42 extends through one of the openings 52.

The elevation of the lower end 44 of the filler pipe 42 determines the level to which the measuring tank 28 will be filled. With this arrangement, it is easy to fill the measuring tank 28 with the desired quantity of liquid, to a high degree of accuracy. It is preferred to provide means for accurately adjusting the elevation of the filler pipe 42. The illustrated filler pipe 42 has an externally threaded portion 56 which is slidable vertically through a guide sleeve 58. A bracket 60 is provided for rigidly mounting the sleeve 58 on the ceiling 62 or some other solid support. The illustrated bracket 60 is made of pipe fittings and nipples, but any other suitable construction may be employed. The illustrated sleeve 58 is made from a T-type pipe fitting, but it should be emphasized that the threaded portion 56 of the pipe 42 is slidable through the sleeve 58. In the illustrated construction, upper and lower adjusting or lock nuts 64 and 66 are mounted on the threaded portion 56. The nuts 64 and 66 are above and below the sleeve 58. By turning the nuts 64 and 66, the pipe 42 may easily be adjusted upwardly and downwardly. When tightened, the lock nuts 64 and 66 hold the filler pipe 42 in the same fixed position, until readjusted.

The apparatus 10 of FIG. 1 also comprises an alternative or secondary system 70 for filling the measuring tank 28 with the desired quantity of liquid. The secondary system 70 is adapted to be supplied with the liquid under positive pressure. Thus, for example, the liquid may be supplied from an elevated storage tank 72 which is at a higher elevation than the measuring tank 28 so that the liquid will flow by gravity between the elevated storage tank 72 and the measuring tank 28. A pipe or other conduit 74 is connected between the lower end of the storage tank 72 and the upper portion of the measuring tank 28. To control the flow of liquid, a valve 76 is connected into the pipe or line 74. The valve 76 is opened to fill the measuring tank 28 with liquid to the required level.

The secondary system 70 employs an electrical level control device 78 which is of a type sometimes employed to control the operation of a sump pump. As shown, the device 78 comprises three conductive electrodes or rods 81, 82 and 83 which project downwardly into the measuring tank 28 and are adapted to be contacted by the liquid

in the tank. As shown, the electrodes 81–83 are enclosed within a protective tubular casing 84. The casing 84 has an open lower end 86 to admit the liquid. A plurality of radial openings or holes 88 are also formed in the casing 84 so that the liquid may rise and fall freely therein.

The rod 81 is a common or ground electrode and is longer than the rod 82. The rod 83 is also longer than the rod 82. However, the rod 83 is not actually necessary to the present application and need not be employed. The level of the lower end of the rod 82 determines the level to which the liquid will rise in the measuring tank 28. When the liquid rises to the lower end of the rod 82, the liquid completes an electrical circuit between the rods 81 and 82. This presupposes that the liquid is capable of conducting electricity. It will be apparent that the control device 78 acts as an automatic switch which is closed by the rising of the liquid to the desired level. The closure of the circuit through the control device 78 is employed to cause the valve 76 to be operated to its closed position so as to stop the flow of liquid into the measuring tank 28 through the conduit 74.

Thus, the control device 78 is connected by means of a cable 90 to a relay control unit 92, which in turn is connected to a solenoid-type valve 94. In this case, the solenoid valve 94 is connected into an air line 96 so as to control the supply of air to the valve 76, which is of the air-operated type. A manually operable switch 98 is connected into a power line 100 which leads to the relay unit 92. When the switch 98 is closed, the relay unit 92 causes the solenoid 102 of the valve 94 to be energized so as to open the valve. Compressed air is supplied through the valve 94 to the air operator 104 of the valve 76 so as to open the valve. The liquid then flows through the conduit 74 into the measuring tank 28. When the liquid touches the electrode 82, the relay unit 92 causes the solenoid 102 to be deenergized, so as to close the valve 94 and cut off the supply of compressed air to the air operator 104. At the same time, the valve 94 connects the air operator 104 to the atmosphere through a vent connection 106. The valve 76 thereupon closes and stops the flow of liquid into the measuring tank 28.

The control device 78 may be moved upwardly and downwardly in order to adjust the level to which the tank 28 will be filled with liquid. To provide a screw adjustment, the illustrated control device 78 is suspended from the ceiling 62 by a turn buckle 110, but other means of adjustment may be employed.

The measuring tank 28 is adapted to supply the liquid to a filler head 114 having a plurality of downwardly extending spigots or filler pipes 116. As shown, the spigots 116 are mounted on a movable frame 118 which may be manipulated so that all of the spigots 116 may be inserted into the bottles 12 simultaneously. The frame 118 may be moved either manually or mechanically. The illustrated frame 118 is provided with a handle 120 for manual manipulation. All of the spigots 116 extend downwardly from the frame 118 to the same level.

As shown to best advantage in FIG. 2, flexible tubes or hoses 122 are connected between all of the spigots 116 and a manifold pipe 124. The liquid is supplied to the manifold pipe 124 through a T-fitting 126 connected into the central portion of the manifold pipe.

The tubes 122 may be provided with flow-equalizing devices. In the illustrated construction, such devices simply take the form of adjustable clamps 128 mounted on the tubes or hoses 122. Each clamp may be tightened as necessary, so as to constrict the corresponding hose so that the flow of the liquid through the various hoses will be substantially equalized.

A hose or other conduit 130 is connected to the lower end of the measuring tank 28 for carrying the liquid downwardly therefrom. The lower end of the hose 130 is connected to a pipe 132. Valve means 134 are provided between the pipe 132 and a nipple or pipe 136 leading

to the T-fitting **126** at the center of the manifold **124**. In the illustrated construction, the valve means **134** take the form of a three-way valve having a movable valve member **138** with two operative positions. In the first operative position of the three-way valve **134**, the passage **140** in the valve member **138** forms a connection between the pipes **132** and **136** so that the liquid may flow through the hose **130** into the manifold **124**. The liquid flows out of the manifold through the tubes **122** and into the bottles **12** through the spigots **116**. The manifold **124** is at a lower elevation than the lower ends of the spigots **116**. Moreover, the spigots project downwardly into the bottles to a level considerably below the level to which the bottles are to be filled. Thus the manifold is well below the level to which the bottles are to be filled. When the liquid has flowed out of the measuring tank **28** and the bottles have been filled, the liquid also completely fills the manifold **124**, the tubes **122**, the spigots **116**, and the valve **134**. With this arrangement, the liquid levels in the various bottles are automatically equalized by siphonic action through the tubes **122** and the manifold **124**. This precise equalization does not depend upon the adjustment of the clamps **128**, but is brought about by the automatic siphoning of liquid from one bottle to another until the liquid comes to precisely the same level in all of the bottles. The clamps **128** are provided to make sure that all of the bottles are filled at substantially the same rate so that the liquid will not overflow from any of the bottles during the filling operation. The final equalization of the liquid in all of the bottles occurs automatically by siphoning between the bottles after the flow of the liquid from the measuring tank **28** has been completed.

The valve **134** has a second operative position in which the pipe **132** is closed off and the passage **140** establishes communication between the pipe **136** and a pipe **142** leading to the lower end of an enlarged stand pipe **144**. It will be seen that the stand pipe **144** has and open upper end so that the upper end of the stand pipe communicates with the atmosphere. When the valve **134** is in its first operative position, the pipe **142** is closed off so that the liquid in the stand pipe **144** is trapped and cannot escape. This is the condition of the system as shown in FIG. 4. This condition exists after the liquid is equalized in the bottles **12** and before the valve **134** is shifted to its second operative position. Normally, the level of the liquid in the stand pipe **144** is somewhat higher than the level of the liquid in the bottles **12**, at this stage in the operation. The higher level of the liquid in the stand pipe represents the condition which existed at the end of the preceeding cycle of operation.

When the valve **134** is shifted to its second operative position, the liquid flows out of the stand pipe **144** and into the bottles **12** until the liquid comes to the same level in all of the bottles and also in the stand pipe. Thus, the stand pipe is effective to deliver a small amount of additional liquid to the bottles **12**.

The main function of the stand pipe **144** is to improve the operation of the system with respect to the withdrawal of the spigots **116** from the bottles **12**. Of course, the spigots **116** are withdrawn by moving the frame **118** upwardly. When the lower ends of the spigots **116** have been moved out of the liquid in the bottles **12**, the liquid in the upper extremities of the tubes **122** flows into the stand pipe **144** by gravity, while the small amount of liquid in the spigots **116** drains into the bottles **12**. It is this rise in the level of the liquid in the stand pipe **144** which accounts for the higher level of the liquid in the stand pipe, with respect to the level of the liquid in the bottles, just before the valve is moved to its second operative position. The lower end of the enlarge stand pipe **144** is well below the frame **118** and also below the level to which the bottles are to be filled with liquid, so that the backflow of liquid from the tubes **122** will immediately raise the liquid level in the stand pipe.

Due to the large capacity of the enlarged stand pipe **144**, relative to the capacity of the tubes **122** and spigots **116**, there is only a small change in the liquid level in the stand pipe **144** as the spigots **116** are moved upwardly. Thus, the withdrawal of the spigots does not disturb the equal levels of the liquid in the bottles **12**. By receiving the backflow of liquid from the upper extremities of the tubes **122**, the stand pipe prevents the flow of liquid from the tube or tubes which might be higher through another tube or tubes which might be lower as the spigots are withdrawn, such flow tending to over-fill some bottles and even, in some cases, to spill liquid over the bottles. In the absence of the stand pipe **144**, some of the bottles may contain noticeably more liquid than the others. With the provision of the stand pipe **144**, there are no noticeable differences between the levels of the liquid in the various bottles.

After the spigots **116** have been withdrawn from the set of bottles **12**, the spigots **116** are inserted into another set of bottles in another case or carton, which is advanced along the conveyor **22** to replace the preceding case of bottles. Due to the action of the stand pipe **144** in allowing the liquid to drain out of the upper extremities of the tubes **122**, there is no appreciable loss of liquid when the spigots **116** are transferred from the full bottles to the next set of empty bottles.

As soon as the valve **134** is shifted from its first operative position to its second operative position, the refilling of the measuring tank **28** may be started. The valve **134** retains the liquid in the measuring tank and prevents the liquid from flowing out of the pipe **132** at the lower end of the hose **130**. Thus, the measuring tank **28** can be filling during the time required for equalization of the liquid levels in the bottles **12** and the stand pipe **144**, and also the time required for withdrawing the spigots **116** from one set of bottles and transferring them to a new set of bottles.

Before the first cycle of operation, the manifold **124** and the stand pipe **144** should be filled with liquid to the levels which normally exist at the end of a normal cycle of operation. The manifold **124** is provided with a drain valve **152** so that the manifold and the stand pipe may easily be drained when the apparatus is to be shut down. Two separate control valves may be employed, one between the manifold and the stand pipe, and the other between the manifold and the conduit leading to the measuring tank.

FIG. 5 illustrates a modified control system in which the electrical level control device **78** is employed to control the operation of the pump **34** of FIG. 1. The control system of FIG. 5 employs the electrical control device **78**, the relay control unit **92**, and the manually operable switch **98**, the same as in FIG. 1. However, instead of connecting the valve solenoid **102** to the relay control unit **92**, the pump motor **38** is connected to the relay control unit. With this arrangement, the pump motor **38** is started by operating the switch **98**. When the liquid rises sufficiently in the tank **28** to touch the lower end of the electrode **82**, the motor **38** is stopped by the relay control unit **92**. If desired, the electrical control device **78** may be adjusted so that the lower end of the rod **82** is at a somewhat higher elevation than the lower end of the fill pipe **42**. When the motor **38** is stopped, the liquid will then siphon back through the fill pipe **42** and the pump **34** until air enters the lower end of the pipe **42** so as to stop the siphoning action. Thus, the liquid is automatically brought to the correct level in the measuring tank **28** by siphonic action.

FIG. 6 illustrates another modified construction in which the top of the stand pipe **144** is provided with a cover **160**, which may be welded or otherwise secured thereto. A pipe **162** is connected into the cover **160** and extends upwardly therefrom. Thus, the pipe **162** con-

stitutes an upward extension of the stand pipe **144**. The pipe **162** has an upper end **164** which is open to the atmosphere.

In this case, the lower end of the enlarged stand pipe **144** is connected directly to the manifold **124** through the pipe **142**, a T-fitting **166**, and the pipe **136**. Thus, there is no valve between the lower end of the stand pipe **144** and the manifold. A simple two-way valve **168** is provided between the pipe **132** and the T-fitting **166** to control the flow of liquid into the manifold **124** from the hose or conduit **130** leading to the measuring tank **28**. With the modified construction of FIG. 6, the measuring tank **28** is filled with the desired quantity of liquid, as previously described. The spigots **116** are inserted into the bottles **12** to be filled. The valve **168** is then opened to allow the liquid to flow out of the measuring tank **28**, through the manifold **124** and the tubes **122**, and into the bottles **12**. As the liquid flows out of the measuring tank **28**, the liquid rises in the enlarged stand pipe **144** and normally rises to some extent into the extension pipe **162**. The open upper end **164** of the extension pipe **162** is at a sufficiently high level to prevent the liquid from overflowing from the upper end of the extension pipe. As the bottles or other containers **12** become filled, the liquid level drops in the stand pipe **144** until the liquid is at the same level in the stand pipe and all of the bottles **12**. Because of the large capacity of the enlarged stand pipe **144**, the last portion of the liquid flows gently from the stand pipe **144** into the bottles **12**. The stand pipe **144** has the effect of reducing the head or the pressure of the liquid during the final portion of the filling operation. Thus, the stand pipe **144** substantially obviates any possibility that liquid will overflow from any of the bottles.

When the spigots **116** are withdrawn from the bottles **12**, the stand pipe **144** acts in the manner previously described, to receive the backflow of liquid from the upper extremities of the tubes **122**, so as to prevent uneven drainage of the liquid from the tubes into the bottles, while also preventing spillage of the liquid.

Before the spigots **116** are withdrawn from the bottles **12**, the valve **168** may be closed so that the refilling of the measuring tank **28** may be started. In another modified construction, the hose **130** and the valve **168** may be connected to the extension pipe **162**, but with this construction the closing of the valve must be delayed until after the spigots **116** are withdrawn from the bottles **12**.

It will be evident that the apparatus of the present invention makes it easy to fill a plurality of bottles to exactly the same level. Moreover, the quantity of liquid delivered to the bottles is accurately controlled. With the apparatus of the present invention, no trouble will be experienced with bottles which are insufficiently filled.

Unlike some filling systems, the present bottle filling apparatus does not involve the drawing of a vacuum in the bottles. The use of a vacuum has the disadvantage that the plastic bottles in common use will not withstand the vacuum but will collapse. Thus, the apparatus of the present invention may be used with any kind of bottles, whether made of plastic, glass or any other material.

The present invention is capable of filling the bottles rapidly as well as accurately. Moreover, the apparatus may be operated with a high degree of facility.

Various other modifications, alternative constructions and equivalents may be employed without departing from the true spirit and scope of the invention, as exemplified in the foregoing description and defined in the following claims.

I claim:

1. An apparatus for filling a plurality of containers simultaneously,

said apparatus comprising a storage tank for holding a supply of liquid with which the containers are to be filled,

an elevated measuring tank having a top opening communicating with the atmosphere,

said measuring tank having a transparent wall,

a fill pipe extending downwardly into said measuring tank,

said fill pipe having its lower end at the level to which said measuring tank is to be filled,

a centrifugal pump,

conduit means connecting said pump between said storage tank and the upper end of said fill pipe,

means for energizing said pump until the liquid rises in said measuring tank to a level substantially above the lower end of said fill pipe,

the liquid being effective upon deenergization of said pump to flow back through said pump by siphonic action from said measuring tank into said storage tank until the level of the liquid in said measuring tank drops to the lower end of said fill pipe,

a manifold pipe located substantially below the level of said measuring tank,

a three-way valve adjacent said manifold pipe and connected thereto,

a conduit extending between the lower end of said measuring tank and said three-way valve,

a filler frame movable vertically relative to the bottles to be filled,

a plurality of filler spigots extending downwardly from said frame for insertion into the containers to be filled,

a plurality of flexible tubes connected between said spigots and said manifold pipe,

said three-way valve being movable between first and second positions,

said valve having means effective in said first position for connecting the manifold pipe to the conduit leading to the lower end of said measuring tank whereby the liquid will flow from said measuring tank through said manifold pipe and said spigots into the containers to fill the containers to a predetermined level,

said spigots extending below said predetermined level,

said manifold pipe being at a substantially lower elevation than said predetermined level whereby liquid will be trapped in said manifold pipe so that the levels of the liquid in the containers will be equalized by siphonic action after the flow of the liquid from the measuring tank to the containers has been completed,

and an enlarged stand pipe having its lower end connected to said three-way valve,

said stand pipe having its upper end open to the atmosphere and having its lower end below said predetermined level,

said valve being effective in said second position to connect said manifold pipe to the lower end of said stand pipe while disconnecting said manifold pipe from the conduit leading to said measuring tank,

said stand pipe being effective to receive liquid from said flexible tubes when said spigots are withdrawn upwardly from the filled containers in preparation for insertion of said spigots into a new set of empty containers.

2. In an apparatus for filling a plurality of containers simultaneously,

the combination comprising an elevated measuring tank,

selectively operable means for filling said tank to a first level,

said tank having its upper end in communication with the atmosphere,

a conduit connected to the lower end of said measuring tank and extending downwardly therefrom,

a manifold disposed substantially below the level of the lower end of said measuring tank,

a filler frame movable vertically relative to the containers to be filled,

a plurality of spigots extending downwardly from said frame for insertion into the containers to be filled,

a plurality of flexible tubes connected between said spigots and said manifold,
said spigots and said tubes being substantially below the level of the lower end of said tank,
a master valve for connecting said conduit to said manifold whereby the liquid will flow from said measuring tank solely by gravity through said manifold and said spigots into the containers to fill the containers to a second level which is substantially lower than said first level,
said manifold being at a lower elevation than said second level whereby said manifold will remain filled with liquid so that the levels of the liquid in said containers will equalize by siphonic action after the flow from said measuring tank has been completed,
a stand pipe having its lower end below said second level,
the upper end of said stand pipe being in communication with the atmosphere,
and means connecting the lower end of said stand pipe directly to said manifold whereby said stand pipe will receive said liquid from said flexible tubes when said spigots are withdrawn upwardly from the filled containers.

3. In an apparatus for measuring out liquid,
the combination comprising a storage tank for holding a supply of the liquid,
an elevated measuring tank disposed substantially above the level of said storage tank,
a dispensing device connected to the lower end of said tank for selectively emptying the liquid therefrom,
said measuring tank having its upper end open to the atmosphere,
a fill pipe extending downwardly into said measuring tank,
the lower end of said fill pipe extending to and terminating at a level substantially above the lower end of said measuring tank,
an adjusting device for moving said fill pipe upwardly and downwardly to adjust the level of the lower end thereof,
a selectively operable centrifugal pump,
a first conduit connected between said storage tank and the suction side of said pump,
a second conduit connected between the discharge side of said pump and the upper end of said fill pipe,
said pump being adapted to be actuated until said measuring tank is filled to a level substantially above the lower end of said fill pipe,
the liquid being effective upon the stopping of said pump to flow back through said pump from said measuring tank to said storage tank by siphonic action until the liquid level in said measuring tank drops to the lower end of said fill pipe so as to expose the lower end of said fill pipe to the atmosphere,
whereby the final level of the liquid in said measuring tank is precisely determined by the adjusted level of the lower end of said fill pipe.

4. In an apparatus for measuring out liquid,
the combination comprising an elevated measuring tank,
said measuring tank having its upper end communicating with the atmosphere,
a dispensing device connected to the lower end of said tank for selectively emptying the liquid therefrom,
a fill pipe extending downwardly into said measuring tank,
said fill pipe having its lower end extending to and terminating at a level substantially above the lower end of said measuring tank,
an adjusting device for moving said fill pipe upwardly and downwardly to adjust the lower end thereof to the level to which said measuring tank is to be filled,
a conduit extending upwardly to the upper end of said fill pipe from a level below the lower end of said fill pipe,
a supply source of liquid,
and selectively operable means for delivering liquid under pressure from said supply source to the lower end of said conduit to force the liquid upwardly through said conduit and downwardly through said fill pipe into said measuring tank,
said means being operable to fill said measuring tank with liquid to a level substantially above the lower end of said fill pipe,
said means thereupon being operable to lower the pressure at the lower end of said conduit to atmospheric pressure whereupon the liquid will flow back through said conduit from said measuring tank by siphonic action until the liquid in said measuring tank drops to the level of the lower end of said fill pipe so as to expose the lower end of said fill pipe to the atmosphere,
whereby the final level of the liquid in said measuring tank is precisely determined by the adjusted level of the lower end of said fill pipe.

5. In an apparatus for filling a plurality of containers or the like simultaneously,
the combination comprising an elevated measuring tank,
selectively operable means for filling said tank with a predetermined quantity of liquid,
said tank having its upper end in communication with the atmosphere,
a conduit connected to the lower end of said measuring tank and extending downwardly therefrom,
a manifold disposed substantially below the level of the lower end of said measuring tank,
a filler member movable vertically relative to the containers to be filled,
a plurality of spigots extending downwardly from said filler member for insertion into the containers to be filled,
a plurality of tubes connected between said spigots and said manifold,
said spigots and said tubes being substantially below the level of the lower end of said tank,
and a master valve for connecting said conduit to said manifold whereby the liquid will flow from said measuring tank solely by gravity through said manifold and said spigots into the containers to fill the containers to a predetermined level which is substantially below the level of the lower end of said measuring rank,
said manifold being lower than said predetermined level whereby said manifold will remain filled with liquid so that the levels of the liquid in said containers will equalize by siphonic action.

6. In an apparatus for filling a plurality of containers simultaneously,
the combination comprising an elevated measuring tank,
means for filling said tank with a predetermined quantity of liquid,
a conduit connected to said tank and extending downwardly therefrom,
a manifold disposed substantially below the level of said measuring tank,
a filler member,
a plurality of spigots extending downwardly from said member for insertion into the containers to be filled,
a plurality of tubes connected between said spigots and said manifold,
a stand pipe,
and valve means operable between first and second settings,
said valve means being operative in said first setting to connect said conduit to said manifold whereby the liquid will flow from said measuring tank through said valve means and said manifold into the containers to fill the containers to a predetermined level,

said manifold being lower than said predetermined level whereby said manifold will remain filled with liquid so that the levels of the liquid in said containers will equalize by siphonic action,

said valve means being operative in said second setting to disconnect said manifold from said conduit while connecting said manifold to the lower end of said stand pipe,

whereby said stand pipe will receive liquid from said tubes when said spigots are withdrawn upwardly from the filled containers.

7. In an apparatus for filling a plurality of containers or the like simultaneously,

the combination comprising an elevated measuring tank,

means for filling said tank with a predetermined quantity of liquid,

a conduit connected to said tank and extending downwardly therefrom,

a manifold disposed substantially below the level of said measuring tank,

a filler member,

a plurality of spigots extending downwardly from said member for insertion into the containers to be filled,

a plurality of tubes connected between said spigots and said manifold,

a three-way valve connected to said manifold,

the lower end of said conduit being connected to said three-way valve,

and a stand pipe connected to said three-way valve,

said three-way valve being operable between first and second positions,

said valve being operative in said first position to connect said manifold to said conduit whereby the liquid will flow from said measuring tank through said valve and said spigots into the containers to fill the same to a predetermined level,

said manifold being lower than said predetermined level whereby the levels of the liquid in said containers will equalize by siphonic action,

said valve being operative in said second position to disconnect said manifold from said conduit while connecting said stand pipe to said manifold whereby said stand pipe will receive liquid from said tubes when said spigots are withdrawn upwardly from the filled containers.

8. An apparatus for filling a plurality of containers simultaneously,

said apparatus comprising a supply tank for holding a supply of liquid with which the containers are to be filled,

an elevated measuring tank having a top opening communicating with the atmosphere,

a fill pipe extending downwardly into said measuring tank,

said fill pipe having its lower end at the level to which said measuring tank is to be filled,

a centrifugal pump,

conduit means connecting said pump between said supply tank and the upper end of said fill pipe,

means for energizing said pump until the liquid rises in said measuring tank to a level substantially above the lower end of said fill pipe,

the liquid being effective upon deenergization of said pump to flow back through said pump by siphonic action from said measuring tank into said supply tank until the level of the liquid in said measuring tank drops to the lower end of said fill pipe,

a manifold pipe located substantially below the level of said measuring tank,

valve means connected to said manifold pipe,

a conduit extending between the lower end of said measuring tank and said valve means,

a filler member movable vertically relative to the containers to be filled,

a plurality of filler spigots extending downwardly from said filler member for insertion into the containers to be filled,

a plurality of tubes connected between said spigots and said manifold pipe,

said valve means being operable between first and second settings,

said valve means being operative in said first setting for connecting the manifold pipe to said conduit whereby the liquid will flow from said measuring tank through said manifold pipe and said spigots into the containers to fill the same to a predetermined level,

said manifold pipe being substantially lower than said predetermined level whereby liquid will be trapped in said manifold pipe so that the levels of the liquid in the containers will be equalized by siphonic action after the flow of the liquid from the measuring tank to the containers has been completed,

and a stand pipe having its lower end connected to said valve means,

said stand pipe having its upper end open to the atmosphere and its lower end below said predetermined level,

said valve means being operative in said second setting to connect said manifold pipe to the lower end of said stand pipe while disconnecting said manifold pipe from said conduit,

said stand pipe being effective to receive liquid from said tubes when said spigots are withdrawn upwardly from the filled containers.

9. In an apparatus for filling a plurality of containers simultaneously,

the combination comprising an elevated measuring tank,

selectively operable means for filling said tank with a predetermined quantity of liquid,

said tank having its upper end in communication with the atmosphere,

a conduit connected to the lower end of said measuring tank and extending downwardly therefrom,

a manifold disposed substantially below the level of the lower end of said measuring tank,

a filler member movable vertically relative to the containers to be filled,

a plurality of spigots extending downwardly from said filler member for insertion into the containers to be filled,

a plurality of tubes connected between said spigots and said manifold,

said spigots and said tubes being substantially below the level of the lower end of said measuring tank,

a master valve for connecting said conduit to said manifold whereby the liquid will flow from said measuring tank solely by gravity through said manifold and said spigots into the containers to fill the containers to a predetermined level which is substantially below the lower end of said measuring tank,

said manifold being lower than said predetermined level,

whereby said manifold will remain filled with liquid so that the levels of the liquid in said containers will equalize by siphonic action,

and an enlarged stand pipe having its lower end connected directly to said manifold for receiving the liquid from said tubes when said spigots are withdrawn upwardly from the filled containers, said stand pipe having its upper end in a communication with the atmosphere.

10. An apparatus for filling a plurality of containers simultaneously,

said apparatus comprising an elevated measuring tank having its upper end communicating with the atmosphere,

a fill pipe extending downwardly into said measuring tank to the level to which said measuring tank is to be filled,

a supply source of liquid,

a first conduit extending upwardly from said supply source to the upper end of said fill pipe,

means for forcing the liquid upwardly under pressure through said first conduit until said measuring tank is filled to a level substantially above the lower end of said fill pipe,

said means being operable to relieve said pressure and provide for backflow of the liquid from said measuring tank through said first conduit by siphonic action until the liquid level in said measuring tank drops to the lower end of said fill pipe so as to expose the lower end of said fill pipe to the atmosphere,

a second conduit connected to said measuring tank and extending downwardly therefrom,

a manifold disposed substantially below the level of said measuring tank,

a filler member,

a plurality of spigots extending downwardly from said filler member for insertion into the containers to be filled,

a plurality of tubes connected between said spigots and said manifold,

valve means for connecting said second conduit to said manifold whereby the liquid will flow from said measuring tank through said manifold and said spigots into the containers to fill the same to a predetermined level,

said manifold being below said predetermined level whereby said manifold will remain filled with liquid so that the levels of the liquid in said containers will equalize by siphonic action,

an enlarged stand pipe having its lower end below said predetermined level,

and means for connecting the lower end of said stand pipe to said manifold for receiving liquid from said tubes when said spigots are withdrawn upwardly from the filled containers.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,311,141 March 28, 1967

Chauncey M. Bell

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

In the heading to the printed specification, line 3, for "105 W. Kinzie," read -- 1050 W. Kinzie, --; column 2, line 58, after "it" insert -- is --.

Signed and sealed this 7th day of November 1967.

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents