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[54] **FLUIDIC FILLING MACHINE**
11 Claims, 7 Drawing Figs.

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137/81.5, 141/141, 141/170, 141/186
[51] **Int. Cl.** **B65b 43/42**
[50] **Field of Search** 137/81.5,
(Inquired); 141/131, 169, 170, 183, 186, 248,
236, 284, 256, 140, 141, 142, 143

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ABSTRACT: A filling machine having a conveyor for transporting at least two rows of the containers to be filled with a liquid through the filling station of the machine at a constant speed. A positive displacement rotary pump operating at a speed synchronized with the speed of the conveyor continuously pumps a steady, constant volume, flow of the liquid to a fluidic valve which has a pair of outlets, one located over each row. A control means acting responsive to container position indicators shifts the flow from one of the outlets to the other so that successive containers in the two rows are filled alternately. A second fluidic valve having a pair of outlets connected in series with the first valve acts as a no-can no-fill mechanism to divert flow of the liquid away from the first valve if a container is absent from either of the rows.

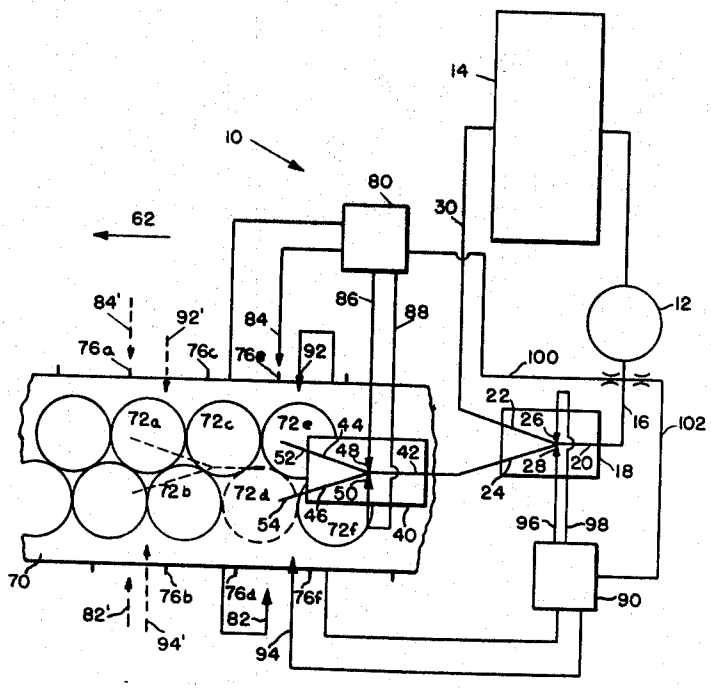


FIG. 1

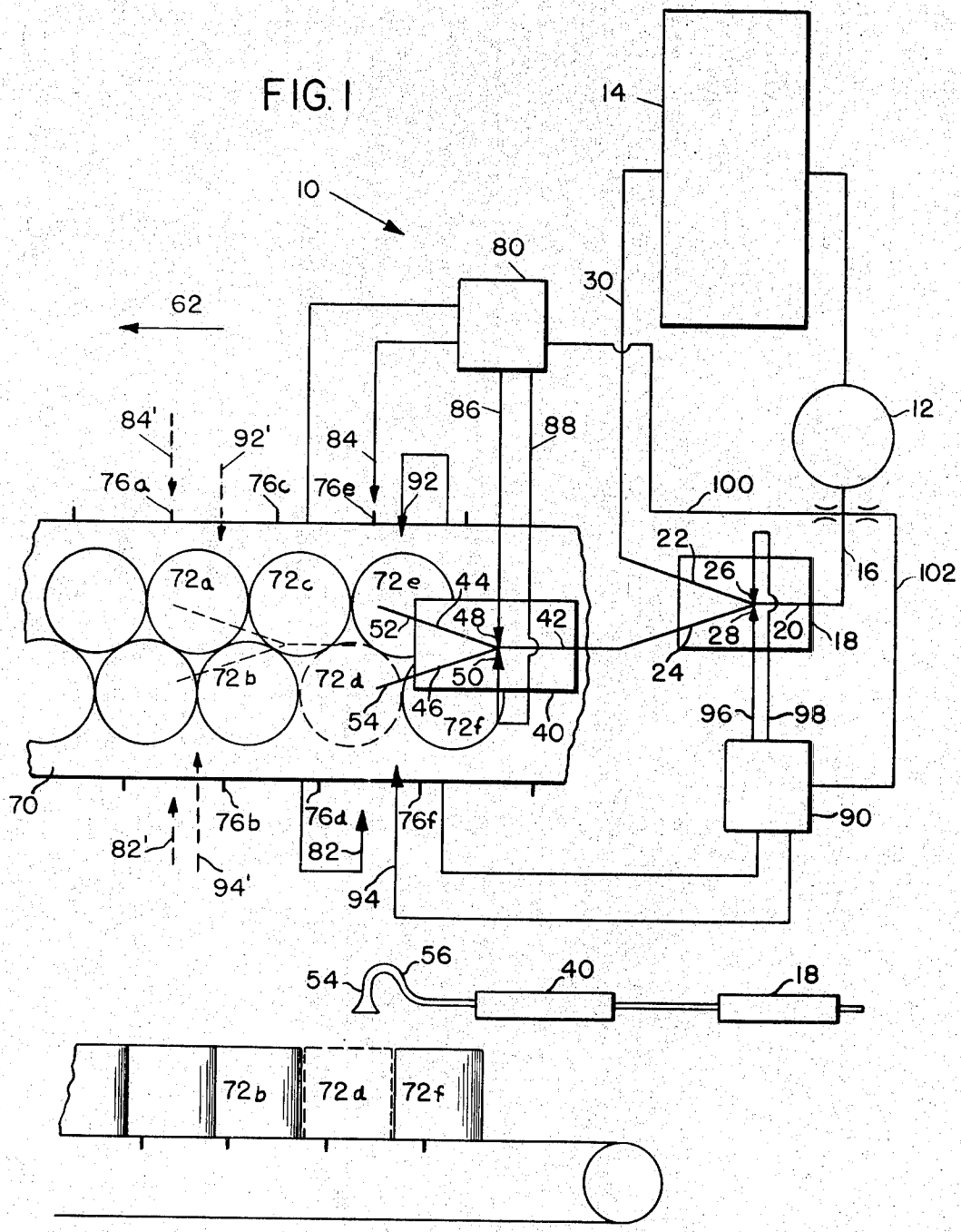


FIG. 2

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FIG. 3

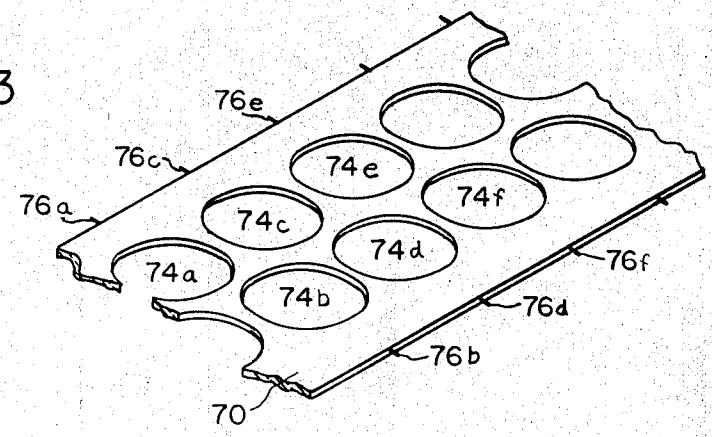


FIG. 4

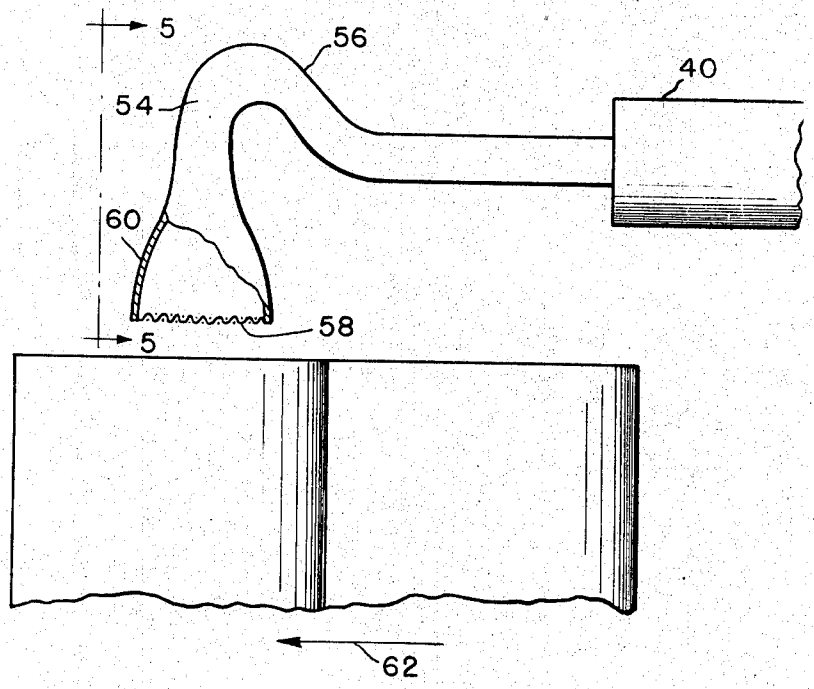
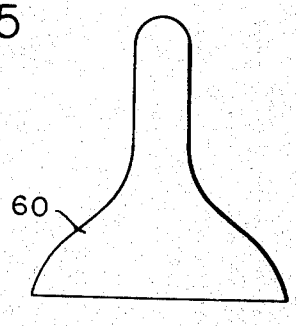


FIG. 5



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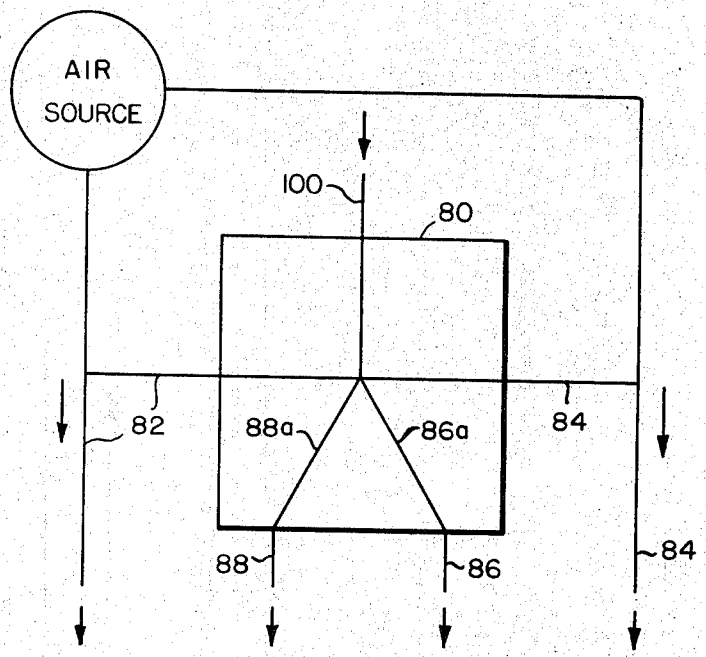


FIG. 6

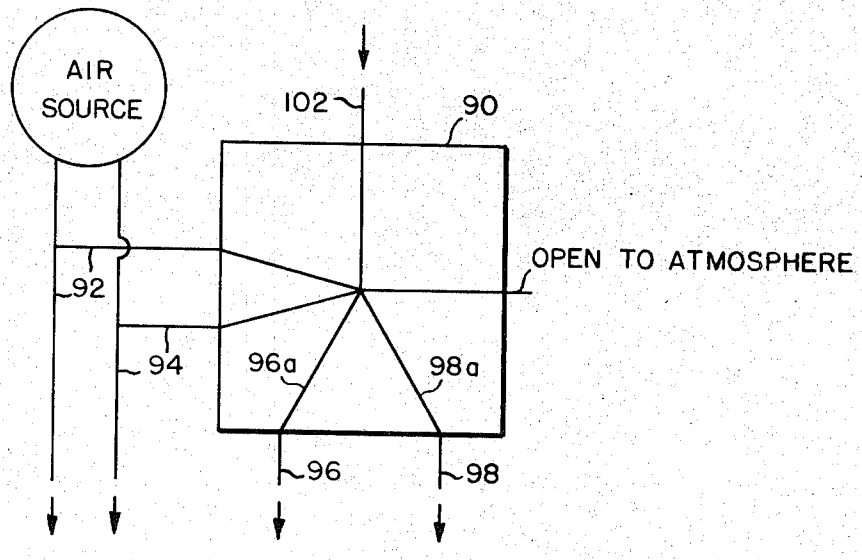


FIG. 7

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FLUIDIC FILLING MACHINE

The present invention relates generally to filling machines for filling empty containers with a liquid product as the empty containers are transported by a conveyor beneath a filling head. More specifically, the invention relates to filling machines which employ a flow divider to equally apportioned a continuous stream of liquid among a series of continuously moving, axially alined containers.

There are several methods of operating conveyor type filling machines. For example, a single file of containers can be transported beneath a stationary filling head. The linear travel of the containers is then stopped either by stopping the travel of the conveyor or stopping the movement of the containers with respect to the conveyor to locate empty containers beneath the filling head. Filling nozzles are then opened to fill a set of containers after which the filled containers are moved away and replaced by a second set of containers.

Another type of filling machine employs a filling head which moves substantially linearly at a speed synchronized with the linear speed of the conveyor. With this arrangement, the filling head tracks the container so that a stream of fluid can be directed into an empty container as they move through the filling station. In still another system, a continuous flow of fluid is directed through a stationary filling head. The flow through the filling head is interrupted by a deflector and recirculated to a reservoir until a container is moved into position beneath the filling head. At this time, the deflector is removed and fluid is allowed to issue from the filling head and into the moving container. If containers are alined rim to rim on the conveyor so that there is no space between containers, a continuous stream can issue from a nozzle which has a mechanical apparatus oscillating through the continuous flow to divert flow from the filled container to the next following empty container.

There are several drawbacks in these prior art systems. For example, filling rate is low if containers must be held in one position beneath a filling head during the actual filling operation. High production rates are achieved only by continuous operation. Accordingly, it is an object of my invention to provide a filling machine which fills containers as they are continuously transported beneath the filling head.

Filling heads which track the container are able to fill a file of continuously moving containers, but have limited production rates because the flow of product fluid through the filling head must stop as the filling head returns to a start position and alines with the next incoming container. Therefore, it is another object of my invention to provide a filling machine which fills a continuous file of incoming containers without stopping the flow of product fluid.

Inserting a foreign object into the stream of product fluid to divert flow from a filled container to the next following empty container may contaminate the product fluid. Also, any moving mechanical deflector, besides being subject to failure through wear, may provide areas where the product fluid, especially liquid foods, can accumulate and spoil if the apparatus is not easily cleaned. Therefore, a further object of my invention is to provide a filling mechanism which has no moving parts to clean and which diverts a steady stream of product fluid from a filled container to an empty container without opening or closing mechanical valves or inserting a deflector into the flow stream.

A still further object of my invention is to provide a filling machine which operates on at least two rows of empty containers, the flow of product fluid being alternated between empty containers of each row.

The relatively new science of fluidics has developed devices which control fluid flow without using mechanical parts to interrupt flow. Therefore, it is a further object of my invention to provide a filling machine which employs fluidic devices for both operation and control.

One fluidic device is a bistable fluid valve which utilizes a side control jet to deflect mainstream flow from one branch passage of the valve to another. The fluidic valve which is employed in the present invention to divide a continuous stream of fluid between two rows of containers is known as a bistable or flip-flop. This type of fluidic valve is generally Y-shaped having an inlet or base leg, two branch passages or outlet arms and a control jet inlet communicating with either side of the base leg adjacent the branch passages. In such a valve, a jet of control fluid applied to one or another of the control jet inlets diverts flow at the Y junction from the base leg to one or another of the branch passages. Flow continues down one branch passage even though the control jet is removed and until a control jet applied to the opposite side of the base leg flips the flow to another branch passage. Such a valve has no moving parts to wear and can shift a continuous flow from one leg to another at speeds limited only by the speed of sound through the fluid used. Therefore, another object of my invention is to provide a filling machine which uses a valve of the type described in association with suitable controls to shift flow of product fluid from one branch passage to the other to provide continuous filling of containers.

These and other objects, advantages and characterizing features of my invention will become more apparent upon the consideration of the following detailed description thereof in conjunction with the accompanying drawings depicting the same in which:

FIG. 1 is a schematic representation of the plan view of the filling machine of my invention;

FIG. 2 is a side elevation view of FIG. 1 with control elements removed for clarity of the drawing;

FIG. 3 is a perspective view of a portion of the conveyor belt;

FIG. 4 is an enlarged elevation view partly broken away of the diffuser nozzle;

FIG. 5 is a view taken along line 5–5 of FIG. 4;

FIG. 6 is a schematic representation of the fluidic control device 80; and

FIG. 7 is a schematic representation of fluidic control device 90.

The present invention can be characterized in one aspect thereof by the provision of two series connected bistable fluidic valves of the type described, the first of these valves operating as a no-can no-fill feature, the second valve having a pair of filling outlets and operating as a flow divider, a conveyor for carrying a double row of alined containers beneath the filling outlets, a positive displacement pump for continuously pumping liquid from a reservoir to the filling outlets wherein the linear travel of the conveyor is synchronized with the rotation of the pump, a control means for alternately switching the continuous flow from one of the filling outlets to the other to fill alternate ones of the containers, wherein the positive displacement pump is responsible for the overall fill of the containers and the second fluidic valve is responsible for the equal distribution of the fluid between the containers.

Referring now in detail to the drawings, FIG. 1 shows the filling machine of my invention generally designated at 10. The filling machine includes a positive displacement rotary pump 12 for pumping product liquid from reservoir 14 through line 16 to a valve or flow distributor 18. Valve 18 is a bistable fluidic valve of the type described having an inlet 20 and branch passages 22, 24. Valve 18 is further provided with a pair of control ports 26, 28 for directing flow down one branch passage 24 or 22 respectively. Flow down branch passage 22 recirculates the liquid product to reservoir 14 through a recirculating line 30 while flow down branch passage 24 will conduct the liquid product to a flow divider 40.

Flow divider 40 is also a bistable fluidic valve of the type described having an inlet 42, two branch passages 44, 46 and two control ports 48, 50 for shifting flow to either branch passages 46 and 44 respectively. Branch passages 44, 46 are each provided with a diffuser nozzle 52, 54 for purposes set out hereinbelow. To prevent the liquid product from running

by gravity from nozzles 52 and 54 valve 18 and flow divider 40 are disposed in a substantially horizontal plane (FIG. 2). The same result, however, can be achieved by disposing either or both of the valve 18 and flow divider 40 in a vertical or near vertical plane and the horizontal disposition is shown by way of example only. Nozzles 52 and 54 are in turn adapted to direct the flow of liquid product downward into an empty container carried beneath each nozzle. In this respect, each nozzle is goose-necked, having a portion 56 (FIG. 2), which extends above the liquid level in flow divider 40 to insure that the liquid product does not run by gravity from the flow divider. As shown in FIG. 4, each nozzle may also include a screen element 58 disposed across the nozzle opening so that the surface tension of the liquid adhering to screen 58 can be used to further insure that the liquid product will not drip from the nozzle. Furthermore, FIGS. 4 and 5 show that the diffuser portion 60 of each nozzle is oval having the short axis thereof lying generally parallel and the long axis thereof lying generally at right angles to the direction of conveyor travel indicated by arrow 62 for purposes set out herein below.

Filling machine 10 also includes a conveyor 70 for carrying a double row of containers 72*a*, *b*, *c*, etc. beneath nozzles 52 and 54 (FIG. 1) in the direction indicated by arrow 62. The speed of the conveyor is synchronized by any suitable mechanical, hydraulic or electronic means (not shown) with the rotation of the pump. The pump and conveyor speeds must be synchronized to insure that for every empty container 72 which passes beneath nozzles 52 and 54 an amount of liquid product is pumped which will just fill that container. For example, if two empty containers are filled with each pump revolution, it is obvious that the speed of the conveyor must be geared to the pump so that one container will pass beneath each nozzle (a total of two containers) for each revolution of the pump. In like manner, if two revolutions of the pump were needed to fill one container, it is obvious that the pump and conveyor must be geared so that one container will pass beneath each nozzle for every 4 revolutions of the pump.

Containers 72 are alined on conveyor 70 in two rows, one row passing beneath each nozzle. Liquid product passing through flow divider 40 is diverted from one branch passage 44 to the other 46 and this, in turn, causes the liquid to flow alternately from one nozzle 52 and then the other 54 so that the one container 72 in each row is filled during each cycle of operation. Thus, while the purpose of positive displacement pump 12 is to continuously pump a measured quantity of liquid product to the flow divider, the purpose of flow divider 40 is to continually divide this measured quantity of quantity of liquid equally between the double rows of containers 72.

The containers should be alined on the conveyor preferably rim to rim to avoid drippage onto the conveyor. Furthermore, it is preferred that one row of containers be linearly offset from the other to permit staggering the containers on the conveyor as shown in FIG. 1. Staggering the containers facilitates filling because with this arrangement a container in one row fills and passes from beneath one nozzle as the next empty container in the other row comes into filling position beneath the second nozzle. While this same arrangement can be achieved by making one or the other of nozzles 52, 54 longer than the other, it is preferred to stagger the containers in relation to nozzles 52 and 54 rather than stagger the nozzles in relation to the containers.

As stated hereinabove, each nozzle 52 and 54 is provided with an oval-shaped diffuser 60 with the short axis thereof parallel to the direction of conveyor travel. The oval shape provides substantially the same cross-sectional discharge area as a circular diffuser but allows diffuser 60 to locate its full flow area over the container being filled for a longer period of time than a circular diffuser of equal cross-sectional area. This in turn provides a safety factor to insure that sufficient time will be allowed for filling each container.

As stated hereinabove, flow divider 40 is provided with control ports 48, 50 for shifting flow from one branch passage 46 to the other 44. This shift must be accomplished whenever an empty container 72 is in position beneath that nozzle 52 or 54 to which flow is shifted so that approximately equal time is allocated for the flow of liquid product from each nozzle. The proper positioning of empty containers is insured in the present invention by having containers 72 positioned on conveyor 70 in set stations. Any suitable means can be used to located containers in set stations on the conveyor. For example, FIG. 3 shows a series of pockets 74*a*, *b*, *c*, etc., formal in the conveyor to receive and hold each container 72*a*, *b*, *c*, etc., respectively. The stations in each row are in turn represented by any station indicators. For example, a series of tabs 76*b*, *d*, *f*, etc. located on the right-hand edge of conveyor 70 can represent or correspond respectively to the stations holding containers 72*b*, *d*, *f*, etc., and another series of tabs 76*a*, *c*, *e*, etc. located on the left-hand edge of conveyor 70 can represent or correspond respectively to the stations holding containers 72*a*, *c*, *e*, etc.

A control device 80 which is operatively connected to flow divider 40 and activated by the passage of tabs 76 operates to flip the flow through flow divider 40 from one branch passage to another. Any suitable control device may be used for this purpose. For example, control device 80 as shown in FIG. 1 has one sensor or pick up 82 for indicating the presence or absence of tabs *b*, *d*, *f*, etc. and another sensor or pick up 84 for indicating the presence or absence of tabs 76*a*, *c*, *e*, etc. sensors 82 and 84 may be operated by any suitable means to produce an input signal to the control device 80 whenever a tab 76 is in registry with a sensor. However, for purposes set out hereinbelow, it is preferred that pick ups 82 and 84 operate pneumatically wherein they include a nozzle for discharging a stream of low pressure air into the path of travel of tabs 72. The input to control device 80, then, is the back pressure or shock wave created in the pick up by air impinging on the tabs when the tab and pick ups are in registry. The output signal from control device 80 responsive to this back pressure input is a jet of control fluid, which travels through control line 86 or 88 to the control inlet 48 or 50 respectively of flow divider 40. In this manner, for example, the registry of tabs 76 *a*, *c*, *e*, etc. with sensor 84 will apply an input signal to control device 80. Control device 80 acting responsive to this input will produce as an output signal, a jet of control fluid which travels through line 88 to control jet inlet 50. An input at inlet 50 will in turn flip the flow of product fluid through flow divider 40 to branch passage 48. In like respect, the registry of tabs 76 *b*, *d*, *f*, etc. with sensor 82 will apply an input signal to control device which then acts responsive to this input to produce an output applied through line 86 to control jet inlet 48. An input at inlet 48 will in turn flip the flow of product fluid through flow divider 40 to branch passage 46. In this manner, the flow of product fluid is shifted alternately from one branch passage to another to fill consecutively the containers 72 *a*, *b*, *c*, *d*, *e*, *f*, etc.

A second control device 90 is provided, which has a pair of sensors or pick ups 92 and 94 for indicating the presence or absence of containers on the conveyor belt. Pick ups 92 and 94 also may be operated by any suitable means to provide an input signal to control device 90 whenever a container is in registry with the pick up. However, it is preferred for purposes set out hereinbelow that pick ups 92 and 94 operate pneumatically wherein they include a nozzle for discharging a stream of low pressure air into the path of travel of containers. The input to control device 90 then is the back pressure or shock wave created in the pick up by the exhausting air impinging on the container when the container and pick up are in registry.

Control device 90 performs an OR-NOR function so that if a container is in registry with either pick up 92 or 94, the output from control device 90 is a jet of control fluid which passes through line 98 to control port 26 of flow distributor 18. An input of the control jet at control port 26 will in turn direct liquid product down branch passage 24 of flow distributor 18 and into flow divider 40. However, if neither pick up is in registry with a container, the output jet of control device 90 is directed through line 96 to distributor control port 28 which

will in turn flip the flow of liquid product to branch passage 22, through line 30 and back to reservoir 14. Thus, flow distributor 18 and control device 90 cooperate to provide a no-can no-fill mechanism to divert flow from flow divider 40 whenever a container is absent from the conveyor.

In the preferred embodiment of my invention control devices 80 and 90 are also fluidic devices so that all filling operations are controlled and operated by a fluidic system. For example, the function of control device 80 is suited to a bistable flip-flop valve and the function of control device 90 is suited to an OR-NOR valve, both types of fluidic valves being described in the Dec. 6, 1965issue of Product Engineering at page 68. In this respect, FIG. 6 shows a schematic representation of a bistable fluidic flip-flop valve as may be used for control device 80. This valve has an inlet line 100 for control fluid and a pair of outlets 86*a*,88*a*, connected to control lines 86 and 88 respectively. These control lines 86,88 as set out hereinabove are in turn connected to control inlets 48 and 50 of flow divider 40. As stated hereinabove, air from any suitable low pressure source is discharged through lines 82 and 84 at tabs 76. The back pressure or shock waves caused by the streams of air impinging on the tabs travel back through lines 82,84 and act as input jets to the fluidic device 80 to switch the flow of control fluid through the device from one outlet to another. For example, a back pressure at line 82 diverts the flow of control fluid to outlet 86*a* and control line 86 whereas the back pressure in line 84 switches the flow of control fluid to outlet 88*a* and control line 88.

FIG. 7 shows a schematic representation of an OR-NOR fluidic valve which may be used as control device 90. As shown in FIG. 7, the OR-NOR valve also has an inlet line 102 for control fluid and a pair of outlets 96*a*,98*a* connected respectively to lines 96,98. The OR-NOR valve is characterized in that one side of inlet 102 is open to atmosphere while the other side of inlet 102 is connected to both lines 92 and 94. With this arrangement, air from any suitable low pressure source discharged through lines 92,94 which impinges on a passing container will create a back pressure or shock wave in either line 92 or 94. Any input at either line 92 or 94 will in turn direct the flow of control fluid to outlet 98 and the control port 26 of flow distributor 18 whereas an absence of a back pressure in either lines 92 or 94 causes the flow of control fluid to switch to outlet 96 and control port 28 of the flow distributor. As set out hereinabove, an input at control port 26 will cause product liquid to flow to flow divider 40 whereas an input at control port 28 will cause product liquid to recirculate back to the reservoir through branch passage 22 and recirculating line 30. It should be appreciated that the absence of a back pressure in lines 92,94 occurs when no container 72 is in position to impede the stream of air so that control device 90 with flow distributor 18 provides a no-can no-fill mechanism which directs the flow of product liquid away from flow divider 40 whenever a container is absent on the conveyor.

Any suitable fluid such as air can be used as a control fluid and discharged into either control inlets 48, 50 or control ports 26, 28. However, in cases where the liquid product may be contaminated by mixing with the jet of control fluid, it is possible to use jets of product liquid for control. For example, liquid can be bled from line 16 through bleed lines 100 and 102 to control devices 80 and 90 respectively. Control devices 80 and 90 can then reinject the liquid bled from line 16 into control ports 26, 28, 48 and 50 to control the mainstream flow of liquid product through distributor 18 and flow divider 40.

While FIG. 1 shows filling machine 10 in position to begin the filling of container 72*e*, I shall describe the filling cycle, for purposes of illustration only, as beginning with the filling machine in position to begin the filling of container 72*a*. The relative positions of the flow divider and sensors with respect to conveyor 70 at this time are shown in phantom as indicated at 82', 84', 92' and 94'. With the apparatus in this position, the filling cycle begins with liquid from reservoir 14 being pumped by pump 12 through line 16, inlet 20, branch leg 24, inlet 42, branch leg 44, through diffuser nozzle 52 and into container 72*a*. Since the containers are staggered on the conveyor, container 72*b* moves beneath diffuser nozzle 54 before the filling cycle of container 72*a* is completed so that the filling of container 72*b* can begin immediately after container 72*a* is filled. As the conveyor moves bringing container 72*b* into filling position beneath diffuser nozzle 54, sensor 94 indicates to control device 90 that a container is in position for filling. Control device 90 acting responsive to this input signal applies a jet of control fluid through line 98 to control port 26. The input at port 26 will in turn cause the liquid to continue flowing down branch passage 24 and into flow divider 40. Flow divider 40 must now divert the liquid product to branch passage 46 and diffuser nozzle 54 to fill container 72*b*.

Diverting the flow of the liquid to branch passage 46 and diffuser nozzle 54 in order to fill container 72*b* is accomplished in the following manner. The linear movement of conveyor 70 in the direction indicated by arrow 62 causes station indicator 76*b* to come into registry with sensor 82. Sensor 82 then applies an input to control device 80 which in turn applies a jet of control fluid through line 86 to flow divider control port 48. This input signal at control port 48 in turn causes the liquid product flowing through flow divider 40 to flow down branch passage 46 through diffuser nozzle 54 and into container 72*b*. When container 72*b* is filled, container 72*c* has come into position beneath diffuser nozzle 52. Sensor 92 now indicates the presence of an empty container to control device 90 which in turn applies a jet of control fluid to control port 26 to direct product fluid through branch passage 24 to flow divider 40. Flow divider 40 must now divert product fluid to branch passage 44 and diffuser nozzle 52 to fill container 72*c*. Flow is diverted back through branch passage 44 and diffuser nozzle 52 into container 72*c* in the following manner. The moving conveyor causes left-hand station indicator 76*c* to come into registry with sensor 84. Sensor 84 retrieves a signal from the left-hand station indicator causing control device 80 to apply a jet of control fluid through line 88 to control port 50 of flow divider 40. An input at control port 50 in turn causes the liquid product to switch its flow from branch passage 46 to branch passage 44, and through diffuser nozzle 52 into container 72*c*.

Assume for the moment that the next container 72*d*, as represented by the broken line in FIG. 1, is missing from its position on the conveyor. The liquid product must now be diverted away from flow divider 40 to prevent liquid product from flowing from diffuser nozzle 54 and onto the conveyor belt. This is accomplished in the following manner. If container 72*d* is not in position, neither sensor 92 nor sensor 94 will apply a signal to control device 90. Sensor 94 will not receive a signal because the container is missing from position and sensor 92 will not retrieve a signal because container 72*e* has not reached the point where it will activate sensor 92. When neither sensor 92 nor sensor 94 apply a signal to control device 90, the control device is adapted to apply a jet of control fluid through line 96 to control port 28 of flow distributor 18. A signal at port 28 will in turn cause liquid product to flow down branch passage 22 and into line 30 for recirculation back to reservoir 14. This prevents the discharge of liquid from diffuser nozzle 54 whenever a container associated with this nozzle is missing from the alinement. In like manner, the discharge of liquid from diffuser nozzle 52 will be prevented whenever a container associated with this nozzle is missing from the alinement.

Now as conveyor 70 continues to travel bringing container 72*e* into position beneath diffuser nozzle 52 as shown in FIG. 1, sensor 92 will retrieve a signal from container 72*e* causing control device 90 to apply a jet of control fluid through line 98 to control port inlet 26 of flow divider 18. An input at control port 26 will in turn reestablish the flow of product liquid down branch passage 24 of distributor 18 in a manner as stated hereinabove. Furthermore, as container 72*e* comes into filling position, left-hand station indicator 76*e* registers with sensor 84 causing the sensor to apply a control signal to control device 80. Acting responsive to this signal, control device 80

will in turn apply a jet of control fluid through line **88** to control port **50** of flow divider **40** to reestablish the flow of liquid product down passage **44** in the manner described hereinabove.

In this manner of operation, positive displacement pump **12** continuously pumps liquid through valves **18** and **40** while flow divider **40** continually switches flow from one branch passage **44** to the other **46** to fill empty containers passing beneath nozzles **52** and **54** respectively. If the container does not appear beneath one of the nozzles, distributor valve **18** will cause the product liquid to flow down branch passage **22** to recirculate back to reservoir **14**.

Thus, it will be appreciated that the present invention accomplishes its intended objects providing a filling machine which can continuously fill a double row of conveyor transported containers without interrupting the flow of liquid. Using fluidic valves to switch flow from one row of containers to another eliminates the need for on-off valves and greatly eliminates the number of moving parts in direct contact with the liquid product. While the present invention describes a single unit for filling a double row of containers, it can be appreciated that several such units, each comprising a pump, a flow distributor and a flow divider, can be connected in parallel to a common reservoir to achieve higher rates of production.

While I have described a preferred embodiment of my invention, it will be readily apparent that other modifications can be made therein without changing the spirit and scope of the invention as set out in the appended claims. For example, while I have shown a pair of fluidic devices **18** and **40** connected in series it is possible to combine the function of these two devices in a single fluidic device, which would have one branch passage associated with each row of containers and a third branch passage for recirculating product fluid back to the reservoir when containers are missing from the double row alinement. Furthermore, in the embodiment described control devices **80** and **90** inject a continuous stream into one or another of the control ports **26, 28, 48** and **50**. However, other suitable fluidic devices can be used which only inject a short spurt into these control ports.

I claim:

1. Apparatus for filling containers with a liquid product comprising:

a. a conveyor for moving two rows of said containers at a uniform linear velocity;

b. a pump adapted to pump a stream of said liquid product at a uniform rate of flow proportional to the linear velocity of said conveyor;

c. a flow divider for filling containers on said conveyor with said liquid product, said flow divider comprising a bistable fluid valve having an inlet for receiving said stream of liquid product from said pump, at least two branch outlet passages for said liquid product, one being positioned over each of said rows of containers for directing said liquid product into said containers, and a control port communicating with each branch passage; and

d. control means operatively connected to said control ports and activated by movement of said conveyor through predetermined increments of linear travel for shifting flow of said liquid product from one of said branch outlet passages to another to fill successive containers in alternate ones of said rows.

2. Apparatus as set forth in claim **1** in which said control means comprises:

a. a bistable fluid control valve having an outlet communicating with each of said flow divider control ports, and an inlet; and

b. means for supplying control fluid to said control valve inlet, said control valve adapted to act responsive to movement of said conveyor through predetermined increments of linear travel to direct a jet of said control fluid through one or another of said control valve outlets to one or another of said flow divider control ports wherein a jet input of control fluid at one or another of said flow divider control ports shifts flow of said product fluid from one flow divider branch passage to another.

3. Apparatus as set forth in claim **1** comprising:

a. spaced indicators carried by said conveyor through a path of travel, the movement of said indicators past a fixed point defining increments of linear travel of said conveyor; and

b. gas discharge means communicating with said control means for directing a stream of free flowing gas into the path of travel of said indicators, said stream of gas impinging on passing indicators to creating a back pressure in said discharge means and control means to activate said control means.

4. Apparatus for filling containers as set forth in claim **1** in which said conveyor is provided with means for maintaining each container on said conveyor at predetermined positions as said containers are transported beneath said branch outlet passages.

5. Apparatus as set forth in claim **4** in which said rows and the containers in said rows are maintained in a rim-to-rim alinement on said conveyor.

6. Apparatus for filling containers as set forth in claim **1** further comprising a no-can no-fill mechanism interposed between said pump and said flow divider, said mechanism comprising:

a. a flow distributor comprising a bistable fluid valve having an inlet adapted to receive said stream of liquid product from said pump, a first outlet communicating with said flow divider inlet and a second outlet directing said stream of liquid product away from said flow divider inlet; and

b. flow distributor control means operatively connected to said flow distributor and activated by the presence of a container beneath said branch outlets for directing the flow of said liquid product through said flow distributor first outlet and into said flow divider inlet and said flow distributor control means being activated by the absence of containers beneath said branch outlet passages for directing the flow of said liquid product through said flow distributor second outlet.

7. Apparatus for filling containers as set forth in claim **6** in which said flow distributor control means comprises:

a. a bistable fluid control valve having a first exhaust associated with said flow distributor first outlet and a second exhaust;

b. means for supplying a control fluid to said fluid control valve; and

c. means communicating with said fluid control valve for directing a stream of free flowing gas into the path of travel of said containers, said stream of gas impinging on passing containers to create a back pressure input to said fluid control valve, said fluid control valve acting responsive to said back pressure input to direct a jet of said control fluid through said first exhaust causing liquid product to flow through said flow distributor first outlet and into said flow divider inlet.

8. Apparatus for filling containers as set forth in claim **7** in which said control fluid is liquid bled from said product liquid at a point upstream from said flow divider.

9. Apparatus for filling containers as set forth in claim **6** in which said flow divider and flow distributor are disposed to prevent said liquid product from running by gravity from said discharge outlets.

10. Apparatus for filling containers as set forth in claim **9** in which said flow divider and flow distributor are disposed in a substantially horizontal plane, said branch outlet passages being downward turned to direct said liquid product downwardly into said containers.

11. Apparatus for filling containers with a liquid product comprising:

a. a container support and moving means for continuously moving at least two rows of said containers through a path of travel;

b. a pump for pumping a steady stream of said liquid product at a uniform rate of flow proportional to the velocity of said container support and moving means;

c. a bi-stable fluid flip-flop valve having an inlet receiving said stream of liquid product from said pump and at least two branch outlet passages, one branch passage being adapted to direct said liquid product into each row of moving containers; and

d. control means having an input responsive to travel of said container support means through predetermined increments of travel and an output communicating with siad bi-stable fluid valve for flipping flow of said stream of liquid product from one branch passage of said bi-stable fluid valve to another to fill successive containers in alternate rows responsive to movement of said container support means through said predetermined increments of travel.