

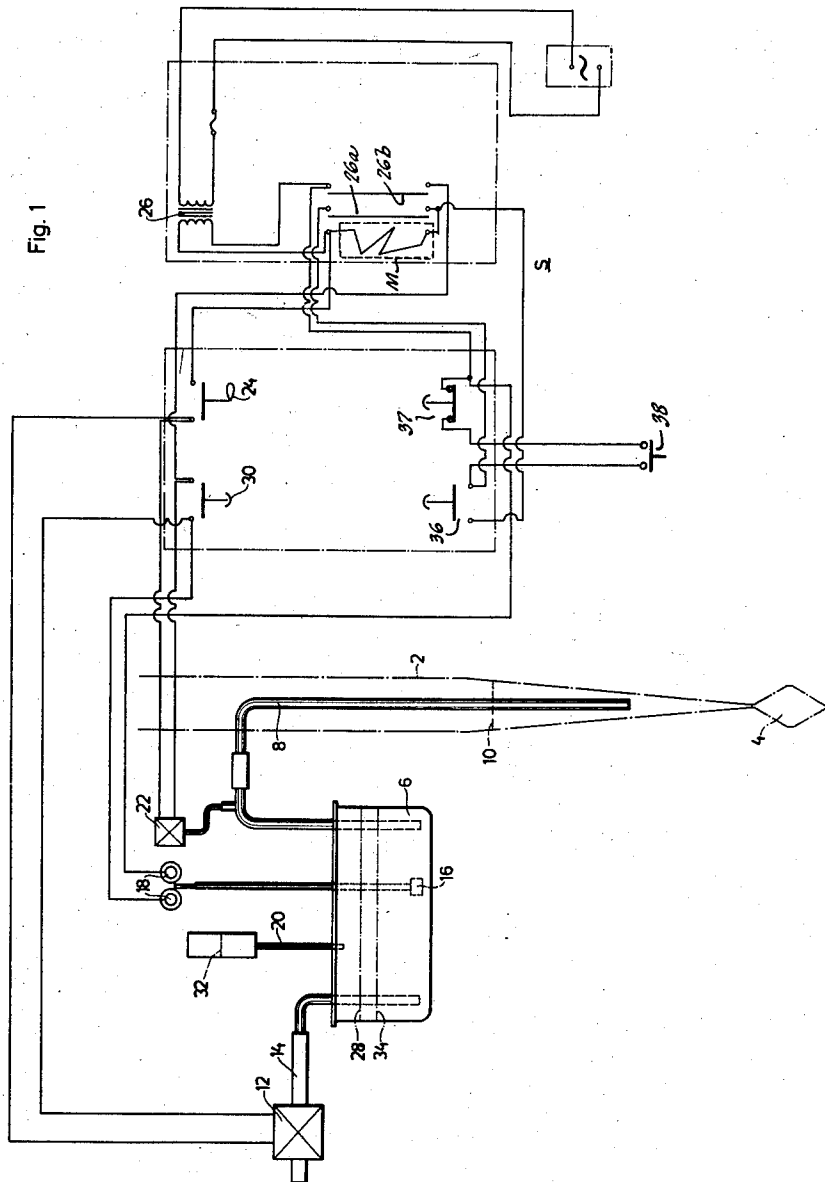
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A LIQUID DURING THEIR MANUFACTURE

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2 Sheets-Sheet 1



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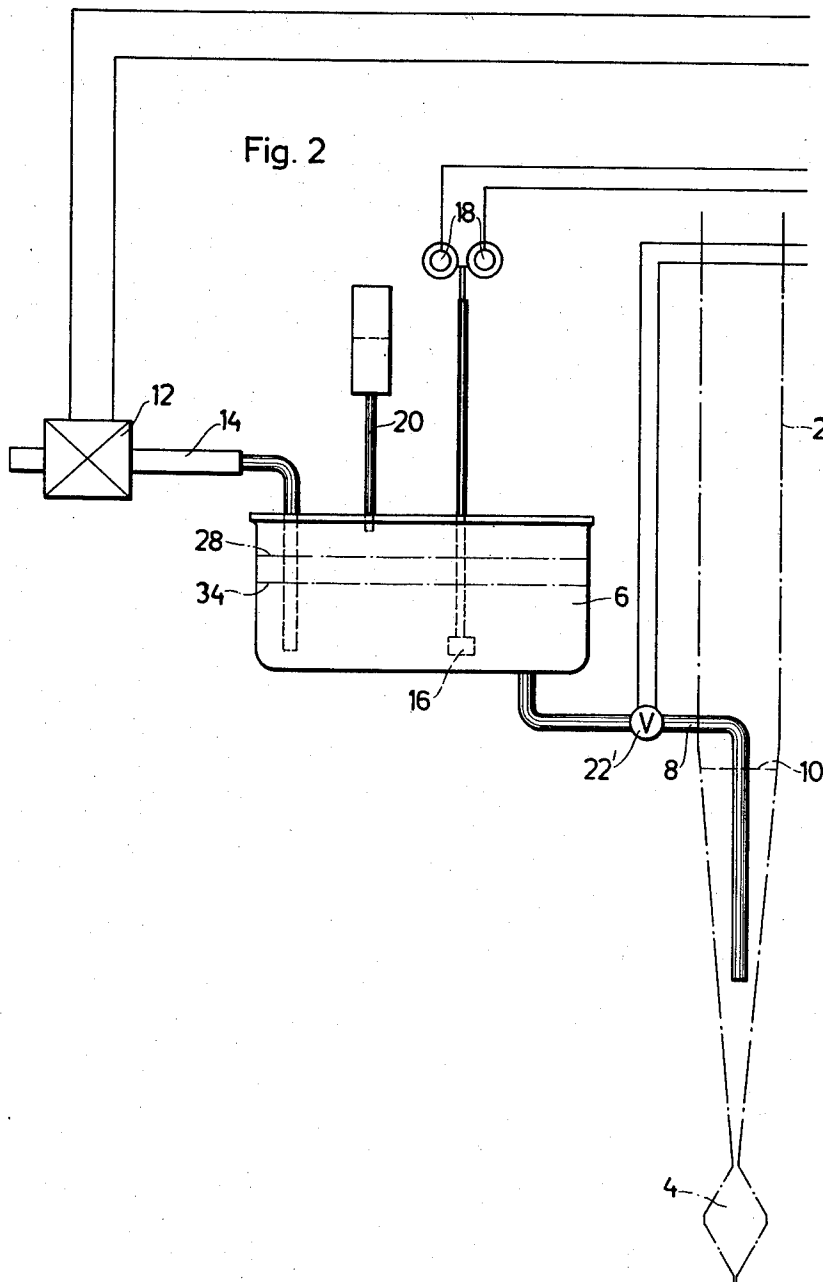
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DEVICE FOR CONTINUOUS FILLING OF PACKAGES WITH A LIQUID DURING THEIR MANUFACTURE

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7 Claims. (Cl. 53—63)

This invention relates to a device for continuous packing of a liquid in containers during the continuous manufacture of the containers from a tube of a packing material, having the property of being heat sealable, by flattening and sealing said tube at equidistant zones transverse to the longitudinal direction of said tube. Packing machines of this kind have been previously disclosed e. g. in United States patent application Serial No. 263,358 filed December 26, 1951, now Patent No. 2,832,271. In another United States patent application, Serial No. 288,639 filed May 19, 1952, now U. S. Patent No. 2,687,740 granted August 31, 1954, there has been suggested a device for the continuous supply of liquid to packing machines of the type above referred to where part of the control means must be located inside the tube from which the packages are being manufactured.

The main object of the present invention is to provide a device in which all controlling means are located outside of the tube from which the packages are being made so that only a supply pipe has to be inserted into the same, thereby providing for easier supervision and control and better safety of the construction, particularly in machines for the manufacture of smaller containers since the dimensions of the controlling means do not have to be limited by the small cross section of the tube from which the packages are made.

The new filling device according to the invention comprises a supply line or pipe for the liquid to be packed extending down into the tube from which the packages are being made, a levelling tank being provided in said supply line or pipe outside of said tube, the levelling tank being in such relation to the surrounding atmosphere that the atmospheric pressure is prevalent in the tank above the liquid level normally maintained therein, and a control device actuated by pressure variations being provided in the levelling tank below the liquid level, thus being influenced only by variations in liquid level in said tank, for regulating the supply of liquid to said levelling tank at the same rate as liquid is fed from said tank to the packages under manufacture.

The supply line from the levelling tank to the packages under manufacture, may comprise a pipe, applied to the bottom of the levelling tank and equipped with a magnetic valve, the energizing circuit of which is connected to the circuit, that furnishes power to the drive motor of the packing machine.

According to another embodiment the supply line is made like a siphon, in the top part of which there is located an air valve, which in the same manner is regulated by an electric circuit, connected to the driving circuit for the motor of the packing machine, in such a manner, that the air valve will be opened, when the electric current to the drive motor is cut off. When using such a siphon arrangement, a riser is preferably provided in the levelling tank, so that when starting the machine, a sufficient quantity of liquid can be supplied to the levelling tank, so that the liquid in the riser

can reach a level higher than the top bend of the siphon, and thereby start the siphoning action.

The control device for regulating the supply of the liquid to the levelling tank may suitably consist of a manometer or similar instrument, sensitive to pressure variations, in combination with a toggle switch, for example a mercury switch or the like, which at a certain lower liquid level in the levelling tank would close, and at a predetermined somewhat higher level would open the energizing circuit to a feed pump or a magnetic valve in the supply line to the levelling tank respectively.

The invention will hereinafter be described more fully with reference to the accompanying drawings, which diagrammatically illustrate the invention.

On the drawings,

Fig. 1 shows a device according to the invention being a siphon between the levelling tank and the tube of packing material and further a schematic drawing for the electrical connections.

Fig. 2 shows a modified embodiment in which the feeding line between the levelling tank and the packing tube is made as a bottom discharge pipe from the levelling tank, while the electrical connections are mainly the same, as those shown in Fig. 1.

On the drawings, 2 signifies a tube, from which a series of integral packages 4 are made, on the drawing shown as tetrahedrons. Outside of the tube there is located a levelling tank 6, from which a discharge pipe 8 runs into the tube, below the liquid level 10 to be maintained in said tube during the run of the machine. The pipe 8 as illustrated in Fig. 1 passes through the wedge-shaped opening between the edges of a paper band, which is bent to form the tube 2.

On the drawing, 12 signifies a feed pump or a magnetic valve in the supply line to the levelling tank 6, and the pipe 14 has its mouth at the bottom of the levelling tank, in order as far as possible to prevent foam forming in this tank, when running the machine continuously. In the levelling tank 6 there is also provided a manometer 16 or the like, actuating a mercury switch 18 or similar means, for stopping or starting the feed pump 12 or for closing and opening the magnetic valve, in a manner which will be further described below. Finally, the levelling tank is equipped with a riser 20 open to the atmosphere and suitably equipped with a porous cap or the like, to prevent impurities from entering the levelling tank 6.

In the embodiment shown in Fig. 1 the discharge pipe 8 is indicated as a siphon, in the top bend of which there is provided an air-valve 22 which in this case constitutes a magnetic valve, connected to the same circuit as the drive motor M of the packing machine, in such a manner, that the air valve 22 is open, when the current is shut off and at the same time the feed pump or the magnetic valve 12 will be put out of action. Switch 36 is provided for starting the motor M which forms and drives the packaging tube 2 to begin operation and switch 37 is provided for stopping the motor M to end the operation. Switch 38 is in the nature of a safety switch which is closed automatically when a paper strip, from which the tube 2 is to be formed, is inserted in the machine. Switch 38 remains closed during normal operation and is opened to stop motor M and cut off the liquid only when the strip breaks or runs out in the machine.

The embodiment shown in Fig. 2, differs from the embodiment as described above, mainly in that the discharge pipe 8 from the levelling tank 6 is made as a bottom discharge pipe and is equipped with a magnetic valve 22', which functions for the same purpose as the air valve 22, as shown in Fig. 1. S signifies a schematic drawing of the electrical connections.

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The arrangement as illustrated in Fig. 1 works in the following manner: When starting the machine a paper strip is first inserted into the machine and such strip automatically closes safety switch 38. The starting switch 36 is now closed by the operator, and consequently the relay contacts 26a, 26b close and thus serve to start motor M. The switch 24 is now closed by the operator. Hereby the feed pump 12 is started, or the magnetic valve 12 opened respectively, and is kept in this position by means of relay 26 to supply liquid to the levelling tank 6 through the pipe 14, until the liquid in this tank has reached the level 28, when the supply of liquid is automatically stopped. The pressure switch 30 is now closed by the operator thus short-circuiting switch 24, whereby the feed pump 12 or the magnetic valve 12, respectively, again start to function, so that the level of the liquid in the levelling tank continues to rise. The pressure switch 30 which is so connected that it does not function unless the packing machine is running, is kept connected until the liquid has risen in the riser to level 32, above the top bend of the siphon, when the pressure switch 30 can be released so that it disconnects. Liquid is then sucked into the packages under manufacture through the siphon 8.

When the push button type pressure switch 30 is released, the supply of liquid to the levelling tank is shut off, and accordingly as liquid is fed to the machine, the liquid level in the tank sinks to levels 34, in which position the feed pump 12 or the magnetic valve 12 respectively is again influenced through the action of the manometer 16 and the mercury switch 18, so that liquid is again supplied to the levelling tank 6. The supply line 14 and the discharge line 8 are so proportioned, that a little more liquid is supplied through line 14, than is discharged through line 8. Consequently the rate-of-flow of liquid into the tank is not exactly the same as, but is substantially the same as the rate-of-flow of the liquid from the tank. On this account the liquid level in the levelling tank 6 is caused to rise slowly, until the level 28 is reached, when the supply to the levelling tank is again shut off through the influence of the manometer 16 and the mercury switch 18. Under running conditions the liquid level in the levelling tank 6 thus oscillates between the levels 28 and 34, the level difference of which can be made so small, that it does not influence the velocity through the pipe 8. Through suitable dimensioning of the pipe 8 and the choice of suitable level difference between the level 10 in the packages in the process of manufacture, on the one hand, and the liquid level in the levelling tank 6 on the other hand, a liquid supply can be obtained to the packages under manufacture, in such timing with the capacity of the packing machine, that the liquid level 10 can be practically kept constant. If the capacity of the packing machine should be changed, for example should be increased, the result will be, that the level in the packages under manufacture will sink, which will mean that the pressure height and thereby the liquid velocity in the pipe 8 will increase, and vice versa if the capacity is decreased. The arrangement thus implies, at the same time, an automatic regulating of the liquid supply, according to variations in the capacity of the packing machine.

In order to stop operation of the machine, switch 24 is opened by the operator and consequently valve 12 closes and air valve 22 opens. Liquid flow from tank 6 to pipe 8 now stops. The operator now opens the normally closed stopping switch 37 which causes relay contacts 26a, 26b to open and hence stop motor M.

The embodiment, shown in Fig. 2, functions principally in the same manner as the one shown in Fig. 1. Yet, when starting the arrangement shown in Fig. 2, it is not necessary to close the pressure switch 30 in order to bring the liquid to rise in the riser 20, instead the connection is such, that the magnetic valve 22' is kept closed until the level 28 in the levelling tank has been reached, whereafter the magnetic valve 22' is opened,

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and the continuous fluctuating process with periodical supply of liquid to the levelling tank starts.

What is claimed is:

1. A device for continuous supply of liquid material to packages during the continuous manufacture of the same by periodically transversely pressing together and sealing a travelling tube of flexible material, the distances between successive sealings being substantially equal, comprising a supply line for the liquid material extending down into said tube, a levelling tank provided in said supply line outside of said tube, the upper portion of said levelling tank above the level of the liquid material therein being in communication with the surrounding atmosphere and a control device actuated by pressure variations and disposed in the lower portion of said levelling tank below the level of the liquid material therein for regulating the supply of liquid material to said levelling tank at substantially the same rate as liquid material is fed from said tank to the packages under manufacture.

2. A device as claimed in claim 1, in which the supply line leading from the levelling tank into the tube of packing material is connected as a bottom outlet from said levelling tank for gravity flow of the liquid material into the tube, said supply line from said tank further being provided with a magnetic valve and means controlling energization of said valve in accordance with the operation of the driving machinery of the packing machine so that said magnetic valve is open when the machine is running but closes when the machine stops.

3. A device as claimed in claim 1 in which the supply line from said levelling tank to the packages under manufacture is designed as a siphon in the top bend of which there is provided an air valve, said air valve being governed by the driving machinery of the packing machine in such a way that it is closed when the packing machine is running but opens to the air when the packing machine stops, thereby letting air into said siphon so as to cut off the liquid flow through said siphon, said levelling tank further being provided with a riser, extending above the top bend of the siphon to make possible the starting of the siphoning action by filling liquid into said levelling tank so as to rise in the riser above the level of said top bend.

4. A device as claimed in claim 1 including an electrically operated supply means for controlling flow of said liquid material through said supply line into said levelling tank and wherein said control device comprises a manometer connected to a switch provided in the electric circuit controlling energization of said electrically operated supply means so as to cut off the liquid supply to said tank when the liquid therein has risen to a predetermined upper level and to open the supply when the liquid has sunk to a predetermined lower level, the supply line leading from said levelling tank to the packing machine being designed for slightly less feeding rate than the supply line to said levelling tank.

5. A device as claimed in claim 4 in which said supply means is a magnetic valve in a supply line from a storage tank.

6. A device as claimed in claim 4 in which said supply means is a feeding pump driven by an electric motor.

7. A device for continuous supply of a liquid to packages during the continuous manufacture thereof by periodically transversely pressing together and sealing a travelling tube, the distances between successive sealings being substantially equal, comprising a supply line for the liquid extending down into said tube, a levelling tank provided in said supply line outside of said tube, the upper portion of said levelling tank above the level of the liquid therein being in communication with the atmosphere, the supply line to said tank from the source of liquid bearing a relation to the supply line from said tank into said tube such that the rate of liquid flow into the tank slightly exceeds the rate at which the

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liquid flows out of said tank into said tube thereby causing the liquid level in said tank to rise slowly, and a control device actuated in accordance with variation in the liquid level in said tank for regulating the supply of liquid through said supply line into said tank, said device including means for shutting off the flow of liquid into said tank when the liquid level therein rises to a predetermined height and restarting the flow when the liquid level sinks to a predetermined distance below said height.

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