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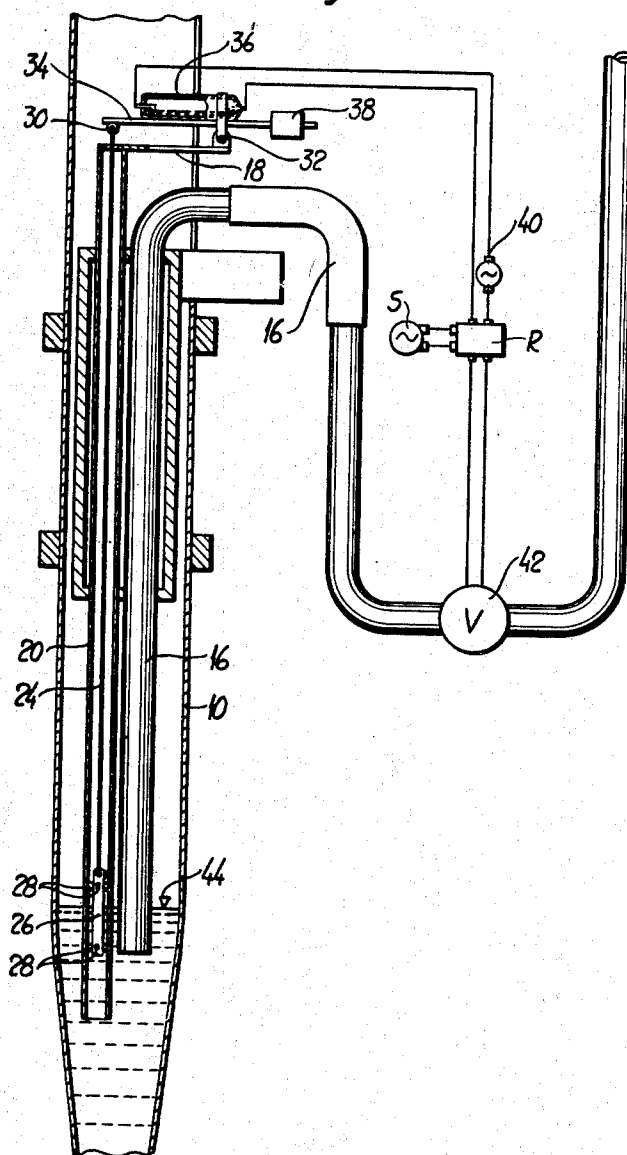
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DEVICE FOR FILLING LIQUIDS INTO CONTAINERS

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3 Sheets-Sheet 1

Fig. 1



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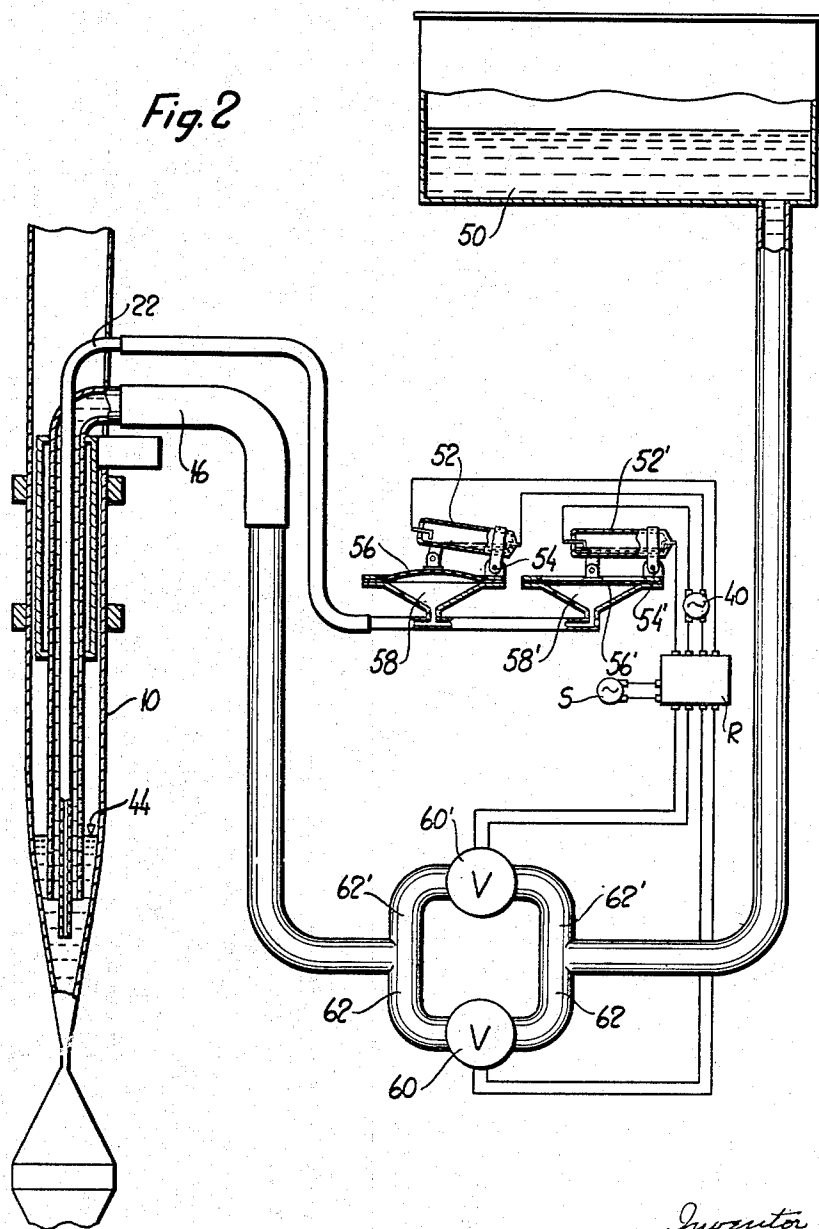
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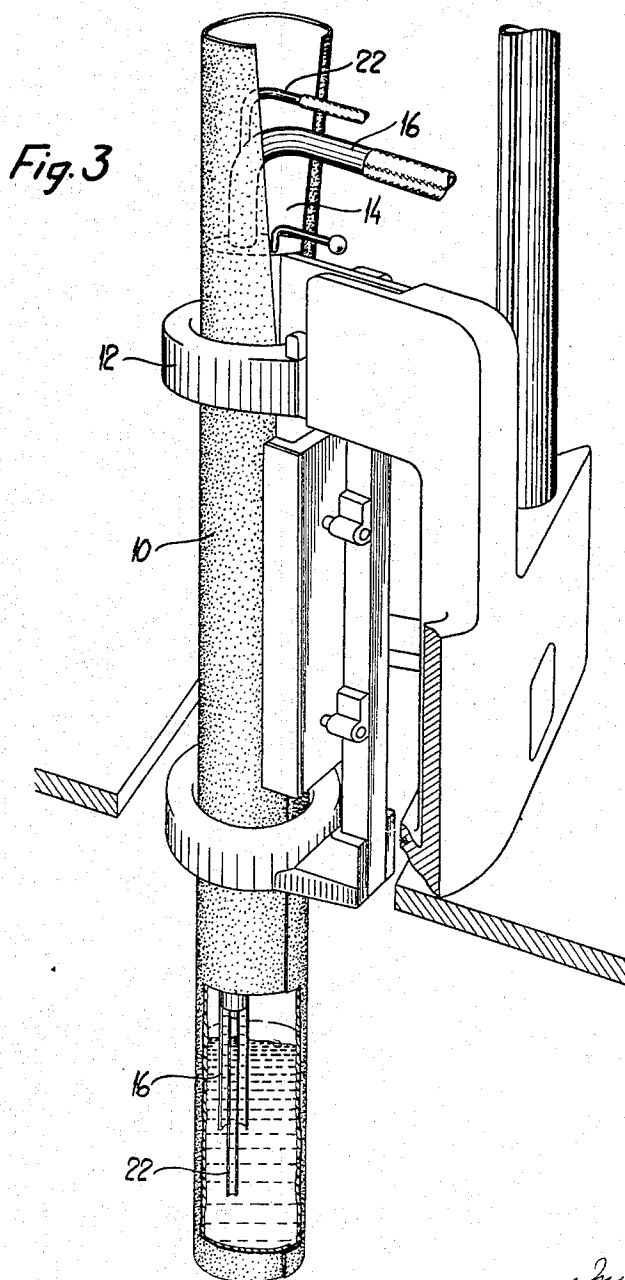
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UNITED STATES PATENT OFFICE

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DEVICE FOR FILLING LIQUIDS INTO
CONTAINERS

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4 Claims. (Cl. 137—110)

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When filling liquids into containers as they are being produced, e. g. by pressing and sealing together spaced apart areas extending across a tube or the like as it moves longitudinally, it is desirable to regulate the supply of liquid so as to keep the level of the liquid in the tube or the like from which the filled-up package is produced, as constant as possible. At the same time, especially when packing liquids which tend to foam in the above way the supply-pipe has to discharge under the liquid level in the tube from which the package is produced, so as to avoid the formation of foam.

The above problem arises e. g. when producing and at the same time filling tetrahedron shaped packages according to my previous applications Ser. No. 263,357 and 263,358 filed Dec. 26, 1951.

This invention concerns a device which solves the above problem of filling liquids into containers. According to the invention the device principally consists of at least one magnetic valve provided in the supply-pipe for the liquid, a rocking-switch or the like preferably a mercury switch being connected into the electric circuit of the magnetic valve, said switch in one position closing the circuit to the magnetic valve to keep the valve open, and in its other position interrupting the current so that the valve becomes closed or vice versa; the rocking-switch shifting from one position to the other when the liquid level in the tube or the like from which the packages are made passes a predetermined level. The shifting of the mercury switch can e. g. be influenced by a floating device or by a volume of gas, e. g. air, enclosed in a barometric tube which influences a membrane or the like supporting one end of the rocking-switch.

In the following, the invention will be described more in detail, with reference to the accompanying drawings, which by way of examples show a few different devices, suitable for use on e. g. the tetrahedron packing machine according to the above applications.

In the drawings:

Fig. 1 is a front elevation partly in section of a device, according to the invention, where the rocking-switch is operated by a floating device;

Fig. 2, shows a device, also partly in section, where the rocking-switch is operated by an enclosed volume of gas and which is provided with two valves coupled in parallel in the liquid supply pipe and each valve being regulated by a rocking-switch.

Fig. 3 is a partially sectioned perspective view of a machine for forming a tube according to my

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application Ser. No. 263,358 designed to be connected with a tetrahedron-forming machine according to my application Ser. No. 263,357 and illustrating the introduction of supply pipe and barometric pipe into the tube which is being formed.

On the drawings 10 indicates a tube or the like which in the embodiment shown is produced by bending a continuous band of suitable sheet material such as paper around an axis parallel with the longitudinal axis of the web and joining together the edges of the band. Above the top bending means 12 (Fig. 3) a wedge-shaped opening 14 is formed between the edges of the web, through which pass a liquid supply pipe 16 and a support 18 for a float tube 20 (Fig. 1), or a barometric tube 22 respectively (Figs. 2 and 3.)

According to the embodiment shown in Fig. 1 a float 26 is suspended on a thread or cord 24 inside the float tube 20 and provided with small extensions 28 at top and bottom in order to prevent disturbing capillary forces occurring as a result of contact between the surface of the float and the inside surface of the float-tube. The suspension thread or cord 24 is fastened at 30 to a rocking lever 34 which is tiltable on a pivot 32 on the support 18. Rocking lever 34 supports a mercury switch 36, and a counter-weight 38 for balancing the rocking system. The mercury switch 36 controls the energization of a relay R from a low voltage current source 40, and the relay R in turn controls the energization of a magnetic valve 42 in the liquid supply pipe 16 from a power current source S.

This device functions as follows:

When the relay circuit is closed through the switch 36, the relay R is conditioned, either energized or de-energized according to the design of the valve 42, to hold the valve 42 open. Liquid is then supplied with slightly greater speed than is necessary and the liquid level 44 rises in the tube 10. This raises the float, so that the counter-weight 38 can tilt the rocking lever 34 to open the mercury switch 36, thus establishing the alternate condition at relay R which results in a closing of the valve 42. When the valve 42 is closed, the level 44 will sink under continued production of packages, whereby the float pulls the lever 34 back into its original position to effect the re-opening of the valve 42.

In the embodiment of Fig. 2, reference numeral 10, as heretofore, identifies the tube which is being formed and filled continuously with liquid to produce tetrahedron-shaped packages. Nu-

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meral 16 indicates the liquid supply pipe coming from tank 50 and 22 indicates the barometric tube connected with the rocking devices for two mercury switches 52 and 52'.

The mercury switches are at one end tiltably mounted on solid pins 54 and 54' respectively and, at the other end articulatedly fastened to membranes 56 and 56', respectively, these membranes covering the funnel shaped cubicles 58 and 58' respectively which are in open connection with the tube 22. The switches 52 and 52' are connected into the circuit of their respective magnetic valves 60 and 60' which are provided in the respective branches 62 and 62' of the supply pipe 16.

The device shown in Fig. 2 functions as follows:

When the circuits of switches 52 and 52' are closed, the two valves 60 and 60' are open. This makes the liquid from the tank 50 flow through the two valves 60 and 60' at a rate corresponding to somewhat more than the capacity of the package making machine; consequently the level 44 in the tube 10 and of course also the corresponding level in the pipe 22 will rise. This increases the pressure upon the gas enclosed in the tube 22, which pressure causes the membrane 56 to bulge upwards and the mercury switch 52 to tilt over, so that the current to the valve 60 is interrupted and that valve is closed.

Membrane 56' is dimensioned for a higher pressure and functions only if something should have gone wrong, so that the liquid in the tube 10 continues to rise; in that case the switch 52' also opens and breaks the circuit to relay R thereby to close the valve 60'.

Normally, however, when valve 60 is closed but valve 60' remains open, a little less liquid than corresponding to the capacity of the packing machine should flow through the branch pipe 62' and the supply pipe 16. This will again cause the level 44 to sink, gas pressure in the tube 22 will diminish and the membrane 56 will return to normal position, so that the circuit to valve 60 is closed again and the valve will open, after which the whole process is repeated.

The above should make it entirely clear that the device concerned in the invention provides for automatic regulation of the liquid supply to limit the variations of level in the tube 10 to satisfactorily small values.

Of course the invention is not limited to the constructions herein illustrated but can be varied in its details in many ways without going outside its scope. Thus, of course the floating device according to Fig. 1 may be combined with two switches and valves according to Fig. 2; and a

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switch operated by a pressure membrane according to Fig. 2 may be used instead of the floating device in the more simple form according to Fig. 1. Also, by use of other relay circuits, the rocking switch 52' according to Fig. 2 can be arranged so that it influences both valves 60 and 60', thus serving as a safeguarding means for complete cutting off of the liquid supply.

I claim:

1. Apparatus for filling a liquid into containers as they are formed from a continuous tube, said apparatus consisting of a supply pipe for introducing the liquid into said tube, electromagnetic valve means for controlling the flow of liquid through said pipe, an electric switch in the electric circuit of said valve, said switch in one position keeping the circuit to the magnetic valve closed and thereby the valve open and in another position breaking the circuit and thereby closing the valve or vice versa, and means controlled by the level of the liquid within said tube for actuating said switch; said means comprising a gas-filled chamber having a flexible diaphragm for actuating said switch, and a gas-filled tube extending from said chamber downwardly into said tube and terminating below the normal liquid level, whereby the gas pressure within said chamber varies with the level of the liquid within said tube.

2. Apparatus as recited in claim 1, wherein said supply pipe includes two parallel branches, and said electromagnetic valve means includes a valve in each branch of the supply pipe; one branch having a capacity to supply somewhat less liquid than the quantity normally required to maintain the desired liquid level in said tube, and the electromagnetic valve in said one branch being normally continuously open.

3. Apparatus as recited in claim 2, wherein a separate diaphragm-operated switch is provided for each of said electromagnetic valves, and the diaphragms are constructed and arranged to operate at gas pressures corresponding to different levels of the liquid within said tube.

4. Apparatus as recited in claim 2, wherein said diaphragm extends across the top of said gas-filled chamber, and said switch is a rocking mercury switch mounted upon said diaphragm.

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