

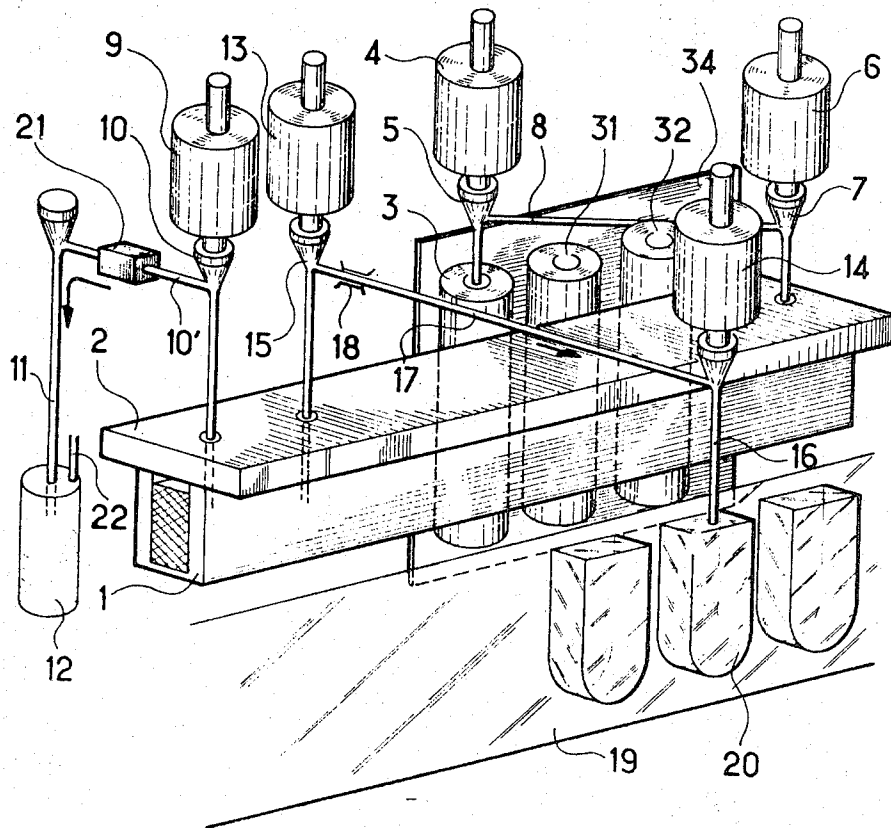
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FILLING LINE FOR THE FILLING OF CONTAINERS

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FILLING LINE FOR THE FILLING OF CONTAINERS

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7 Claims

ABSTRACT OF THE DISCLOSURE

A plurality of storage containers on a movable support are selectively coupled to a fixed storage container through hollow needles coupled by conduit means adapted to penetrate into the corresponding reservoir and transfer container with gas pressure transferring the same along with a second transfer device for selectively transferring metered quantities of the product to containers carried by a moving web through penetrating needles. A third transfer device removes unused material from the transfer container by fluid pressure after puncturing the perforable and retractable material overlying the transfer container for discharging the same into a waste reservoir.

BACKGROUND OF THE INVENTION

Field of the invention

The present invention relates to a filling line for the filling of containers and more particularly one which handles automatically, a liquid wherein the manual handling of which may be dangerous.

SUMMARY OF THE INVENTION

The present invention permits the automatic handling of liquid products in a circuit entirely protected from the ambient atmosphere. This makes it possible, more particularly, to handle products such as bacteriological cultures, contact with which may be dangerous to human beings and which may be detrimentally affected by the atmosphere. The present invention further permits filling simultaneously and/or successively a large number of containers with quantities of liquid product which are dosaged with very great precision, the containers being introduced and removed by a conveyor which operates at high speed.

The present invention comprises a line for filling a plurality of containers, including a reservoir for storing a liquid product to be handled, which is hermetically closed. A transfer container for the liquid product is closed by a cover having at least portions of a readily perforable and retractable material. A first device for the transfer of the liquid product is adapted to connect the storage reservoir to the transfer container. A second device for transferring a calibrated quantity of liquid product is adapted to connect the transfer container to at least one of the containers to be filled. The transfer devices each comprise a hollow conduit whose ends are prolonged respectively by two hollow needles adapted to penetrate into the corresponding reservoir or container. The free internal portions of the said storage reservoir and/or the said transfer container are subjected to gas pressure. This

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permits filling a plurality of containers with a first liquid product and then a second plurality of containers with another product without manual operation while preventing any mixing of products with one another.

The present invention will be described, without implying any limitation, in the case of the automatic handling of microbe cultures to be transferred into containers arranged on a conveyor.

BRIEF DESCRIPTION OF THE DRAWING

The single figure is a perspective view of a preferred embodiment of the invention.

In the figure, the containers to be filled comprise compartments such as 20 carried by a support 19. The support 19 and the compartments 20 are made for example, of plastic material, preferably a rigid and transparent material. The microbe culture is contained in a container or supply tube 3.

The apparatus line for filling the compartments 20, according to the invention, comprises a storage or transfer container 1, made preferably of plastic material, whose internal cross-section is advantageously in the form of a U. This transfer container constitutes a trough closed in sealing-tight manner by a cover 2 which comprises at least several portions of elastic retractable material which is easily pierced by a hollow needle.

The line according to the invention comprises an automatic apparatus for the transfer of a liquid from one container to another. These containers, for example the liquid supply tube 3 and the storage or transfer reservoir 1 are closed hermetically and each comprises an elastic wall which can be perforated by a needle as described hereinbefore. The automatic transfer device comprises a needle such as 5 arranged in such a manner as to be able to perforate the cover of the tube 3, and connected by means of a flexible conduit 8 to another needle 7 arranged so as to be able to perforate the cover of the reservoir 1.

Each of these needles is held in the desired position by an actuator such as 4 or 6 which may advantageously be electromagnetic or pneumatic.

In some cases the tube 8 connecting the needles 5 and 7 can be rigid, and the needles can be positioned by a single actuator. The needle 5 can be associated with another needle whose lower end is situated above the lower end of the needle 5, the said other needle being connected to a source of gas under pressure. In the raised position, the lower end of the needle 5 is out of the tube 3. In the "upper" position the lower end of the needle 5 is situated in the space between the surface level of the liquid contained in the tube 3 and the cover of this tube, and also the end of the other needle which is associated with it, the gas under pressure being transmitted to the needle 7. In the "lower" position, the gas pressure is applied above the liquid of the tube 3 which is expelled through the agency of the needle 5 toward the needle 7.

The operation of the needle 7 is such that the needle 7 transmits the liquid from the tube 3 to the reservoir 1 when the needle 5 is in the lower position, and transmits gas under pressure to the upper portion of the reservoir 1 when the needle 5 is in the upper position.

The filling line according to the invention comprises a plurality of transfer devices intended to transfer specific quantities of liquid contained in the reservoir 1 to containers arranged on a conveyor.

The latter transfer devices associated respectively with each of the containers of a group of containers of the con-

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veyor are similar to the transfer device described hereinabove. This transfer device comprises means for detecting the passage of the liquid taken, arranged at a point in the conduit 8.

The transfer device comprises a needle 15 connected to a discharge tube or needle 16 by means of a preferably flexible conduit 17. The needle 15 is held in position by an actuator 13 of the same type as the actuators 4 and 6. The needle or tube 16 can also be held in position, if appropriate, by an actuator 14. The needle 15 and the conduit 17 have an internal cross-section distinctly smaller than that of the elements 5-8 and 7. The difference in cross-section is due to the fact that it is necessary to calibrate precisely the quantities of liquid transferred from the reservoir 1 to the containers 20. For this purpose, a detector 18 is positioned at a specific location in the circuit 15-17 and energizes the actuator 13 as soon as the liquid arrives at the level of the detector. The actuator then raises the needle 15 into the upper position, which has the result of limiting the quantity of liquid introduced into the circuit 15-17. The liquid is introduced into this circuit owing to the effect of the gas pressure acting on the surface of the liquid contained in the reservoir 1, this pressure being supplied by the circuit 5-8-7 as described hereinbefore.

When the needle 15 is in the upper position, its lower end is above the surface level of the liquid, and the gas expels the quantity of liquid contained in the circuit 15-17 towards the container 20.

When this liquid has been expelled, the gas continues to escape through the circuit 15-17-16, which has the result of drying the internal wall of this circuit but has no perceptible effect on the pressure in the reservoir 1 owing to the small cross-section of the elements of this circuit.

The filling line according to the invention also comprises a device whereby the reservoir 1 can be emptied. This device comprises a needle 10 held in position by an actuator 9. The needle 10 is connected by a flexible conduit 10' to a needle 11 extending through an elastic cover of an emptying reservoir 12. This cover comprises an opening or auxiliary needle 22 intended for the discharge of the air of the reservoir 12 or the gas under pressure of the reservoir 1.

Preferably, the needle 11 will be arranged in such a manner that its lower end is never immersed in the liquid contained in reservoir 12. According to one form of embodiment, the actuator 9 can have three positions. In a lower position, the needle 10 is immersed in the liquid contained in reservoir 1 which is expelled towards the reservoir 12, which permits of draining the reservoir 1.

In an "upper" position, the needle 10 and the elements 10' and 11 serve for the discharge of gas from the reservoir 1 during its filling from the reservoir or tube 3. In the raised position (the needle being out of the cover of the reservoir 1), there is no longer any discharge of gas or liquid, and there is no longer any pressure loss in the reservoir 1.

The actuator 9 can also be a simple two-position (upper and lower) actuator, an electromagnetic valve being arranged in the conduit 10' to close this during the operations of filling the containers 20.

Finally, the line according to the invention comprises means for cleaning the conduits, needles and reservoirs of the installation after use or when changing-over the products being dealt with. Depending on particular cases, detergents, sterilizing or wetting products will be used together or separately in successive operations. These products will be introduced into the installation by way of the transfer device 5-8-7, the needle 5 being introduced into a reservoir similar to the reservoir 3 containing the necessary cleaning product.

The cleaning product will be passed through the conduits 8-7 which are thus cleaned; this product will clean the reservoir 1 and will be expelled at least partly by means of the transfer devices 15-17-16, cleaning these

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latter during passage. The remainder of the cleaning products contained in the reservoir 1 will be emptied by the device 10-10' and 11. At each conclusion of operation, the gas used for creating the necessary pressure will drive the various conduits on passing through.

According to one embodiment, the reservoirs such as 3, comprising various products to be dosaged and transferred into the containers 20, are arranged on a support which can be provided with an automatic advancing means. In this case the reservoirs containing the cleaning products are interposed between two reservoirs containing the products which are to be handled. For example, it is possible to arrange a reservoir 3 with bacteriological culture followed by a reservoir 31 containing a sterilizing product, a reservoir 32 containing a detergent product, and then another containing a wetting product followed finally by a different bacteriological culture reservoir.

The support 34, not shown in detail, is preferably constructed, at its lower portion, with a base in the form of an inverted U, provided with a plurality of notches in the plane of the base of the U prolonged by slots in the plane of the outer arm of the U, and comprising at its upper portion a plurality of ledges arranged opposite the notches, the tubes such as 3 being accommodated below the ledges and fitting into the slots and notches.

The filling line as described hereinbefore comprises an automatic control circuit associated with a sequence program control device not shown here, permitting the various operations to be synchronized, more particularly the advance of the conveyor 19, the position of the actuators 4, 6, 13, 14 and 9 and the advance of the support 34.

This control circuit makes it possible to carry out automatically a series of operations such as, for example, the simultaneous or individual filling of a certain quantity of containers with a certain product, the cleaning of the apparatus and the simultaneous or individual filling of the same containers or another series of containers with another product.

What is claimed is:

1. In a filling line for the filling of a plurality of containers, comprising: a hermetically closed storage reservoir for a liquid product to be handled, the improvement comprising: a transfer container for said liquid product which is closed by a cover having at least portions of a readily perforable and retractable material, a first device for the transfer of the said liquid product adapted to connect the said storage reservoir to the said transfer container, a second device for transferring a calibrated quantity of liquid product adapted to connect the said transfer container to at least one of the containers to be filled, said transfer devices each comprising a hollow conduit whose ends are prolonged respectively by two hollow needles adapted to penetrate into the corresponding reservoir or container, and means for subjecting the free internal portions of the said storage reservoir and/or the said transfer container to gas pressure.

2. The filling line according to claim 1, wherein each of the said first and second transfer devices are provided with an actuator adapted to position the needles at different distances from the surface level of the liquid product in the storage reservoir and/or in the transfer container.

3. The filling line according to claim 2, wherein said means for subjecting the free internal portions of the said storage reservoir and/or transfer container to gas pressure comprises a second hollow needle prolonged by a conduit providing communication between a source of gas under pressure and said storage reservoir and means operatively coupling said gas pressure subjecting means with the actuator with which the first transfer device is provided in such a manner as to provide communication between said source of gas under pressure and the transfer container by means of the said conduit and the said hollow needles connecting the storage reservoir and the said transfer container.

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4. The filling line according to claim 3, further comprising a plurality of reservoirs for storing liquid products, means for connecting said reservoirs successively to the transfer container by means of the said first removing device, and a third transfer device connecting said transfer container to an emptying tank including a conduit provided at each of its two ends with a needle which is adapted to be moved in translational movement under the action of a controlled actuator.

5. The filling line according to claim 4, wherein the plurality of storage reservoirs for said liquid products are carried by a single support cooperating with an automatic advancing device.

6. The filling line according to claim 5, wherein the plurality of containers to be filled are carried by a single support cooperating with an automatic advancing device.

7. The filling line according to claim 6, further comprising

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a sequential program control circuit controlling the coordinated action of the said actuators, and the devices for the automatic advance of the storage reservoirs and containers to be filled.

References Cited

UNITED STATES PATENTS

2,753,098	7/1956	Ward	141—129X
3,219,416	11/1965	Natelson	141—129X
3,486,982	12/1969	Noren	195—127

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