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(54) Liquid filling apparatus and method

(57) The present invention provides liquid filling apparatus and method which enables simple and efficient filling of diversified small quantity of liquids, and continuous filling of different liquids by continuous operation of a single machine.

At the time of type change to a different filling liquid, filling nozzles (3) and filling liquid supply means (4), which are separately prepared for a different filling liquid, are attached to a machine (1) for filling the containers with the different liquid.

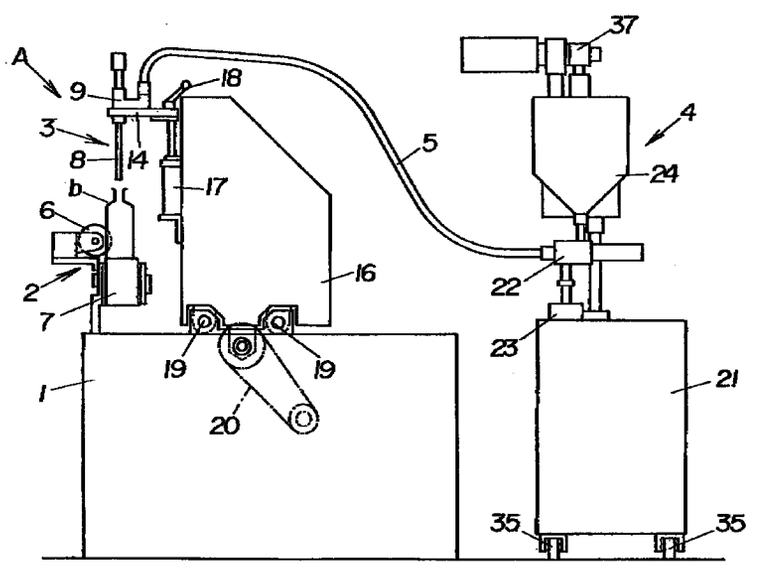

FIG.1

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Description

TECHNICAL FIELD

The present invention relates to liquid filling apparatus and method used in the industry of filling and packaging liquids such as drinks and the like.

BACKGROUND ART

At the present, in the industry of filling and packaging drinks and the like, the whole apparatus is progressively increased in size and diversified due to rationalization of processing, labor saving, etc. This enables mass production by continuously filling and packaging drinks for a short time.

Such an apparatus is generally selectively used for filling and packaging different liquids, i.e., it is used accompaning type change.

At the time of type change, a liquid in a filling liquid passage in the apparatus, i.e., in a liquid contact portion or a liquid contact surface, is thoroughly washed away by CIP washing or the like using water and hot water or a cleaning fluid and sterilized in preparation for filling a different liquid immediately before the next work.

However, the liquid filling and packaging apparatus has the following problems. Since the liquid filling and packaging apparatus is increased in size and complicated, much time is required for completing, sufficient washing. Further, the line operation must be stopped due to the need to disassemble and wash a complicated mechanism in the apparatus, and the main work of filling containers with a liquid must thus be stopped.

Particularly, in diversified small-quantity production, the liquid type is changed many times a day, and it is tedious to carry out the work of washing the liquid contact portions at each time of the type change, thereby interfering with the work of filling a liquid.

At the time of type change for filling containers with at least two types of liquids, e.g., a detergent, a, cosmetic and a gargle, since more time is required for washing, the filling line itself must be changed from the viewpoint of work efficiency.

DISCLOSURE OF THE INVENTION

The present invention has been achieved for solving the above problems, and an object of the invention is to provide liquid filling apparatus and method in which at the time of type change for filling a different liquid, filling nozzles and filling liquid supply means, which are separately prepared for filling a different liquid, are attached to the machine for filling containers with the liquid so that diversified small-quantity liquids can simply and efficiently be filled, and different liquids can continuously be filled by a single machine.

In order to achieve the object, the present invention provides a liquid filling apparatus comprising transfer means provided on a machine substantially horizontally for transferring containers which are filled with a liquid; filling nozzles provided above the containers on the transfer means opposite thereto, for filling the containers with the liquid; and filling liquid supply means for supplying the liquid to the filling nozzles; and supplying pipes respectively connecting the filling nozzles and the filling liquid supply means, wherein the filling nozzles are detachably provided on the machine by fixing means, and the filling liquid supply means comprises filling valves, filling liquid measuring members and a supplying tank, all of which are mounted on a movable carriage separated from the machine.

The apparatus further comprises washing means connected to the filling nozzles and the filling liquid supply means, for washing the liquid contact portions thereof.

The present invention also provides a liquid filling method in a liquid filling apparatus comprising transfer means provided on a machine substantially horizontally, for transferring containers which are filled with a liquid; filling nozzles provided above the containers on the transfer means opposite thereto, for filling the containers with the liquid; filling liquid supply means for supplying the liquid to the filling nozzles; and supplying pipes respectively connecting the filling nozzles and the filling liquid supply means. In the method, at the time of type change for filling a different filling liquid, other filling nozzles and filling liquid supply means, which are prepared for filling a different liquid, are attached to the machine for filling containers with the liquid.

The liquid filling apparatus and method of the invention constructed as described above exhibits the following effects.

The filling nozzles for filling containers, which are transferred substantially horizontally, with a liquid are detachably provided on the machine by the fixing means.

The filling liquid supply means for supplying a liquid to the filling nozzles comprises the filling valves, the filling liquid measuring members and the supplying tank, all of which are movably mounted on the movable carriage separated from the machine. The filling nozzles and the filling liquid supply means are connected by the supplying pipes.

A number of filling liquid supply means corresponding to a desired number of type changes are movably provided in the vicinity of the machine so as to comply with different liquids.

When a next liquid different from the previous filling liquid is filled, therefore, the filling apparatus is stopped, the filling nozzles are removed from the machine by the fixing means, and other filling nozzles connected to another filling liquid supply means are attached by the fixing means in preparation for immediately filling the different liquid.

When the filling apparatus is operated, the containers are transferred by the transfer means, and the predetermined measured amount of different liquid is sent from the supplying tank in the filling liquid supply means

to the filling nozzles by switching the filling valves so that the containers are successively filled with the liquid.

At this time, the liquid contact portions of the filling nozzles and the filling liquid supply means are thoroughly washed by the washing means connected thereto. Since the washing is carried out regardless of the work of filling the containers with the liquid, the filling operation line is not stopped.

Even if it is necessary to fill another different liquid, filling liquid supply means for the another different liquid is attached to the machine, and the filling nozzles are changed so as to minimize the stopping time of the line, thereby enabling substantially continuous filling.

In this way, the work of washing the liquid contact portions used for previous filling can be performed in parallel with the filling work.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a drawing illustrating the outline of liquid filling apparatus and method in accordance with an embodiment of the present invention;

Fig. 2 is a plan view of the apparatus shown in Fig. 1;

Fig. 3 is a partly broken-away drawing of the filling nozzle shown in Fig. 1;

Fig. 4 is a perspective view illustrating a state where the filling nozzles shown in Fig. 3 are mounted; and

Fig. 5 is a side view illustrating the outline of the filling liquid supply means shown in Fig. 1.

BEST MODE FOR CARRYING OUT THE INVENTION

Liquid filling apparatus and method in accordance with an embodiment of the present invention are described with reference to the drawings.

In Figs. 1 and 2, A denotes the principal portion of the liquid filling apparatus in accordance with an embodiment of the present invention. The apparatus basically comprises transfer means 2 provided substantially horizontally on a machine 1 for transferring containers b which are filled with a liquid, filling nozzles 3 provided above the containers b on the transfer means 2 opposite thereto for filling the containers b with the liquid, filling liquid supply means 4 for supplying the liquid to the filling nozzles 3, and supplying pipes 5 respectively connecting the filling nozzles 3 and the filling liquid supply means 4.

The transfer means 2 comprises combination of a caterpillar endless conveyor 6 for transferring the containers loaded thereon from one side of the machine 1 to the other side, and a screw conveyor 7 having many recesses for respectively containing the containers b. The transfer means 2 is driven at a predetermined speed and timing.

Many groups of the filling nozzles 3 are provided and have discharge pipes 8 which are respectively positioned opposite to the containers b for filling the containers b with the liquid supplied from the filling liquid supply means which will be described below. As shown in Fig. 3, a valve body 11 which is operated by switching means such as a fluid cylinder or the like is provided in a casing 9, and the discharge pipe 8 which communicates with a supplying portion 12 projected from one side of the casing 9 is connected to the bottom of the casing 9.

As shown in Fig. 4, the casings 9 of the filling nozzles 3 are fixed to a plate-formed supporting member 14, and a mounting piece 15 extended from one side of the supporting member 14 is detachably attached to a movable body 16 which is movably mounted on the machine 1, by screw-type fixing means 18 through lifting means 17 such as a fluid cylinder or the like.

The movable body 16 is mounted on horizontal guides 19 provided on the machine 1 so as to permit movement parallel to the transfer means 3 by driving means 20 while following or synchronizing the transfer of the containers b by the transfer means 2.

The filling liquid supply means 4 supplies, to each of the filling nozzles 3, a liquid in a predetermined amount, i.e., an amount corresponding to the volume of each container b. As shown in Figs. 1 and 5, the filling liquid supply means 4 comprises a movable carriage 21, filling valves 22, filling liquid measuring members 23 and a supplying tank 24. A necessary number of filling liquid supply means 4 are previously prepared for changing the liquid type in the vicinity of the machine 1.

The above movable carriage 21 has casters 35 provided at the bottom thereof so that it can be moved by a simple operation.

The liquid is supplied from the supplying tank 24 to the filling liquid measuring members 23 through the filling valves 22. After a predetermined amount of liquid is measured, the liquid is forced to be supplied from the supplying pipe 5 to the discharge pipe 8 of each of the casings 9 by discharge means 25.

Each of the filling liquid measuring members 23 has a cylinder 26 one end of which is connected to the filling valve 22, and a pumping piston 27 provided in the cylinder 26 so that when the filling valve 22 is open, the liquid in the supplying tank 24 is flowed into the cylinder by lowing the piston 27.

The discharge means 25 sends in and out the liquid by vertically moving the pumping piston 27. A lifting member 29 connected to an operation rod, 28 provided at the bottom of the pumping piston 27 is movably detachably provided on a supporting guide 30, and a screw shaft 32 into which a female screw piece 31 of the lifting member 29 is screwed is driven by a driving member 33 such as a servo motor which can be numerically controlled to move the pumping piston 27 for a predetermined amount. The filling speed and amount of the liquid discharged from each of the discharge pipes 8 are determined by control means for appropriately controlling the moving amount and speed of the pumping piston 27.

The supplying pipes 5 respectively connecting the filling nozzles 3 and the filling liquid supply means 4 are

detachably connected to the casings 9 and filling valves 22, the ends of each of the supplying pipes 5 being respectively fixed by joint pins (not shown).

At the time of type change for changing the filling liquid to another liquid, the supplying pipes 5 are respectively removed from the filling nozzles 3, the filling liquid supply means 4 is moved from a position of the machine 1, filling liquid supply means 4 for another liquid in moved to the vicinity of the machine 1 by moving the movable carriage 21 thereof, and the supplying pipes 5 are connected thereto so that the liquid filling apparatus A can immediately be operated. This exchange work can be performed by stopping the filling operation for a time as short as several minutes.

The washing means 36 is provided in vicinity of the machine 1 and connected to the filling nozzles 3 and the filling liquid supply means 4 so as to wash the liquid contact portions thereof. For example, a general washing machine or a CIP apparatus can be used as the washing means 36. The used filling nozzles and filling liquid supply means 4 can be washed during the time of filling another liquid.

For example, the washing means 36 comprises a plurality of tanks (no shown) such as a hot water tank, an alkali tank, a chlorine tank and so on which respectively contain cleaning fluids. The washing means 36 may comprise a single tank according to the type of the liquid. These cleaning fluids are supplied to a mounting portion 37 provided on the supplying tank 24 and are appropriately sent to the liquid contact portions at a predetermined step of washing the liquid contact portions by circulating it through the filling liquid supply means 4 and the filling nozzles 3. After washing, the cleaning fluids are disposed of or returned to a recovery apparatus connected to each of the tanks and recycled.

The washing process depends upon the type of the filling liquid, and, for example, the washing process includes a rinsing step, an acid washing step, an intermediate rinsing step, an alkali washing step, a final rinsing step and a sterilizing step.

The liquid filling apparatus and method of the invention constructed as described above can significantly decrease the time required for changing the liquid type and minimize the stopping time of the main filling work at the time of type change to a different liquid, thereby increasing the efficiency of the filling work. Particularly, the invention exhibits the peculiar effect of causing advantages to diversified small-quantity production and filling of completely different liquids in different types of industry.

Claims

1. A liquid filling apparatus comprising transfer means (2) provided on a machine (1) substantially horizontally for transferring containers which are filled with a liquid; falling nozzles (3) provided above the containers on the transfer means (2) opposite thereto in the machine (1), for filling the containers with the liquid; filling liquid supply means (4) for supplying the liquid to the filling nozzles (3); and supplying pipes (5) respectively connecting the filling nozzles (3) and the filling liquid supply means (4); characterized in that the filling nozzles (3) are detachably provided on the machine (1) by fixing means (18), and the filling liquid supply means (4) has filling valves (22), filling liquid measuring members (23) and a supplying tank (24), which are mounted on a movable carriage (21) separated from the machine (1).

2. A liquid filling apparatus comprising transfer means (2) provided on a machine (1) substantially horizontally for transferring containers which are filled with a liquid; filling nozzles (3) provided above the containers on the transfer means (2) opposite thereto in the machine (1), for filling the containers with the liquid; filling liquid supply means (4) for supplying the liquid to the filling nozzles (3); and supplying pipes (5) respectively connecting the filling nozzles (3) and the filling liquid supply means (4); characterized in that the filling nozzles (3) are detachably provided on the machine (1) by fixing means (18), the filling liquid supply means (4) has filling valves (22), filling liquid measuring members (23) and a supplying tank (24), which are mounted on a movable carriage (21) separated from the machine (1), and washing means (36) in connected to the filling nozzles (3) and the filling liquid supply means (4), for washing the liquid contact portions thereof.

3. A liquid filling method in a liquid filling apparatus comprising transfer means (2) provided on a machine (1) substantially horizontally for transferring containers which are filled with a liquid; filling nozzles (3) provided above the containers on the transfer means (2) opposite thereto in the machine (1), for filling the containers with the liquid; filling liquid supply means (4) for supplying the liquid to the filling nozzles (3); and supplying pipes (5) respectively connecting the filling nozzles (3) and the filling liquid supply means (4); characterized in that filling nozzles (3) and filling liquid supply means (4) which are separately prepared for a different filling liquid are attached to the machine (1) at the time of type change to a different liquid, and then filling the containers with the liquid.

FIG.1

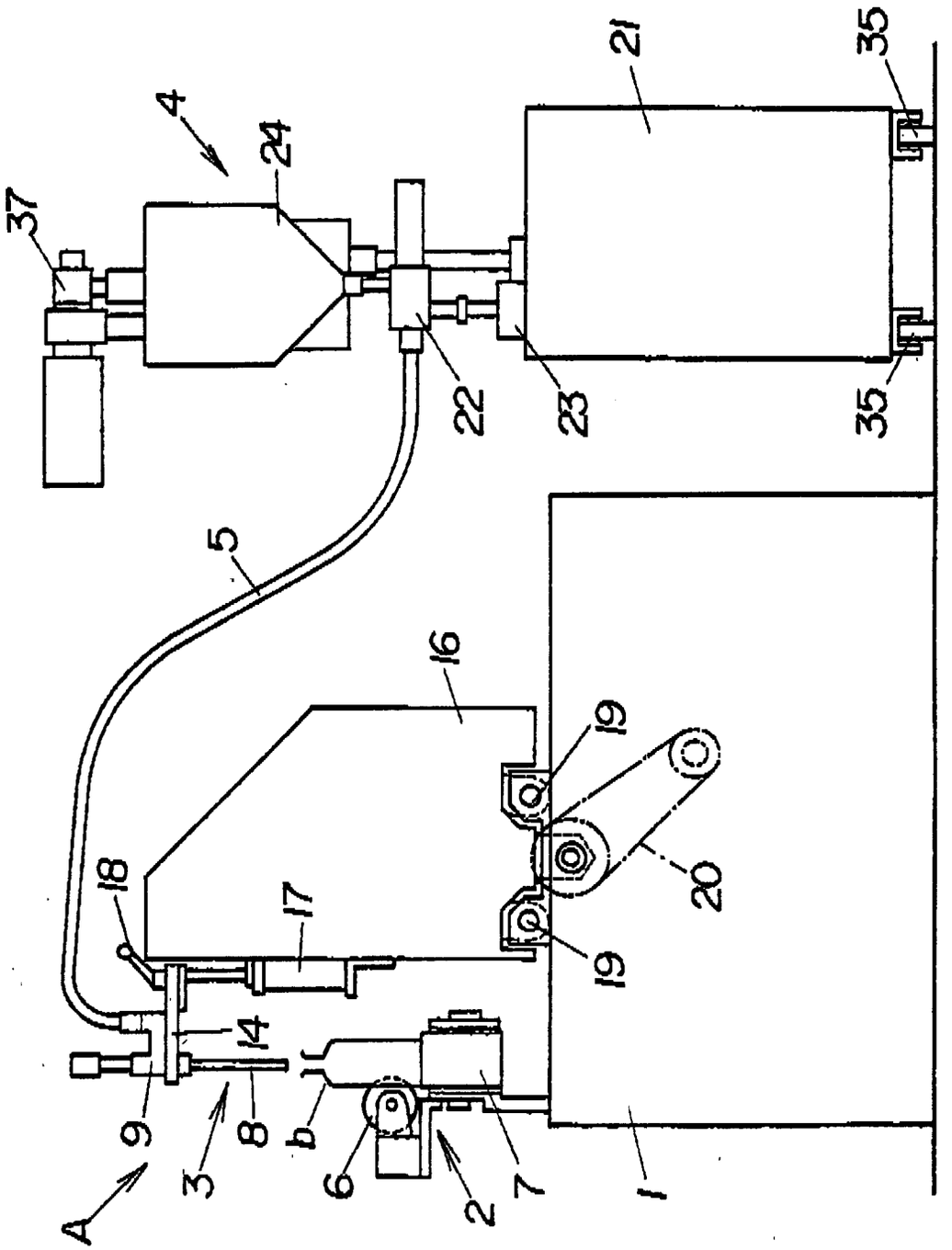


FIG.2

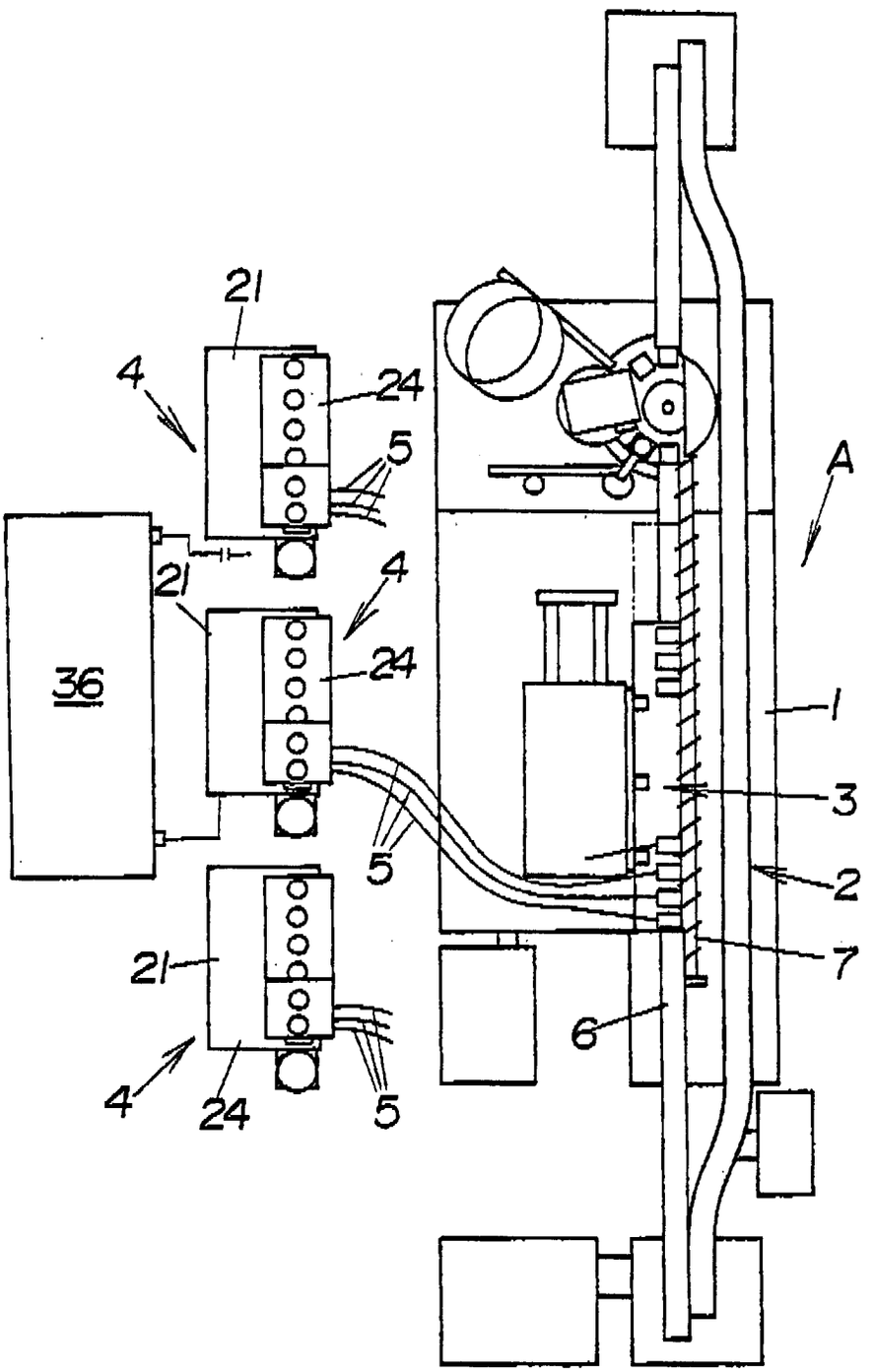


FIG.3

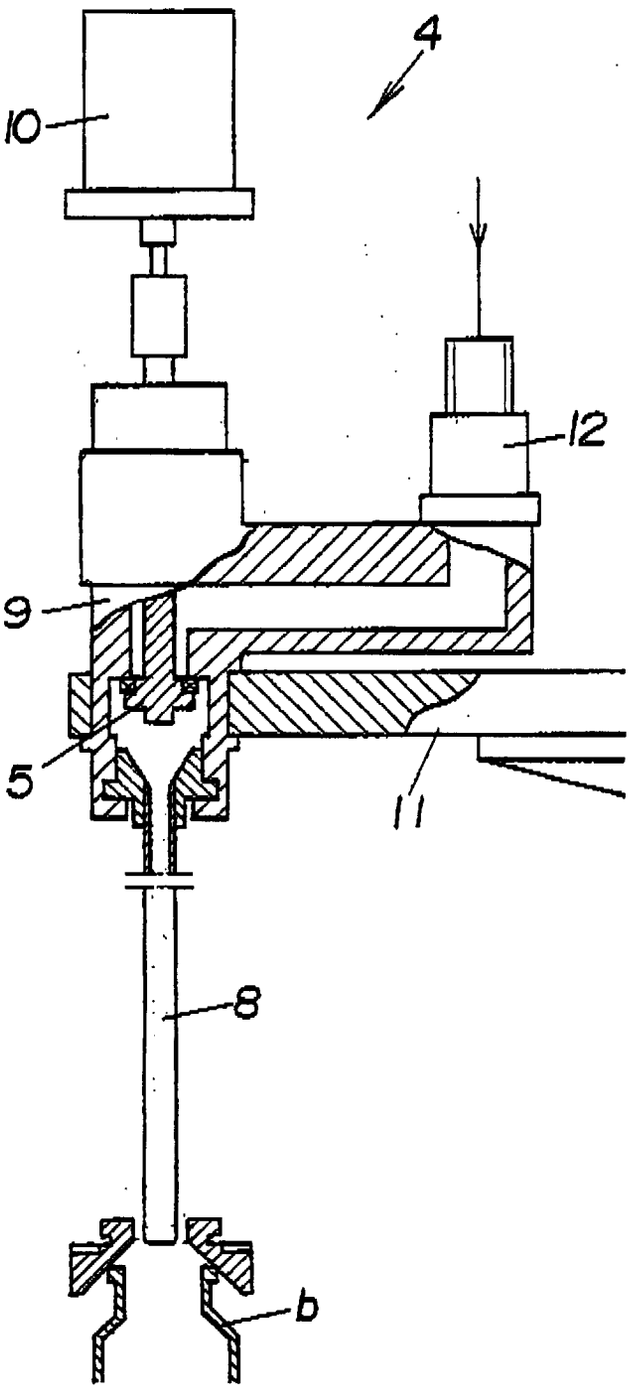


FIG.4

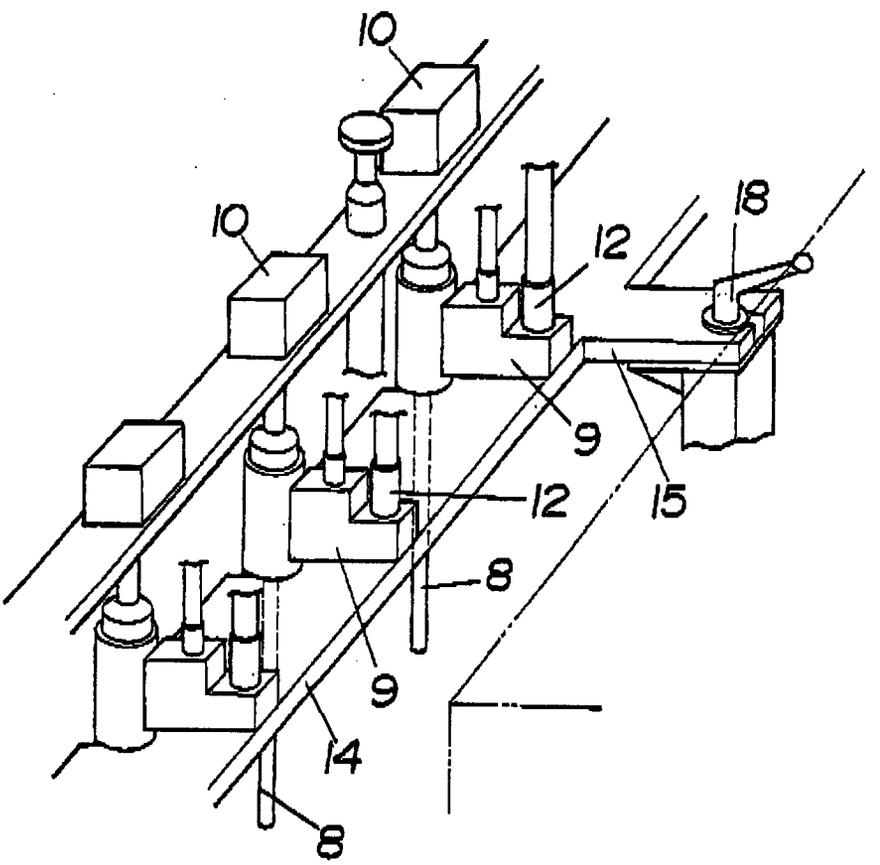
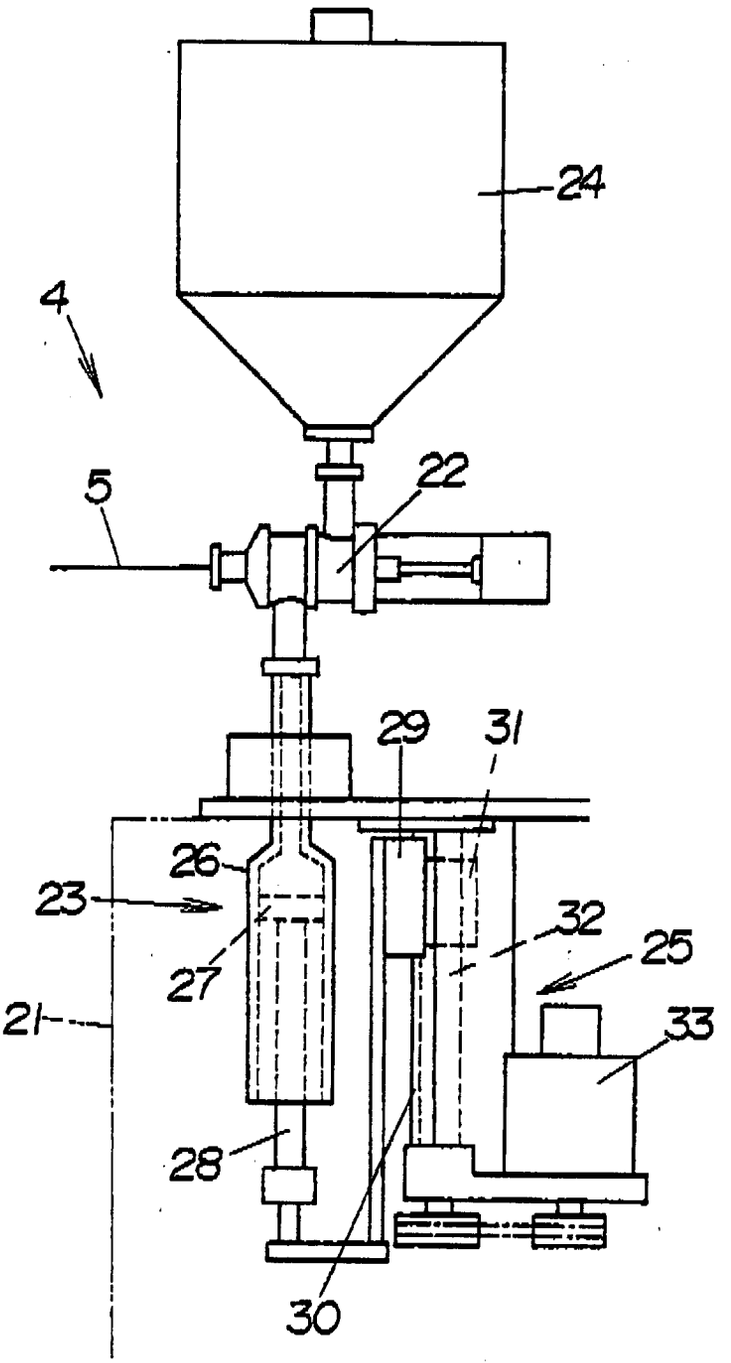


FIG.5



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EUROPEAN SEARCH REPORT

Application Number
EP 95 10 2419

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
Y	DE-A-30 24 271 (INST. DE SEROTHERAPIE) * page 13, line 2 - page 15, line 7; figures *	1-3	B65B39/00 B65B59/04 B67C3/22
Y	GB-A-2 232 210 (D.C. NORRIS) * page 3, line 1 - page 6, line 9; figures *	1-3	
Y	GB-A-2 216 885 (ROBY TEKNIK) * page 6, line 8 - page 10, line 18; figures *	2	
Y	EP-A-0 631 977 (I.M.A.) * column 4, line 7 - column 5, line 6; figures *	3	
A	US-A-4 573 502 (B. HURLEY) * column 3, line 21 - column 4, line 33; figures *	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B65B
B67C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	24 July 1995	Jagusiak, A

CATEGORY OF CITED DOCUMENTS

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