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(71) Applicant: **Mascheretti, Mariarosa**
Via Petrarca, 1
I-24036 Ponte San Pietro (Bergamo)(IT)

(72) Inventor: **Gerosa, Eugenio**
via Pascoli, 23
Mapello (Bergamo)(IT)

(74) Representative: **Lecce, Giovanni**
STUDIO NORD BREVETTI Via Suardi, 4
I-24100 Bergamo(IT)

(54) Improvements in a machine for the preparation and filling of drums for fluid products.

(57) Improvements in a drum filling machine comprise heads (1) for prewashing, washing and sterilization of the filling heads (36) substantially made up of coaxial bodies (2) and (37) having upper internal chambers (3) and (41) and lower internal chambers (4) and (38) through which, and by means of central distributors (5) with upper pushers (18), the washing fluids can be run into the overturned drums (16) through their central ducts (25) with ball valves (22) and discharged through the annular apertures (24) of the fillers (17) while filling with the fluids is performed by counterflow for discharge of internal air or gases through the central duct (25).

An intermediate phase can include a jaw system (28) which rotates the drums (16) while shaking the contents thereof.

All is done automatically within the full cycle of the drum filling machine.

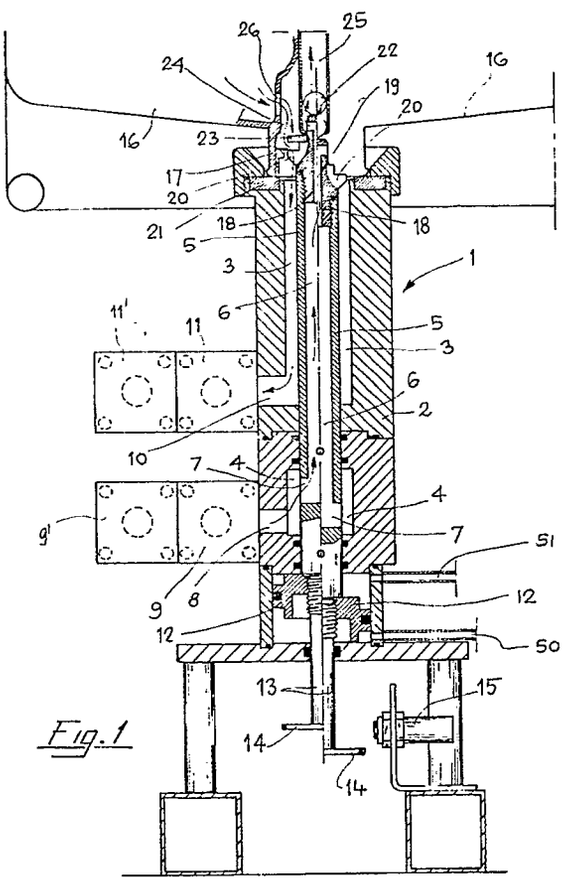

Fig. 1

EP 0 453 823 A2

The present invention relates to improvements in machines for the preparation and filling of drums for fluid products and in particular for the metallic drums of known type termed "keg" with fittings usable for packaging, preservation, transportation and mixing of liquid foodstuffs such as drinks, beer and the like.

Said improvements consist of a washing head with delivery and drain heads with controlled automatic opening and closing, a station for rotation of the drums and a filling head with delivery and drain ducts with controlled automatic opening and closing with recovery of residual liquids.

Said improvements are located in sequence on drum filling machines organized with linear, circular or other arrangements without distinction.

Present drum filling machines consist essentially of pluralities of sequential work stations on which the arriving drums are subjected to operational steps of prewashing, washing, draining, drying and filling.

The entire processing cycle, while being substantially effective, has shown however certain drawbacks.

In particular it is observed that, during prewashing and washing, the hot pressurized jets of water, soda or other suitable products do not strike and lick all the internal parts of the drums in the same manner, performing an irregular detergent action.

Another serious drawback is the fact that the present filling heads do not have any device for recovery of residual liquids, i.e. each time a drum reaches its filling level and delivery of the liquid is stopped, the residual liquid in the feed ducts is evacuated and drained with no possibility of recovery.

This situation constitutes a useless waste of liquid foodstuff, which effects considerably the cost of the product and can also cause uncontrollable pollution by generation of high concentrations of certain substances and ingredients in the industrial sewers.

The object of the present invention is to eliminate the above drawbacks.

The invention, as characterized in the claims, solves the problem by improvements in machines for the preparation and filling of drums for fluid products by means of which there are obtained the following results.

The prewashing and washing phases are performed using washing heads comprising the delivery and drain ducts with automatic opening and closing with axial distributor. The prewashing and washing are performed with jets of water, steam, soda or other, from below upward, through the central duct with a check valve, with radial spraying and peripheral drain conveyed and drained through the peripheral slits of the central filler of the drums. Equalization of the internal washing of the drums along all the walls is obtained by means of an optional rotation station in which the drums are rotated in such a manner that the washing contents can uniformly lick all the internal surfaces. The drums are filled using filling heads comprising ducts for delivery and scavenging of internal gases with automatic opening and closing with axial distributor and recovery of residual liquids.

The advantages achieved with the present invention are essential the fact that the drums are subjected to a more complete and effective prewashing and washing, filling is performed in a precise and correct manner and recovery of the residual liquid corresponding to the filling stage of each drum allows a clear financial saving, reduction in the cost of the products and increased production.

To further clarify the explanation of the innovative principles of the present invention and its advantages as compared with the known art there is described below with the aid of the annexed drawings possible embodiments as examples applying said principles. In the drawings -

FIG. 1 shows a cross section of a washing head wherein, in relation to the axis of symmetry of the central drive piston, the right-hand part represents the closing condition and the left-hand part represents opening,

FIG. 2 shows a front cross section view of a drum station or rotation,

FIG. 3 shows a plan view of the same station as FIG. 2, and

FIG. 4 shows a cross section of a filling head wherein, in relation to the axis of symmetry of the central drive piston, the right-hand part represents the closing condition and the left-hand part represents the opening condition.

The figures illustrate examples of embodiment of improvements in machines for the preparation and filling of drums for fluid products.

Said improvements are particularly suited for drum filling machines in line and not in line and in the prewashing and washing stations comprise heads (1) essentially made up of a central body (2) having an upper chamber (3) and a lower chamber (4) which are mutually coaxial and at the centre of which there is an axial distributor (5) free to travel and in which there is a central duct (6) having radial ports (7). The radial ports (7) are positioned in alignment with said lower chamber (4) which, in turn, has a radial port (8) connected to at least one solenoid valve (9). Similarly the upper chamber (3) has a radial port (10) connected to at least one solenoid valve (11). The axial distributor (5) comprises, in its lower part, a double acting piston (12) preferably but not in a limiting manner of the com-

pressed air type. The rod (13) of the piston (12) extends on the side opposite to the distributor and ends with a shoe (14) which aligns with a sensor (15) such as for example a photoelectric cell.

In operation, each drum (16) to be subjected to prewashing and washing is positioned overturned at a head (1) with the central filler (17) aligned with the axial distributor (5) which comprises at its upper end a pusher (18) with a central passage hole (19) and radial shaped grooves (20).

The passage hole (19) communicates with the central duct (6) of the axial distributor (5) while the shaped grooves (20) communicate with the upper chamber (3).

The drum (16) positioned in alignment with the head (1) rests on the gasket (21) of said head and is pressed there by an upper pressing cylinder (not shown).

The presence of the drum (16) in the head (1) gives automatic consent for lifting of the axial distributor (5) and this takes place injecting compressed air in the lower chamber of the piston (12).

Lifting of the distributor causes engagement of the pusher (18) with the central ball valve (22) and soda closing plug (23), having an annular passage (24), opening the latter. In this manner the lower chamber (4) connects with the duct (25) of the ball valve (22) through the central duct (6) of the distributor (5) and the passage hole (19) of the pusher (18) while the upper chamber (3) connects with the annular passage (24) of the central filler (17) through the shaped grooves (20).

Concomitantly therewith the operational phases begin; the lower solenoid valve (9) opens and begins deliver, e.g. of hot prewashing water which, through the chamber (4), the duct (6), the hole (19) and the duct (25), is fed into the drum with force against the upward turned bottom and a subsequent fall downward until it is emptied through the radial ports (26) of the annular passage (24) of the filler (17) and the upper chamber (3).

In some phases the drain solenoid valve (11) can be opened directly for direct scavenging of the liquid products, or can be opened with delay to allow more or less forced filling of the drums (16).

Similarly there are carried out other optional sequential operations of washing with soda or other products, emptying under pressure of steam or other gases such as CO_2, drying with CO_2, if the drying was performed with steam, and so on.

To achieve this, paired with the solenoid valve (9) and (11) there can be other valves (9'), (11') for inlet and drain of the different products.

Closing of the ports of the filler (17) at the end of the above operations is obtained by withdrawing the distributor (5) by input of air into the upper chamber of the piston (12). Input of control air is made through the ducts (59) and (51).

In accordance with another possible operational solution between the delivery and drain phases, to ensure that the hot water, steam, soda or other substance lick perfectly and to be certain that they have carried out their action on the entire internal surface of the drums (16), the latter are preferably subjected to rotation.

To effect this operation the drums (16) are translated into a sequential station in which they are gripped by at least two opposing jaws (28) constrained to shafts (29) supported by bearings (30). The bearings (30) are comprised in slide supports (31) sliding in fixed guides (32). Pistons (33) paired with lever systems (34) control closing and/or opening of the jaws (28). In at least one of said supports is applied a double acting piston (35) of known type fitted with a rack rod which couples with a gear coaxial with at least one of said shafts (29).

When a drum (16) is gripped by the jaws (28) the double acting piston (35) enters into action in one direction and the opposite direction several times depending on the working programme. Said movement of the piston (35) causes rotation in one direction and the opposite direction of the shafts (29) and consequently of said jaws (28) constrained thereto and of the gripped drum (16).

The products contained in the drums (16) are thus forced to exert a sliding action along all the internal surfaces.

After a programmed time the drums are translated to the following operative station, in which there is another head (1), or a similar one, through which is performed scavenging of said products under steam pressure, CO_2 or other, drying in CO_2 and so on.

In the following filling step, the drums are positioned in stations comprising loading heads (36) essentially made up of a central body (37) equipped with a lower chamber (38) with radial port (39) connected to at least one solenoid valve (40) and an upper chamber (41) in which slides a double acting piston (42), preferably but not in a limited manner of the compressed air type, with air inlet ducts (43) and 44).

The chamber (41) is connected by means of a port (45) to a feed pipe (46). In the centre of said lower chamber (38) and said piston (42), which are mutually coaxial, there is an axial distributor (5) free to slide and essentially identical to the one (5) in the washing head (1) and already described.

Each drum (16) to be filled is positioned overturned at a loading head (36) with the central filler (17) aligned with the axial distributor (5) and resting on the gasket (21).

As above, the presence of the drum (16) signals automatic consent for lifting of the axial distributor (5) by sending air into the lower chamber of

the piston (12).

The pusher (18) causes opening of the ball valve (22) and opening of the passage seat (24). In this manner the lower chamber (38) is connected to the duct (25) of the drum (16) through the central duct (6) of the distributor (5) and the passage hole (19) of the pusher (18) while the upper chamber (41) is connected to the annular passage (24) of the filler (17) through the shaped grooves (20). In this condition of opening and connection the sliding piston (42) is held downward with air fed into its upper chamber.

Said positioning allows connection of the upper chamber (41) with the port (45) of the feed pipe (46).

In this condition consent is given for the beginning of filling and the fluid coming from the piping (46) passes into the drum (16) through the port (45), the shaped grooves (20), the annular passage (24), and the radial ports (26) while, through the duct (25), the hole (19) of the pusher (18), the duct (6) or the ports (7) of the distributor (5), the chamber (38) and its port (39) and the solenoid valve (40) there is discharged all the air present in the drum (16) and the CO_2 introduced for drying in the preceding phases.

Upon completion of filling the distributor (5) is lowered, the ball valve (22) and the plug (23) close and, before the filled drum (16) is released and continues its travel, the piston (42) is raised. Its moving causes closing of the feed port (45) and discharge of the fluid held in the upper chamber (41) through a side duct (47). Said fluid is thus recovered and recycled. The following washing, before a new drum filling, causes the only loss of the small amount of fluid remaining in the annular zone between the top of the raised piston (42) and the bottom of the lowered piston (18). All the controls of the devices illustrated in the scope of the drum filling machines are of the fully automatic type and their sequences and operations and the duration of each operation are regulated and programmed in accordance with requirements. Said conditions are preferably obtained by means of electronic devices such as PLC.

Claims

1. Improvements in a machine for the preparation and filling of drums for fluid products characterized in that they comprise at least one head (1) for prewashing, washing and drying and at least one filling head (36) with recovery of residual liquids equipped with coaxial delivery and drain ducts with controlled automatic opening and closing and at least one intermediate drum rotation station (16).

2. Improvements in a machine for the preparation of drums (16) for liquid products characterized in that they comprise heads (1) consisting of a central body (2) with a mutually coaxial upper chamber (3) and lower chamber (4) through which runs an axial distributor (5) with pusher (18) in which there is present a central duct (6) with radial ports (7) aligned with the hole (19) of said pusher, the lower end of the distributor comprising a drive piston (12) and a shoe (14) placed in control alignment with a control sensor (15).

3. Improvements in accordance with claims 1 and 2 characterized in that the radial ports (7) of the distributor (5) are aligned with the lower chamber (4) which has a radial port (8) aligned with at least one solenoid valve (9) and that the upper chamber (3) has a radial port (10) connected to at least one solenoid valve (11).

4. Improvements in a machine for the filling of drums (16) for liquid products characterized in that they comprise heads (36) consisting of a central body (37) with mutually coaxial lower chamber (38) and upper chamber (41) through which runs an axial distributor (5) with pusher (18) in which there is a central duct (6) with radial ports (7) and aligned with the hole (19) of said pusher, the lower end of the distributor comprising a control piston (12) and a shoe (14) placed in control alignment with a control sensor (15), said upper chamber (41) having a coaxial intermediate piston (42) through which runs the distributor (5) and a side drain duct (47).

5. Improvements in accordance with the claims 1 and 4 characterized in that the radial ports (7) of the distributor (5) are aligned with the lower chamber (38) which has a radial port (39) aligned with at least one solenoid valve (40) and that the upper chamber (41) has a radial port (45) aligned with the feed duct (46) and said radial port (45) being obstructed or not by the advanced or withdrawn position of said coaxial piston (42).

6. Improvements in accordance with claims 1 to 5 characterized in that the prewashing, washing and drying heads (1) and the filling heads (36) enter into a relationship of coaxial engagement with the collectors (17) of the drums (16), with the pusher (18) of the distributor (6) in a relationship of frontal engagement with the valve (22) of the central duct of the drums and in a relationship of peripheral engagement with the closing plug (23) of the annular passage seat

(24) of said collectors (17).

7. Improvements in drum filling machines characterized in that they comprise at least one drum rotation station (16) in which at least two jaws (28) diametrically opposed in relation to said drums enter into a relationship of engagement with the peripheral surface of said drums by means of pistons (33) with levers (34) which act on movable slides (31), said jaws being mounted on shafts (29), upheld by bearings (30) and free to rotate in one direction and the opposite direction under the action of a double acting tangential piston (35), the rack stem coupling with a coaxial gear to at least one of said shafts.

8. Improvements in accordance with claims 1 to 7 characterized in that they are sequentially arranged on drum filling machines for drums (16) and are driven, controlled and programmed by means of electronic devices such as PLC.

9. Improvements in a machine for the preparation and filling of drums for fluid products in accordance with the above claims as illustrated and described and for the specified purposes.

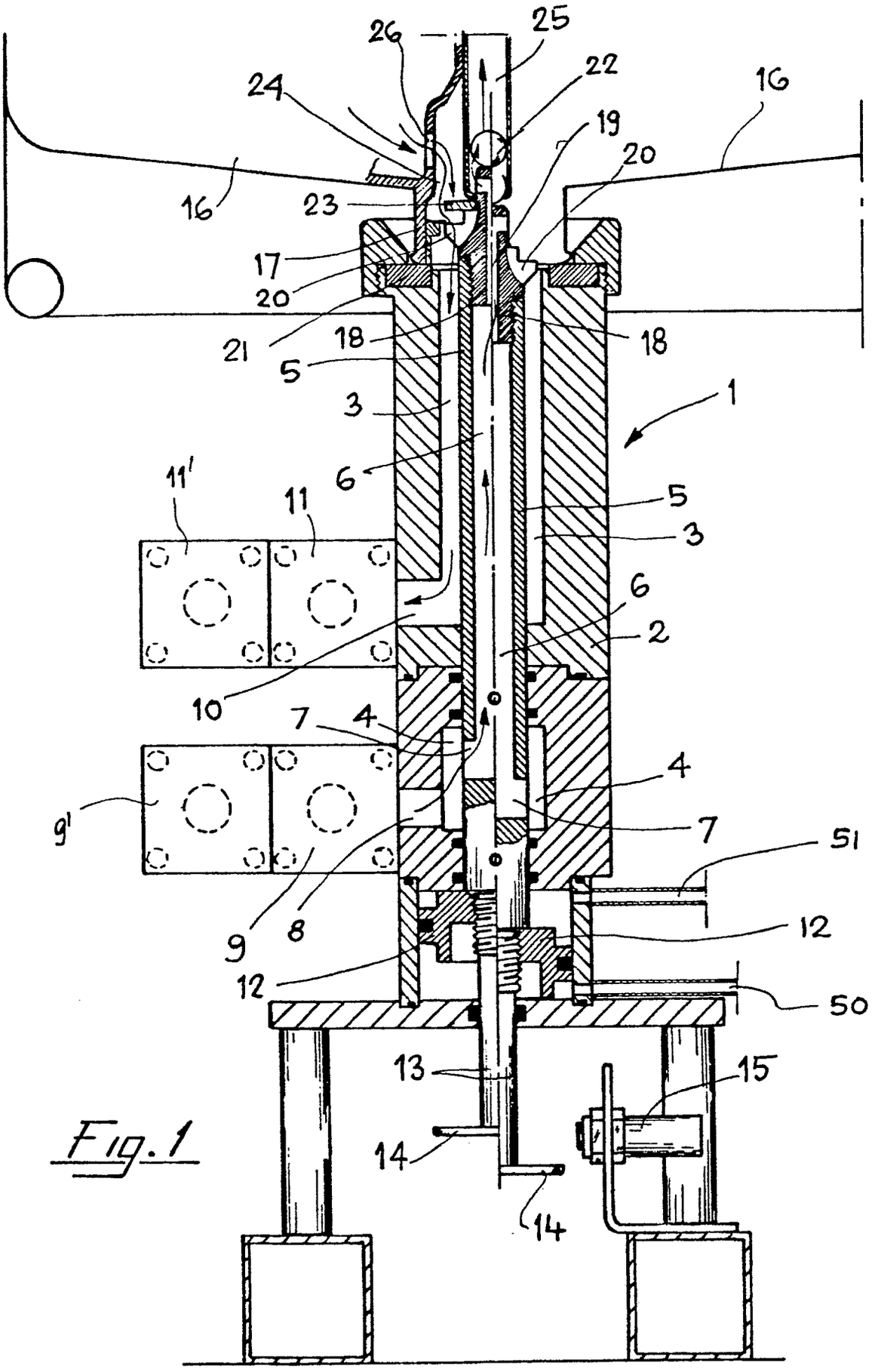
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Fig. 1

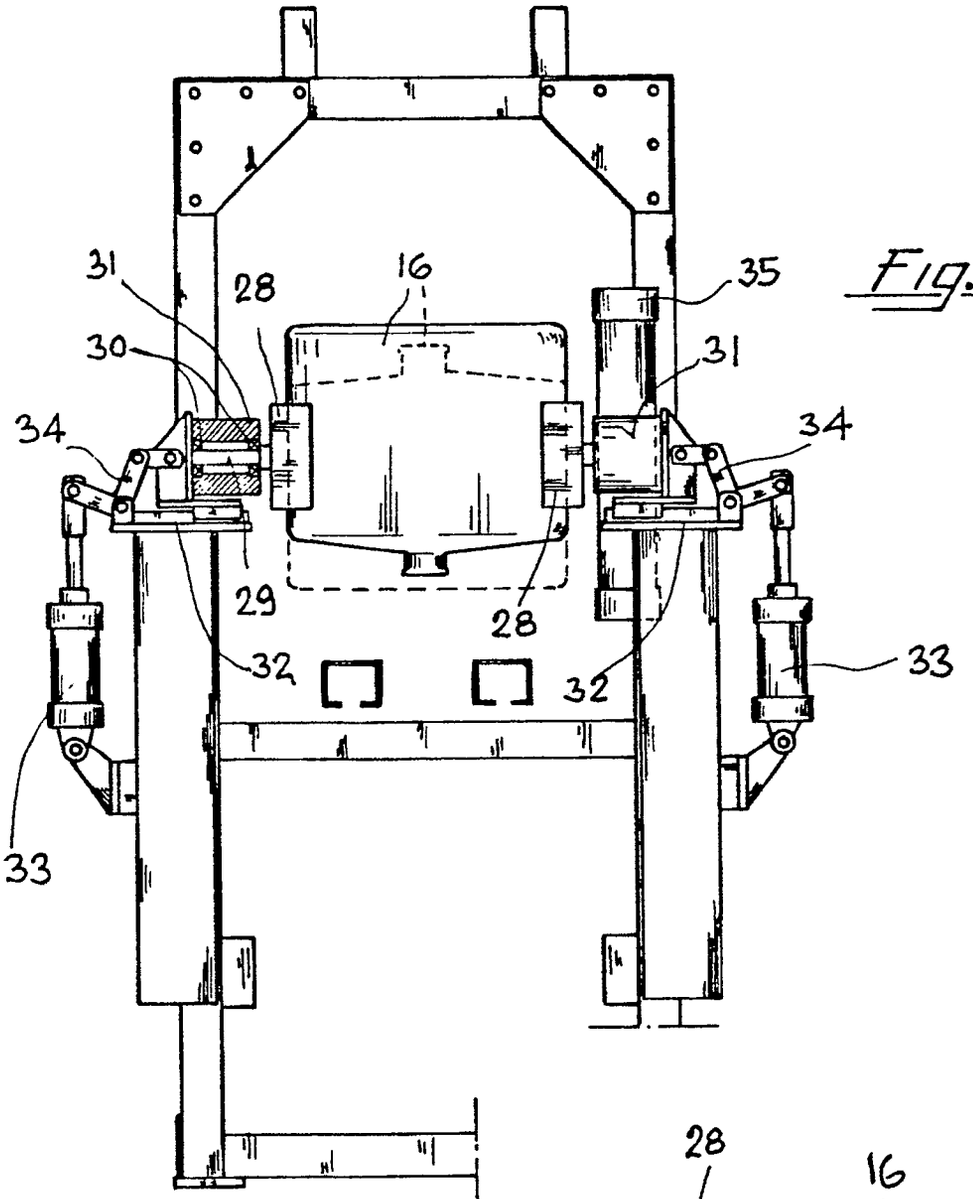

Fig. 2

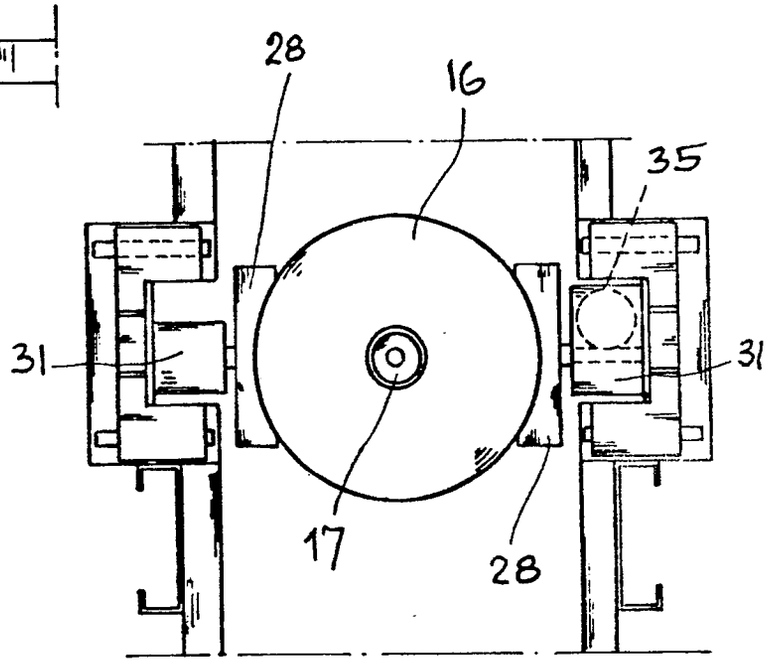

Fig. 3

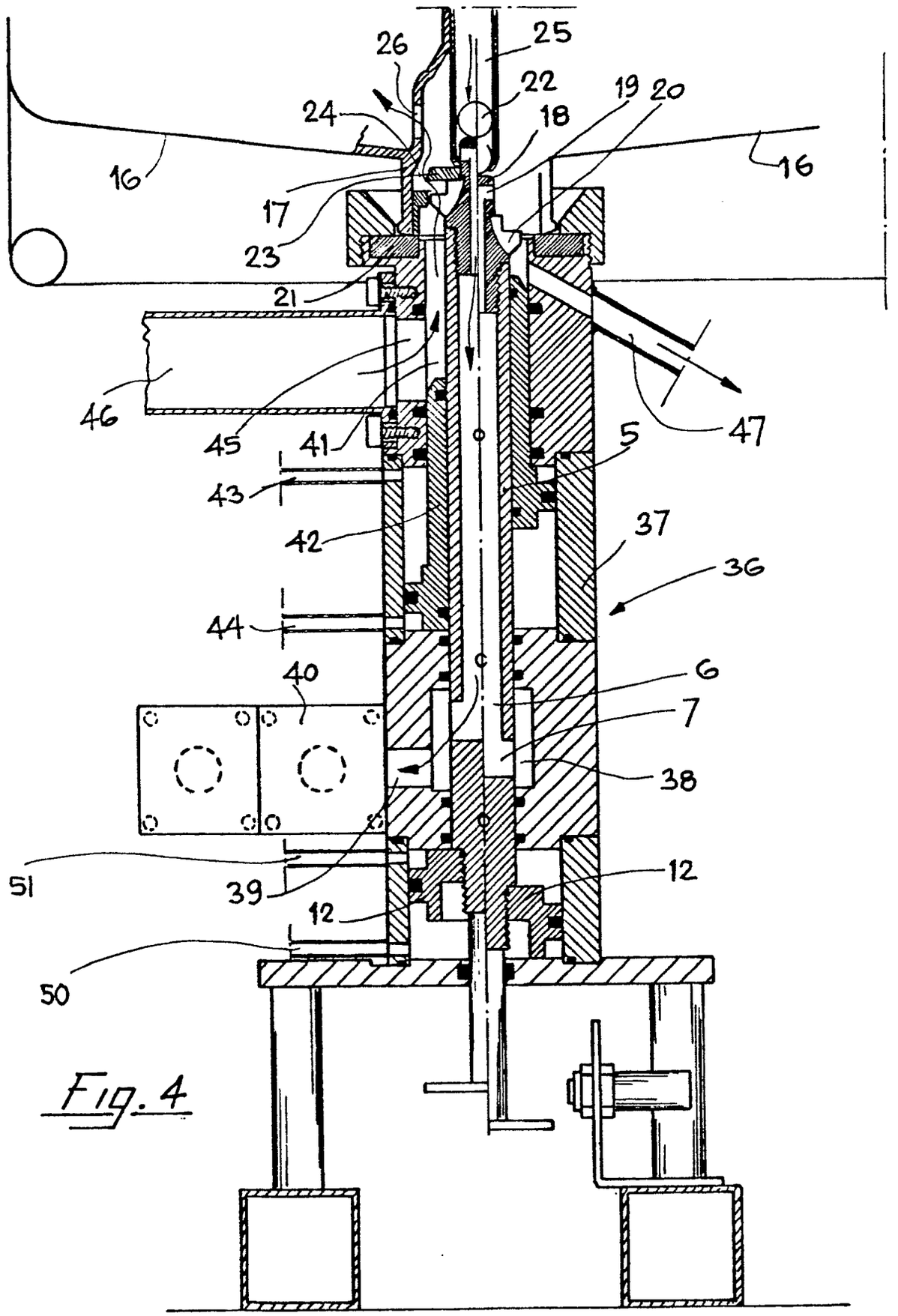
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Fig. 4