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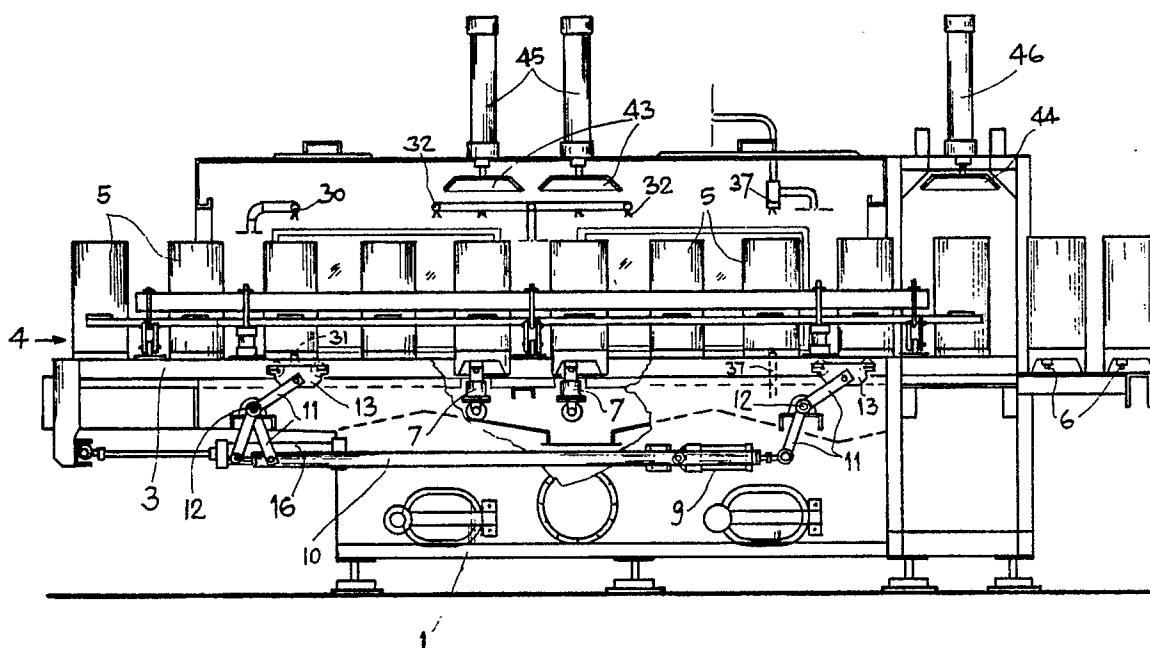
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I-24100 Bergamo(IT)(54) **Drum-washing machine, with tunnels.**

(57) In an external fixed structure one or more tunnels (2) are obtained along which drums (5) move intermittently.

At each movement, or advancement of one step, a station corresponds, in which a particular operative

phase of prewashing, washing, draining, rinsing, re-washing and sterilization is carried out. At the end of the route of each tunnel (2), the drums (5) are totally washed, sterilized and checked automatically.

*Fig.1***EP 0 410 220 A1**

DRUM-WASHING MACHINE, WITH TUNNELS

The invention concerns a drum-washing machine with tunnels with one or more tracks, particularly suitable for washing and sterilizing external surfaces, internal surfaces and the small valves of each type of drum, e.g. those known with the name "jolly", normally used to contain liquid food products.

It is substantially composed of at least one longitudinal track, equipped with peripheral grip means of the bodies of the drums, along which said drums, overturned, are made advance and are positioned intermittently in sequential stations in which are carried out the working phases of a complete cycle which terminates with the discharge of the drums washed and sterilized.

The sequential phases of said complete cycle comprise an external-internal prewashing of the drums, with rinsing of the remainders, an external-internal washing of the drums and of the small valves in heated water-detergents solution, an external-internal rinsing with water, and a final washing divided into sequential phases of: water-detergents solution, jet of steam or sterile air in pressure with function of recovery of the solutions and ejection of the residues of same, rinsing with hot water and, again, a final jet of steam or sterile air in pressure, with further object of recovery of the hot air and ejection of any other residues of solution and sterilization.

Each entrance line is equipped with at least one flow signal valve to check the washing of each drum and the signalling of any lack of washing of same due to incorrect positioning, or to other reasons.

The drums in general, and in particular those normally used to contain liquid food products, like drinks and similar, when empty, are recovered and returned to filling. Before said phase they are checked, and as far as presently possible, submitted to washing.

Said operations are at present substantially carried out manually, with a great waste of energy and time, or by semi-automatic means, like pumps, sprayers, sprinkler systems and the like, which, however, while less demanding from the point of view of human fatigue, require a large amount of staff and a great deal of time.

Another drawback consists in the fact that at present it is impossible to carry out sterilization treatments without damaging economy and productivity.

For this reason, sterilization of the drums, even if extremely important for the food products, is not usually carried out, and the hygienic-sanitary guarantees are only entrusted to traditional washing

systems.

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

The invention, as characterized by the claims, solves the problem by means of a drum-washing machine with tunnels, through which the following results are obtained: the drums, once positioned upside down and suitably aligned according to a pre-established position, are submitted to a series of automatic sequential working phases, during which they are washed and rinsed externally and internally, together with the small loading and drain valves, several times, with water-detergents solutions, with steam or sterile air in pressure, in succession, until a perfect washing and an internal sterilization are obtained.

In the washing phases the flows of water and/or steam are checked to ensure that the washes are really and correctly carried out so that the small valves through which the flows are injected are efficient and operating; the flow checks are coupled to signal systems which allow to select the washed, sterilized drums from the unwashed ones.

The machine, in its group of sequential stations, may comprise one or more parallel tunnels with flanked work stations.

The advantages of the present invention mainly consist in the fact that all the operative phases are carried out automatically and that the machine requires a modest presence of labour, which is entrusted only to load and position the overturned drums and discharge the treated drums.

Another advantage consists in the fact that the sequence of the operative phase guarantees an efficient washing and sterilization of the drums in all their parts, including the small loading and drain valves, guaranteeing the required hygienic-sanitary conditions provided for the containers of food products.

The invention is described in more detail below according to a preferred constructive form, given only as example and unbinding, with reference to the enclosed drawings, in which:

fig. 1 shows the schematic view of a longitudinal section of a drum-washing machine, showing the feed and locking means of the drums;

fig. 2. shows a cross-section of the machine, in a solution with three flanked tunnels, in which in the right part the locking means of the drums are shown, and on the left the feed means;

fig. 3 shows the feed means, more enlarged and in cross-section;

fig. 4 shows one of the feed means in lateral, enlarged view;

fig. 5 shows a locking means of the drums with

relative operating control with piston;

fig. 6 shows the group of water and/or steam injectors through the small valves and exhaust manifold through the opening without cover of the drums;

fig. 7 shows a second cross-section of the machine, showing on the right the injectors for water and/or steam coupled to the exhaust manifolds destined to the final washing station and, on the left, the injectors for water and/or steam destined to the intermediate washing station, and

fig. 8 is a lateral and cross-section of a flow control device.

The figures illustrate an unbinding example of a drum-washing machine, with tunnels, substantially composed of an external supporting structure (11), on which are preferably constructed various tunnels or corridors (2), bordered by longitudinal structures (3).

In the front part, the machine comprises a loading station (4) on which the drums (5) are mounted upside down, without covers, and with the loading and drain valves (6) arranged in a pre-ordered position, suitable to permit, in the following stations, their correct positioning with the injectors (7) and (8).

In this position each drum (5) is made advance intermittently along one of the tunnels (2).

Each advance is followed by a stop period in a pre-established position, corresponding to the time of stay in each station for execution of the operative phases.

The intermittent feed was obtained by means of a so-called "pilgrim-step" in which some lateral pistons (9), connected directly or by means of longitudinal bars (10) to some levers (11) fixed on the transversal axis (12), cause the lifting of trolleys (13) on which wheels (14) are applied, which are engaged and lift the longitudinal sections (3), which border the abovementioned tunnels (2).

In the lifting of the sections (3), the corresponding lateral fins (15) are engaged with the peripheral edge of the drums (5) and lift them, after which the action of the longitudinal pistons (16) causes said sections (3) to move one step forward.

The subsequent lowering of said trolleys (13) and the return of the pistons (16) causes the lowering of the drums (5), their detachment from the fins (15) and the support on the fixed structures (17) in positions one step forward of the previous position.

At each step, prefixed and fixed, according to the type of drum (5), corresponds an operative sequential station in which one of the phases relating to the washing and internal and external sterilization cycle of the drums is carried out.

In each of these traverse phases, to guarantee locking of the drums in their positions, special

means are provided, located on the upper part of said longitudinal sections (3). The drums (5) are therefore peripherally gripped by pliers (18), hinged in the lower part in fulcri (19) and connected, by means of longitudinal slits (23), to some pins (21) integral with stirrups (22) which form a single body with some rods (23). Said rods (23) comprise a threaded upper end (24) which is engaged, with possibility of position regulation, with a longitudinal body (25).

To the same body (25), in intermediate position to the abovementioned rods (23), are engaged also the upper ends (26), threaded and adjustable, of the rods (27) of pistons (28).

The supports with the fulcri (19) and the bodies (29) of the pistons (28) are firmly fixed to the upper part of the longitudinal sections (3).

Acting in one direction on the pistons (19), the corresponding rods (27) rise, moving the longitudinal body (25). This lifting causes the lifting also of the rods (23), integral to the stirrups (22). In lifting, the pins (21), of the stirrups (22), slide along the longitudinal slots (20) causing a backward movement of the pliers (18) which are detached from the external surface of the drums (5).

The reverse movement, towards the bottom, of the pistons (19) causes the advance of said pliers (18) and their locking engagement on the external surface of the drums (5). With the help of the described means, the drums (5) are moved along the tunnels from one work station to the next. The first wash is carried out with spray nozzles (30) and (31) which strike the drum (5) externally and internally with water recovered from the following washing sections; said water has the function of removing all the coarsest dirt and is then eliminated.

The crudest washing water, coming preferably from the third washing section, is conveyed by suitable piping to a collecting tank from which an electric pump, not illustrated, withdraws it upstream of a first filter with double grill in drilled sheet steel and a second filter, and sends it to the sprayers (30) and (31).

After a subsequent draining station, the drums (5) pass to the second phase of external-internal washing, in which the washing of the small loading and exhaust valves (6) is also comprised.

In a second tank the mains water is loaded, by means of a suitable valve, and in it is added a suitable quantity of detergent, e.g. soda.

This second phase is with total recycle.

After a multiple filtering, the caustic solution is withdrawn by a second electric pump (33) and sent to the next line, simple or double, of spraying with adjustable nozzles (32), for external washing of the drums, and to the double piping with the injectors (7) for internal washing and the washing of the two small valves (6) of the drums (5).

The solution, after having completed washing, is collected on the bottom of the machine, and, passing through a box in drilled sheet steel (35) is collected in the tank, ready for repetition of the cycle on the following drum (5).

The water-soda solution of this second tank is maintained at constant temperature, preferably approximately 80 °C, by a steam pipe coil (36). After an intermediate draining pause, we pass to the third phase of washing which consists in external-internal rinsing by means of upper and lower nozzles (37), by which mains water is delivered. This washing has the function of removing traces of soda from the drums. At the end, this water is collected on the bottom and sent to the first washing tank for the already described coarse washing.

The fourth and last phase provides further washing and sterilization of the internal part of the drums (5).

Washing is split into sequential phases: the first with water-detergents solution, the second with jet of steam or sterile water, with the function of recovery of the previous solution, of rinsing and of elimination of the residues of said solutions, the third with hot rinsing water and, finally, again with a jet of steam or sterile air in pressure, with further function of recovery of the hot water, of ejection of any residues of solutions and of final sterilization. The water-detergents solution and the hot water recovered with the jets of steam or sterile air are sent, as already indicated, to the first work stations, of prewashing and coarse washing.

The washing fluid enters the drums (5) through the small loading and exhaust valves (6) by means of injectors (8) equipped with check spring mechanisms (38).

On each feed line of the injectors (8) a flow signal valve (39) is positioned, equipped with sensor with photo-electric cell or magnetic sensor (40).

Said valves (39), by means of their gates (41), safely check the washing of each drum (5), signalling any lack of fluid flow and consequently signalling lack of washing due to incorrect operation of the system or to other events.

The flow of hot water, that of the caustic soda, that of the steam, that of the sterile air, together with the various devices with piston, are preferably but unbindingly pneumatically controlled; however, this does not exclude operation by other means, e.g. oleodynamic and mechanical.

The action of the caustic solution and that of the steam or sterile air, eliminates any traces of soda which may persist and causes the sterilization and drying of the internal parts of the drums (5).

On the discharge (42), positioned at the openings (47) without covers of the drums, probes are present which detect the end of the cycle and prepare the unit for the next one.

The entrance of the fluids takes place, as already mentioned, through the opening (47) of the cover of the drums (5).

Sealing of the washing fluids is guaranteed by a large gasket (48) which is pressed by said drums, which are in turn pressed by the upper disks (43) and (44).

The injectors (7), illustrated only schematically in figures 1 and 7, are substantially corresponding, in conformation and operation, with the injectors (8) illustrated in figure 6.

The hot water used for this last phase is recovered and sent to the relative tank for the first coarse washing treatment.

The collecting tanks, not illustrated, are equipped with overflow and drain pipes with cocks. Each tank is equipped with fast-opening door for any internal washes.

In both the second and fourth washing phase, the start of the cycle is caused by the descent of drum-pressing disks (43) and (44) controlled by upper pistons (45) and (46). The descent of the disks causes locking of the drums and their lowering until they press the small valves (6) against the injectors (7) or (8).

The abovementioned lowering causes a partial lowering of the injectors (7) and (8), compression of the pressure-springs (38) and opening of their through-seats (48). To this action correspond, automatically, the start of the pumps and the injection of the washing fluid.

Finally, the drum-pressing disks (43) and (44) rise, freeing the drums, which may thus traverse and prearrange themselves for the following phases.

The injectors (7) and (8) are substantially composed of small external pistons (8') held in position by the external springs (38). At the act of support of the small valves (6), the external springs (38) are compressed and the small external pistons drop and center on said small valves thanks to their semiconic mouth (49).

The further pressure of the small valves (6) causes the lowering of the central rod (50) and of the corresponding plug (51).

In this way, the through-seats (48) enter into communication with the rear feed ducts (52).

The small external pistons (8') are equipped with seal gaskets (53).

The operation of the machine is, as already mentioned, completely automatic, and is controlled by an electronic unit of PCL type, which also has the function of detecting and memorizing the drums (5) not washed and of signalling the position of the station with faults and the tunnel in which the faulty drums are present.

While the present invention has been illustrated and described in its functional assembly and in its

most important constructive parts, it will be evident to experts of the sector that also modified or different constructive solutions may be applied, without departing from the sphere and object of the invention.

Claims

1) Drum-washing machine (5), with tunnels (2), characterized by the fact of comprising a series of sequential stations, equipped with washing fluid delivery means, in which are present the coupling devices of the drums (5), of the intermittent feed devices of the drums (5), of the centering and pressing devices of the drums (5), of the control devices, all organized according to pre-established successions of working phases of automatic washing.

2) Drum-washing machine according to claim 1, characterized by the fact that the sequential stations are equipped to carry out in automatic successions, with intermittent feed of the drums (5), an upside down loading of the drums (5) with downward alignment of the small loading and drain valves (6) and without cover (47), a coarse prewashing of the drums (5) with rinsing of the remainders, a draining, a double washing with detergent solution, a draining, an intermediate rinsing with draining, a final washing with sequential phases with: water-detergents solution, pressurized injection of steam or sterile air of recovery, rinsing and ejection of the solutions and of any residues, hot water, pressurized injection of steam or sterile air of recovery, rinsing and ejection of the hot water and any other residues of solutions, with final sterilization.

3) Drum-washing machine according to claims 1 and 2, characterized by the fact of comprising one or more tracks or longitudinal tunnels (2) comprised between longitudinal sections (3), along which are conveyed and moved intermittently the drums (5) to be treated, placed in upside down position, with the small valves (6) suitably positioned and without cover (47); said means of intermittent feed of the drums (5) being composed of so-called "pilgrim step" systems, in which some lateral pistons (9), connected directly or by means of longitudinal bars (10) and levers (11) fixed on a transversal axis (12), enter into lifting engagement with trolleys (13) having wheels (14) aligned and comprised in the structure of the longitudinal sections (3) which border the tunnels (2) in which the drums (5) move; said sections comprising lateral fins (15) which are engaged, in lifting, with the sides of the drums (5) and being synchronized in lifting and lowering with the movement of advance and return at fixed pitch of said sections (3), driven

by longitudinal pistons (16).

4) Drum-washing machine according to claims 1 to 3, characterized by the fact that the connecting means of the drums (5), present in each sequential station, comprise pliers (18), fixed to the base (19) and equipped with longitudinal slots (20) into which slide some pins (21) which are integral to some stirrups (22) which form a single body with some rods (23) which are engaged with some longitudinal bodies (25), on which are engaged also some rods (27) of pistons (28); said base fulcri (19) and the bodies (29) of said pistons being integral with the longitudinal sections (3).

5) Drum-washing machine according to claims 1 to 3, characterized by the fact of comprising adjustable sprayers (30), (31) and (37), positioned at the intermediate stations of coarse prewashing and intermediate rinsing, and of comprising injectors (7), equipped with elastic centering and checking means, positioned at one or more intermediate washing stations, with flows passing through the small drain and loading valves (6) of the drums (5); said injectors (7) being self-aligning with said small valves, in collaboration with upper drum-pressing disks (43) driven by pistons (45).

6) Drum-washing machine according to claims 1 to 5, characterized by the fact of comprising some injectors (8) equipped with elastic centering and checking means, positioned at at least one final washing stations, with flows passing through the small loading and drain valves (6) of drums (5); said injectors being self-aligning with said small valves, in collaboration with upper drum-pressing disks (44), driven by pistons (46), and being connected to drains (42) with the mouths aligned to the openings (47) without covers, of the drums (5), against which seal gaskets (48) are engaged.

7) Drum-washing machine according to claims 1 to 6, characterized by the fact that the injectors (7) and (8) comprise some small external pistons (8), held in position by external springs (38), equipped with seal gaskets (53) and with an upper internal seat against which is engaged, in closure, a plug (51) with central rod (50) held in position by another internal spring (38).

8) Drum-washing machine according to claims 1 to 6, characterized by the fact of comprising some tanks and some feed and/or drain pipes for the conveyance of the fluids to be used at the various stations; said flows of fluids being recyclable, in particular those heated and/or comprising detergent products; and of comprising some circulation pumps (33) and heating means (36) of the abovementioned washing fluids.

9) Drum-washing machine according to claims 1 to 8, characterized by the fact that each fluid feed duct to the injectors (8) comprises a flow signal valve (39) equipped with photo-electric cell sensor

or magnetic sensor (40).

10) Drum-washing machine according to claims 1 to 9, characterized by the fact of comprising some circulation pumps (33) and some heating means (36) of the flows of washing fluids.

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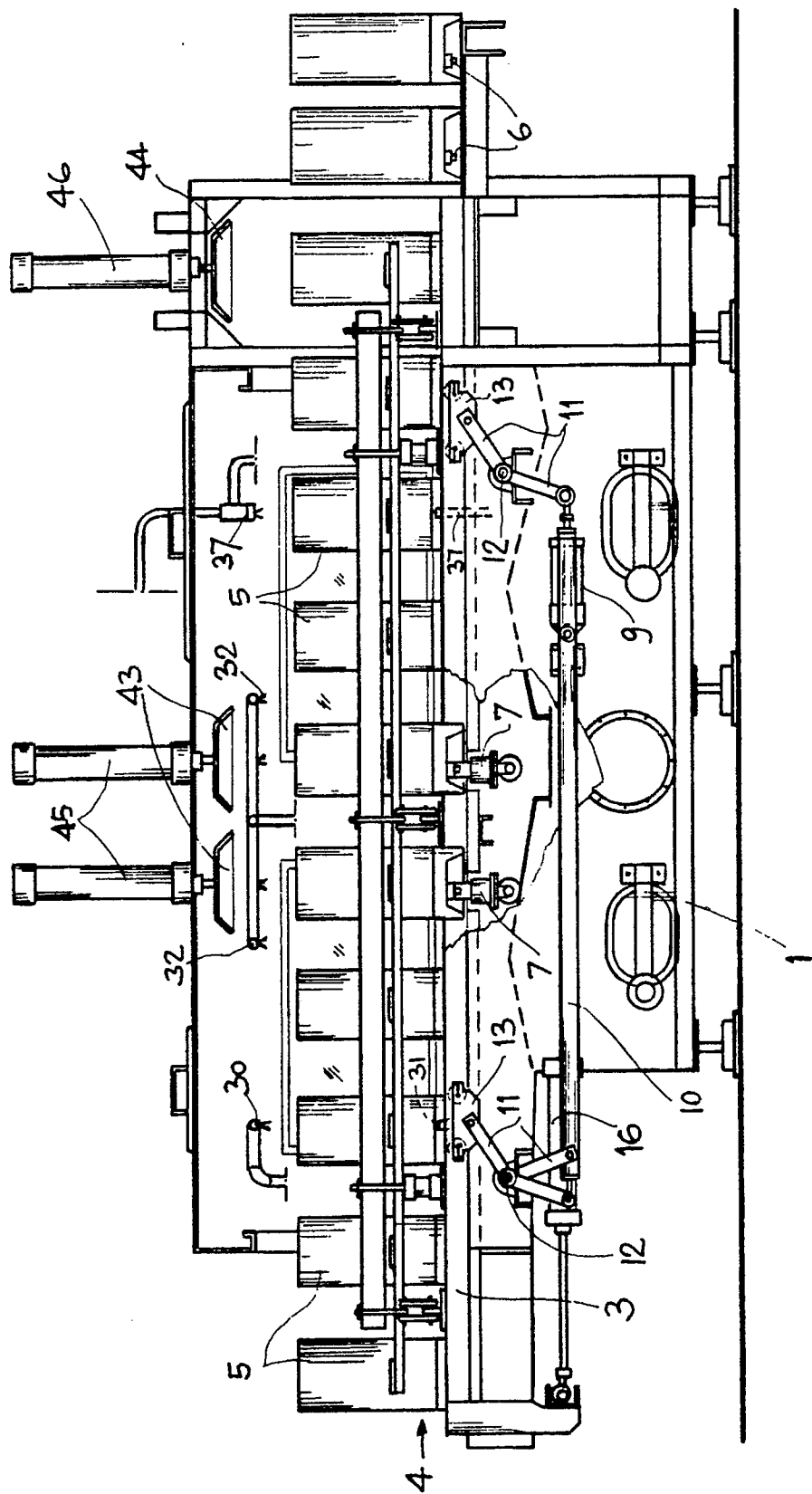
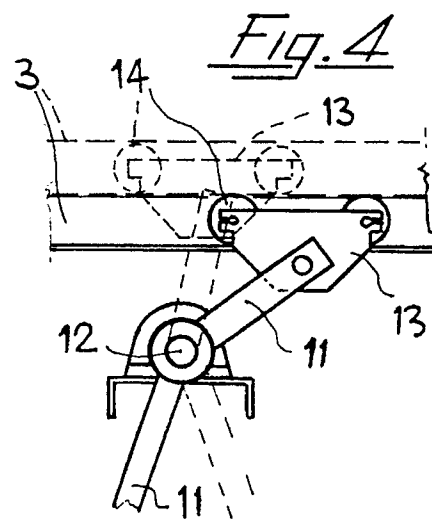
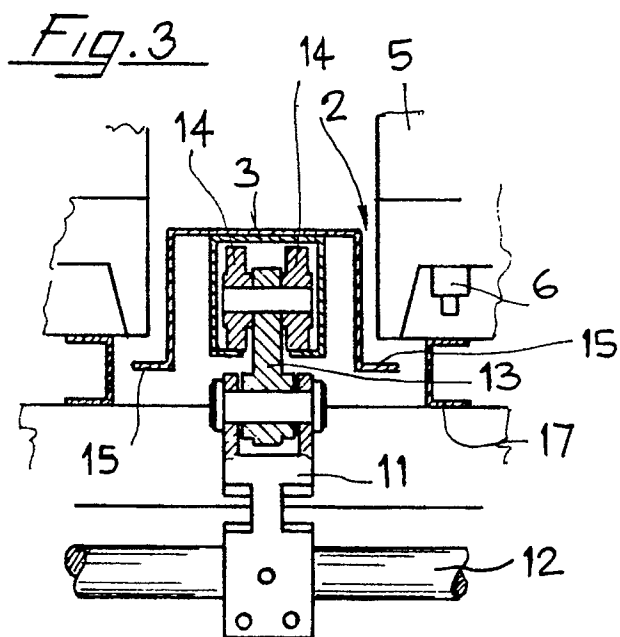
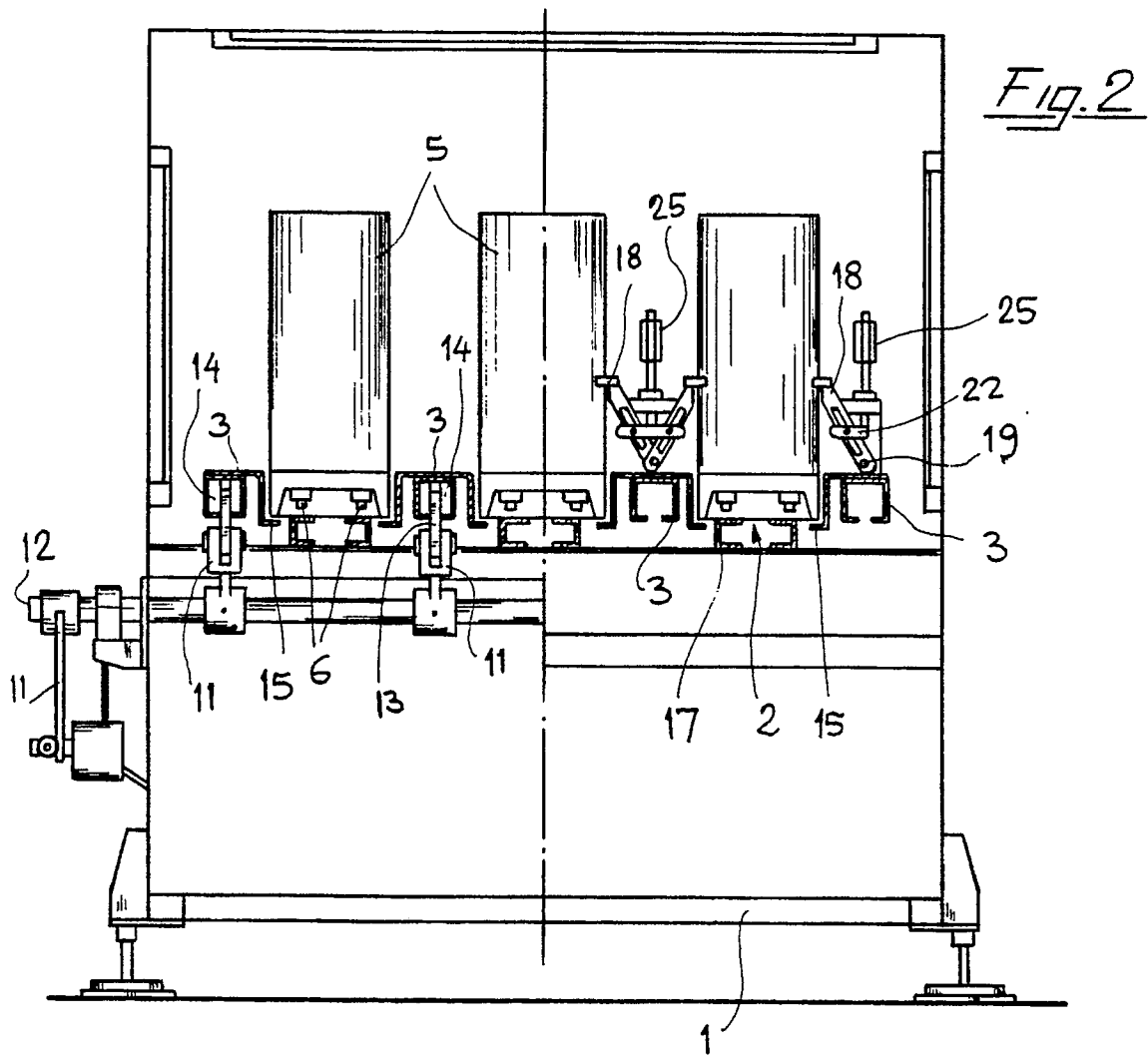
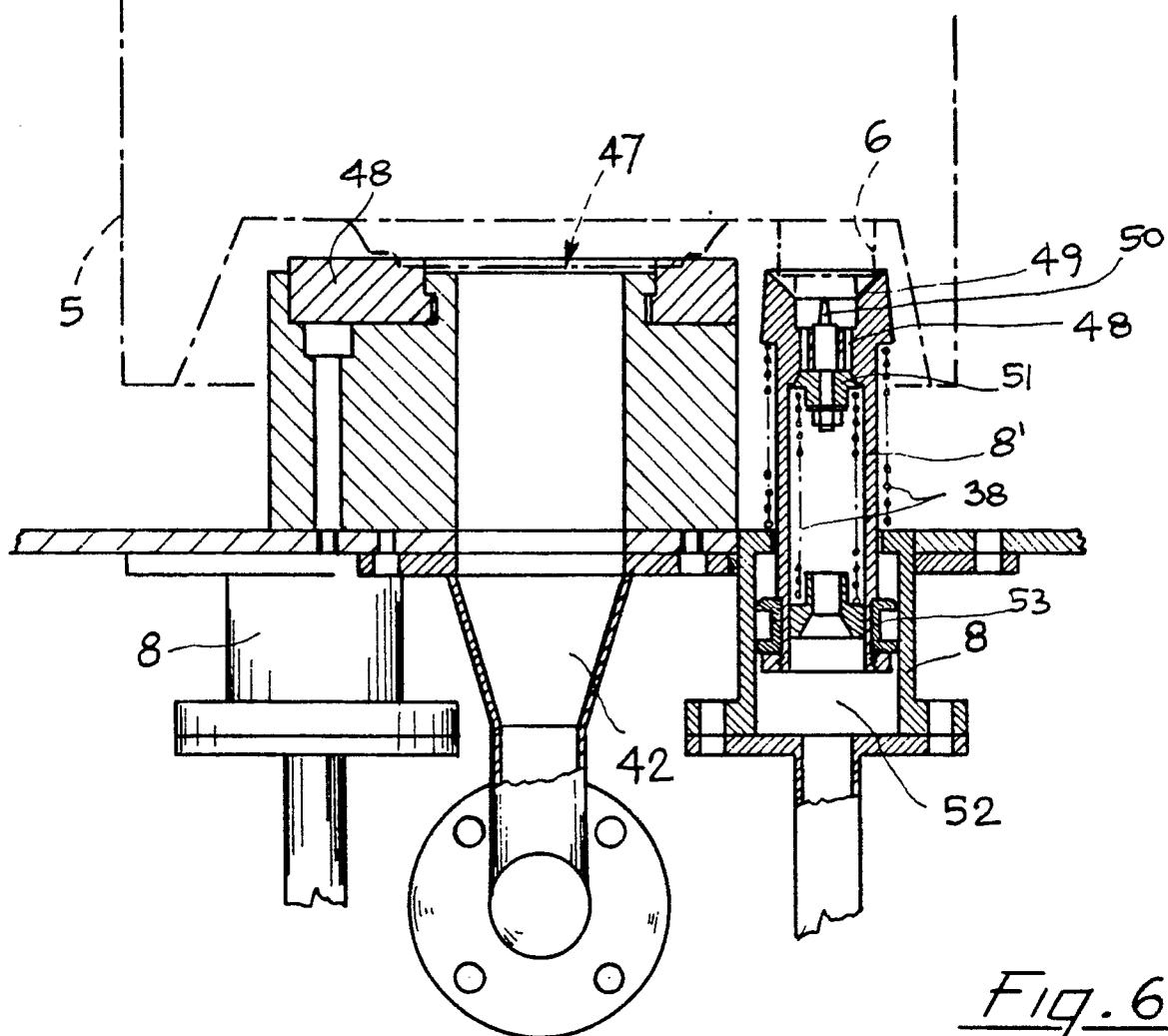
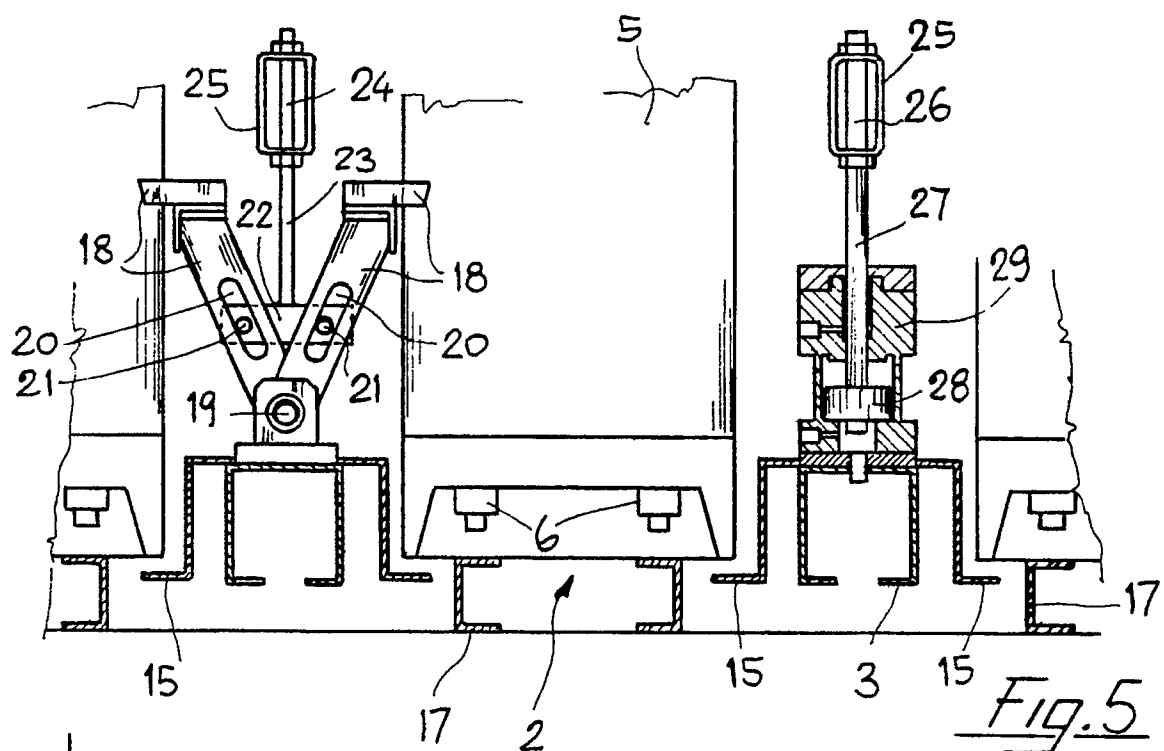
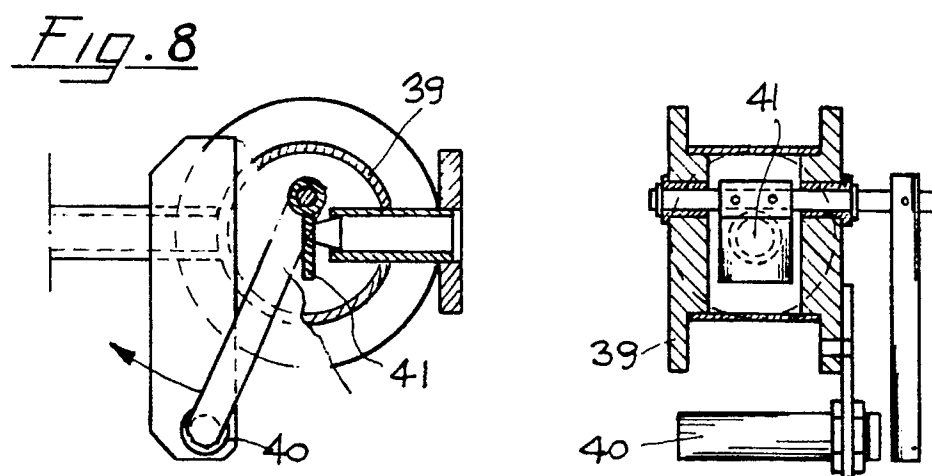
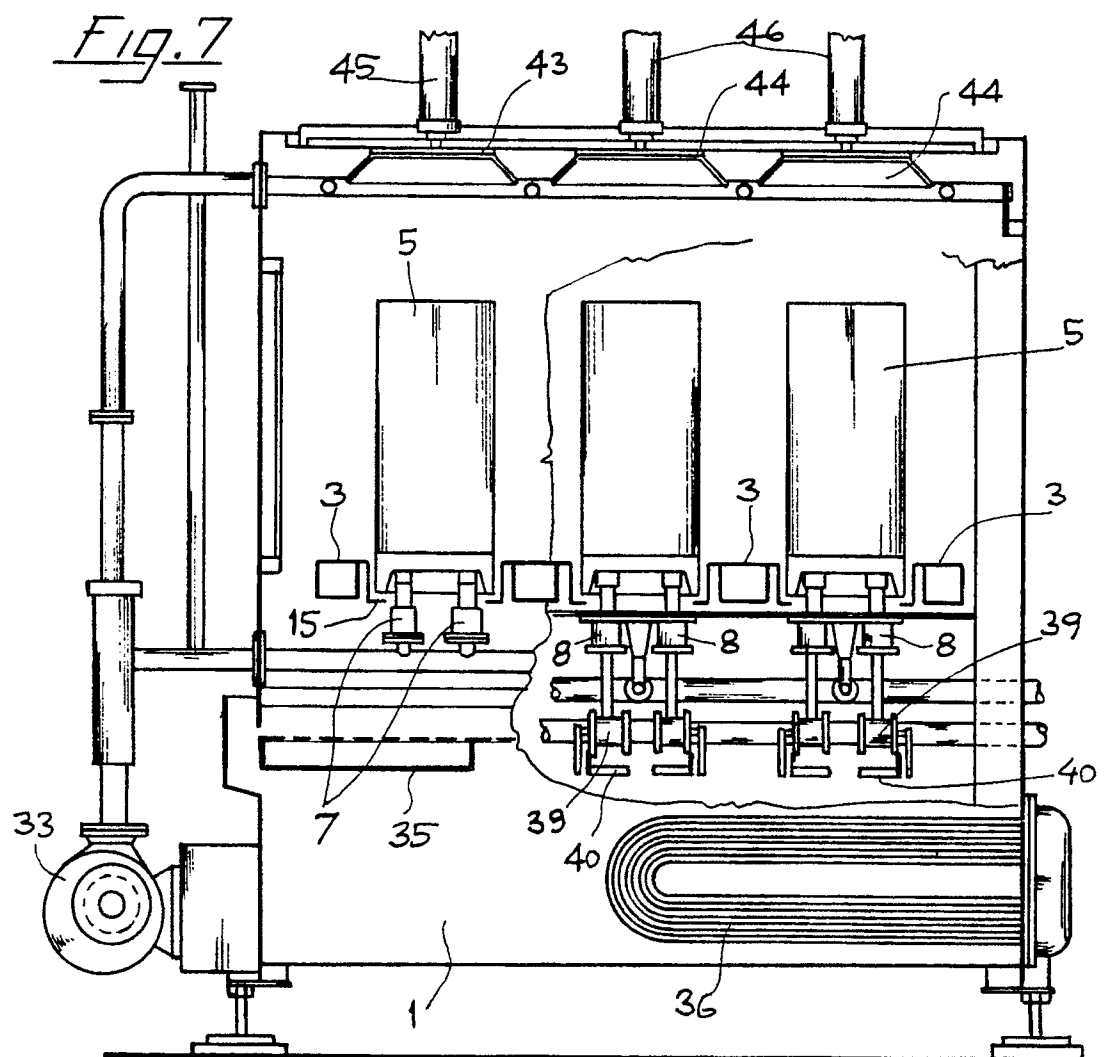


Fig. 1









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EUROPEAN SEARCH REPORT

Application Number

EP 90 11 3340

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.5)
A	DE-A-3 628 165 (TILL) * Page 2, figure * - - -	1	B 08 B 9/20 B 08 B 9/42
A	DE-A-1 457 009 (BLOCH) * Page 1, lines 1-4; pages 4-7, figures 1-4 * - - -	1	
A	DE-A-3 531 697 (SCHMIDT) * Column 2, line 47 - column 3, line 25; figures 1-2 * - - -	1	
A	BE-A-9 026 44 (GILLAIN & CO.) * Page 3, line 24 - page 5, line 24; figures 1-7 * - - - - -	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B 08 B
The present search report has been drawn up for all claims			
Place of search		Date of completion of search	Examiner
The Hague		08 November 90	VOLLERING J.P.G.
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