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(54) Machine for dispensing liquid and semiliquid material.

(57) The invention relates to a machine for dispensing liquid and semiliquid material in measured amounts to containers. Plug means are provided for easily cleaning the machine without requiring a disassembly of the machine.

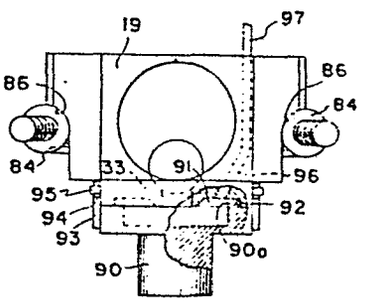

FIG. 6

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The invention relates to a machine in accordance with the preamble of claim 1.

A machine of this kind is disclosed in US-A- 3 601 288.

It is the object of the present invention to design an extremely sanitary machine of this kind which can easily be cleaned without requiring a disassembly of its parts.

The solution of this objects according to the invention consists in the characterising features of claim 1.

An embodiment of the invention is shown in the drawing, in which:

Figure 1 is a fragmentary, sectional, side elevational view of the filling machine;

Figure 2 is an enlarged, fragmentary, sectional, elevational view more particularly illustrating the dispensing valve assembly and associated parts;

Figure 3 is a schematic top plan view illustrating positions of the pump piston controlling cams and the abutments for shifting the dispensing valve handles to rotate the valves;

Figure 4 is a fragmentary top plan view illustrating the manner in which the valve and pump housings are mounted for ready disassembly;

Figure 5 is a front elevational view of one of the pump assemblies;

Figure 6 is a front elevational view of one of the valve assemblies.

Referring now more particularly to the

accompanying drawings, the machine is shown as having a frame F supporting an upstanding sleeve 10 which has a flange 10a bolted to the frame at 11. Bearings 12 and 13 mounted by sleeve 10 journal a central shaft 14 which is adapted to be driven by a spur gear 15 connected with any suitable source of rotary power.

A tank mounting orbiting assembly, to be later described, supports a liquid-filled tank 16 for rotation with the shaft 15. Also mounted for rotation with the assembly are a plurality of pump assemblies A, pins 17 being provided to secure the assemblies A in place surrounding the outlet portion 16a of tank 16 as shown. It is to be understood that the outlet portion 16a has an outlet passage 18 and that the number of assemblies A depend on how many containers are to be supported on the machine and filled during the revolution of shaft 14. The passages 18 are in radial alignment with passages 18a provided in the pump assemblies A, which, as Figure 2 indicates, are sandwiched between the tank outlet portion 16a and a plurality of valve assemblies 19 which are mounted outboard radially of each pump assembly A. As Figure 2 indicates, seal rings 20 are provided around outlet portion 18 in slots 21 provided in each assembly A to seal passages 18 and 18a at the juncture of assemblies A and portion 16a, and circular seal rings 22 are provided in slots

23 in the assemblies 19 to seal the passages 18a and passages 19a provided in the assmblies 19 at the juncture of the assemblies 19 and A.

Each pump assembly A includes a cylinder 24 with a piston 25. The piston head 25a is slotted to receive a sealing-O-ring 26. Each assembly 19 is provided with a frustoconically shaped recess R communicating with an associated passage 19a to receive a rotary frustoconical valve 27 which later will be more particularly described, and it will be seen that a cylinder 24 is positioned opposite each recess R and valve 27. Springs 27b retained by removable retainers 27a secured in the outer ends of the recesses R urge valves 27 inwardly and a sealing ring 27d is provided as shown. Openings 29 are provided in the radial outer wall of each cylinder 24, so that when a valve 27, with its port system 30, is in the position shown in Figure 2, it communicates the passage 19a with the filling passage 31 above piston 25 via opening 29. Each port system 30 includes ports 30a and 30b, and a port 30e perpendicular to port 30b, and in the Figure 2 position, ports 30a and 30b communicate passage 19a with cylinder 24. Each pump assembly A carries a container supporting pedestal 32 having a partly enclosing side wall 32a for supporting an open-topped yogurt container Y which is in position to be filled through a dispensing

opening 33 provided above each pedestal 32 in communication with each valve recess R. It is to be understood that, when the valve 27 is rotated approximately 90° from the suction position in which it is shown in Figure 2, port 30e of angle shaped port system 30 will communicate with the dispensing opening 33 and deliver material ejected by the pump piston 25 through opening 29 and port 30b of port system 30 to dispensing opening 33 via port 30e. Mounted below valve assemblies 19 are a pair of semi-circular, detachable, orbiting, condensate collecting and spill trays 34, each having passages 34a beneath each opening 33 formed by riser walls 35 which are of greater height than the tray outer lips 36.

It will be seen that each piston 25 includes an upper stem part 25b and a lower stem part 25c, joined by a coupling 37.

A rotatable tank-supporting annular frame C, which is journaled by a bearing 39, includes a top plate 41 to which an under plate 42 is secured by bolts 43. Under plate 42 is secured to the annular frame C by bolts 44. Depending from plate 42 is a flange 40 which is welded to shaft 14 and may be secured to plate 42 by bolts 45. A pin 46 centrally disposed in openings 47, 48 and 49 in plates 42, 41, and in a bottom plate 16b for tanke 16, respectively, is provided

as shown to aid in locating the parts for assembly.

As Figure 1 indicates, a guide ring 50, secured to the frame C intermediate its length by a bolt 51, mounts slide bearings 52 for the lower stem parts 25c, and a further guide ring 53 with slide bearings 54 for the lower stemp parts 25c is also provided.

Figure 1 shows a piston 25 in both an upper and lower position. Provided to guide each piston in its vertical travel relative to frame C, is a follower roller 55 received within a recessed guideway 56 formed in frame C. Each roller 55 is mounted on a threaded stem 55a received in a threaded opening 57 provided in a block 58 fixed to the lower stem part 25c of each piston 25.

The vertical position of each piston 25 at any time is determined by the vertical position of a cam follower roller 59 which is mounted in a block 60 dependent from each block 58. The vertical position of each roller 59 is influenced by either an upper arcuate cam part 61 or a lower annular cam part 62, dependent on its orbital position. The lower cam part 62 is fixedly secured to an angle plate 64 which is fixedly secured to frame F. The upper cam part 61 is pivotally secured by a pin 65 to a brace 66 projecting inwardly from frame F and mounted for vertical swinging movement upwardly and downwardly relative to fixed lower cam part 62 to vary the

lower limit position of each piston 25 and determine the volume of liquid dispensed according to the size of the container being filled. To accomplish the desired adjustment of upper cam part 61, a nut 67 secured to the end of the cam part 61 by a pin 68, receives a screw 69 which is journaled by frame F as at 70. A gear 71 on the lower end of screw 69 is in mesh with a worm gear 72 fixed on an adjusting shaft 73 which is fixed against axial movement and journaled by frame F. Preferably, a hand wheel 74 may be provided on shaft 73 to permit its manual rotation or, if desired, the shaft 73 could be motor driven.

Figure 3 schematically depicts the positions of the cam parts 61-62 and the valve 27 control abutments 75 and 76. These abutments are provided in the rotary path of handles 77 which are pinned as at 77a to the valve retainers 27a of each valve 27, handles 77 having stems 77b received in bores 27e provided in the outer end of each valve 27. The abutment 75 is fixed in position and arranged to rotate the valves 27 approximately 90 degrees when the ends of the handles 77 strike them, to a suction position in which the port systems 30 is in communication with passages 19a and out of communication with openings 33. This occurs after the charge of material has been delivered to the container at

a time when the pump pistons 25 are in "up" position. Abutment 76 normally reverses each valve 27 because it is at a different level in position to engage the opposite upper end of each handle 77 and cause it to swing in the opposite direction. It is to be observed however, that the abutment 76 is retractable from normal position to a position in which it is radially out of the path of the handles 77 and will not activate them to move the valves 27 to a dispensing position.

Certain critical parts are fabricated and assembled in a particular manner to permit their ready disassembly for periodic cleaning purposes. In addition a "clean-in-place" system is provided which is used to clean the parts on a daily basis. Figures 4 and 6 particularly indicate the manner in which the assemblies 19 and A are supported by the tank bottom plate 16b in the manner which permits them to be easily disassembled. It will be observed that the outer perimeter of plate 16b is a fourteen-sided polygon and it will further be obeserved that threaded openings 83 are provided in the plate 16b to accomodate mounting stud members 84.

As Figure 5 particularly indicates, the pump assemblies A in front elevation are substantially T-shaped and include converging recesses 85 from which the assemblies A are suspended on

stud members 84. Likewise (see Figure 6), the valve assemblies 19, which also are generally T-shaped in front elevation, have converging recesses 86 to similarly suspend the assemblies 19 on the stud members 84. Clamp washers 87 provided on the studs 84 may be secured by nuts 88 within recesses formed by shouldering the assemblies 19 as at 19c, and as will be seen have wedge walls 87a which engage with similarly inclined walls 89 on the valve assemblies 19 to clamp the assemblies 19, and thereby the housings A, securely in position. To disassembly the assemblies 19 and A for cleaning and obtain access to passages 18, it is merely necessary to back off the nuts 88 and lift the assemblies 19 and A vertically from the stud members 84. It is extremely easy likewise then to simply replace them in position again and tighten nuts 99 when reassembly is to be effected.

When it is desired to clean the critical parts of the assembly "in place", the semi-circular trays 34 are removed and plugs 90 (Figure 6) are pushed up into position in the recessed openings 91 provided in the valve assemblies 19 surrounding dispensing openings 33. Each plug 90 includes a shoulder portion 90a snugly fitting into opening 91 and has an O-ring or other suitable seal 92, as shown. To secure the plugs 90 in position, outboard walls 93 thereon have bayonet slots 94 for receiving pins 95 provided

on the assemblies 19 and the plugs 90 are twisted to engage the pins 95 in the slots as the plugs 90 are moved into position. Leading upwardly from each assembly 19 from opening 91, is a passage 96 leading to a tube 97. Tube 97, as indicated in Figure 1 leads back into tank 16.

In order to clean the assembly in place, each of the openings 91 in each assembly 19 is fitted with a plug 90 and water introduced through a tube 98 into the interior of tank 16 is then re-circulated through the assemblies A and 19 back to the tank 16 via passages 96 and tubes 97. Only one tube has been shown in Figure 1 but it is to be understood that each of the valve assemblies 19 may have a tube 97 or that a manifold (not shown) can be provided to which passages 96 lead and that a single tube may then lead from it back into tank 16. When a water flush has been accomplished, one of the valves 27 can be removed to drain the water from the system. Thereafter the process can be repeated with a sanitized cleaning solution, and suitable water and cleaning solution flushes can be alternated until the desired sanitary cleaning has been accomplished.

It is believed that the operation of the device will be readily understood from the foregoing description. In practice, as indicated in Figure 3, a star wheel 99 is provided to deliver

containers to each pedestal 32 as the pedestals move past the pockets 99a in the star wheel. Just prior to the time that a particular pedestal 32 reaches the container loading position, abutment 76 has been engaged by the handle 77 of the particular valve assembly 19 to rotate the particular valve 27 through substantially 90° to the "fill" position. At this time, the piston 25 is in its lowermost position, riding on the lower cam part 62. As the particular assembly rotates around, lower cam part 62 moves the piston 25 upwardly during the fill stroke to dispense fluid to the container and by the time fixed abutment 75 is reached, the dispensing operation has been completed. When the opposite end of handle 77 contacts abutment 75, the valve 27 is reversed and brought to the Figure 2 position, and the suction stroke of the pump piston 25 can begin. By the time a container reaches the star wheel 100 and is removed by it, valve 27 has completely closed and the position of star wheel 100 is such that its pockets 100a engage and remove the container from each pedestal 32 at a point slightly downstream from the fixed abutment 75.

It is the upper cam 61 which moves the piston 25 downwardly in the suction stroke indicated in Figure 3. The pivotal position of cam 61 determins the length of the suction stroke within certain predetermined limits to handle the volume

requirements of various containers.

The mounting of the pump assemblies A and of the valve assemblies 19 is subject of European application 81107187.7, the pivotal mounting of cam part 61 is subject of European application .... (divisional application of 81107187.7).

Claims:

1. Machine for dispensing liquid and semi-liquid material and the like in measured amounts to containers (y), comprising

a) a supply tank (16) with a plurality of circumferentially spaced radial tank outlet passages (18) provided in a housing of said tank, the tank (16) being mounted for rotation on a stationary frame (F);

b) a pedestal (32) for supporting a multiplicity of containers (y) to orbit with said tank (16);

c) a plurality of pump assemblies (A) mounted to orbit with said tank (16), each pump assembly (A) including a cylinder (24) and a piston (25) mounted for reciprocating movement in a suction and ejection stroke;

d) a plurality of valve assemblies (19) mounted to orbit with said tank (16), each valve assembly (19) including a valve (27) feeding material in one position from a tank outlet passage (18) to the cylinder (24) of a pump assembly (A) and in another position from the cylinder (24) to a dispensing opening (33) above a container (y);

e) stationary arcuate cam parts (61, 62) for moving cam follower rollers (59) connected with said piston (25);

characterised by the following features:

f) plugs (90) may be received by said valve assemblies (19) to block said dispensing openings (33);

g) passages (96) are provided in each of said valve assemblies (19) to remove material blocked by one of said plugs (90).

2. Machine according claim 1, characterised in that tubes (97) are provided connecting said passages (96) with the tank (16) to recirculate cleaning fluid thereto.

3. Machine according claim 1, characterised in that said plugs (90) are lockably and releasably receivable by said valve assemblies (19) in recessed openings (91) surrounding said dispensing openings (33).

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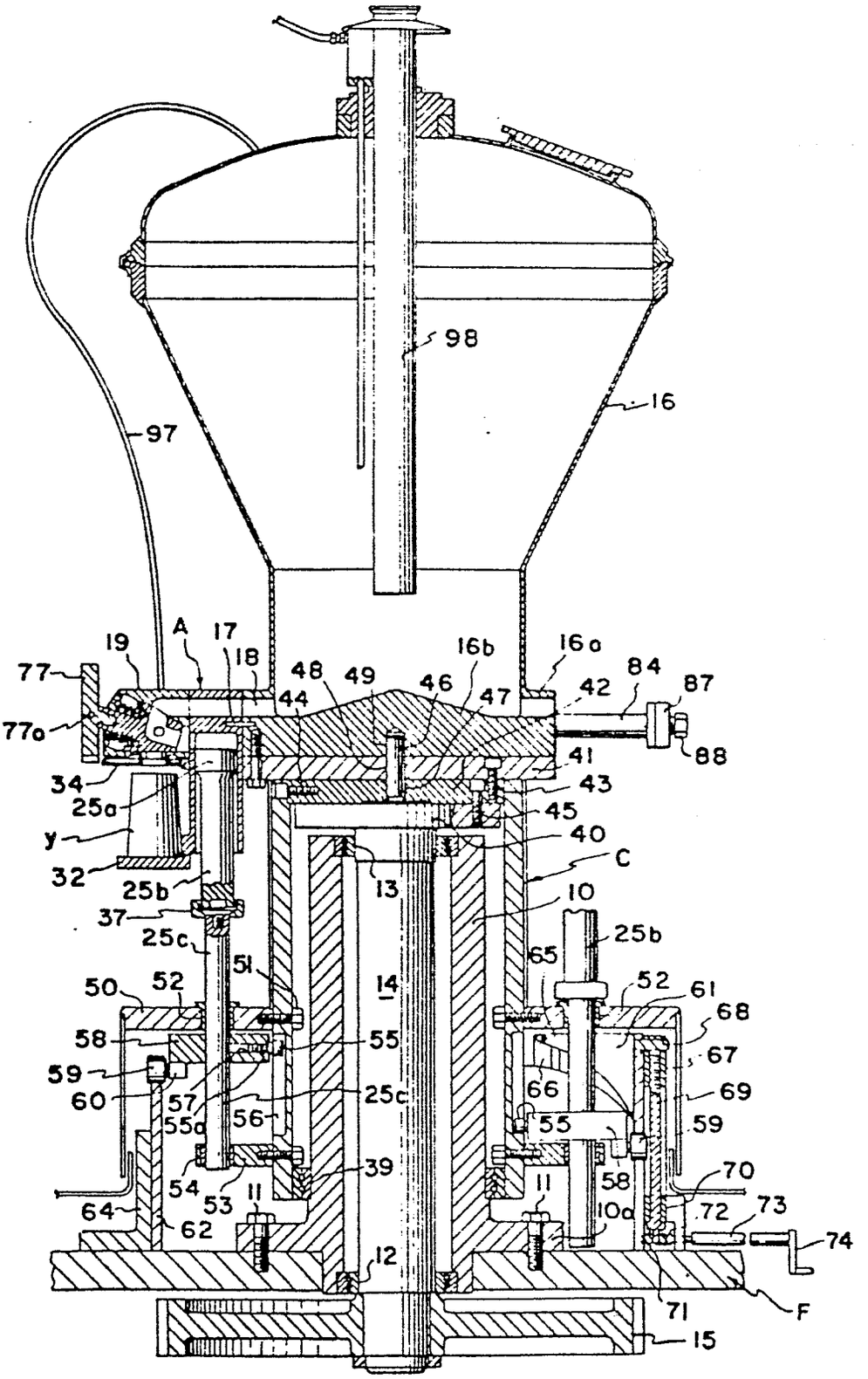
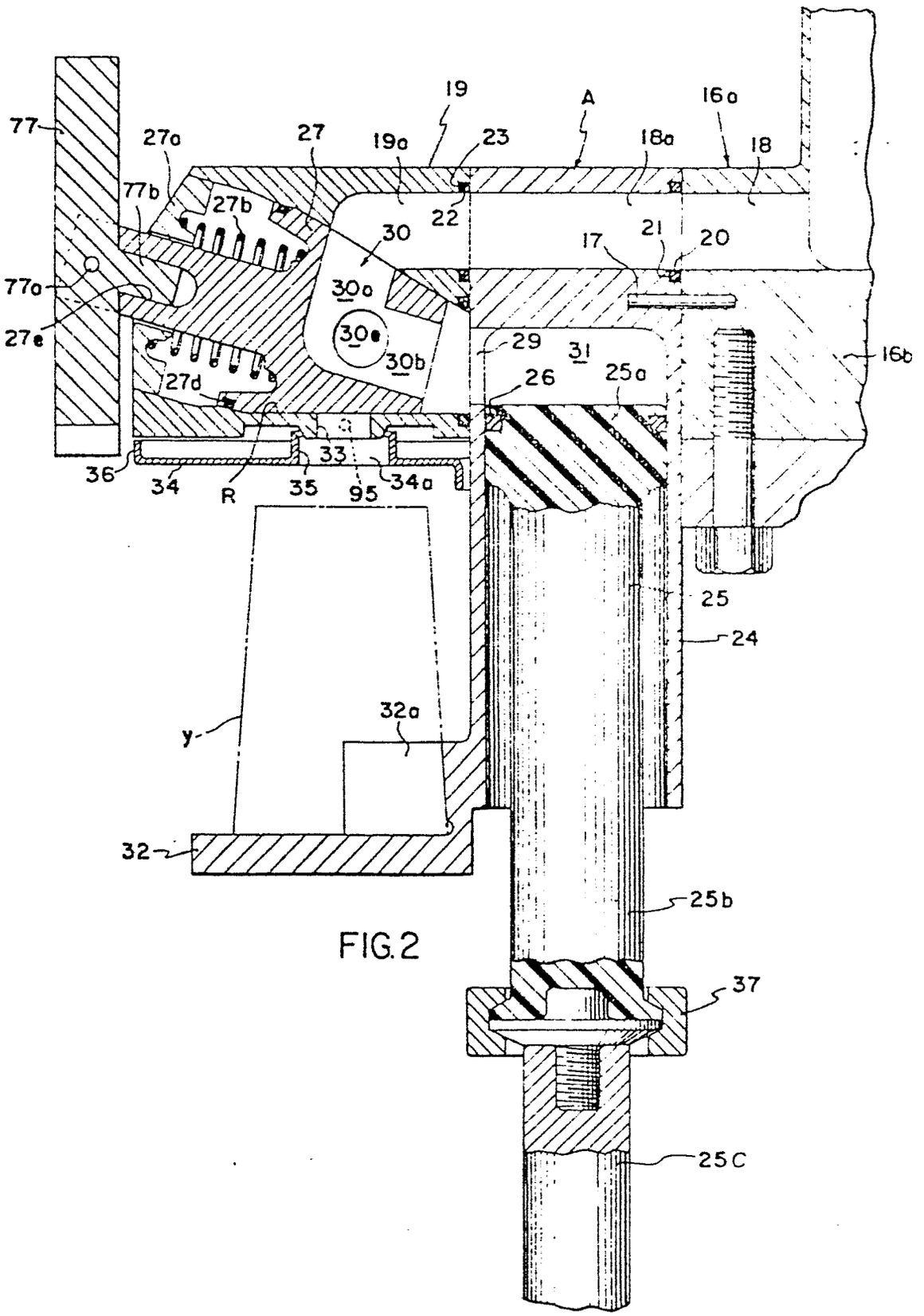


FIG1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77b
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27e
30c
30b
29
31
16b
27d
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y
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25c

FIG. 2

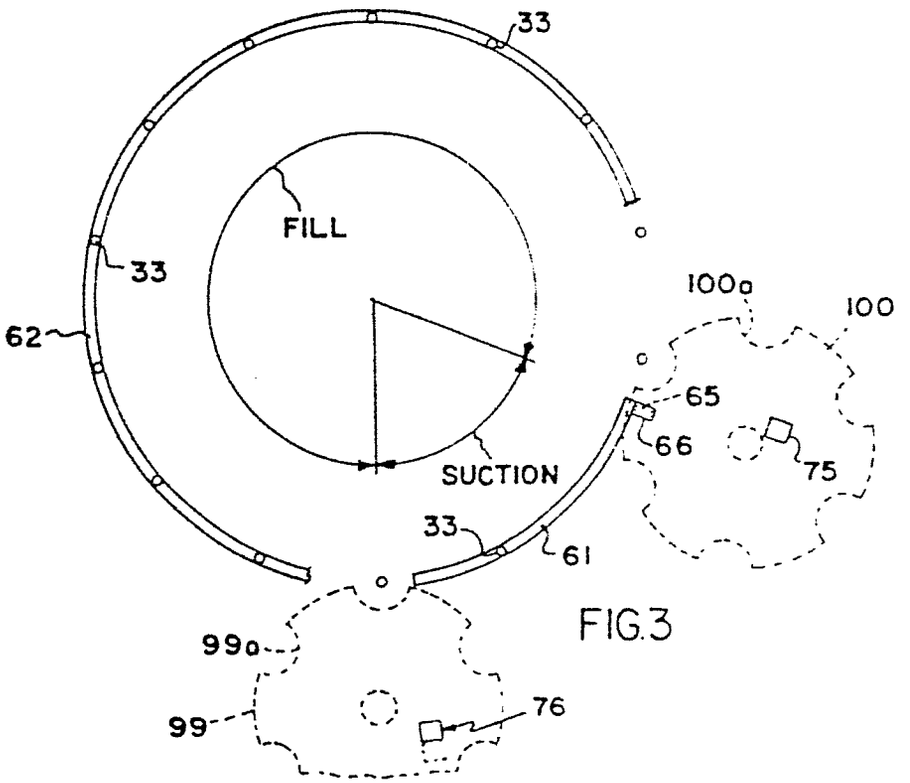

FIG.3

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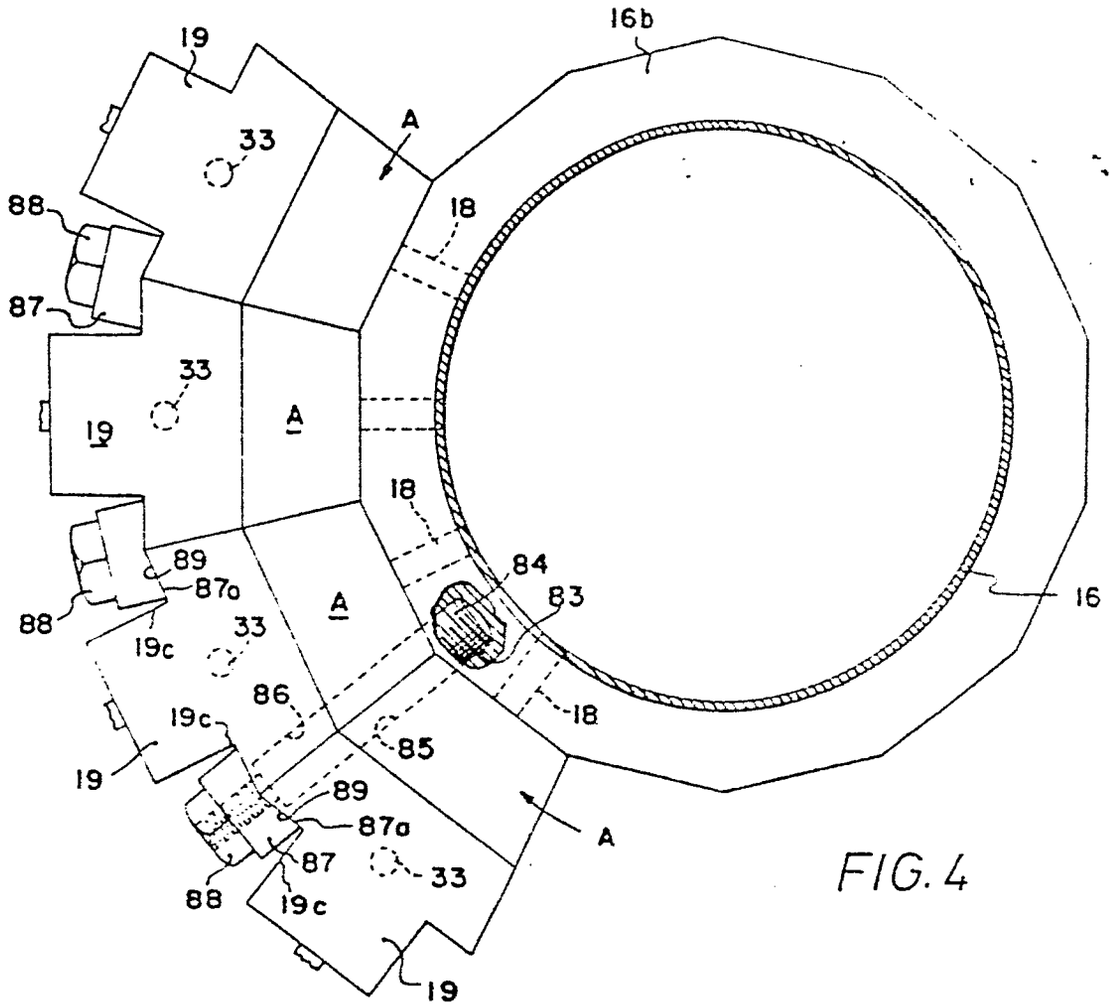

FIG. 4

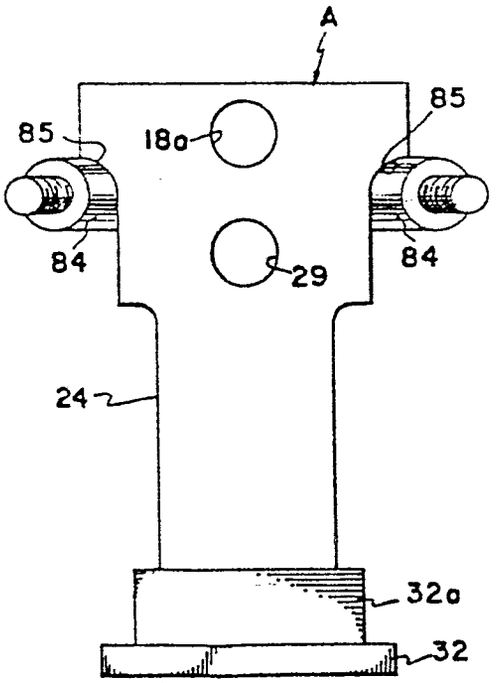

FIG. 5

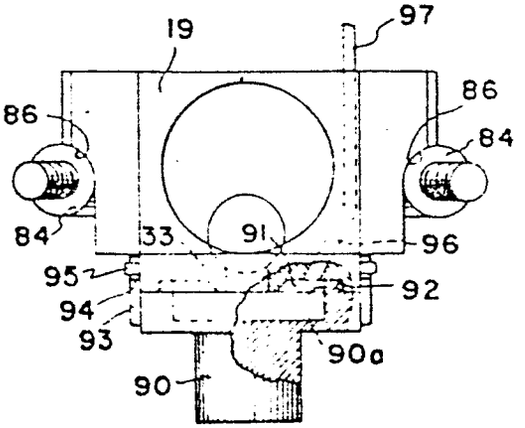

FIG. 6