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(54) An apparatus for batching liquids

(57) An apparatus for batching liquids comprises a plurality of dispenser valves (6) arranged circumferentially on a horizontal plane. A base (7) predisposed below the dispenser valves (6) is commanded to rotate by a motor group (11, 12) solid in rotation with the base (7) about a vertical axis (x-x). The base (7) bears a balance (16) for weighing a recipient (15) collecting batched liquids. By effect of rotations of the base (7) the recipient (15) can be positioned selectively below the valves to receive the liquids to be batched. An organ (17), solid in rotation with the rotatable base (7), can open the dispenser valves (6). The apparatus can be used to batch paints, solvents and additives precisely and rapidly, and is particularly suitable for instantaneous preparation of paint products.

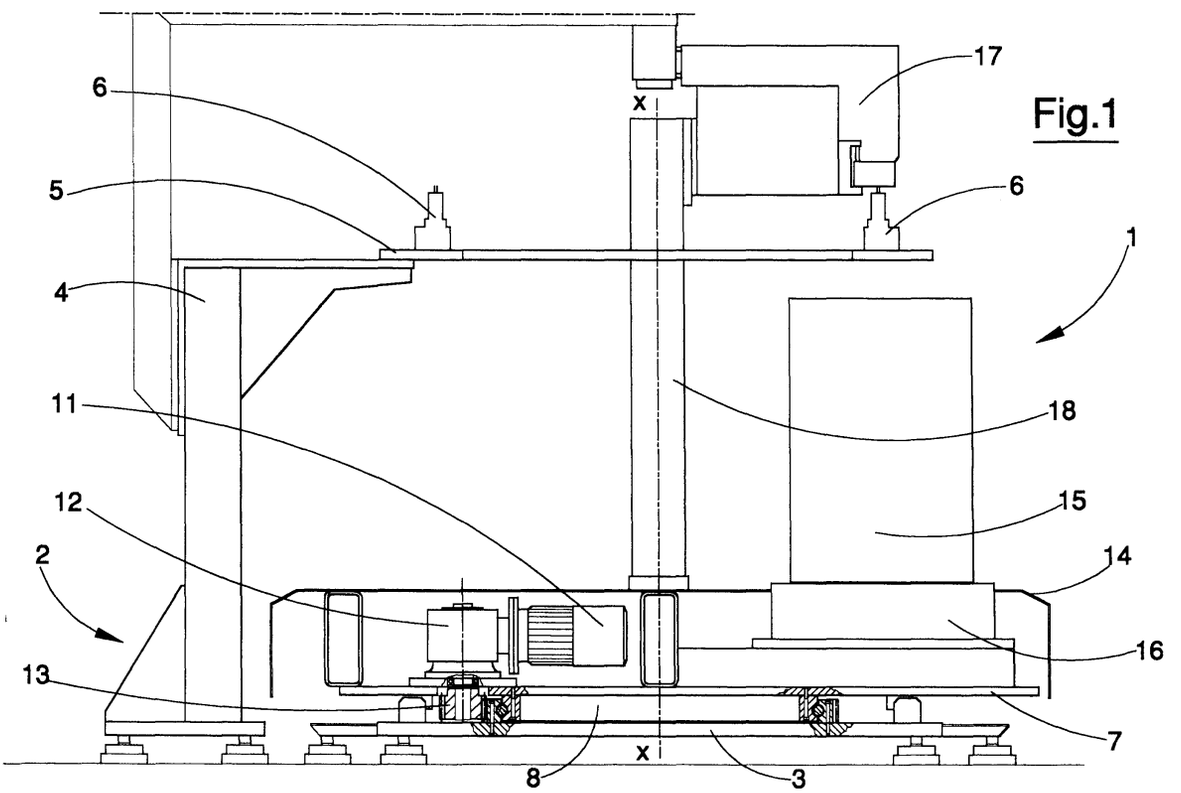

Fig.1

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Description

[0001] Specifically, though not exclusively, the invention can be usefully applied in batching paints, solvents and additives, especially for the preparation of packages of paint products.

[0002] The prior art teaches various apparatus for instant preparation of paint products. For example, Italian patent application IT MO97A000126 describes a machine comprising a plurality of nozzles distributed in a straight line. Each nozzle can dispense a batched liquid from a tank. A balance is constrained to a straight-moving slide moving parallel to the line of nozzles; a storage recipient for the batched liquid, resting on the balance, can be selectively positioned below the nozzles by effect of controlled translations of the slide so as to receive from the nozzle batched quantities of liquids on command of a central unit which also reads off the weight on the balance. During operation, the operator places an empty recipient on the balance, after which the central unit carries out the recipient automatic filling cycle so that a final product is exactly as the operator ordered when preselecting.

[0003] Known batching apparatus, however, have various drawbacks and can be improved in various aspects.

[0004] Firstly, the apparatus are relatively massive considering the number of liquids they can batch.

[0005] Secondly, the filling cycle of a batched product package takes quite a long time to carry out. Having said that, it is impossible to reduce work time by much since excess speed would damage the precision of the batching, mainly because the inertia of the mobile parts of the apparatus might alter the weight reading on the balance.

[0006] A further drawback of known apparatus is the presence of flexible tubes in movement (for example, tubes carrying the operating fluids of the opening and closing devices of the dispensing valves), with a consequently high risk of damage to or breakage of the tubes themselves.

[0007] Other drawbacks besides in known apparatus are represented by the limitation in the number of batchable liquids and poor batching precision.

[0008] The main aim of the present invention is to obviate the above-mentioned drawbacks in the prior art.

[0009] An advantage of the invention is that it provides a batching apparatus which is compact and relatively contained in mass, both in terms of length and width. A further advantage is that the invention provides a constructionally simple and economical apparatus.

[0010] A further advantage is that the apparatus of the invention can carry out a high number of batching operations for a wide range of different liquid products.

[0011] A further advantage is that a relatively precise batch is produced, and at a high operating speed.

[0012] These aims and advantages and others besides are all attained with the invention as it is characterised in the appended claims.

[0013] Further characteristics and advantages of the present invention will emerge from the detailed description that follows, of a preferred but not exclusive embodiment of the invention, illustrated purely by way of a non-limiting example in the accompanying figures of the drawings, in which:

figure 1 is a schematic lateral view in vertical elevation of an apparatus made according to the invention;
figure 2 is a plan view from above of the apparatus of figure 1;
figures 3 and 4 show two enlarged details of figure 1.

[0014] With reference to the above figures, 1 denotes in its entirety an apparatus for batching liquids, especially useful for batching paints, solvents and additives with the aim of being able to produce at will a wide range of differing paint products.

[0015] The apparatus 1 comprises a frame 2 inferiorly having a base platform 3 and at least one upright 4 which superiorly supports a horizontal support plane 5 having a central opening.

[0016] A plurality of dispensing valves 6 are predisposed on the periphery of the upper support plane 5, each of which valves dispenses a liquid in batches. The valves 6 are circumferentially arranged on a horizontal plane. Each valve 6 has its own means (of known type and not illustrated) for supplying liquid to be batched, which means comprise, for each valve 6, at least one container for a liquid product to be batched and a feed pipe for transferring liquid from the container to the dispenser valve 6. Each valve is also provided with a pump device, of known type and not illustrated, for conveying the liquid product along the supply pipe from the container to the valve. A return pipe (of known type and not illustrated) is provided for each valve 6 for returning the liquid product from the valve 6 back to the container. With the valve closed, the return pipe can be passed through by a volume of liquid generated continuously or at predetermined intervals by the pumping device. The return flow reduces the risk of encrustations and blockages in the dispenser valve 6.

[0017] Each valve 6 is provided with a mobile element that can assume at least one lower closed position in which it prevents liquid dispensing, and an upper open position in which the valve can dispense liquid. In the given example the mobile element comprises a lower obturator which can close a dispensing mouth of the valve 6 and a stem, solidly constrained to the obturator, having a vertical axis, and superiorly provided with a head for gripping the mobile element with an actuating organ.

[0018] The apparatus 1 comprises a base 7 which can be rotated on command with respect to the frame 2 about a vertical rotation axis x-x. The base 7 is predisposed below the dispenser valves 6. The base 7 com-

prises a flat support, substantially circular in shape, on a bottom side of which a cylindrical body is screw-coupled. The body 8 has a smaller diameter than the flat support. The lower body 8 has a cylindrical peripheral surface which is coaxial to the rotation axis x-x of the base 7. The peripheral surface is rotatably coupled, for example by means of a series of spheres 9 or other elements having a rolling support function, to an internal diameter of an annular crown wheel 10 screw-fixed to the frame 2.

[0019] The rotatable base 7 is rotated by a motor group which is solid in rotation with the base itself. The motor 11 itself is preferably electric and actuates, through a preferably geared reducer 12 at least one pinion 13 having a vertical axis which enmeshes with the fixed crown wheel 10 coaxial to the rotatable base 7. The pinion 13 is supported at a lower end of a rotating shaft projecting from the reducer 12 and crossing an opening afforded in the flat support of the base 7. The whole motor group is located above the rotatable base 7 and is comprised within the radial mass of the base itself. The direction of the axis of the motor is substantially radial with respect to the base 7. The motor 11 extends in a substantially horizontal direction, perpendicular to rotation axis x-x of the rotatable base 7. The shaft bearing the pinion 13 which projects from the reducer has a vertical rotation axis. The motor 11 is situated in a space comprised between the vertical rotation axis of the pinion 13 and the vertical rotation axis x-x of the rotatable base 7. A casing 14 superiorly and laterally protects the motor group.

[0020] The apparatus 1 comprises means for weighing predisposed to weigh at least one recipient 15 located on the rotatable base 7. In the illustrated case the means for weighing comprise a balance 16 of known type which is solid in rotation with the rotatable base 7 and located diametrically opposite to the motor group 11 and 12. The balance 16 has an upper plane for positioning and weighing a recipient 15 containing the batched product. The weighing plane is predisposed at an opening afforded in the casing 14. By effect of rotations of the base 7 the recipient 15 can be positioned selectively below the various valves 6 so as to receive the batched dispensed liquid.

[0021] The apparatus has at least one valve actuation organ 17 able on command to move the mobile elements of the valves 6 from a closed position into an open position. The actuating organ 17 is mounted on a support column 18 which rises vertically and coaxially from the rotatable base 7. The actuating organ 17, which is located substantially on the vertical of the balance 16, is solid in rotation with the rotatable base 7. In the illustrated embodiment the actuating organ 17 comprises a hydraulic linear actuator having a vertical line of action for commanding vertical displacements of a gripping element able to interact with the head of the stem of a valve 6. By effect of rotations of the base 7 and thus of the support column 18, the actuation organ 17 can be positioned selectively according to the various valves to be actuated. The actuator can comprise three coaxial cylinders set in series one above another; in another embodiment the valve actuation organ can comprise an obturator raising device which can be commanded, for example, by means of an encoder to enable regulatable opening of the valves in a plurality of intermediate dispenser mouth open positions.

[0022] The actuator of the actuation organ 17 is commanded by means of an operating fluid transmission circuit having a fixed part and a mobile part solid in motion with the column 18 of the rotatable support. The fixed part and the rotating part of the fluid circuit are interconnected by means of a joint 19 comprising a rotating fluid distributor of known type and represented schematically in figure 4. The fixed part of the fluid circuit terminates in one or more conduits afforded internally in a fixed cylindrical body 20 located above and coaxially to the support column 18. The joint 19 is located between the fixed internal body 20 and an external tubular body 21 rotatably coupled to the fixed body 20. At least one pressurised-fluid supply conduit 22 leads from the rotatable tubular body 21, which conduit 22 is connected to the opposite head of the actuator of the actuating organ 17.

[0023] A central control unit, of known type, presides over the operation of the apparatus, which unit can actuate the motor group rotating the base 7 and the fluid actuator for opening the valves 6. The control unit is predisposed to receive notification of the weight of the recipient 15 read off by the means for weighing 16.

[0024] During operation, a recipient 15 is placed on the balance 16; liquids will be batched as desired into the recipient 15. The motor group is actuated with a consequent rotation of the base 7, the column 18, the balance 16, the recipient 15 and the valve actuation organ 17. Once the recipient 15 has been positioned below a predetermined dispenser valve 6, the actuation organ 17 opens the valve for a predetermined time so as to pour into the recipient the desired quantity of liquid. During this phase the gripping element of the organ 17 engages the head of the selected valve and is then commanded by the actuator to move upwards, raising the relative stem, with a consequent opening of the valve and a dispensing of the liquid. When the control unit is informed by the balance 16 that the recipient has reached a predetermined weight, it orders the descent of the actuator, which closes the valve 6 with a consequent interruption of liquid dispensing. Subsequently the above-mentioned series of operations (positioning of the recipient 15 below a pre-selected valve 6 and batched filling of the recipient 15 itself) is repeated according to a work cycle which is ordered by the central control unit and which can be pre-set by the operator so as to achieve a mixture batched as so desired.

[0025] In another embodiment, not illustrated, the means for weighing are predisposed to weigh two recipients situated in diametrically opposite points on the ro-

tatable base. In this case the means for weighing can comprise two balances, like in figure 1, each of which can receive a respective recipient for the batched product. In this embodiment the machine is provided with two actuation organs, situated on diametrically opposite sides of the support column, each of which is operatively associated to a balance. In this embodiment the machine can produce two fully batched recipients at once, with a notable time saving. With this embodiment it is preferable that around the nozzle circumference, at opposite sides of the circumference there is a nozzle dispensing an identical product, with possibly the same delivery rates too. This would enable production of two identical batched products contemporaneously, or even two liquid products containing the same ingredients but differently batched.

[0026] In still further embodiments three means for weighing could be included to weigh three recipients located on three balances arranged on the base at intervals of 120° with respect to the rotation axis x-x of the base 7 itself. In this case three rotating actuation organs can be provided, rotating together with the base 7 and arranged above each balance. In other embodiments it would be possible to predispose four or even more balances, situated at equidistanced angles around the circumference with reference to the base 7 rotation axis.

[0027] Thanks to the invention the inertia of the means for positioning the recipient has only a very limited effect on the weight reading of the recipient itself. Weighing errors can be considerably reduced where they are due to the inertia of the recipient moving system. Furthermore, the apparatus leads to time saving inasmuch as the weight can be read off precisely as soon as the recipient is positioned below the dispenser valve, with no significant wait for the recipient weighing system to settle and give a proper reading of the weight.

Claims

1. An apparatus for batching liquids, characterised in that it comprises:

   a plurality of dispenser valves (6), each of which is able to dispense a liquid to be batched, the valves (6) being arranged on a horizontal plane according to a circumference, each valve being provided with a mobile element able to assume at least a closed position, in which dispensing is impossible, and an open position in which dispensing is possible;
   a rotatable base (7) which can be commanded to rotate about a vertical rotation axis (x-x), the base (7) being predisposed below the dispenser valve;
   means for weighing predisposed to weigh at least one recipient (15) placed on the rotatable base, the recipient being selectively positionable below the valves to receive the liquid to be batched by effect of rotations of the base (7);
   an actuating organ (17) of the dispenser valves able on command to move the mobile elements of the dispenser valves from the closed position to the open position, said actuating organ (17) being solid in rotation with the rotatable base (7), the actuating organ being selectively positionable below a valve to be activated by effect of rotations of the base (7).

2. The apparatus of claim 1, characterised in that the rotatable base (7) is rotated by a motor group (11, 12) solidly rotating with the base (7).

3. The apparatus of claim 2, characterised in that it comprises at least one pinion (13) which can be rotated by the motor group (11, 12) and which enmeshes with a fixed crown wheel (10) coaxial to the rotatable base (7).

4. The apparatus of claim 3, characterised in that the rotatable base (7) is rotatably coupled to an internal diameter of the crown wheel (10).

5. The apparatus of any one of the preceding claims, characterised in that the means for weighing are predisposed to weigh a plurality of recipients situated in angularly equidistanced zones with reference to the rotation axis of the base (7).

6. The apparatus of any one of the preceding claims, characterised in that each valve (6) is provided with means for supplying a liquid to be batched, which means for supplying comprise a return conduit which with the valve (6) in the closed position can be passed through by a return flow returning from the valve to a container of the liquid.

Fig.1

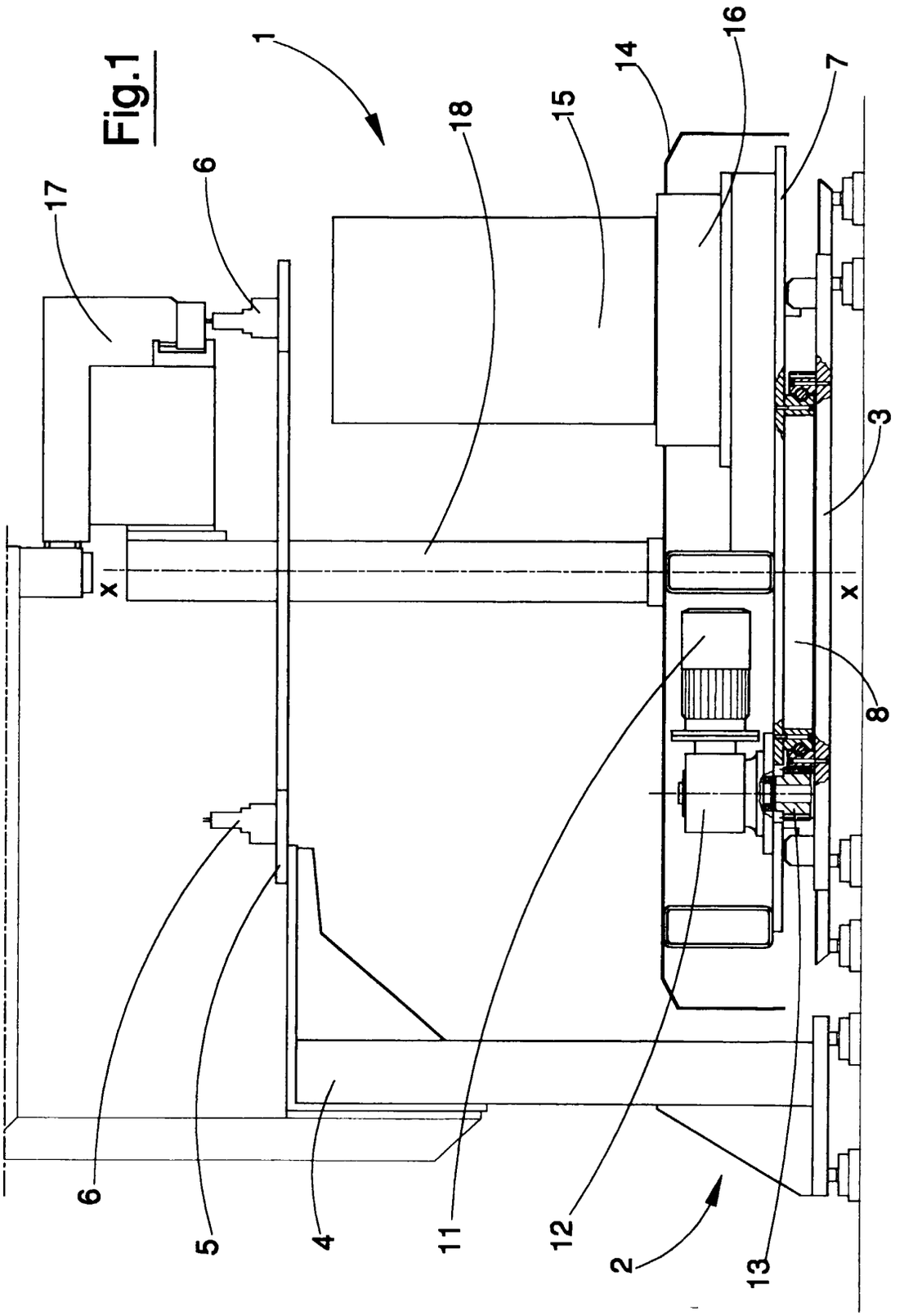
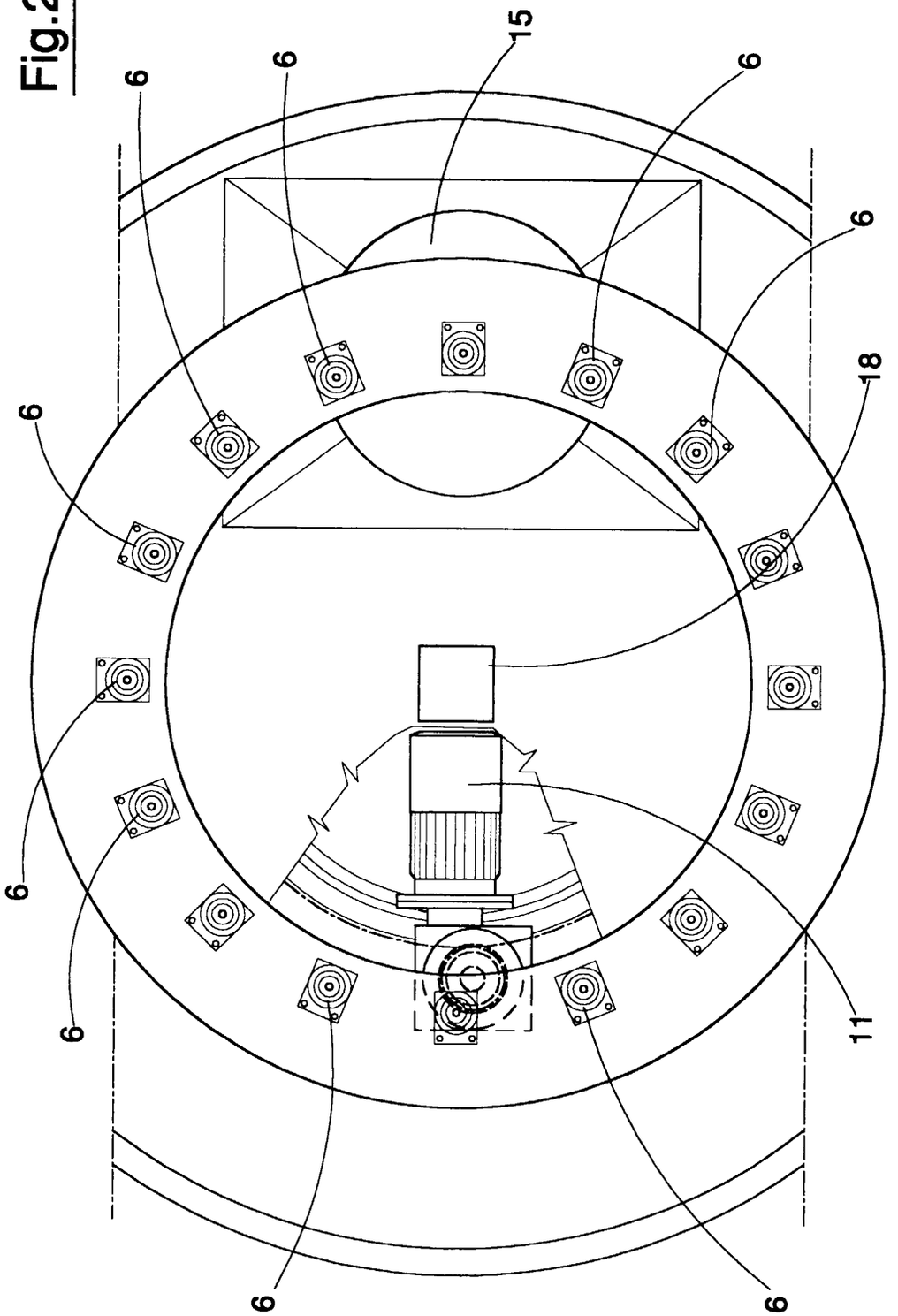


Fig.2



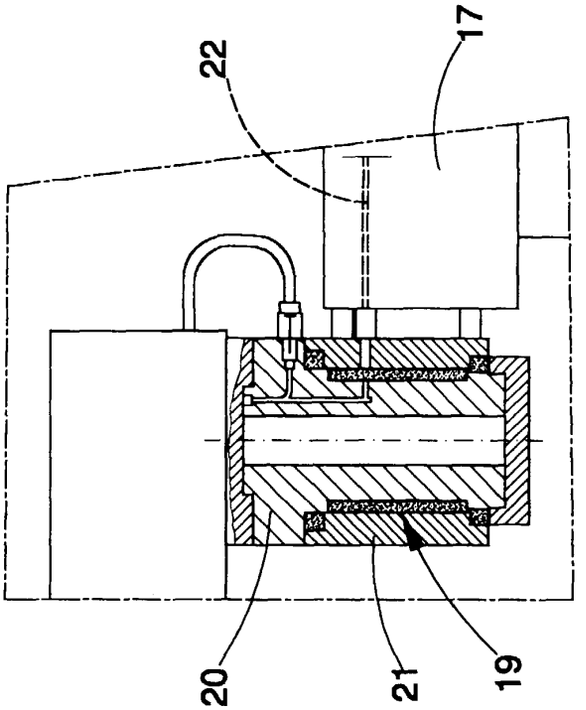


Fig. 4

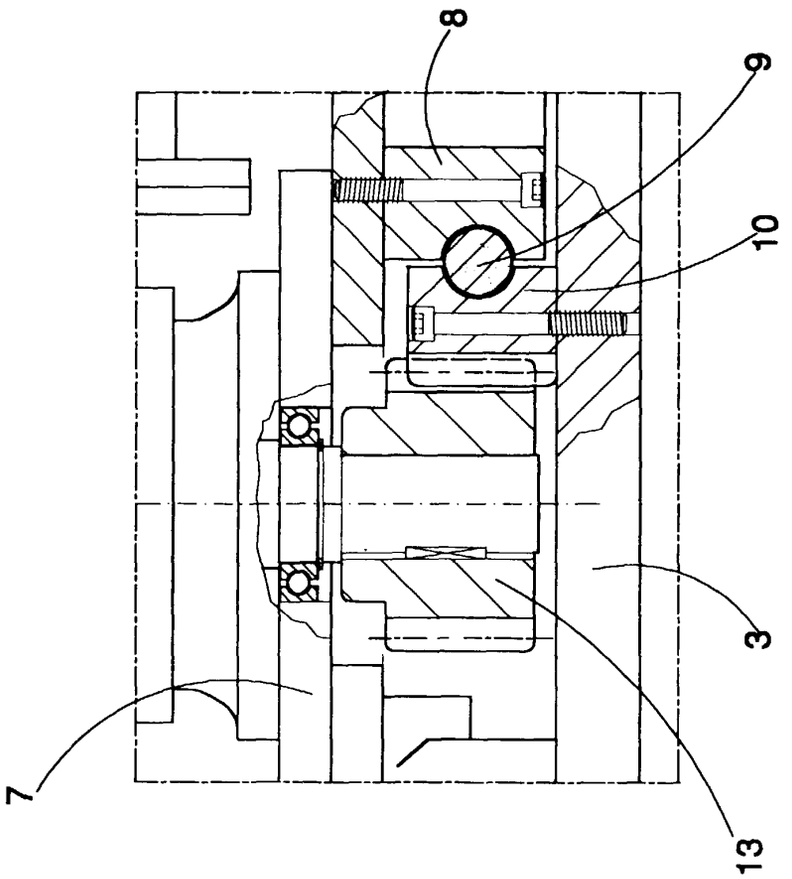


Fig. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 99 83 0146

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	31 August 1999	Belibel, C

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