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(54) **Automatic apparatus for flushing operating machines and machine equipped with said apparatus**

(57) Apparatus for flushing pipes and/or nozzles (110) in operating machines, comprising a ring (200) to which the following are connected:
- a plurality of radially extending cups (210), means (260) able to cause rotation of the ring (200) from an angular rest position into an angular working position where the cups (210) are coaxial with the parts to be flushed and vice versa;
- means (250) for moving the ring (200) in both directions along a vertical axis (Z-Z) from an axial rest position into an axial working position where the cups (210) are sealingly engaged with the nozzles (110) to be flushed, said cups being connected to a header (220) for collecting the flushing liquid.

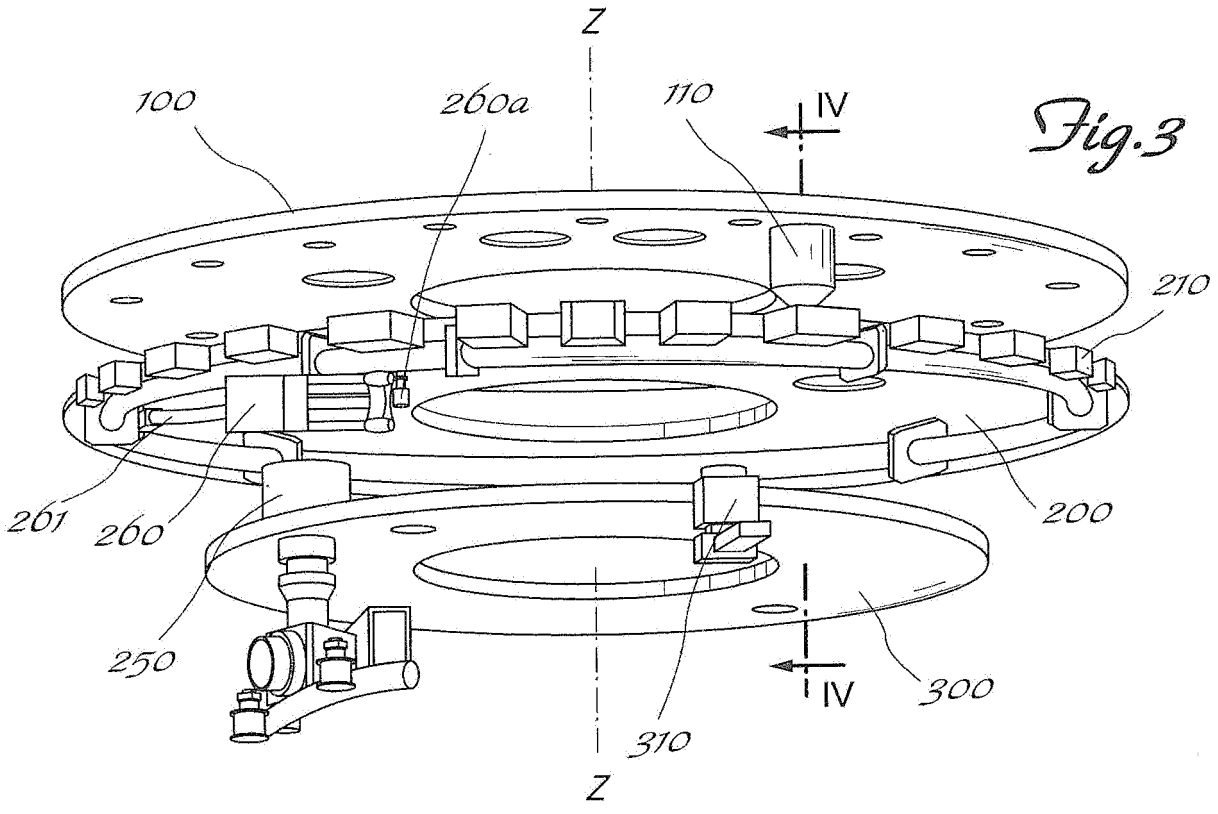

Fig.3

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Description

[0001] The present invention relates to an automatic apparatus for flushing container filling machines and an associated filling machine equipped with said flushing apparatus.

[0002] In the technical sector relating to the packaging of liquid and/or fluid products, so-called filling machines able to introduce automatically a programmed quantity of product into individual containers which are then sealed and conveyed away for packaging are known.

[0003] It is also known that said machines consist of a circular platform on which the empty containers are fed and arranged at regular angular intervals so that, when a rotational movement is imparted to the platform, said containers are located in a coaxial position underneath fixed delivery heads which are connected to pipes supplying the product to be packaged.

[0004] Since said products are obtained from basic formulations to which suitable specific additives are added depending on the particular function of the finished product, it is required to perform complete flushing of the filling machine whenever the product must be changed.

[0005] In the prior art these flushing operations are performed by supplying a flushing liquid to the same pipes supplying the product to be introduced into the containers; the flushing liquid is discharged from the filling nozzles and collected by special trays which have the form of a circle segment and are movable from a rest position radially outside the circumference of the container support rings into a working position radially inside this circumference and situated underneath a plurality of nozzles.

[0006] Although performing their function, these trays have the drawback of being open, resulting in spillage of the flushing liquid due to the turbulence produced by the high pressure at which it is discharged from the nozzles.

[0007] The technical problem which is posed, therefore, is to provide an apparatus for performing flushing and recovery of the associated flushing liquid, able to prevent spillage of the latter during the recovery and discharge stages, intended in particular for circular operating machines such as, for example, container filling machines.

[0008] In connection with this problem it is also required that this apparatus should have small dimensions, be easy and inexpensive to produce and assemble and be able to be installed also on existing machines without the need for excessive special adaptation and be able to perform flushing with an automatic sequence incorporated in the machine cycle.

[0009] These results are achieved according to the present invention by an automatic apparatus for flushing filling machines according to the characteristic features of Claim 1.

[0010] A further object of the present invention is to provide a filling machine equipped with said flushing apparatus according to the characteristic features of Claim 11.

[0011] Further details may be obtained from the following description of a non-limiting example of the embodiment of the subject of the present invention provided with reference to the accompanying drawings in which:

- Figure 1 shows a schematic perspective view of the flushing apparatus according to the present invention mounted on a filling machine during the filling stage;
- Figure 2 shows a partial schematic cross-section along the plane indicated by II-II in Fig. 1;
- Figure 3 shows a schematic perspective view of the flushing apparatus according to the present invention mounted on a filling machine at the start of the flushing cycle;
- Figure 4 shows a partial schematic cross-section along the plane indicated by IV-IV in Fig. 3;
- Figure 5 shows a schematic view of the complete flushing sequence; and
- Figs. 6a-6b show a schematic perspective view of the flushing apparatus according to the present invention, relating to the discharge connection means during the centring and engaging operations, respectively.

[0012] As shown Fig. 1 and assuming solely for the sake of simplification of the description and without a limiting meaning a vertical axis Z-Z coinciding with the axis of rotation of the filling machine, the latter is substantially formed by a first upper ring 100 which has the filling nozzles 110 and a lower ring 300 which has the supports 310 for the containers 1 to be filled; the two rings are axially fixed and rotationally synchronized so that the nozzle 110 and the container 1 are always coaxial in the vertical direction Z-Z.

[0013] A flushing apparatus according to the invention is axially arranged between the two rings 100 and 300 and comprises a middle ring 200 which has, arranged along its circumference, internally hollow and radially extending cups 210 with an upper opening 210a.

[0014] Said cups 210 have, emerging in their side surfaces, a pipe 211 connected to an annular header 220 provided with a fixed discharge union 221 integral with the lower ring 300.

[0015] An annular seal 212 of the 0-ring type is also provided inside the cup 210.

[0016] The cups 210 are present in a number corresponding to the number of filling nozzles 110 and are arranged in a position and at an angular distance such as to be coaxially out of alignment with the said nozzles.

[0017] The middle ring 200 has, integral therewith, a cylinder 260 with a mechanical stop 260a and arm 261 able to cause rotation of the ring 200 from the rest position (Fig. 2) into a working position where each cup is arranged coaxial with a respective nozzle 210 (Fig. 4).

[0018] Means 250 for moving the middle ring 200 in both directions along the vertical axis Z-Z are also ar-

ranged between the lower ring 300 and the middle ring 200.

[0019] Using the configuration described above and with reference to Figure 5 the flushing sequence is now described:

- during filling of the container 1 (Fig. 5a) the nozzle 110 and the container 1 are arranged coaxially, and the cups 210 are angularly offset with respect to the said nozzle 110 and in a raised position;
- when filling has been completed, the flushing sequence is started with operation of the means 250 which cause lowering of the ring 200 in the vertical direction Z-Z down to a height where they do not interfere with the nozzles 110 (Fig. 5b);
- operation of the cylinder 260 which, causing rotation of the ring 200, brings each cup 210 into a position coaxial with a respective nozzle 110;
- operation of the means 250 which raise the ring 200 until the cup 210 engages with the nozzle 110 with deformation of the 0-ring 212 so as to form a sealed connection;
- pressurized supplying of the flushing liquid which, passing along the pipes and through the filling nozzles, performs cleaning thereof, which flushing liquid is collected without spillage by the cups 210, being conveyed via the pipes 211 to the header 220 and from here to the discharge outlet described in detail below;
- when the flushing cycle has terminated, the sequence already described is repeated in reverse so that the machine is reset to the operating conditions at the start of the filling cycle.

[0020] As shown in Figs. 6a-6b, it is envisaged that collection of the flushing liquid which is to be conveyed away for discharging is performed by means 400 comprising a pump 401 arranged on a slide 420 on which it may freely travel and an arm 430 extending in the vertical direction Z-Z and provided with a roller 431 able to engage in the vertical direction with a centring fork piece 330 integral with the lower ring 300 in a position such as to cause relative coaxial positioning of the mouth 410 of the pump 401 and the end union 221 of the header 220 (Fig. 6a); once centring is achieved the device 430 is raised so as to sealingly engage the mouth 410 and union 221, starting discharging of the flushing liquid.

[0021] It is therefore clear how, with the apparatus according to the invention, it is possible to perform rapid pressurized flushing, without spillage, of all the product supplying parts, in particular in container filling machines and how such apparatus may be incorporated in the filling machine itself without interfering with the normal working cycle thereof.

[0022] It is envisaged moreover that, for special flushing cycles, the apparatus may also function with the fluid being supplied in the opposite direction.

[0023] Although described in connection with certain constructional forms and certain preferred examples of embodiment of the invention, it is understood that the scope of protection of the present patent is defined solely by the following claims.

Claims

1. Apparatus for flushing pipes and/or nozzles (110) in operating machines, **characterized in that** it comprises a ring (200) to which the following are connected:

   - a plurality of radially extending cups (210),
   - means (260) able to cause rotation of the ring (200) from an angular rest position into an angular working position where the cups (210) are coaxial with the parts to be flushed and vice versa
   - means (250) for moving the ring (200) in both directions along a vertical axis (Z-Z) from an axial rest position into an axial working position where the cups (210) are sealingly engaged with the nozzles (110) to be flushed, said cups being connected to a header (220) for collecting the flushing liquid.

2. Apparatus according to Claim 1, **characterized in that** a pipe (211) for connection to the header (220) emerges in the side surfaces of said cups (210).

3. Apparatus according to Claim 1, **characterized in that** an annular sealing element (212) is provided inside each cup (210).

4. Apparatus according to Claim 1, **characterized in that** said means for angular movement of the ring (200) comprise a cylinder (260) with arm (261) and mechanical stop (260a).

5. Apparatus according to Claim 3, **characterized in that** said means (250) for angular movement of the ring (200) in the axial direction are integral with a fixed reaction element (300) of the operating machine to be flushed.

6. Apparatus according to Claim 1, **characterized in that** said header is a continuous annular header.

7. Apparatus according to Claim 6, **characterized in that** said annular discharge header (220) has an end union (221) with a vertical axis arranged in a fixed angular position.

8. Apparatus according to Claim 1, **characterized in that** it comprises means (400) connected to the header (220) for forced discharging of the flushing liquid.

9. Apparatus according to Claim 8, **characterized in that** said forced discharging means (400) comprise a pump (401) which has a mouth (410) and is arranged on a slide (420) on which it may freely travel, there being envisaged means for raising/lowering the assembly from a disengaged position into a position for relative engagement of the mouth (410) and the union (221) of the discharge header (220).

10. Apparatus according to Claim 9, **characterized in that** said discharging means (400) comprise an arm (430) extending in the vertical direction (Z-Z) and provided with a roller (431) able to engage in the vertical direction (Z-Z) with a centring fork piece (330) so as to cause relative coaxial positioning of the mouth (410) of the pump (401) and the end union (221) of the header (220).

11. Machine for filling containers (1), comprising a first upper ring (100) which has filling nozzles (110), a lower ring (300) which has supports (310) for the containers (1) to be filled, said rings (100, 300) being axially fixed and rotationally synchronized so that the nozzle (110) and the container (1) are coaxial in the direction parallel to the axis of rotation of the vertical machine (Z-Z), **characterized in that** it comprises a flushing apparatus according to Claim 1 axially arranged between the two said rings (100, 300).

12. Machine according to Claim 11, **characterized in that** in the rest position said cups (210) are angularly offset with respect to the filling nozzles (110) and in said angular working position said cups (210) are coaxial with the filling nozzles (110).

13. Machine according to Claim 11, **characterized in that** said means (250) for moving the middle ring (200) in both directions along the vertical axis (Z-Z) are arranged between the lower ring (300) and the middle ring (200).

14. Machine according to Claim 11, **characterized in that** the end union (221) of the header (220) is integral with the lower ring (300).

15. Machine according to Claim 11, **characterized in that** it comprises a centring fork piece (330) integral with the lower ring (300).

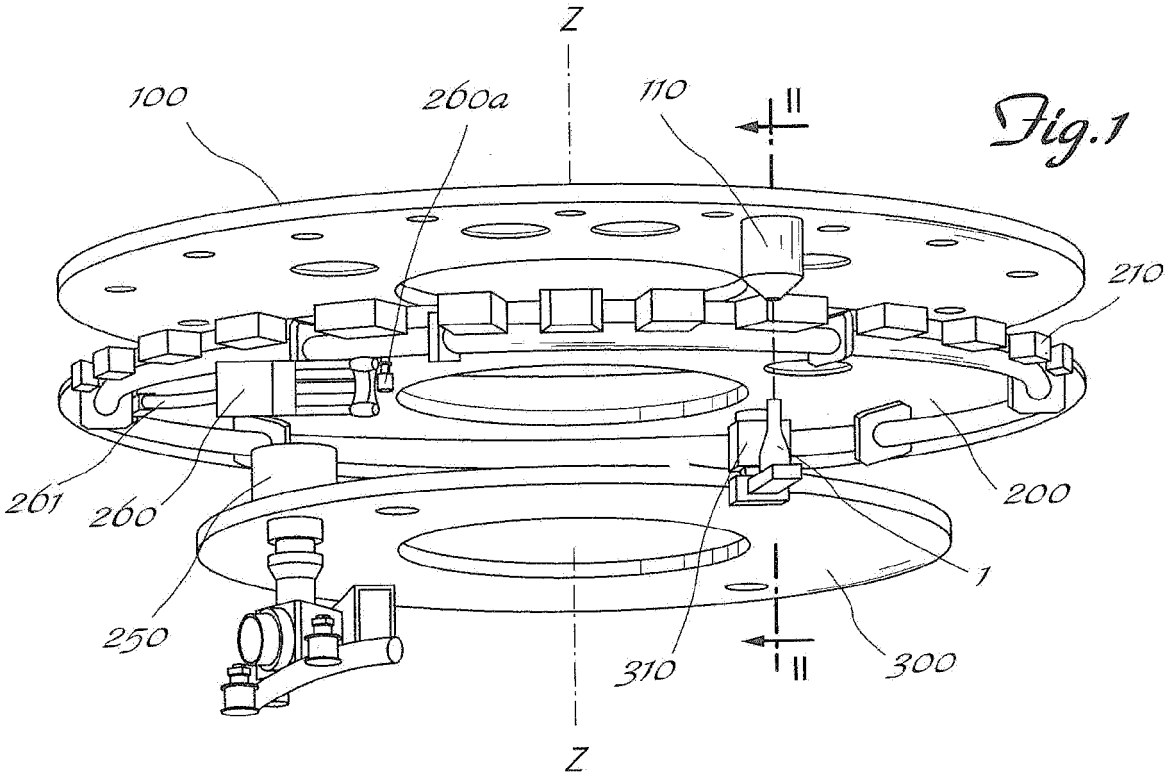


Fig.1

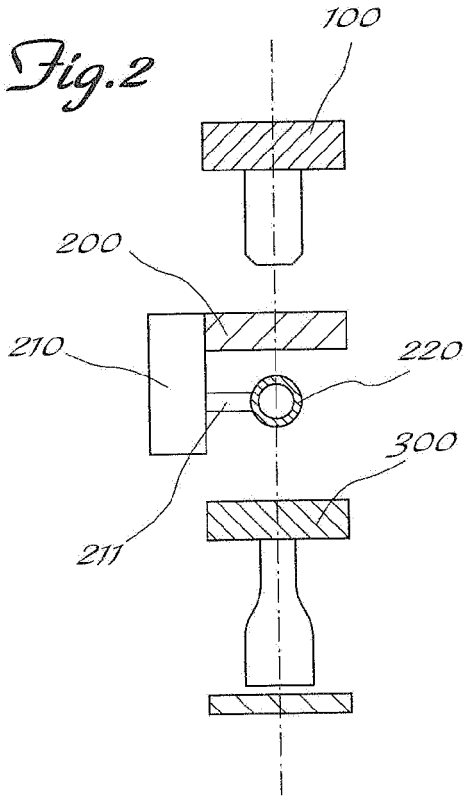


Fig.2

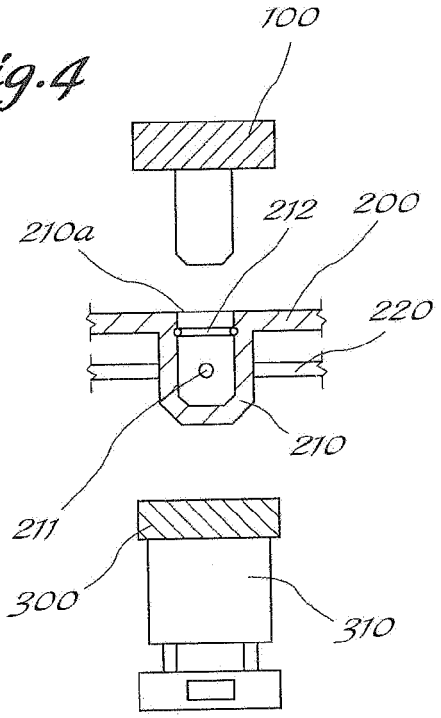


Fig.4

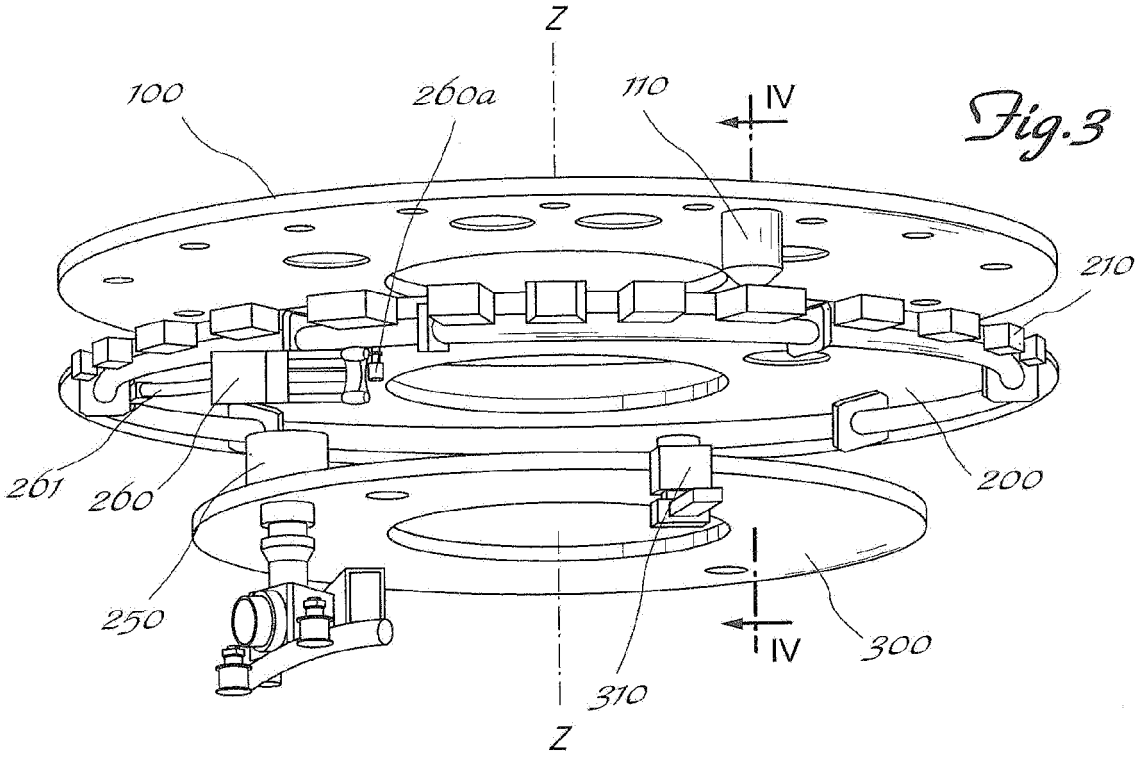
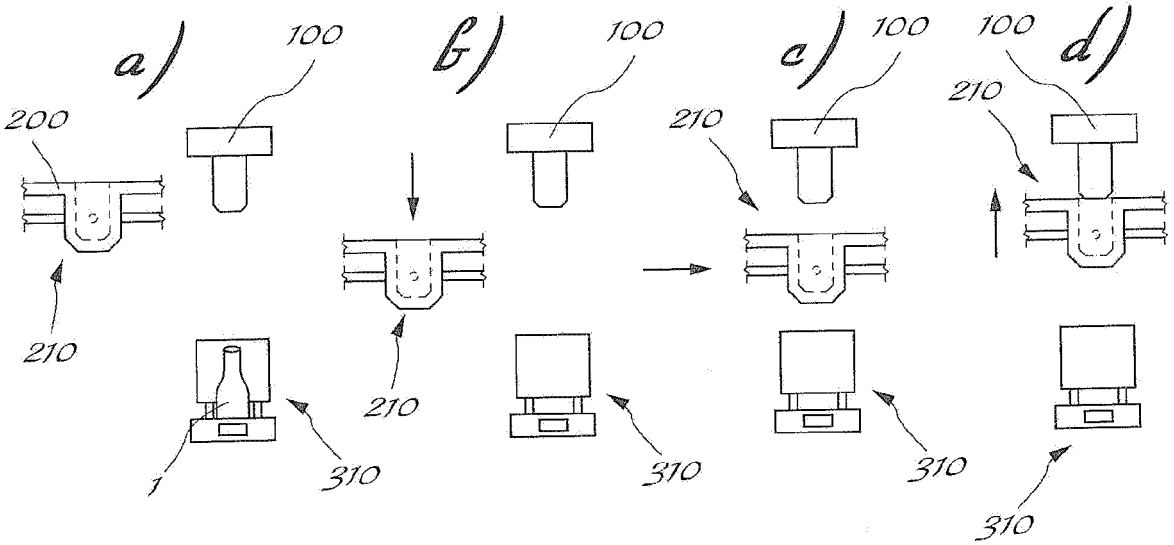

Z
100
260a
110
IV
210
261
260
200
250
IV
300
310
Z

Fig.3

Fig.5


a)
100
200
210
1
310
b)
100
210
310
c)
100
210
310
d)
100
210
310

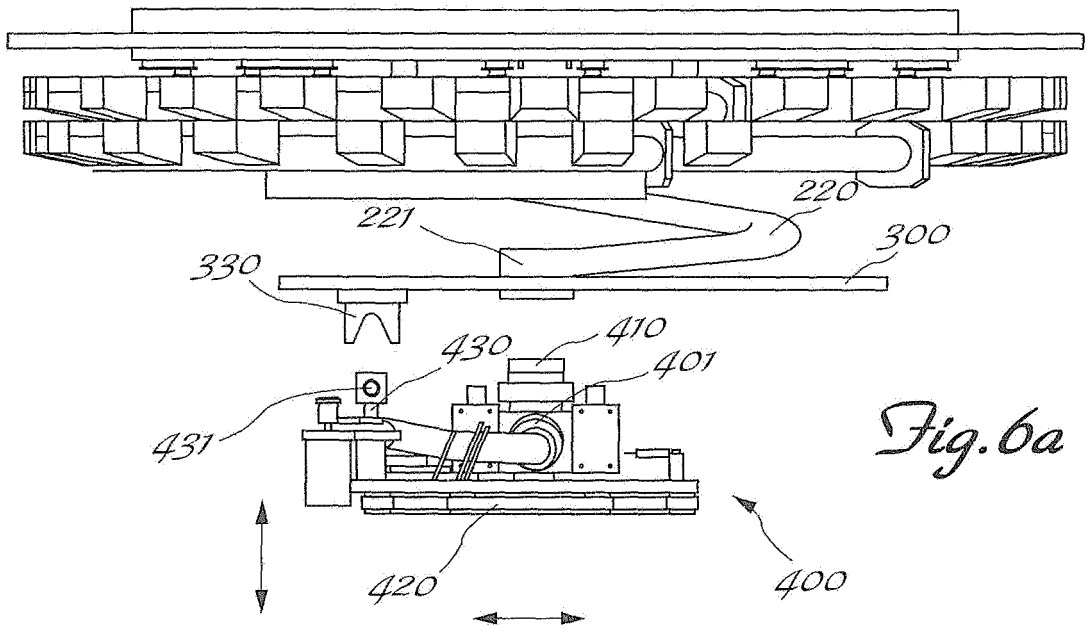

220
221
300
330
410
430
401
431
420
400

Fig. 6a

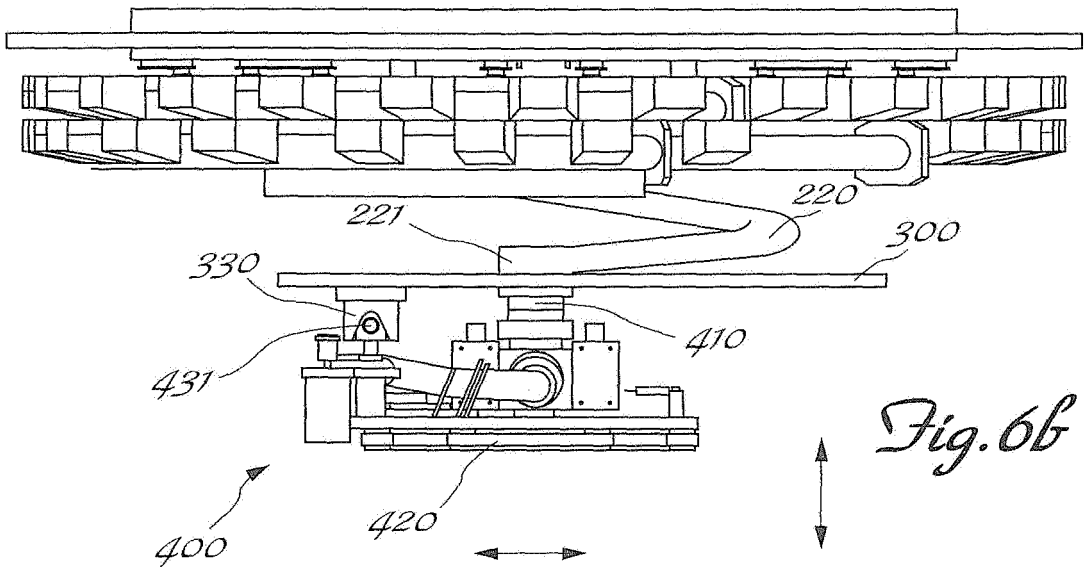

220
221
300
330
410
431
400
420

Fig. 6b

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EUROPEAN SEARCH REPORT

Application Number
EP 09 15 7067

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TECHNICAL FIELDS SEARCHED (IPC)
B67C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	20 May 2009	Wartenhorst, Frank

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