(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 702 880 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
20.09.2006 Bulletin 2006/38

(51) Int Cl.:
B67C 3/02 *(2006.01)* ***B67C 3/00*** *(2006.01)*
B67C 3/20 *(2006.01)*

(21) Application number: **06110791.8**

(22) Date of filing: **07.03.2006**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

(30) Priority: **14.03.2005 IT BO20050147**

(71) Applicant: **AZIONARIA COSTRUZIONI MACCHINE AUTOMATICHE-A.C.M.A.-S.p.A.**
I-40131 Bologna (IT)

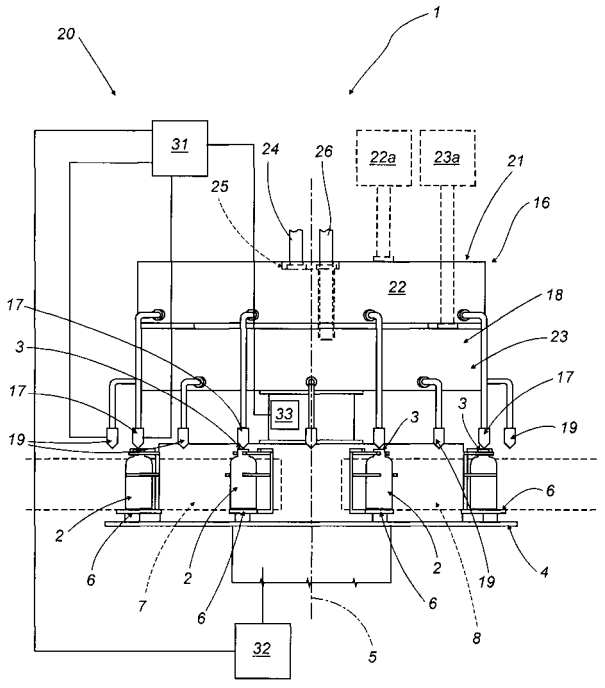
(72) Inventors:
- **DONINI, Maurizio**
  46045, MARMIROLO (Mantova) (IT)
- **COSTA, Samuele**
  46010, CURTATONE (Mantova) (IT)

(74) Representative: **Ghioni, Carlo Raoul Maria**
Bugnion S.p.A.
Via Goito, 18
40126 Bologna (IT)

(54) Machine for filling containers with liquid or powder products

(57) Containers are filled with liquid or powder products by a machine comprising a carousel (4) set in rotation about a vertical axis (5), a set of pedestals (6) carried by the carousel, on which the single containers (2) are supported and weighed during the filling operation, a set of first filler valves (17) delivering a first product, arranged about the axis (5) of rotation and movable as one with the carousel (4), and at least a set of second filler valves (19) delivering a second product. The machine also incorporates a system (20) that will position the first filler valves (17) or the second filler valves (19) alternately in alignment with the pedestals (6), so that a changeover from one type of product to another can be effected quickly and conveniently, with no need for operations to be suspended while tanks and pipelines are cleaned.

FIG.1



EP 1 702 880 A1

Description

[0001] The present invention relates to a machine for filling containers with liquid or powder products.

[0002] The invention has application to advantage in the art field of carousel type machines used to fill containers with a variety of substances, including liquid food products such as milk or fruit juices, also mineral lubricating oils, detergents, etc.

[0003] A filling machine of the type in question appears as a tank carried by a main carousel and holding a supply of the liquid substance; the carousel is rotatable about a vertical axis through a first transfer station by way of which it receives a succession of containers, each with a filler mouth.

[0004] The tank is rigidly associated with the carousel and affords a plurality of filler valves at the bottom, each of which can be associated with the mouth of a respective container; thus, when the carousel is set in rotation, the tank turns on the vertical axis and its contents are released via the filler valves into the containers, whereupon the filled containers are directed by way of a second transfer station onto an outfeed conveyor.

[0005] Depending on production requirements, carousel type filling machines will be supplied at different times with a variety of liquids that can present markedly dissimilar properties. By way of example, a single machine might be used by a manufacturer of automotive fluids to fill containers with engine oil, with screenwash detergent, or with antifreeze radiator coolant.

[0006] To this end, the machine must be fully cleansed employing appropriate flushing procedures, in order that no traces of a product handled previously will find their way into a product handled subsequently. Since production must be suspended while these flushing procedures are carried out, machine down time is notably increased.

[0007] The only alternative currently available is that of purchasing a number of separate machines, each dedicated exclusively to one type of product; this however calls for increased financial investment and for space to house the additional machines, and there is also the risk that at least one machine could remain idle in the event of there being no demand for a given liquid product.

[0008] The object of the present invention, accordingly, is to provide a machine for filling containers with liquid products or powder products, such as will be unaffected by the drawbacks mentioned above.

[0009] One object of the invention, in particular, is to make available a machine for filling containers with liquid or powder products that will allow of changing from one liquid product to another without lengthy stoppages.

[0010] The objects mentioned above are duly realized in a machine according to the present invention for filling containers with liquid or powder products, comprising a carousel rotatable about a relative axis and carrying supporting and weighing means on which to stand and weigh a plurality of containers, characterized in that it comprises first feed means supplying a first product delivered by first filler devices arranged about the axis of rotation and moving as one with the carousel, at least second feed means supplying a second product delivered by second filler devices arranged about the axis of rotation and moving as one with the carousel, and means by which to position the first and second filler devices relative to the supporting and weighing means, switchable between a first configuration in which the supporting and weighing means are associated with the first filler devices, and at least a second configuration in which the supporting and weighing means are associated with the second filler devices.

[0011] The invention will now be described in detail, by way of example, with the aid of the accompanying drawings, in which:

- figure 1 shows a first embodiment of a machine according to the present invention for filling containers with liquid or powder products, viewed in elevation;
- figure 2 is a plan view of the machine shown in figure 1;
- figure 3 shows a second embodiment of the machine as in figure 1, viewed in elevation;
- figure 4 is a plan view of the second embodiment of the machine shown in figure 3.

[0012] With reference to figure 1, numeral 1 denotes a filling machine, in its entirety, designed to batch liquid or powder products into containers 2, each affording a respective filler mouth 3.

[0013] The machine 1 comprises a carousel 4 rotatable about a vertical axis denoted 5 and carrying supporting and weighing means 6 on which to stand and weigh a plurality of containers 2 as these are filled with liquid, proceeding along a circular filling path P that extends clockwise as seen in figures 2 and 4 about the vertical axis 5 of the carousel, from an infeed station 7 to an outfeed station 8.

[0014] The carousel 4 receives containers 2 singly and in succession at the infeed station 7 from a rotary infeed conveyor 9. As indicated in figures 2 and 4, the conveyor 9 turns anticlockwise about a relative axis 10 parallel to the axis 5 of the carousel 4 and is positioned to take up containers 2 advancing along a horizontal infeed channel equipped with a feed screw 11 driven by a motor 12.

[0015] The outfeed station 8 is occupied by an outfeed conveyor 13 rotatable anticlockwise, as viewed in figures 2 and 4, about an axis 14 parallel likewise to the axis 5 of the carousel 4, so as to transfer the filled containers 2 into an

outfeed channel 15 along which they advance toward a take-up unit (not illustrated).

[0016] The machine 1 comprises first feed means 16 such as will deliver a first product by way of first filler devices 17 installed in number equal to the number of the supporting and weighing means 6. The first filler devices 17 are spaced uniformly about the axis 5 of rotation, and caused to rotate as one with the carousel 4 and with the containers 2 during the step of filling the selfsame containers.

[0017] The machine 1 also comprises second feed means 18 delivering a second product by way of second filler devices 19 spaced uniformly around the axis 5 of the carousel 4 and caused to rotate as one with the carousel 4 during the filling step.

[0018] The second filler devices 18 are installed, like the first, in number equal to the number of the supporting and weighing means 6.

[0019] Also, the first and second filler devices 17 and 19 are arranged in alternating sequence about the axis 5 of the carousel 4, with each first filler device 17 located between a pair of second filler devices 19.

[0020] Numeral 20 denotes means by which the first and second filler devices 17 and 19 can be positioned relative to the supporting and weighing means 6, alternating between a first configuration in which the supporting and weighing means 6 are associated with the first filler devices 17, and at least a second configuration in which the supporting and weighing means 6 are associated with the second filler devices 19.

[0021] In the first configuration, which is illustrated in the accompanying drawings, each of the first filler devices 17 is positioned above a respective pedestal of the supporting and weighing means 6, and over the container 2 standing on the pedestal, with each of the second filler devices 19 placed between one pedestal and the next.

[0022] In the second configuration, not illustrated in the drawings, each of the second filler devices 19 is positioned above a respective pedestal of the supporting and weighing means 6, and each of the first filler devices 17 placed between one pedestal and the next.

[0023] By virtue of the structure thus described, the machine 1 is able to implement a first step in which the containers 2 carried by the supporting and weighing means 6 are filled with the first product by the first filler devices 17, followed simply and seamlessly by a second step in which further containers 2 are filled with the second product by the second filler devices 19.

[0024] Whilst the accompanying drawings show only first and second filler devices 17 and 19 ordered in alternation about the axis 5 of the carousel 4, the scope of the invention would nonetheless admit of equipping the machine 1 with other filler devices spaced likewise uniformly and alternately around the axis 5, in which case the positioning of the sets of devices, numbering "n", will be such that the distance "d", measured along an arc to a circle between one device and the next device in sequence forming part of another set, is equal to "1/n" times the distance "D" between one pedestal of the supporting and weighing means 6 and the next.

[0025] In the example of the drawings, the distance "d" between each first filler device 17 and the two nearest second filler devices 19 on either side is half the distance "D" between two neighbouring pedestals of the supporting and weighing means 6.

[0026] To advantage, means 20 for positioning the first and second filler devices 17 and 19 relative to the supporting and weighing means 6 will comprise an element 21 serving to carry the first and second filler devices 17 and 19, capable of movement about the axis 5 of rotation relative to the carousel 4 between the first and the second configuration.

[0027] This preferred solution is illustrated in the accompanying drawings, which show the first filler devices 17 mounted to a first tank 22, and the second devices 19 mounted to a second tank 23.

[0028] During the step of filling the containers 2, the two tanks 22 and 23, which function also as carrier elements 21, are set in rotation about the axis 5 together with the carousel 4 whilst the machine 1 remains in the first or the second configuration. To pass from one configuration to the other, both tanks 22 and 23 are rotated in relation to the carousel 4 through a distance such as will bring the first filler devices 17 or the second filler devices 19 into alignment with the supporting and weighing means 6.

[0029] In the first embodiment of figures 1 and 2, the first tank 22 and the second tank 23 are both of cylindrical shape, positioned one on top of the other and concentric with the axis 5 of rotation. The first tank 22, uppermost, receives the first product from a first pipeline 24 connected to a fixed coupling 25 about which both tanks 22 and 23 are rotatable. Also connected to the coupling 25 is a second pipeline 26 carrying the second product, which extends vertically down to the level of the second tank 23 beneath.

[0030] In the second embodiment of figures 3 and 4, the first tank 22 and the second tank 23 are both of toroidal shape, positioned one on top of the other and encircling the axis 5 of rotation. The first and second products flow from the two pipelines 24 and 26 into central cylindrical bodies 29 and 30 connected to the tanks 22 and 23 by way of relative ducts 29 and 30. In a preferred solution, moreover, the machine 1 will comprise pressure regulators 22a and 23a so that the pressure within the respective toroidal tank 22 and 23 can be varied according to the viscosity and density of the liquid product being handled, thereby ensuring a steady and continuous delivery through the filler devices 17 and 19.

[0031] Such pressure regulators 22a and 23a might also be incorporated into the embodiment of figure 1, so that the tanks 22 and 23 of this solution, like that of figure 2, will be able to handle liquids of different viscosity and foamable

liquid products with equal effectiveness, the pressure internally of the two tanks again being raised or lowered according to the nature of the particular liquid.

[0032] The machine 1 might also comprise first flushing means that can be activated to cleanse the first feed means 16 when the machine is in the second configuration, and second flushing means that can be activated to cleanse the second feed means 18 when the machine is in the first configuration.

[0033] Thus, the flushing means (not illustrated) will allow the respective tank and filler devices to be cleansed when there is no product effectively being batched into the containers 2 by these same components, that is to say when the filler devices are not positioned above and in alignment with the supporting and weighing means 6.

[0034] The first and second filler devices 17 and 19 are connected to an electronic control unit 31, as also are a motor 32 by which the carousel 4 is driven in rotation, an auxiliary motor 33 by which the first and second filler devices 17 and 19 are positioned relative to the supporting and weighing means 6, and possibly sensors of suitable type serving to monitor the configuration of the machine 1 at any given moment.

[0035] The control unit 31 will also be programmed to govern the operation of the machine during a change of configuration.

[0036] In particular, the control unit 31 will pilot the auxiliary motor 33 to rotate the tanks 22 and 23 between the first and second configuration, open or close the first filler devices 17 or second filler devices 19, and activate the flushing means if included, as and when the machine 1 occupies the first or second operating configuration.

[0037] In a first alternative embodiment of the machine (not illustrated), the means 20 for positioning the first and second filler devices 17 and 19 relative to the supporting and weighing means 6 might comprise an element, to which the supporting and weighing means 6 are mounted, capable of movement about the axis 5 of rotation between the first and the second configuration. The carousel 4 itself, for example, besides being rotatable as one with the filler devices 17 and 19 when the product is batched into the containers 2, could also be uncoupled from the tanks 22 and 23 and shifted angularly about the axis 5 in such a way as to bring the first filler devices 17 or the second filler devices 19 into position over the supporting and weighing means 6.

[0038] In a second alternative embodiment (likewise not illustrated), the means 20 for positioning the first and second filler devices 17 and 19 relative to the supporting and weighing means 6 comprise quick fit and release devices attached to each pedestal of the supporting and weighing means 6 and insertable into respective first sockets of the carousel 4, when the machine is in the first configuration, or into respective second sockets of the carousel 4 when the machine is in the second configuration. Each of the first sockets is located beneath a respective first filler device 17, whilst each of the second sockets is located beneath a respective second filler device 19. The switch between the two configurations is effected manually by removing the pedestals 6 of the supporting and weighing means 6 from the one set of sockets and inserting them in the other set.

[0039] In other alternative embodiments of the machine, not illustrated but falling nonetheless within the scope of the present invention, the first tank 22 and/or the second tank 23 might be fixed, installed remote from the carousel 4 and connected to the respective filler devices 17 and 19 by way of pipelines and rotary couplings. In this instance the filler devices 17 and 19 will not be mounted directly to the tanks but to a specially designed structure providing the carrier element 21. Such a solution is described and illustrated in European Patent EP 1243546, filed in the name of the present applicant.

[0040] Self-evidently, the filling machine according to the present invention is able to continue operating practically without interruption even during the changeover from one liquid product to another. With this type of arrangement, down time attributable solely to flushing operations can be eliminated, and the filling of containers with substances of different types can be managed more efficiently.

Claims

1. A machine for filling containers with liquid or powder products comprising a carousel (4) rotatable about a relative axis (5) and carrying supporting and weighing means (6) on which to stand and weigh a plurality of containers (2), **characterized**
in that it comprises:

   - first feed means (16) supplying a first product delivered by first filler devices (17) arranged about the axis (5) of rotation and moving as one with the carousel (4);
   - at least second feed means (18) supplying a second product delivered by second filler devices (19) arranged about the axis (5) of rotation and moving as one with the carousel (4);
   - means (20) by which to position the first and second filler devices (17, 19) relative to the supporting and weighing means (6), switchable between a first configuration in which the supporting and weighing means (6) are associated with the first filler devices (17), and at least a second configuration in which the supporting and

weighing means (6) are associated with the second filler devices (19).

2. A machine as in claim 1, wherein the first filler devices (17) and the second filler devices (19) are arranged in alternating sequence about the axis (5) of rotation.

3. A machine as in claim 1 or 2, wherein the first filler devices (17) and the second filler devices (19) are installed in number equal to the number of the supporting and weighing means (6).

4. A machine as in claim 1, 2, or 3, wherein means (20) by which to position the first and second filler devices (17, 19) relative to the supporting and weighing means (6) comprise an element (21) carrying the first and second filler devices (17, 19) and capable of movement about the axis (5) of rotation between the first configuration and the second configuration.

5. A machine as in claim 1, 2, or 3, wherein means (20) by which to position the first and second filler devices (17, 19) relative to the supporting and weighing means (6) comprise an element (21) carrying the supporting and weighing means (6) and capable of movement about the axis (5) of rotation between the first configuration and the second configuration.

6. A machine as in claim 1, 2, or 3, wherein means (20) by which to position the first and second filler devices (17, 19) relative to the supporting and weighing means (6) comprise quick fit and release devices attached to each of the supporting and weighing means (6) and insertable in respective first sockets presented by the carousel (4), when in the first configuration, or in respective second sockets presented by the carousel (4) when in the second configuration.

7. A machine as in claim 1, wherein the first feed means (16) comprise a first tank (22) connected to the first filler devices (17).

8. A machine as in claim 1, wherein the second feed means (18) comprise a second tank (23) connected to the second filler devices (19).

9. A machine as in claim 7, wherein the first tank (22) is rotatable about the axis (5) of rotation of the carousel and associated rigidly with the first filler devices (17).

10. A machine as in claim 8, wherein the second tank (23) is rotatable about the axis (5) of rotation of the carousel and associated rigidly with the second filler devices (19).

11. A machine as in claim 9 or 10, wherein the first tank (22) and the second tank (23) are rotatable as one.

12. A machine as in claim 9, wherein the first tank (22) is cylindrical in shape and concentric with the axis (5) of rotation.

13. A machine as in claim 10, wherein the second tank (23) is cylindrical in shape and concentric with the axis (5) of rotation.

14. A machine as in claim 9, wherein the first tank (22) is toroidal in shape and encircles the axis (5) of rotation.

15. A machine as in claim 10, wherein the second tank (23) is toroidal in shape and encircles the axis (5) of rotation.

16. A machine as in claim 9 or 10, wherein the first tank (22) and the second tank (23) are stacked one on top of another along the axis (5) of rotation.

17. A machine as in claim 7, wherein the first tank (22) is fixed and connected to the first feed means (16) by way of respective pipelines and a rotary coupling.

18. A machine as in claim 8, wherein the second tank (23) is fixed and connected to the first feed means (19) by way of respective pipelines and a rotary coupling.

19. A machine as in claim 1, further comprising first flushing means serving to cleanse the first feed means, activated when the machine is in the second configuration, and second flushing means serving to cleanse the second feed

means, activated when the machine is in the first configuration.

20. A machine as in claim 1, further comprising an electronic control unit (31) connected to the first filler devices (17) and the second filler devices (19), also to sensors monitoring the configuration of the first filler devices (17) and the second filler devices (19) relative to the supporting and weighing means (6), and able thus to activate the first filler devices (17) or the second filler devices (19) according to the current configuration of the machine.

FIG.1

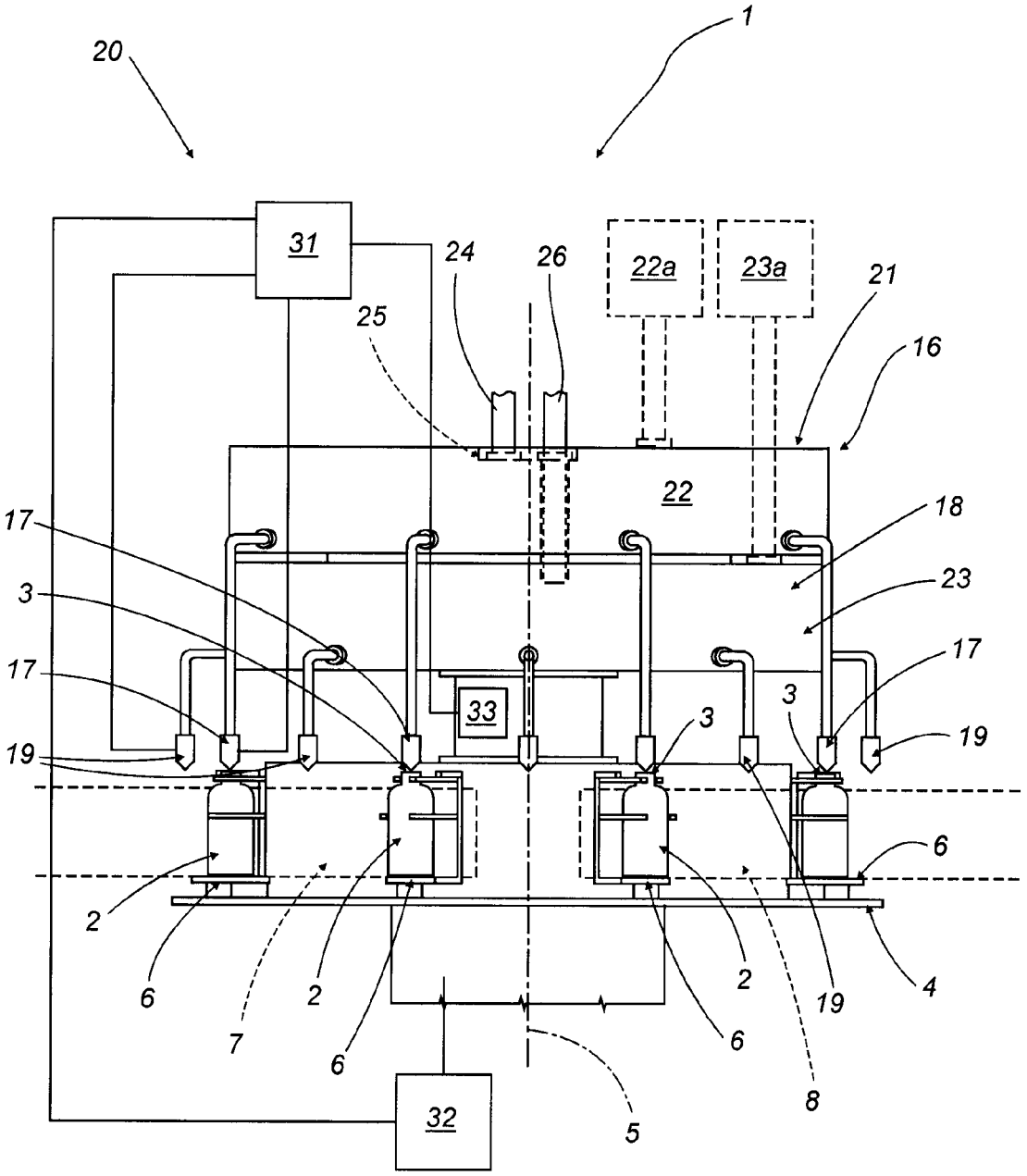

1
20
31
24
26
22a
23a
21
16
25
22
18
23
17
3
17
33
3
3
17
19
19
6
2
6
2
7
2
6
6
2
19
4
8
5
32

FIG.2

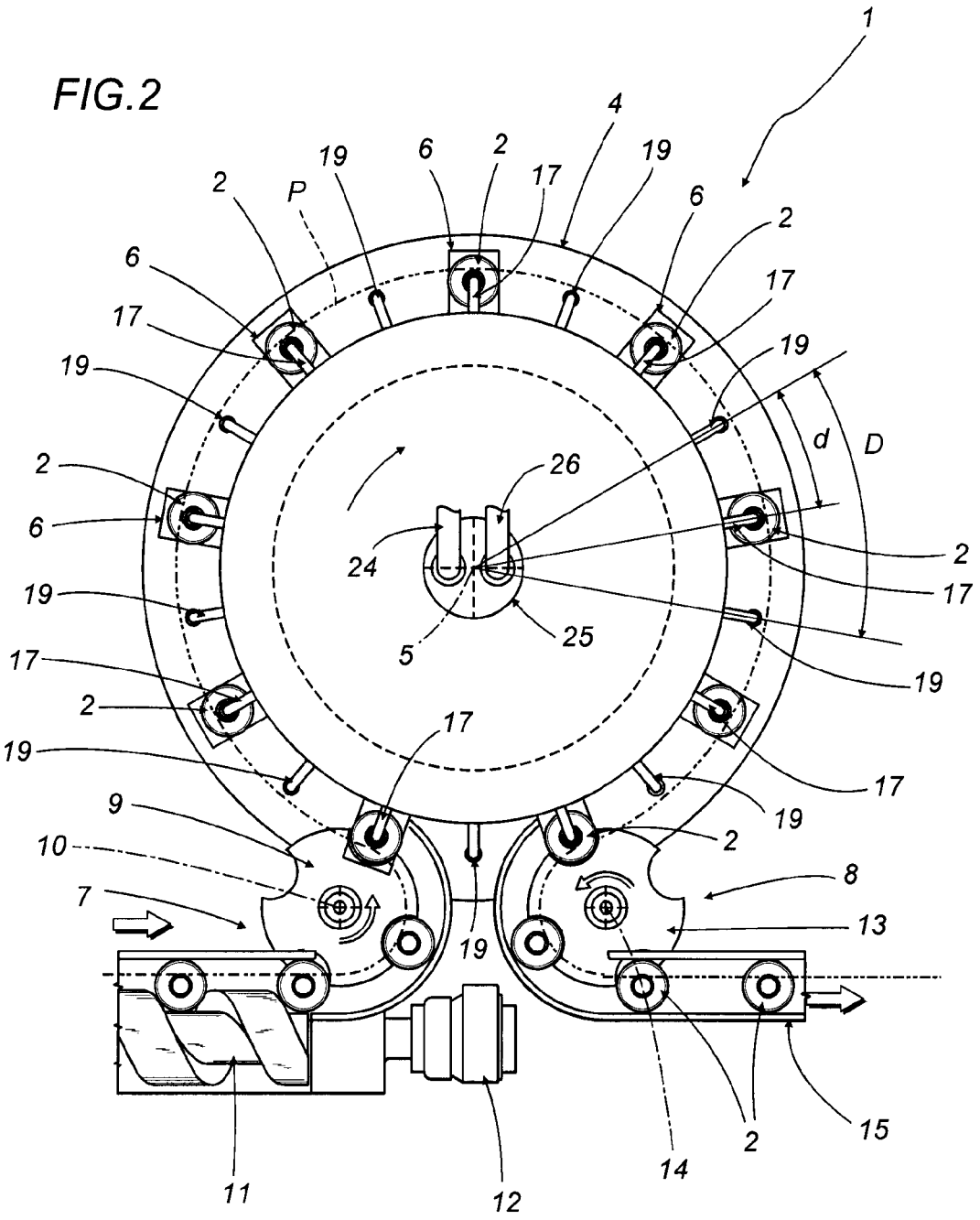


FIG.3

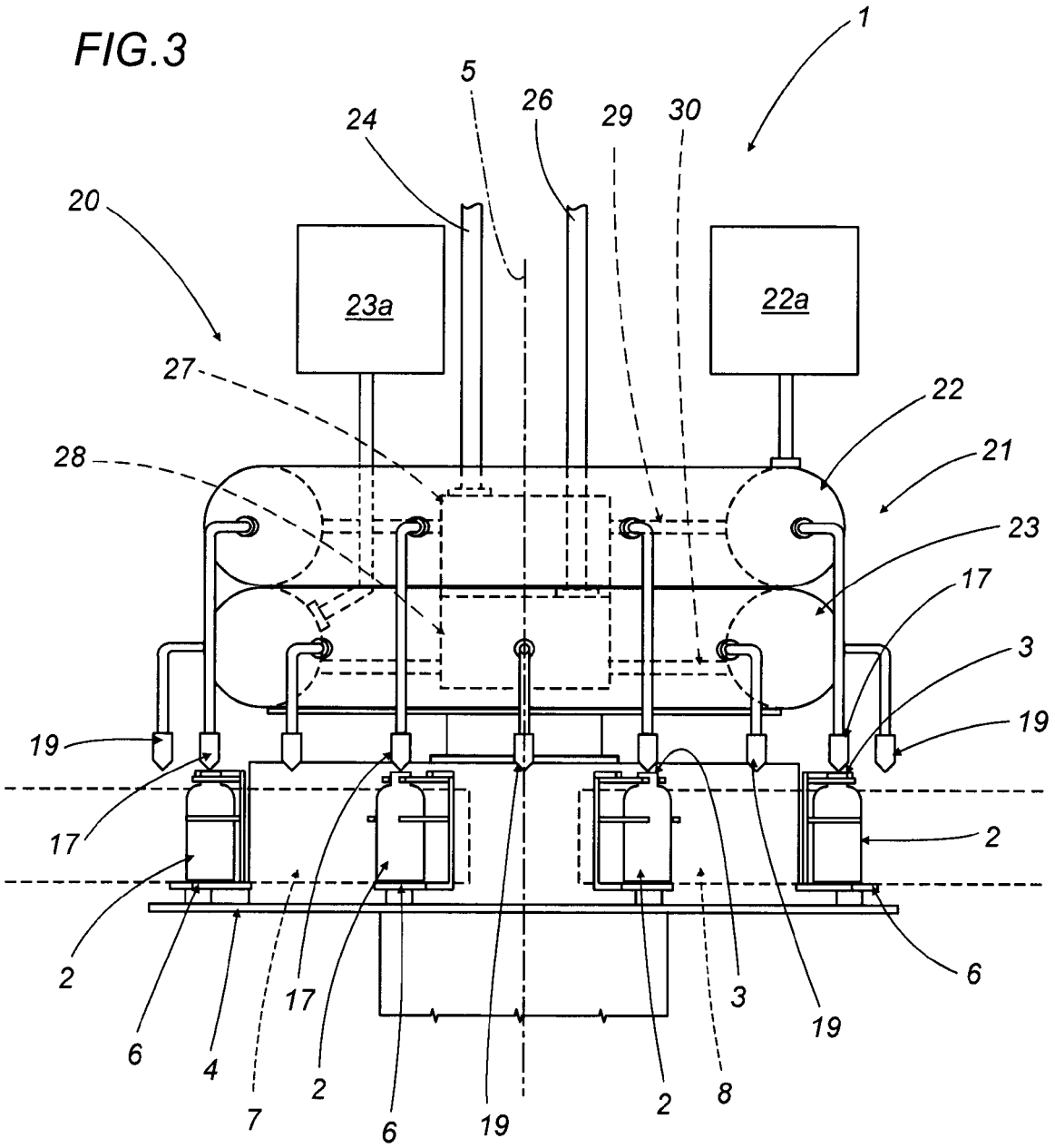
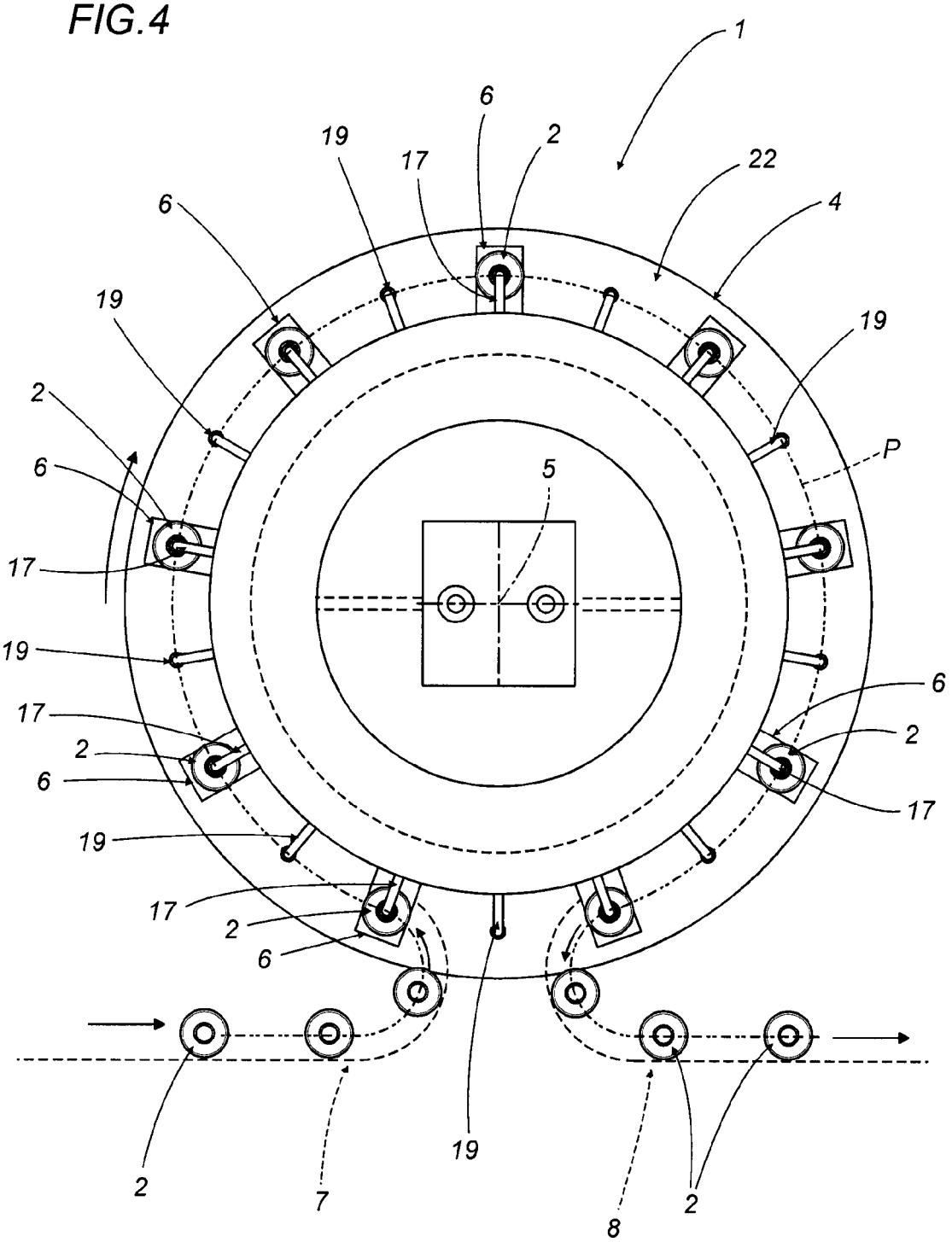

1
5
24
26
29
30
20
23a
22a
27
22
28
21
23
17
3
19
19
17
2
2
6
4
7
17
2
6
19
2
8
3
19
6

FIG.4



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 11 0791

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y	WO 2005/003017 A (AZIONARIA COSTRUZIONI MACCHINE; PASQUALI, MARIO; CAVALLARI, STEFANO) 13 January 2005 (2005-01-13) * page 4, line 26 - page 5, line 25 * * page 6, line 5 - line 24 * * page 10, line 10 - line 19 * * page 11, line 8 - line 22 * * figures 1-3 * -----	1-3,5, 7-13,17, 18,20 14,15,19	INV. B67C3/02 B67C3/00 B67C3/20
Y	US 5 713 403 A (CLUESSERATH ET AL) 3 February 1998 (1998-02-03) * column 3, line 65 - line 67 * -----	14,15	
D,Y	EP 1 243 546 A (AZIONARIA COSTRUZIONI MACCHINE AUTOMATICHE-A.C.M.A.-S.P.A) 25 September 2002 (2002-09-25) * paragraph [0032] * -----	19	

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	13 June 2006	Martínez Navarro, A.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 06 11 0791

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

13-06-2006

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2005003017 A	13-01-2005	EP 1641706 A1	05-04-2006
US 5713403 A	03-02-1998	BR 9601252 A	27-04-2004
		DE 19513064 A1	10-10-1996
		IT MI960660 A1	06-10-1997
EP 1243546 A	25-09-2002	AT 283826 T	15-12-2004
		CN 1375430 A	23-10-2002
		DE 60202090 D1	05-01-2005
		DE 60202090 T2	15-12-2005
		ES 2232727 T3	01-06-2005
		IT BO20010161 A1	23-09-2002
		US 2002134460 A1	26-09-2002

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- EP 1243546 A **[0039]**