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(54) **Modular-type rotative filling machine**

Modulare rotierende Befüllungsmaschine

Machine de remplissage rotative de type modulaire

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Description

[0001] The present invention relates to a modular-type rotative filling machine for filling containers, for example bottles, according to the preamble of claim 1 which can easily be configured to operate both in the presence of untreated air, i.e. in environmental conditions not subject to particular constraints, and in ultra clean environmental conditions. Such a machine is known from WO 2011/029609.

[0002] As is known, depending on the type of drink by which the relative container must be filled, it may be necessary to operate in special environmental conditions, for example ultra clean or even aseptic conditions.

[0003] For example, carbonated beverages can normally be filled into relative bottles in the presence of untreated air since such beverages are usually added with preservatives which provide a long life. In a totally different manner, low acidity beverages or still water may be subject to the formation of mould or bacteria and must therefore be filled in the respective containers in ultra clean environmental conditions with microfiltered air.

[0004] There are currently different types of filling machines depending on the mode by which the filling must take place.

[0005] The filling machines intended to operate in untreated air conditions are traditionally formed by a carousel rotating about a vertical axis thereof and provided with a plurality of filling units for respective containers, arranged angularly equally spaced from one another about the above said axis. In particular, each filling unit comprises a support member for a relative container and a filling valve, usually placed above the relative support member and adapted to be actuated, during the rotation of the carousel, to fill the corresponding container.

[0006] The above disclosed filling machines are then normally surrounded by protection panels arranged about the carousel; in any case, the atmospheric conditions in which the filling takes place are the same present in the plant in which such filling machines are placed.

[0007] Differently, in the filling machines intended to operate in ultra clean environmental conditions, to avoid contaminations, the area in which the container filling operation is performed must be appropriately isolated from the external environment and protected from impurities.

[0008] Therefore, in this case, the filling machines must be provided with a controlled atmosphere chamber in which the components of the machine which could cause the contamination of the beverage to be filled in the containers are housed. This chamber is normally maintained pressurised with respect to the external environment by inputting microfiltered air by means of fans. The microfiltered air also has a one-way flow outwards at the openings required for the inlet/outlet of the containers into/from the chamber. Thereby, the entry of microorganisms in the area where the containers are processed is avoided.

[0009] The need is felt in the field to increasingly reduce the production costs of the various machines, decreasing, where possible, the number of components strictly dedicated to specific types of machines and simplifying the assembly operations.

[0010] In the same field, a problem also arises each time there is the need to shift from filling in an untreated air condition to filling in a impurity-free environment, for example where the amount of preservatives is to be reduced in the beverage to be bottled. In this case, the filling machine used up to that moment must be replaced completely, switching to a model suitable to operate in ultra clean or even aseptic environmental conditions, depending on the circumstances.

[0011] WO 2011/029609 discloses a rotative filling machine adapted to operate always under sterile conditions and basically comprising a rotor, a plurality of filling valves fixed to a peripheral horizontal wall of the rotor, a plurality of support elements also secured to the periphery of the rotor and adapted to maintain the containers in positions below the respective filling valves along a predetermined path defined by the rotation of the rotor, and a fixed panelling arranged around the rotor, defining with the latter a controlled atmosphere chamber for filling the containers in sterile air conditions and cooperating with the rotor by means of labyrinth means extending along the rotation path of the containers.

[0012] It is an object of the present invention to therefore provide a modular rotative filling machine which allows to meet, in a simple and cost-effective manner, the above mentioned need and overcome at the same time the drawback connected to the known and above specified filling machines.

[0013] The aforementioned object is achieved by the present invention as it relates to a modular rotative filling machine as defined in claim 1.

[0014] A preferred embodiment is hereinafter disclosed for a better understanding of the present invention, by mere way of non-limitative example and with reference to the accompanying drawings, in which:

- figure 1 shows a perspective view with parts removed for clarity of a modular rotative filling machine obtained according to the present invention and adapted to carry out the filling of containers in ultra clean environmental conditions;
- figure 2 shows a top view of the machine according to figure 1 on a reduced scale;
- figure 3 shows a perspective view on an enlarged scale of a base module of the machine of figures 1 and 2, which is adapted to define on its own a filling machine adapted to carry out the filling of containers in untreated air conditions;
- figure 4 shows a perspective view on an enlarged scale of a portion of the filling machine of figures 1 and 2, with parts removed for clarity;
- figure 5 shows a partially sectioned perspective view of the same portion of the filling machine of figure 4;
- figure 6 shows a perspective view on an enlarged

scale of a detail of an auxiliary module of the filling machine of figures 1 and 2; and

- figure 7 shows a side view on an enlarged scale of another detail of the filling machine of figures 1 and 2.

[0015] In figures from 1 to 3, numeral 1 indicates as a whole a modular rotative filling machine adapted to carry out the filling of containers, for example bottles (known per se and not shown), both in untreated air conditions, i.e. in environmental conditions which are not stringent in terms of air purity, and in ultra clean environmental conditions.

[0016] In particular, machine 1 is adapted to receive in a sequence the containers to be filled from a feeding device, for example a star wheel 2, to feed them along a path P about a vertical axis A to fill them, for example with a liquid or pourable food product, and to feed the full containers to an outlet device, for example another star wheel 3.

[0017] Machine 1 comprises a base module 4, adapted to rotate the containers about axis A and to fill them, and an auxiliary module 5 which is peripherally couplable, by means of constraint means 6, for example of the releasable type or by means of welding, to base module 4 so as to define, around feeding path P of the containers, a controlled atmosphere chamber 7, in which the filling of the containers can be carried out in ultra clean atmospheric conditions.

[0018] In practice, base module 4 defines on its own a filling machine adapted to fill the containers in untreated air conditions; the optional coupling of auxiliary module 5 to base module 4 allows to obtain a filling machine adapted to operate in ultra clean atmospherical conditions.

[0019] With reference to figures 1 to 4, base module 4 comprises a support frame 8, a rotor 10 borne by frame 8 so as to rotate about axis A, a plurality of filling valves 11 fixed to the external periphery of rotor 10, and a plurality of support elements 12 also borne by rotor 10 and adapted to maintain the containers in positions below respective filling valves 11 along path P.

[0020] In particular, frame 8 essentially comprises a main hollow cylindrical body 13 having axis A, mounted on a plurality of vertical support legs 14.

[0021] Rotor 10 essentially comprises a central body 15, rotatingly borne by main body 13 about axis A, and an annular peripheral body 16 having axis A, fixed to central body 15 by means of a plurality of radial connection elements 17 arranged angularly equally spaced from one another about axis A.

[0022] In greater detail, peripheral body 16 is essentially formed by an annular wall 18 having a cylindrical configuration and by a substantially horizontal flat annular wall 19, arranged orthogonally to axis A and protruding from a lower edge 20 of annular wall 18 towards axis A.

[0023] Annular wall 18 is defined, on the opposite side to that facing axis A, by a cylindrical surface 21, from which filling valves 11 protrude, so that the latter result radially projecting outwards from annular wall 18.

[0024] Base module 4 also comprises a tank 22 (figure 3) containing the product to pour in the containers and fixed above frame 8, and a feeding network 23 of the respective filing valves 11, which is rotatable with rotor 10 and is connected to tank 22 by means of a delivery member (known per se and not shown).

[0025] As may be seen in particular in figure 4, a plurality of ducts 25 which are part of network 23 and connected to respective filling valves 11 pass through annular wall 18 of peripheral body 16 of rotor 10 in preset angular positions which are equally spaced about axis A.

[0026] In practice, each filling valve 11 is fixed on the front to annular wall 18 in a position such as to allow the fluidic connection thereof with the relative feeding duct 25 of the product to be poured in the containers.

[0027] Filling valves 11 are disclosed in the following only as far as necessary to understand the present invention.

[0028] In particular, as may be seen in figures 4, 5, and 7, each filling valve 11 comprises a delivery module 26 having a substantially parallelepipedal configuration, directly fixed to the cylindrical surface 21 of the annular wall 18 and connected with a relative duct 25, an electronic piloting module 27, also having a substantially parallelepipedal configuration, placed above relative delivery module 26, and a valve module 28, having a substantially parallelepipedal configuration, fixed in front of relative delivery module 26 and adapted to enable/inhibit the outflow of product from a lower mouth (not shown).

[0029] In practice, each delivery module 26 defines, with an inner duct 31 thereof, the fluidic connection between relative duct 25 and relative valve module 28; each piloting module 27 is instead used to electronically control the filling operation of the relative containers; and finally each valve module 28 internally has a feeding duct 32 of the product towards the relative lower outflow mouth, and a shutter element 33 mobile within duct 32 to open/close the above said mouth.

[0030] With reference to figures 3, 4, 5 and 7, each support element 12 is associated to a relative filling valve 11 and is carried, in a cantilevered manner, by a lower end portion 34 of valve module 28 thereof; more in particular, each support element 12 projects below from relative valve module 28 and comprises in a known manner, a hooking gripping member 35, the opening/closing motion of which on the relative containers is controlled by a cam follower roller 36 cooperating in use with cam means known per se and not shown.

[0031] With reference to figures 1, 2, 4, 5, 6 and 7, auxiliary module 5 comprises an annular rotating element 40, which is adapted to coaxially protrude from peripheral body 16 of rotor 10 fixed by means of constraint means 6 and has a plurality of through-seats 41 sealingly engageable by valve modules 28 of respective filling valves 11; auxiliary module 5 also comprises a fixed panelling 42 arranged about peripheral body 16 of rotor 10 and rotating element 40 and cooperating with rotating ele-

ment 40 by means of labyrinth means 43 extending along rotation path P of the containers about axis A.

[0032] In practice, rotating element 40 and fixed panelling 42 laterally define chamber 7, through which the containers are fed to be filled.

[0033] As may be seen in figures 4, 5, and 7, rotating element 40 is fixed below and coaxially to annular wall 19 of peripheral body 16 of rotor 10 by means of a plurality of brackets 44 defining constraint means 6. More in particular, brackets 44 are formed by respective elongated plates fixed by means of screws 45 to a lower surface of annular wall 19 of peripheral body 16 so as to radially extend with respect to axis A; brackets 44 project with respect to peripheral body 16 of rotor 10 both below and radially outwards.

[0034] In practice, each bracket 44 has an upper edge fixed by means of screws 45 to the lower surface of annular wall 19 of peripheral body 16 of rotor 10 and a lower edge fixed by means of further screws 46 to rotating element 40.

[0035] As may be seen in figures 4, 5, and 7, rotating element 40 comprises a first annular wall 47, substantially orthogonal to axis A and fixed below to brackets 44 by means of screws 46, and a second cylindrical annular wall 48 protruding below from annular wall 47.

[0036] In particular, annular wall 47 results fixed to peripheral body 16 of rotor 10 so as to radially protrude therefrom outwards and is provided with seats 41 through which lower end portions 34 of valve modules 28 of respective filling valves 11 pass; in practice, a relative gasket 49 is placed between lower end portion 34 of each valve module 28 and relative seat 41, preferably having a rectangular profile; thereby, the end segment of lower end portion 34 of each valve module 28 provided with the lower outlet mouth and relative support element 12, fixed to lower end portion 34, are both arranged below the annular wall 47 and facing annular wall 48.

[0037] With reference to figures 1, 5 and 6, panelling 42 extends in a fixed position about base module 4 and axis A and is interrupted at the inlet and outlet area of the containers defined by star wheels 2 and 3.

[0038] Panelling 42 comprises an upper wall 50 extending like a complete ring about axis A and adapted to cooperate with annular wall 47 of rotating element 40 through a part of labyrinth means 43, a front wall 51 facing annular wall 48 of rotating element 40 and interrupted in the area of star wheels 2 and 3, a lower wall 52 facing upper wall 50 and also interrupted like front wall 51, and a back wall 53 having a reduced height with respect to front wall 51, extending like a complete ring about axis A and cooperating with annular wall 48 of rotating element 40 through another part of labyrinth means 43. It should be noted that back wall 53 is arranged radially more internally with respect to annular wall 48 of rotating element 40 (figure 5).

[0039] In practice, panelling 42 is formed by a series of modules 55 (figure 6), each formed by an upper panel 56, by a front panel 57 provided with a port portion which can be opened on a hinge outwards, by a lower panel 58 and by a back panel 59. Various modules 55 are then connected to one another by a plurality of uprights 60. Ultimately, upper wall 50 is formed by the set of upper panels 56 with the addition of a further upper panel 56a adapted to close the ring about axis A, front wall 51 is formed by the set of front panels 57, lower wall 52 is formed by the set of lower panels 58 and lower wall 53 is formed by the set of back panels 59 with the addition of a further back panel 59a adapted to close the ring about axis A.

[0040] Given the type of connection of various modules 55, panelling 42 takes a polygonal configuration about axis A (clear when considering figure 2).

[0041] As visible in figure 6, each module 55 finally comprises another pair of front panels 61, 62 arranged respectively above and below front panel 57 and substantially on the same plane as the latter. The port portions of front panels 57 and front panels 61 are also transparent.

[0042] With particular reference to figure 5, in each interface area 63, 64 between rotating element 40 and panelling 42, i.e. at each of the cooperation areas between rotating element 40 and upper and back walls 50, 53 of panelling 42, labyrinth means 43 comprise a fixed annular channel 65, 66, which may or may not be filled with a sealing liquid, and an annular engagement portion 67, 68 borne by rotating element 40, engaged with play in relative channel 65, 66 so as to freely slide therein; in case channel 65, 66 is filled by sealing liquid, the relative engagement portion is partially immersed in the sealing liquid and slides in the liquid drawn by the rotation of rotor 10.

[0043] More precisely, in interface area 63, channel 65 is fixed on an annular edge of upper wall 50 adjacent to rotating element 40 and cooperates with engagement portion 67 protruding from an adjacent projecting cylindrical edge 69 of annular wall 47; in greater detail, cylindrical edge 69 protrudes on top from the annular wall 47 and engagement portion 67 extends radially outwards from cylindrical edge 69 and has a T configured cross section, the vertical segment of which engages with play relative channel 65.

[0044] In interface area 64, channel 66 is formed on the upper edge of back panels 59 of modules 55 and cooperates with engagement portion 68 protruding from an intermediate portion of annular wall 48 of rotating element 40; in greater detail, engagement portion 68 extends from a surface of annular wall 48 facing axis A and has an inverted L configured cross section, the horizontal segment of which projects radially from annular wall 48 and the vertical segment of which extends downwards from a free end of the horizontal segment and engages with play relative channel 66.

[0045] The sealing liquid, when present in channels 65, 66, acts as insulating medium preventing the contact between the internal area of chamber 7 and the surrounding external environment.

[0046] Machine 1 is finally provided with a plurality of fans 70 adapted to introduce microfiltered air which is slightly pressurised (a few millibars) with respect to the external environment within chamber 7, so as to generate a unidirectional flow outwards at the openings of chamber 7 provided for the inlet and outlet of the containers and optionally at interface areas 63, 64, when the presence of sealing liquid in channels 65, 66 is not provided. As may be seen in figure 1, fans 70 are directly supported by frame 8 of base module 4.

[0047] Machine 1 in the configuration of figure 3 - in which it can operate in untreated air conditions - can easily be converted to the configuration of figures 1, 2 and 5, essentially by carrying out the following operations:

- removing the lower end portions 34 of valve modules 28 from the remaining part of respective filling valves 11; in this operation, support elements 12, fixed to the respective lower end portions 34, are also removed;
- fixing, by means of screws 45, brackets 44 to the lower surface of annular wall 19 of peripheral body 16 of rotor 10 in predetermined angular position about axis A;
- fixing rotating element 40 to brackets 44 by means of screws 46 so as to arrange each seat 41 at relative valve module 28;
- again applying lower end portions 34 to relative valve modules 28, introducing them through respective seats 41 of annular wall 47 with the interposition of respective gaskets 49; and
- mounting modules 55, uprights 60 and upper and back panels 56a, 59a of panelling 42 about rotor 10 so as to arrange engagement portions 67, 58 in relative channels 65, 66.

[0048] A protected environment (chamber 7) is therefore easily formed around path P of the containers adapted to be fed with microfiltered air which is slightly pressurised with respect to the surrounding environment; this protected environment can ensure ultra clean environmental conditions for carrying out filling operations of the containers.

[0049] From an analysis of the features of machine 1 made according to the present invention, the advantages it allows to obtain are apparent.

[0050] In particular, the same type of base module 4 can be used both to make filling machines adapted to operate in untreated air environmental conditions and to make filling machines intended to operate in ultra clean environmental conditions. In practice, by applying or not applying auxiliary module 5 to base module 4 one or the other filling machine can be obtained. This allows a dramatic reduction of costs and a considerable simplification of the production processes and of the assembly operations of the various machines.

[0051] Furthermore, a producer of sealed containers for pourable products, who has initially acquired a filling machine according to the configuration of figure 3, i.e. adapted to operate in untreated air, and who wants to later improve the environmental conditions in which the filling of containers is carried out, can upgrade the existing machine, formed only by the base module 4, simply by applying auxiliary module 4; thereby, the complete replacement of the existing filling machine is no longer necessary, with an obvious reduction of costs and time consumption.

[0052] Finally, chamber 7 defines a reduced volume to be pressurised and has a reduced size such as to require reduced water consumption for washing.

[0053] Finally, it is clear that modifications and variants to machine 1 disclosed and shown herein can be made without departing from the scope of protection of the claims.

[0054] In particular, auxiliary module 5 could also be used to guarantee aseptic conditions within chamber 7.

[0055] Furthermore, panelling 42 could also not have back wall 53 and annular channel 66 could in this case also be obtained on the radially innermost edge of lower wall 52.

Claims

1. A modular rotative filling machine (1) comprising:

- a base module (4) adapted to carry out the filling of containers in untreated air conditions and formed by a rotor (10), by a plurality of filling valves (11) fixed to the external periphery of said rotor (10), and by a plurality of support elements (12) borne by said rotor (10) and adapted to maintain the containers in positions below the respective filling valves (11) along a predetermined path (P) defined by the rotation of said rotor (10);

characterized by

- an auxiliary module (5) peripherally couplable, by means of constraint means (6), to said base module (4) and defining a controlled atmosphere chamber (7), for filling said containers in ultra clean atmospheric conditions, said chamber (7) being defined by an annular rotating element (40) and by a fixed panelling (42) arranged about said rotor (10) and said rotating element (40) and cooperating with the rotating element (40) by means of labyrinth means (43) extending along said rotation path (P) of said containers;

wherein said annular rotating element (40) is attachable in a cantilevered manner, by means of said constraint means (6), to the external periphery of said rotor (10) and has a plurality of through-seats (41)

which can be sealingly engaged by said respective filling valves (11); wherein each said filling valve (11) has a removable lower end portion (34) engaged through a relative said through-seat (41) of said rotating element (40) with the interposition of sealing means (49); and wherein each said support element (12) protrudes below from said lower end portion (34) of a relative said filling valve (11) and is carried in a cantilevered manner by said lower end portion (34).

2. The machine according to claim 1, wherein said labyrinth means (43) comprise at least one fixed annular channel (65, 66) borne by said panelling (42), and at least one annular engagement portion (67, 68) borne by said rotating element (40) and engaged with play in said channel (65, 66) so as to freely rotate during the angular movements of said rotor (10).

3. The machine according to claim 2, wherein said annular channel (65, 66) is filled at least partially with a sealing liquid, and wherein said engagement portion (67, 68) slides in said sealing liquid drawn by the rotation of said rotor (10).

4. The machine according to any of the preceding claims, wherein said rotating element (40) comprises a first annular wall (47) protruding orthogonally from said rotor (10) and defining said engagement seats (41) for said filling valves (11), and a second cylindrical annular wall (48) protruding below from said first annular wall (47).

5. The machine according to claim. 4 when depending on claims 2 or 3, wherein said labyrinth means (43) comprise two said annular channels (65, 66) borne by said panelling (42) and two said annular engagement portions (67, 68) engaging with play the respective said channels (65, 66) and respectively borne by said first and second annular wall (47, 48).

6. The machine according to claim 5, wherein said panelling (42) comprises an upper wall (50) provided with a first annular channel (65) cooperating with said first annular wall (47), a front wall (51) facing said second annular wall (48), and a lower wall (52) bearing a second annular channel (66) cooperating with said second annular wall (48).

7. The machine according to claim 6, wherein said panelling (42) also comprises a cylindrical back wall (53) protruding from a radially internal edge of said lower wall (52), arranged radially more internally with respect to said second annular wall (48) of said rotating element (40) and provided with said second annular channel (66) cooperating with the second annular wall (48).

8. The machine according to any of the preceding claims, wherein said panelling (42) comprises a series of modules (55) one beside the other and connected by respective uprights (60) interposed therebetween, each module (55) comprising an upper panel (56) forming an uppper wall (50), a front panel (57) forming a front well (51), and at least one lower panel (58) forming a lower well (52).

Patentansprüche

1. Modulare rotierende Befüllungsmaschine (1), die enthält:

- ein Basismodul (4), das geeignet ist, das Füllen von Behältern unter Rohluft-Bedingungen durchzuführen, und das von einem Rotor (10), von einer Vielzahl von am Außenumfang des Rotors (10) befestigten Füllventilen (11) und von einer Vielzahl von Trägerelementen (12) geformt wird, die vom Rotor (10) getragen werden und geeignet sind, die Behälter in Stellungen unter den jeweiligen Füllventilen (11) entlang eines vorbestimmten Pfads (P) zu halten, der durch die Drehung des Rotors (10) definiert wird;

gekennzeichnet durch

- ein Hilfsmodul (5), das am Umfang mittels Spanneinrichtungen (6) mit dem Basismodul (4) verkuppelt werden kann und eine Kammer mit kontrollierter Atmosphäre (7) definiert, zum Füllen der Behälter unter ultrareinen atmosphärischen Bedingungen, wobei die Kammer (7) von einem ringförmigen rotierenden Element (40) und von einer feststehenden Wandverkleidung (42) definiert wird, die um den Rotor (10) und das rotierende Element (40) herum angeordnet ist und mit dem rotierenden Element (40) über Labyrintheinrichtungen (43) zusammenwirkt, die sich entlang des Rotationspfads (P) der Behälter erstrecken;
wobei das ringförmige rotierende Element (40) mittels der Spanneinrichtungen (6) am Außenumfang des Rotors (10) auskragend befestigt werden kann und eine Vielzahl von Durchgangsaufnahmen (41) hat, in die die jeweiligen Füllventile (11) abdichtend einrasten können;
wobei jedes Füllventil (11) einen entfernbaren unteren Endteil (34) hat, der **durch** eine Durchgangsaufnahme (41) des rotierenden Elements (40) hindurch mit Zwischenfügung von Dichteinrichtungen (49) einrastet; und wobei jedes Trägerelement (12) von unter dem unteren Endteil (34) eines Füllventils (11) vorsteht und vom unteren Endteil (34) auskragend getragen wird.

2. Maschine nach Anspruch 1, wobei die Labyrintheins-

richtungen (43) mindestens einen von der Wandverkleidung (42) getragenen feststehenden ringförmigen Kanal (65, 66) und mindestens einen ringförmigen Einrastteil (67, 68) enthalten, der von dem rotierenden Element (40) getragen wird und mit Spiel in den Kanal (65, 66) einrastet, um während der Winkelbewegungen des Rotors (10) frei zu rotieren.

3. Maschine nach Anspruch 2, wobei der ringförmige Kanal (65, 66) mindestens teilweise mit einer Dichtflüssigkeit gefüllt ist, und wobei der Einrastteil (67, 68) von der Rotation des Rotors (10) gezogen in der Dichtflüssigkeit gleitet.

4. Maschine nach einem der vorhergehenden Ansprüche, wobei das rotierende Element (40) eine erste ringförmige Wand (47), die orthogonal vom Rotor (10) vorsteht und die Einrastaufnahmen (41) für die Füllventile (11) definiert, und eine zweite zylindrische ringförmige Wand (48) enthält, die von unter der ersten ringförmigen Wand (47) vorsteht.

5. Maschine nach Anspruch 4, wenn er von den Ansprüchen 2 oder 3 abhängt, wobei die Labyrintheinrichtungen (43) zwei von der Wandverkleidung (42) getragene ringförmige Kanäle (65, 66) und zwei ringförmige Einrastteile (67, 68) enthalten, die mit Spiel in die Kanäle (65, 66) einrasten und von der ersten bzw. zweiten ringförmigen Wand (47, 48) getragen werden.

6. Maschine nach Anspruch 5, wobei die Wandverkleidung (42) eine obere Wand (50), die mit einem ersten ringförmigen Kanal (65) versehen ist, der mit der ersten ringförmigen Wand (47) zusammenwirkt, eine Stirnwand (51) gegenüber der zweiten ringförmigen Wand (48) und eine untere Wand (52) enthält, die einen zweiten ringförmigen Kanal (66) trägt, der mit der zweiten ringförmigen Wand (48) zusammenwirkt.

7. Maschine nach Anspruch 6, wobei die Wandverkleidung (42) auch eine zylindrische Rückwand (53) enthält, die von einer radial inneren Kante der unteren Wand (52) vorsteht, die radial weiter innen bezüglich der zweiten ringförmigen Wand (48) des rotierenden Elements (40) angeordnet und mit dem zweiten ringförmigen Kanal (66) versehen ist, der mit der zweiten ringförmigen Wand (48) zusammenwirkt.

8. Maschine nach einem der vorhergehenden Ansprüche, wobei die Wandverkleidung (42) eine Reihe von Modulen (55) eines neben dem anderen und durch dazwischen angeordnete Ständer (60) verbunden enthält; wobei jedes Modul (55) eine obere Platte (56), die eine obere Wand (50) formt, eine Stirnplatte (57), die eine Stirnwand (51) formt, und mindestens eine untere Platte (58) enthält, die eine untere Wand formt (52).

Revendications

1. Machine de remplissage rotative modulaire (1) comprenant :

- un module de base (4) organisé pour mettre en oeuvre le remplissage de récipients dans des conditions d'air non traité et formé d'un rotor (10), d'une pluralité de vannes de remplissage (11) fixées à la périphérie externe dudit rotor (10), et d'une pluralité d'éléments de support (12) portés par ledit rotor (12) et aptes à maintenir les récipients dans des positions situées au-dessous des vannes de remplissage (11) respectives le long d'un chemin prédéterminé (P) défini par la rotation dudit rotor (10) ;

caractérisée par :

- un module auxiliaire (5) pouvant être couplé à sa périphérie, par l'intermédiaire de moyens de contrainte (6), audit module de base (4) et définissant une chambre à atmosphère contrôlée (7) pour le remplissage desdits récipients dans des conditions d'atmosphère extrêmement propres, ladite chambre (7) étant définie par un élément rotatif annulaire (40) et par un ensemble de panneaux fixes (42) disposé autour dudit rotor (10) et dudit élément rotatif (40) et coopérant avec l'élément rotatif (40) par l'intermédiaire de moyens de labyrinthe (43) s'étendant le long dudit chemin (P) de rotation desdits récipients ;

dans laquelle ledit élément rotatif annulaire (40) peut être fixé en porte-à-faux, par l'intermédiaire desdits moyens de contrainte (6), à la périphérie externe dudit rotor (10) et comporte une pluralité de sièges traversants (41) dans lesquels peuvent venir en engagement étanche lesdites vannes de remplissage (11) respectives ; dans laquelle chacune desdites vannes de remplissage (11) comporte une partie terminale inférieure amovible (34) engagée à travers l'un, qui lui est relatif, desdits sièges traversants (41) dudit élément rotatif (40), avec interposition de moyens d'étanchéité (49) ; et dans laquelle chacun desdits éléments de support (12) est en saillie au-dessous de ladite partie terminale inférieure (34) de ladite vanne de remplissage (11) qui lui est relative et est porté en porte-à-faux par ladite partie terminale inférieure (34).

2. Machine selon la revendication 1, dans laquelle lesdits moyens de labyrinthe (43) comprennent au moins un canal annulaire fixe (65, 66), porté par ledit ensemble de panneaux (42), et au moins une partie

d'engagement annulaire (67, 68), portée par ledit élément rotatif (40) et engagée, avec un jeu, dans ledit canal (65, 66) de manière à tourner librement pendant les mouvements angulaires dudit rotor (10).

3. Machine selon la revendication 2, dans laquelle ledit canal annulaire (65, 66) est rempli au moins partiellement d'un liquide d'étanchéité, et dans lequel ladite partie d'engagement (67, 68) glisse dans ledit liquide d'étanchéité en étant tirée par la rotation dudit rotor (10).

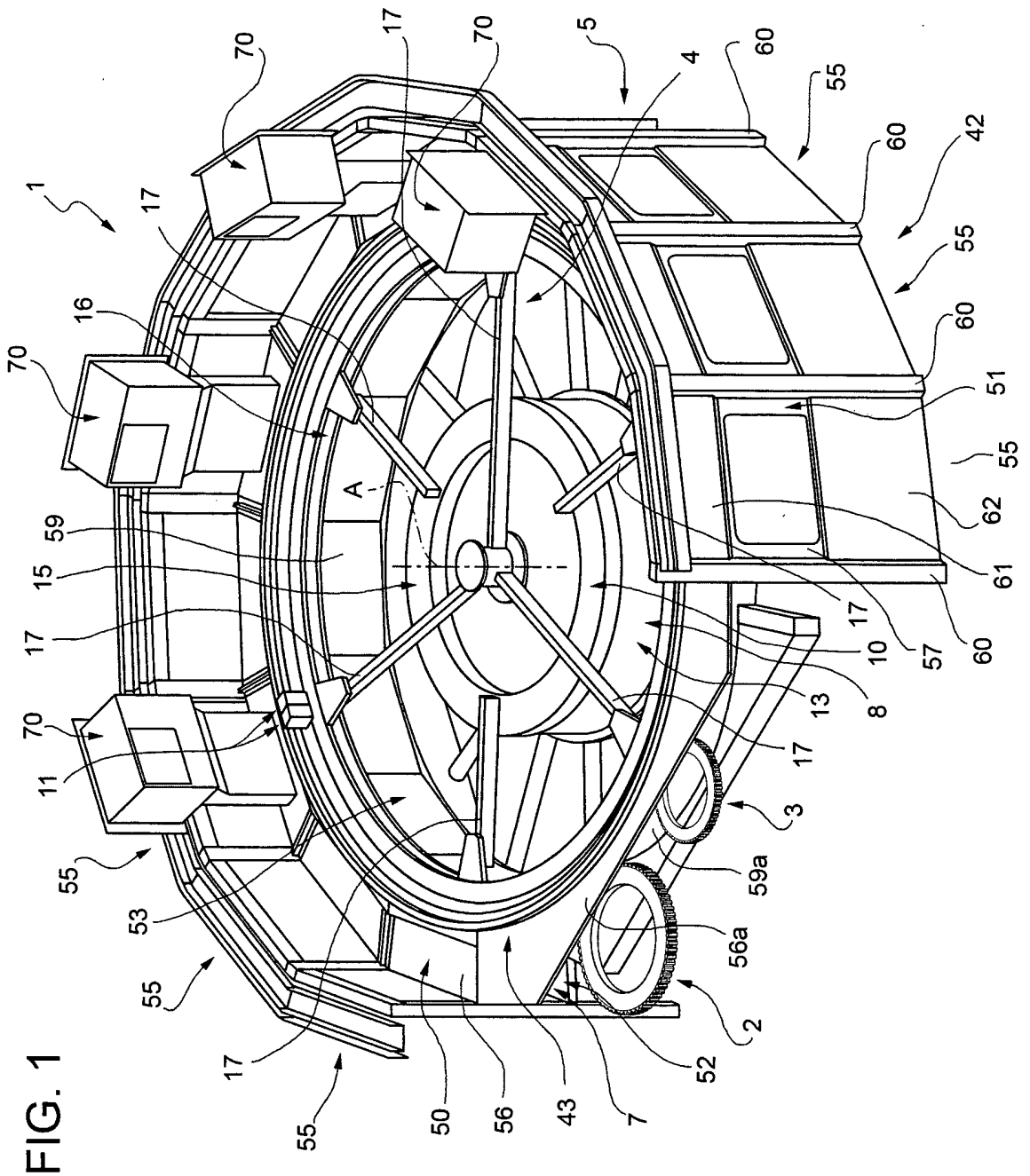
4. Machine selon l'une quelconque des revendications précédentes, dans laquelle ledit élément rotatif (40) comprend une première paroi annulaire (47), faisant saillie de manière orthogonale par rapport audit rotor (10) et définissant lesdits sièges traversants (41) pour lesdites vannes de remplissage (11), et une deuxième paroi annulaire cylindrique (48) faisant saillie au-dessous de ladite première paroi annulaire (47).

5. Machine selon la revendication 4, dans la mesure où elle dépend des revendications 2 ou 3, dans laquelle lesdits moyens de labyrinthe (43) comprennent lesdits deux canaux annulaires (65, 66) portés par ledit ensemble de panneaux (42) et lesdites deux parties d'engagement annulaires (67, 68) venant s'engager, avec un jeu, dans lesdits canaux respectifs (65, 66) et portées respectivement par lesdites première et deuxième parois annulaires (47, 48).

6. Machine selon la revendication 5, dans laquelle ledit ensemble de panneaux (42) comprend une paroi supérieure (50) équipée d'un premier canal annulaire (65) qui coopère avec ladite première paroi annulaire (47), d'une paroi frontale (51) faisant face à ladite deuxième paroi annulaire (48), et d'une paroi inférieure (52) portant un deuxième canal annulaire (66) qui coopère avec ladite deuxième paroi annulaire (48).

7. Machine selon la revendication 6, dans laquelle ledit ensemble de panneaux (42) comprend également une paroi arrière cylindrique (53) faisant saillie à partir d'un bord interne radial de ladite paroi inférieure (52), et étant disposée, quant à sa position radiale, de manière plus interne par rapport à ladite deuxième paroi annulaire (48) dudit élément rotatif (40) tout en étant équipée dudit deuxième canal annulaire (66) qui coopère avec la deuxième paroi annulaire (48).

8. Machine selon l'une quelconque des revendications précédentes, dans laquelle ledit ensemble de panneaux (42) comprend une série de modules (55) situés les uns à côté des autres et reliés au moyen de montants respectifs (60) interposés entre eux, chaque module (55) comprenant un panneau supérieur (56) formant une paroi supérieure (50), un panneau frontal (57) formant une paroi frontale (51), et au moins un panneau inférieur (58) formant une paroi inférieure (52).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59a
56a
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FIG. 1

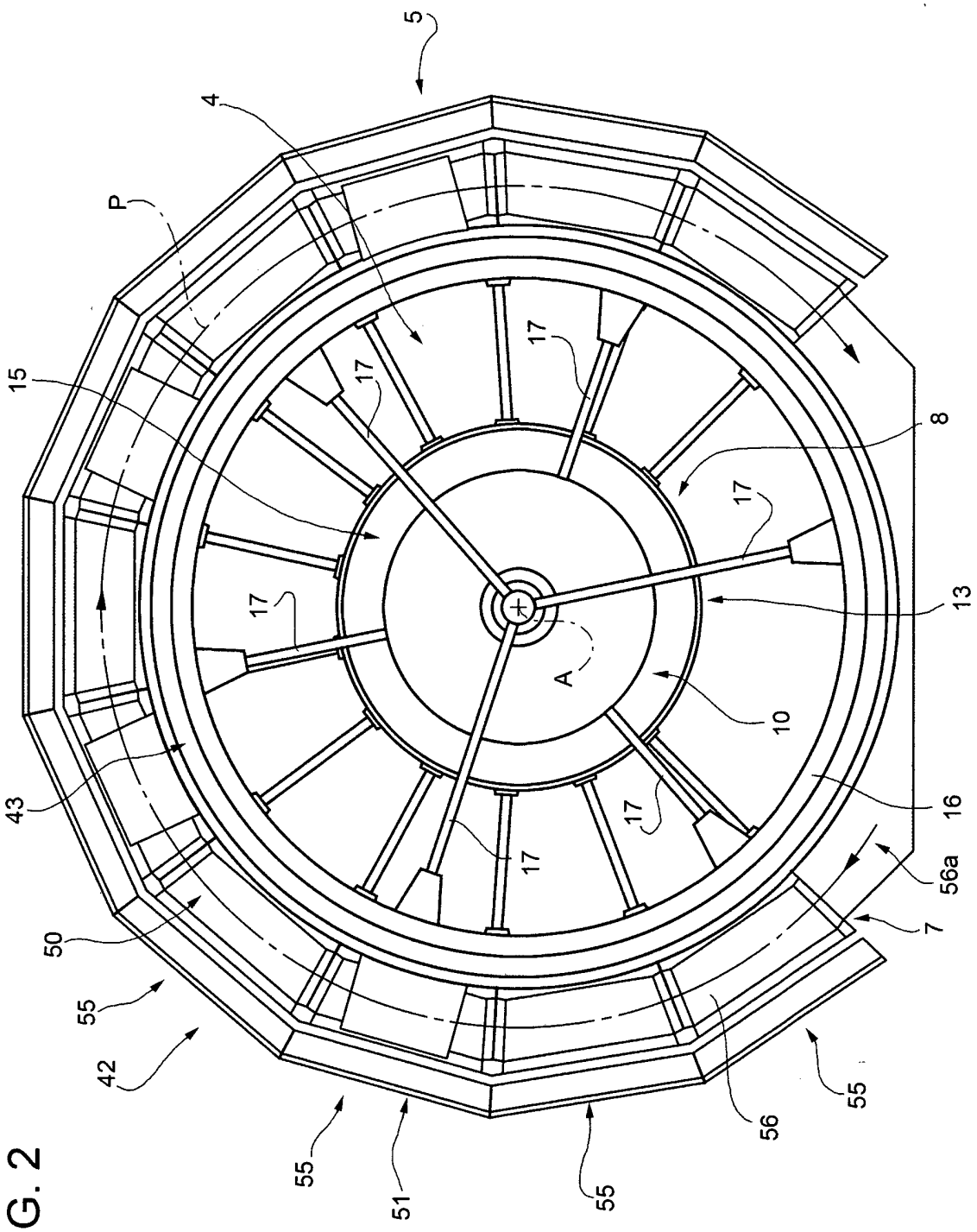

FIG. 2

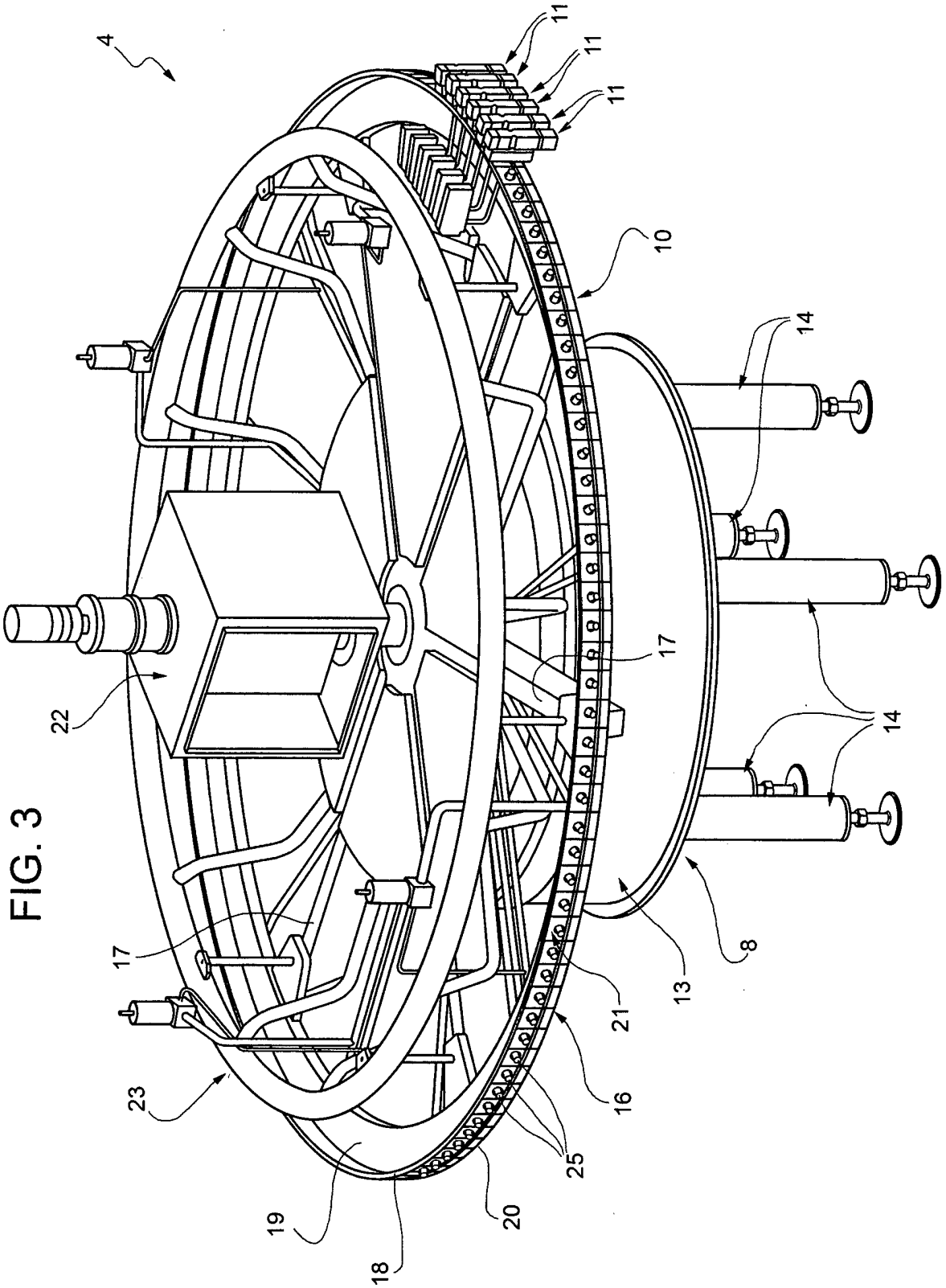

FIG. 3

FIG. 4

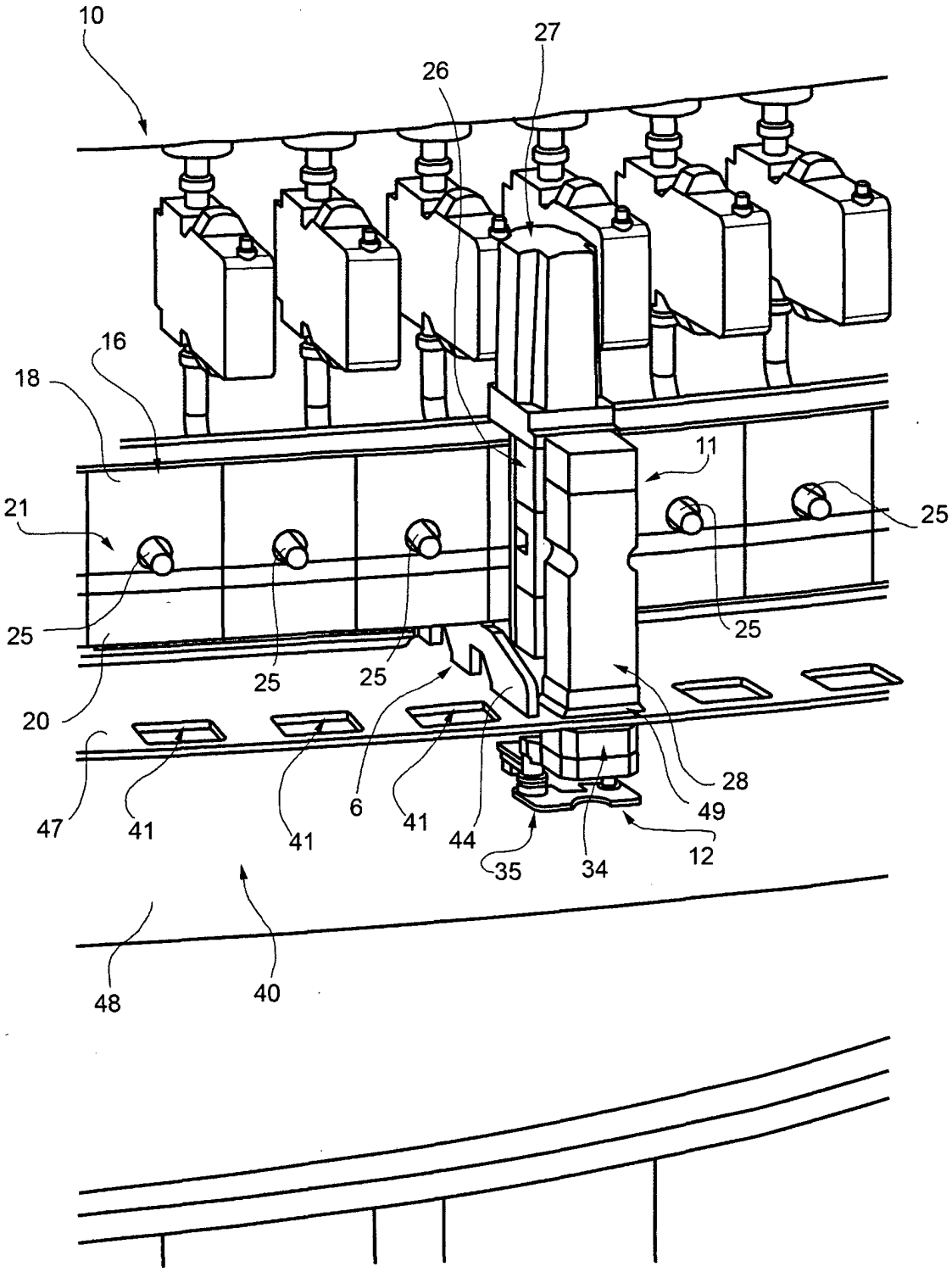
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FIG. 5

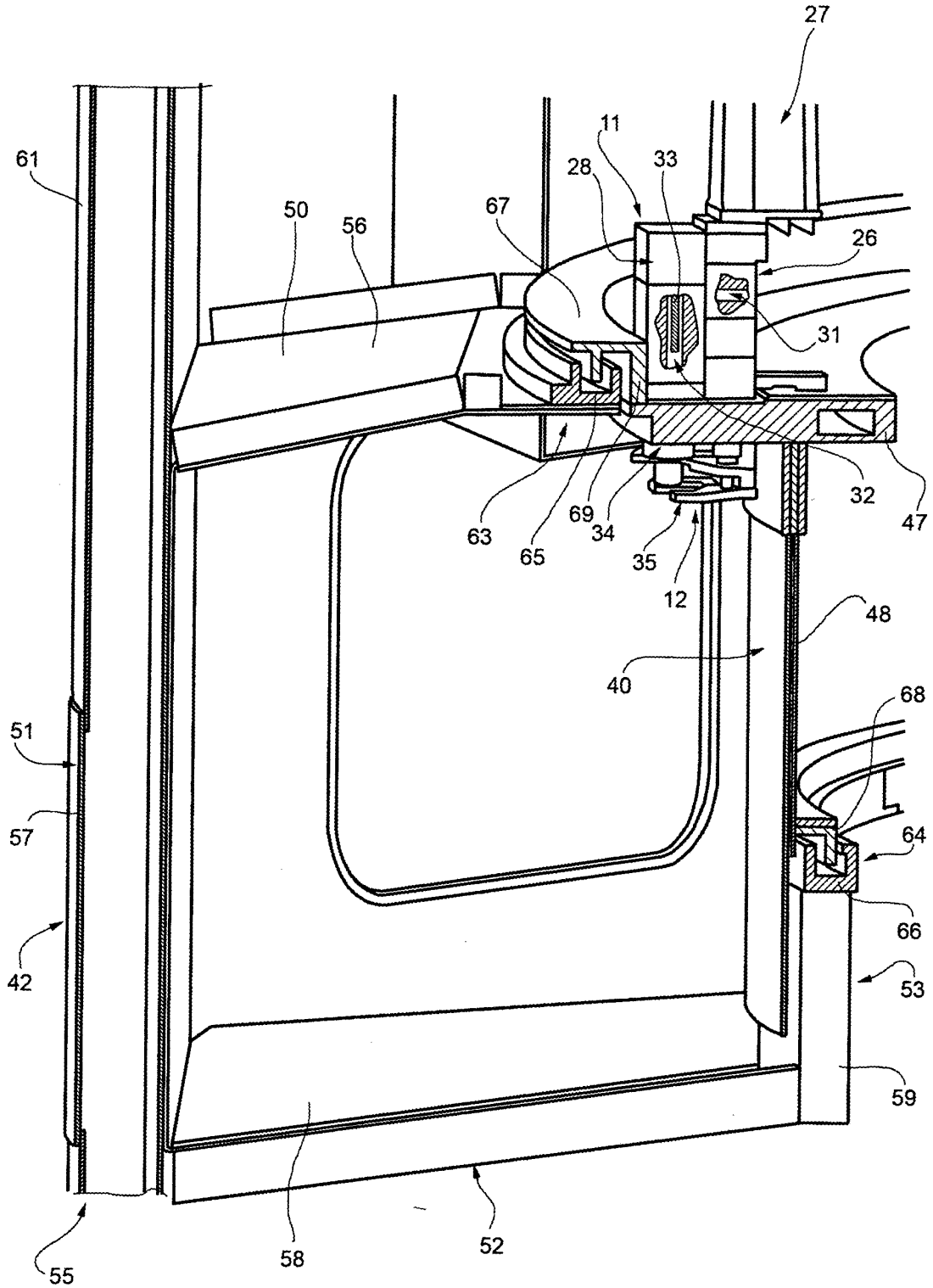
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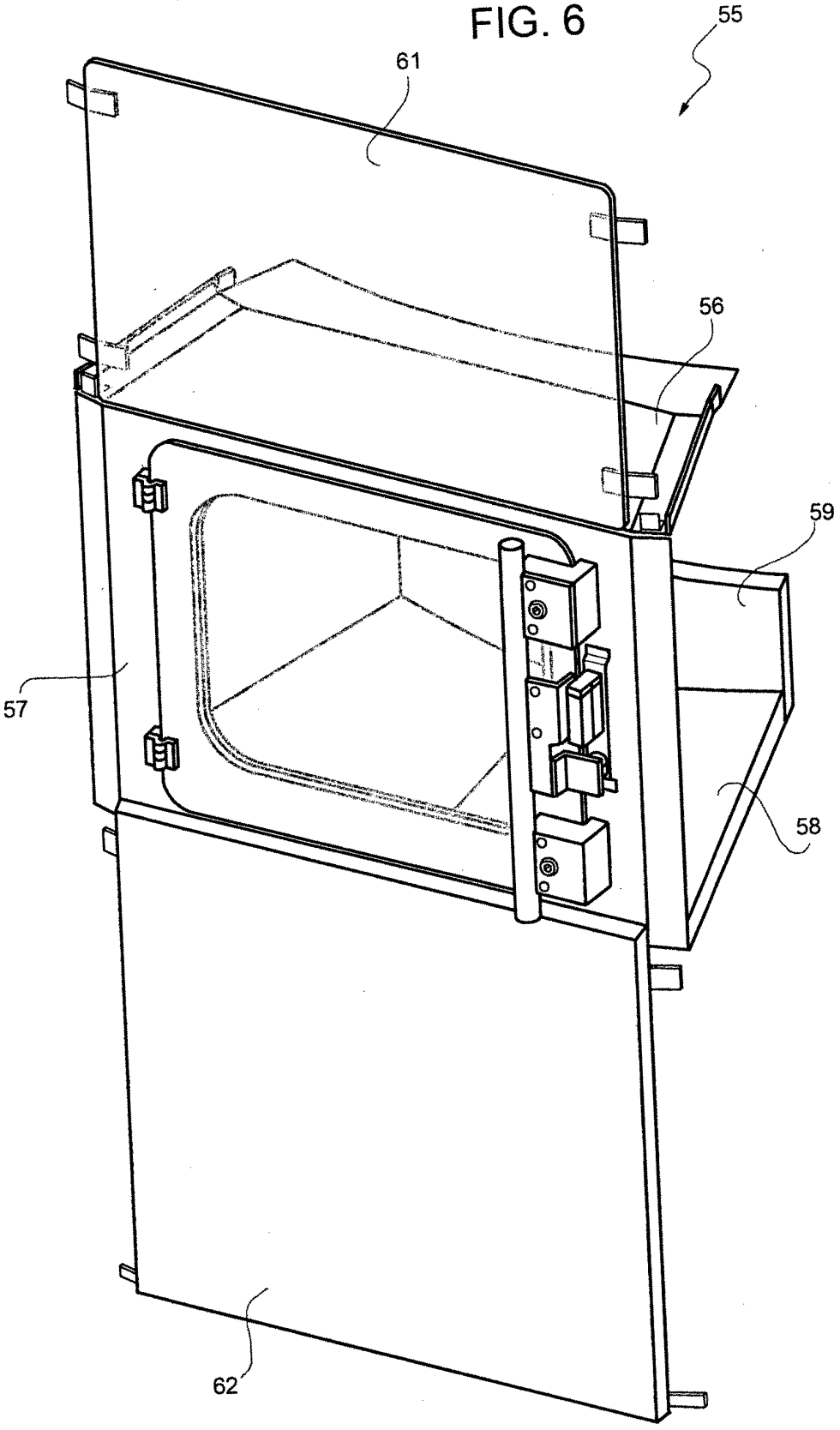
FIG. 6



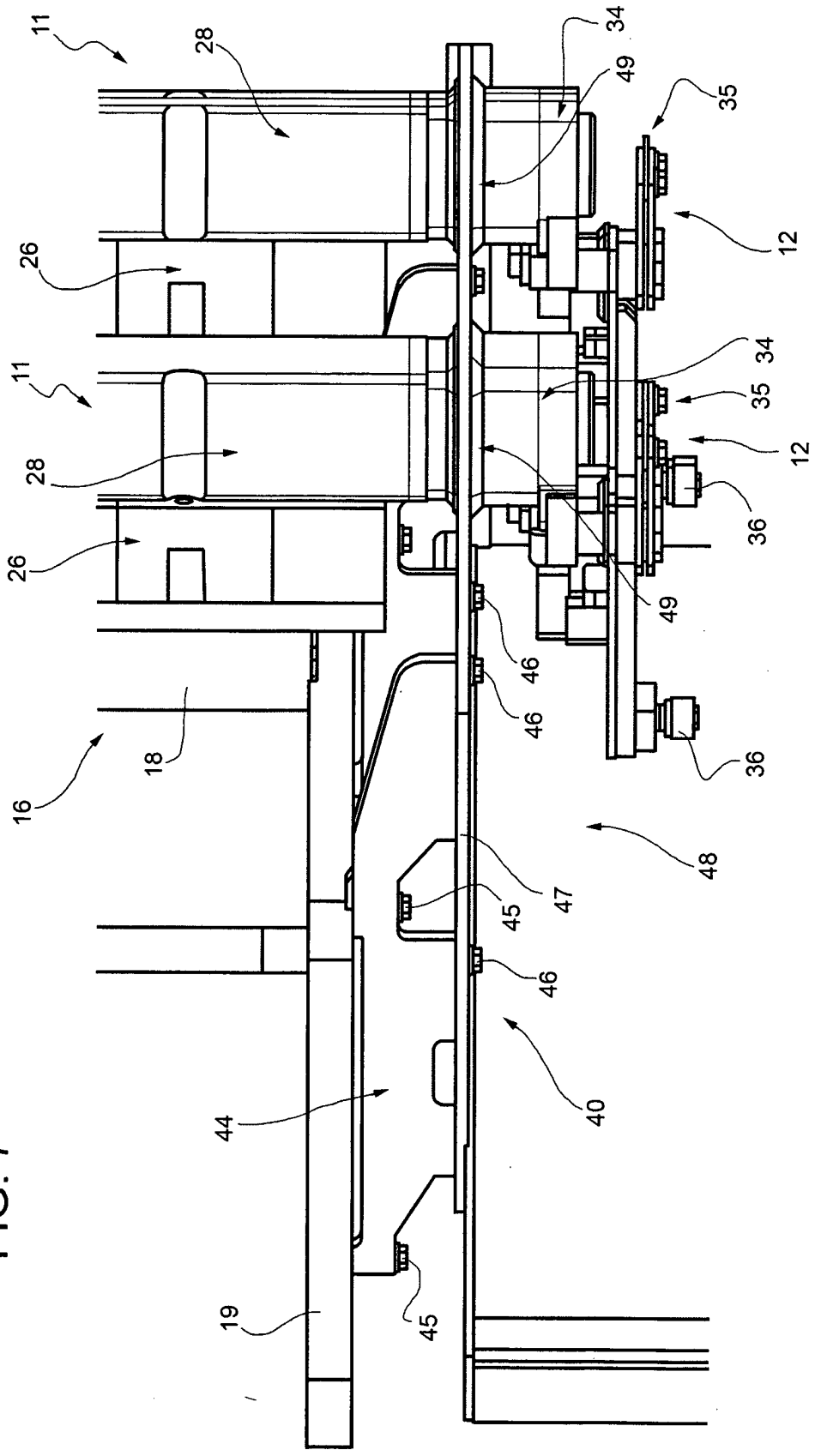

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FIG. 7

REFERENCES CITED IN THE DESCRIPTION

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