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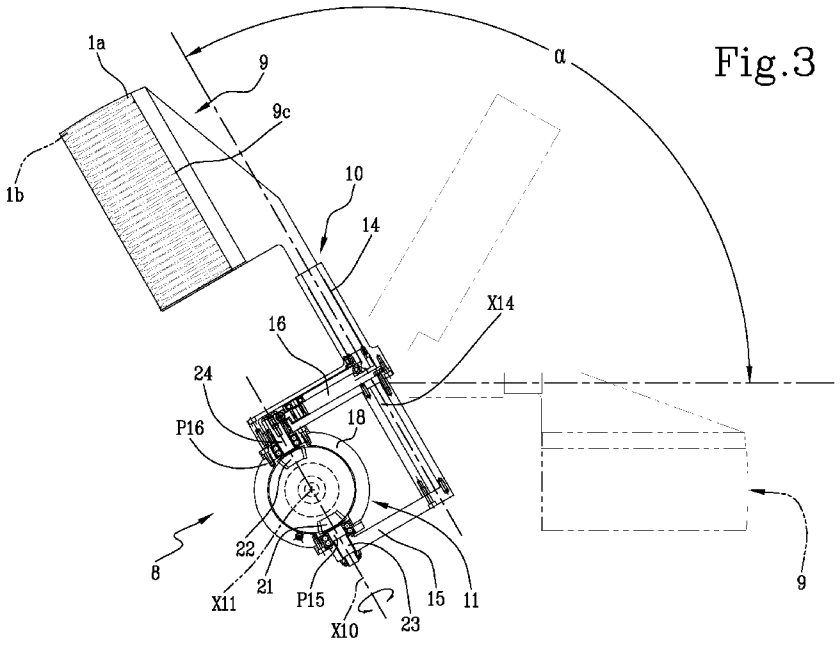

Fig.3

(57) Abstract: Described is a machine for forming filter-bags (1) containing infusion products, comprising a transporting element (2) configured for picking up, transporting and releasing filter-bags (1) from an operational station (3) for forming filter-bags (1) to a station (4) for preparing and packaging groups (G) of formed filter-bags (1); the preparing and packaging station (4) comprises a tubular conduit (5) configured to receive individual filter-bags (1); and a unit (8) for transferring the group (G) of filter-bags (1) positioned, in a receiving position, below the tubular conduit (5) and configured to rotate about a second axis (X11) parallel to the first axis (X3) between a position for receiving the group (G) of filter-bags (1) to a position for releasing the group (G) of filter-bags (1) inside a box (12) and vice versa; the transfer unit (8) is articulated to a movement unit (11) in such a way as to also rotate about a third axis (X10) transversal to the second axis (X11) of rotation of the movement unit (11) of the body (9), in particular the transfer unit (8) is configured

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to rotate in a synchronised fashion about the second (X11) and the third (X10) axis so as to rotate and orient the group (G) of filter-bags (1) prior to the arrival in the release position inside the box (12).

DESCRIPTION

MACHINE FOR FORMING FILTER-BAGS WITH INFUSION PRODUCTS

Technical field

This invention relates to a machine for forming filter-bags with infusion products.

The expression “infusion products” means products such as tea, coffee, camomile (in powder, granules, or leaves).

Background art

More specifically, the machine according to the invention is used for forming filter-bags of the single-lobed or double-lobed type, or in any case on filter-bags with a flat extension.

For example, in the case of two-lobed filter-bags, they comprise a single length of filter paper defining two separate and closed chambers. Each chamber contains a dose of infusion product. The two chambers are folded towards each other forming a single upper end (in the shape of an upturned “V”) and a bottom end in the shape of a “W”.

In addition, the filter-bag may be equipped with a thread for association with a gripping tag.

A type of machine for forming this type of filter-bag is known from patent document EP765274.

That patent document describes a machine structured along a forming and feeding line on which are positioned:

- a station for feeding a web of filter paper along a feed surface;
- a station for feeding doses of product on the web of filter paper at predetermined distances;
- a station designed to close the web on itself, wrap the doses of product and, subsequently, longitudinally join the web;
- a station for folding individual pieces of filter paper with double chamber;

- a carousel equipped with radially protruding grippers, positioned beneath the folding station and configured to receive individual pieces of folded filter paper; the carousel, moved stepwise about a horizontal axis, moves each piece of filter paper in the proximity of stations arranged one after another to associate to the piece of filter paper a thread, suitably wrapped around the piece of filter paper, and a tag in turn associated with the thread.

In some machine solutions, depending on the type of filter-bag, there may be:

- a further station for transversal closing of the ends of the piece before or at the same time as the separation from the remaining film; or
- a station for folding the open ends of the two chambers of the piece along the path of the carousel.

If necessary, there may also be a station for applying an overwrapping material to the filter-bag thus obtained along the path of the carousel.

Moreover, the carousel transfers the filter-bag thus formed to a station for preparing and packaging groups of filter-bags comprising units for orientation of the filter-bags, units for stacking and transferring of the filter-bags stacked in packages (of particular interest in this specification).

The orientation unit (shown in patent document EP762973) comprises (see Figure 1) a drum T, positioned alongside the carousel GS, comprising a plurality of housing pockets T1, arranged circumferentially and each designed to house and retain by interference a filter-bag SF whilst the drum T rotates in a stepwise fashion and a transporting element OT which picks up by a gripper PZ of the carousel GS, and carries (with substantially rectilinear motion) on the pocket of the drum, the filter-bag.

The drum T, moved stepwise about an axis parallel to the axis of the carousel, has, precisely, the duty of receiving, rotating (orienting), and releasing the filter-bags SF inside the stacking station SI for preparing, transferring and housing groups (in a predetermined number) of filter-bags SF inside final packages (boxes). The stacking and packaging units of the

station SI comprise:

- a fixed tubular conduit CT, oriented in a radial direction relative to the drum T, and having an upper opening positioned facing the surface of the drum and configured to receive individual filter-bags;
- a plate PT defining a bottom base inside the tubular conduit; the plate is movable, in both directions, along the conduit and in a synchronised fashion with the arrival of the individual filter-bags from the opening of the conduit and in such a way as to form a stack of filter-bags feeding towards the bottom of the tubular conduit;
- a gripper PM movable radially and longitudinally relative to the tubular conduit and configured to retain the stack formed between the top and bottom of the stack (simultaneously with a disengagement of the bottom plate); the gripper is provided with sliding means for transferring the stack beyond the bottom of the tubular conduit and towards a unit for transferring the stack positioned, in a receiving position, coaxial with the tubular conduit and below the latter.

In turn, the transfer unit has a housing body composed of three walls (two side and one bottom) forming a U-shaped housing for receiving the stack of filter-bags; a side wall is movable towards and away from the other side wall for retaining or releasing the stack of filter-bags.

The body is associated with an articulated arm to a motor-driven shaft and rotates about an axis parallel to the axis of the drum to allow a rotation of the body from a position for receiving the stack to a position for releasing the stack inside a box set up in advance and vice versa.

Now, as described, the structure of the station for preparing and packaging groups of filter-bags comprise a multiplicity of components forming the operating units which must be synchronised in the operational movements through a large number of kinematic systems which, in effect, make this portion of the machine extremely complex and bulky.

In effect, in order to correctly package the groups of filter-bags using this transfer unit it is necessary to rotate the individual filter-bags with the

above-mentioned drum.

This determines a passage of the filter-bags in three different operating zones before be packaged.

Moreover, this end section of the machine must maintain high operating speeds as a function of a high speed for feeding the filter-bags with respect to the speed, more constant and step by step, of the remaining stations designed to form the individual filter-bags.

Patent documents WO2012/117308, US2002/139086 and WO2007/138471 describe corresponding further solutions of structures for stacking groups of filter-bags formed and fed by a carousel or drum for unloading filter-bags formed by the preceding stations.

These solutions are structurally simple relative to that described previously and are of the “passive” type, that is, they can be used only for accepting the filter-bags being unloaded and forming groups of filter-bags without determining a precise orientation before packaging.

Disclosure of the invention

The aim of this invention is therefore to provide a machine for forming filter-bags for infusion products which is able to simplify the operations and the operational components present in the station for preparing and packaging groups of filter-bags.

More specifically, the aim of this invention to provide a machine for forming filter-bags for infusion products which is able to perform in a single operation both the orientation and the packaging of the stack of bags and maintain a high production speed.

These aims are fully achieved by the machine for forming filter-bags containing infusion products according to this invention as characterised in the appended claims.

Brief description of the drawings

The features of the invention will become more apparent from the following

detailed description of a preferred, non-limiting embodiment of it, with reference to the accompanying drawings, in which:

- Figure 1 illustrates a schematic front view, with some parts cut away to better illustrate others, of a part of the machine for forming filter-bags for infusion products of known type and in particular a carousel for forming filter-bags and a part of a station for preparing and packaging filter-bags;
- Figure 2 illustrates a schematic front view, with some parts cut away to better illustrate others, of a part of the machine, according to this invention, and in particular a carousel for forming filter-bags and a part of a station for preparing and packaging filter-bags;
- Figures 3 and 4 illustrate schematic front views, with some parts cut away to better illustrate others, of another part of the preparing and packaging station of the machine according to the invention, in particular a unit for transferring groups of filter-bags, in two different operating positions;
- Figure 5 illustrates a side view, with some parts in cross section and others cut away to better illustrate some details, of the transfer unit of Figures 3 and 4;
- Figure 6 illustrates a schematic front view of a detail of movement elements of the transfer unit of Figure 5.

Detailed description of preferred embodiments of the invention

With reference to the accompanying drawings, in particular Figures 2 to 4, the machine according to the invention, labelled 100 in its entirety, is used for forming filter-bags 1 containing infusion products.

The expression "infusion products" means products such as tea, coffee, camomile (in powder, granules, or leaves).

Preferably, but not exclusively, the filter-bag 1 formed by a machine according to the invention may be of the two-lobed type, that is to say, having two chambers folded towards each other forming a top end 1a (with the shape of an upturned "V") and a bottom end 1b with the shape of a

"W".

The machine 100 according to the invention comprises a transporting element 2 configured for picking up, transporting and releasing individual filter-bags 1 from a operating station 3 for forming the filter-bags 1, rotating about a first axis X3, to a station 4 for preparing and packaging groups G of filter-bags 1 formed.

In the case illustrated, purely by way of an example, the operating station 3 is a rotary stepwise carousel, having a plurality of grippers 3a arranged radially on the carousel.

Each gripper 3a is designed to transport, along a curved path, the basic components (material and doses) which will form the filter-bag 1 through a plurality of stations designed to apply the other components in order to complete each filter-bag 1.

At the end of this curved path each gripper 3a reaches a position for release of the formed filter-bag 1 to the above-mentioned pick-up transporting element 2.

This transporting element 2, in the case illustrated in Figure 2, is a gripper movable radially in both directions relative to the carousel, and is able to pick up the filter-bag 1 and move above the preparing and packaging station 4.

The preparing and packaging station 4 comprises a tubular conduit 5 (a frame with a rectangular cross section open on two or more sides and on the bottom) having an upper end opening 5a positioned facing the transporting element 2 and configured to receive the individual filter-bags 1.

Preferably, the transporting element 2 is aided by a pushing element 31, located above the transporting element 2 and configured to direct the filter-bag 1 towards the upper end opening 5a of the tubular conduit 5 at the positioning of the filter-bag 1 above the tubular conduit 5.

The preparing and packaging station also comprises units 6, 7 for controlling the descent of the individual filter-bags 1 and for defining the

group G of filter-bags to be formed.

These units 6, 7 are movable along the tubular conduit 5 (advantageously the units are movable both along the axis of extension of the tubular conduit 5 and radially relative to the conduit).

The units 6, 7 are configured to form, retain and transfer the stacked group G of filter-bags 1 beyond the bottom of the tubular conduit 5.

As illustrated in Figure 2, by way of a non-limiting constructional example, the elements comprise a plate 6 defining a bottom base inside the tubular conduit 5.

The plate 6 is movable, in both directions, axially along the tubular conduit 5 and in a synchronised fashion with the arrival of the individual filter-bags 1 from the upper opening 5a of the tubular conduit 5 in such a way as to form a stacked group G of filter-bags 1 feeding towards the bottom of the tubular conduit 5.

The plate 6 can move both axially and radially with respect to the tubular body 5, or only axially if the plate 6 is configured in two half-parts to define two prongs of a gripper which can be opened and closed to enter and leave (sideways) into / from the tubular conduit 5.

The means also comprise a gripper 7 movable relative to the tubular conduit 5 and in a synchronised fashion with the plate 6.

The gripper 7 is configured to retain the stacked unit G of filter-bags 1 formed between the top and bottom of the stack.

The gripper 7 is equipped with sliding means (not illustrated) to transfer the stacked group G of filter-bags 1 beyond the bottom of the tubular conduit 5 and towards a unit 8 for transferring the group G of filter-bags 1 positioned, in a receiving position, coaxial with the tubular conduit 5 and below the latter.

In light of this, the unit 8 for transferring the group G of filter-bags 1 positioned, in a receiving position, below the tubular conduit 5 (see Figure 2).

It should be noted that the transfer unit 8 has a body 9 for housing the

group of filter-bags 1.

The body 9 is associated with at least one supporting frame 10 connected to a unit 11 for moving the body 9 configured to rotate about a second axis X11 parallel to the first axis X3 (of the carousel 3) so as to allow a rotation of the body 9 from the position for receiving the group G of filter-bags 1 (Figures 2 and 3) to a position for releasing the group G of filter-bags 1 inside a box 12 (figure 4) and vice versa.

As shown in Figures 2 to 5, the transferring unit 8 has the frame 10 for supporting the housing body 9 articulated to the unit 11 for moving the body 9 in such a way as to rotate also about a third axis X10 transversal to the second axis X11 of rotation of the unit 11 for moving the body 9.

Kinematic means 13 of rotation about the third axis X10 are interposed between the unit 11 for moving the body 9 and the supporting frame 10 and configured to allow a synchronised rotation of the frame 10 about the second X11 and the third X10 axis in such a way as to rotate and orient the group G of filter-bags 1 prior to the arrival of the body 9 in the above-mentioned release position inside the box 12.

In other words, the transfer unit 8 is structured in such a way as to guarantee the rotation designed to allow the housing in the packaging box and simultaneously a correct orientation the groups G of filter-bags 1 immediately before being housed in the packaging box 12.

This makes it possible to eliminate orientation units (drum) immediately before the stacking of each filter-bag in the tubular body with simplification and improvement in the length of time for unloading the filter-bags from the forming carousel.

Preferably, the frame 10 comprises a rod 14 for supporting the housing body 9.

In light of this, the rod 14 has an axis X14 of longitudinal extension parallel to the third axis X10 of rotation.

More specifically, the frame 10 comprises the rod 14 supported by two arms 15 and 16 positioned transversally to the rod 14 and each articulated

to the unit 11 for moving the body 9.

In light of this, the arms 15, 16 are parallel with each other and articulated in points P15 and P16 different to each other on the unit 11 for moving the body 9 and both intersecting the third axis X10 of rotation.

Preferably, the above-mentioned housing body 9 comprises two side walls 9a, 9b and a bottom wall 9c to form a "U" and wherein the open area of the "U" faces towards the operating station 3 (carousel) rotatable about the first axis X3 at its position for receiving the groups G of filter-bags 1 so as to house the group G of filter-bags 1 with a corresponding head 1a in contact with the bottom wall 9c of the housing body 9.

It should be noted that, preferably, the movement unit 11 comprises at a first shaft 17 rotating about the second axis X11 and having an end portion with a diameter D1 greater than the diameter D2 of the remaining portion of the first shaft 17.

The end portion of the first shaft 17 forms an annular flange 18 on which are articulated, on the outer surface, the two arms 15, 16 supporting the bar 14 at points diametrically opposite from each other and intersecting the third axis X10 of rotation.

The two arms 15 and 16 form a rotary coupling fork on the annular flange 18.

Again, the movement unit 11 comprises a second shaft 19 positioned coaxially and inside the first shaft 17.

In light of this, the second shaft 19 has a free end positioned inside the annular flange 18 of the first shaft 17, forming a tubular chamber, and on which is positioned a first part of the above-mentioned kinematic means 13 of rotation of the frame 10 around the third axis X10.

Preferably, the kinematic means 13 comprise a first half-ring gear 20 with teeth having a conical profile made on the free end of the second shaft 19 housed in the tubular chamber formed by the annular flange 18 (gear which therefore forms the first part of the kinematic means).

Again, the kinematic means 13 comprise a first toothed wheel 21 keyed to

an articulation pin 23 in a point P15 of articulation of the supporting arm 15 on the annular flange 18 of the first shaft 17.

The first toothed wheel 21 is engaged with the first half-ring gear 20 so as to allow the rotation of the supporting arms 15, 16 about the third axis X10 in synchrony with the rotation of the body 9 about the second axis X11.

Substantially, the first half ring 20 and the gear wheel 21 form a conical torque which is able to rotate the frame 10 about the annular flange 18 whilst the flange 18 rotates about the second axis X11: this makes it possible to orient the filter-bags 1, whilst they are moved towards the inside of the box 12.

Preferably, the movement unit 11 also comprises a third shaft 28 positioned coaxially and inside the second shaft 17 (see Figure 5).

The third shaft 28 has a free end positioned inside the annular flange 18 of the first shaft 17 and on which are positioned movement means 29 configured for controlling the movement of one of the walls 9a, 9b of the body 9, about a fourth axis X9a and in synchrony with the kinematic means 13 (that is, with the conical torque designed for moving the third axis X10), between an inoperative receiving position, wherein the two walls 9a, 9b are parallel to each other, and an operating retaining position, wherein one of the walls 9a is at least partly close to the other wall 9b.

In light of this, the movement means 29 comprise a second half-ring gear 30 with teeth having a conical profile connected to the free end of the third shaft 28 housed in the tubular chamber formed by the annular flange 18, and a second toothed wheel 22 keyed to an articulation pin 24 coinciding with a point P16 of articulation of one of the supporting arms 16 on the annular flange 18 of the first shaft 17.

The second toothed wheel 22 is engaged with the second half-ring gear 30 so as to allow the movement of one of the walls 9a of the body 9, about the fourth axis X9a of rotation in synchrony with the rotation of the body 9 about the second axis X11.

Substantially, the second half crown 30 and the gear wheel 22 form a

second conical torque which is able to move/rotate a wall 9a of the body 9 whilst the flange 18 rotates about the second axis X11: this makes it possible to retain the group G of filter-bags 1, whilst they are moved towards the inside of the box 12.

It should be noted that the pin 24 extends along the axis X14 of the arm 16 and the pin 24 is articulated to an arm 32 articulated, in turn, to the wall 9a to allow the book-like movement for opening and closing the wall 9a.

Preferably, each arm 15, 16 is articulated to the corresponding pin 23, 24 passing radially through the annular flange 16.

Each pin 23, 24 is associated with the corresponding gear wheel 21, 22.

It should be noted (see also Figure 6), by way of a non-limiting example, that the first shaft 17 has a toothed intermediate portion meshing with a toothed arc 25 formed on an end of a motor-driven operating lever 26.

The operating lever 26 is articulated to a fixed support 27, at a point P26, so as to execute a pendulum-type movement in both directions about the point P26 of articulation and in such a way as to allow the rotation of the first shaft through a first angle α about the second axis X11.

Preferably, this first angle α of rotation is substantially equal to 120°.

The second shaft 19 is connected (kinematically) to and movable in a synchronised fashion with the first shaft 17, allowing rotation of the frame 10 through a second angle about the third axis X10.

Preferably, the second angle of rotation is different from the first angle α of rotation.

More specifically, the second angle of rotation is greater than the first angle α of rotation.

Preferably, the second angle of rotation is approximately 180°.

The preparing and packaging station 4 operates in the following manner.

The transporting element 2 picks up from the carousel 3 the individual filter-bags 1 and releases them inside the tubular conduit 5 through the end opening 5a aided by the pusher 31 (Figure 2).

Inside the tubular conduit 5 there is the base plate 6 which moves

downwards in coordination with the arrival of the filter-bags 1 inside the same tubular conduit 5 to form the group G of filter-bags 1 (Figure 2).

Having reached the predetermined number of filter-bags 1 to form a group G, the transport gripper 7 is activated 5 to retain the group G of filter-bags 1 at the top and bottom, whilst the plate 6 releases the bottom of the filter-bags through a movement for opening the relative half-parts or through a radial movement away from the conduit 5 (Figure 2).

At this point, the plate 6 returns upwards to start a new cycle for forming a group G, whilst the gripper 7 slides axially downwards and beyond the bottom of the tubular conduit 5 for moving the group in the housing body 9 waiting in the receiving position (Figure 2).

The body 9 for housing, receiving and retaining the group G of filter-bags 1 is rotated simultaneously about the second and third axis X11 and X10 so as to orient (that is, rotate by 180°) the filter-bags 1 whilst the group G is transferred by the tubular conduit 5 inside the box 12 for packaging 12 (Figures 3 and 4) in which the group G is released.

At the start of the housing body 9, the wall 9a is rotated towards the wall 9b to retain the group G of filter-bags 1 during the double rotation of the body 9.

It should be noted that, thanks to the rotation about the third axis X10, all the filter-bags 1 of the group are housed in the box with the relative bottom 1b on the bottom of the box 12.

Having reached this horizontal position of the body 9, a retaining sheet (not illustrated) is inserted between the bottom 9c of the body 9 and the tops 1a of the filter-bags 1 to retain the latter in the box 12 during the return rotation of the housing body 9 towards the tubular conduit 5.

This description clearly shows that, thanks to the machine structured in this way, the transfer and packaging of the group G of filter-bags 1 is extremely rapid, safe and suitable for the feed speeds of the filter-bags 1 formed.

In addition, the preparing and packaging station 4 consists of a limited

number of production components, but with a high elasticity thanks to the dual function of the transfer and packaging unit configured to orient the filter-bags simultaneously with their transfer. This dual function of the transfer unit actually increases the operational potential of the station, since the orientation is obtained on the entire group of stacked filter-bags rather than the single orientation obtained with the traditional solutions.

In addition, the synchronised movement structure is grouped together in a reduced size and obtains three different movements all synchronised with each other thanks to the system with three coaxial shafts assisted by the pair of conical torques present in the flange. This system considerably reduces the overall dimensions of the unit, whilst maintaining a high level of operational precision.

CLAIMS

1. A machine for forming filter-bags (1) containing infusion products, including at least one transporting element (2) configured for picking up, transporting and releasing individual filter-bags (1) from a operating station (3) for forming the filter-bags (1), rotating about a first axis (X3), to a station (4) for preparing and packaging groups (G) of filter-bags (1) formed; the preparing and packaging station (4) comprising at least:

- a tubular conduit (5) having an upper end opening (5a) positioned facing the transporting element (2) and configured for receiving single filter-bags (1);

- units (6, 7) for controlling the descent of the individual filter-bags (1) and for defining the group (G) of filter-bags to be formed, movable along the tubular conduit (5); the units (6, 7) being configured to form, retain and transfer the stacked group (G) of filter-bags (1) beyond the bottom of the tubular conduit (5)

- a unit (8) for transferring the group (G) of filter-bags (1) positioned, in a receiving position, al below the tubular conduit (5); the transfer unit (8) having a body (9) for housing the group (G) of filter-bags (1); the body (9) being associated with at least one supporting frame (10) connected to a unit (11) for moving the body (9) configured to rotate about a second axis (X11) parallel to the first axis (X3) so as to allow a rotation of the body (9) from the position for receiving the group (G) of filter-bags (1) to a position for releasing the group (G) of filter-bags (1) inside a box (12) and vice versa;

characterised in that the transfer unit (8) has the frame (10) for supporting the housing body (9) articulated to the unit (11) for moving the body (9) in such a way as to rotate also about a third axis (X10) transversal to the second axis (X11) of rotation of the movement unit (11) of the body (9); kinematic means (13) of rotation about the third axis (X10) being interposed between the unit (11) for moving the body (9) and the

supporting frame (10) and configured to allow a synchronised rotation of the frame (10) about the second (X11) and the third (X10) axis in such a way as to rotate and orient the group (G) of filter-bags (1) prior to the arrival of the body (9) in the release position inside the box (12).

2. The machine according to claim 1, wherein the frame (10) comprises a rod (14) for supporting the housing body (9); the rod (14) having an axis (X14) of longitudinal extension parallel to the third axis (X10) of rotation.

3. The machine according to any one of the preceding claims, wherein the housing body (9) comprises two side walls (9a, 9b) and a bottom wall (9c) to form a “U” and wherein the open area of the “U” faces towards the operating station (3) rotatable about the first axis (X3) at its position for receiving the groups (G) of filter-bags (1) so as to house the group (G) of filter-bags (1) with a corresponding head (1a) in contact with the bottom wall (9c) of the housing body (9).

4. The machine according to any one of the preceding claims, wherein the frame (10) comprises a rod (14) supported by two arms (15, 16) positioned transversally to the rod (14) and each articulated to the unit (11) for moving the body (9); the arms (15, 16) being parallel with each other and articulated in points (P15, P16) which are different to each other on the unit (11) for moving the body (9) and both intersecting the third axis (X10) of rotation.

5. The machine according to any one of the preceding claims, wherein the movement unit (11) comprises at least a first shaft (17) rotating about the second axis (X11) and having an end portion with a diameter (D1) greater than the diameter (D2) of the remaining portion of the first shaft (17); the end portion of the first shaft (17) forming an annular flange (18)

on which are articulated, on the outer surface, the two arms (15, 16) for supporting rod (14) at diametrically opposite points from each other and intersecting the third axis (X10) of rotation.

6. The machine according to claim 5, wherein the movement unit (11) comprises a second shaft (19) positioned coaxially and inside the first shaft (17); the second shaft (19) having a free end positioned inside the annular flange (18) of the first shaft (17), forming a tubular chamber, and on which is positioned a first part of the kinematic means (13) of rotation of the frame (10) around the third axis (X10).

7. The machine according to any one of claims 4 to 6, wherein the kinematic means (13) comprise a first half-ring gear (20) with teeth having a conical profile made on the free end of the second shaft (19) housed in the tubular chamber formed by the annular flange (18), and a first toothed wheel (21) keyed to an articulation pin (23) coinciding with a point (P15) of articulation of one of the supporting arms (15, 16) on the annular flange (18) of the first shaft (17); the first toothed wheel (21) being engaged with the first half-ring gear (20) so as to allow the rotation of the supporting arms (15, 16) about the third axis (X10) in a synchronised fashion with the rotation of the body (9) about the second axis (X11).

8. The machine according to any one of claims 4 to 7, wherein the movement unit (11) comprises a third shaft (28) positioned coaxially and inside the second shaft (17); the third shaft (28) having a free end positioned inside the annular flange (18) of the first shaft (17), forming a tubular chamber, and on which are positioned movement means (29) configured for controlling the movement of one of the walls (9a, 9b) of the body (9), about a fourth axis (X9a) and in synchrony with the kinematic means (13), between an inoperative receiving position, wherein the two walls (9a, 9b) are parallel to each other, and an operating retaining

position, wherein one of the walls (9a) is at least partly close to the other wall (9b).

9. The machine according to claim 8, wherein the movement means (29) comprise a second half-ring gear (30) with teeth having a conical profile connected to the free end of the third shaft (28) housed in the tubular chamber formed by the annular flange (18), and a second toothed wheel (22) keyed to an articulation pin (24) coinciding with a point (P16) of articulation of one of the supporting arms (16) on the annular flange (18) of the first shaft (17); the second toothed wheel (22) being engaged with the second half-ring gear (30) so as to allow the movement of one of the walls (9a, 9b) of the body (9), about the fourth axis (X9a) of rotation in synchrony with the rotation of the body (9) about the second axis (X11).

10. The machine according to any one of claims 4 to 9, wherein the first shaft (17) has a toothed intermediate portion meshing with a toothed arc (25) formed on an end of a motor-driven operating lever (26); the operating lever (26) being articulated to a fixed support (27), at a point (P26), so as to execute a pendulum-type movement in both directions about the point (P26) of articulation and in such a way as to allow the rotation of the first shaft through a first angle (α) about the second axis (X11).

11. The machine according to any of claims 4 to 10, wherein the second shaft (19) is connected to and movable in a synchronised fashion with the first shaft (17), allowing rotation of the frame (10) through a second angle about the third axis (X10).1.

PRIOR ART

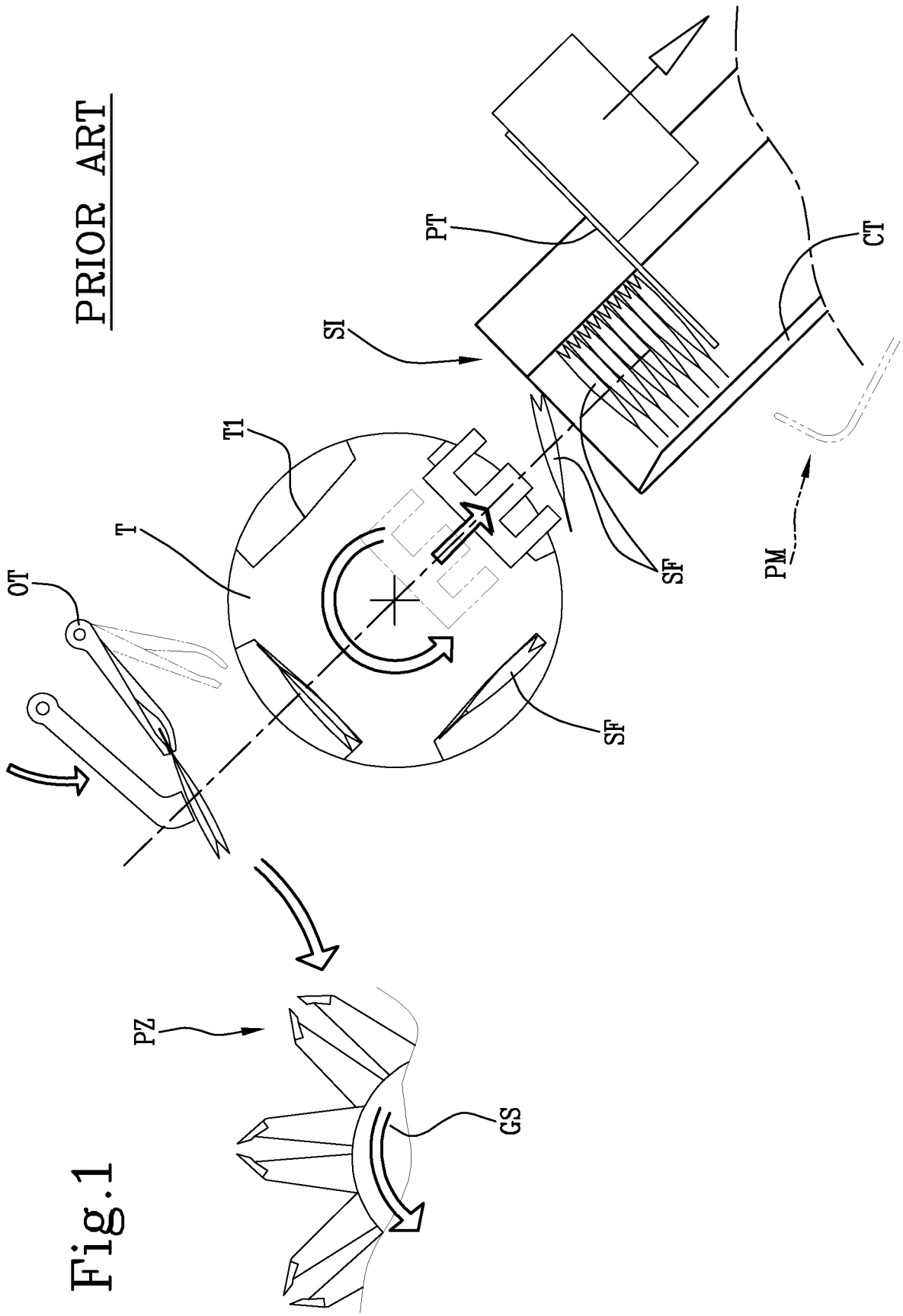


Fig.1

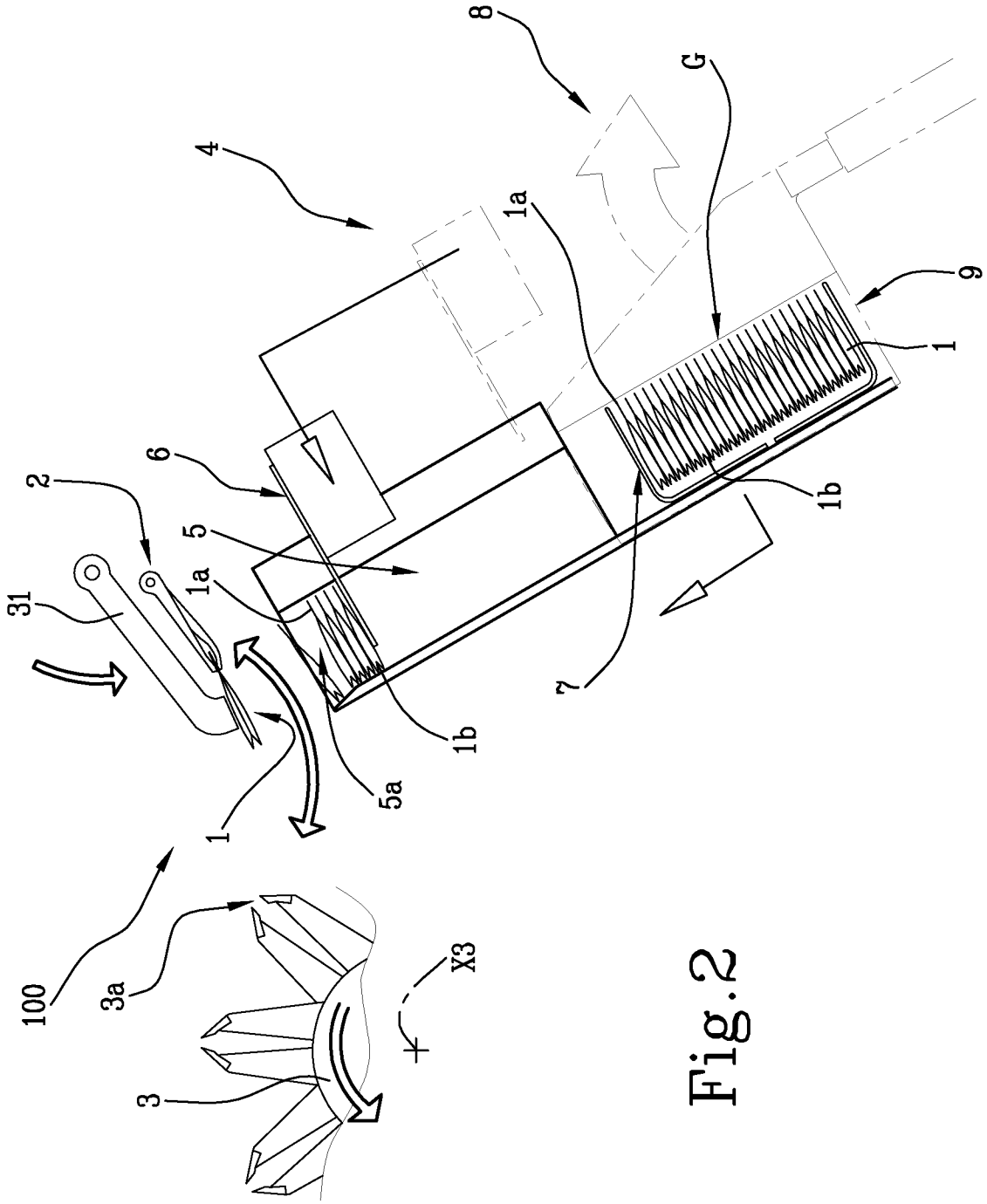


Fig.2

Fig.3

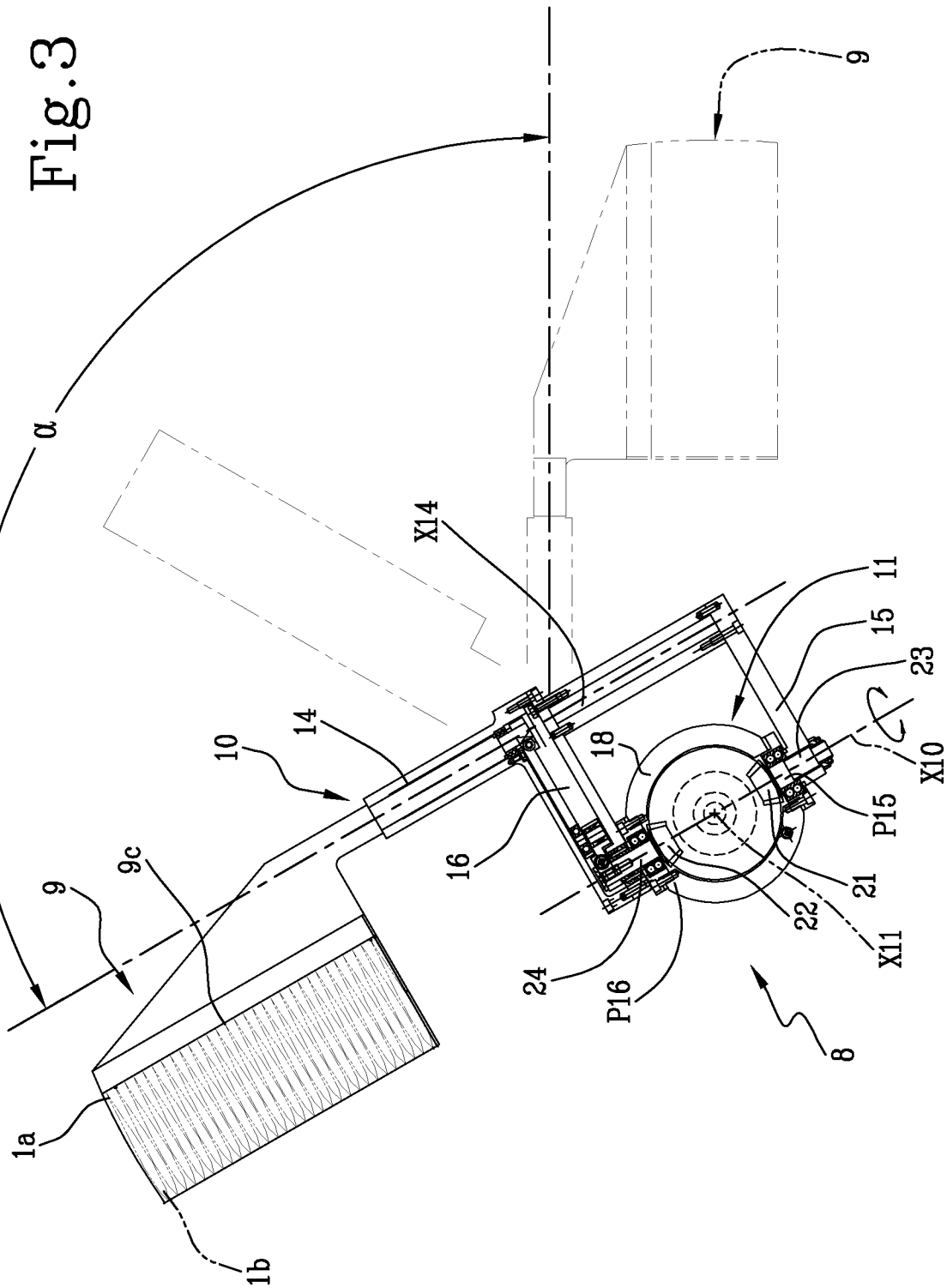


Fig.4

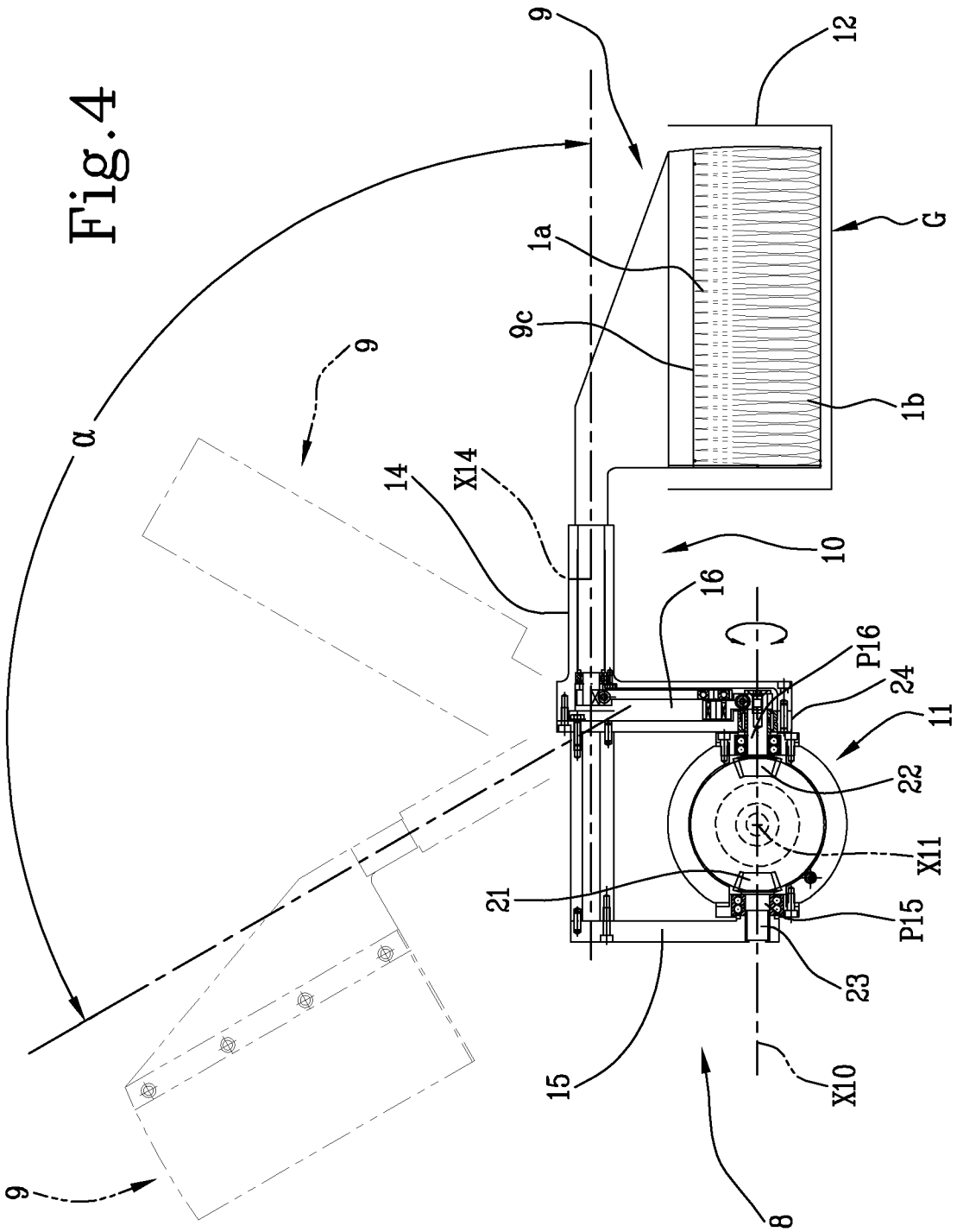
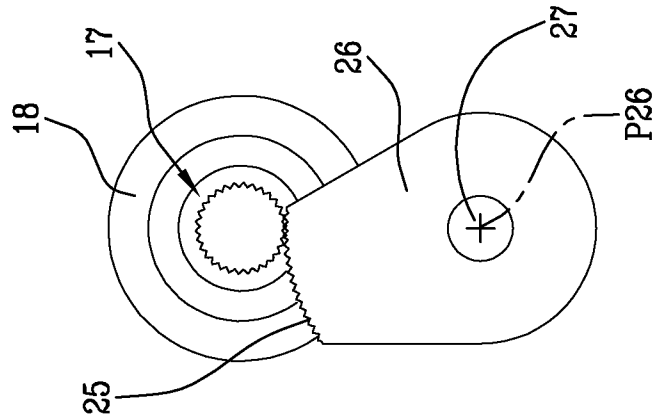


Fig.6


17
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P26
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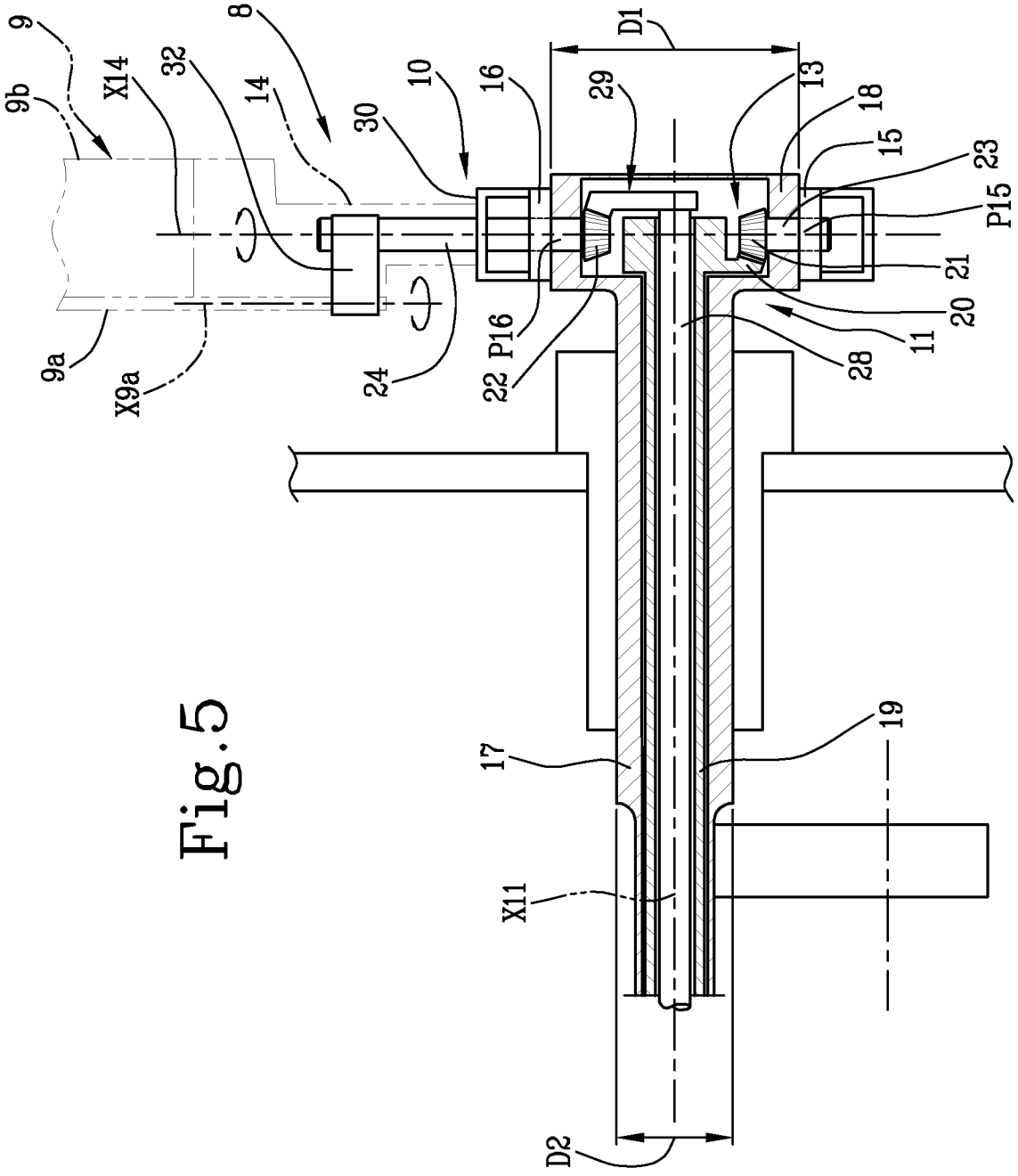
Fig.5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9a
X9a
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P16
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X11
D2

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2017/054389

A. CLASSIFICATION OF SUBJECT MATTER
INV. B65B29/02 B65B29/04 B65B35/36 B65B35/52
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B65B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2012/117308 A1 (IMA IND SRL [IT]; CONTI ROBERTO [IT]) 7 September 2012 (2012-09-07) the whole document	1-11
A	US 2002/139086 A1 (GHIRLANDI DANTE [IT]) 3 October 2002 (2002-10-03) the whole document	1-11
A	WO 2007/138471 A1 (IMA SPA [IT]; BERNARDI MATTEO [IT]; REA DARIO [IT]) 6 December 2007 (2007-12-06) the whole document	1-11
A	EP 0 762 973 B1 (IMA SPA [IT]) 12 July 2000 (2000-07-12) cited in the application the whole document	1-11

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
7 December 2017	18/12/2017

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Ngo Si Xuyen, G

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IB2017/054389

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