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(54) **MANUFACTURING MACHINE AND MANUFACTURING METHOD FOR THE PRODUCTION OF POUCHES, EACH CONTAINING A QUANTITY OF LOOSE PRODUCT**

(57) A manufacturing machine (6) and a manufacturing method for the production of pouches (1), preferably snus pouches (1), each containing a quantity (2) of loose product. The following are provided: an upper disc (21), which is arranged horizontally, is mounted in a rotary manner, in a stepped manner, around a vertical rotation axis (22) and has at least one through hole (24) which laterally delimits a compartment (23), which is open at the top and is designed to receive and contain an amount of loose product; a transfer device (49), which is configured to retrieve at least one quantity (2) of loose product from the compartment (23); and a lower disc (25) which is mounted in a rotary manner around the rotation axis (22) in a synchronous manner with the upper disc (21), is arranged under the upper disc (21), has a base wall (26) inserted in the through hole (24) of the upper disc (21) so as to delimit, at the bottom, the compartment (23) and is axially movable relative to the upper disc (21) in order to change a depth of the compartment (23).

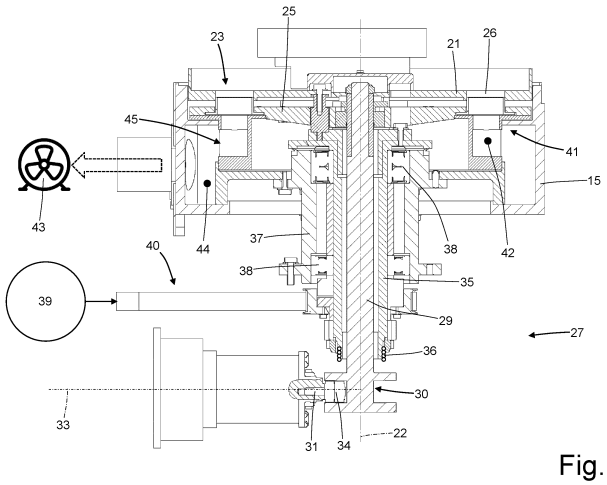

Fig. 8

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Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This patent application claims priority from Italian patent application no. 102023000021414 filed on October 13, 2023, the entire disclosure of which is incorporated herein by reference.

TECHNICAL FIELD

[0002] The present invention relates to a manufacturing machine and to a manufacturing method for the production of pouches, each containing a quantity of loose product.

[0003] The present invention is advantageously applied to the production of snus pouches (namely, permeable bags, each containing a prepacked quantity of nicotine-based loose and moist product for oral use), to which the following discussion will explicitly refer without thereby losing generality.

PRIOR ART

[0004] Currently, snus pouches are produced with a production process of FFS ("Form, Fill & Seal") type and thus have a rectangular shape and each have a longitudinal sealing and a pair of transverse sealings.

[0005] A known manufacturing machine (for example as described in patent application WO2008114128A2) for the production of snus pouches is of FFS type and comprises: a conveying device for conveying a band of wrapping material along a manufacturing path; a winding station arranged along the manufacturing path and in which the band of wrapping material is wound so as to form a tubular wrapping having a longitudinal development around a winding duct; a longitudinal sealing unit for longitudinally sealing the tubular wrap in the area of an overlapping zone of the band of wrapping material; a feeding device of loose material for feeding in sequence the quantities of loose product inside the tubular wrapping; a transverse sealing unit for transversely sealing the tubular wrapping in order to form an alternated sequence of sealing zones and zones containing a quantity of loose product; and a cutting unit for transversely cutting the tubular wrapping in the area of the sealing zones in order to separate the single snus pouches. Patent application US2011277878A1 describes a feeding unit of quantities of moist smokeless tobacco with high content of volatile substances; a rotary dosing device is provided comprising a lower disc, a dosing disc, a plurality of cavities obtained in the dosing disc and at least one housing for the vacuum arranged around the periphery of the lower disc and in pneumatic communication with the plurality of cavities (in this manner, the vacuum is applied to the cavities so as to favour the filling thereof).

DESCRIPTION OF THE INVENTION

[0006] The object of the present invention is to provide a manufacturing machine and a manufacturing method for the production of pouches, each containing a quantity of loose product, which allow feeding the quantities of loose product at a high operating speed (measured as number of quantities of loose product fed in the time unit) and allow making quantities of loose product which are uniform (namely, each containing the same desired amount of loose product)

[0007] A further object of the present invention is to provide a manufacturing machine and a **manufacturing** method for the production of pouches, each containing a quantity of loose product, which allow making, in a simple manner, quantities of loose product having a different shape and/or density and/or weight.

[0008] In accordance with the present invention, a manufacturing machine and a **manufacturing** method are provided for the production of pouches, each containing a quantity of loose product, according to what claimed in the appended claims.

[0009] The claims describe preferred embodiments of the present invention, forming integral part of the present description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The present invention will now be described with reference to the accompanying drawings, which illustrate a non-limiting example embodiment thereof, wherein:

- Figures 1, 2 and 3 are a perspective, side and plan view, respectively, of a snus pouch;
- Figure 4 is an exploded side view of the snus pouch of Figures 1, 2 and 3;
- Figure 5 is a schematic front view of a manufacturing machine which makes the snus pouches of the type of that of Figures 1, 2 and 3;
- Figure 6 is a perspective view of a forming drum of the manufacturing machine of Figure 5;
- Figure 7 is a perspective view of a feeding unit of the manufacturing machine of Figure 5;
- Figure 8 is a longitudinal section view of part of the feeding unit of Figure 7;
- Figure 9 is a perspective longitudinal section view of a detail of the feeding unit of Figure 7;
- Figures 10 and 11 are two perspective views of two discs of the feeding unit of Figure 7;
- Figure 12 is a perspective view of a transfer device and of the corresponding actuator assembly of the feeding unit of Figure 7;
- Figures 13 and 14 are a perspective view and an exploded perspective view, respectively, with parts removed for clarity of the actuator assembly of Figure 10;
- Figures 15-18 are two different perspective views, a

front view and a longitudinal section view, respectively, of the transfer device of Figure 12; and

- Figures 19 and 20 are two schematic views of the transfer device of Figure 12 and of the forming drum of Figure 6 with a protection plate in two different positions.

PREFERRED EMBODIMENTS OF THE INVENTION

[0011] In Figure 1, reference numeral 1 indicates, as a whole, a snus pouch containing, on the inside, a quantity 2 of snus (illustrated in Figure 4), namely of a nicotine-based loose and moist product for oral use.

[0012] In the embodiment illustrated in the accompanying figures, the snus pouch 1 has in plan a circular shape, but according to other embodiments the snus pouch 1 could have in plan different and more or less regular shapes, for example a star shape, a triangular shape, a heart shape, a polygonal shape.

[0013] According to what is illustrated in Figure 4, the snus pouch 1 comprises two cup-shaped elements 3 which are overlapped so as to delimit between them a closed volume in which the quantity 2 of snus is housed; each element 3 has a flat edge 4 which rotates all around the element 3 so that the two flat edges 4 of the two elements 3 are overlapped and joined by a sealing 5 which is closed on itself (namely, has an annular shape with neither head nor tail). In other words, the pouch has one single annular sealing 5 (closed on itself with neither head nor tail) which connects the two elements 3 to each other. It is understood that both two elements 3 are not necessarily cup-shaped.

[0014] In Figure 5, reference numeral 6 indicates, as a whole, a manufacturing machine that produces the snus pouches 1.

[0015] The manufacturing machine 6 comprises a frame which rests on a floor and has a vertical base wall (the *"front"* wall of the manufacturing machine 6 coinciding with the plane in Figure 5) on which all the operating components concurring to the production of the snus pouches 1 are mounted.

[0016] The manufacturing machine 6 comprises two forming drums 7 (substantially identical to each other) which are mounted in a rotary manner with an intermittent motion law (namely a motion law which cyclically alternates motion phases and dwell phases) around respective horizontal rotation axes 8 parallel to each other (and perpendicular to the plane in Figure 5). The two forming drums 7 cooperate with (are coupled to) each other and are arranged one above the other so as to define between them a joining zone 9 comprised between the two forming drums 7; namely, the two forming drums 7 are arranged vertically aligned at different heights so that one forming drum 7 is above and the other forming drum 7 is below.

[0017] Each forming drum 7 has a plurality of pockets 10 (illustrated in Figure 6), each of which reproduces, in negative, part of a shape of the snus pouch 1; in particular, each pocket 10 reproduces, in negative, the shape of one of the two cup-shaped elements 3, which together constitute the snus pouch 1. Namely, each pocket 10 (or seat 10) is a notch, which is hollowed on the outer surface of the respective forming drum 7 and reproduces, in negative, the shape of one of the two cup-shaped elements 3, which together constitute the snus pouch 1. In the embodiment illustrated in the accompanying figures, each forming drum 7 has several groups (in particular eight groups) of pockets 10 each having a series of pockets 10 (in particular eight pockets 10) arranged side by side and aligned parallel to the rotation axis 8. In this manner, in the joining zone 9 defined between the two forming drums 7, at every work cycle, a series of snus pouches 1 (in particular eight snus pouches 1) equal to the number of pockets 10 of each group are formed. According to other embodiments not illustrated, the number of groups of pockets 10 of each forming drum 7 and/or the number of pockets 10 of each group could be different.

[0018] Each pocket 10 of a forming drum 7 always cooperates with a same corresponding pocket 10 of the other forming drum 7 and, in the embodiment illustrated in the accompanying figures, each pocket 10 reproduces, in negative, a shape of a corresponding half (namely, of a cup-shaped element 3) of the snus pouch 1 so that two pockets 10 together reproduce, in negative, the shape of the snus pouch 1.

[0019] According to what is illustrated in Figure 5, the manufacturing machine 6 comprises two feeding units 11 (substantially identical to each other), each of which is configured to feed, in a respective feeding station S1 arranged upstream of the joining zone 9 relative to the direction of rotation of the respective forming drum 7, a respective band 12 of wrapping material which winds around part of the periphery of the respective forming drum 7. In this manner, in the joining zone 9, the two forming drums 7 convey the two bands 12 of wrapping material towards each other so that the two bands 12 of wrapping material overlap each other and by joining form the snus pouches 1.

[0020] The manufacturing machine 6 comprises two insertion devices 13 (substantially identical to each other), each of which is coupled to a respective forming drum 7 between the respective feeding station S1 and the joining zone 9 and is configured to push the respective band 12 of wrapping material inside the pockets 10 of a same group of pockets 10 of the respective forming drum 7. Namely, each insertion device 13 locally deforms the respective band 12 of wrapping material so as to insert the band 12 of wrapping material inside the pockets 10 of a same group of pockets 10 of the respective forming drum 7 so that the band 12 of wrapping material covers the pockets 10; in this manner, in each pocket 10, the band 12 of wrapping material assumes the shape of a cup-shaped element 3, namely the shape of half a snus pouch 1.

[0021] According to a preferred embodiment, each pocket 10 is a sucking pocket, namely is provided with

a series of micro-holes that are connected to a suction source, so as to hold, on the inside, the respective band 12 of wrapping material after the respective insertion device 13 has pushed the band 12 of wrapping material inside the pocket 10. Generally, the suction of each pocket 10 is maintained from the zone of the insertion devices 13 (for favouring the insertion of the bands 12 of wrapping material in the respective pockets 10 helping the action of the insertion devices 13) up to the joining zone 9 (in which the bands 12 of wrapping material are overlapped and joined) and is interrupted in the area of the joining zone 9 (for favouring the subsequent separation from the respective pockets 10 of the overlapped bands 12 of wrapping material).

[0022] The manufacturing machine 6 comprises one single feeding unit 14 (schematically illustrated in Figure 5) configured to feed, in a feeding station S2 arranged between the respective insertion device 13 and the joining zone 9, a plurality of quantities 2 of snus in the pockets 10 of a group of pockets 10 of the respective forming drum 7 covered by the respective band 12 of wrapping material (i.e. with the interposition of the respective band 12 of wrapping material). Namely, one single feeding unit 14 is provided coupled to only one of the two forming drums 7 for feeding in the pockets 10 of the respective forming drum 7 the quantities 2 of snus (which are held inside the pockets 10 by the sucking action of the pockets 10).

[0023] The suction of each pocket 10 which receives, in the feeding station S2, the respective quantity 2 of snus contributes to maintaining the quantity 2 of snus inside the pocket 10 and in contact with the respective band 12 of wrapping material; namely, the bands 12 of wrapping material are porous (breathable) and thus *"transmit"* the suction generated by each pocket 10 also to the corresponding quantity 2 of snus and in this manner the suction of the pocket 10 contributes to maintaining the quantity 2 of snus inside the pocket 10 and in contact with the respective band 12 of wrapping material. Also for this reason (namely, for maintaining the quantities 2 of snus in the respective pockets 10), the suction of each pocket 10 is maintained from the zone of the insertion devices 13 up to the joining zone 9.

[0024] According to what is illustrated in Figure 7, the feeding unit 14 comprises a tank 15 with a cylindrical shape, which is arranged horizontally and is carried by a frame 16 (schematically illustrated in Figure 5) which preferably rests on the ground. The tank 15 is provided with a lid 17, which closes the tank 15 at the top and has a loading opening 18, through which the snus can be fed inside the tank 15 and an unloading opening 19, through which it is possible to retrieve the quantities 2 of snus from the inside of the tank 15. The feeding unit 14 comprises a vertical feeding duct 20, which is configured to feed inside the tank 15 a flow of snus and is arranged through the loading opening 18 of the lid 17. It is understood that the tank 15 could have a different shape relative to what is illustrated in Figure 7.

[0025] According to what is illustrated in Figures 7 and 8, the feeding unit 14 comprises an upper disc 21, which is arranged horizontally inside the tank 15 (namely, the tank 15 contains the upper disc 21), is mounted in a rotary manner, in a stepped manner, around the vertical rotation axis 22, and delimits four compartments 23, which are uniformly distributed around the rotation axis 22; each compartment 23 has a rectangular shape, is open at the top and is designed to receive and contain an amount of loose material. In use, the vertical feeding duct 20 feeds inside the tank 15 a flow of loose material which forms a bed of loose material inside each compartment 23. In particular, the upper disc 21 has, for each compartment 23, a respective through hole 24, which laterally delimits the compartment 23; namely, the inner surface of each through hole 24 constitutes the side wall of the respective compartment 23.

[0026] According to what is illustrated in Figure 8, the feeding unit 14 comprises a lower disc 25, which is arranged horizontally inside the tank 15 (namely, the tank 15 contains the lower disc 25), is mounted in a rotary manner around the rotation axis 22 in a synchronous manner with the upper disc 21 (namely, the two discs 21 and 25 rotate together in an integral manner), and is arranged below the upper disc 21. The lower disc 25 has four base walls 26, each of which is arranged in the area of a respective compartment 23 and is inserted in the respective through hole 24 of the upper disc 21 so as to delimit the compartment 23 at the bottom. Furthermore, the lower disc 25 is axially movable (slidable) relative to the upper disc 21 so as to change a depth of the compartments 23; namely, by lifting or lowering the lower disc 25 relative to the upper disc 21, the thickness of the compartments 2 is decreased or increased and thus the volume of the compartments 23 is decreased or increased.

[0027] The feeding unit 14 comprises an actuator device 27 configured to axially translate the lower disc 25 relative to the upper disc 21 and thus to change, as described above, the volume of the compartments 23. The feeding unit 14 comprising a control unit 28 (schematically illustrated in Figure 7) which supervises the operation of the feeding unit 14 and, among the other things, is configured to change the depth (volume) of the compartments 23 so as to adjust, namely increase or decrease, a weight of the quantities 2 of snus. According to a preferred embodiment, the manufacturing machine 6 comprises a measurement station in which the weight of the quantities 2 of snus contained in the snus pouches 1 is measured (directly or indirectly) and, in case of significant deviations relative to a desired weight, the control unit 28 compensates these deviations by increasing or decreasing the depth (volume) of the compartments 23.

[0028] According to what is illustrated in Figures 8 and 9, the lower disc 25 is connected to an upper end of an inner shaft 29, which is mounted coaxial to the rotation axis 22; at the lower end of the inner shaft 29 (namely, at the end of the inner shaft 29 opposite the lower disc 25) an annular groove 30 is provided delimited by two flanges

integral with the inner shaft 29. The actuator device 27 comprises an eccentric body 31, which engages the groove 30 of the inner shaft 29 and an electric motor 32 (illustrated in Figure 7), which rotates the eccentric body 31 around a horizontal rotation axis 33, which is perpendicular to the vertical rotation axis 22 and is eccentric relative to the eccentric body 31. In particular, the electric motor 32 is provided with a reduction gear which is oriented perpendicular to the electric motor 32 and is interposed between a shaft of the electric motor 32 and the eccentric body 31. Preferably, the eccentric body 31 is connected to a bearing 34, which is arranged inside the groove 30 of the inner shaft 29 so as to allow a rotation without slipping of the groove 30 around the rotation axis 22; namely, the outer part of the bearing 34 is in contact with the surface of the groove 30 and rotates together with the groove 30 around the rotation axis 22, whereas the inner part of the bearing 34 is integral with the eccentric body 31 and does not rotate around the rotation axis 22. The feeding unit 14 comprises an internally hollow outer shaft 35, which is mounted in a rotary manner on the frame 16 so as to rotate around the rotation axis 22 and supports, at an end, the upper disc 21; the inner shaft 29 (which supports the lower disc 25) is mounted inside the outer shaft 35 (and at a given radial distance from outer shaft 35) so as to rotate with the outer shaft 35 in an integral manner and axially slide relative to the outer shaft 35. For example, between the outer shaft 35 and the inner shaft 29 a grooved or ribbed coupling can be present so as to cause the two shafts 29 and 35 to rotate in an integral manner simultaneously allowing a relative axial movement between the two shafts 29 and 35; alternatively, the constraint between the two shafts 29 and 35 is determined only by the interpenetration of the base walls 26 (carried by the lower disc 25 integral with the inner shaft 29) in the through holes 24 (obtained in the upper disc 21 integral with the outer shaft 35).

[0029] According to a possible embodiment, an elastic element 36 (in particular a helical spring) is provided which pushes the lower disc 25 far from the upper disc 21; in particular, the elastic element 36 is interposed between a lower end of the outer shaft 35 (supporting the upper disc 21) and a flange, which is integral with the inner shaft 29 (supporting the lower disc 25) and defines a wall of the groove 30.

[0030] The frame 16 of the feeding unit 14 is fixed to a tubular support body 37 which is arranged coaxial to the rotation axis 22 and inside which the outer shaft 35 is arranged; the outer shaft 35 is connected to the support body 37 by means of the interposition of two bearings 38, which enable the rotation of the outer shaft 35 around the rotation axis 22. The feeding unit 14 comprises an electric motor 39 configured to rotate the outer shaft 35 around the rotation axis 22; in particular, a belt transmission 40 is provided, which connects the electric motor 39 to the outer shaft 35 and has a pulley integral with the outer shaft 35, a pulley caused to rotate by the electric motor 39 and a toothed belt wound so as to form a ring around the two pulleys. In particular, the electric motor 39 is provided with a reduction gear which is oriented perpendicular to the electric motor 39 and is interposed between a shaft of the electric motor 39 and the respective pulley of the belt transmission 40.

[0031] According to a preferred embodiment better illustrated in Figures 9 and 11, the lower disc 25 supports four cup-shaped bodies 41 with a parallelepiped shape, which are arranged with the end open downwards and comprise the base walls 26 of the compartments 23; namely, each cup-shaped body 41 of the lower disc 25 partially engages a through hole 24 of the upper disc 21 and constitutes the base wall 26 of the corresponding compartment 23. Each base wall 26 is a sucking wall, namely is capable of exerting a suction which holds the snus in contact with the base wall 26; in particular, the base wall 26 has a plurality of through micro-holes having a diameter that is smaller than a minimum dimension of the particles of loose material. Inside each cup-shaped body 41 a chamber 42 is defined, which is arranged below the respective base wall 26 and in pneumatic communication with an outer suction source 43 (illustrated in Figure 8). According to a preferred embodiment illustrated in Figure 8, inside the tank 15 a chamber 44 is defined, which is arranged around the rotation axis 22, is externally in pneumatic communication with the suction source 43 by means of a radially oriented duct, and is internally in pneumatic communication with each chamber 42 by means of a suction opening 45 with a circular shape. The chamber 44 is obtained inside the tank 15 (which is carried by the frame 16 resting on the ground) and thus constitutes a fixed pneumatic distributor, which surrounds the lower disc 25, which rotates around the rotation axis 22; the suction opening 45 develops around the rotation axis 22 by approximately 270° so that the suction is transmitted to the chambers 42 (thus to the base walls 26) anywhere except in the area of the unloading opening 19 (in which the quantities 2 of snus are retrieved from a compartment 23 and thus it is counterproductive to attract the loose material inside the compartment 23).

[0032] According to a preferred embodiment, a lower end of the feeding duct 20 is arranged in (substantial) contact with an upper surface of the upper disc 21 (namely, the clearance between the lower end of the feeding duct 20 and the upper surface of the upper disc 21 is the minimum necessary for allowing the rotation of the upper disc 21 relative to the feeding duct 20); in this manner, the loose material which is in the feeding duct 20 enters only in the compartments 23 of the upper disc 21 and does not uselessly disperse on the upper surface of the upper disc 21.

[0033] According to a preferred embodiment illustrated in Figure 10, the lid 17 of the tank 15 supports a plurality of scraping elements 46, which are in contact with an upper surface of the upper disc 21 so that the snus cannot reach under the scraping elements 46 and have the function of pushing away the snus that rests against the upper disc

21 on the outside of the compartments 23. Preferably, a scraping element 46 is provided, which completely insulates the volume of the upper disc 21 which is in the area of the unloading opening 19. In accordance with an alternative embodiment, the scraping elements 46 are not carried by the lid 17 of the tank 15.

[0034] According to a preferred embodiment schematically illustrated in Figure 7, the feeding duct 20 is provided with a load sensor 47 configured to determine whether a level of loose product inside a terminal part of the feeding duct 20 has reached a minimum level and with a load sensor 48 configured to determine whether a level of loose product inside the terminal part of the feeding duct 20 has reached a maximum level. The control unit 28 is configured to control a feeding of loose product in the feeding duct 20 so that the level of loose product inside the terminal part of the feeding duct 20 is always between the minimum level and the maximum level.

[0035] According to what is illustrated in Figure 7, the feeding unit 14 comprises a transfer device 49, which is configured to retrieve from a compartment 23, which is in the area of the unloading opening 19 of the tank 15, a plurality of (in particular eight) quantities 2 of loose material and thus give the (eight) quantities 2 of loose material to respective pockets 10 of a forming drum 7 in the feeding station S2.

[0036] According to what is illustrated in Figure 15, the transfer device 49 comprises a retrieving head 50 provided with eight pockets 51 which are arranged aligned relative to one another and each of which is open at the bottom and is shaped so as to contain, on the inside, a quantity 2 of snus. Furthermore, according to what is illustrated in Figure 7, the transfer device 49 comprises an actuator assembly 52 (illustrated in Figure 12) configured to cyclically move the retrieving head 50 between a retrieving station S3 (arranged in the area of the unloading opening 19 of the lid 17 of the tank 15), in which the retrieving head 50 is arranged above a compartment 23 and the pockets 51 are arranged inside the compartment 23 in order to retrieve respective quantities 2 of loose material, and the feeding station S2, in which each pocket 51 of the retrieving head 50 is coupled to a corresponding pocket 10 of a forming drum 7 in order to transfer the quantity 2 of loose material to the pocket 10 of the forming drum 7.

[0037] In Figure 7, the retrieving head 50 arranged in the feeding station S2 is illustrated by a solid line and the retrieving head 50 arranged in the retrieving station S3 is illustrated by a dashed line.

[0038] According to what is illustrated in Figure 12, the actuator assembly 52 is configured to rotate the retrieving head 50 around a rotation axis 53 transverse to the rotation axis 22 of the discs 21 and 25 and parallel to the rotation axes 8 of the forming drums 7 and to translate the retrieving head 50 along a translation direction D perpendicular to the rotation axis 53.

[0039] According to what is illustrated in Figures 12, 13 and 14, the actuator assembly 52 comprises an annular body 54 which is mounted in a rotary manner around the rotation axis 53 and is caused to rotate around the rotation axis 53 by an electric motor 55 which transmits the motion to the annular body 54 by means of a belt transmission 56. In particular, the electric motor 55 is provided with a reduction gear, which is oriented perpendicular to the electric motor 55 and is interposed between a shaft of the electric motor 55 and a pulley of the belt transmission 56. The annular body 54 supports, on the inside, a linear guide 57 (composed of two tracks parallel to each other), which defines the translation direction D and a slide 58, which supports the retrieving head 50 and is mounted so as to slide along the linear guide 57; namely, the linear guide 57 is arranged inside the annular body 54.

[0040] The actuator assembly 52 comprises an annular body 59, which is arranged next to the annular body 54 (on the opposite side of the retrieving head 50), and supports in a rotary manner a cam 60 engaged by a cam-follower roller 61 integral with the slide 58; namely, the annular body 59 is integral with the annular body 54 (thus rotates together with the annular body 54 around the rotation axis 53) and supports, on the inside, the cam 60 so as to allow the cam 60 to rotate relative to the annular body 59 (and thus relative to the annular body 54) around the rotation axis 53. Finally, the actuator assembly 52 comprises an electric motor 62 which rotates the cam 60 relative to the annular bodies 54 and 59 and around the rotation axis 53 so as to impart a translation to the slide 58 (and thus to the retrieving head 50 integral with the slide 58) along the translation direction D. In particular, the electric motor 62 transmits the motion to the cam 60 by means of a belt transmission 63 and is provided with a reduction gear, which is oriented perpendicular to the electric motor 62 and is interposed between a shaft of the electric motor 62 and a pulley of the belt transmission 63.

[0041] According to what is better illustrated in Figure 14, the retrieving head 50 comprises a frame 64 which is integral with the slide 58 (namely, is carried cantilevered by the slide 58) and supports all the other components of the retrieving head 50. In particular, the frame 64 of the retrieving head 50 comprises an upper crosspiece 65, which is integral with the slide 58, a lower crosspiece 66 (illustrated in Figures 15 and 16), which is parallel to and opposite the upper crosspiece 65, and two side plates 67, which are arranged on the opposite sides of the two crosspieces 65 and 66 and connect the two crosspieces 65 and 66 to each other.

[0042] According to what is better illustrated in Figure 15, each pocket 51 of the retrieving head 50 comprises a side wall 68, which is closed so as to form a ring and delimits the outer perimeter of the pocket 51, and a bottom wall 69, which is arranged inside the side wall 68. Preferably, the bottom wall 69 of each pocket 51 of the retrieving head 50 is a sucking wall, namely capable of exerting a suction which holds the snus (i.e. the loose material) in contact with the bottom wall 69; in other

words, the bottom wall 69 of each pocket 51 of the retrieving head 50 is provided with a plurality of through micro-holes having a diameter that is smaller than a minimum dimension of the particles of loose material and connectable to an outer suction source.

[0043] According to a preferred embodiment illustrated in Figure 18, each bottom wall 69 is part of a hollow element 70, which at one end ends with the bottom wall 69 and at the opposite end is integral with the frame 64 and in particular is fixed to the lower crosspiece 66 of the frame 64. In the area of each hollow element 70, the lower crosspiece 66 of the frame 64 has a through hole, which puts an inner chamber of the hollow element 70 in communication with a chamber 71, which is arranged above the lower crosspiece 66, is common for all the hollow elements 70 and is connectable to the outer suction source through two pneumatic ducts 72 arranged at the two opposite ends of the chamber 71. According to a preferred embodiment illustrated in Figure 18, each side wall 68 is mounted on the retrieving head 50 so as to move relative to the corresponding bottom wall 69 (namely, relative to the frame 64, which is integral with the corresponding bottom wall 69); the retrieving head 50 comprises a pneumatic actuator 73 configured to move each side wall 68 relative to the bottom wall 69 between a retrieving position (illustrated in the accompanying figures) assumed in the retrieving station S3, in which the bottom wall 69 is arranged at a given distance other than zero from an outer edge of the side wall 68, and a release position (not illustrated) assumed in the feeding station S2, in which the bottom wall 69 is coplanar to the outer edge of the side wall 68. In other words, in the retrieving position (illustrated in the accompanying figures), each pocket 51 has a given inner volume (determined by the distance between the bottom wall 69 and the outer edge of the side wall 68), in which a corresponding quantity 2 of loose material is contained and this inner volume is zeroed in the release position so as to push the quantity 2 of loose material outside the pocket 51.

[0044] According to a preferred embodiment, the retrieving head 50 comprises a support plate 74, which is mounted on the frame 64 in a movable manner and supports the side walls 68 of the pockets 51; the pneumatic actuator 73 is configured to translate the support plate 74 relative to the frame 64 so as to simultaneously move the side walls 68 of all the pockets 51. Preferably, the pneumatic actuator 73 comprises two pneumatic pistons arranged at the two opposite ends of the support plate 74; each pneumatic piston comprises an end integral with the support plate 74 and an opposite end connected to the upper crosspiece 65 of the frame 64 by means of an adjusting screw 75, which allows accurately adjusting the position of the support plate 74 relative to the frame 64.

[0045] According to a preferred embodiment better illustrated in Figure 16, the retrieving head 50 comprises a cleaning plate 76, which has a plurality of through holes 77, in each of which the side wall 68 of a respective pocket 51 is inserted. In particular, the cleaning plate 76 is part of a "U"-shaped structure which is mounted on the frame 64 of the retrieving head 50 in a movable manner so as to translate relative to the frame 64 (and thus relative to the side walls 68 of the pockets 51 which are integral with the frame 64). The retrieving head 50 comprises a pneumatic actuator 78 (illustrated in Figures 17 and 18) configured to translate the cleaning plate 76 relative to the frame 64 (and thus relative to the side walls 68 of the pockets 51 which are integral with the frame 64). Preferably, the pneumatic actuator 78 comprises two pneumatic pistons arranged at the two opposite ends of the cleaning plate 76; each pneumatic piston comprises an end integral with the cleaning plate 76 and an opposite end integral with the upper crosspiece 66 of the frame 64.

[0046] The pneumatic actuator 78, driven by the control unit 28, is configured to perform a cleaning cycle of the outer surface of the side walls 68 of the pockets 51 by having the cleaning plate 76 make a forth travel and a back travel relative to the side walls 68 between a rest position (illustrated in the accompanying figures), in which the cleaning plate 76 is arranged at a given distance other than zero from the outer edge of the side walls 68, and a work position, in which the cleaning plate 76 is coplanar to the outer edges of the side walls 68. During the cleaning cycle described above, the through holes 77 of the cleaning plate 76 slide along the entire extension of the side walls 68 of the pockets 51 eliminating (pushing away) from the outer surface of the side walls 68 of the pockets 51 possible residuals of loose material. In particular, the control unit 28 is configured to perform the cleaning cycle described above when the retrieving head 50 is in the retrieving station S3 above the compartment 23, which is in the area of the unloading opening 19 and is spaced apart from the compartment 23 immediately after the pockets 51 have retrieved respective quantities 2 of loose material from the compartment 23. In this manner, the loose material remained on the outer surface of the side walls 68 of the pockets 51 is removed and made to fall, by gravity, in the underlying compartment 23. According to what is illustrated in Figures 19 and 20, the feeding unit 14 comprises a protection plate 79, which is arranged in the feeding station S2 so as to place itself between the retrieving head 50 and the forming conveyor 7 and has a through opening 80 in the area of each pocket 10 of the forming drum 7 (namely, has a plurality of through openings 80, each of which is arranged in the area of a respective pocket 10 of the forming drum 7). The feeding unit 14 comprises an actuator device 27, which radially moves the protection plate 79 relative to the rotation axis 8 of the forming drum 7 so as to move the protection plate 79 closer to the forming drum 7, when the quantities 2 of loose material are transferred to the pockets 10 of the forming drum 7 (as is illustrated in Figure 19) and so as to move the protection plate 79 away from the forming drum 7 in order to rotate the forming drum 7 around the rotation axis 8 (as is illustrated in Figure 20).

[0047] The function of the protection plate 79 is to

protect the band 12 of wrapping material, which is around the pockets 10 of the respective forming drum 7 from possible contaminations of loose material so as to improve the following sealing of the band 12 of wrapping material around the pockets 10 of the respective forming drum 7 (namely, around the quantities 2 of loose material). In other words, if the surface of the band 12 of wrapping material has (also slight) traces of loose material, it is more difficult to make a good quality sealing (namely, which is resistant and sealing) and thus it is useful to protect the band 12 of wrapping material, which is around the pockets 10 of the respective forming drum 7, from possible contaminations of loose material so as to improve the following sealing of the band 12 of wrapping material.

[0048] The following describes the operation of the transfer device 49 for retrieving eight quantities 2 of loose material from a compartment 23 stationary in dwell mode in front of the unloading opening 19 (namely, in the retrieving station S3) and for transferring the eight quantities 2 of loose material in just as many pockets 10 of a forming drum 7, which are stationary in dwell mode in the feeding station S2.

[0049] Initially, the control unit 28 drives the actuator assembly 52 so as to move (by rotating the retrieving head 50 around the rotation axis 53) the eight pockets 51 carried by the retrieving head 50 so that they end up above the compartment 23 stationary in dwell mode in front of the unloading opening 19 (namely, in the retrieving station S3); at the end of the rotation of the retrieving head 50, the eight pockets 51 carried by the retrieving head 50 are arranged above the compartment 23 stationary in dwell mode in front of the unloading opening 19 and spaced apart from the compartment 23. Subsequently, the control unit 28 drives the actuator assembly 52 in order to vertically translate the eight pockets 51 carried by the retrieving head 50 downwards so as to lay the outer edges of the side walls 68 of the eight pockets 51 against the base wall 26 of the compartment 23 so that each pocket 51 traps, on the inside, a respective quantity 2 of loose material (which is held inside the pocket 51 by suction).

[0050] According to a possible embodiment, in this step, the pockets 51 can compress the respective quantities 2 of snus against the base wall 26 of the compartment 23; in particular, the height of the bed of loose material, which is in the compartment 23, can be greater than the height of the pockets 51 (namely, of the distance between the outer edge of a side wall 68 of each pocket 51 and the bottom wall 69 of the pocket 51) and thus a quantity 2 of loose material is inevitably compressed inside the respective pocket 51. According to a possible embodiment, the control unit 28 drives the actuator assembly 52 so as to rotate (clockwise and counter-clockwise by a few degrees or by a few degree fractions) the upper disc 21 around the rotation axis 22 when the outer edge of the side walls 68 of the pockets 51 rests against the base wall 26 of the compartment 23; in this manner, the outer edge of the side walls 68 of the pockets 51 slides against the base wall 26 of the compartment 23 so as to reduce the residuals of loose material, which could stop on the outer surface of the side walls 68 of the pockets 51 and so as to reduce the residuals of loose material which could stop on the outer edge of the side walls 68 of the pockets 51.

[0051] It is important to observe that the side walls 68 of the pockets 51 are mounted on the frame 64 of the retrieving head 50 with the interposition of the pneumatic actuator 73 which constitutes in actual fact a pneumatic spring; therefore, the thrust that presses the side walls 68 of the pockets 51 against the base wall 26 of the compartment 23 is always constant and determined by the pressure of the air inside the pneumatic actuator 73. Subsequently, the control unit 28 drives the actuator assembly 52 so as to vertically translate the pockets 51 carried by the retrieving head 50 upwards by moving the pockets 51 away from the compartment 23; when the pockets 51 carried by the retrieving head 50 are still arranged above the compartment 23, which is in the area of the unloading opening 19, and as described in the foregoing, the control unit 28 drives the pneumatic device 78 for performing the cleaning cycle described above.

[0052] Subsequently, the control unit 28 drives the actuator assembly 52 so as to move (by rotating the retrieving head 50 around the rotation axis 53) the eight pockets 51 carried by the retrieving head 50 in the feeding station S2, in which the eight pockets 51 face and are aligned with the pockets 10 of the forming drum 7 and spaced apart from the pockets 10 of the forming drum 7.

[0053] Subsequently, the control unit 28 drives the actuator assembly 52 so as to translate the eight pockets 51 carried by the retrieving head 50 in order to insert the side wall 68 of each pocket 51 inside a respective pocket 10 of the forming drum 7; at this point, the control unit 28 drives the pneumatic actuator 73 so as to retract the side walls 68 of the pockets 51 and thus leave the respective quantities 2 of loose material in the pockets 10 of the forming drum 7. Finally, the control unit 28 drives the actuator assembly 52 so as to translate the eight pockets 51 carried by the retrieving head 50 by moving the eight pockets 51 away from the forming drum 7 and thus allow the rotation of the forming drum 7 around the rotation axis 8.

[0054] As mentioned in the foregoing, during the transfer of the quantities 2 of loose material from the pockets 51 carried by the retrieving head 50 to the pockets 10 of the forming drum 7, the protection plate 79 moves closer to the forming drum 7.

[0055] The manufacturing machine 6 described above (and thus the feeding unit 14, which is part of the manufacturing machine 6) is configured to make pouches 1 containing loose material, i.e. snus; however, the above-described manufacturing machine 6 (and thus the feeding unit 14, which is part of the manufacturing machine 6) could be configured to process other types of loose products different from snus such as, for example, other

types of powders for oral use or herbs or the like for infusions (namely, to make pouches for infusion beverages).

[0056] In the embodiment illustrated in the accompanying figures, the retrieving head 50 carries eight pockets 51 because the forming drums 7 each have eight aligned pockets 10, namely because the manufacturing machine 1 is configured to produce eight snus pouches 1 at a time; according to other embodiments not illustrated, the retrieving head 50 carries a different number of pockets 51: from a minimum of one single pocket 51 to a maximum of about twenty pockets 51.

[0057] The embodiments described herein can be combined with one another without departing from the scope of protection of the present invention.

[0058] The above-described manufacturing machine 6 has numerous advantages.

[0059] Firstly, the feeding unit 14 of the manufacturing machine 6 described above allows achieving high hourly productivity, namely allows feeding the quantities 2 of snus at a high operating speed (measured as number of quantities 2 of snus fed in the time unit). Furthermore, the feeding unit 14 of the manufacturing machine 6 described above allows making quantities 2 of loose material which are very uniform (namely, each containing the same desired amount of loose material).

[0060] The feeding unit 14 of the above-described manufacturing machine 6 allows obtaining high quality sealings (namely, resistant and sealing) of the bands 12 of wrapping material around the quantities 2 of loose material; this result is also obtained thanks to the extreme attention which is placed in preventing the bands 12 of wrapping material from being contaminated by loose material.

[0061] Furthermore, the feeding unit 14 of the above-described manufacturing machine 6 allows making quantities 2 of loose material of different shape and/or size by simply changing the shape of the pockets 51 of the retrieving head 50.

[0062] Finally, the feeding unit 14 of the above-described manufacturing machine 6 is particularly compact and allows an operator who is in the proximity of the manufacturing machine 6 to reach all the various parts of the feeding unit 14 with his/her hands, without having to make unnatural movements.

LIST OF THE REFERENCE NUMERALS OF THE FIGURES

[0063]

1	snus pouch
2	quantity
3	cup-shaped element
4	edges
5	sealing
6	manufacturing machine
7	forming drums
8	rotation axes
9	joining zone
10	pockets
11	feeding unit
12	band of wrapping material
13	insertion devices
14	feeding unit
15	tank
16	frame
17	lid
18	loading opening
19	unloading opening
20	feeding duct
21	upper disc
22	rotation axis
23	compartment
24	through hole
25	lower disc
26	base wall
27	actuator device
28	control unit
29	inner shaft
30	groove
31	eccentric body
32	motor
33	rotation axis
34	bearing
35	outer shaft
36	elastic element
37	support body
38	bearings
39	motor
40	belt transmission
41	cup-shaped bodies
42	chamber
43	suction source
44	chamber
45	suction opening
46	scraping element
47	load sensor
48	load sensor
49	transfer device
50	retrieving head
51	pockets
52	actuator assembly
53	rotation axis
54	annular body
55	motor
56	belt transmission
57	linear guide
58	slide
59	annular body
60	cam
61	cam-follower roller
62	motor
63	belt transmission
64	frame
65	upper crosspiece

66 lower crosspiece
67 side plates
68 side wall
69 bottom wall
70 hollow element
71 chamber
72 pneumatic ducts
73 pneumatic actuator
74 support plate
75 adjusting screw
76 cleaning plate
77 through hole
78 pneumatic actuator
79 protection plate
80 through opening
81 actuator device
D translation direction
S 1 feeding station
S2 feeding station
S3 retrieving station

Claims

1. A manufacturing machine (6) for the production of pouches (1), preferably snus pouches (1), each containing a quantity (2) of loose product; the manufacturing machine (6) comprises:

a first forming conveyor (7), which has a first pocket (10), which reproduces, in negative, part of a shape of the pouch (1);
a second forming conveyor (7), which is coupled to the first forming conveyor (7) so as to define a joining zone (9) comprised between the two forming conveyors (7);
a first feeding unit (11) configured to feed, in a first feeding station (S1) arranged upstream of the joining zone (9), a first band (12) of wrapping material which winds around part of the periphery of the first forming conveyor (7);
a second feeding unit (11) configured to feed, in a second feeding station (S1) arranged upstream of the joining zone (9), a second band (12) of wrapping material which winds around part of the periphery of the second forming conveyor (7) so that the second band (12) of wrapping material overlaps the first band (12) of wrapping material in the joining zone (9) forming the pouch (1); and
a third feeding unit (14) configured to feed, in a third feeding station (S2) arranged between the first feeding station (S1) and the joining zone (9), the quantity (2) of loose product in the first pocket (10) of the first forming conveyor (7) with the interposition of the first band (12) of wrapping material;
the manufacturing machine (6) is **characterized in that** the third feeding unit (14) comprises:

an upper disc (21), which is arranged horizontally, is mounted in a rotary manner, in a stepped manner, around a first vertical rotation axis (22) and delimits at least one compartment (23), which is open at the top and is designed to receive and contain an amount of loose product; and
a transfer device (49), which is configured to retrieve at least one quantity (2) of loose product from the compartment (23) and transfer the quantity (2) of loose product into the first pocket (10) of the first forming conveyor (7).

2. The manufacturing machine according to claim 1, wherein:

the upper disc (21) has a through hole (24), which laterally delimits the compartment (23); and
a lower disc (25) is provided, which is mounted in a rotary manner around the first rotation axis (22) in a synchronous manner with the upper disc (21), is arranged under the upper disc (21), has a base wall (26) inserted in the through hole (24) of the upper disc (21) so as to delimit, at the bottom, the compartment (23) and is axially movable relative to the upper disc (21) in order to change a depth of the compartment (23).

3. The manufacturing machine (6) according to claim 2 and comprising an actuator device (27) configured to axially translate the lower disc (25) relative to the upper disc (21).

4. The manufacturing machine (6) according to claim 3 and comprising an elastic element (36), which pushes the lower disc (25) far from the upper disc (21).

5. The manufacturing machine (6) according to claim 3 or 4, wherein:

the lower disc (25) is connected to an inner shaft (29) provided, at an end opposite the lower disc (25), with an annular groove (30); and
the actuator device (27) comprises an eccentric body (31), which engages the groove (30) of the inner shaft (29), and a first motor (32), which rotates the eccentric body (31) around a second rotation axis (33), which is perpendicular to the first rotation axis (22) and is eccentric relative to the eccentric body (31).

6. The manufacturing machine (6) according to claim 5, wherein the eccentric body (31) is connected to a bearing (34), which is arranged inside the groove (30) of the inner shaft (29) so as to allow the groove

(30) to rotate around the first rotation axis (22) without slipping.

7. The manufacturing machine (6) according to one of the claims from 2 to 6 and comprising:

a frame (16);
an internally hollow outer shaft (35), which is mounted on the frame (16) in a rotary manner so as to rotate around the first rotation axis (22) and supports, at an end, the upper disc (21); and
an inner shaft (29), which is mounted inside the outer shaft (35) so as to rotate with the outer shaft (35) in an integral manner and axially slide relative to the outer shaft (35) and
supports the lower disc (25).

8. The manufacturing machine (6) according to claim 7, wherein the frame (16) comprises a tubular support body (37) accommodating, on the inside, the outer shaft (35), which is connected to the support body (37) through the interposition of two bearings (38).

9. The manufacturing machine (6) according to claim 7 or 8 and comprising:

a second motor (39) configured to rotate the outer shaft (35) around the first rotation axis (22); and
a belt transmission (40), which has a pulley integral with the outer shaft (35) and a pulley caused to rotate by the second motor (39).

10. The manufacturing machine (6) according to one of the claims from 2 to 9, wherein the base wall (26) is a sucking wall.

11. The manufacturing machine (6) according to claim 10, wherein:

the base wall (26) has a plurality of through micro-holes having a diameter that is smaller than a minimum dimension of the particles of loose product; and
the lower disc (25) comprises a first chamber (42), which is arranged under the base wall (26) and is in pneumatic communication with a suction source (43).

12. The manufacturing machine (6) according to claim 11 and comprising a second chamber (44), which is arranged around the first rotation axis (22), is carried by a frame (16), externally is in pneumatic communication with the suction source (43) and internally is in pneumatic communication with the first chamber (42).

13. The manufacturing machine (6) according to one of the claims from 2 to 12 and comprising a tank (15) with a cylindrical shape, which is arranged horizontally, is carried by a frame (16) and contains, on the inside, the two discs (21, 25).

14. The manufacturing machine (6) according to claim 13 and comprising a vertical feeding duct (20) configured to feed, into the tank (15), a flow of loose product, which forms a bed of loose product inside the compartment (23).

15. The manufacturing machine (6) according to claim 14, wherein the tank (15) is provided with a lid (17), which closes the tank (15) at the top and has a loading opening (18), through which the feeding duct (20) is arranged, and an unloading opening (19), through which the transfer device (49) can retrieve the quantity of loose product (2) from the compartment (23).

16. The manufacturing machine (6) according to any one of the claims from 2 to 15 and comprising at least one scraping element (46), which is in contact with an upper surface of the upper disc (21) so that the loose product cannot reach under the scraping element (46) and has the function of pushing away the loose product that rests against the upper disc (21) on the outside of the compartment (23).

17. The manufacturing machine (6) according to claim 14 or 15, wherein a lower end of the feeding duct (20) is arranged in contact with an upper surface of the upper disc (21).

18. The manufacturing machine (6) according to claim 14, 15 or 17, wherein:

the feeding duct (20) is provided with a first load sensor (47) configured to determine whether a level of loose product inside a terminal part of the feeding duct (20) has reached a minimum level and with a second load sensor (48) configured to determine whether a level of loose product inside the terminal part of the feeding duct (20) has reached a maximum level; and
a control unit (28) is provided, which is configured to control the feeding of loose product in the feeding duct (20) so that the level of loose product inside the terminal part of the feeding duct (20) is always between the minimum level and the maximum level.

19. The manufacturing machine (6) according to one of the claims from 1 to 18 and comprising a control unit (28), which is configured to change the depth of the compartment (23) so as to adjust, namely increase or decrease, a weight of the quantities (2) of loose product.

20. A manufacturing method for the production of pouches (1), preferably snus pouches (1), each containing a quantity (2) of loose product; the manufacturing method comprises the steps of:

advancing a first forming conveyor (7) having a pocket (10) which reproduces, in negative, part of a shape of the pouch (1);
advancing a second forming conveyor (7) which is coupled to the first forming conveyor (7) so as to define a joining zone (9) comprised between the two forming conveyors (7);
feeding, by means of a first feeding unit (11) and in a first feeding station (S1) arranged upstream of the joining zone (9), a first band (12) of wrapping material which winds around part of the periphery of the first forming conveyor (7);
feeding, by means of a second feeding unit (11) and in a second feeding station (S1) arranged upstream of the joining zone (9), a second band (12) of wrapping material which winds around part of the periphery of the second forming conveyor (7) so that the second band (12) of wrapping material overlaps the first band (12) of wrapping material in the joining zone (9) forming the pouch (1); and
feeding, by means of a third feeding unit (14) and in a third feeding station (S2) arranged between the first feeding station (S1) and the joining zone (9), the quantity (2) of loose product into the pocket (10) of the first forming conveyor (7) covered by the first band (12) of wrapping material;
the manufacturing method is **characterized in that** it comprises the steps of:

rotating, in a stepped manner and around a vertical rotation axis (22), an upper disc (21), which is arranged horizontally and delimits at least one compartment (23), which is open at the top and is designed to receive and contain an amount of loose product; and
retrieving, by means of a transfer device (49), at least one quantity (2) of loose product from the compartment (23); and
transferring, by means of the transfer device (49), the quantity (2) of loose product into the first pocket (10) of the first forming conveyor (7).

21. The manufacturing method according to claim 20, wherein:

the upper disc (21) has a through hole (24), which laterally delimits the compartment (23); and
a lower disc (25) is provided, which is mounted in a rotary manner around the rotation axis (22) in a synchronous manner with the upper disc (21), is arranged under the upper disc (21), has a base wall (26) inserted in the through hole (24) of the upper disc (21) so as to delimit, at the bottom, the compartment (23) and is axially movable relative to the upper disc (21) in order to change a depth of the compartment (23).

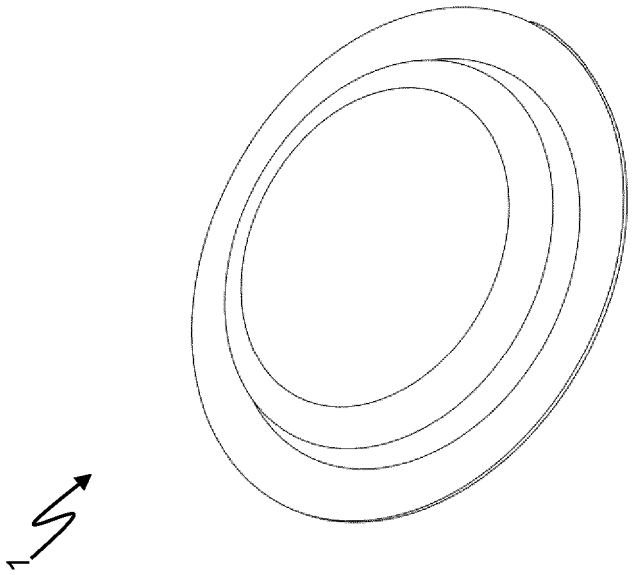


Fig. 1

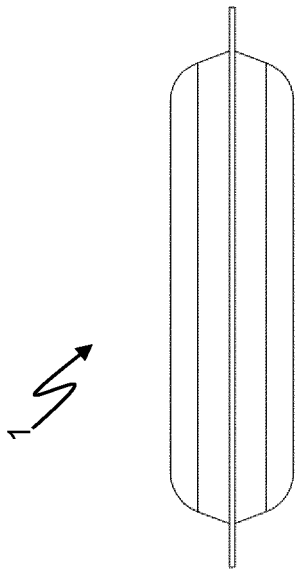


Fig. 2

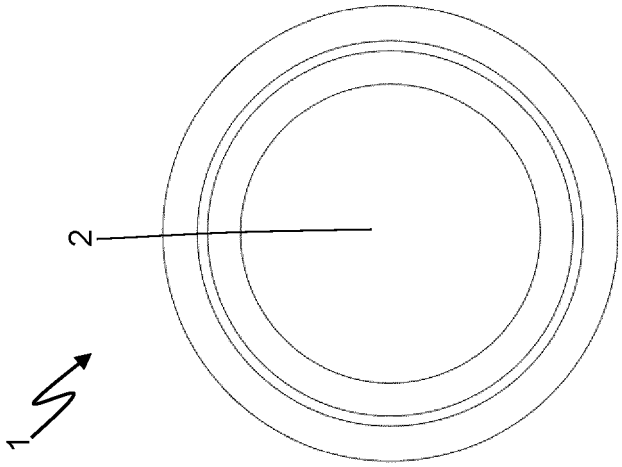


Fig. 3

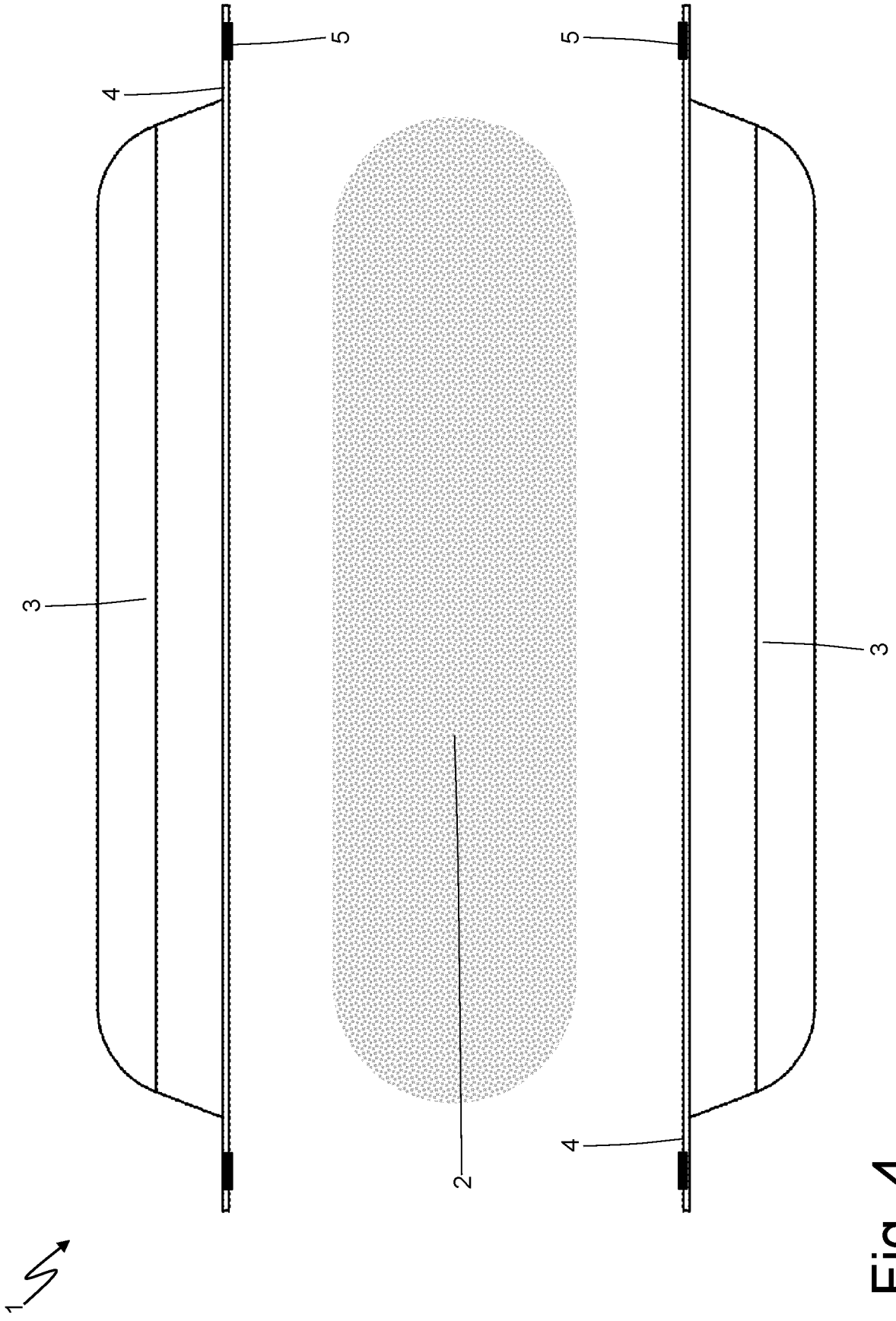
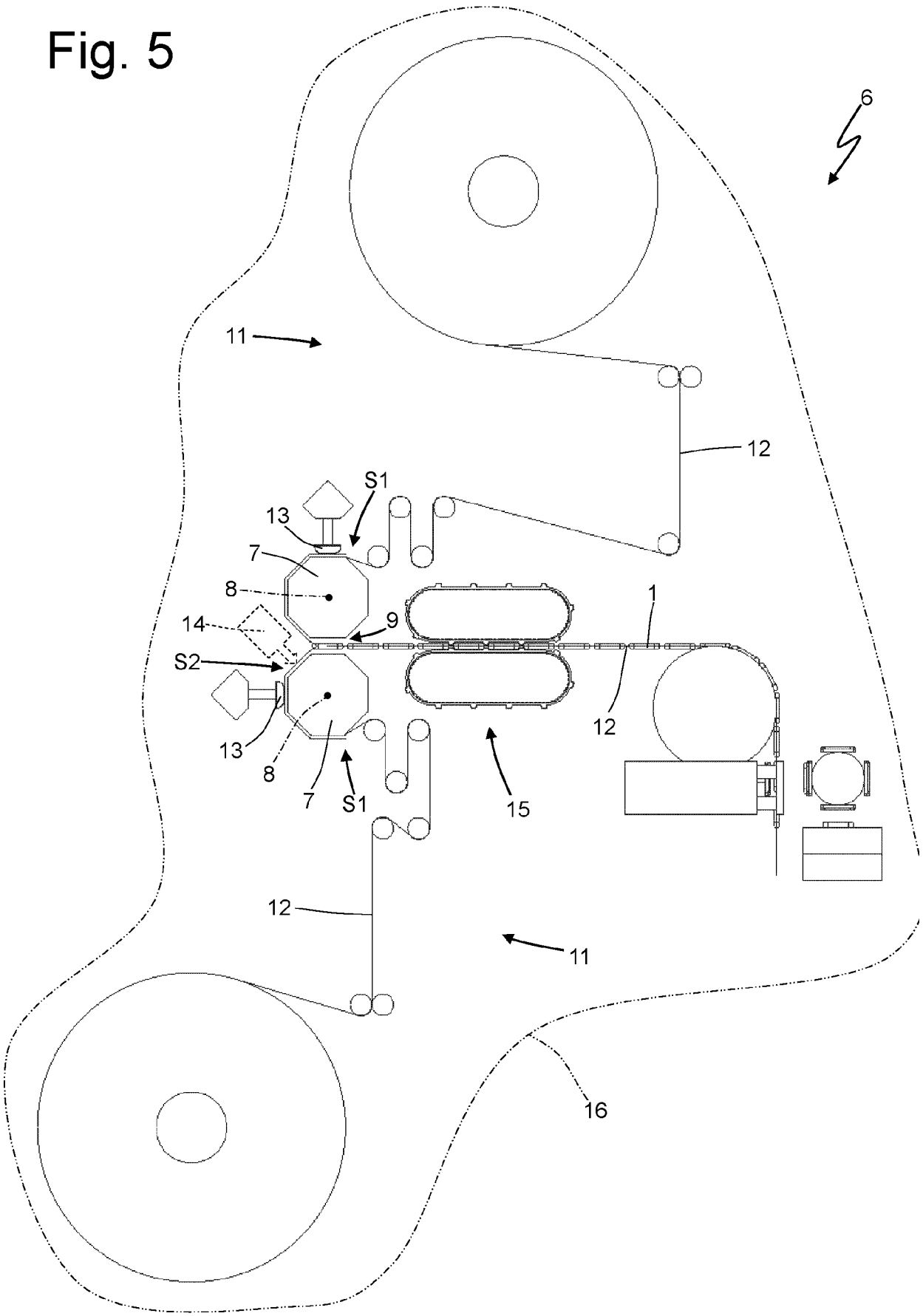


Fig. 4

Fig. 5



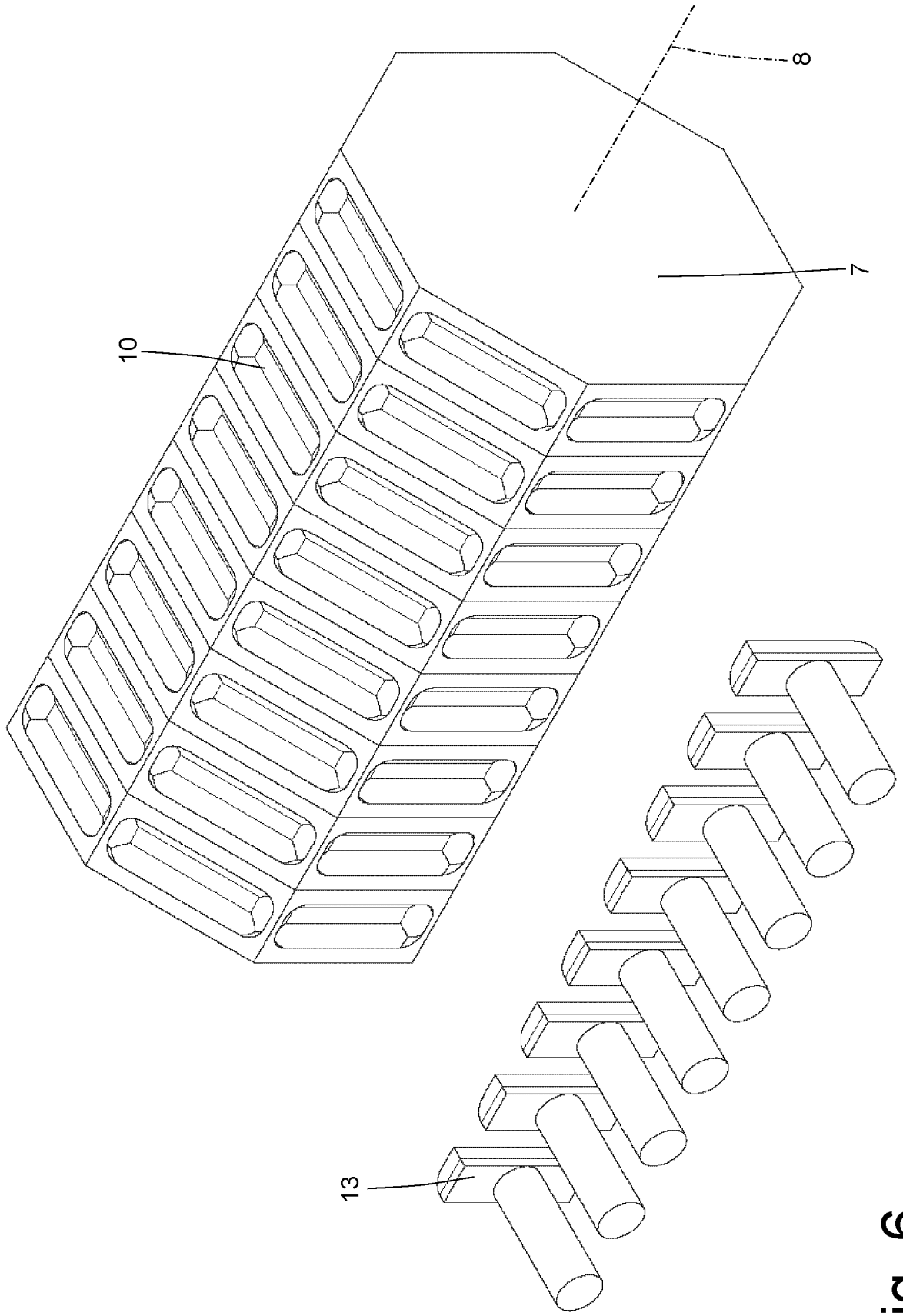


Fig. 6

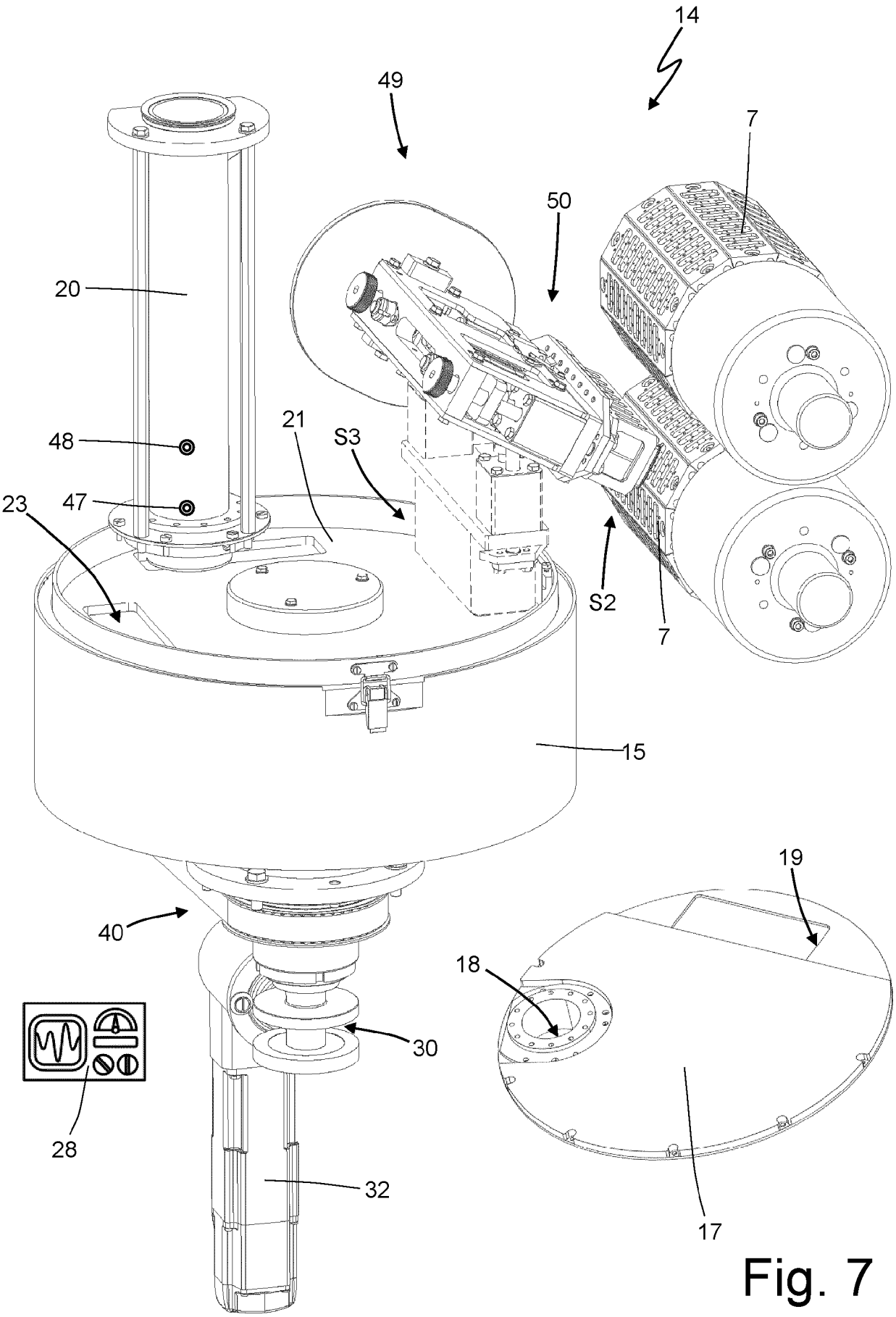
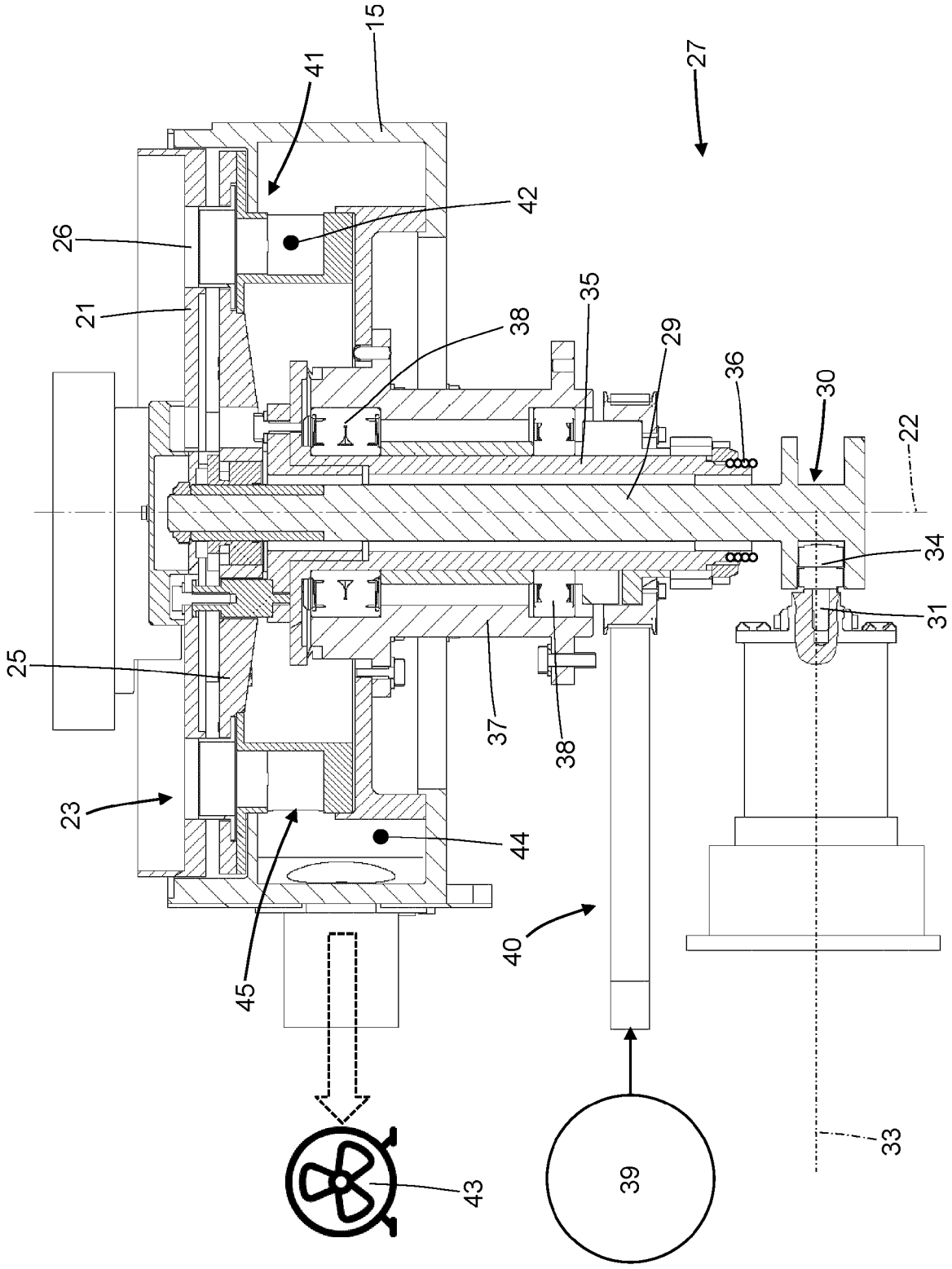


Fig. 7

Fig. 8



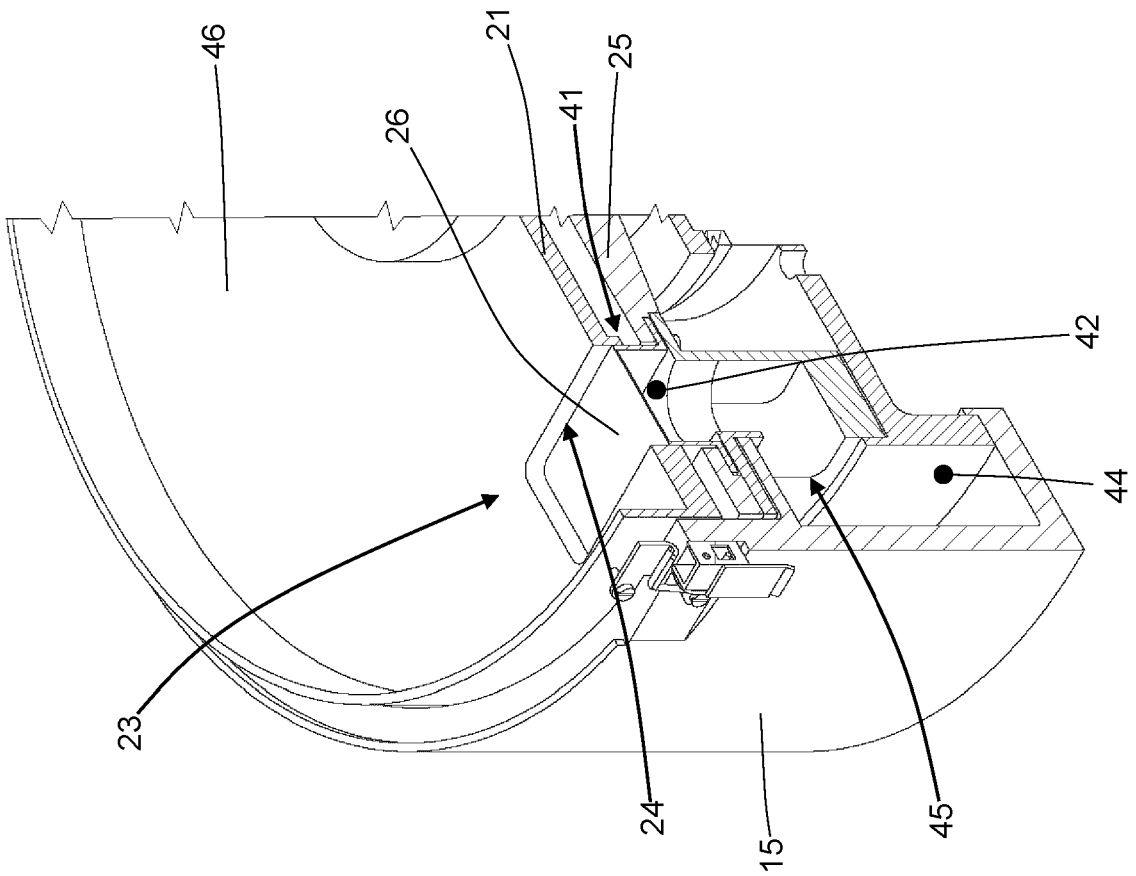


Fig. 9

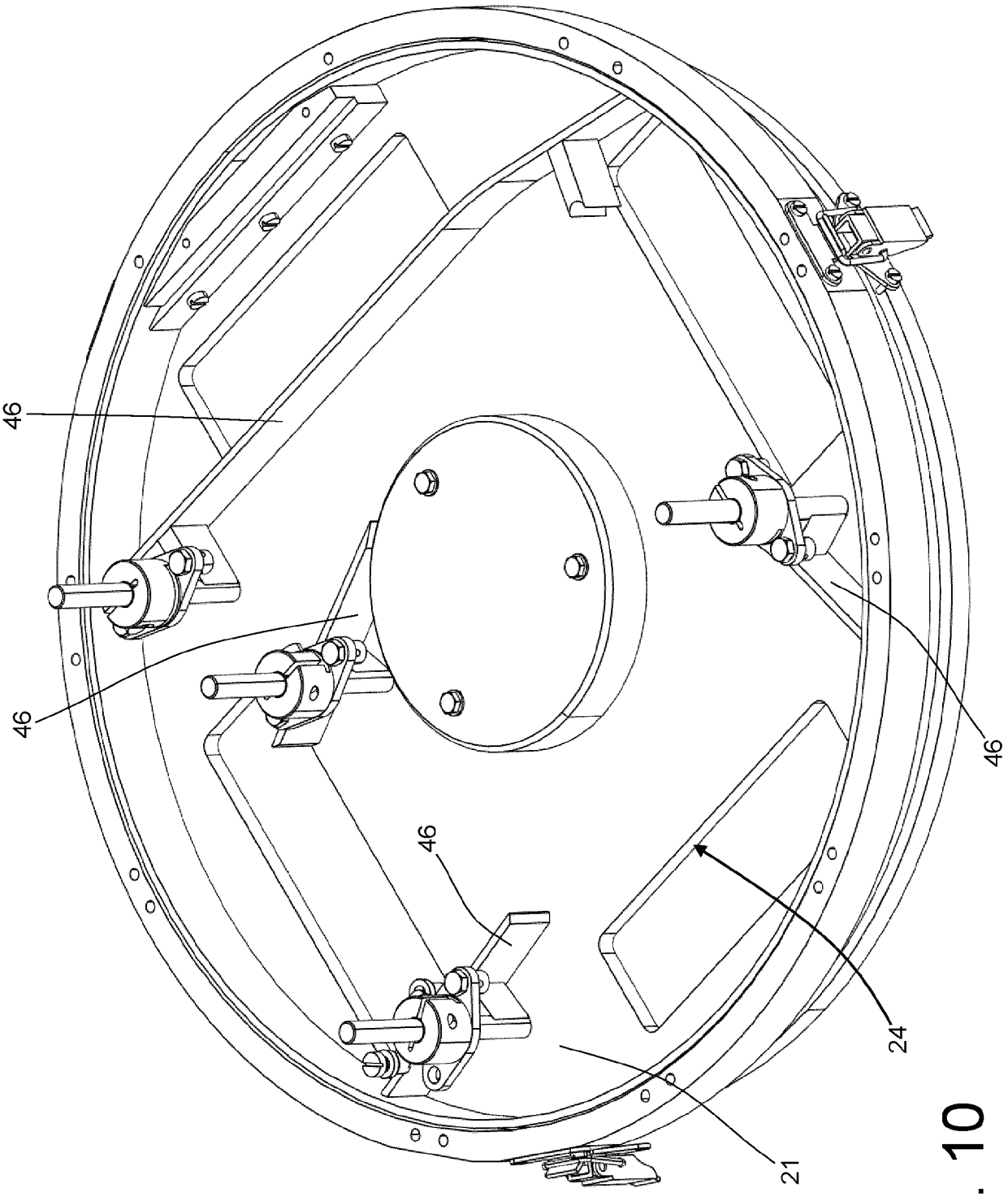


Fig. 10

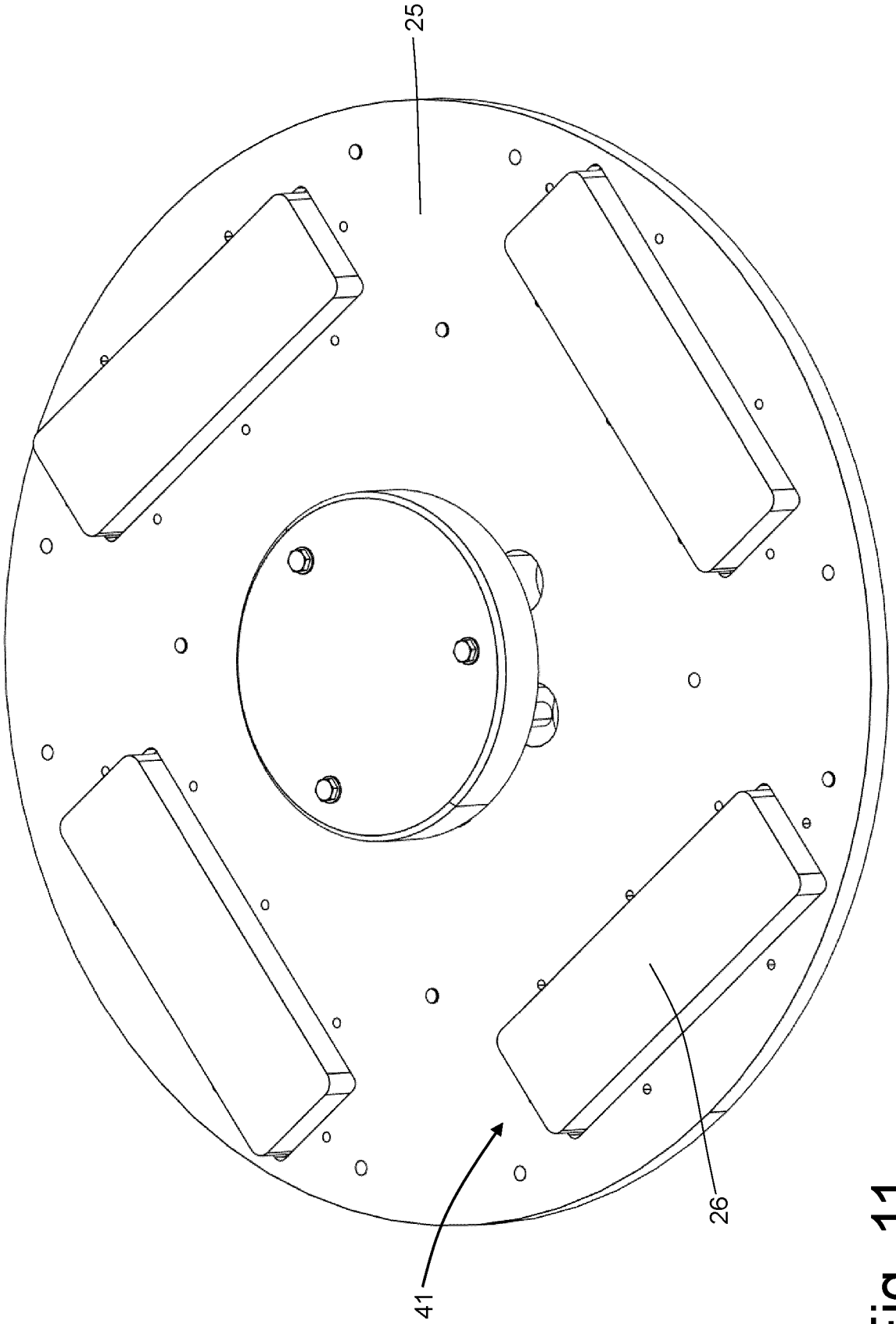


Fig. 11

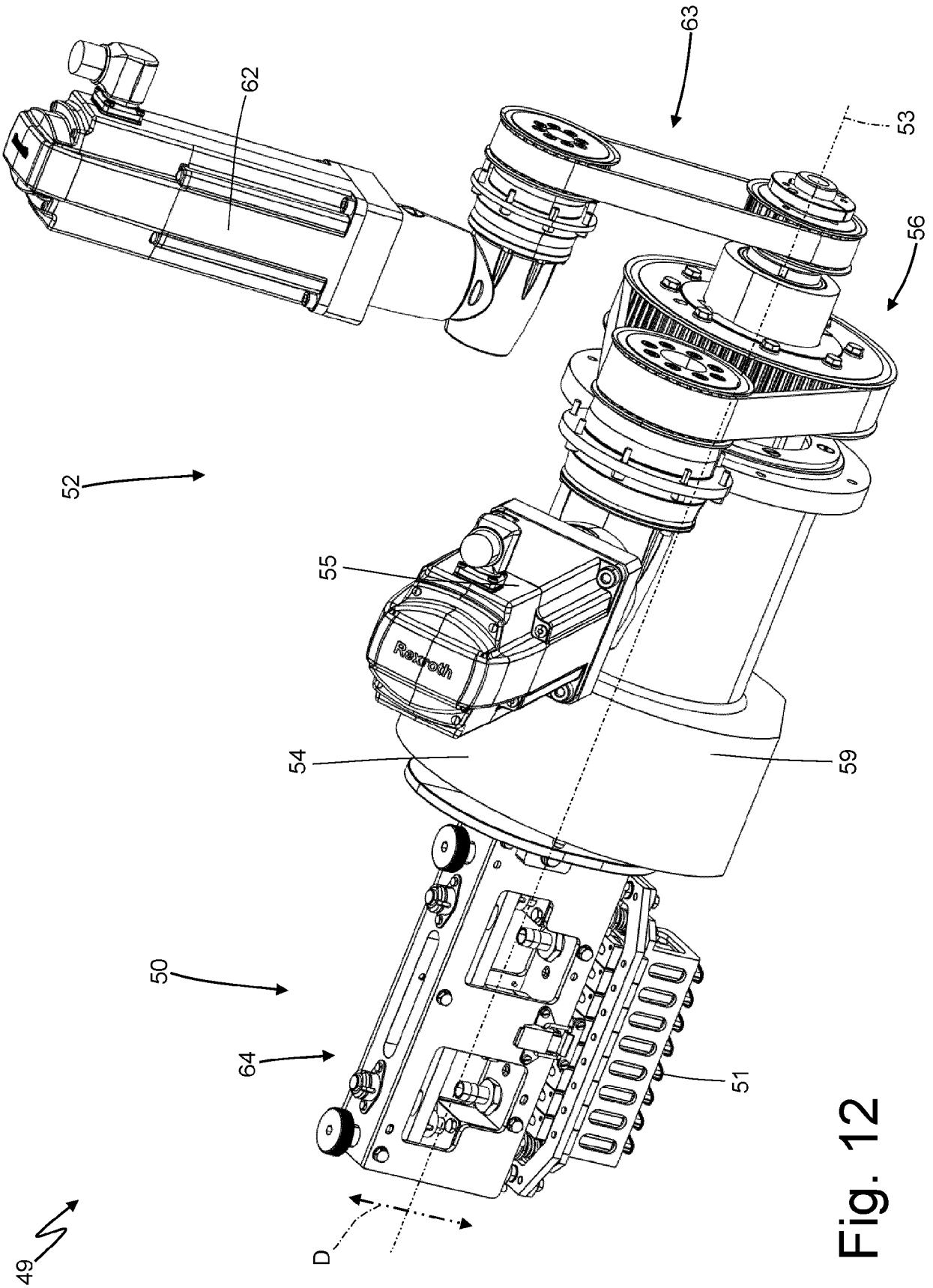


Fig. 12

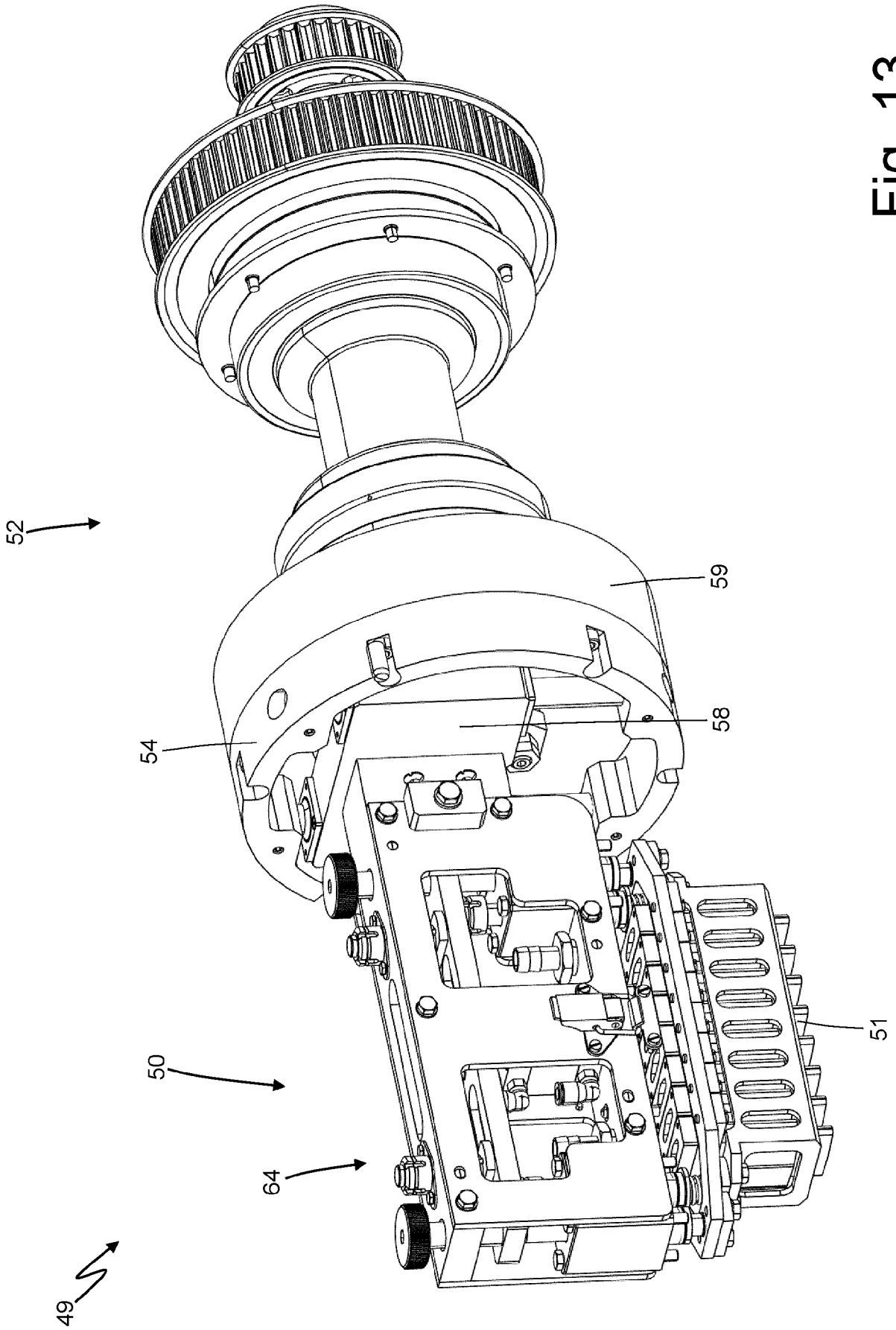


Fig. 13

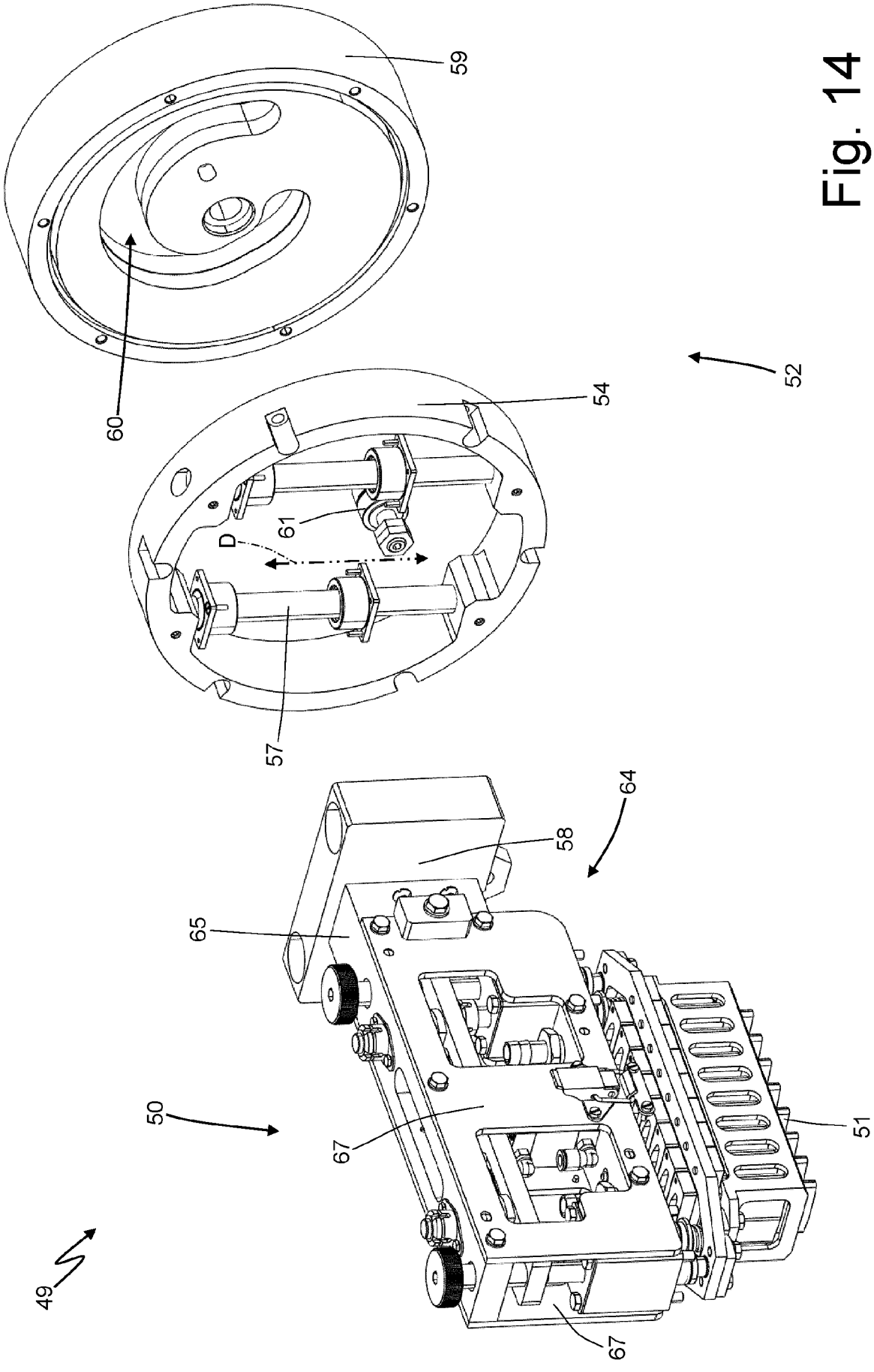


Fig. 14

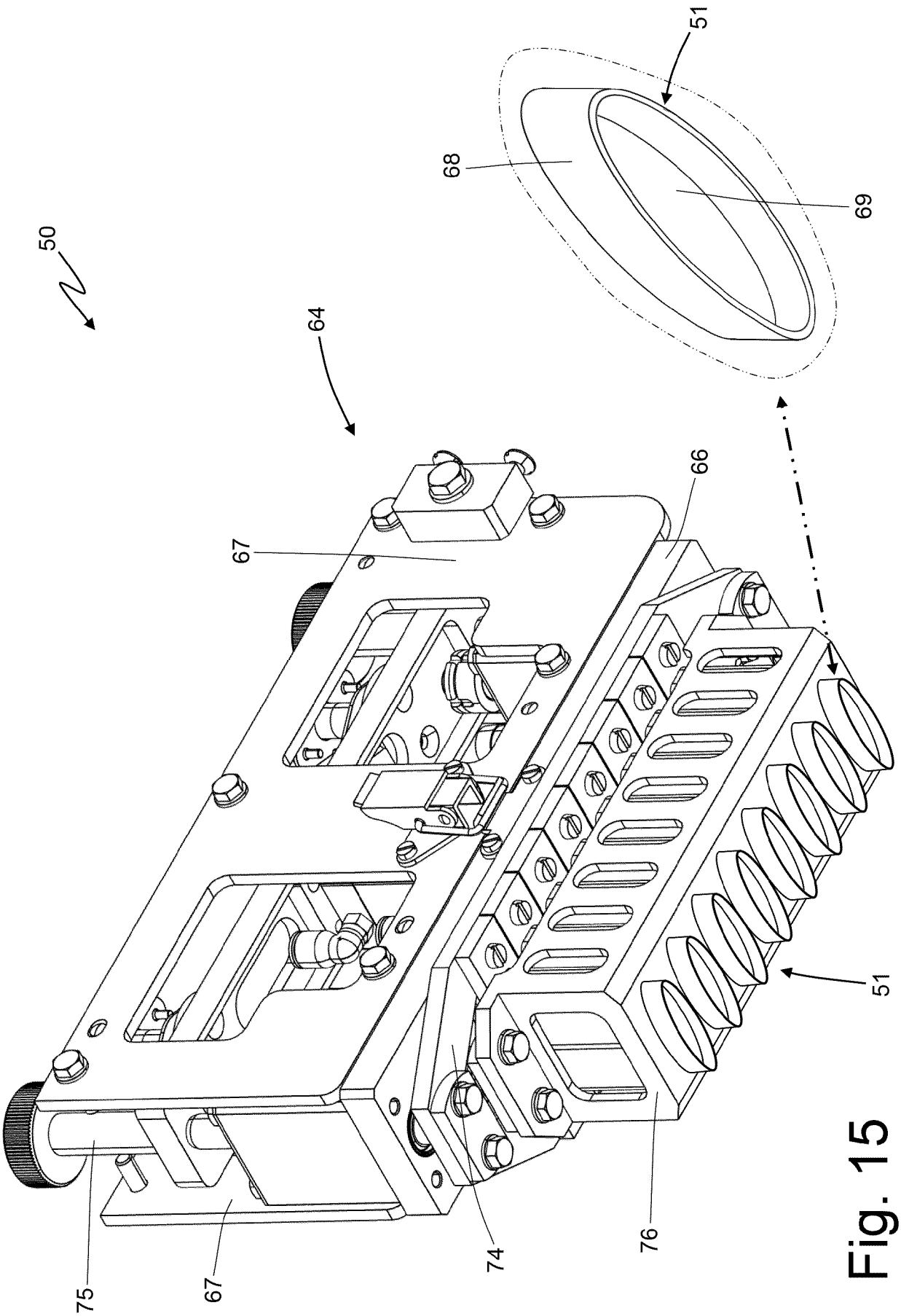


Fig. 15

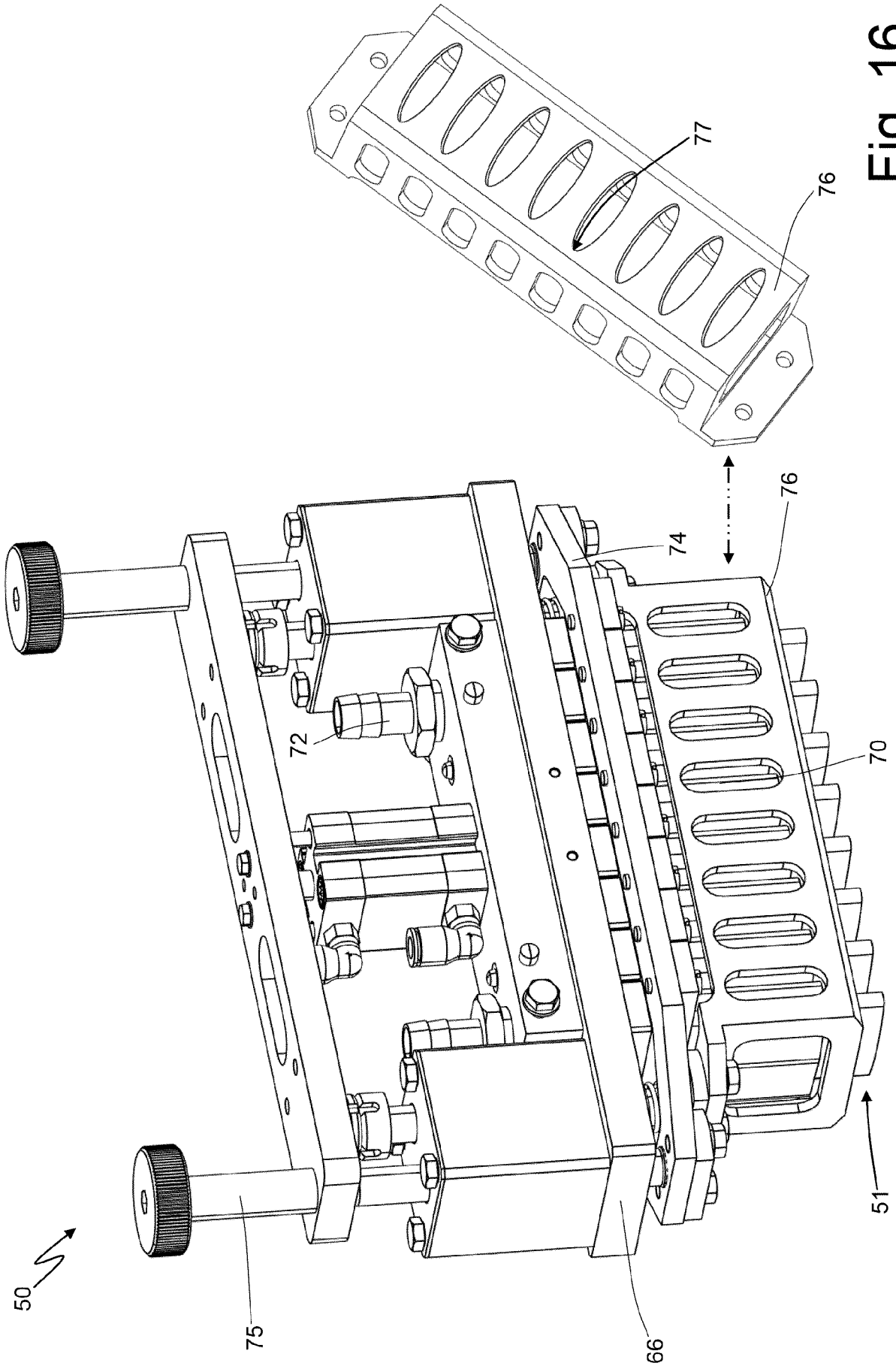


Fig. 16

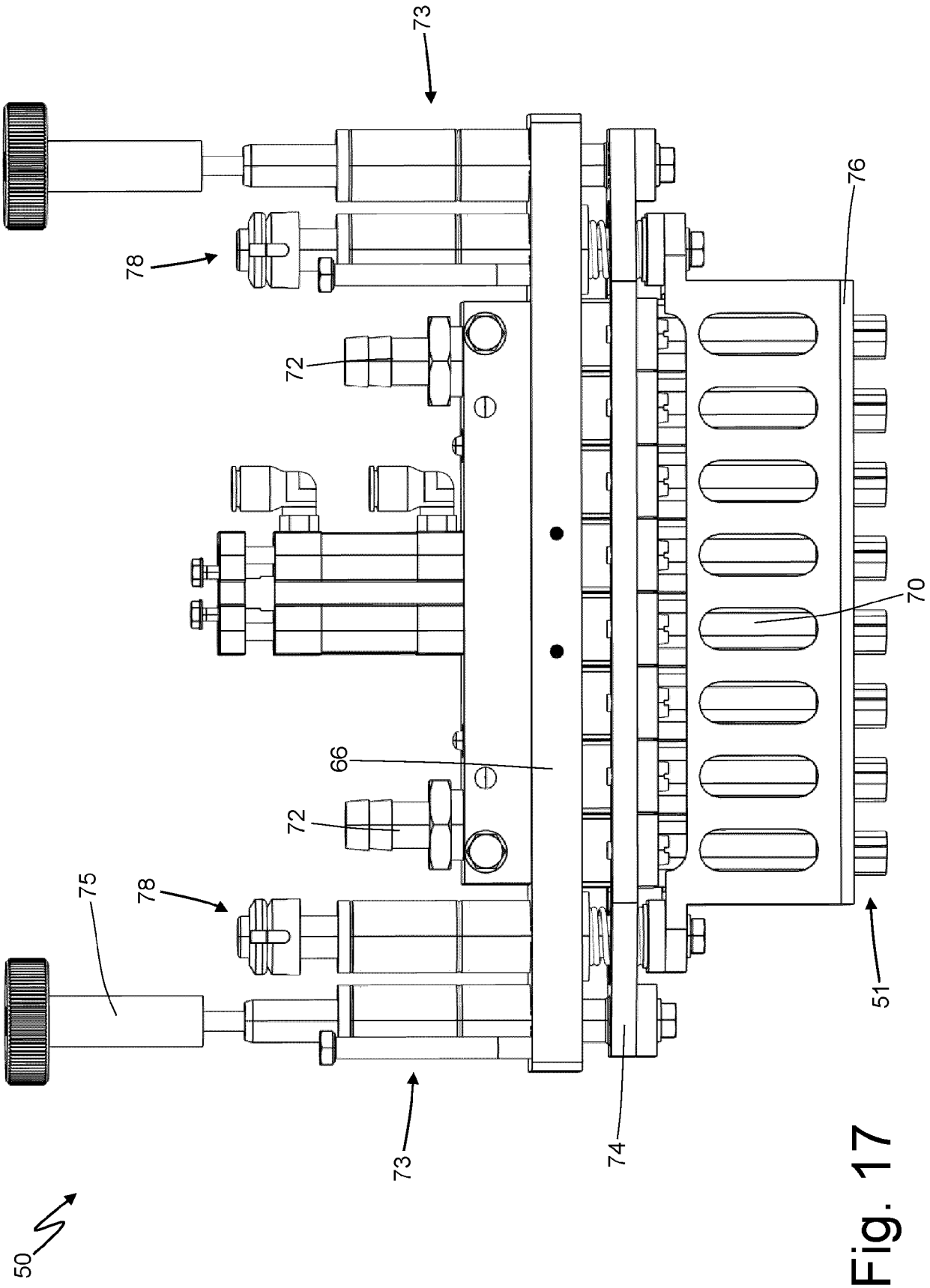


Fig. 17

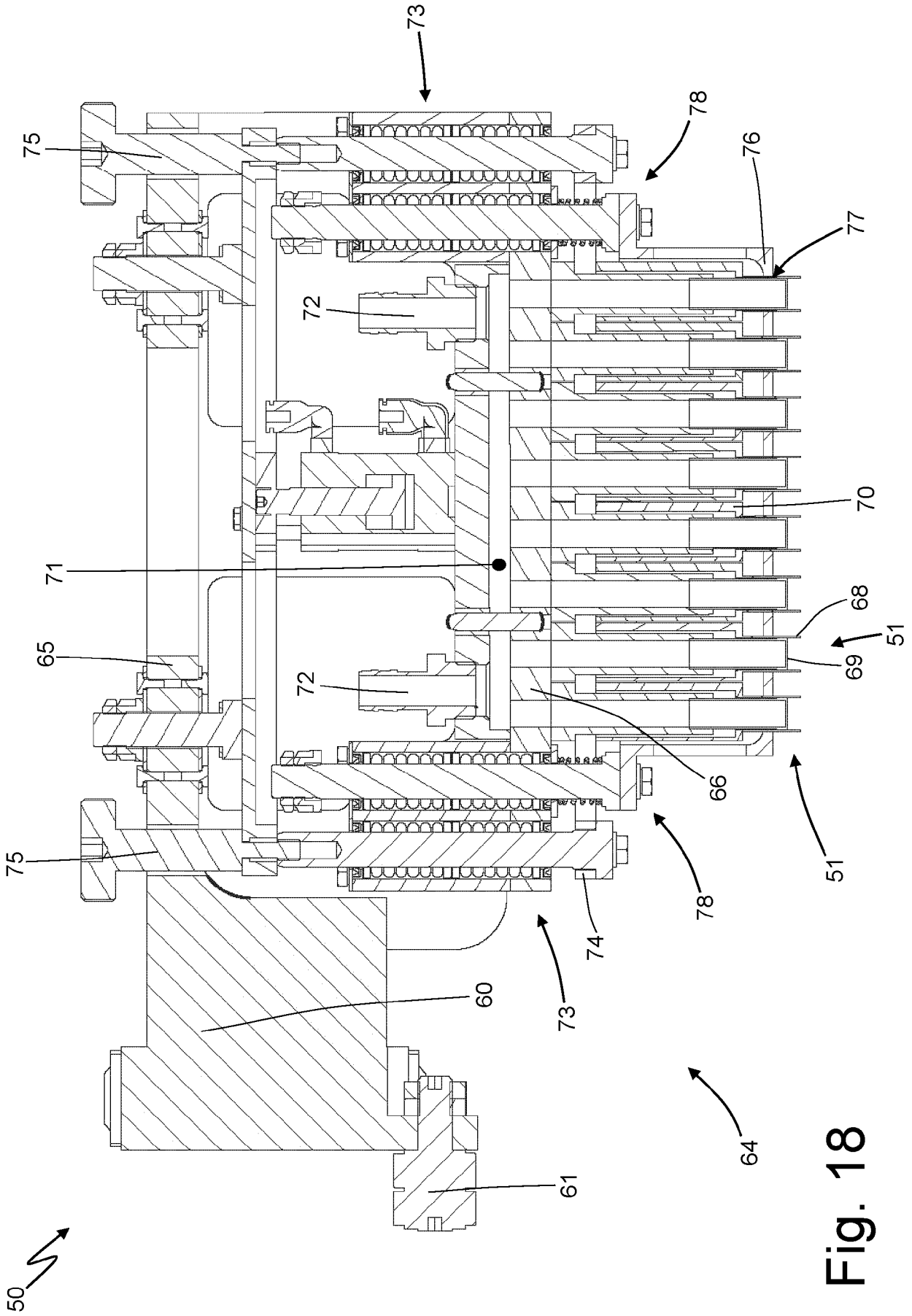


Fig. 18

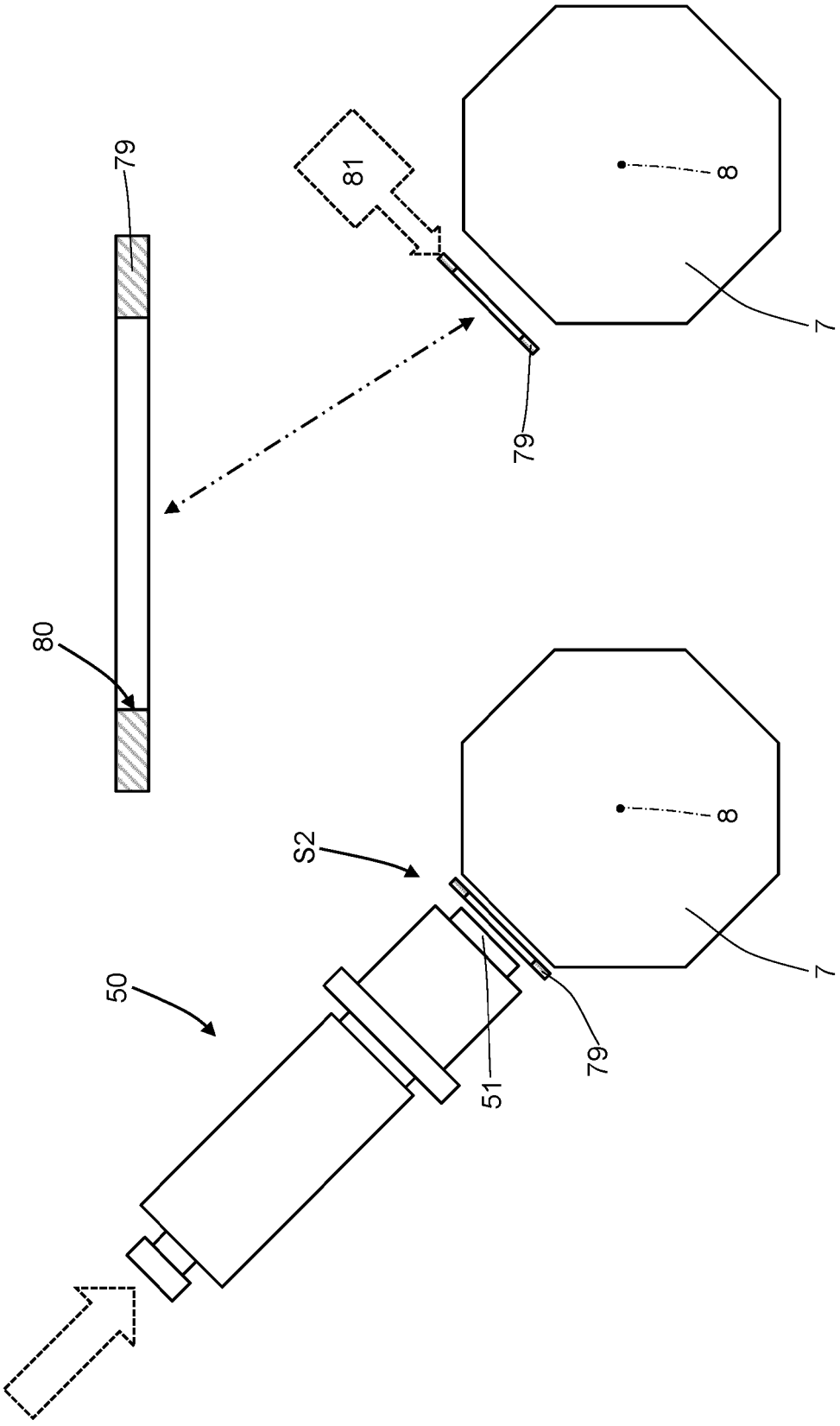


Fig. 19

Fig. 20

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- IT 102023000021414 **[0001]**
- WO 2008114128 A2 **[0005]**
- US 2011277878 A1 **[0005]**