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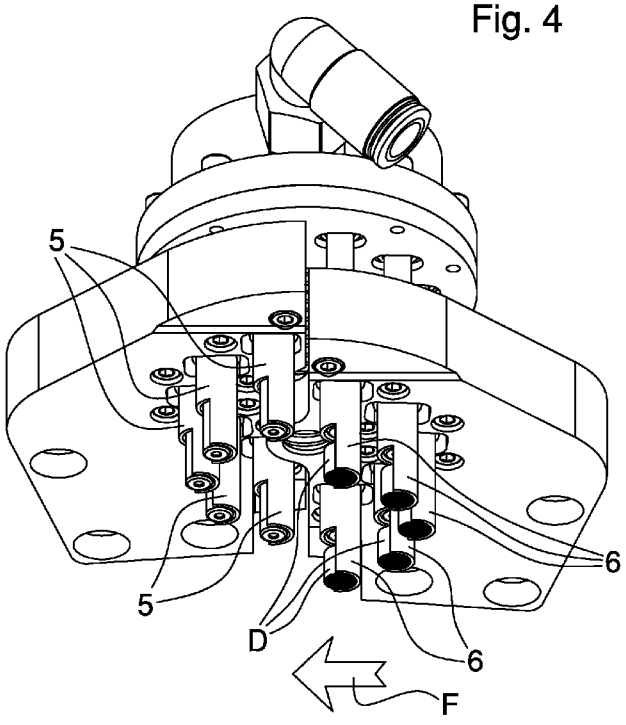
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[Continued on next page]

(54) Title: DEVICE FOR SEPARATING DOSES OF PLASTICS

Fig. 4



(57) Abstract: A device for separating a plurality of doses of plastics from a plurality of extruder outlets comprises a movable element that carries two groups of dose separating elements wherein at least a first group is movable with respect to at least a second group. The separating device expels the doses in a circular arrangement for subsequent compression moulding of a liner for a container closure.

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DEVICE FOR SEPARATING DOSES OF PLASTICS

Background of the invention

[0001] The invention relates to a device for separating multiple doses from extruding means for extruding plastics.

[0002] Specifically, but not exclusively, the invention can be advantageously applied to supply the plastics intended for forming the annular liner of a closure for containers, such as, for example, a lid for a jar or a cap for a bottle.

[0003] In particular, reference is made to a device for separating a multiplicity of doses of plastics and then for depositing the doses of plastics, for example directly inside a closure for containers, such that at least one part of the deposited doses has an annular arrangement. This annular arrangement will in fact facilitate the formation, for example through compression of the doses, of the internal sealing liner of the closure for containers.

[0004] Forming an annular liner by means of a process that comprises separating a multiplicity of doses from an extruder, placing the doses in a circular arrangement and subsequently forming the annular liner by compressing the doses is already known.

[0005] The known technique disclosed above nevertheless has some limits and drawbacks.

[0006] In the first place there exist certain structural and/or functional constraints that limit the maximum number of the doses and/or the minimum diameter of the liner.

[0007] With reference to figure 1, with A the various dose separating elements are indicated and with B the corresponding extruder outlets from which the plastics exit. In general, a dose separating element is concave and faces forwards, with reference to the advancing of the separating element to the outlet of the extruder.

[0008] A first constraint is the diameter D of the dose, which in general must not be less than the height of the dose.

[0009] Another constraint is the thickness of the wall of

the separating element, which will be, generally, between 0.75 and 1 millimetre.

[0010] A further constraint is the distance between a separating element and the holes of the extruder outlets, which distance must in general be greater than at least 0.7 millimetres.

[0011] Taking account of at least these constraints, it is very difficult, if not impossible, to form liners with a very small diameter Dp, especially if such liners are relatively very heavy, i.e. require the use of a large quantity of plastics.

[0012] Further, it is not possible to increase over a certain limit the number of doses of plastics (and the consequent number of extruder openings and of dose separating elements) for a certain liner diameter Dp.

[0013] Each of documents US 2007/134361, EP 1101587, EP 1101586 and US 2009/127076 discloses a device according to the preamble of claim 1.

Summary of the invention

[0014] One object of the invention is to overcome one or more of the aforementioned limits and drawbacks.

[0015] One advantage is to provide a device for separating a relatively high number of doses of plastic.

[0016] One advantage is to separate, almost simultaneously, a relatively high number of doses from extruding means for extruding plastics.

[0017] One advantage is to make available a device for separating a multiplicity of doses from extruding means and then placing the doses in an annular arrangement with a relatively reduced diameter.

[0018] One advantage is separating a multiplicity of doses from extruding means and then arranging part of the doses in an external annular arrangement and another part of the doses inside the external annular arrangement (where in the context of the overall present description the meaning of "annular arrangement" may comprise the meaning that will be disclosed

better below).

[0019] One advantage is separating multiple doses to enable the liners for closing relatively small containers to be subsequently formed.

[0020] These objects and advantages, and still others, are obtained by the device according to one or more of the claims set out below.

[0021] In one example, a device for separating a plurality of doses of plastics comprises a plurality of extruder outlets, from which said plurality of doses is separated, and a movable element that carries two or more groups of dose separating elements in which at least a first group of elements is movable on said movable element with respect to at least a second group of elements.

[0022] In one example, the separating device is controlled in such a manner that the second group of dose separating elements, which is arranged at least partly behind the first group of dose separating elements (with reference to an advancing direction of the movable element), meets some extruder outlets whilst the first group of dose separating elements, arranged at least partly in front, is arranged in a non-interference position (for example a raised position) and subsequently the first group of dose separating elements is moved (for example downwards) to take on a position in which it meets other extruder outlets.

[0023] In one example, the separating device is configured for expelling the doses in an arrangement that is at least partly annular for subsequent forming (by compression of plastics) of a sealing liner of a closure for containers.

Brief description of the drawings

[0024] The invention can be better understood and implemented with reference to the enclosed drawings that illustrate some non-limiting examples thereof.

[0025] Figure 1 is a diagram of an arrangement of dose separating elements and of extruder openings.

[0026] Figure 2 is a view, in a vertical elevation, of an

embodiment of a movable element that carries the dose separating elements according to the invention.

[0027] Figure 3 is a diagram of a sequence of the movement of the movable element in figure 2.

[0028] Figures 4 to 6 show the dose separating elements in figure 3, in perspective on an enlarged scale, in three different positions.

[0029] Figure 7 shows the doses deposited by the dose separating elements in figure 6 inside a closure for containers.

[0030] Figure 8 shows an exploded view of the extruding means associable with the movable element in figure 2.

[0031] Figures 9 and 10 show two different prospective views of the extruding means in figure 8.

[0032] Figure 11 shows another embodiment of a movable element that carries the dose separating elements according to the invention.

[0033] Figures 12 and 13 show, on an enlarged scale, the dose separating elements of the movable element in figure 11 in two different operating configurations.

[0034] Figure 14 is a view of a device for separating multiple extruded doses having a plurality of movable elements like those in figure 2 or in figure 11.

[0035] Figure 15 shows a detail in figure 14 on an enlarged scale.

[0036] Figure 16 is a diagram of another embodiment of a movable element that carries dose separating elements according to the invention, in which a dose separating element is shown in three different operating configurations in sequence.

[0037] Figure 17 is a section along a horizontal plane of any of the movable elements in figure 16.

[0038] Figure 18 shows an example of a closure for containers with liners that can be made by using the movable elements in figure 16.

[0039] Figure 19 is a prospective view of an example of

extruding means that is associable with a movable element according to the invention.

[0040] Figure 20 is a partially sectioned top plan view of figure 19.

[0041] Figure 21 is the section XXI-XXI in figure 20.

[0042] Figure 22 is the section XXII-XXII in figure 20.

Detailed description

[0043] With reference to the aforesaid figures, with 1 a device has been overall indicated for separating, almost simultaneously, a multiplicity of doses from a corresponding multiplicity of extrusion flows that exit extruding means for extruding plastics. The separating device 1 can be arranged, in particular, in the context of an apparatus for forming annular liners that will form the sealing liners inside closures for containers, in particular in an apparatus for forming liners by compression of plastics.

[0044] The separating device 1 comprises extruding means for extruding plastics having a first group of extruder outlets 2 and a second group of extruder outlets 3 arranged at a greater height than the first group of extruder outlets 2. In this specific example, the first group of extruder outlets 2 comprises a plurality of extruder outlets and the second group of extruder outlets 3 comprises a plurality of extruder outlets, although it is possible to provide other examples, according to the invention, in which the first group of extruder outlets comprises a single extruder outlet and/or the second group of extruder outlets 3 comprises a single extruder outlet.

[0045] The separating device 1 comprises a movable element 4 that is movable in an advancing direction F along a closed loop path arranged in such a manner as to pass, at each rotation, opposite the extruding means. In the specific case, the movable element 4 rotates with a vertical rotation axis, along a horizontal circular path.

[0046] The separating device 1 comprises a first (front) group of dose separating elements 5 carried by the movable

element 4 to separate, at each revolution of the movable element, doses of plastics from the first group of extruder outlets 2. The separating device 1 further comprises a second (rear) group of dose separating elements 6 carried by the movable element 4 to separate, at each revolution of the movable element, doses of plastics from the second group of extruder outlets 3.

[0047] In the specific case, the first group of extruder outlets 2, is arranged after (with reference to the advancing direction F of the movable element) the second group of extruder outlets 3.

[0048] The dose separating elements of the first and of the second group, respectively 5 and 6, can be arranged on the movable element 4 such as to take on, overall, at least one annular arrangement (see, for example, figure 6) to enable the doses to be expelled with a corresponding annular arrangement (see, for example, figure 7). In the specific case, the arrangement of the various dose separating elements is circular (horizontal). In this description, "annular arrangement" can be understood (for example both with reference to the annular arrangement of the dose separating elements, and with reference to the annular arrangement of the deposited doses) in the meaning of comprising an arrangement of at least two objects that are spaced apart from one another, as well as an arrangement of at least three non-aligned objects. The term "annular" may therefore comprise, for example, an arrangement of two spaced objects in order to make it possible to arrange between the two spaced objects another object (for example a central part of a compression mould), a triangular arrangement, a circular arrangement, an elliptical arrangement, a polygonal arrangement, etc. An annular arrangement, specifically of rectangular shape with rounded edges, can be used, in particular, to form a liner in the lid of cans of food products having this specific shape.

[0049] The first group of dose separating elements 5 is

movable on the movable element 4, with respect to the second group of dose separating elements 6, in such a manner as to take on at least a first configuration (see figure 4 or figure 12), in which the first group of dose separating elements does not interfere, during movement of the movable element along the closed loop path, with the second group of extruder outlets or with the plastics that exit therefrom. In this first non-interference configuration the first group of dose separating elements 5 can be raised, as in the example illustrated in figure 4, or laterally shifted, as in the example illustrated in figure 12.

[0050] The first group of dose separating elements 5 can take on at least a second configuration (see, for example, the lowered configuration of figure 5), wherein the first group of dose separating elements, in the course of movement of the movable element, could interfere in an undesirable manner with the second group of extruder outlets 3 or with the plastics that exit therefrom. In order to avoid such interference, the first group of dose separating elements 5 when passing opposite the second group of extruder outlets 3, can be arranged in the first configuration of non interference (e.g. the raised configuration of figure 4 or the laterally shifted configuration of figure 12) whilst in the meantime the second group of dose separating elements 6 meets the second group of extruder outlets 3 to remove a part of the doses of plastic that will then be deposited to form a single annular liner.

[0051] The separating device 1 can comprise, in particular, driving means that is able to carry selectively the first group of dose separating elements 5 in the first (raised) non-interference configuration before the passing, at each revolution of the movable element, of the first group of dose separating elements opposite the second group of extruder outlets 3, and in the second (lowered) configuration, of possible interference, after the first group of dose separating elements has passed in front of the

second group of extruder outlets.

[0052] This movement (downwards, for example in a vertical direction) is shown in the right part in figure 3, in which the movable element 4 is visible in the first configuration, in the moment in which it passes opposite a part of the extruding means (in particular the second group of extruder outlets 3), and in the second configuration, in the moment in which it passes opposite another part of the extruding means (in particular the first group of extruder outlets 2 arranged below the second group of extruder outlets 3).

[0053] In the specific case, the first group of dose separating elements 5 is arranged, on the movable element 4, after the second group of dose separating elements 3, with reference to the advancing direction F.

[0054] The first group of dose separating elements 5 is movable on the movable element 4 in a first (vertical) direction that is transverse to the (horizontal) advancing direction F. The first group of dose separating elements 5 can be movable on the movable element by means of slidable coupling, for example along (vertical) linear sliding guides.

[0055] The first group of dose separating elements 5, when it is in the first (non-interference) configuration, leaves free a front space, i.e. arranged in front (with reference to the advancing direction F) of the second group of dose separating elements 6 to enable the latter to remove the doses correctly.

[0056] The first and the second group of extrusion outlets are arranged in such a manner that the first group of dose separating elements 5 is, in the first (raised) non-interference configuration, farther from the first (lower) group of extruder outlets 2 than from the second (upper) group of extruder outlets 3.

[0057] The dose separating elements of the first and of the second group, considered overall, can have, as in the example in figure 2, both in the first and in the second configuration, an annular arrangement (in particular with two

staggered half-circumferences at different heights) around a (vertical) axis that is transverse to the (horizontal) advancing direction F.

[0058] The second group of dose separating elements 6 may be optionally movable on the movable element, particularly by means of a sliding coupling, e.g. along (vertical) linear sliding guides.

[0059] It is possible that the first and the second group of dose separating elements are able to take on a third configuration (figure 6) in which the various separating elements, considering both groups overall, have an annular arrangement (suitable in particular for expelling the doses), for example a circular arrangement. In this third configuration the overall separating elements may be located at the same vertical height.

[0060] The driving means that moves the dose separating elements can comprise, as in the specific case, cam-type driving means. In particular, the cam means can comprise at least a first annular cam path 7 that is operationally associated (in particular by a cam-following member, for example of the roller type) with the first group of dose separating elements 5 and at least a second annular cam path 8 that is operationally (in particular by a cam-following member, for example of the roller type) with the second group of dose separating elements 6.

[0061] The first group of dose separating elements 5 can comprise, as in the specific example, a first (front) semicircular arrangement of elements. The second group of dose separating elements 6 can comprise, as in this case, a second (rear) semicircular arrangement of elements. The second semicircular arrangement is arranged to the rear of the first semicircular arrangement, with reference to the advancing direction F of the movable element.

[0062] The first and the second group of extruder outlets 2 and 3 can have, as in the example disclosed here, an outlet direction of the extruded plastics that is transverse

(vertical) to the (horizontal) advancing direction F of the movable element.

[0063] The extruding means comprises, in the case in point, an extruder with an inlet 11 for the plastics and a plurality of supply channels 12 for supplying plastics to the various outlets 2 and 3.

[0064] In the example illustrated in figures 11 to 13 (for similar elements the same numbering has been used for the sake of simplicity), the first group of (front) dose separating elements 5 is movable on the movable element 4 in a (horizontal) direction that is transverse to the (vertical) outlet direction of the extruded plastics, being able to assume the first configuration (figure 12), wherein the first group of dose separating elements 5 is distanced (laterally) from the second group of extruder outlets (not shown and arranged for being operationally associated with the second group of dose separating elements 6), and being further able to take on the second configuration (figure 11), in which the dose separating elements of the first and of the second group have, overall, an annular arrangement and in which, moreover, the first group of dose separating elements 5 can separate the doses from the first group of extruder outlets (not shown and arranged for being operationally associated with the first group of dose separating elements). The first group of dose separating elements 5 can be movable in a linear direction (horizontal and/or arranged radially with respect to a rotation axis of the movable element 4) along sliding guides.

[0065] For each of the examples disclosed above and below, each separating device 1 can comprise, for example, a rotating carousel 9 (figure 14), for example rotating around a vertical rotation axis, that carries a plurality of movable elements 4, each of which can comprise a movable element according to any one of the examples disclosed here. The movable elements 4 can be mounted on the carousel spaced angularly (at equal distances) from one another. The carousel

9 can comprise, for example, a conveying wheel 14 to convey the closures C along a set (circular) path along which the multiple doses will be placed inside each closure C. The closures will be sent to a device (which is not shown) for compression moulding of doses to obtain the seal liner/s.

[0066] In each of the examples disclosed here, each of the dose separating elements (both of the first group, the second group, and of any further possible groups of elements) can be provided with means for expelling the dose in an expelling direction, for example downwards. In the specific cases disclosed here, these expelling means comprise, for example, an expelling member 10 (one for each dose separating element), for example in the shape of a cylinder, which is movable in the expelling direction (for example vertically) inside the respective dose separating element. The expelling means for expelling the dose can be commanded by driving means, for example of the cam type. In the specific case the device comprises driving means that is suitable for driving the dose expelling means and comprises a third annular cam path 13 that is operationally associated (in particular by a cam-following member, for example of the roller type) to the expelling means (expelling member 10).

[0067] It is observed that in the drawing in figure 3 the cam paths 7 and 8 (and 13) extend flat, although in the disclosed example these cam paths extend in a circumferal direction, for example in a circumferal direction that is coaxial to the rotation axis of the movable element 4 (in particular coaxial to the carousel 9 that carries the movable elements).

[0068] The operation of the device is clear from what has been disclosed previously. Each movable element rotates carried by the carousel 9. At each revolution of the carousel, initially the second (rear) group of dose separating elements 6 separates the doses from the second group of extruder outlets 3 (rear and upper), with the first group of dose separating elements 5 in the first (raised)

non-interference configuration. Subsequently, the first group of dose separating elements 5 lowers to separate the doses from the first group of extruder outlets 2 (front and lower). Subsequently, both the first group and the second group of dose separating elements 5 and 6 take on the third configuration (of dose deposition), in which they are (at the same height) near a conveying plane X along which the container closures slide. In figure 3 the trajectory of the first group of dose separating elements 5 has been indicated by Y and the trajectory of the second group of dose separating elements 6 has been indicated by Z. At each revolution, the movable element can deposit the doses in a circular arrangement inside a closure for containers (which is not illustrated) that slides on the conveying plane X. Depositing can be facilitated by the expelling means, in particular by the expelling members 10, that, by sliding downwards at the command of the driving means, push the doses downwards (figure 6).

[0069] The extruding means can comprise, as for example in the embodiment illustrated in figures 16 and 17, a first extruder 15 that can have a first flow of plastics operationally associated with a first group of extruder outlets 2 (for the sake of simplicity, for similar elements, the same numbering as used before has been left) and a second extruder 16 that can have a second flow of plastics, distinct from the first flow of plastics, operationally associated with a second group of extruder outlets 3.

[0070] In one embodiment, for example like the one illustrated in figures 16 and 17, a second group of dose separating elements 6 (also in this case, for the sake of simplicity, for similar elements, the same numbering as used before has been left) can comprise a second annular arrangement (for example circular) of elements and a first group of dose separating elements 5 can comprise a first arrangement of elements that can be arranged inside and surrounded by the second annular arrangement of elements. The

second arrangement of elements can comprise three of more elements arranged, for example, circumferally. The first arrangement of elements could be arranged concentrically with respect to the second circular arrangement (for example inside or outside the arrangement). In the specific case illustrated here, the second group of dose separating elements 6 (external group) comprises a plurality of (ten) elements (with circular arrangement) and the first group of dose separating elements 5 (internal group) comprises a single element (arranged inside the second group of elements).

[0071] The extruder outlets 3 of the second group (associated with the second extruder 16 of a second plastic material) will thus be ten (for example aligned), whilst the first group of extruder outlets 2 (associated with the first extruder 16 of a first plastic material that is optionally different from the second plastic material) will comprise a single extruder outlet 2 (in the specific case bigger than each of the outlets 3).

[0072] The first group of dose separating elements 5 can be, in this example, movable on the movable element that carries the separating elements in a movement direction, for example parallel to the (vertical) axis of concentricity of the first and second circular arrangement of elements. The second group of dose separating elements 6 can be, in this example, movable on the movable element in a movement direction, for example, parallel to the (vertical) movement direction of the first group of dose separating elements 5. The movable element can thus have at least three operating configurations in which: (i) the second group of dose separating elements 6 (external group) is arranged below with respect to the first group of dose separating elements 5 (internal group) to be able to separate the doses of plastic D from the extruder outlets 3 of the second extruder 16 (to the right in figure 16), without there being an interference of the first group of dose separating elements 5; (ii) the

first group of dose separating elements 5 (internal group) is arranged below the second group of dose separating elements 6 (external group) in order to be able to separate the doses of plastic D from the group of extruder outlets 2 of the first extruder 15 formed by a single outlet (in the centre in figure 16); and (iii) the first group of dose separating elements 5 and the second group of dose separating elements 6 are arranged substantially at the same height to be able to place the doses of plastic D inside a closure C (to the left in figure 16).

[0073] The closure C will then be sent to the step where the liner/s are formed, for example by compression of the doses D, to obtain the closure C, illustrated in figure 18, having a first external liner 17, for example annular (in the form of a circular crown), and a second internal liner 18, for example full (circular). The two liners 17 and 18 can be made of plastic materials having at least one chemical-physical feature different from one another.

[0074] The extruding means illustrated in figure 19 to 22 comprises a plurality of extruder outlets, for example of the second group of extruder outlets 3, in which one or more of the extruder outlets each comprises flow adjusting means of the flow of plastics that leaves the respective extrusion outlet. Such flow adjusting means can comprise, for example, an adjusting member 19 arranged in the plastics flow path and movable transversely to the flow direction to increase or decrease selectively the passage section of the material. The position of each adjusting member 19 can be varied by driving means, for example of manual type. Such driving means can comprise a screw coupling to enable the adjusting member 19 to move axially. The latter can be fixed in position by a locking member 20 (for example of the screw type). In the specific case all the extruder outlets are provided with flow adjusting means but the last outlet (figure 22), i.e. the outlet that is farther from the supply of the flow of plastics, which can be left, for example, always completely

open, so the other outlets are regulated in function of the latter. It is possible to provide other examples, which are not illustrated, in which the flow adjusting means is associated with all the extruder outlets, or in which the flow adjusting means is not set up on one or more extruder outlets that is different by the latter.

[0075] The extruding means in figure 19 comprises a plurality of extruder outlets arranged aligned on one another. The rectilinear arrangement of extruder outlets can be applied, in a specific but not exclusive manner, to a movable element (such as, for example, the one in figure 11-13) comprising a first part of movable element that is movable laterally with respect to a second part of movable element, in which said lateral movement can be in a (horizontal) direction that has at least one radial component with respect to the rotation axis of the rotating support (carousel) supporting and moving the movable element.

[0076] The aforesaid flow adjusting means for adjusting the extrusion flow can be operationally associated with both the extruder outlets 2, and the extrusion outlets 3.

[0077] In an example that is not shown, the separating device can comprise at least a third group of dose separating elements carried by the movable element and arranged to separate, at each revolution of the movable element, doses of plastics from at least a third group of extruder outlets of the extruding means.

[0078] For each of the examples disclosed here, the separating device can comprise, for example, a first and a second group of extrusion outlets in which the extrusion outlets are arranged with an upward (vertical) outlet direction of the plastics. Nevertheless, it is possible to provide extruding means with different outlet directions of the extruded material, for example (vertical) downwards, horizontally, obliquely.

[0079] In each of the examples disclosed here, each of the dose separating elements (of the first, of the second and of

possible further groups of elements) can be opened below to release the dose in a (vertical) expelling direction downwards and can further be conformed into a forwardly facing concave shape, with reference to the advancing direction F. In particular, each of the dose separating elements has a U-shaped cross section with the forwardly facing concave shape. It is nevertheless possible to provide dose separating elements having other conformations.

[0080] Each of the movable elements disclosed here has a first group of dose separating elements that comprises a first horizontal arrangement of elements, in which this first horizontal arrangement is movable on the movable element (for example in a vertical or horizontal direction). It is nevertheless possible to provide other arrangements (vertical, oblique, or a combination thereof) and/or different movement directions that are suitable for enabling the doses to be separated from the extruding means.

[0081] Each of the movable elements disclosed here has a second group of dose separating elements that comprises a second horizontal arrangement of elements, in which this second horizontal arrangement is movable on the movable element in a direction (for example in a vertical direction). Also in this case it will be possible to provide other arrangements (vertical, oblique, or a combination of them) and different movement directions of the second group of dose separating elements, that are nevertheless suitable for separating the doses from the extruding means.

CLAIMS

1. Device comprising:
   - extruding means for extruding plastics having a first group of extruder outlets (2) and a second group of extruder outlets (3);
   - a movable element (4) that is movable in an advancing direction (F) along a closed loop path arranged in such a manner as to pass, at each revolution, opposite said extruding means;
   - at least one first group of dose separating elements (5) carried by said movable element to separate, at each revolution of the movable element, at least one dose of plastics from said first group of extruder outlets (2);
   - at least one second group of dose separating elements (6) carried by said movable element to separate, at each revolution of the movable element, at least one dose of plastics from said second group of extruder outlets (3);

characterized in that said first group of dose separating elements (5) is movable on said movable element (4), with respect to said second group of dose separating elements (6), in such a manner as to take on at least a first configuration, in which said first group of dose separating elements is free from interference, during the movement of said movable element along said path, with said second group of extruder outlets or with the plastics that exit therefrom, and a second configuration, in which said first group of dose separating elements could interfere at each revolution of the movable element with said second group of extruder outlets or with the plastics that exit therefrom, the device comprising driving means to prevent this interference taking selectively said first group of dose separating elements to said first configuration and to said second configuration,

respectively, before and after the passage, at each revolution of the movable element, of said first group of dose separating elements (5) at said second group of extruder outlets (3).

2. Device according to claim 1, wherein:
   - said first group of dose separating elements (5) is arranged after said second group of dose separating elements (6), with reference to said advancing direction (F);
   - said first group of dose separating elements (5) is movable on said movable element (4) in a first direction that is transverse to said advancing direction (F).

3. Device according to claim 1 or 2, wherein said first group of dose separating elements (5) leaves free, in said second configuration, a space arranged, with reference to said advancing direction (F), in front of said second group of dose separating elements (6).

4. Device according to any preceding claim, wherein the dose separating elements of said first and second groups are arranged on said movable element so as to take on at least one annular arrangement to enable the doses to be expelled in a corresponding annular arrangement.

5. Device according to any preceding claim, wherein:
   - said first and second group of extrusion outlets are arranged such that said first group of dose separating elements (5) is, in said first configuration, farther from said first group of extruder outlets (2) than from said second group of extruder outlets (3);
   - the dose separating elements of said first and second groups (5; 6) have overall, in both said first and second configurations, an annular arrangement around an axis that is transverse to said advancing direction (F).

6. Device according to any preceding claim, wherein said

second group of dose separating elements (6) is movable on said movable element (6) such that said first and second groups of dose separating elements (5; 6) can take on a third configuration wherein they have overall an arrangement that is suitable for expelling the doses located at the same vertical height.

7. Device according to any preceding claim, wherein said driving means comprises cam driving means having at least a first annular cam path (7) operationally associated with said first group of dose separating elements and at least a second annular cam path (8) operationally associated with said second group of dose separating elements.

8. Device according to any preceding claim, wherein said first group of dose separating elements (5) comprises a first semicircular arrangement of elements and wherein said second group of dose separating elements (6) comprises a second semicircular arrangement of elements located behind the first, with reference to said advancing direction (F).

9. Device according to any preceding claim, wherein:

- said first and second group of extruder outlets (2; 3) have an outlet direction of the extruded plastics that is transverse to said advancing direction (F);
- said first group of dose separating elements (5) is movable on said movable element (4) in a direction that is transverse to said outlet direction taking on said first configuration, in which said first group of dose separating elements (5) is far from said second group of extruder outlets (3), and said second configuration, in which the dose separating elements of said first and second group (5; 6) overall have an annular arrangement.

10. Device according to any preceding claim, wherein said extruding means comprises a first extruder (15) having a

first flow of plastics operationally associated with said first group of extruder outlets (2) and a second extruder (16) having a second flow of plastics, distinct from the first, operationally associated with said second group of extruder outlets (3).

11. Device according to any preceding claim, comprising at least a third group of dose separating elements carried by said movable element to separate, at each revolution of the movable element, at least one dose of plastics from at least a third group of extruder outlets of said extruding means.

12. Device according to any preceding claim, comprising flow adjusting means (19) for adjusting the flow of extruded plastics operationally associated with one or more of the extruder outlets of said first group of extruder outlets (2) and/or with one or more of the extruder outlets of said second group of extruder outlets (3).

13. Device according to any preceding claim, wherein said second group of dose separating elements comprises a second annular arrangement of elements and wherein said first group of dose separating elements comprises a first arrangement of elements arranged inside said second circular arrangement, said first group of dose separating elements being movable on said movable element in a direction parallel to an axis of said second circular arrangement of elements.

14. Device according to claim 13, wherein said second annular arrangement of elements is circular, and wherein said first arrangement of elements is arranged concentrically with respect to said second circular arrangement of elements.

15. Device according to any preceding claim, comprising a carousel (9) rotating with a vertical axis that carries a plurality of movable elements (4), each like said movable element, spaced angularly apart from one another; for each movable element (4), said first group

of dose separating elements (5) comprises a horizontal arrangement of elements that is movable on said movable element in a vertical direction; for each movable element, said second group of dose separating elements (6) comprises a horizontal arrangement of elements that is movable on said movable element in a vertical direction; said first and second groups of extrusion outlets (2; 3) comprise outlets arranged with outlet direction of the plastics that is vertical upwards; for each movable element (4), said first and second groups of dose separating elements (5; 6) comprise separating elements which are each opened below to release the dose downwards in vertical expulsion direction and have a forwardly facing concave shape, with reference to said advancing direction (F); for each movable element (4), said first and second groups of dose separating elements (5; 6) comprise separating elements that are each provided with means for expelling the dose downwards, said means for expelling comprising an expelling member (10) that is movable vertically inside the respective separating element.

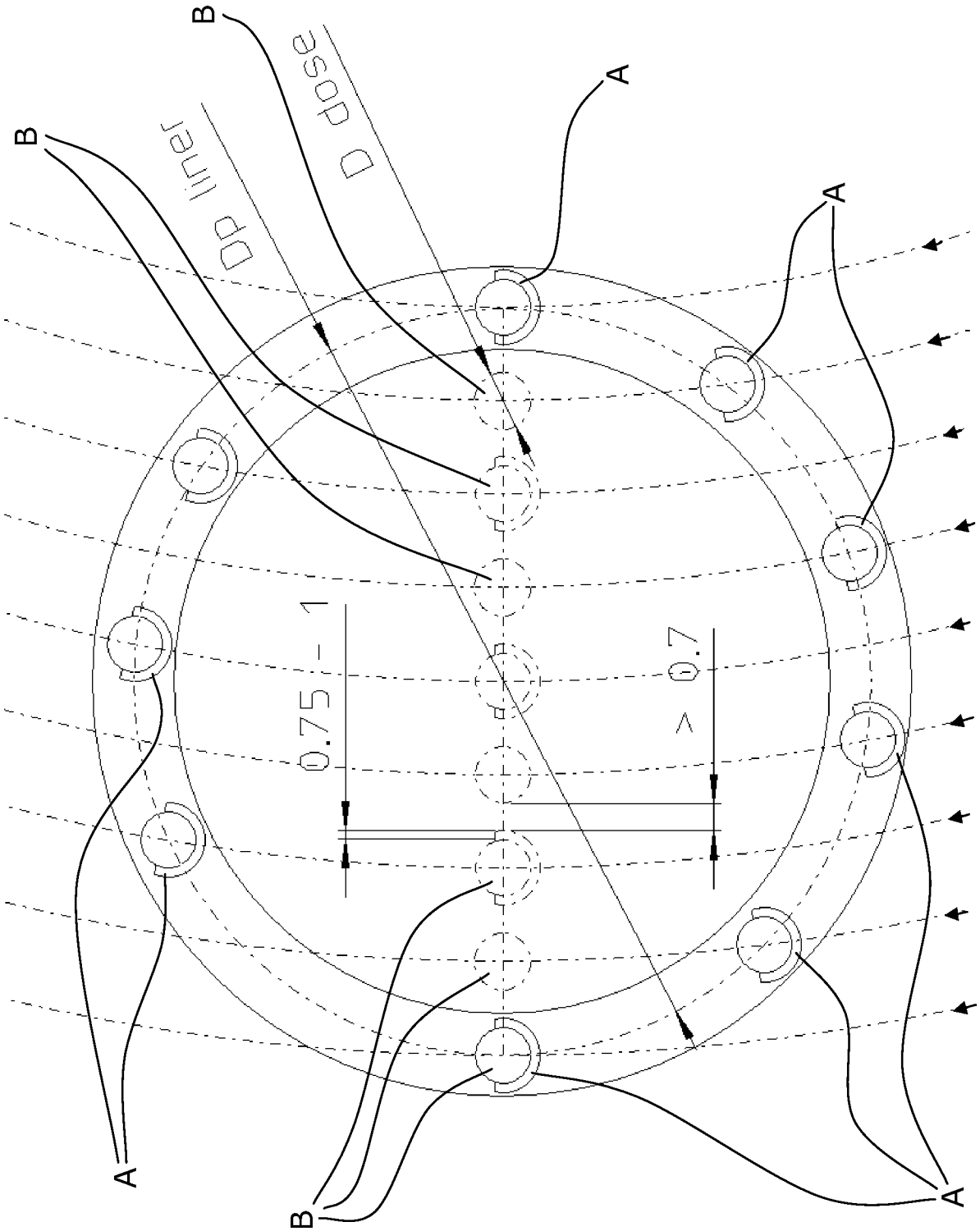


Fig. 1

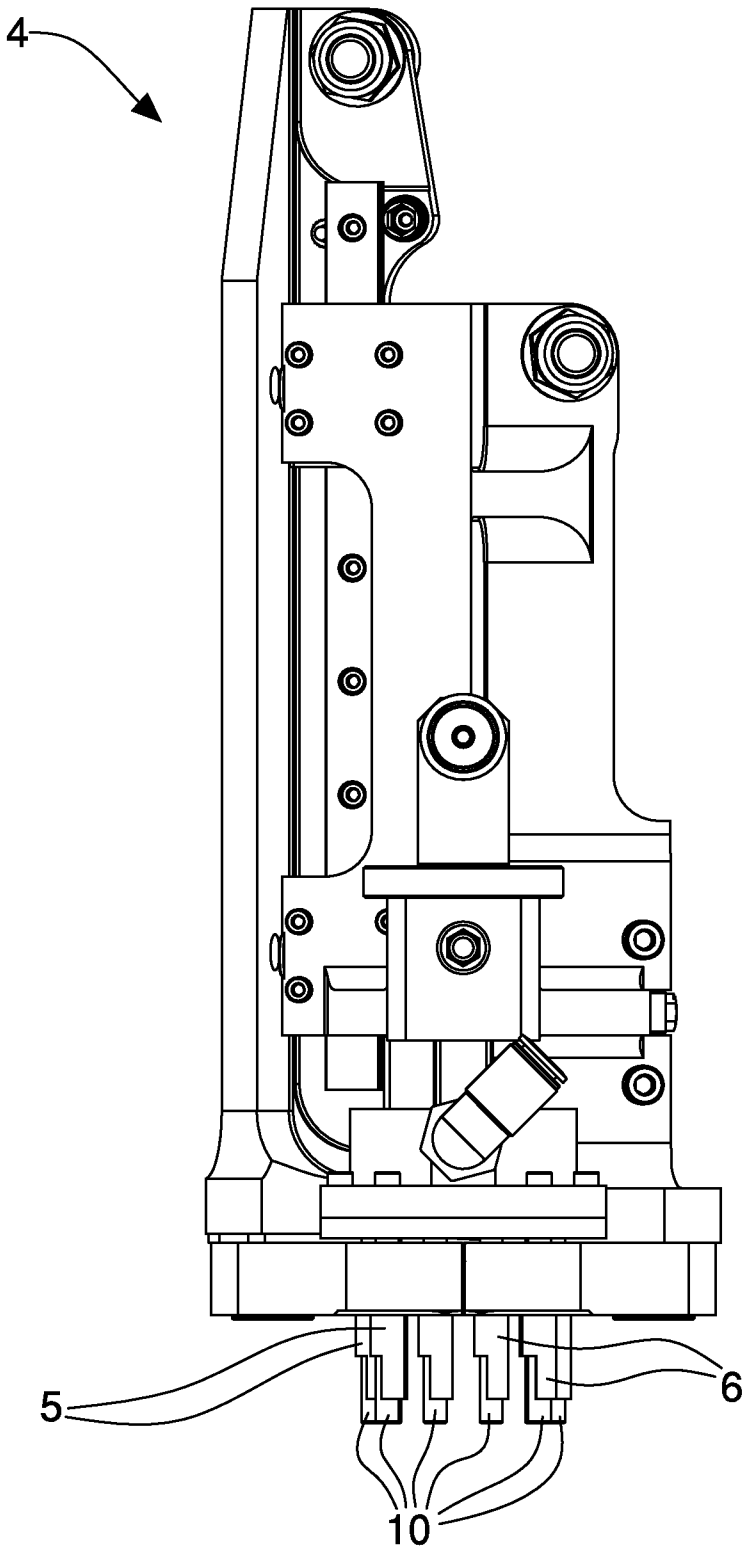


Fig. 2

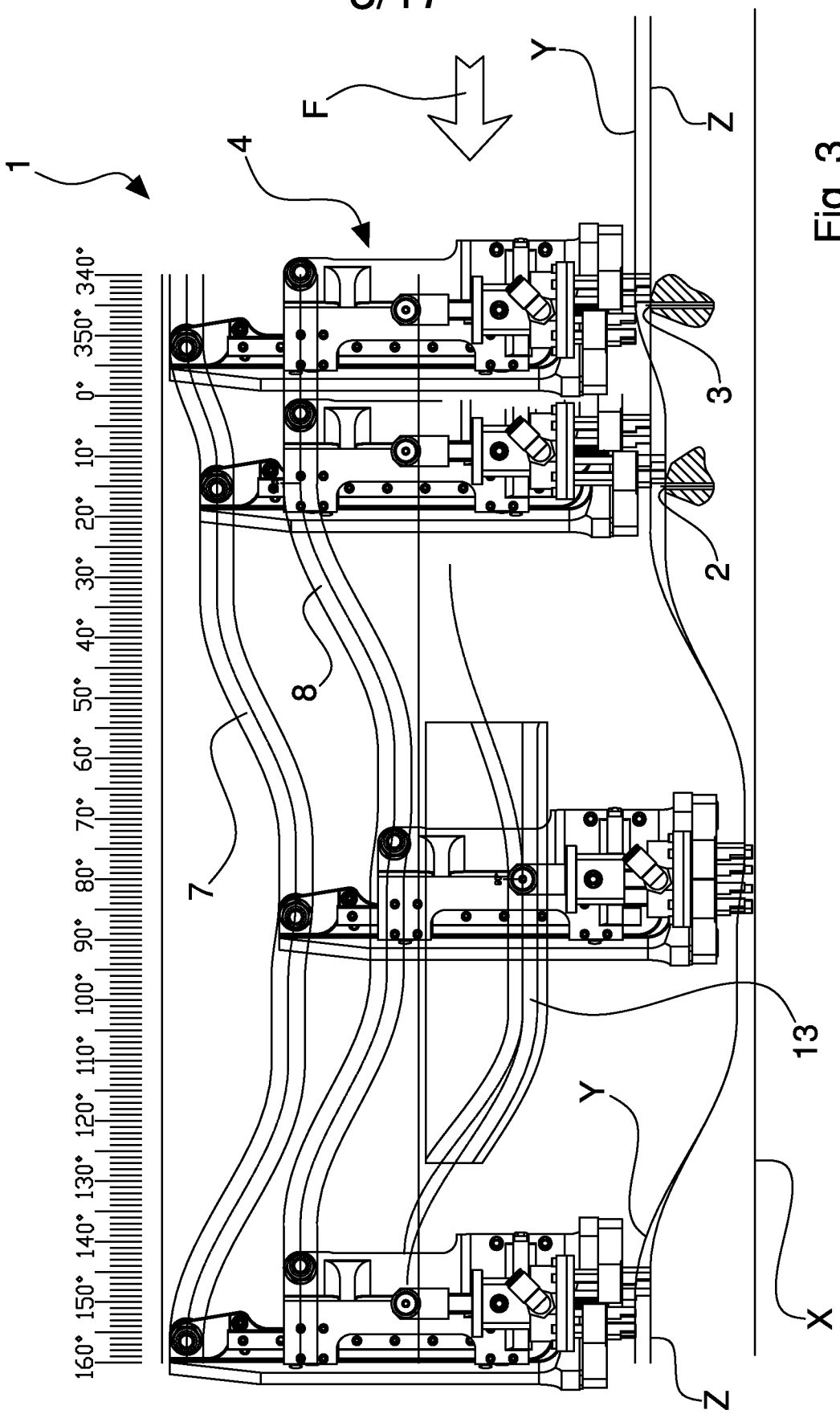

1
4
F
Y
Z
3
2
8
7
13
Y
X
Z
160° 150° 140° 130° 120° 110° 100° 90° 80° 70° 60° 50° 40° 30° 20° 10° 0° 350° 340°

Fig. 3

Fig. 5

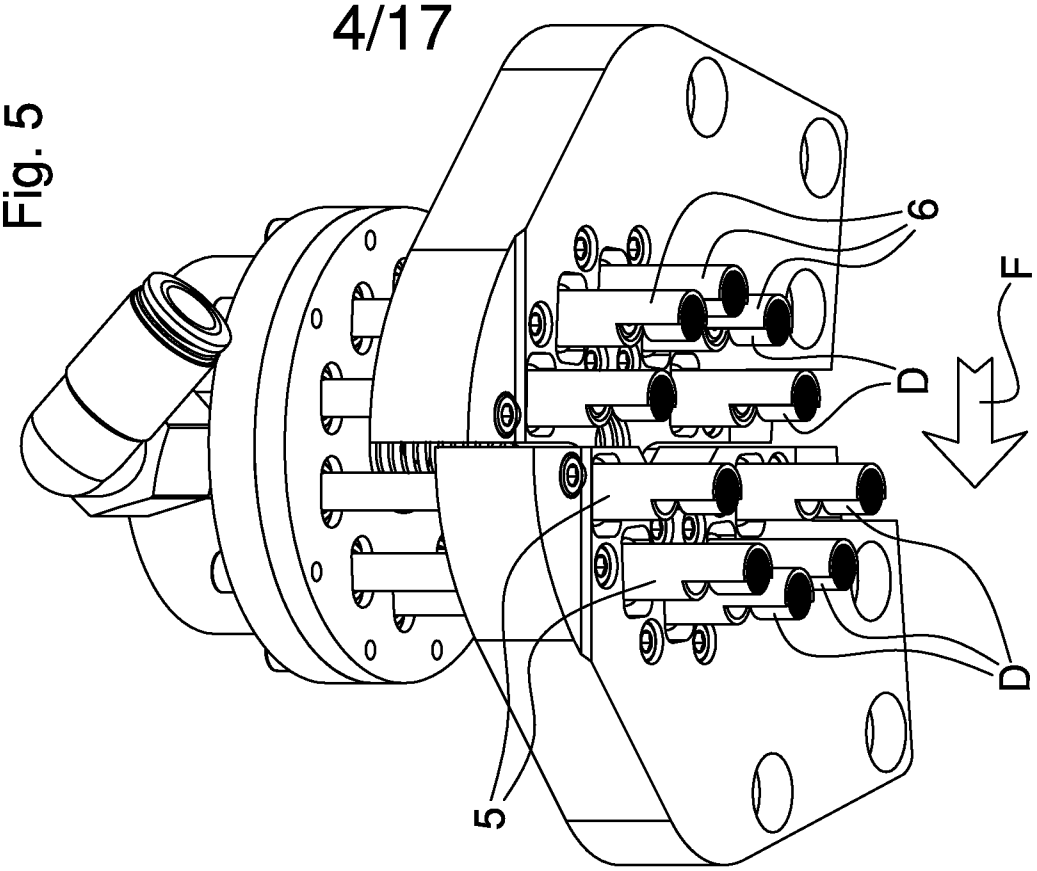
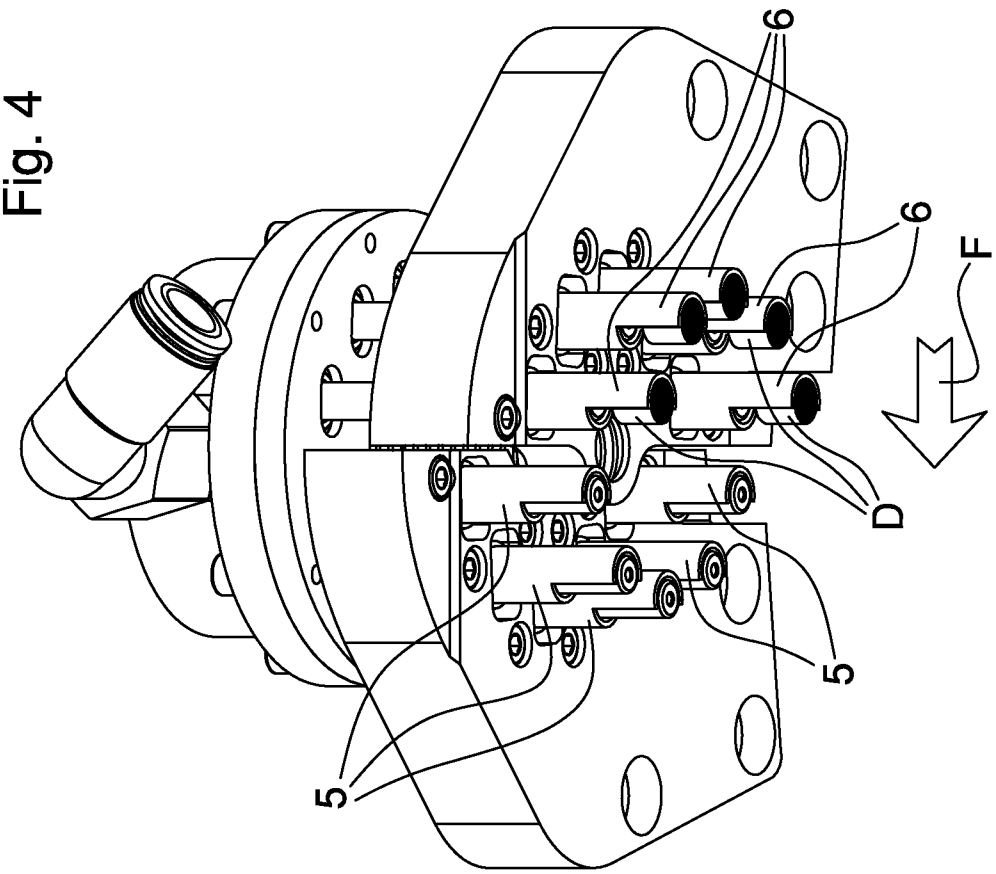


Fig. 4



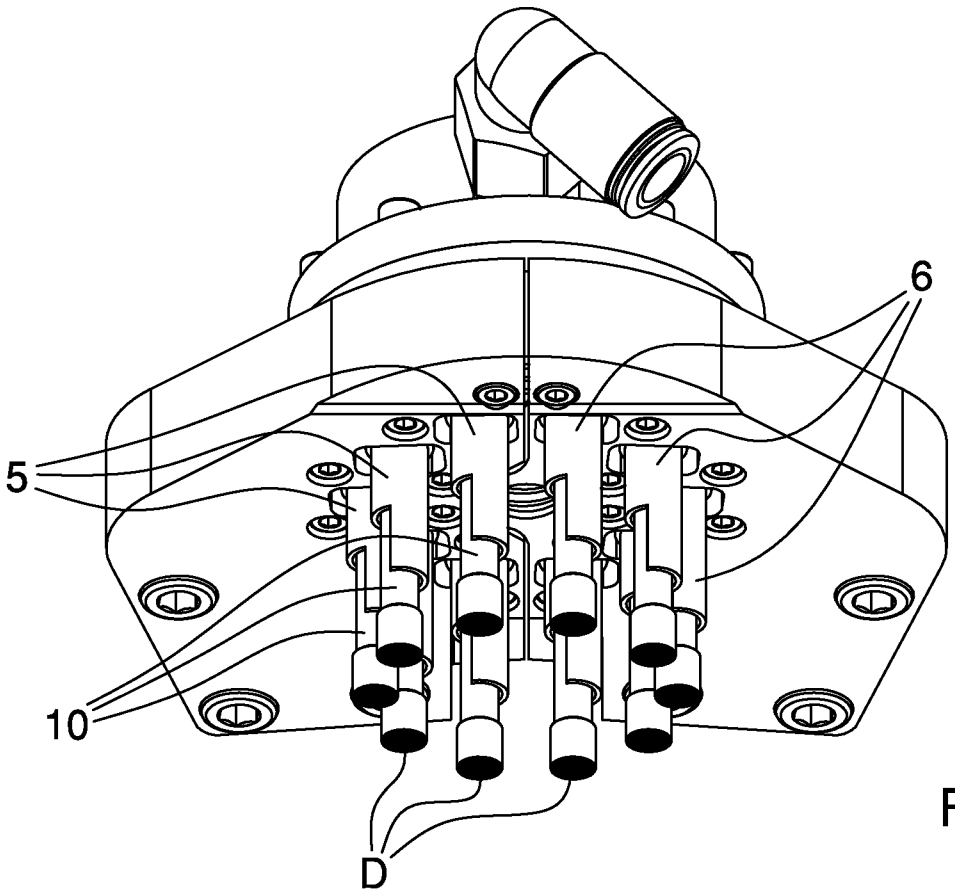


Fig. 6

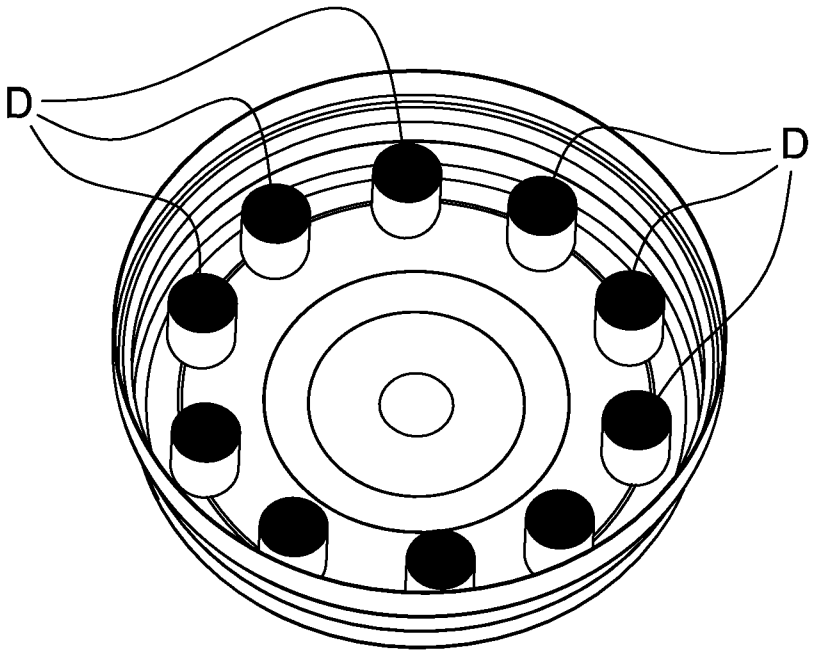


Fig. 7

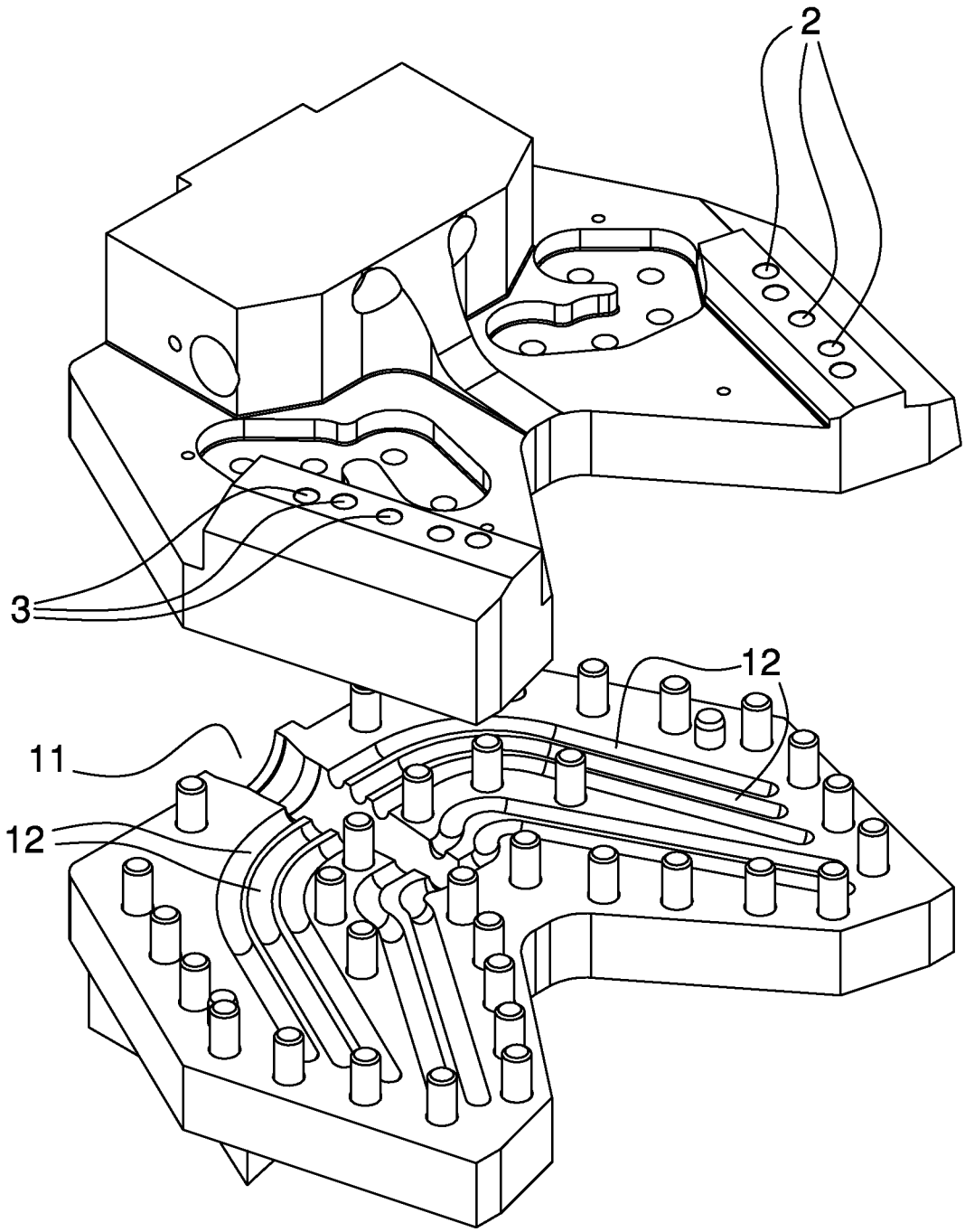


Fig. 8

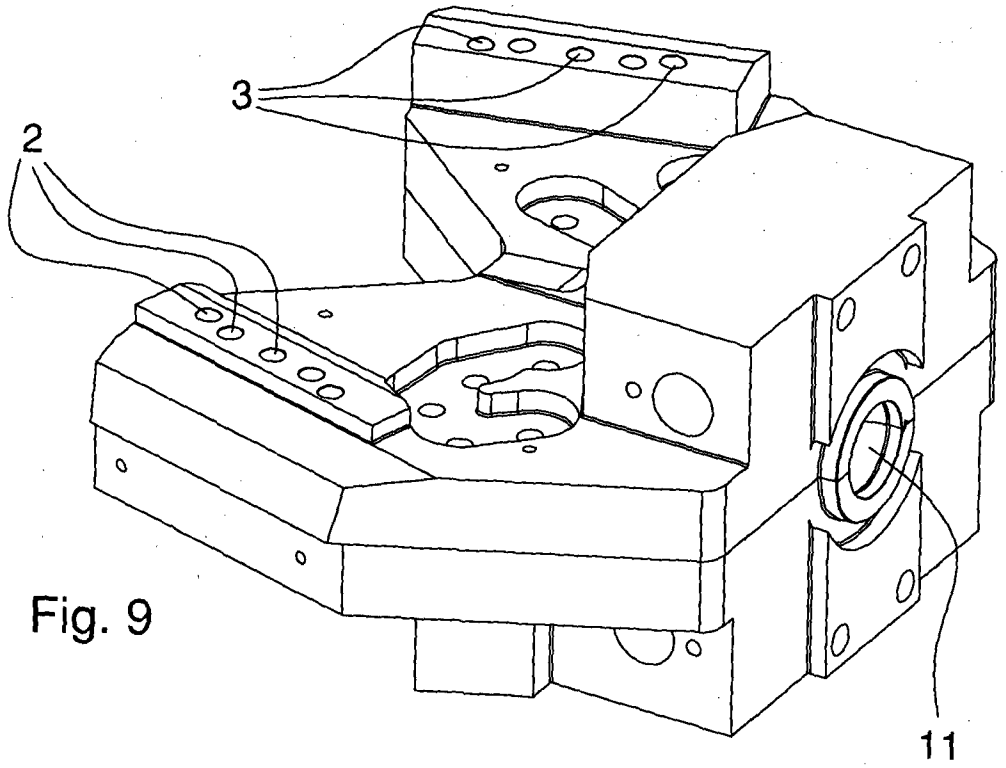


Fig. 9

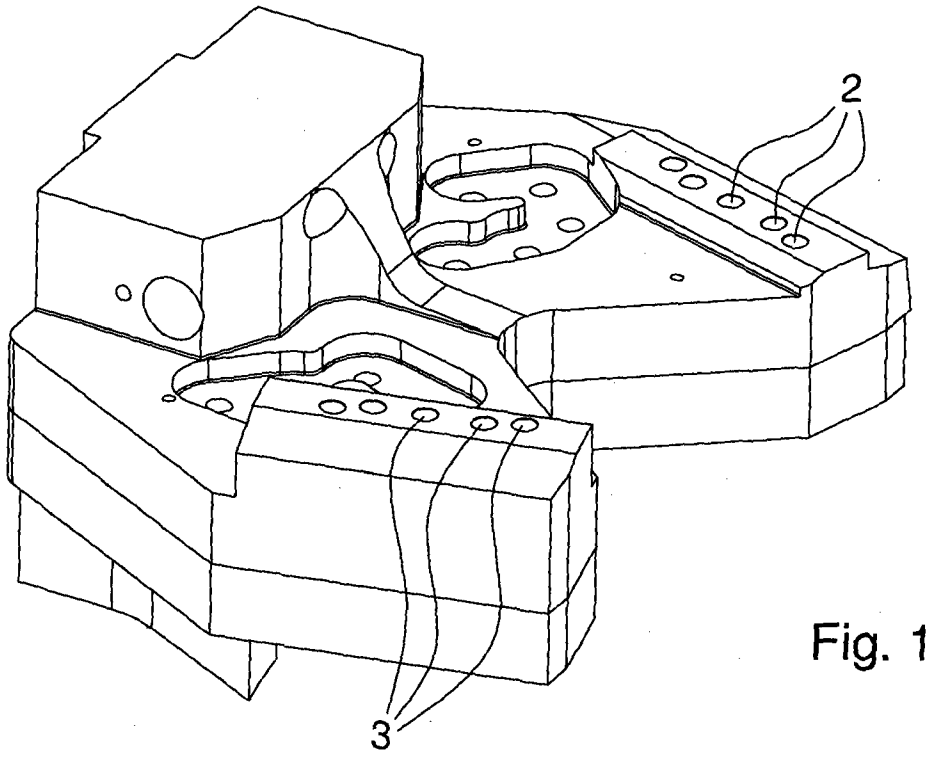


Fig. 10

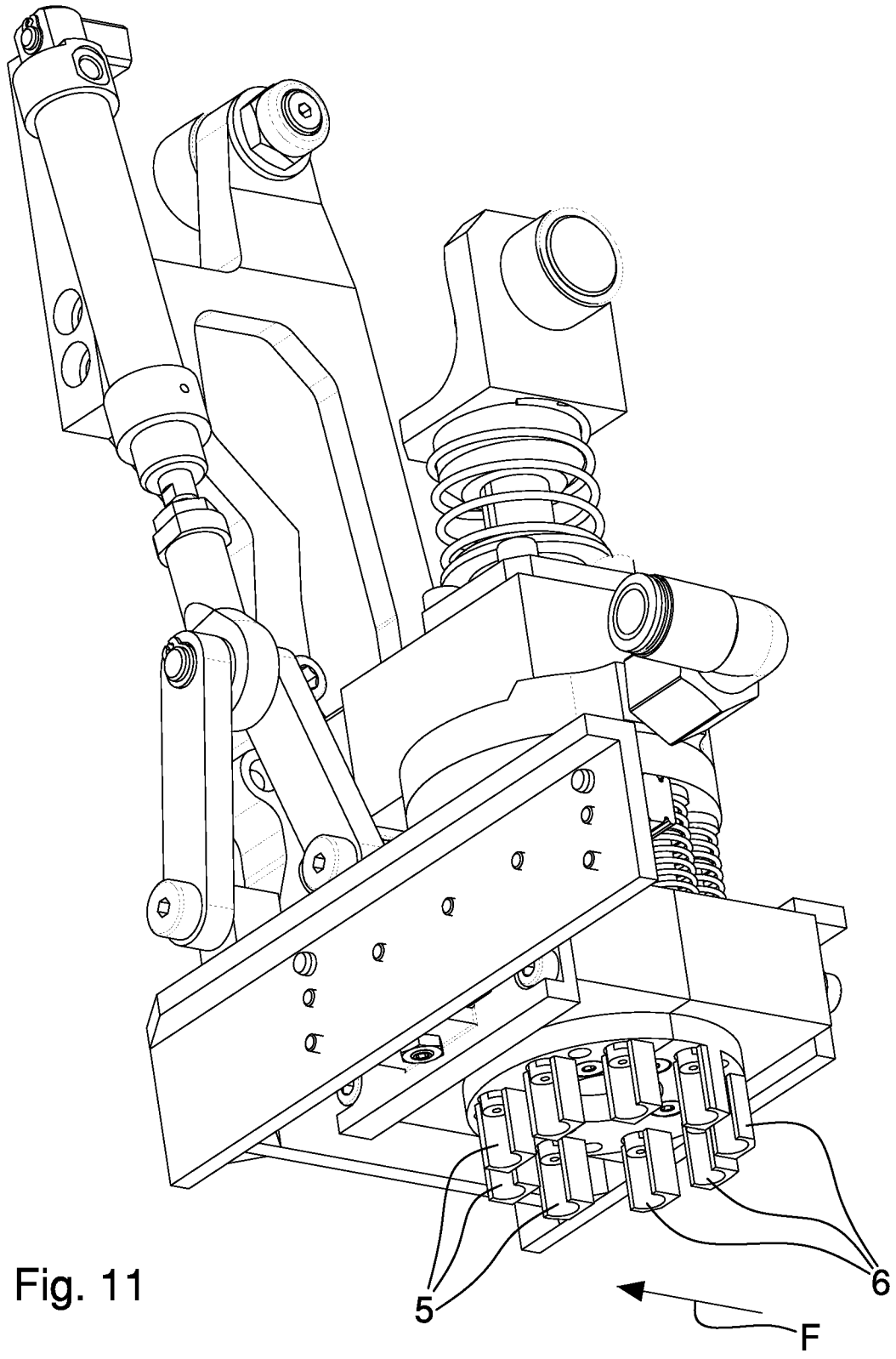


Fig. 11

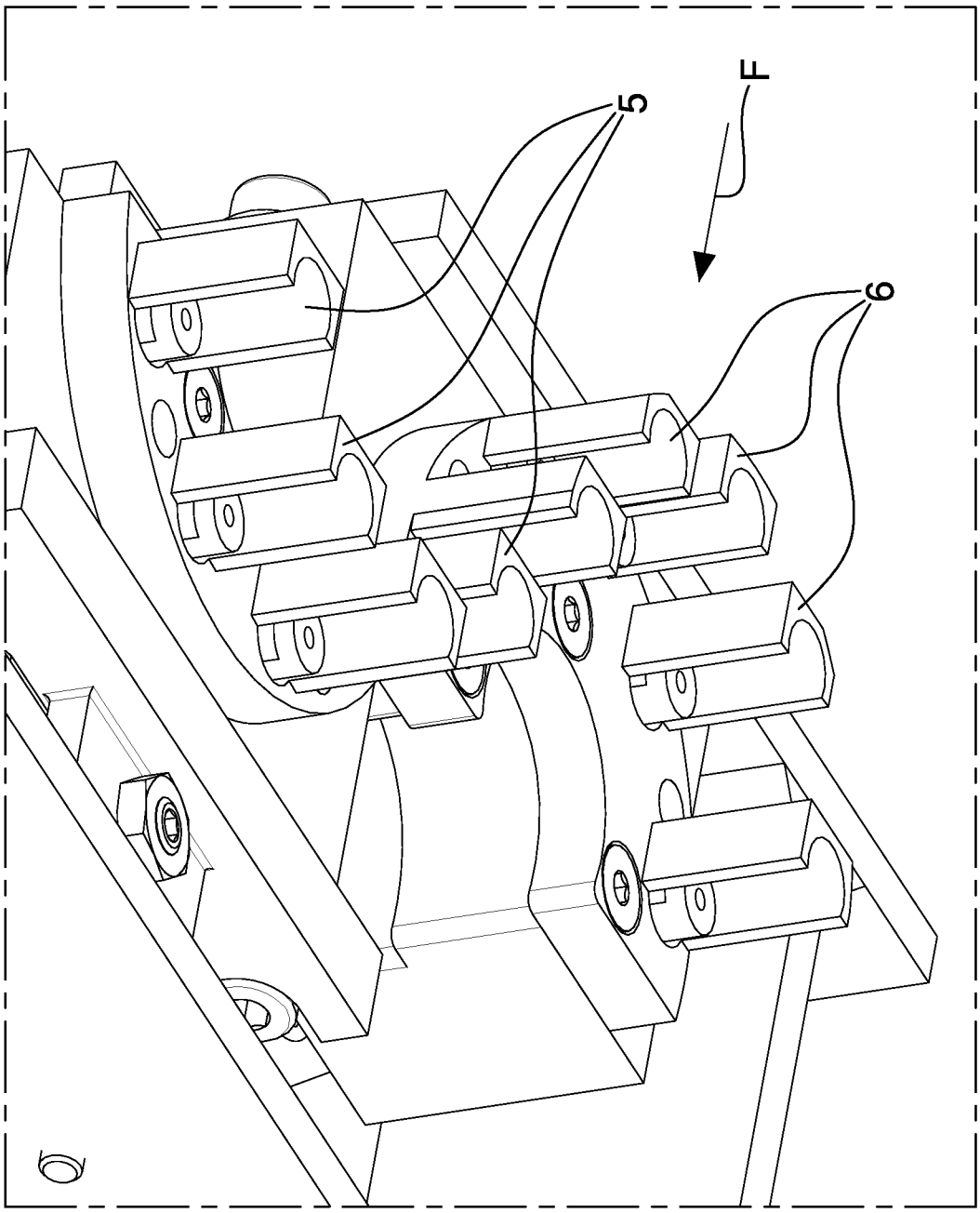


Fig. 12

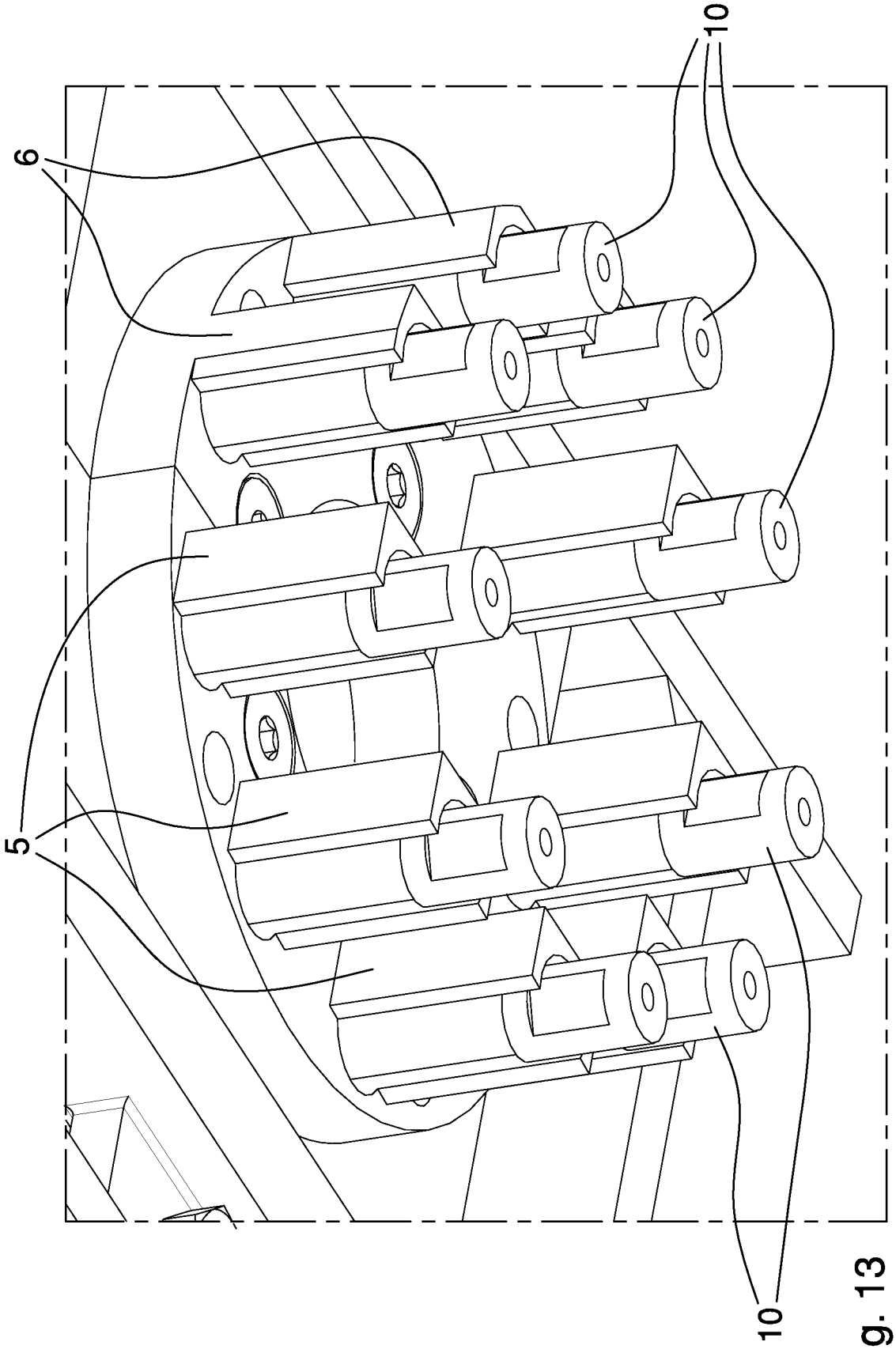


Fig. 13

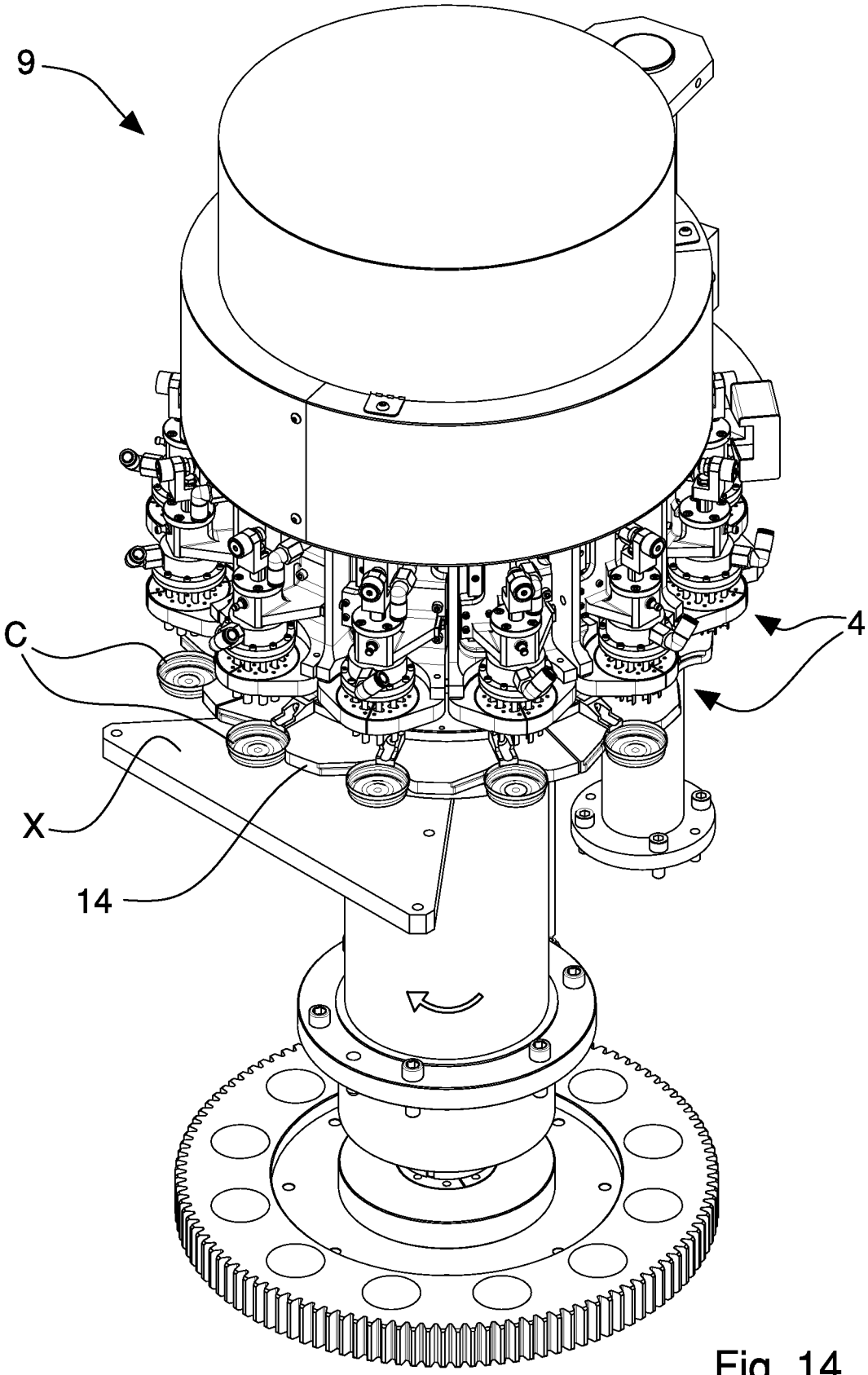


Fig. 14

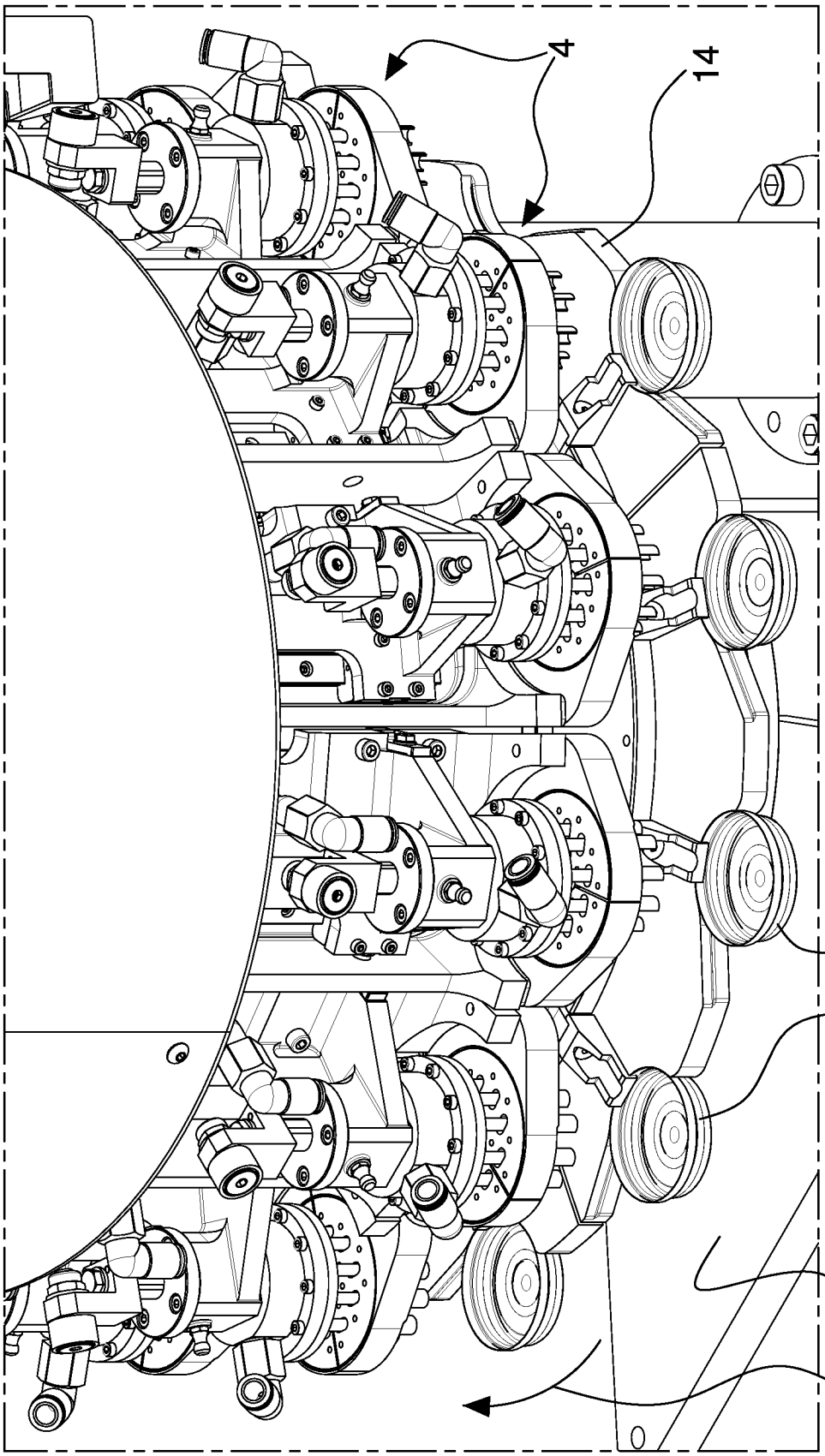


Fig. 15

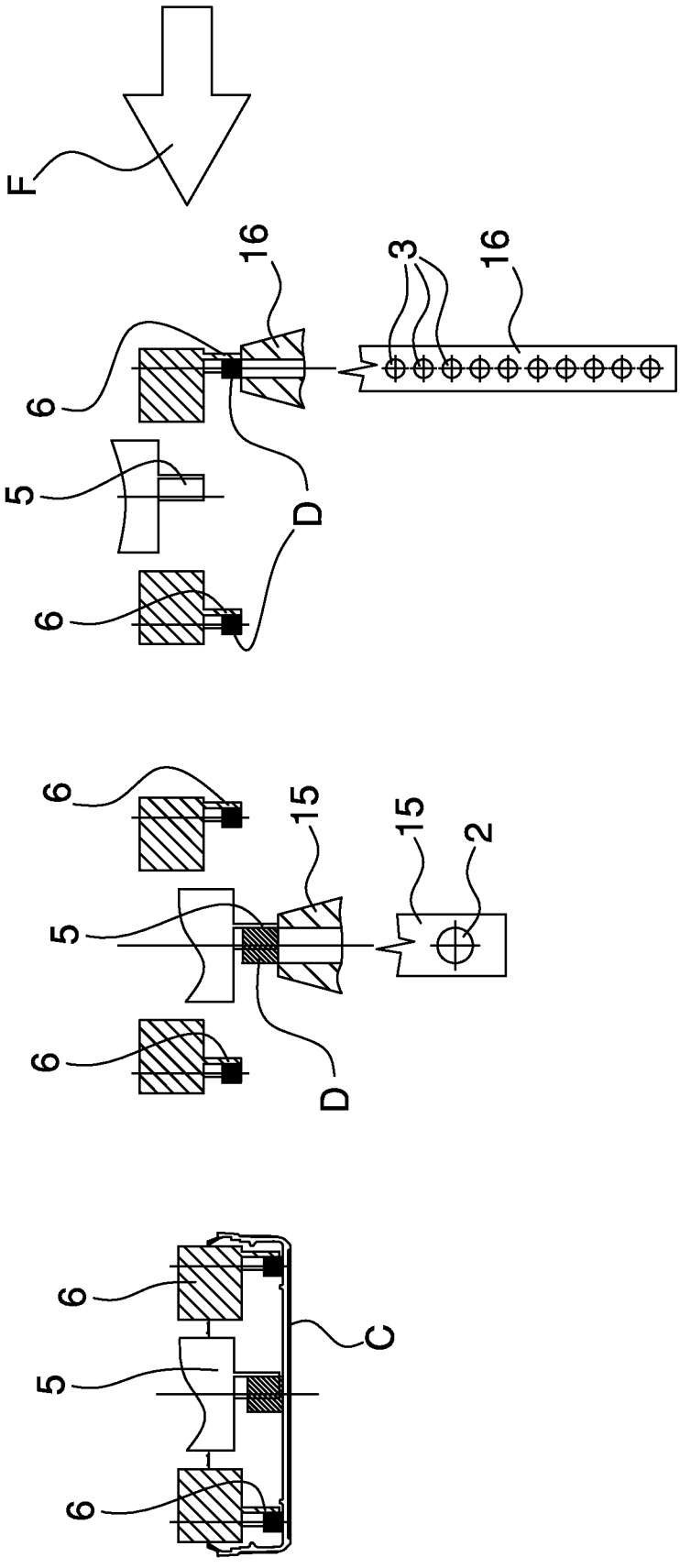


Fig. 16

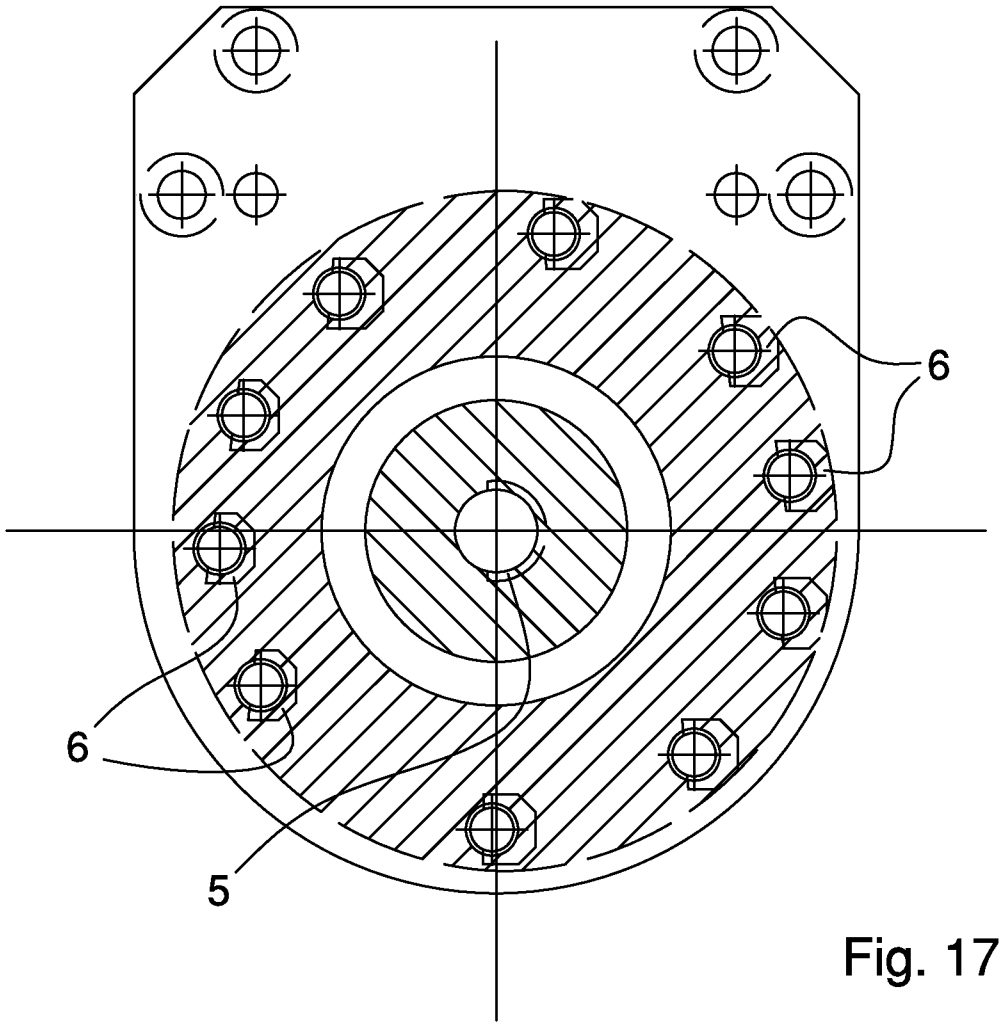


Fig. 17

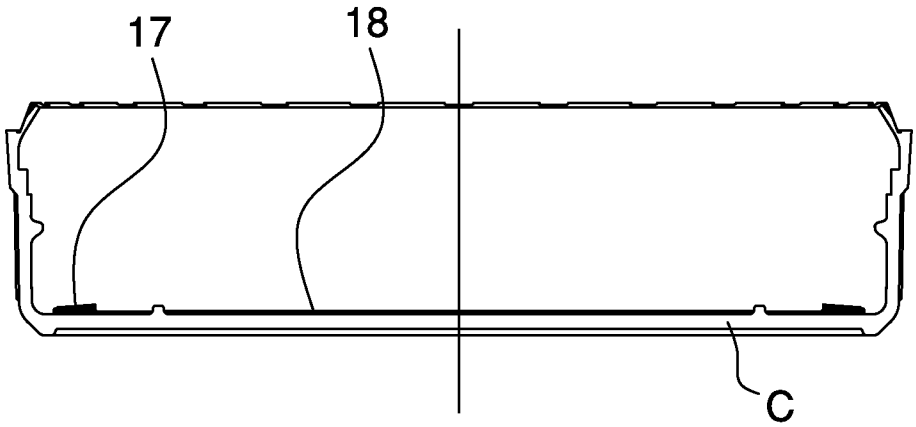
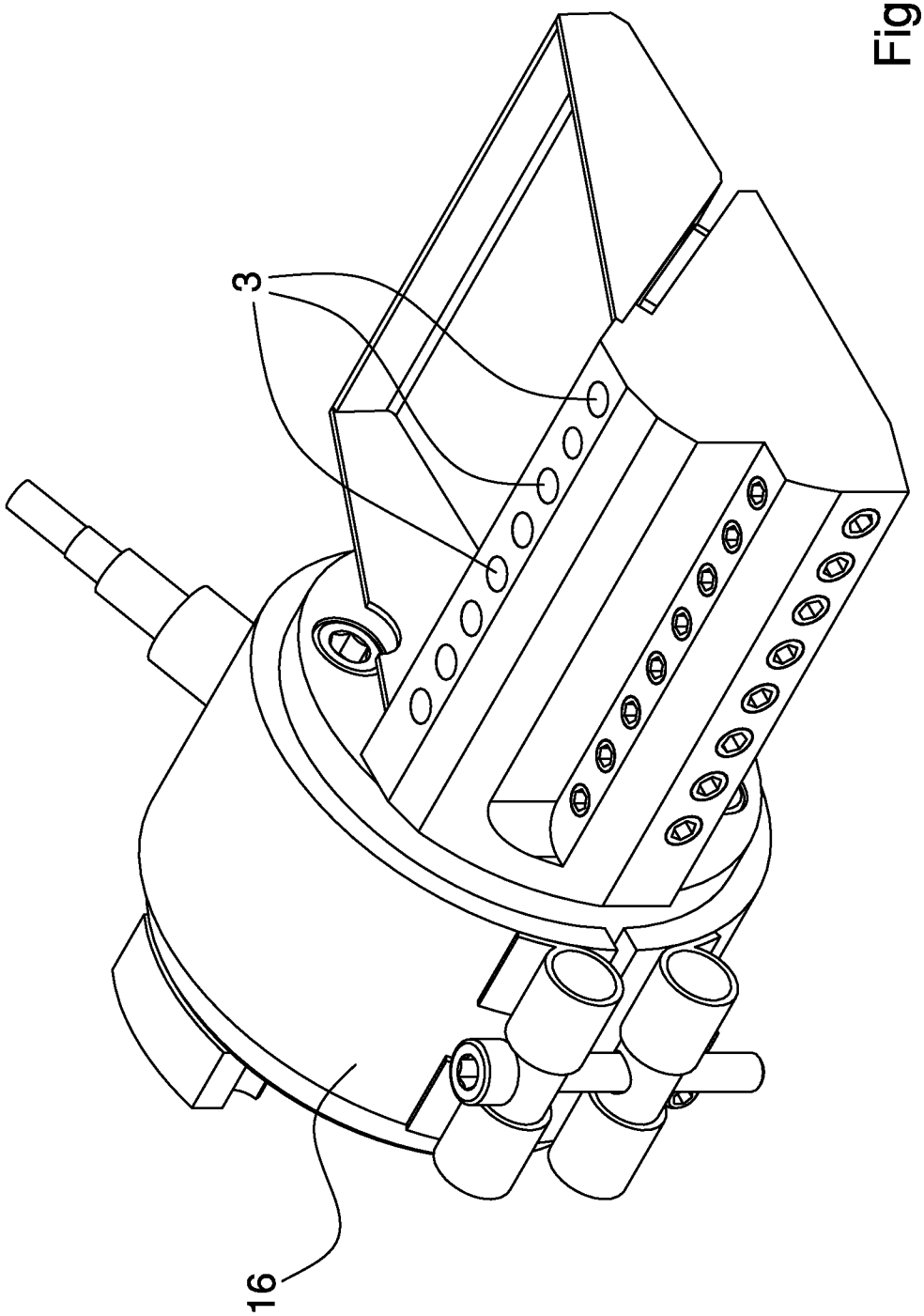


Fig. 18

Fig. 19



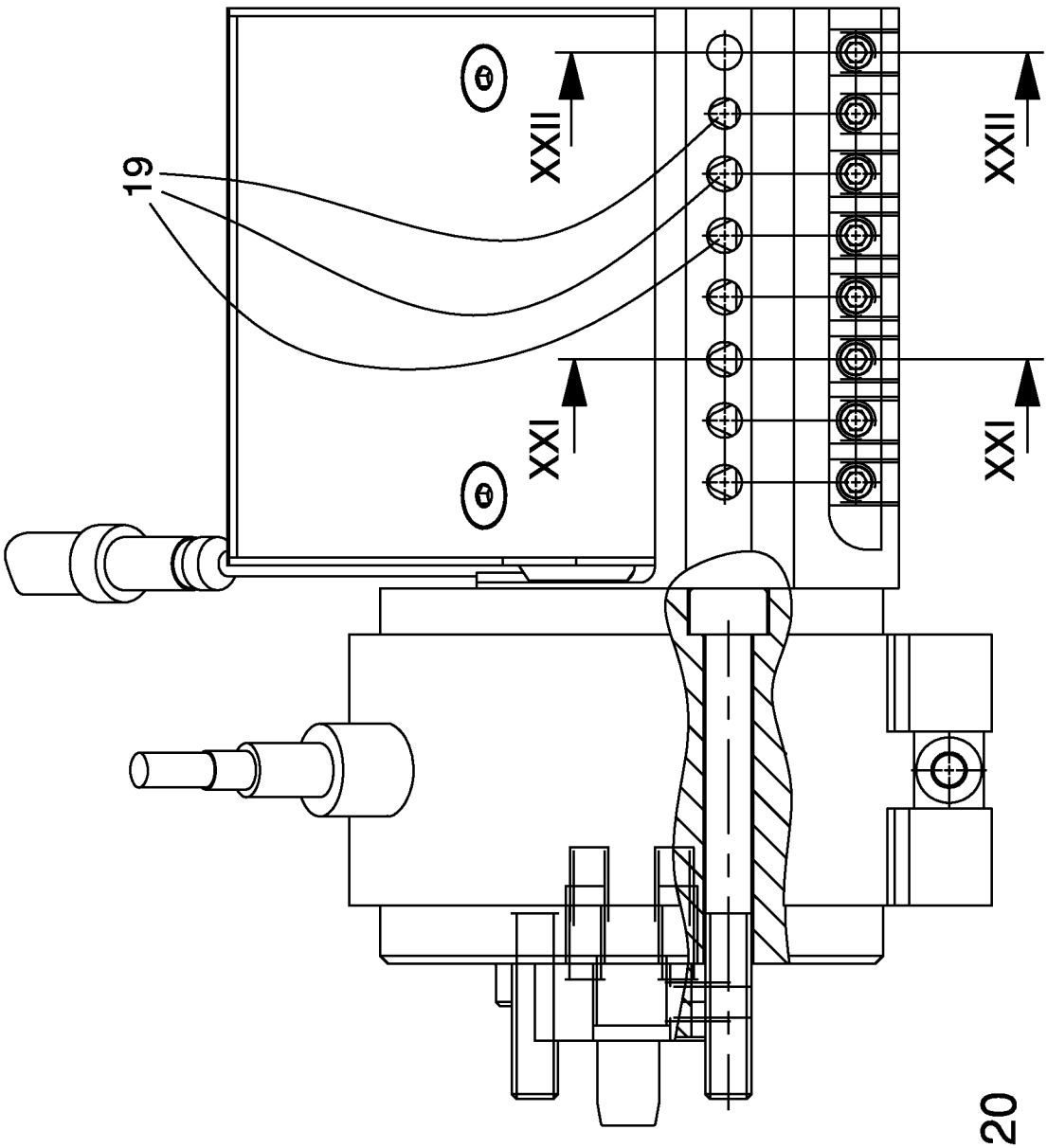


Fig. 20

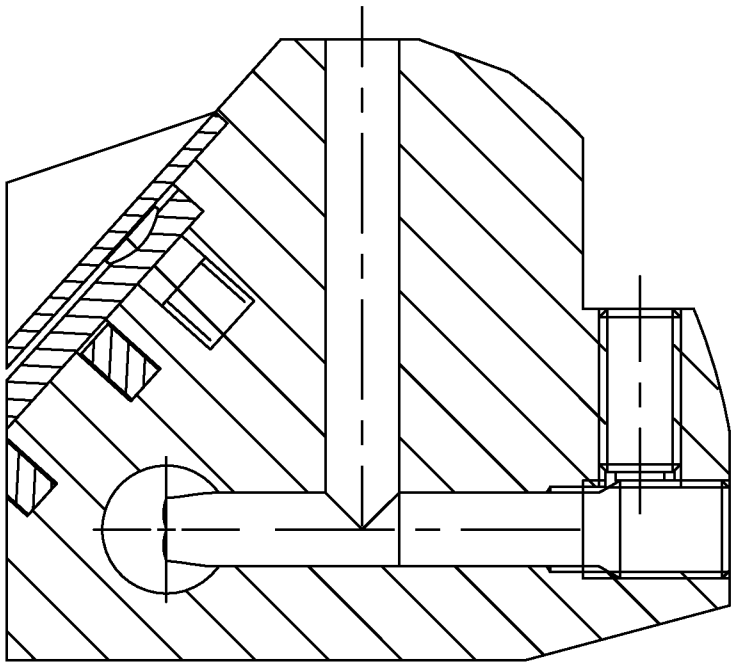


Fig. 22

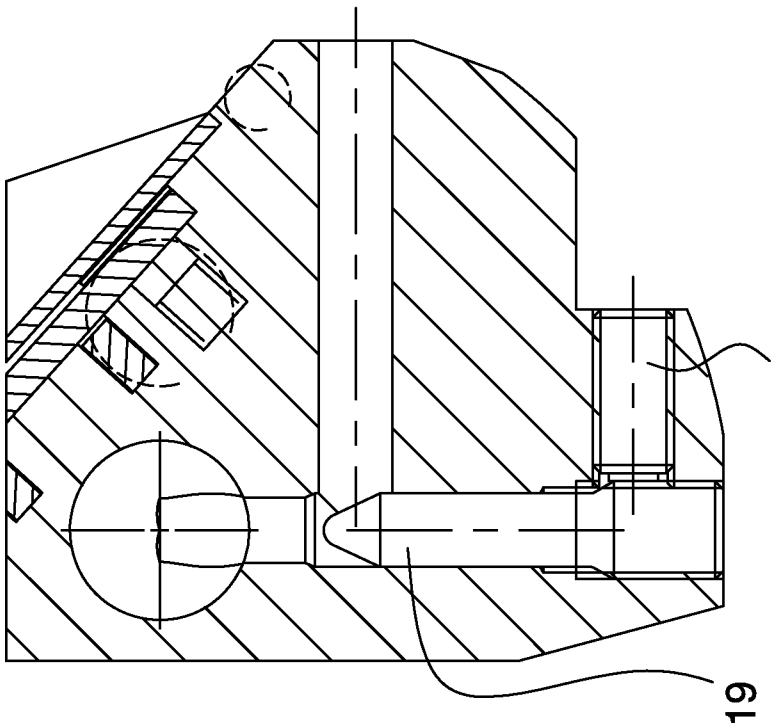


Fig. 21