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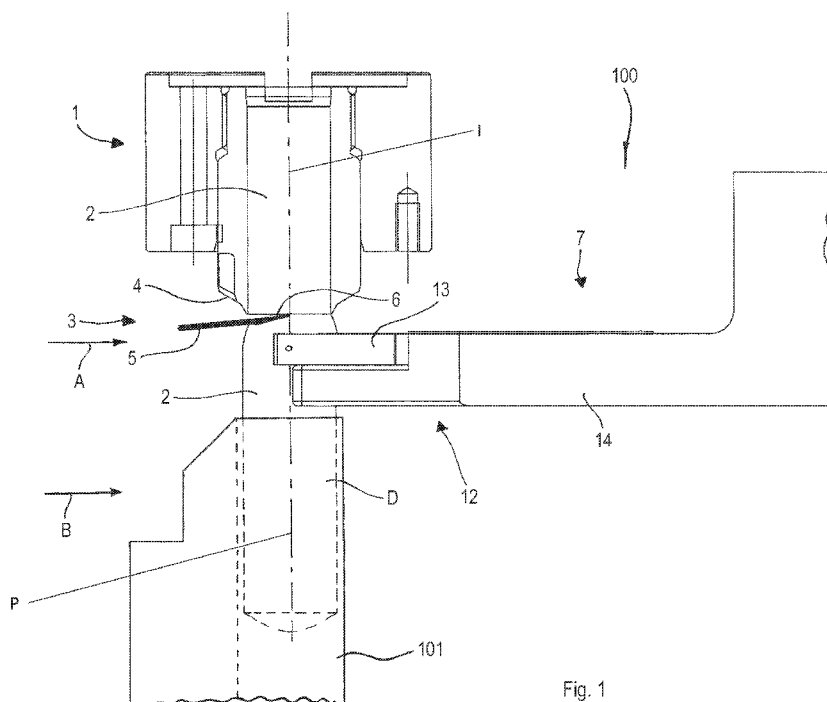


Fig. 1

(57) Abstract: An apparatus for obtaining doses of plastics in a pasty state comprises a dispensing device (1) for dispensing plastics (2), cutting means (3) for cutting said plastics (2) to obtain a dose (D) and contrasting means (7; 107; 207; 307) opposite said cutting means (3) for restingly receiving said plastics (2) during and after cutting, said contrasting means (7; 107; 207; 307) comprising a first contrasting element (13; 113; 115) and a second contrasting element (13; 113; 116) that are mutually movable.



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Apparatus

The invention relates to an apparatus for obtaining doses of plastics in a pasty state, these doses being able to be compression-moulded for obtaining objects, for example preforms that can be subsequently blow-moulded to obtain containers.

Apparatuses are known for obtaining doses of plastics comprising rotating knives that periodically pass in front of a mouth of an extruder from which the plastics exit.

During rotation, the knives cut the plastics to obtain the doses.

The doses, after being separated from the plastics that exit from the extruder, drop through the force of gravity to transferring elements that are movable along a preset trajectory, for example a trajectory configured as a closed loop.

The transferring elements receive the doses inside transferring chambers and, subsequently, transfer the doses to forming cavities with which female half moulds of a compression-moulding machine are provided. The forming cavities cooperate with punches with which male half moulds of the aforesaid compression-moulding machine are provided for compression-moulding the doses for obtaining objects, for example container preforms.

Known apparatuses further comprise a contrasting element that prevents the impact exerted by the knife on the dose that has just been separated from the plastics removing the dose from the transferring element intended to receive the dose. This, in fact, could make it difficult to receive the dose or even prevent the dose being received in the respective transferring chamber.

The contrasting device comprises a contrasting element that restingly receives the dose whilst the dose is separated from the plastics by the knife.

Owing to the contrasting element, the dose is substantially longitudinally aligned with the transferring element and

therefore enters inside the transferring chamber with greater facility.

One drawback of the apparatuses disclosed above is that the knife, by interacting with the plastics, deforms the upper portion of the dose so as to form pointed zones - in particular two opposite pointed zones positioned on the upper face of the dose - that cool more quickly compared with the remaining zones of the dose, generating at least partially solidified portions. The at least partially solidified portions slide with greater difficulty with respect to the pasty plastics that form the remaining zones of the dose. As a result, the at least partially solidified portions hinder the flow of the plastics and make transferring of the dose more difficult.

In addition, the at least partially solidified zones are less deformable during compression moulding. This causes defects in the preform and in the container obtained therefrom.

A further drawback of the apparatuses disclosed above is that the knife deforms the dose, causing ovalisation of the section and thus an increase of the maximum diameter.

The dose has a theoretical cross section that is substantially circular and a diameter that is slightly less than that of the transferring chamber that is intended for receiving the dose.

The deformed portion of the dose, having a diameter that is nearer than of the transferring chamber, tends to interact with the side walls of the transferring chamber and to adhere to the side walls. The dose may thus tilt in an undesired manner inside the transferring chamber. This entails incorrect positioning of the dose inside the forming cavity, inasmuch as the dose may adhere to the side walls of the forming cavity before reaching the bottom of the cavity. This produces a non-uniform distribution of the plastics in the forming cavity that may cause defects in the preform and in the container obtained therefrom.

Further, shocks may occur between the dose and the walls of the transferring chamber, which, in addition to slowing the descent of the dose to the forming cavity, may alter the surface quality of the dose, causing folds and deformation. One object of the invention is to improve the apparatuses for obtaining doses of plastics.

Another object is to obtain an apparatus that provides doses of plastics that are substantially devoid of solidified portions.

A further object is to obtain an apparatus that provides doses of plastics that are substantially devoid of deformed portions owing to the interaction between cutting means and the plastics that form the doses.

A still further object is to obtain an apparatus that provides doses of plastics having a substantially constant cross section, in particular a substantially circular cross section.

According to the invention, there is provided an apparatus comprising a dispensing device for dispensing plastics, cutting means for cutting said plastics to obtain a dose and contrasting means opposite said cutting means for supportingly receiving said plastics during and after cutting, characterised in that said contrasting means comprises a first contrasting element and a second contrasting element that are mutually movable.

In one embodiment, the apparatus further comprises transferring means - intended for receiving the dose and transferring the dose - that is distinct from the contrasting means. In particular, the transferring means delivers the dose to mould cavity means of compression moulding means in which the dose is compression-moulded to obtain an object, for example a container preform.

The first contrasting element and the second contrasting element, being mutually movable, act as shaping means intended for moving the pointed portions generated by the interaction of the cutting means with the plastics to an

inner zone of the dose. As at the inner zone of the dose the plastics that form the dose are hotter than the peripheral zone of the dose the pointed zones do not solidify even partially.

In addition, the first contrasting element and the second contrasting element, by moving the aforesaid pointed portions to the inner zone of the dose substantially cancel the deformation - in particular ovalisation- caused by the interaction of the cutting means with the plastics. Consequently, the dose has a substantially constant and regular cross section, in particular a circular cross section.

This limits the risk of the dose adhering to the walls of the transferring means and of the mould cavity means and increases the transfer speed thereof.

In a still further embodiment of the present invention the contrasting means comprises a first contrasting element and a second contrasting element that are mutually movable along a direction substantially perpendicular to a transferring direction of the dose of plastics.

The first contrasting element and the second contrasting element are used to align the dose with a transferring chamber of the transferring means, intended for receiving said dose and transferring the dose to the forming means, preventing the dose being able to take on a tilted position with respect to an axis of said transferring chamber, which would cause shocks between the dose and the walls of the transferring chamber, that, in addition to slowing the descent of the dose to the forming means, may alter the surface quality of the dose, causing folds and deformation. Such contrasting means, through the inner configuration thereof, also performs functions of partial modelling of the extended shapes of the doses.

The invention can be better understood and implemented with reference to the attached drawings, that illustrate some embodiments thereof by way of non-limiting example, wherein:

Figure 1 is a schematic side view of an apparatus for obtaining doses of plastics;

Figure 2 is a perspective view of a dose of plastics;

Figure 3 is a cross section of contrasting means of the apparatus in Figure 1;

Figure 4 is a plan view of the contrasting means in Figure 3 in a closed configuration;

Figure 5 is a plan view of the contrasting means in Figure 3 in an open configuration;

Figure 6 is a perspective bottom view of the contrasting means of the apparatus in Figure 1;

Figure 7 is a bottom plan view of the contrasting means in Figure 6;

Figure 8 is a perspective top view of the contrasting means in Figure 6;

Figure 9 is a schematic plan view of a further embodiment of contrasting means in a further open configuration;

Figure 10 is a view like that in Figure 9 that shows the contrasting means in a further closed configuration;

Figure 11 is a schematic perspective top view of a still further embodiment of contrasting means according to the present invention;

Figure 12 is a bottom schematic perspective view of the contrasting means in Figure 11;

Figure 13 is a perspective view of a detail of the contrasting means in Figures 11 and 12;

Figures 14, 15 and 16 schematically illustrate embodiments of revolving elements that are part of the contrasting means of Figures 11, 12 and 13;

Figure 17 illustrates an embodiment of revolving elements that are part of the apparatus according to the invention;

Figure 18 illustrates a further embodiment of revolving elements that are part of the apparatus according to the invention.

Figure 19 is a perspective schematic view of another embodiment of contrasting means according to the present invention, in a first non-operating position;

Figure 20 is a perspective view like that in Figure 19, with the contrasting means in a second operating position;

Figure 21 is a partial perspective view of the contrasting means in Figures 19 and 20;

Figure 22 is an enlarged view of a detail of Figure 21;

Figure 23 is a partial side view of the contrasting means in Figure 21, in an operating situation;

Figures 24, 25, 26 are partial top views of the contrasting means in three different positions.

A machine for producing preforms comprises a device 100 for obtaining doses D of plastics.

The machine for producing preforms further comprises a transferring device arranged for receiving the doses D and for transferring the doses D to a compression moulding device.

The transferring device comprises a rotatable carousel that supports a plurality of transferring elements 101.

The compression moulding device comprises a further rotatable carousel that supports a plurality of compression moulding moulds, each of which comprises a female half mould, provided with a mould cavity intended for being supplied with a dose D, and a male half mould, provided with a punch intended for being received in the mould cavity for forming the dose D.

The transferring elements 101 may be movable with respect to the aforesaid rotatable carousel, such that the path defined by a transferring element 101 during rotation of the aforesaid rotatable carousel and the path defined by a corresponding mould cavity during rotation of the aforesaid further rotatable carousel overlap for a portion of preset length, such that a dose D can be transferred with precision from the transferring element 101 to the mould cavity.

The device 100 comprises a plasticising device, for example an extruder 1 that extrudes plastics 2 and cutting means 3 that separates the doses D from the plastics 2.

The extruder 1 comprises an extrusion mouth 4 from which the plastics 2 are extruded in a substantially vertical manner - from top to bottom.

The cutting means 3 comprises a knife 5, for example a rotating knife that moves along a circular trajectory.

The circular trajectory is such that a blade 6 of the knife 5, at each revolution of the knife 5, interacts with the plastics 2 that exit from the extrusion mouth 4 to cut the plastics 2 so as to obtain a dose D.

During cutting, the blade 6 moves along an advancing direction A.

Alternatively, instead of the rotating knife it is possible to provide a linearly movable knife.

The dose D has an elongated shape and a substantially circular cross section.

The dose D, after being separated from the plastics 2, is received in a recess of a transferring element 101. The recess has a "C"-shaped or "U"-shaped or "J"-shaped section and an inlet opening through which the dose D penetrates inside the transferring element 101.

The aforesaid carousel moves each transferring element 101 so that the transferring element 101, when it receives the dose D, moves along a movement direction B that is substantially parallel to the advancing direction A. In this manner, the aforesaid inlet opening faces the dose D.

The device 100 further comprises contrasting means 7 positioned substantially opposite the cutting means 3 along the advancing direction A.

The contrasting means 7 is opposite the cutting means 3. In this manner, the dose D is restingly received on the contrasting means 7 during and after cutting and remains in contact with the contrasting means 7 for a certain interval of time whilst it moves to a transferring chamber of the

transferring element 101 positioned below the recess. The contrasting means 7 prevents the knife 6 moving the dose D away from the transferring element 101.

Further, the contrasting means 7 prevents the transferring element 101 knocking against the dose D and projecting the dose D along the movement direction B, so as to move the dose D away from the recess, i.e. overturning the dose D forwards in said movement direction, making the dose D lose alignment in a substantially vertical direction.

The blade 6, during cutting, deforms an upper portion 8 of the dose D, forming pointed zones 9 on an upper surface 10 of the dose D. The pointed zones 9 tend to cool faster than a remaining part of the dose D to form partially solidified portions having less deformability than the plastics 2 that form the remaining part of the dose D.

Further, the blade 6, during cutting, deforms the dose D, increasing a maximum cross section thereof H. In other words, the action exerted by the blade 6 tends to ovalise the cross section of the dose D.

The contrasting means 7 comprises a pair of contrasting elements that are mutually movable.

In the embodiments shown in Figures 3 to 10 the contrasting elements are both movable.

In one embodiment that is not shown, a first contrasting element is maintained in a fixed position whilst a second contrasting element moves towards and away from the second contrasting element.

The contrasting means 7 comprises portions intended for interacting with the doses D that act as shaping means 12 arranged for shaping the upper portions 8 and for acting as stabilising means for stabilising the position of the doses D.

With reference to Figures 3 to 5, the shaping means 12 comprises a pair of shaping elements 13 rotatably fixed to a supporting structure 14 with which the contrasting means 7 is provided.

Movement means 15 are provided that moves the shaping elements 13 with respect to one another.

The shaping elements 13 are movable between an open configuration O, shown in Figure 5, in which the shaping elements 13 are more distant from one another to receive a dose D, and a closed configuration C, shown in Figure 4, in which the shaping elements 13 are nearer one another to interact with the dose D.

In particular, the shaping elements 13 are shaped so as to deform the dose D - when they are in the closed configuration C - so as to push the pointed zones 9 inside the dose D. In this manner the plastics (colder) that form the pointed zones 9 are immersed in the plastics (hotter) that form the remaining part of the dose D. The plastics that form the pointed zones 9 do not thus cool to solidification. Further, the plastics that form the pointed zones 9 remain in a pasty and thus slidable state - similarly to the plastics that form the remaining part of the dose D. In other words, the plastics that - immediately after cutting - formed the pointed zones 9 and the plastics that formed the remaining part of the dose D mix together through the effect of the shaping elements 13 so as to have substantially homogenous physical properties. This enables the drawbacks to be reduced significantly in a preform obtained by compression-moulding the dose D and/or in a container obtained by blow-moulding the aforesaid preform.

Further, the shaping elements 13 deform the upper portion 8 so as to diminish the maximum transversal dimension thereof H. In other words, the shaping means 13 deforms the upper portion 8 in such a way that the dose D has a substantially circular cross section.

This reduces the risk of the dose D interacting with - and adhering to - walls of the transferring chamber. In this manner the dose D is prevented from tilting inside the transferring chamber so as to hinder correct transferring to

a corresponding mould cavity and slidability thereof is encouraged by facilitating the transfer thereof.

The supporting structure 14 comprises a body 16 in which cannels 17 are obtained for supplying and discharging a cooling fluid.

The supply and discharge channels 17 are connected by mouths 18 respectively to a supplying device arranged for supplying the shaping means 12 with the cooling fluid and to a discharging device arranged for evacuating the cooling fluid from the shaping means 12.

The supply and discharge channels 17 are further connected by conduits, for example flexible conduits 22, to a cooling conduit 19 obtained inside each of the shaping elements 13 and arranged for maintaining each shaping element 13 at a suitable temperature.

The cooling conduit 19 is defined by a plurality of rectilinear portions, arranged one after the other and mutually communicating, that can be obtained by holes made with a tool. Closing elements 60 are provided - for example caps - arranged for closing open ends of the aforesaid portions.

The cooling fluid used can be a liquid or a gas, such as, for example, nitrogen, carbon dioxide or compressed air. In the case of use of a gaseous cooling fluid it is advantageous to make the shaping means 12 from a porous material, in which the gaseous cooling fluid, supplied inside said shaping means, directly cools the dose D, exiting from the pores of the surfaces of the shaping means 12 that come into contact with the dose D.

A portion 21 of each shaping element 13 is rotatably connected to the supporting structure 14 by a respective pivot 20.

The movement means 15 comprises a pair of connecting elements 23 - shaped as levers - each of which has an end 24 rotatably connected to a corresponding shaping element 13 and a further end 25 rotatably connected to a movable

driving element; for example a translating element 26. The translating element 26 is received in a cavity 27 - for example of a substantially rectangular shape - obtained in the supporting structure 14.

The translating element 26 is movable between an advanced position M, shown in Figure 5, in which the translating element 26 is nearer the extrusion mouth 4, and a retracted position N, shown in Figure 4, in which the translating element 26 is further from the extrusion mouth 4.

The translating element 26 is fixed to a first end 32 of shaft means 28 that is slidably engaged in hole means 30 obtained in the supporting structure 14. The shaft means 28 comprises a pair of shafts 29 and the hole means 30 comprises a pair of holes, each shaft 29 being received in a corresponding hole.

The shaft means 28 is further slidable in further hole means 61 obtained in a block 62 that is integral with the supporting structure 14. The further hole means comprises a further pair of holes.

A second end 33 of the shaft means 28 - opposite the first end 32 - is fixed to a support 31 to which a wheel 35 is rotatably connected that is arranged for rotating inside a track 36 made in a body, for example a plate 47, rotated by motor means 37. The wheel 35 and the track 36 define cam means 34 that move the translating element 26 - with alternating rectilinear movement - from the advanced position M to the retracted position N, and vice versa.

The translating element 26 in turn moves the shaping elements 13 from the open configuration O to the closed configuration C, and vice versa.

In particular, whilst the translating element 26 moves from the retracted position N to the advanced position M, the shaping elements 13 move away from one another. When the translating element 26 is in the advanced position M the shaping elements 13 are in the open configuration O.

Similarly, whilst the translating element 26 moves from the advanced position M to the retracted position N, the shaping elements 13 move towards one another. When the translating element 26 is in the retracted position N the shaping elements 13 are in the closed configuration C.

During operation of the device 100, the blade 6, whilst it separates the dose D from the plastics 2, pushes the upper portion 8 into contact with a shaping portion of the shaping means 12.

This shaping portion comprises a shaping surface 38 of each shaping element 13 and a further shaping surface 39 obtained in an end portion 40 of the supporting structure 14. The shaping surfaces 38 and the further shaping surface 39 are curved, so as partially to envelop the dose D to give a desired shape to the dose D. When the shaping elements 13 are in the closed configuration C, the shaping surface 38 of each shaping element 13 and the further shaping surface 39 define a seat 102 having a profile shaped as a circular sector having a centre L.

It is advantageous for the centre L of the seat 102 not to be arranged on the axis I of the extruding device 1, but to be moved with respect thereto in the advancing direction A. This positioning of the centre L prevents the risk of a dose D that has just been formed being able to join the flow of plastics exiting from the extruding device 1. In fact, through the effect of the dynamic action of the knife 5, the dose D undergoes a thrust forward in said advancing direction A, so that, owing to said positioning of the centre L of the seat 102, a dose D that has just been formed is stabilised and modelled in a slightly advanced position compared with the flow of plastics from which the knife 5 will separate the dose D that follows immediately afterwards. The shaping means 12 thus comes into contact with the doses D when the latter are no longer aligned with the axis I of the flow of plastics exiting from the extruder 1 and stabilises the position thereof by absorbing the

thrust energy that the doses D have received through the effect of the dynamic action of the knife 5.

The movement means 15 moves the shaping elements 13 from the open configuration O to the closed configuration C, in which the shaping surfaces 38, by cooperating with the further shaping surface 39, push the plastics that form the pointed zones 9 inside the plastics that form the remaining part of the dose D and reduce the maximum transversal dimension H.

The dose D falls through the force of gravity to the corresponding transferring element 101 and is received in the transferring chamber.

In order to prevent the dose D, owing to the blow with the transferring element 101, being moved away from the latter, it is possible to move the contrasting means 7 along the movement direction B. In this manner, the contrasting means 7 accompanies the transferring element 101 - and the dose D supported thereby - to prevent the dose D moving away from the transferring element 101. Whilst the contrasting means 7 and the transferring element 101 move along a common path for a portion of preset length, the dose D moves towards the transferring chamber. The contrasting means 7, by moving together with the transferring element 101, limits the blows between the dose D and the walls of the transferring element 101, reducing the risks of the dose adhering to the aforesaid walls.

The contrasting means 7 is fixed to a movable support, for example a platform 41 that is slidable along the movement direction B with respect to frame means 42 of the device 100.

The platform 41 is provided with sliding means 43, for example rails 44, arranged along the movement direction B that slide with respect to guide means 45, for example guides 46 fixed to the frame means 42.

To the frame means 42 actuating means 52, for example a pneumatic actuator 54 is fixed, connected by a connecting

flange 53, to the platform 41 and arranged for moving the platform 41 along the movement direction B.

To the platform 41 the motor means 37 is fixed that rotates the plate 47. In particular, the motor means 37 comprises an electric motor 48 provided with a motor shaft 49 arranged substantially vertically. The platform 41 is provided with a through window 50 through which an end 51 of the motor shaft 49 passes to which the plate 47 is fixed.

With reference to Figures 9 and 10, one embodiment of contrasting means 107 is shown comprising a pair of connecting elements 123.

One end 124 of each connecting element 123 is provided with a threaded head 132 on which a first part 127 of a spherical joint 128 is screwed.

A second part 129 of the spherical joint is provided with a threaded shank 130 arranged for being screwed in a threaded hole 131 made in a corresponding shaping element 113.

The shaping elements 113 are rotatably connected to the supporting structure 14 by pivots 120.

A further end 125 of each connecting element 123 is rotatably connected to the translating element 26 that is actuated in the manner disclosed previously.

Figure 9 shows the shaping elements 113 in the open configuration O, whilst Figure 10 shows the shaping elements 113 in the closed configuration C.

In Figures 9 and 10 an initial (dashed) cross section S of the upper portion 8 is shown before the shaping elements 113 model the dose D and a final (not dashed) cross section F of the upper portion 8 is shown after the shaping elements 113 have modelled the dose D.

In Figures 11 and 12 there is illustrated a still further embodiment of contrasting means 207 according to the invention.

In this still further embodiment, the contrasting means 207 comprises a first contrasting element 208 and a second contrasting element 210 that are movable parallel to one

another in a direction E substantially perpendicular to a transferring direction F of the dose D to the transferring element 101 intended for transferring the dose D to a mould cavity of the forming device. The first contrasting element 208 and the second contrasting element 210 are further movable in a further direction G that is perpendicular both to the direction E and to the direction F. The first contrasting element 208 is arranged below the second contrasting element 210. Independent adjustments of the position of the first contrasting element 208 and of the second contrasting element 210 in direction F are provided that enable both the mutual position of the two contrasting elements to be adjusted, and the two contrasting elements to be moved away from or brought near the transferring direction F of the doses D, by bringing the two contrasting elements to a non operating position, and then in an operating position. All this is necessary in all those preliminary operating activities of the apparatus and, in particular, of the extruding device 1, if purges have to be conducted before going on to the production step.

It is provided that repositioning the two contrasting means 208 and 210 in an operating position can occur in automatic mode and in synchronised form with the other activities of the apparatus, for example with the cutting activity, so that everything becomes operative from the start of the apparatus.

The first contrasting element 208 has a U shape with a pair of parallel arms, indicated respectively by the reference numbers 216 and 217, connected by a curved portion 218. Inside the curved portion 218 freely rotatable revolving elements 209 are arranged, for example freely rotatable rollers that are used to facilitate and guide the movement of the dose D of plastics along said transferring direction F.

The second contrasting element 210 is the shape of a plate, provided, at an end facing the curved portion 218 of the

first contrasting element 208, with a seat 211 having a substantially semicircular shape.

The curved portion 218 of the first guiding element 208 and the semicircular seat 211 of the second guiding element 210 form a guiding channel that is used to align said dose D of plastics in said transferring direction F, correcting possible misalignments of the dose D with respect to said transferring direction F, caused by the dynamic action of the knife 5.

By moving mutually the first contrasting element 208 and the second contrasting element 210 in the direction E it is possible to adapt the dimensions of said guiding channel to the transversal dimensions of said dose D of plastics and define an optimal transversal dimension of the guiding channel that enables the dose D to be guided in said transfer direction F, without hindering the motion thereof.

Further, in order to optimise the descent conditions of the doses D along the direction F, the first contrasting means 208 and the second contrasting means 210 can also both be slightly moved, or just one thereof can be slightly moved in the direction G to prevent the risk of a dose D that has just be formed being able to unit with the flow of plastics exiting from the extruding device 1.

In Figure 13 there is illustrated an embodiment of the first contrasting element 208 in which three revolving elements 209a 209b and 209c are provided, comprising a central revolving element 209a and two lateral revolving elements 209b and 209c.

The revolving elements 209a, 209b and 209c are rotatable on respective shafts 220a, 220b and 220c (Fig. 13). Between the revolving elements 209a, 209b, 209c and the respective shafts 220a, 220b, 220c pairs of bearings 221 are interposed that facilitate the rotation of the revolving elements 209a, 209b, 209c on the respective shafts 220a, 220b, 220c.

It is advantageous for the two lateral revolving elements 209b and 209c to be orientable with respect to the central

revolving element 220a. For this purpose, one end of the respective shafts 220b and 220c facing the central revolving element 209a is fixed to a respective pivot element 222b, 222c, which may be rotated around an axis, respectively 223b and 223c, perpendicular to the axis of the respective shaft 220b, 220c (Figure 14).

By rotating the pivots 222b and 222c it is possible to vary the position of the lateral revolving elements 209b and 209c with respect to the central revolving element 209a so as to vary the width of the space bound by the revolving elements 209a, 209b, 209c inside the first contrasting element 208. This enables the guiding and descent conditions of the doses D to be optimised and the space bound by the revolving elements 209a, 209b, 209c to be adapted to doses D having various transversal dimensions.

The number of revolving elements 209 may be greater than three, for example the revolving elements 209 may be five, with a central revolving element 209a and four lateral revolving elements 209b, 209c, 209d, 209e, that are rotatable on respective shafts 220a, 220b, 220c, 220d, 220e, as illustrated in Figures 17 and 18, or also more than five. Further, the revolving elements 209a, 209b, 209c, 209d, 209e can be arranged so as to embrace an angle of 180° , as illustrated in Figure 17, or an angle less than 180° , as illustrated in Figure 18, depending on the operating requirements of the apparatus 1.

Also in the configurations of Figures 17 and 18, the lateral revolving elements 209b, 209c, 209d, 209e can be made orientable to one another and with respect to the central revolving element 209a, to adapt the lateral revolving elements 209b, 209c, 209d, 209e to the transversal dimensions of the dose D. Similarly to what is illustrated in Figure 14, an end of each shaft 220b, 220c, 220d, 220e of each lateral revolving element 209b, 209c, 209d and 209e is fixed to a respective pivot element 222b, 222c, 222d and

222e, that is rotatable around a respective axis 223b, 223c, 223d, 223e.

The dose D of plastics, after being passed through said guiding channel defined by the first transferring element 208 and by the second transferring element 210 is directed to a transferring element 101 of the transferring device, which transfers the dose D to a mould cavity of the forming device.

The transferring element 101 comprises a body 219 in which a transferring chamber 215 is obtained, which is open at both ends, the axis of which, during the transfer of the dose D into the transferring element 101, is made to coincide substantially with said transferring direction F, or to be anyway parallel thereto.

The transferring device 101 further comprises a mouth element 212 with a substantially semicylindrical shape, on the inside surface of which there are arranged further freely rotatable revolving elements 213, for example in the form of wheels that are suitable for guiding the dose D in the transferring chamber 215, thus preventing the dose D from being able to adhere even partially to the inner surface of the mouth element 212. Also the inner walls of the transferring chamber 215 are provided with still further freely rotatable revolving elements 214, which are also, for example, in the form of wheels, that guide the dose D through the transferring chamber 215 and maintain the dose D substantially aligned along the transferring direction F.

It may sometimes be appropriate for the axis P (Figure 1) of the doses D to be incident to i.e. not parallel to the direction F, so that a first contact between the dose D and the inner part of the mouth element 212 occurs substantially only at the lower part of the dose D, that, normally, has a shaped portion S with a rounded shape (Figure 2). In this case, the contrasting means 7, 208, 210 has the function of making this condition repeatable and stable that is useful in cases in which it is desired to reduce the forward thrust

induced on the dose D by the mouth element 212 when it comes into contact with the dose D.

The revolving elements 209, 213 and 214 are preferably made of antiadhesive material, or coated with antiadhesive material, in order to prevent the dose D being able to adhere to said revolving elements. Also the seat 211 of the second contrasting element 210 is preferably coated with antiadhesive material.

Further, the outer surface of the revolving elements 209, 213, 214 can be provided with protuberances 224 in order to decrease the area of contact between the doses D and the revolving elements 209, 213, 214.

Alternatively, still for the purpose of decreasing the contact area between the doses D and the revolving elements 209, 213, 214, on the latter annular elements 225 can be positioned, for example of substantially toric shape, made of antiadhesive material, that are capable of withstanding the high temperatures of the plastics.

Lastly, still in order to minimise the risk that the dose D may adhere to the revolving elements 209, 213, 214, it is possible to provide cooling circuits that cool the first contrasting element 208, the second contrasting element 210, the mouth element 212 and the body 219 of the inserting element 101, even without directly cooling the respective revolving elements. If a gaseous fluid is used as a cooling fluid it is advantageous for the revolving elements 209, 213 and 214 and the seat 211 of the second contrasting element 210 to be made with a porous material, and for the gaseous cooling fluid to be sent directly, respectively inside the revolving elements 209, 213, 214 and the seat 211, such that by exiting from the pore of the surfaces of the revolving elements 209, 213, 214 and of the seat 211 it directly cools the dose D.

In Figures 19 to 26 there is illustrated another embodiment of contrasting means 307 according to the invention.

In this embodiment, the contrasting means 307 comprises first contrasting means 308 and second contrasting means 309 that are movable in a direction E substantially perpendicular to a transferring direction F of the dose D to a transferring device, for example the transferring device 101 illustrated in Figures 11 and 12, intended for transferring the dose D to a mould cavity of the forming device. The first contrasting means 308 is arranged above the second contrasting means 309. Adjusting means 310 is provided that enables the position of the contrasting means 307 to be adjusted to move the contrasting means 307 away from the transfer direction F of the doses D, taking the contrasting means 307 to a non-operating position, shown in Figure 19 and in Figure 24, or taking the contrasting means 307 towards said direction F to taking the contrasting means 307 to an operating position shown in Figure 20 and in Figures 25 and 26. This is all necessary in all those preliminary operation activities of the apparatus and, in particular, of the extruding device 1, if, for example, purges have to be conducted before moving on to the production step. The adjusting means 310 comprises a slide element 312 that is slidable in said direction E and driven by an operating cylinder 311, the first contrasting means 308 and the second contrasting means 309 being connected to said slide element 311.

It is provided for that the repositioning of the contrasting means 307 in an operating position can occur automatically and in a manner synchronised with the other activities of the apparatus, for example with the cutting action, such that everything becomes operative with the startup of the apparatus. The first contrasting means 308 comprises a plate 313 an end of which faces said direction F that is provided with a seat 314 intended for acting as a resting and guiding element for the dose D.

The second contrasting means 309 comprises a first contrasting element 315 and a second contrasting element 316

that are movable with respect to one another between an opening position O (Figures 24 and 25) in which said dose D is received between said first contrasting element 315 and said second contrasting element 316 and a closing position (Figure 26) in which said dose D is enclosed at least partially between said first contrasting element 315 and said second contrasting element 316. The first contrasting element comprises a first arm 315 rotatably supported on a body 317 of the second contrasting means 309, so as to be able to rotate around a first fulcrum 318, on a plane substantially perpendicular to the transferring direction F of the dose D. The second contrasting element comprises a second arm 316, which is also rotatably supported on said body 317, so as to be able to rotate around a second fulcrum 319, on said plane substantially perpendicular to the transferring direction F of the dose D.

The first arm 315 is provided with first revolving elements 320, supported at an end of the first arm 315 opposite the first fulcrum 318, and with second revolving elements 321 supported in an intermediate position of the first arm 315.

The second arm 316 is provided with further first revolving elements 320', supported at an end of the second arm 316 opposite the second fulcrum 319, and with further second revolving elements 321' supported in an intermediate position of the second arm 316.

The first revolving elements 320, the further first revolving elements 320', the second revolving elements 321 and the further second revolving elements 321' are supported on the respective arm 315, 316 so as to be able to rotate freely around a respective rotation axis. The rotation axes of the first revolving elements 320, of the further first revolving elements 320', of the second revolving elements 321 and of the further second revolving elements 321' rest substantially on planes that are perpendicular to the transferring direction F of the dose D.

The rotation axes of the first revolving elements 320 are convergent with the rotation axes of the further first revolving elements 320'. Also the rotation axes of the second revolving elements 321 converge on the rotation axes of the further second revolving elements 321'.

The first revolving elements 320 are mounted on a first supporting element 323 connected to the ends of the first arm 315, such that an angular position thereof is adjustable with respect to a respective rotation axis X, to enable the first revolving elements 320 to assume different angular positions with respect to the first arm 315.

The further first revolving elements 320' are mounted on a further first supporting element 323' connected to the end of the second arm 316, such that an angular position thereof is adjustable with respect to a respective rotation axis X', to enable the second revolving elements 320' to assume different angular positions with respect to the second arm 316.

Adjusting the angular position of the first revolving elements 320 and of the second revolving elements 320' is used to compensate for a possible misalignment, i.e. deviation of the dose D with respect to the transfer direction F, limiting this deviation within acceptable limits and thus determining also a stabilising function, as will be disclosed in greater detail below.

Between the first arm 315 and the second arm 316 a contrasting and resting element 324 is further arranged parallel to said direction E and provided, at an end thereof facing said transferring direction F of the dose D, with third revolving elements 325, supported on the contrasting and resting element 324 so as to rotate freely around a respective rotation axis. The rotation axes of the third revolving elements 325 are parallel to one another and arranged on planes that are substantially perpendicular to said transferring direction F of the dose D. On the first arm 315 and on the second arm 316 respective abutting

elements 326 and 326' are provided, intended for coming into contact with the contrasting and resting element 324 to define a closing position of the first arm 315 and of the second arm 316.

The operation of the contrasting means 307 is disclosed below with reference to Figures 23 to 27.

In a preliminary operating step of the apparatus according to the invention, in which, for example, preliminary purging operations of the extruding device 1 and calibrating and regulating operations of the apparatus have to be conducted, the contrasting means 307 is taken to a non-operating position, shown in Figures 19 and 24, in which it is spaced away from the transfer direction F of the dose D.

After the preliminary operations have terminated, the contrasting means 307 is moved in a first operating position, shown in Figure 25, in which the transfer direction F of the dose D is located between the first arm 315 and the second arm 316. The arms 315 and 316 are in an open position O, i.e. in a position in which the abutting elements 326 and 326' are spaced away from the contrasting and resting element 324.

When a dose D exits from the extruding device 1, the arms 315 and 316 are moved towards the closing position C until the abutting elements 326 and 326' come into contact with the contrasting and resting element 324.

When the first arm 315 and the second arm 316 are in said closing position C, the first revolving elements 320, the further first revolving elements 320', the second revolving elements 321, and the further second revolving elements 321' define, together with the third revolving elements 325 of the contrasting and resting element 324, a channel 327 (Figure 22) that orients the dose D in said transfer direction F and guides the dose D to a transferring device, for example the transferring device 101 illustrated in Figures 11 and 12, intended for transferring the dose D to a mould cavity of the forming device.

The first contrasting means 308, the first revolving elements 320 and the second revolving elements 320', mounted on the first arm 315 and on the second arm 316 such that the angular position thereof can be adjusted, act so as to limit a tilt of the dose D with respect to the transfer direction F, caused by the action of the knife 5 of the cutting means 3, and by the contrasting reaction of the support 313 with the seat 314 thereof, such as to guide the dose D in the channel 327 and, subsequently, in the transferring device 101. Adjusting the angular position of the first revolving elements 320 and of the second revolving elements 320' is required to limit the maximum tilt that the dose D can assume with respect to the transfer direction F.

In fact, the first contrasting means 308, with the seat 324 thereof, provides a resting support that limits the tilt of the dose D with respect to the transfer direction F, whilst the first oscillating revolving elements 320 and the second oscillating revolving elements 320', already from the first closure of the first arm 315 and of the second arm 316, ensure that the dose D maintains a descent trajectory, by stabilising the tilt thereof and limiting the descent trajectory within acceptability limits with certain deviations with respect to the transfer direction F.

In Figure 23 there is shown schematically the action performed by the first contrasting means 308, by the first revolving elements 320 and by the further first revolving elements 320' to limit the tilt of the dose D and maintain the dose D within limits that are suitable for insertion into the transferring means. In Figure 23 only the first revolving elements 320 are visible.

CLAIMS

1. Apparatus comprising a dispensing device (1) for dispensing plastics (2), cutting means (3) for cutting said plastics (2) to obtain a dose (D) and contrasting means (7; 107; 207; 307) opposite said cutting means (3) for supportingly receiving said plastics (2) during and after cutting, characterised in that said contrasting means (7; 107; 207; 307) comprises a first contrasting element (13; 113; 208; 315) and a second contrasting element (13; 113; 210; 316) that are mutually movable.
2. Apparatus according to claim 1, wherein said first contrasting element (13; 113) and said second contrasting element (13; 113) are movable between an open configuration (O), in which said plastics (2) are received between said first contrasting element (13; 113) and said second contrasting element (13; 113), and a closed configuration (C), in which said first contrasting element (13; 113) and said second contrasting element (13; 113) partially envelop said dose (D) to shape said dose (D).
3. Apparatus according to claim 1, or 2, wherein said first contrasting element (13; 113) and said second contrasting element (13; 113) comprise shaping surfaces (38) for shaping said dose (D).
4. Apparatus according to claim 3, wherein said shaping surfaces are curved.
5. Apparatus according to claim 3, or 4, wherein said shaping surfaces (38) define a seat (102) shaped so as partially to envelop said dose (D).
6. Apparatus according to any preceding claim, wherein said first contrasting element (13; 113) and said second contrasting element (13; 113) are supported by a supporting structure (14) and are movable with respect to said supporting structure (14).
7. Apparatus according to claim 6 as appended to any one of claims 3 to 5, wherein said supporting structure (14)

- comprises a further shaping surface (39) cooperating with said shaping surfaces (38) for shaping said dose (D).
8. Apparatus according to claim 7, wherein said further shaping surface (39) is curved.
 9. Apparatus according to claim 7, or 8, as claim 6 depends on claim 5, wherein said further shaping surface (39) cooperates with said shaping surfaces (38) to define said seat (102).
 10. Apparatus according to any one of claims 6 to 9, wherein said first contrasting element (13; 113) and said second contrasting element (13; 113) are hinged on said supporting structure (14).
 11. Apparatus according to claim 10, and further comprising a pair of levers (23), a first lever (23) of said pair of levers having an end (24) rotatably connected to said first contrasting element (13) and a further end (25) that is rotatably connected to a movable body (26, 29, 31) and a second lever (23) of said pair of levers having an end (24) rotatably connected to said second contrasting element (13) and a further end (25) connected to said movable body (26, 29, 31).
 12. Apparatus according to claim 10, and further comprising a pair of levers (123), a first lever (123) of said pair of levers having an end (124) connected to said first contrasting element (113) by a spherical joint (128) and a further end (125) rotatably connected to a movable body (26, 29, 31) and a second lever (123) of said pair of levers having an end (124) connected to said second contrasting element (113) by a further spherical joint (128) and a further end (125) connected to said movable body (26, 29, 31).
 13. Apparatus according to claim 11, or 12, wherein on said movable body (26, 29, 31) a revolving element (35) is rotatably supported, engaging with a track (36) obtained in a rotating body (47).

14. Apparatus according to any one of claims 11 to 13, wherein said movable body (26, 29, 31) is slidable linearly between an advanced position (M), in which said movable body (26, 29, 31) is nearer said dispensing device (1) and a retracted position (N), in which said movable body (26, 29, 31) is further from said dispensing device (1).
15. Apparatus according to any one of claims 6 to 14, wherein said supporting structure (14) comprises a body (16) in which supplying and discharging channels (17) for supplying and discharging a cooling fluid are obtained.
16. Apparatus according to claim 15, wherein said supplying and discharging channels (17) are connected by mouths (18) respectively to a supply device arranged for supplying the shaping means (12) with the cooling fluid and to a discharging device arranged for evacuating the cooling fluid from the shaping means (12).
17. Apparatus according to claim 16, or 17, wherein said supplying and discharging channels (17) are further connected by conduits (22) to a cooling conduit (19) obtained inside each of the contrasting elements (13; 113).
18. Apparatus according to claim 17, wherein said cooling fluid is a gaseous fluid, and said contrasting elements (13; 113) and said further shaping surface (39) being made of a porous material.
19. Apparatus according to claim 1, wherein said first contrasting element (208) and said second contrasting element (210) are mutually movable along a direction (E) that is substantially perpendicular to a transferring direction (F) of said dose (D).
20. Apparatus according to claim 19, wherein said first contrasting element (208) and said second contrasting element (210) are mutually movable along a further direction (G) that is substantially perpendicular to

- said direction (E) and to said transferring direction (F).
21. Apparatus according to claim 19, or 20, wherein said first contrasting element (208) is placed below said second contrasting element (210).
 22. Apparatus according to any one of claims 19 to 21, wherein said first contrasting element (208) is U-shaped with a pair of arms (216, 217) that are substantially parallel to one another, connected by a curved portion (218).
 23. Apparatus according to claim 22, wherein inside said curved portion (218) freely rotatable revolving elements (209) are arranged.
 24. Apparatus according to claim 23, comprising a plurality of freely rotatable revolving elements (209a, 209b, 209c, 209d, 209e), comprising a central revolving element (209a) and a plurality of side revolving elements (209b, 209c, 209d, 209e)
 25. Apparatus according to claim 24, wherein each of said freely rotatable revolving elements (209a, 209b, 209c, 209d, 209e) is rotatable on a respective shaft (220a, 220b, 220c, 220d, 220e), between said freely rotatable revolving elements (209a, 209b, 209c, 209d, 209e) and the respective shafts (220a, 220b, 220c, 220d, 220e) there being interposed pairs of bearings (221).
 26. Apparatus according to claim 24, or 25, wherein said side revolving elements (209b, 209c, 209d, 209e) are orientable in relation to each other and in relation to the central revolving element (209a).
 27. Apparatus according to claim 26, as appended to claim 25, wherein an end of each shaft (220b, 220c, 220d, 220e) of each side revolving element (209b, 209c, 209d and 209e) is fixed to a respective pivot element (222b, 222c, 222d and 222e), that is rotatable around a respective axis (223b, 223c, 223d, 223e) that is

- substantially perpendicular to the axis of the respective shaft (220b, 220c, 220d, 220e).
28. Apparatus according to any one of claims 20 to 27, wherein said second contrasting element (210) is provided, at an end facing said curved portion (218) of the first contrasting element (208), with a seat (211) having a substantially semicircular shape.
29. Apparatus according to claim 28, wherein said seat (211) is covered with an antiadhesive material.
30. Apparatus according to claim 28, or 29, wherein said curved portion (218) of the first contrasting element (208) and said seat (211) of the second contrasting element (210) define a guiding channel for said dose (D).
31. Apparatus according to any preceding claim, and further comprising transferring means (101) intended for receiving said dose (D) and for transferring said dose (D), said transferring means (101) being distinct from said contrasting means (7; 107; 207).
32. Apparatus according to claim 31, wherein said transferring means comprises transferring elements (101) supported by a rotatable carousel.
33. Apparatus according to claim 32, wherein each transferring element (101) comprises an inlet element (212) with a substantially semicylindrical shape, on the internal surface of which there are arranged further freely rotatable revolving elements (213).
34. Apparatus according to claim 32, or 33, wherein each transferring element (101) comprises a transferring chamber (215) that is open at both ends and is provided, on the inner surface thereof, with still further freely rotatable revolving elements (214).
35. Apparatus according to any one of claims 31 to 34, and further comprising compression-moulding mould means arranged for receiving said dose (D) from said

- transferring means (101) and for compression-moulding said dose (D).
36. Apparatus according to claim 35, wherein said compression-moulding mould means is supported by rotatable carousel means.
37. Apparatus according to any one of claims 23 to 36, wherein said freely rotatable revolving elements (209) and/or said further freely rotatable revolving elements (213) and/or said still further freely rotatable revolving elements (214) are made of a non-adhesive material, or coated with a non-adhesive material.
38. Apparatus according to any one of claims 23 to 37, wherein an external surface of said freely rotatable revolving elements (209) and/or said further freely rotatable revolving elements (213) and/or said still further freely rotatable revolving elements (214) is provided with protuberances (224).
39. Apparatus according to any one of claims 23 to 36, wherein on said freely rotatable revolving elements (209) and/or on said further freely rotatable revolving elements (213) and/or on said still further freely rotatable revolving elements (214) a plurality of annular elements (225) is placed that are made of a non-adhesive material.
40. Apparatus according to any one of claims 23 to 39, further comprising cooling means for cooling said first contrasting element (208), said second contrasting element (210), said inlet element (212) and a body (219) of said inserting element (101).
41. Apparatus according to claim 40, wherein said cooling means is suitable for cooling directly said freely rotatable revolving elements (209) and/or said further freely rotatable revolving elements (213) and/or said still further freely rotatable revolving elements (214).
42. Apparatus according to claim 41, wherein said freely rotatable revolving elements (209) and/or said further

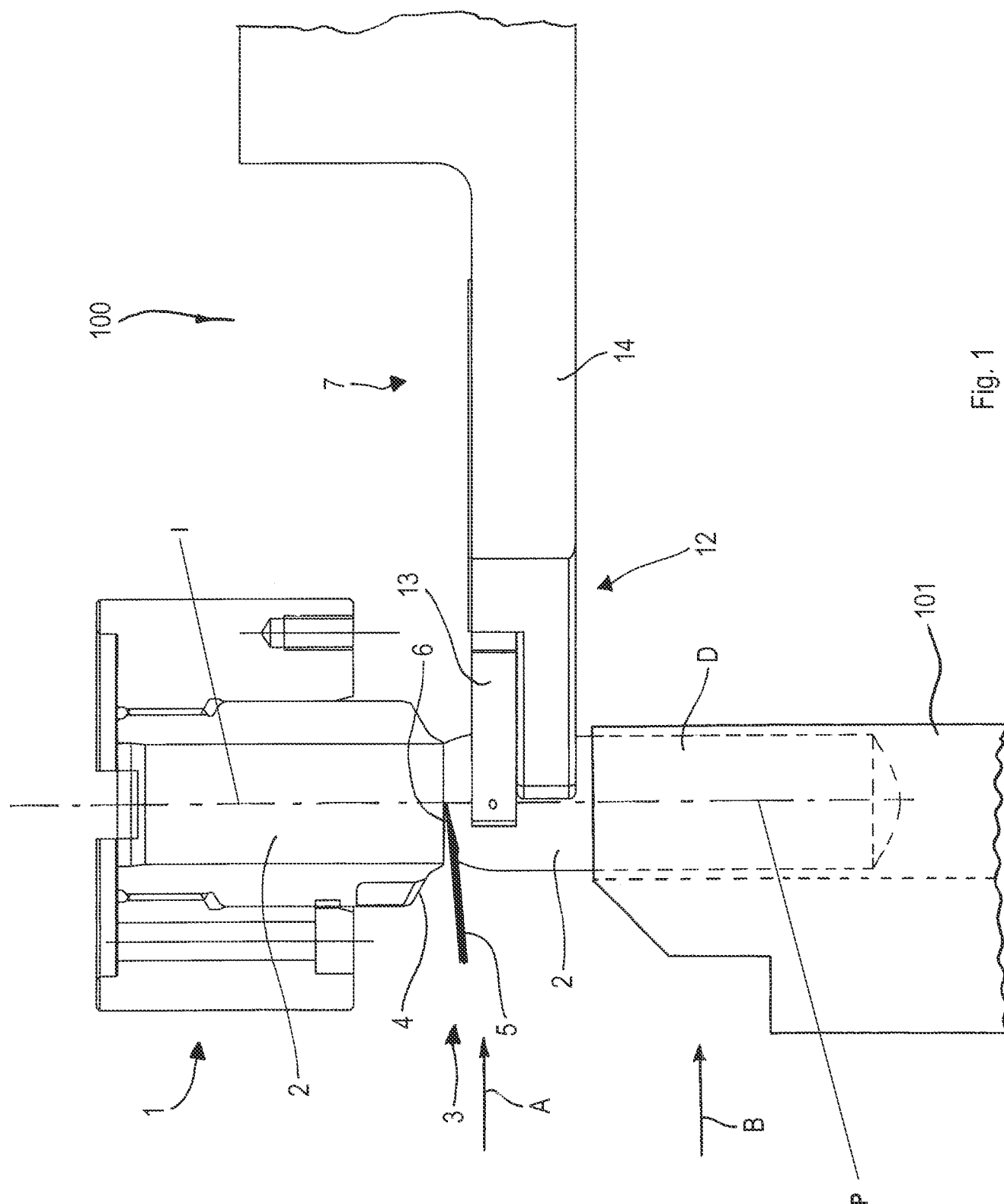
freely rotatable revolving elements (213) and/or said still further freely rotatable revolving elements (214) and/or said seat (211) of the second contrasting element (210) are made of porous material.

43. Apparatus according to claim 1, wherein said contrasting means (307) comprises first contrasting means (308) and second contrasting means (309), said second contrasting means (309) comprising said first contrasting element (315) and said second contrasting element (316).
44. Apparatus according to claim 1, wherein said first contrasting element (315) and said second contrasting element (316) are movable in relation to one another on a plane substantially perpendicular to a transferring direction (F) of said dose (D) between an open configuration (O), in which said dose (D) is received between said first contrasting element (315) and said second contrasting element (316), and a closed configuration (C), in which said first contrasting element (315) and said second contrasting element (316) partially envelop said dose (D).
45. Apparatus according to claim 44, wherein said first contrasting element comprises a first arm (315) rotatably supported on a body (317) of said second contrasting means (309), so as to be able to rotate around a first fulcrum (318).
46. Apparatus according to claim 45, wherein said first arm (315) is provided with first revolving elements (320), supported at an end of the first arm (315) opposite said first fulcrum (318), and with second revolving elements (321) supported in an intermediate position of the first arm (315), said first revolving elements (320) and said second revolving elements (321) being free to rotate around respective rotation axes.
47. Apparatus according to claim 46, wherein said first revolving elements (320) are supported on a first supporting element (323) connected to said end of the

- first arm (315), such that an angular position of said first supporting element (323) is adjustable with respect to a respective rotation axis (X).
48. Apparatus according to any one of claims 44 to 47, wherein said second contrasting element comprises a second arm (316) rotatably supported on a body (317) of said second contrasting means (309), so as to be able to rotate around a second fulcrum (319).
49. Apparatus according to claim 48, wherein said second arm (316) is provided with further first revolving elements (320'), supported at an end of the second arm (316) opposite said second fulcrum (318), and with further second revolving elements (321') supported in an intermediate position of the second arm (316), said further first revolving elements (320') and said further second revolving elements (321') being free to rotate around respective rotation axes.
50. Apparatus according to claim 49, wherein said further first revolving elements (320') are supported at a further first supporting element (323') rotatably connected to said end of the second arm (316), such that a position of said further first supporting element (323') that is angular to respective rotation axis (X') is adjustable.
51. Apparatus according to claim 49, or 50, wherein the rotation axes of said first revolving elements (320) and of said further first revolving elements (320') converge on one another.
52. Apparatus according to any one of claims 49 to 51, wherein the rotation axes of said second revolving elements (321) and of said further second revolving elements (321') converge on one another.
53. Apparatus according to any one of claims 44 to 52, wherein said second contrasting means comprises a contrasting and resting element (324) arranged between said first contrasting element (315) and said second

- contrasting element (316), said contrasting and resting element comprising third revolving elements (325) that are free to rotate around respective rotation axes.
54. Apparatus according to any one of claims 44 to 53, wherein said first contrasting means (308) comprises a plate (313), an end of which, facing said transferring direction (F), is provided with a seat (314) that is suitable for acting as a resting element for said dose (D).
55. Apparatus according to any one of claims 44 to 54, wherein said first contrasting means (308) and said second contrasting means (309) are movable in a direction (E) substantially perpendicular to said transfer direction (F).
56. Apparatus according to claim 55, further comprising adjusting means (310) that is suitable for moving said first contrasting means (308) and said second contrasting means (309) in said direction (E).
57. Apparatus according to claim 56, wherein said adjusting means (310) comprises a slide element (311) to which said first contrasting means (308) and said second contrasting means (309) are fixed, said slide element (311) being movable in said direction (E).
58. Apparatus according to claim 57, further comprising driving means (312) for moving said slide element (311) along said direction (E).

1/18





2/18

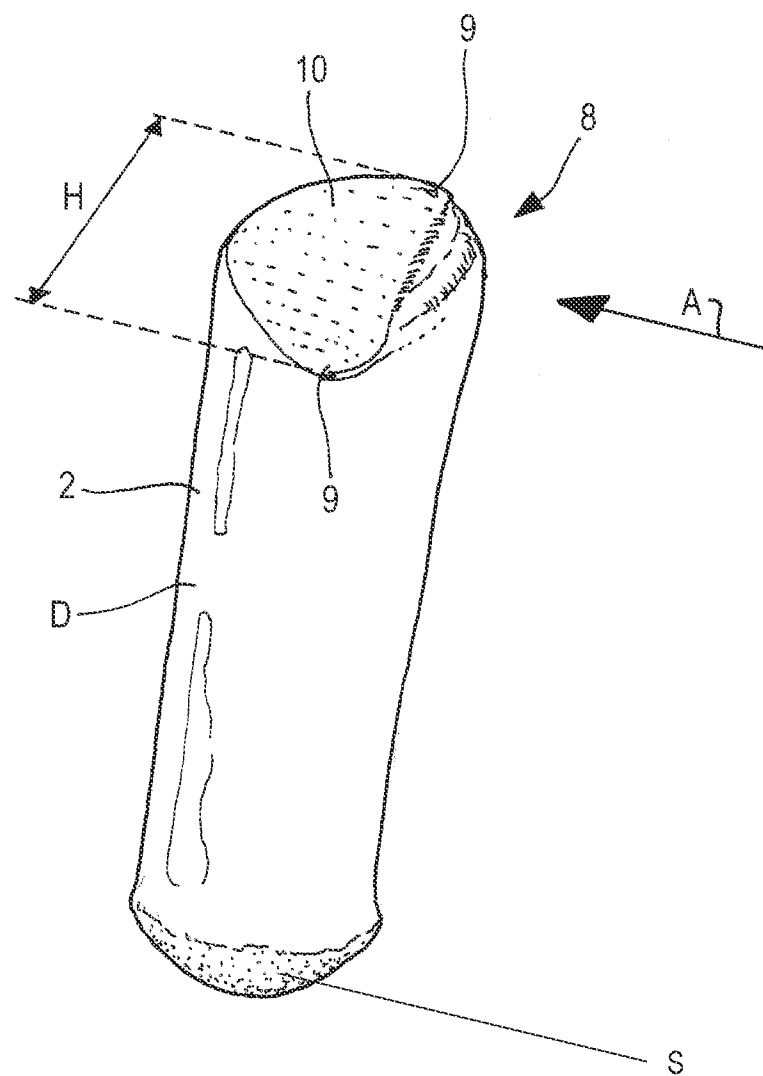


Fig. 2

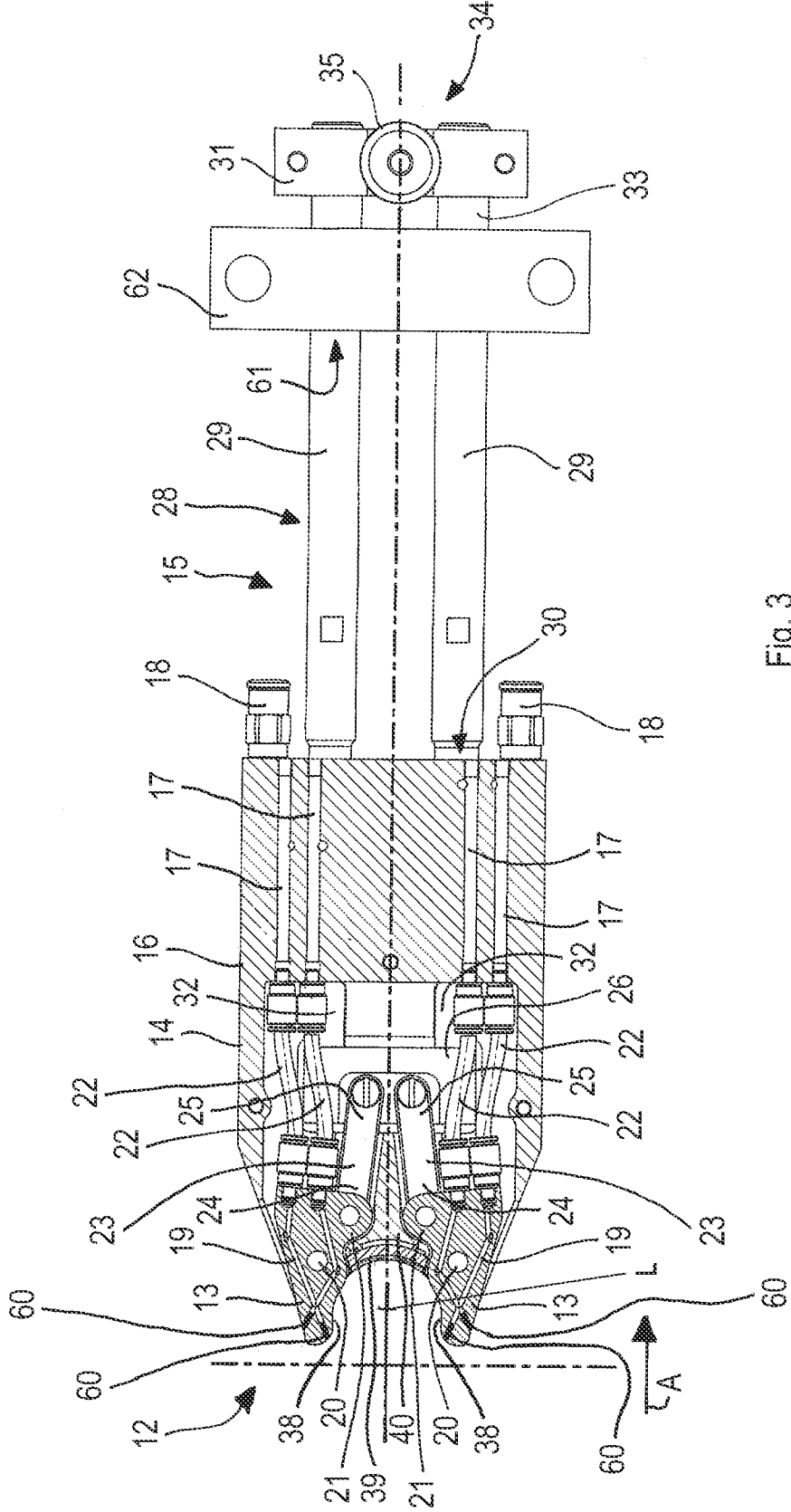


Fig. 3

4/18

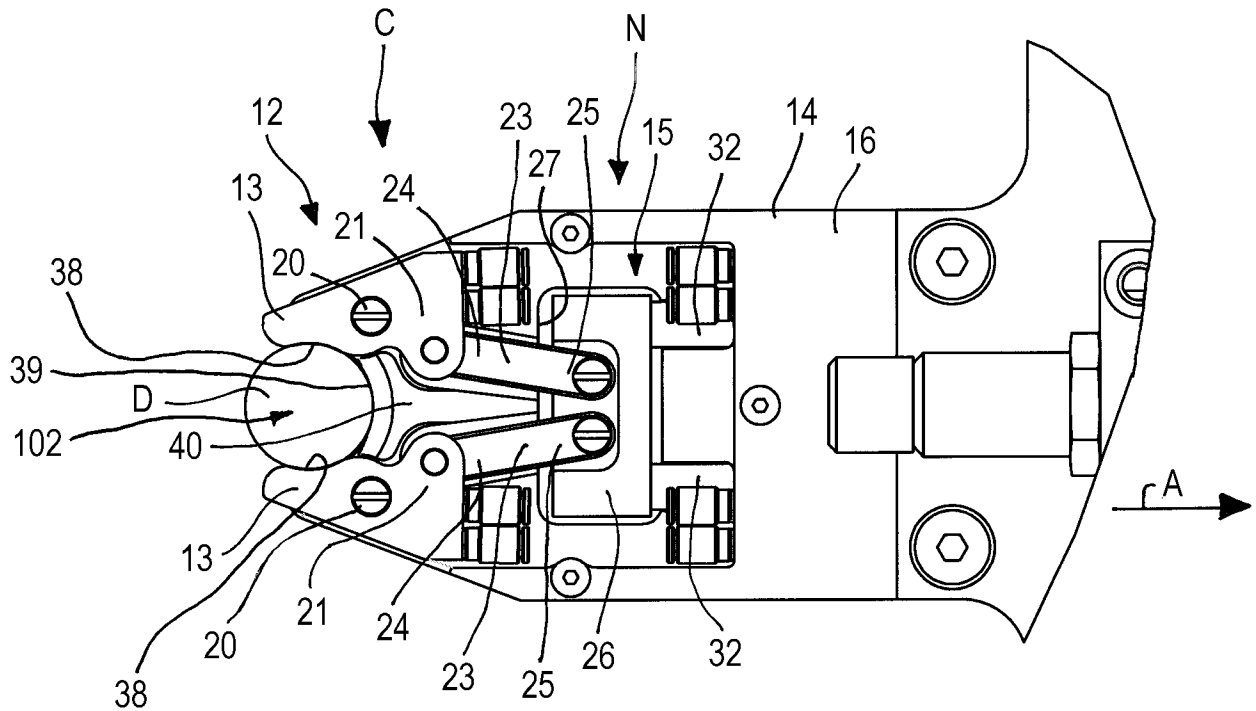


Fig. 4

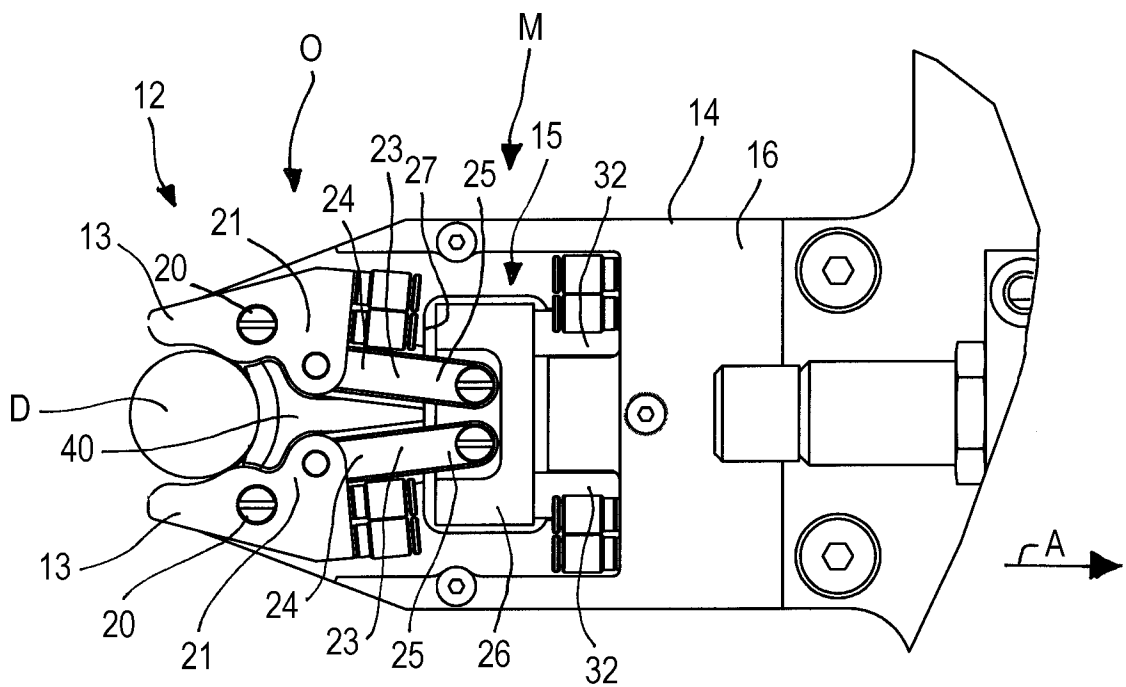


Fig. 5

5/18

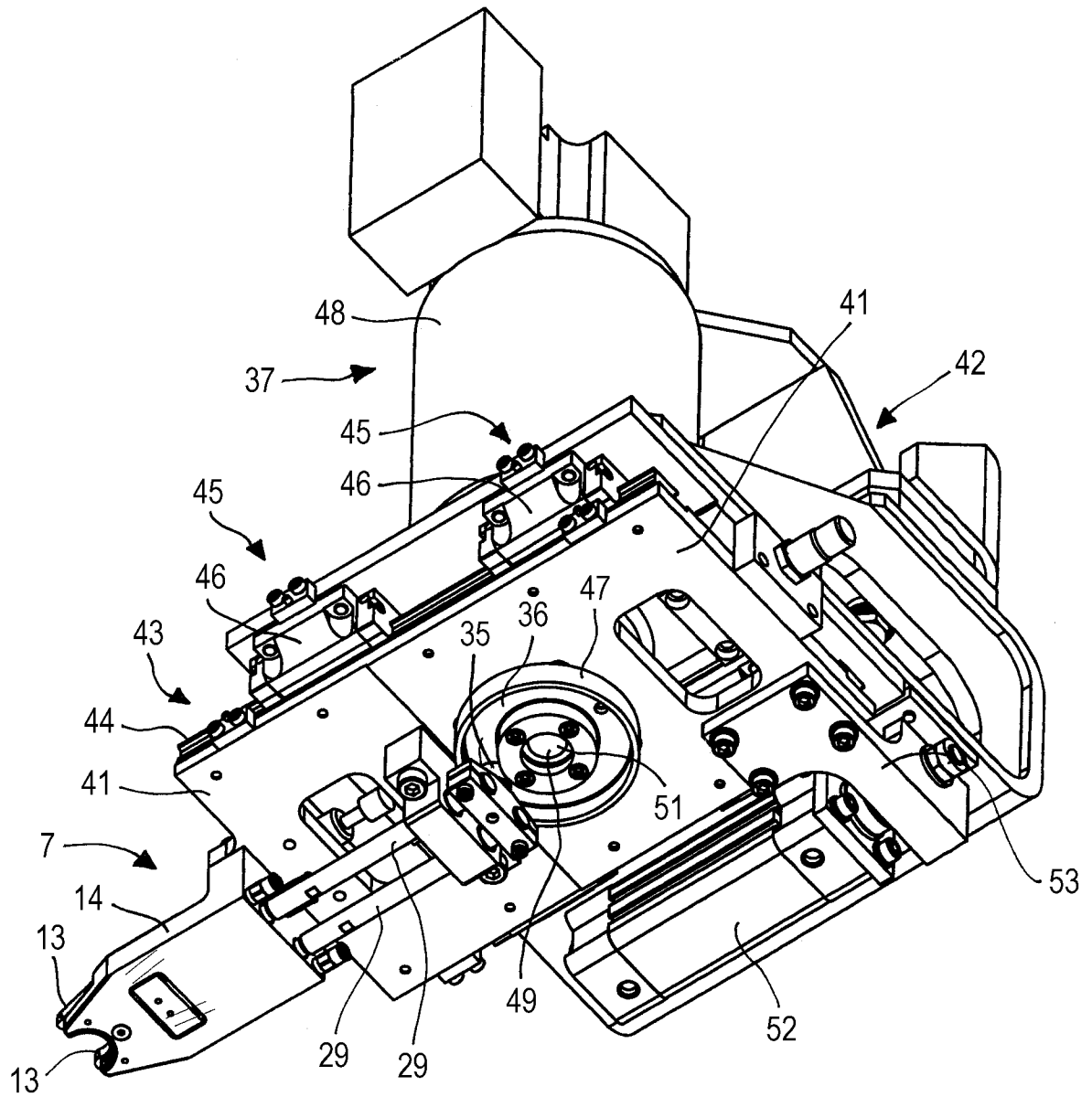


Fig. 6

6/18

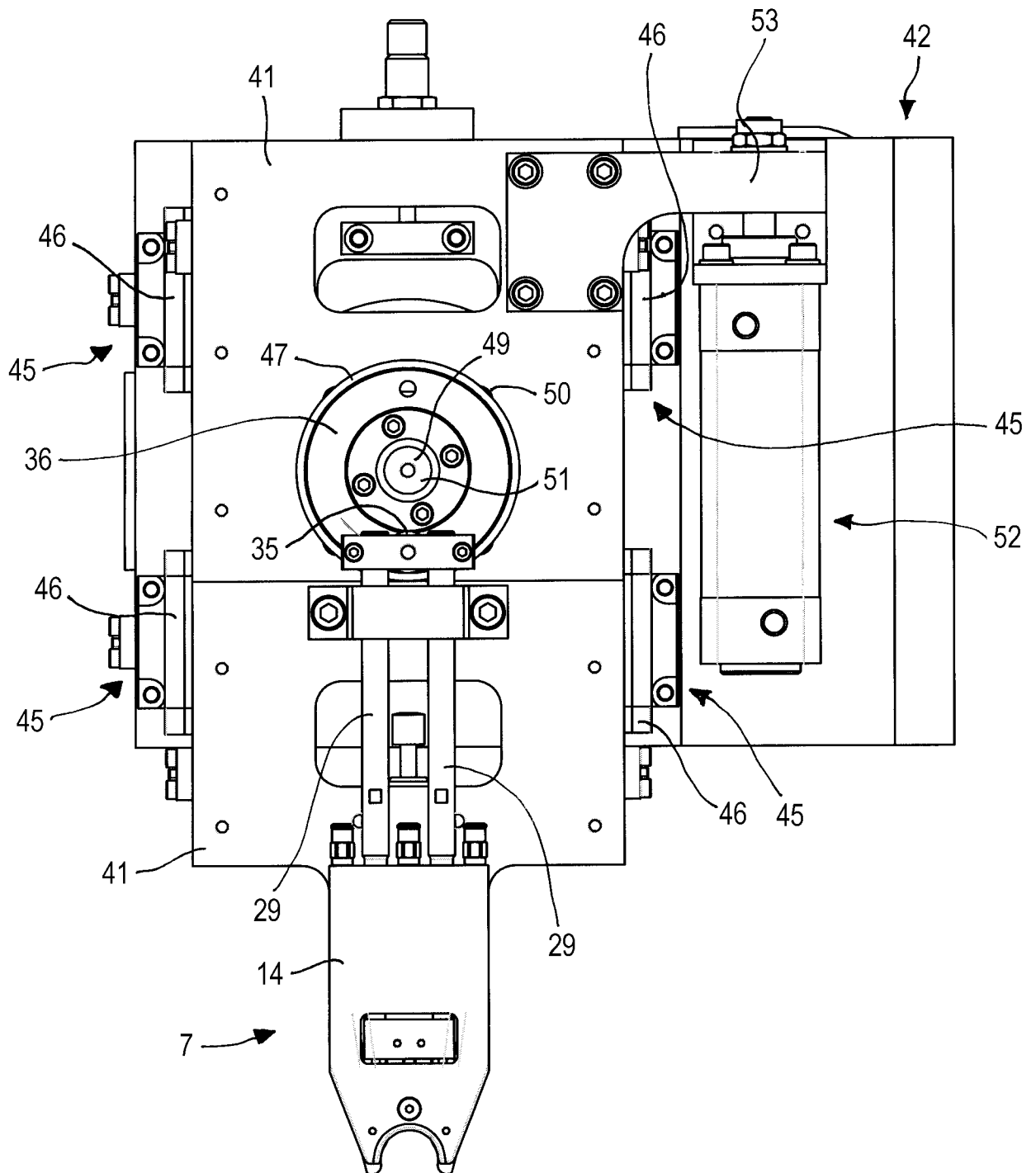


Fig. 7

7/18

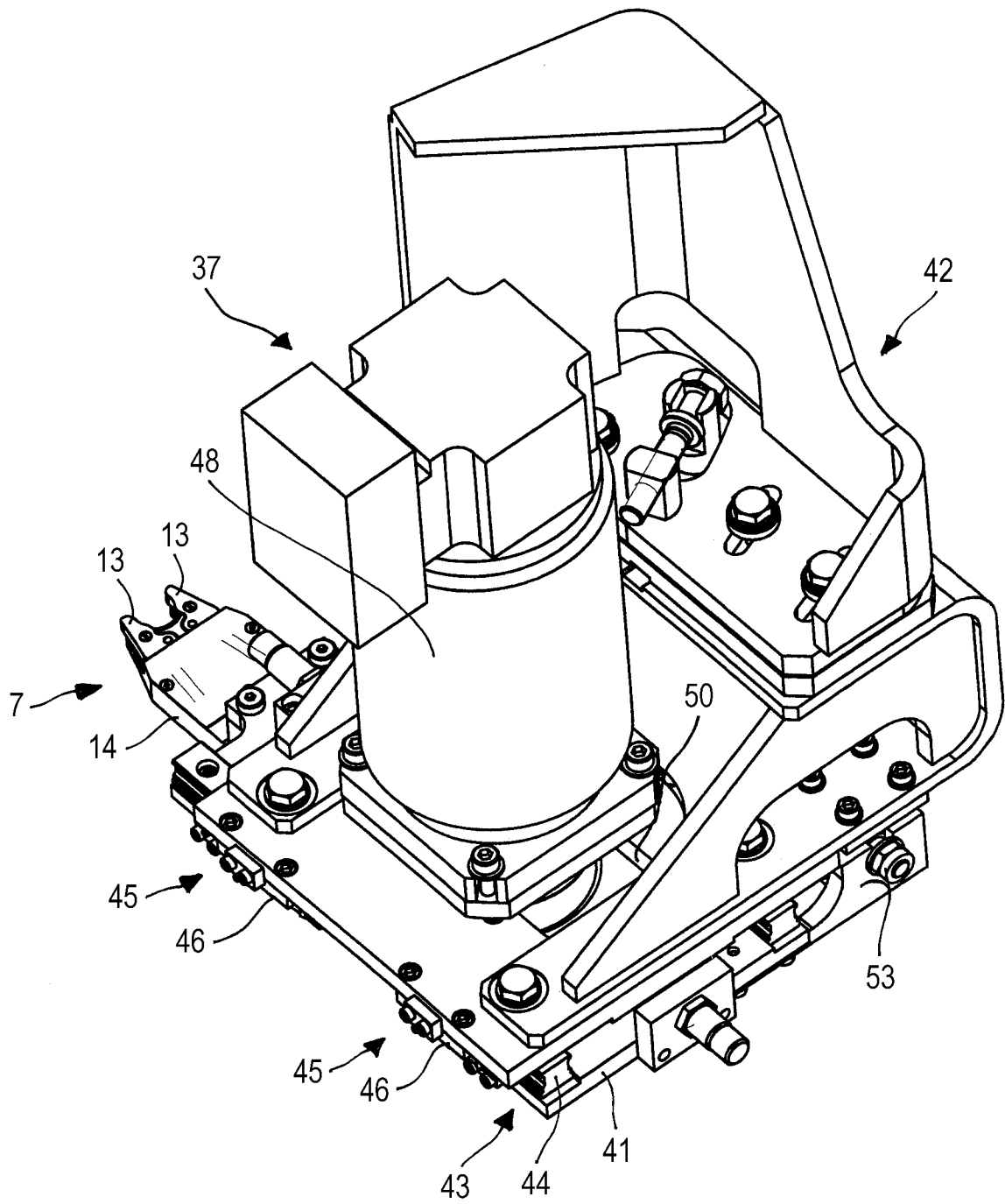


Fig. 8

8/18

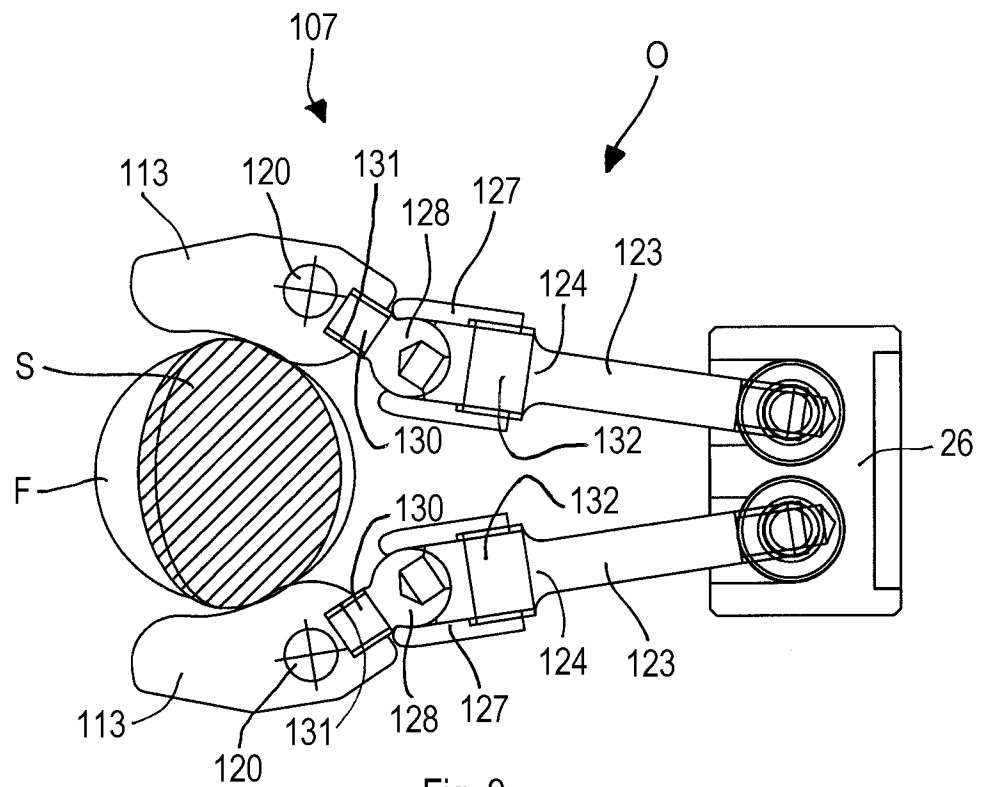


Fig. 9

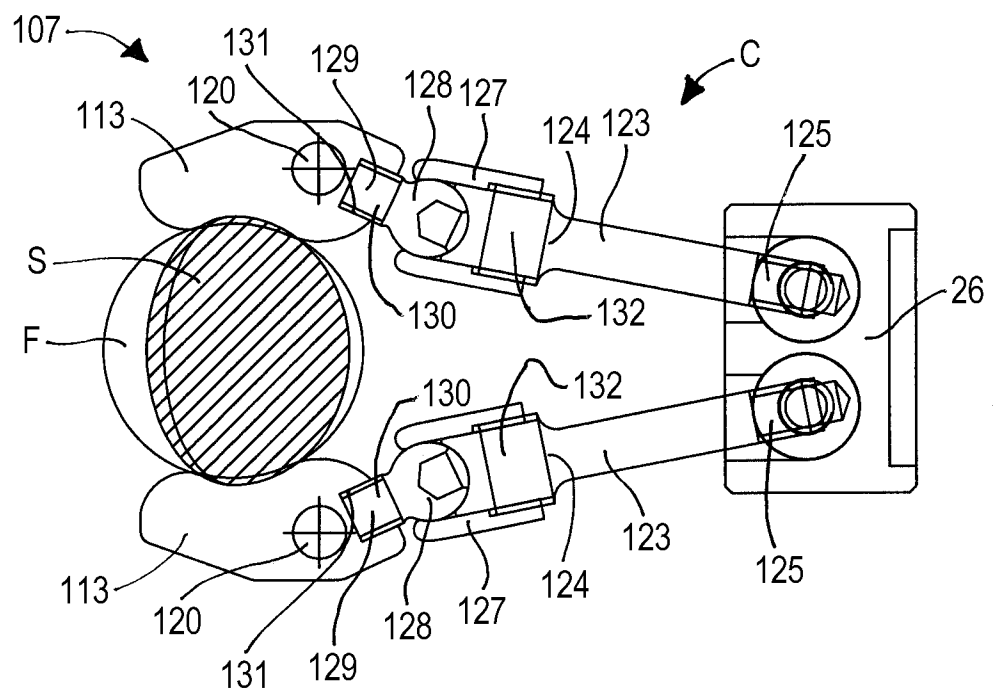
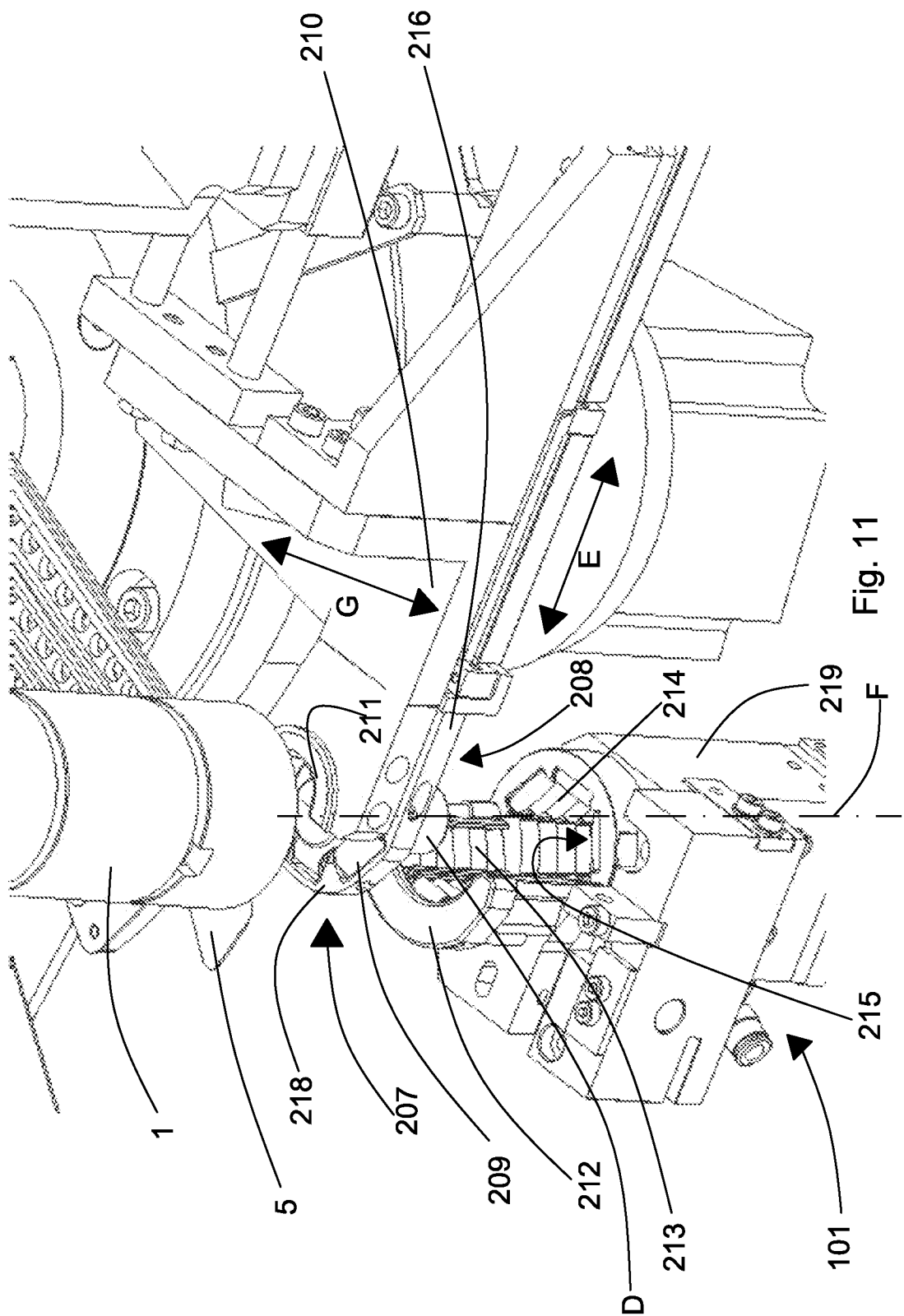
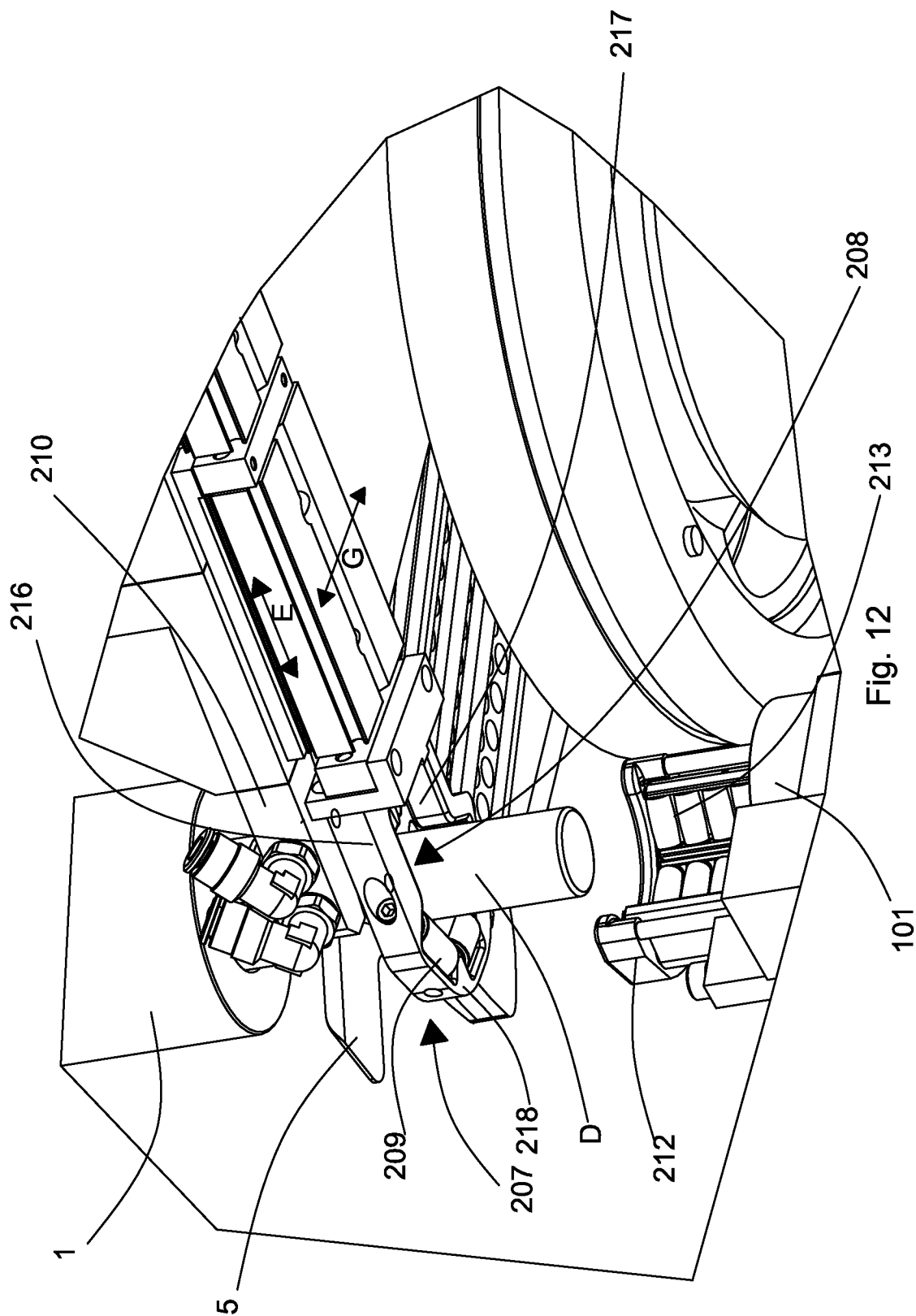


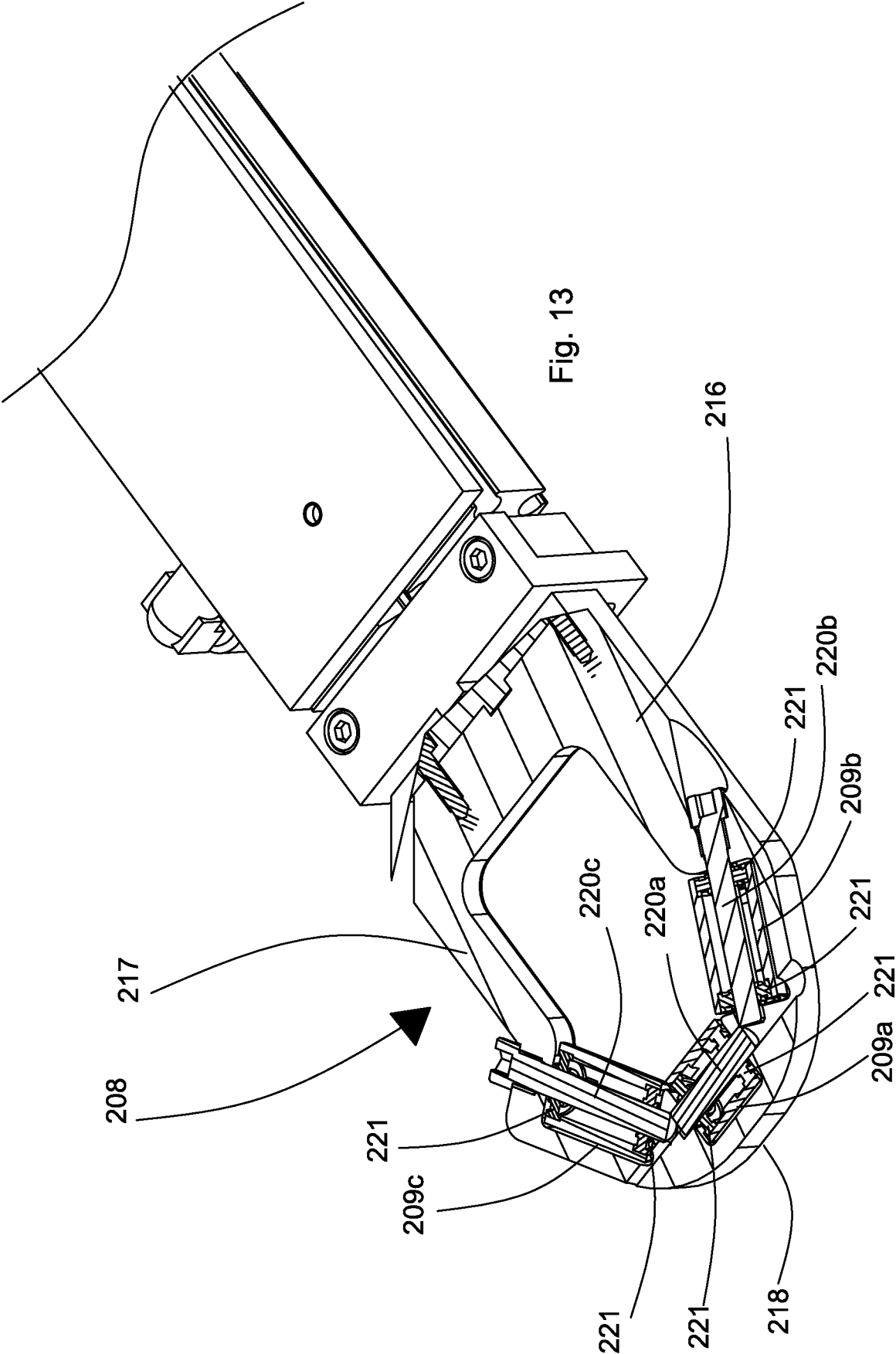
Fig. 10

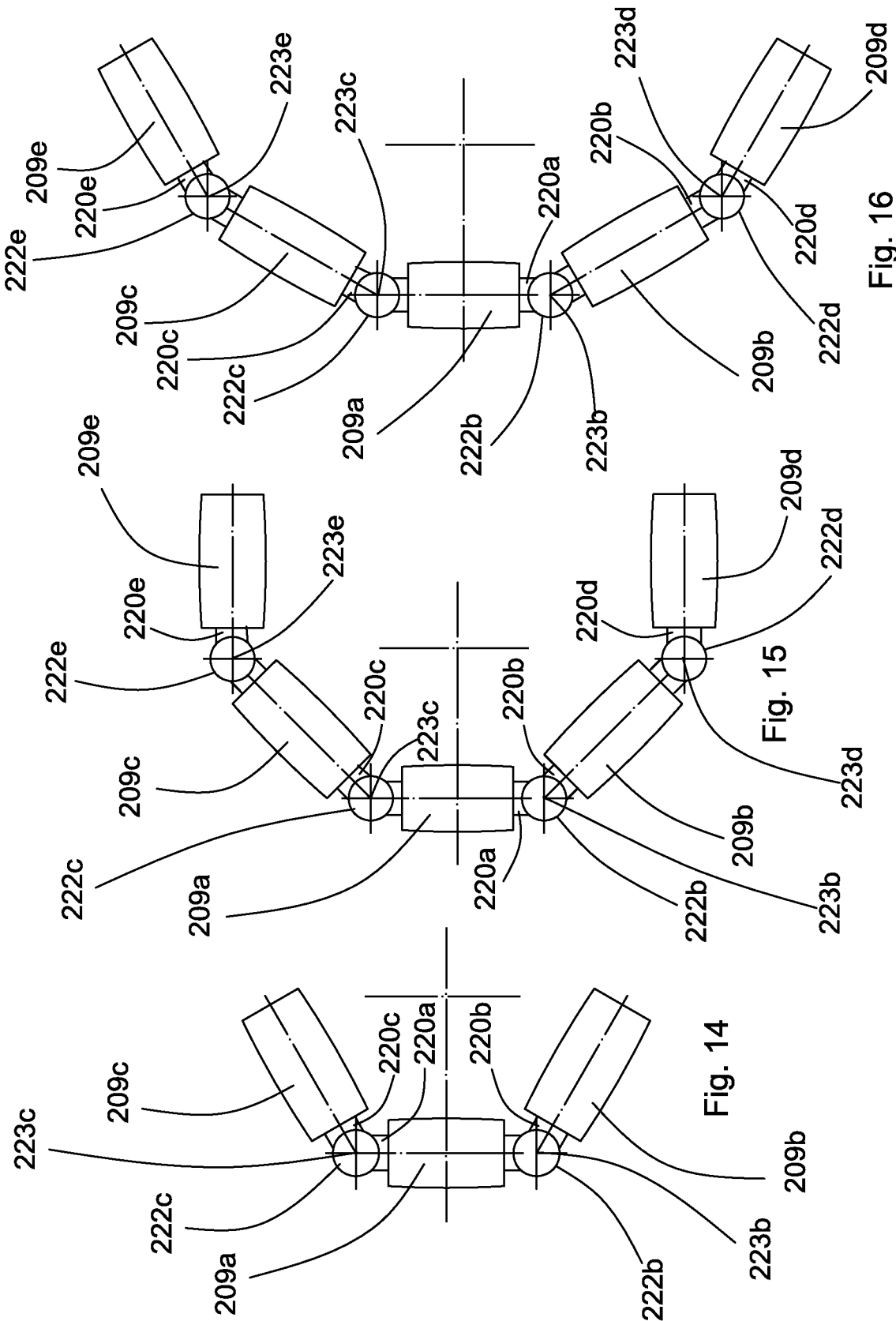
9/18





11/18





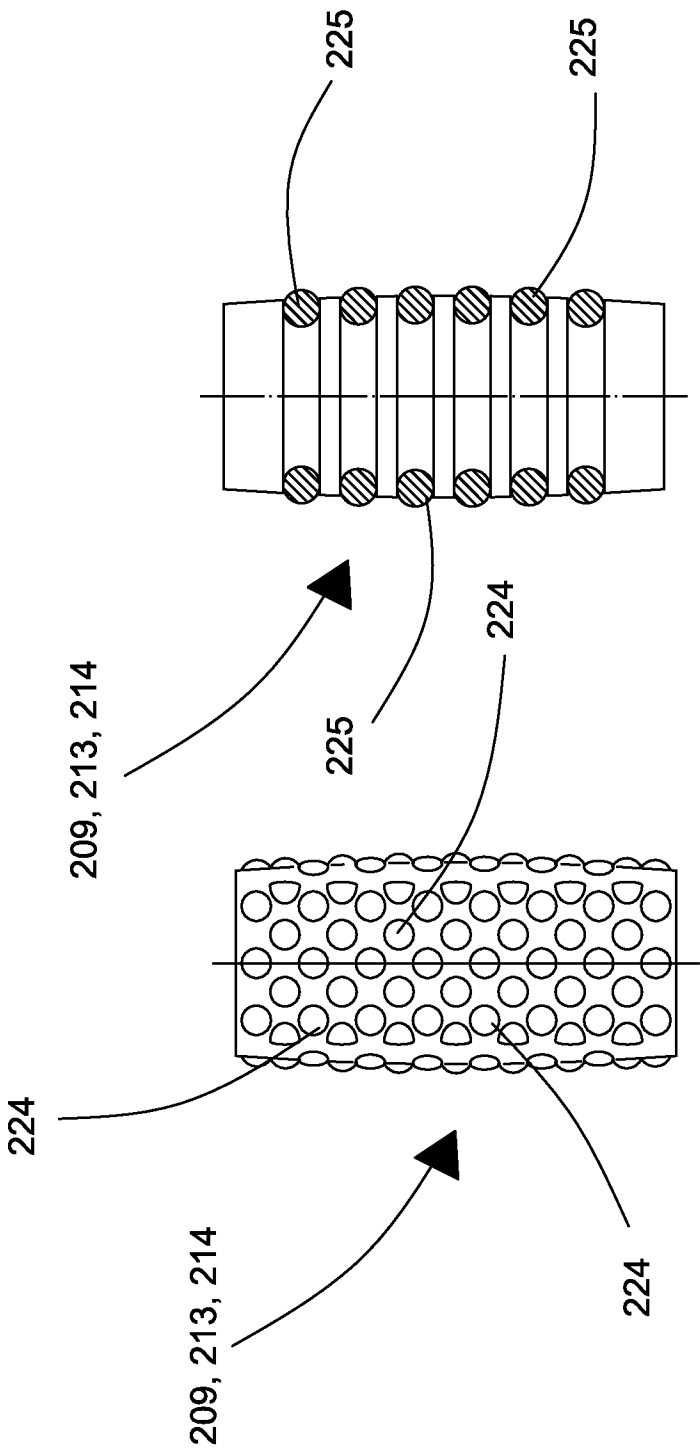


Fig. 18

Fig. 17

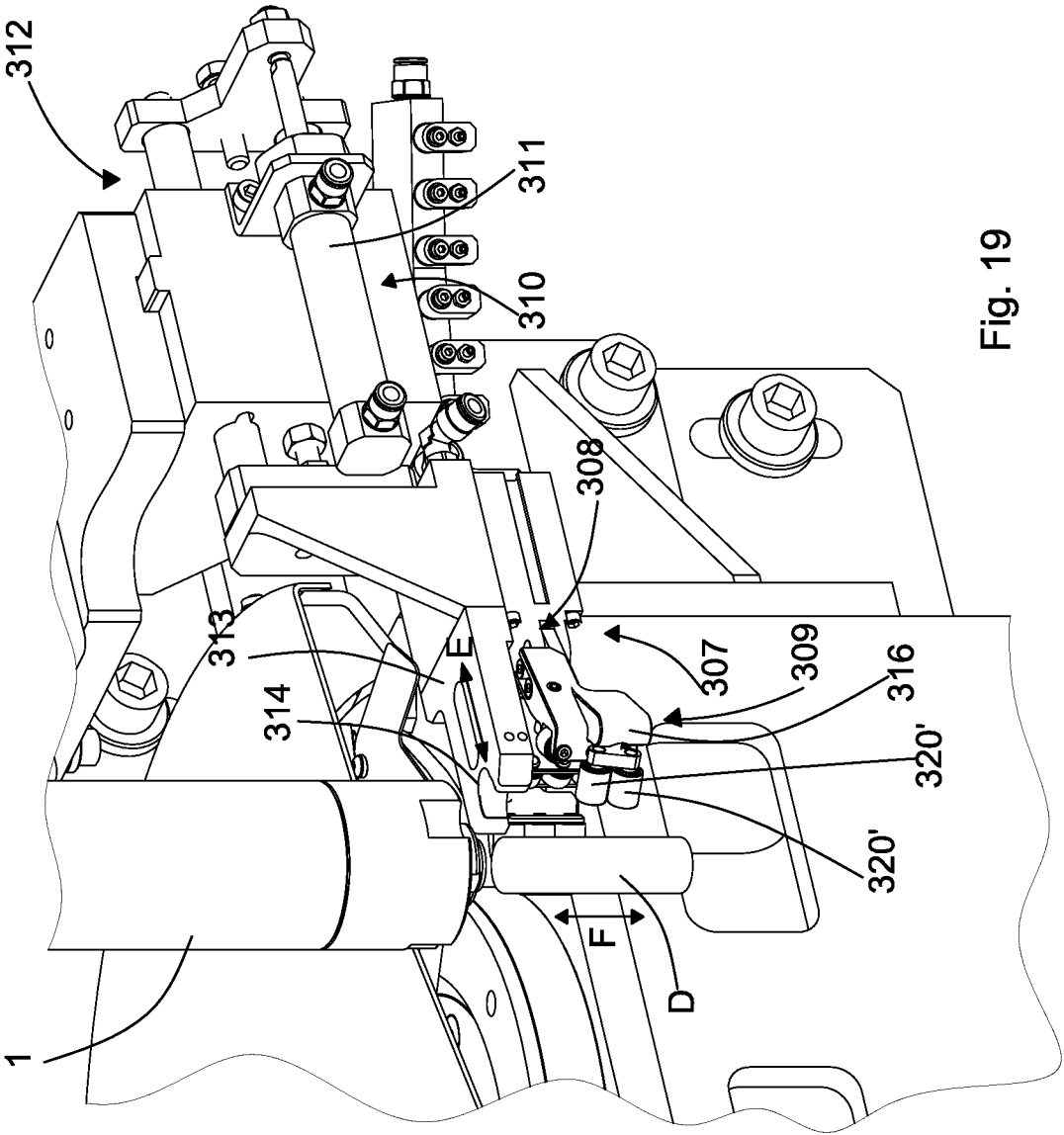


Fig. 19

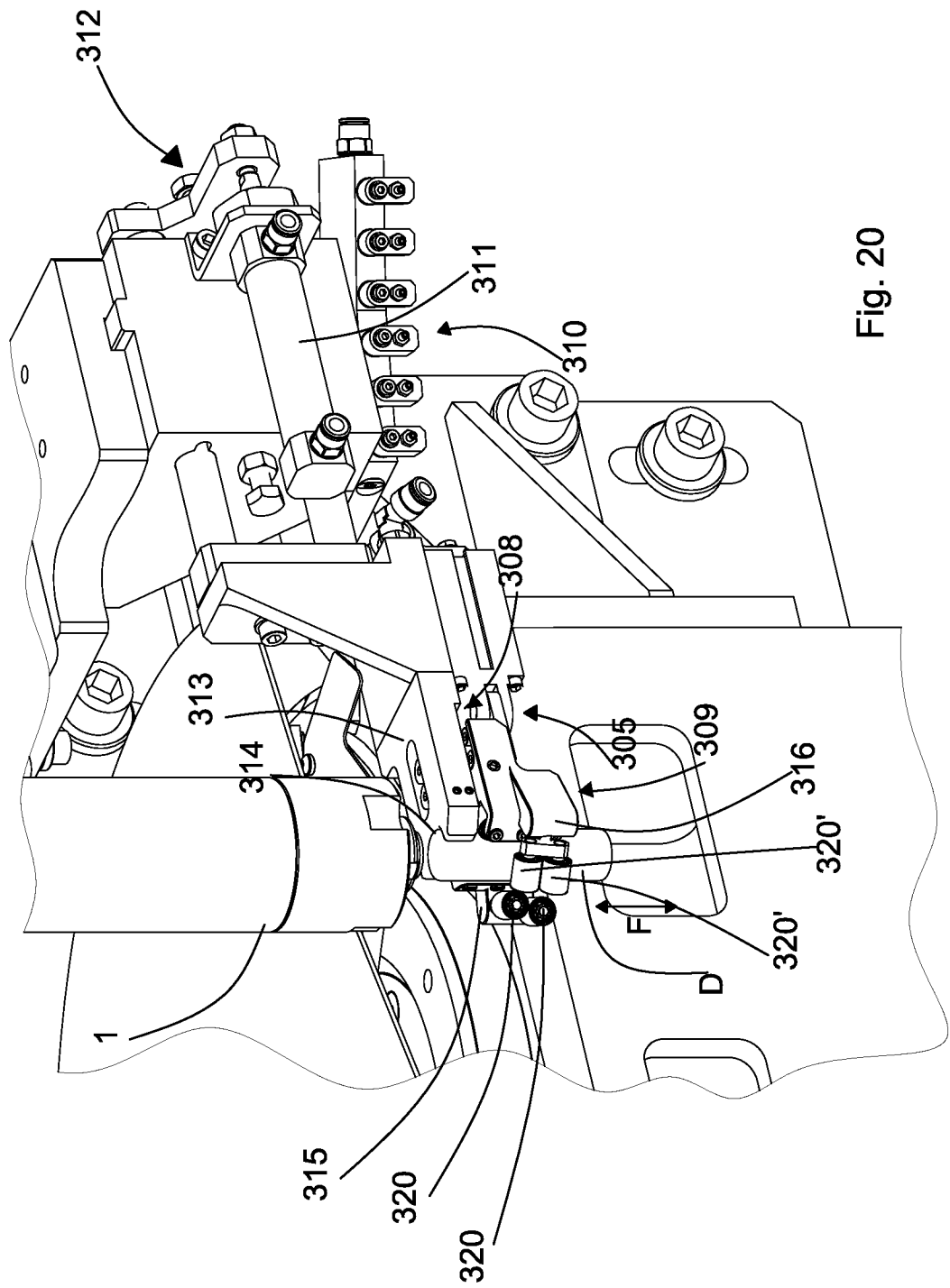


Fig. 20

16/18

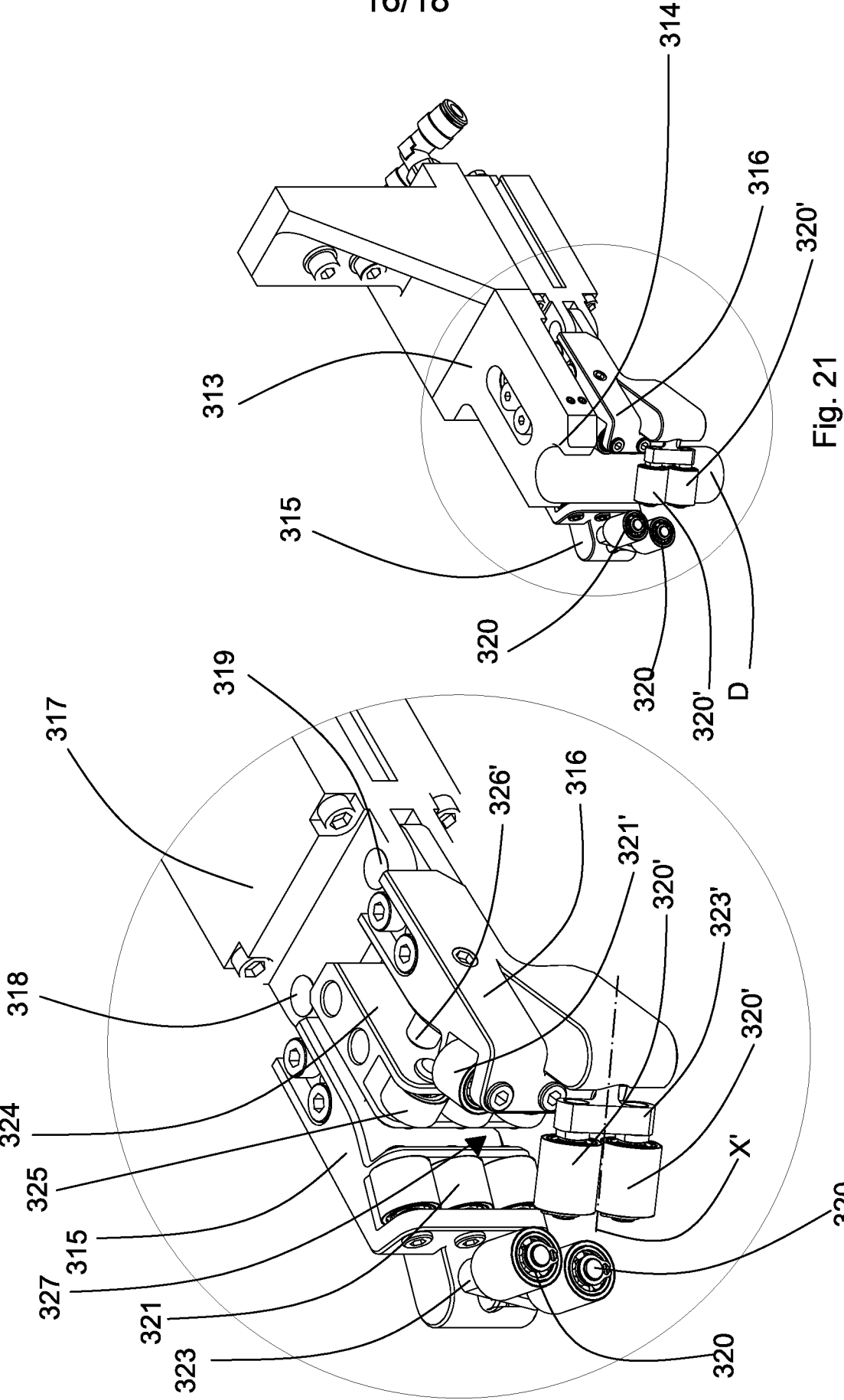


Fig. 21

Fig. 22

17/18

