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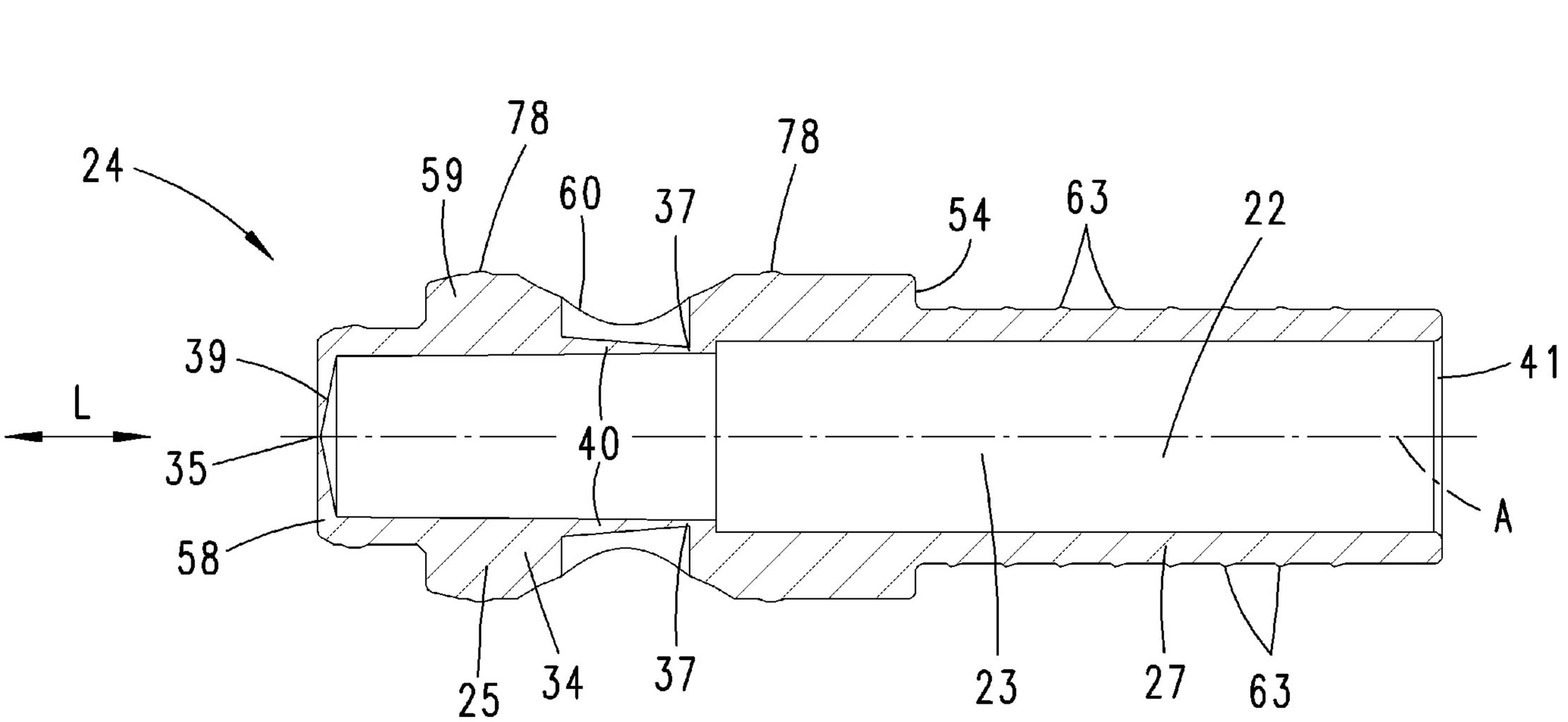
Fig. 11



(57) Abrégé/Abstract:
The invention relates to an injection spigot (24), preferably for an injection head for injection drilling anchors with independent supply of a first and second supply component, wherein the injection spigot (24) has a housing (34) with an internal cavity which

(21) 2 713 194

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(57) Abrégé(suite)/Abstract(continued):
has at least one outlet opening for the outlet of the first and the second supply component. According to the invention, an advantageous improvement may be made, wherein the wall of the housing (34) has at least one first pre-determined breaking point (35) for forming a first inlet opening (36) for a first supply component under pressurisation and at a distance therefrom at least one second pre-determined breaking point (37) to form a second inlet opening (38) for a second supply component under pressurisation. The invention further relates to an injection head for drilling and pressing of drilling injection anchors in which an injection spigot (24) is inserted.

ABSTRACT

The invention relates to an injection spigot (24), preferably for an injection head for injection drilling anchors with independent supply of a first and second supply component, wherein the injection spigot (24) has a housing (34) with an internal cavity which has at least one outlet opening for the outlet of the first and the second supply component. According to the invention, an advantageous improvement may be made, wherein the wall of the housing (34) has at least one first pre-determined breaking point (35) for forming a first inlet opening (36) for a first supply component under pressurisation and at a distance therefrom at least one second pre-determined breaking point (37) to form a second inlet opening (38) for a second supply component under pressurisation. The invention further relates to an injection head for drilling and pressing of drilling injection anchors in which an injection spigot (24) is inserted.

Injection Spigot

The present invention relates to an injection spigot, preferably for an injection head for injection drilling anchors which is suitable for separately supplying at least a first and a second supply component, the injection spigot having a housing which forms an inner cavity that has at least one outlet opening for exit of the first and second supply components.

An injection head of the stated type is known in the prior art from DE 102007008966 A1. As described there, such an injection head is suitable in particular for drilling-in and grouting so-called self-drilling injection drilling anchors in bedrock to be stabilized, in rock or the like. Injection drilling anchors of this kind, which are known per se, may have, for example, a separate drill bit at their tip and have an injection channel running through them in their longitudinal direction, which generally opens out at the front end of the anchor into one or more outlet openings. During the drilling-in, preferably a pressurized flushing medium, for example air or water, can be supplied to the drill hole through the injection channel. In order to grout the injection drilling anchor in the drill hole, a grouting compound can then be forced through the flushing head and the injection channel into the drill hole gap surrounding the injection drilling anchor. Accordingly, the flushing head is used according to the working step for supplying flushing medium (for example water) or grouting compound. Suitable grouting compounds include in particular so-called two-component synthetic resins, one component of which may be a resin (for example water glass) and the other component of which may be a catalyst. To achieve the effect that the two components only cure with each other in the drill hole, they are fed to the injection head separately and only meet in a lost part that is connected to the injection anchor. In DE 102007008966 A1, this lost part is a so-called flushing nut, which can be screwed, with an easily rotatable external thread, into the inner part, and with a comparatively more difficult-to-rotate external thread onto the anchor rod. After the drilling-in and grouting of the injection drilling anchor, the direction of rotation of the drilling drive is reversed to detach the flushing head, the different unscrewing forces causing the flushing nut to leave the inner part as a lost part and to remain screwed on the anchor rod. It will be understood from the above explanation that the commonly used term flushing head means a device which serves not only for flushing the drill hole but also for grouting it. For subsequent use, the injection head may be supplied with a further injection drilling anchor, onto the end of which a further flushing nut is already screwed, possibly ready-loaded in a magazine. The known flushing nut forms a cavity in the interior and has a first inlet opening for connection to a supply line for the separate supply

of a first component as well as second inlet openings for connection to supply lines for supplying a second component, so that the inner cavity to this extent forms a line connection for the supply lines. The inlet openings are produced in the form of bores. To prevent leakages, annular grooves with sealing O-rings inserted in them are provided alongside the bores. With regard to the fact that the known flushing nut is also used for torque transfer, it must consist of a sufficiently strong material. In particular in conjunction with this, the production of this component proves to be relatively complex with regard to the various bores, sealing grooves and types of thread, it also being required that the size does not become less than a certain minimum value, since the anchor rod must be screwed into the flushing nut. When the known flushing nut is used, it is also not possible to rule out the possibility of a certain return flow of the supply components out of the flushing nut after the supply components have been separately forced into the flushing nut and the injection anchor, and the component supply or pressure has subsequently been switched off.

Against this background, it is an object of the invention to develop an injection spigot of the type described at the beginning advantageously such that, in particular, the aforementioned possible disadvantages are avoided to the greatest extent possible.

The object is achieved according to the invention first and foremost in conjunction with the features that the wall of the housing has at least one first predetermined breaking point for forming a first inlet opening for a first pressurized supply component and, at a distance from it, at least one second predetermined breaking point for forming a second inlet opening for a second pressurized supply component. The term predetermined breaking point is understood in a broad sense here within the scope of the invention and, with regard to the geometrical extent, covers the possibilities of meaning not only punctiform and linear but also two-dimensional extents. The invention also includes in its general concept that the housing wall of the injection spigot or connection piece has, as it were in preparation for inlet openings at specific locations of the housing, initially local weak points, preferably wall thickness reductions and/or locally limited punctiform or linear perforations, for example outlining the intended inlet opening, and that the inlet opening is only provided or opened up as a result of a certain pressure being applied. In this way, as explained in more detail below, advantages can be achieved both in terms of production and in terms of use. Firstly, in view of the fact that the inlet openings are still entirely, or at least substantially, closed before pressure is applied, in particular also before the injection spigots are used, protection from damage and soiling is achieved. It is preferably

provided that the first and second predetermined breaking points are each formed at a wall region with a reduced wall thickness in comparison with adjacent wall regions. In particular whenever the wall thickness is in this case reduced only to the extent that there is still a wall thickness (albeit perhaps extremely small), that is to say no perforations are provided, production can be simplified. It is considered to be a practical configuration for the housing of the injection spigot to have a substantially rotationally symmetrical, preferably substantially cylindrical, wall, at one of the longitudinal ends of which the outlet opening for exit of the supply components in the direction of the injection anchor is disposed. At the longitudinal end opposite from the outlet opening, the injection spigot may have an end wall on which at least one predetermined breaking point for a first inlet opening is formed. In the case of a preferred embodiment, it is provided that the predetermined breaking point for the first inlet opening is formed at a wall region, preferably of a circular outline, of which the wall thickness decreases from the outside inward, preferably radially symmetrically and in particular linearly in the radial direction. If the wall thickness thereby decreases toward the center point, there is a punctiform predetermined breaking point at which breaking open occurs first as a result of pressurization by a supply component supplied through the first supply line and then, depending on the pressure, further tearing open of the inlet opening may occur. With respect to one or more so-called second inlet openings for the second supply component, it is preferred that one or more predetermined breaking points, preferably two lying opposite each other on the circumference, are formed correspondingly for this on the circumference of the cylindrical wall of the injection spigot.

It is preferred in this connection that one or more predetermined breaking points, each for a second inlet opening, are formed at a wall region, preferably of a circular outline, with a wall thickness which is suddenly reduced in comparison with adjacent wall regions and decreases in the longitudinal direction of the injection spigot toward the longitudinal end thereof having the outlet opening, preferably decreasing linearly in this direction. To achieve a wall region with a suddenly reduced wall thickness, a depression that forms as it were a cup may be provided in a wall with a comparatively great wall thickness. The preferred predetermined breaking point is located where there is the smallest wall thickness on account of the geometry chosen. Once this location is broken open, depending on the level of pressurization, progressive formation of a tear may occur, starting from there, in particular along the transition in the wall thickness, in the direction of increasing wall thickness of the thickness-reduced wall region, the form of the tear determining the peripheral contour of the inlet opening. Generally, the progression of the tear is

limited by the pressure subsiding as a result of the already existing tear and a certain deflection of the wall regions around which the tear forms. To this extent, the part of the wall region of reduced wall thickness that has not been torn into at the end assumes a retaining function and, in the case of an elastically deformable material, also assumes so to speak the function of a bending joint at which the wall portion around which the tear forms is articulated like a flap valve. Sufficiently elastic properties have the advantageous effect that the flap valves move resiliently back into their starting position of their own accord when the pressure is switched off, that is to say in particular when the supplying of the supply components is ended at the end of the anchor grouting operation, as a result of which the inlet openings are substantially closed again. In this way, return flow is prevented (as in the case of heart valves), in particular once the injection head has been detached from the injection spigot or connector. Within the scope of the invention, a variation in the wall thickness is possible within wide ranges of values or relative values, both within the wall regions of reduced wall thickness and in relation to the adjacent thicker wall regions. It is preferably provided that, at the wall region of reduced wall thickness at which the predetermined breaking point for the second inlet opening is formed, the maximum wall thickness is a multiple of the minimum wall thickness occurring there, preferably two to four times, and that the maximum wall thickness of this wall region of reduced wall thickness is less than the wall thickness of the wall region surrounding the cup mentioned, preferably approximately half or approximately one third in relation thereto. It is also preferred within the scope of the invention that the injection spigot is produced from plastics material, in particular from polyamide. It is also preferred in this connection that the injection spigot is designed as a plastics injection molding or is produced by the plastics injection-molding process.

It is regarded as a suitable development that the cylindrical wall of the injection spigot has, in the rear region of its length, in the area of the wall regions of reduced wall thickness that are associated with the second inlet openings, a continuous peripheral annular groove on the outside. This allows the flow of the supply component to the inlet openings distributed around the circumference to be made more uniform. In particular if it is produced as a plastics injection molding, this provides the possibility in a simple manner that the cylindrical wall of the injection spigot has, in a front region of the length between the predetermined breaking points for the second inlet openings and the outlet opening, on the outside, one or more annular projections, integrally formed, spaced apart in the longitudinal direction and extending in the circumferential direction. This front region of the length may serve for inserting the injection spigot into the

injèction channel (in particular in a widening of the channel) of the injection anchor. The terms front and rear, or front end and rear end, relate to the direction of advancement of an anchor during drilling-in. Given diameters that are suitably made to match one another, the ribs undergo a certain deformation during insertion and oppose later withdrawal of the injection spigot or connector from the anchor, so that a desired high axial retaining force can be realized. As an alternative or in combination, there is the possibility that the cylindrical wall of the injection spigot has, on each of both sides of the already mentioned circumferential groove, a raised and integrally formed annular bead running continuously around the circumference. If the diameters are appropriately made to match, the two annular beads undergo a certain deformation during insertion of the injection spigot into a recess provided for this purpose in the injection head or in the rotatable inner part thereof, so that the annular beads act as seals.

According to the statements made above, the known flushing nut, in which the two resin components meet for the first time, is replaced by the injection spigot according to the invention, which can be produced at comparatively lower cost. In particular, it may be a ready-to-install polyamide injection molding with ready-integrated seals and flap valves. For use, the injection spigot is preferably disposed at the end of the injection anchor, that is to say ahead of a static mixer possibly provided therein. In comparison with the conventional flushing nut, it is of advantage that the anchor rod is not screwed into the flushing nut, but instead the injection spigot can be inserted into the anchor rod. The miniaturization of the injection spigot or connector thereby made possible, to this extent achieves a great cost advantage over the known flushing nut, which requires laborious machining. As explained, in the inserted state of the injection spigot or connection piece, the circumferential ribs that are possible in the front region of the length thereof bring about an increase in the axial retaining force, which as a result can be chosen preferably to be greater than the axial retaining force between the inner part of the flushing head and the injection spigot, so that, when the injection anchor is unscrewed from the flushing head, the injection spigot is also automatically and reliably withdrawn axially from the flushing head and can remain as a lost component on the anchor, acting at the same time as a terminal seal. The cost advantage that is possible by the invention is obtained in particular because of the preferred use as a lost part and the numbers of items that are to this extent required.

The invention is described in more detail below with reference to the accompanying figures, which show a preferred exemplary embodiment of the injection spigot according to the invention and a preferred use, and in which:

Figure 1 shows a longitudinal section of the injection spigot according to the invention as provided by a first preferred embodiment, in conjunction with an injection head preferred for use, after the grouting of a drilling injection anchor;

Figure 2 shows the arrangement shown in Figure 1, but after the detachment of the injection spigot from the injection anchor;

Figure 3 shows a sectional view along a section line III-III in Figure 2;

Figure 4 shows a longitudinal section along section line IV-IV according to Figure 2;

Figure 5 shows a perspective view of the arrangement represented in Figure 2;

Figure 6 shows the injection spigot that is shown in Figure 1, inserted into the injection anchor, with the representation shortened by being broken up;

Figure 7 shows the injection spigot in an enlargement of detail VII in Figure 1, with inlet openings opened;

Figure 8 shows the arrangement shown in Figure 7, but with a new injection spigot with inlet openings still closed;

Figure 9 shows the end of the grouted injection anchor that is shown in Figure 1, after the detachment of the injection head from the injection spigot;

Figure 10 shows a perspective view of the injection spigot that is shown in Figure 1, but enlarged in comparison, and

Figure 11 shows a longitudinal section of the injection spigot that is shown in Figure 1, likewise enlarged in comparison.

The injection head 1 according to the invention, as provided by a first preferred embodiment, is described with reference to Figures 1 to 10, in conjunction with components interacting therewith. The injection head has a flushing head 2, which comprises an outer housing 3 and an inner part 4, which is accommodated rotatably therein in relation to a longitudinal axis A. Associated with the outer housing 3 is a first flushing ring 5, attached to the outside of which is a first supply connection 6 for supplying a first, preferably liquid, supply component, and a second flushing ring 7, which is kept at a distance axially from the first flushing ring 5 in the longitudinal direction L (i.e. in the direction of the longitudinal axis A) and attached to the outside of which is a second supply connection 8 for the separate supply of a further, preferably liquid, supply component. The inner part 4 has, at the rear end, a connection 9 with a receiving opening 10 for receiving in a rotationally form-fitting manner a connecting end 11 of a drilling drive 12, only the front portion of which is indicated by dashed lines. At the front end, the inner part has, as connecting means for the connection of an anchor rod 14 provided with an external anchor thread 13 (cf. also Figure 6), a threaded bore 17 provided with an internal thread 16 matching the anchor thread (cf. also Figures 2 and 4). The threaded bore 17 with the internal thread 16 represents to this extent a connecting means for the connection of an anchor rod 14 provided with a corresponding external anchor thread 13. It is noted that only the rearmost anchor rod 14 of a drilling injection anchor 15 is respectively represented in the figures, but, in a way known per se, said anchor may, if required, also have a number of anchor rods connected for example by threaded coupling nuts, and in particular a drill bit at the tip. As Figures 1, 7 and 8 particularly show, the rotatable inner part 4 has inside it a first supply line 18, which is connected to the first supply connection 6, and four second supply lines 19, which are spaced apart around the circumference each by a quarter turn and are connected to the second supply connection 8. The first supply line is formed by a bore 20 running centrally in the longitudinal direction L and two radial bores 21 running radially from the rear end thereof to the surface. The first and second supply lines 18, 19 are directed in the direction of a line connection 22 shared by them in the inner cavity 23 of an injection spigot 24. The latter is inserted (cf. Figures 7 and 8), with the rear region 25 of its length, into a recess 26, which is disposed in axial extension of the threaded bore 17, is of reduced cross-section in comparison with the latter and is substantially cylindrical, and inserted in the region of the front portion 27 of its length in a force-fitting manner into a widening 28 of the injection channel 29 of the anchor rod 14 that is screwed into the threaded bore 17. A supply line for a desired first supply component may be connected to the first supply connection 6 and this first supply component supplied to the

injèction spigot 24 through the annular groove 31 in the first flushing ring 5, the first supply line 18 and a sprung nonreturn valve 30, which is disposed at the end of the line and opens when there is sufficient supply pressure. A supply line for a further desired supply component may be connected to the second supply connection 8 and this further supply component supplied to the injection spigot 24 separately from the first supply component, through the annular groove 33 in the second flushing ring 7, through the second supply lines 19 and through the sprung nonreturn valves 32, which open when there is sufficient supply pressure. As Figure 8 shows, the housing 34 of the injection spigot 24 has a prepared first predetermined breaking point 35 for forming a first inlet opening 36 (cf. Figure 7) for the first supply component and, at a distance from this breaking point, two second predetermined breaking points 37 each for forming a second inlet opening 38 (cf. Figure 7). Said predetermined breaking points are respectively formed at a wall region 39, 40 with a reduced wall thickness in comparison with adjacent wall regions and are located there, in the region of the smallest wall thickness in each case. The term predetermined breaking point should be understood in a broad sense here and geometrically includes the possibility of a punctiform, linear or two-dimensional extent. If, as represented in Figure 8, a new injection spigot is used, its predetermined breaking points are initially not yet broken, i.e. the associated inlet openings 36, 38 are still closed. With regard to their shaping and dimensioning (in particular with regard to the minimum wall thickness chosen), the predetermined breaking points 35, 37 are in each case made to match the supply pressures for the supply components that can usually be set during the operation of the injection head, in such a way that they break open under suitable pressurization, as represented in Figure 7, so that the respective inlet opening 36, 38 is opened and the supply component, which is in each case still separate there, flows into the inner cavity 23. Only in this cavity 23, i.e. at the line connection 22, do the two separately supplied components (for example resin and catalyst) come into contact. As Figure 11 illustrates in particular, the inner cavity 23 has an outlet opening 41 for the joint exit of the first and second supply components in the direction of the drilling injection anchor 15.

As mentioned above, Figure 1 shows the injection head 1 after a drilling injection anchor 15 (only partially represented) has been drilled into a wall 44 (for example of rock) and after the drilling injection anchor 15 has been grouted in the formed drill hole 45 by means of a grouting compound 46, which has been formed by mixing the two supply components supplied through the supply connections 6, 8 and has then set in the drill hole. As a result of the anchor thread 13 and the unevennesses in the wall of the drill hole, an effective axial shearing bond is formed

by the grouting compound 46 that has hardened out a short time after mixing. For better representation of details, in Figure 1 the grouting compound 46 is shown only in the drill hole 45, i.e. not in the flushing head and the drilling injection anchor. In Figure 1, the drilling injection anchor 15 has been drilled into the wall to a desired depth, at which a supporting plate 47 (so-called collar plate) is pressed against a lagging mat 49, provided in front of the wall 44, by a ball seat nut 48, which is screwed on by means of an internal thread until it comes to an axial stop against the rotatable inner part 4.

According to a method according to the invention, which is preferred in particular with regard to the use shown in Figure 1, it is regarded as suitable that, in preparation for a drilling operation, first the preassembled unit comprising at least one anchor rod 14 and an injection spigot 24 that is represented in Figure 6 is brought to the flushing head that is shown in Figures 2 to 5 and is connected to it. To produce this unit, first of all a first so-called static mixer 50, which is known per se and has a multiplicity of so-called chicanes 51 of helical form disposed one behind the other in the longitudinal direction L, is pushed into the injection channel 29 with a surrounding, in particular separate, enclosing element 52, which may be, for example, a pipe or a flexible tube, and axially fixed therein with the enclosing element 51, in a suitable way, so that it forms an axially fixed barrier to the flow pressure of the supply components in the injection channel 29 that can be flowed through by the different supply components, which, as they flow through, undergo intensive mixing. In the exemplary embodiment chosen, the injection spigot 24 represented in detail in Figure 11 was subsequently inserted with the front region 27 of its length, at the end face of which there is the outlet opening 41, into a channel widening 28 of the anchor rod 14 adjacent the static mixer 50. In this case, on account of the matched diameters, the region 27 of the length with the cylindrically machined channel widening 28 forms a first insert-press connection 53, which can only be separated again if a relatively high, so-called first axial force is applied. The outer side of the injection spigot 24, which in the example is rotationally symmetrical and substantially cylindrical, forms at the transition from the rear region 25 of the length to the front region 27 of the length, by a sudden reduction in cross-section, an axial stop face 54, which forms an axial stop with the end face 55 of the anchor rod 14. The inner cavity 23 is of a substantially cylindrical form. In it, a second static mixer 56 has been fitted and pushed against a rear-end axial stop, formed by an annular step 73 in the cavity 23. In this respect, the terms rear end and front end (or rear and front) again relate to the direction of advancement of the anchor rod during drilling-in. In this way, the second static mixer 56 is fixed in the longitudinal direction L, apart from a small freedom of movement permissible in the

example, without a connection to the injection spigot 24 at its circumference being necessary (even though such a connection would be additionally possible). While the annular stage 73 forms the rearward axial stop, a forward displacement is prevented by the axially fixed static mixer 50. For automated drilling and grouting operation, the unit shown in Figure 6 may be preassembled in relatively large numbers and preferably fed to the arrangement shown in Figures 2 to 5 particularly while loaded in a magazine. For connection to the injection head 1, the anchor rod 14 preassembled with the injection spigot 24 is screwed by means of its anchor thread 13 into the threaded bore 17 of the rotatable inner part 4, until this is not possible any further (as indicated in Figure 8) at the end of the inner thread 16 or at an axial stop (the latter may lie at the rear end of the injection spigot 24). In this case, the injection spigot 24 is pushed, with the rear region 25 of its length, into the substantially cylindrical recess 26 (cf. Figure 2) in the longitudinal direction. The shaping or dimensioning is chosen such that the rear end face 58 (cf. Figure 11) of the injection spigot 24, at which the first predetermined breaking point 35 for the first inlet opening 36 is located, comes to lie axially against a pressing bush 62, which has been inserted into the inner part 4, and the sprung nonreturn valve 30, which has been axially fixed in the center channel of the bush. In this way, front-end and rear-end axial fixing of the injection spigot 24 is also achieved. In this position, which is shown enlarged in Figures 7 and 8, moreover, suitable positioning of the second inlet openings 38 (or of the second predetermined breaking points 37) in the longitudinal direction L in relation to the outlet end of the second supply lines 19, or the sprung nonreturn valves 32 axially held therein, is also ensured. As shown in the figures, on the cylindrical wall 59 of the injection spigot 24, at the axial position of the wall regions 40 of reduced wall thickness, there is a peripheral annular groove 60 on the outside, which is axially in line with the supply lines 19. The rear region 25 of the length of the injection spigot 24 forms, with the recess 26 in the inner part 4, a second insert-press connection 61, the so-called second axial force that can be transferred by this connection 61 being less than the first axial force that can be transferred by the first insert-press connection 53. If the injection head 24 or its rotatable inner part 4 is later unscrewed from the anchor rod 14 (preferably by reversing the direction of rotation on the drilling drive), the axial forces of different magnitude that can be transferred by the two insert-press connections 53, 61 have the effect that the injection spigot 24 is automatically withdrawn from the inner part 4 and can remain as a lost part at the end of the injection drilling anchor. Starting from the installation state shown in Figure 8, in which the first and second predetermined breaking points 35, 37 are not yet broken, i.e. the first and second inlet openings 36, 38 are still closed, in order to arrive at the state shown in Figure 7 (corresponding to Figure 1), the respective individual supply

component is supplied under pressure through the supply connections 6, 8, whereby the sprung nonreturn valves 30, 32 open, the respective supply components press against the wall regions 39, 40 of reduced wall thickness and finally break the predetermined breaking points 35, 37, so that the inlet openings 36, 38 are opened up. In the example chosen, the injection spigot 24 is a component produced in one piece from the plastics material polyamide by the injection-molding process.

A further special feature of the injection head shown as an exemplary embodiment is that on it there is a releasable coupling securement for the torque-transferring connecting end 11 of the drilling drive 12. As Figures 3 and 4 illustrate in particular, this is brought about by two securing elements 64, which in the example are pins 65, and by the inner part 4 having, in a cross-section Q running perpendicularly to the longitudinal direction L at the receiving opening 10, two parallel spaced-apart through-bores 66, which serve as mounting openings 68 for the pins, these being adapted in their diameter for releasable clamping fastening of the pins. Suitable pins are commercially available and known with regard to the general way in which they function. The lateral spacing a between the through-bores 66 is chosen to be less than the diameter D of the adjacent portion 67 of the length of the receiving opening 10. This means that, in the fastening or clamping state of the pins 65, the cross-section of the receiving opening 10 is reduced in comparison with the state without pins 65. In the exemplary embodiment, the drilling drive 12 chosen is one in which the connecting end 11 has, at a distance behind its connecting portion 69, a projection 70 which runs in the form of a ring around the circumference and the diameter of which substantially corresponds to the diameter D. The releasable securing elements 64 make the projection 70 act like a securing projection with the effect of a form fit, which, in the direction of a longitudinal projection (along the longitudinal direction L), radially overlaps the securing elements 64 in the fitted state and thereby forms a releasable separating securement with a form fit in the longitudinal direction L when the drilling drive connecting end 11 is connected. In the example shown, the connecting portion 69 of the drilling drive connecting end 11, reaching as far the front free longitudinal end, is provided, for torque transfer, with an external thread 71, which matches an internal thread 72 provided in a portion of the length of the receiving opening 10. The aforementioned features achieve the effect that, when the direction of rotation of the drilling drive 12 is reversed for separation from the drilling injection anchor 15, the inner part 4 cannot become unscrewed from the drilling drive connecting end 11, so that constant torque transfer is ensured, and with it reliable operation. Detachment of the drilling drive 12 from the flushing head 2 is only made possible by the pins 65

both being removed from the bores 66 by a manipulation - one generally familiar to the person skilled in the art. The pins 65 are selected such that they withstand the centrifugal forces occurring during operation and the percussive stress during drilling.

Further special features of the preferred embodiment, shown by way of example, of the injection spigot according to the invention are explained in more detail below with reference to Figures 6 to 11. Figure 10 in particular clearly shows that the injection spigot is formed as a substantially rotationally symmetrical sleeve part. It is shown in conjunction with Figure 11 that the predetermined breaking point 35 for the first inlet opening 36 (cf. Figure 7) is formed on the rear end wall 58 at a wall region 39 which to this extent is circular and the wall thickness of which decreases from the outside inward in a radially symmetrical linear manner to a small fraction of the peripheral wall thickness. At the predetermined breaking point 35, the wall thickness may be reduced in particular down to a membrane- or film-like residual thickness, so that tearing open occurs even under comparatively low pressurization. Figure 7 shows the first inlet opening 36, which is thereby formed on the assumption that tear lines in the wall 39 radiate out from the predetermined breaking point 35 in the form of a star and through which the first supply component, supplied through the first supply line 18, is supplied into the inner cavity 23. Although Figure 1 shows the state after the grouting of the injection anchor, the enlargement according to Figure 7 still shows for purposes of illustration the open position of the inlet openings 36, 38, which then goes over resiliently into a closed position of the wall portions. Correspondingly, on account of the elastic property of the plastics material used, Figure 9 shows that the wall regions 39, 40 of reduced wall thickness are deformed back again of their own accord after the unscrewing of the flushing head, so that the inlet openings 36, 38 are substantially closed again. However, to present a clear overview in Figure 9 also, the injection spigot 24 and the drilling injection anchor 15 are shown without the grouting compound 46 inside that is still present there. Figures 10 and 11 also reveal that the two predetermined breaking points 37 lying opposite each other at the circumference, each for a second inlet opening 38 (cf. Figure 7), respectively lie at a wall region 40 which has a circular outline and a suddenly reduced wall thickness in comparison with adjacent wall regions. While the inner wall of the cavity 23 runs in a cylindrical manner, the outer side of the wall regions 40 is of a planar form and thereby runs at an acute angle with respect to the longitudinal direction L. Each wall region 40 to this extent forms an inclined planar base of a cup-like depression formed in the housing wall axially level with the annular groove 60. The shaping described has the effect of pre-setting the position of the predetermined breaking point 37 at the location of least wall

thickness. This is the point of intersection of the circular peripheral line of wall region 40 with the sectional plane of Figure 11 that lies facing the front region 27 of the length or the outlet opening 41. The terms front end and rear end or front and rear relate here, as before, to the direction of advancement during the drilling-in of the anchor.

After the tearing-open of the predetermined breaking point 37, pressurization causes tearing to continue from there along part of the circular peripheral line of wall region 40. As Figure 7 shows in this respect, the outlined portion of the wall region 40 is inwardly deflected by the pressurization and forms so to speak a flap valve with a valve flap 76, which is articulated at a bending joint 77. The latter is formed by part of the wall region 40 that has not been reached by the tear on account of its greater wall thickness in comparison with the predetermined breaking point 37. Figures 10 and 11 also show that the cylindrical wall 59 in the front region 27 of the length between the predetermined breaking points 37 and the outlet opening 41 has on the outside a multiplicity of annular projections or ribs 63 spaced apart in the longitudinal direction L. Provided on each of both sides of the circumferential groove 60 on the cylindrical wall 59 is a raised and integrally formed annular bead 78, running around the circumference in the form of a ring, to seal the annular groove 60.

All features disclosed are (in themselves) pertinent to the invention. The disclosure content of the associated/accompanying priority documents (copy of the prior patent application) is also hereby incorporated in full in the disclosure of the application, including for the purpose of incorporating features of these documents in claims of the present application.

CLAIMS

1. Injection spigot, in particular for an injection head for injection drilling anchors which is suitable for separately supplying at least a first and a second supply component, the injection spigot having a housing which forms an inner cavity that has at least one outlet opening for exit of the first and second supply components, characterized in that the wall of the housing (34) has at least one first predetermined breaking point (35) for forming a first inlet opening (36) for a first pressurized supply component and, at a distance from it, at least one second predetermined breaking point (37) for forming a second inlet opening (38) for a second pressurized supply component.

2. Injection spigot according to Claim 1 or in particular according thereto, characterized in that the first and second predetermined breaking points (35, 37) are each formed at a wall region (39, 40) of reduced wall thickness in comparison with adjacent wall regions.

3. Injection spigot according to one or more of the preceding claims or in particular according thereto, characterized in that the housing (34) of the injection spigot (24) has a substantially rotationally symmetrical, in particular substantially cylindrical, wall, at the one longitudinal end of which the outlet opening (41) is disposed.

4. Injection spigot according to one or more of the preceding claims or in particular according thereto, characterized in that the injection spigot (24) has, at the longitudinal end opposite from the outlet opening (41), an end wall (58) on which the predetermined breaking point (35) for the first inlet opening (36) is formed.

5. Injection spigot according to one or more of the preceding claims or in particular according thereto, characterized in that the predetermined breaking point (35) for the first inlet opening (36) is formed at a wall region (39), in particular of a circular outline, of which the wall thickness decreases from the outside inward, in particular radially symmetrically and/or linearly.

6. Injection spigot according to one or more of the preceding claims or in particular according thereto, characterized in that one or more predetermined breaking points (37), in particular two lying opposite each other on the circumference, each for a second inlet opening (38), are formed on the circumference of the cylindrical wall (59) of the injection spigot (24).

7. Injection spigot according to one or more of the preceding claims or in particular according thereto, characterized in that one or more predetermined breaking points (37), each for a second inlet opening (38), are formed at a wall region (40), in particular of a circular outline, with a wall thickness which is suddenly reduced in comparison with adjacent wall regions and decreases in the longitudinal direction (L) of the injection spigot (24) toward the longitudinal end thereof having the outlet opening (41), and in particular decreasing linearly in this direction.

8. Injection spigot according to one or more of the preceding claims or in particular according thereto, characterized in that, at the wall region (40) of reduced wall thickness at which the predetermined breaking point (37) for the second predetermined breaking point (38) is formed, the maximum wall thickness is a multiple of the minimum wall thickness, in particular two to four times, and in that the maximum wall thickness of this wall region (40) of reduced wall thickness is less than the wall thickness of the surrounding wall region, in particular approximately half or approximately one third in relation thereto.

9. Injection spigot according to one or more of the preceding claims or in particular according thereto, characterized in that the injection spigot (24) is produced from plastics material, in particular from polyamide.

10. Injection spigot according to one or more of the preceding claims or in particular according thereto, characterized in that the injection spigot (24) is produced by the plastics injection-molding process.

11. Injection spigot according to one or more of the preceding claims or in particular according thereto, characterized in that the cylindrical wall (59) has, in a rear region (25) of the length, in the area of the wall regions (40) of reduced wall thickness for the second inlet openings (38), a peripheral annular groove (60) on the outside.

12. Injection spigot according to one or more of the preceding claims or in particular according thereto, characterized in that the cylindrical wall (59) has, in a front region (27) of the length between the predetermined breaking points (37) for the second inlet opening (38)

and the outlet opening (41), on the outside, one or more ribs (63), integrally formed, spaced apart in the longitudinal direction (L) and extending in the circumferential direction.

13. Injection spigot according to one or more of the preceding claims or in particular according thereto, characterized in that the cylindrical wall (59) has, on each of both sides of the circumferential groove (60), a raised and integrally formed annular bead (78) running around the circumference.

14. Injection spigot according to one or more of the preceding claims or in particular according thereto, characterized in that the cylindrical wall (59) has, at the transition from the rear region (25) of the length to the front region (27) of the length, a sudden reduction in cross-section, thereby forming an axial stop face (54).

15. Injection spigot according to one or more of the preceding claims or in particular according thereto, characterized in that the inner cavity (23) is of a substantially cylindrical form and in it a static mixer (56) is pushed in against an axial stop (57).

16. Injection spigot according to one or more of the preceding claims or in particular according thereto, characterized in that, in its installation state, the injection spigot (24) is inserted, in the front region (27) of the length having the annular projections, in the longitudinal direction (L) into the injection channel (29) of an anchor rod (14) or into a widening (28) of the injection channel (29), with a force fit.

17. Injection head for drilling in and grouting drilling injection anchors, characterized in that an injection spigot according to one or more of the preceding claims is fitted in the injection head.

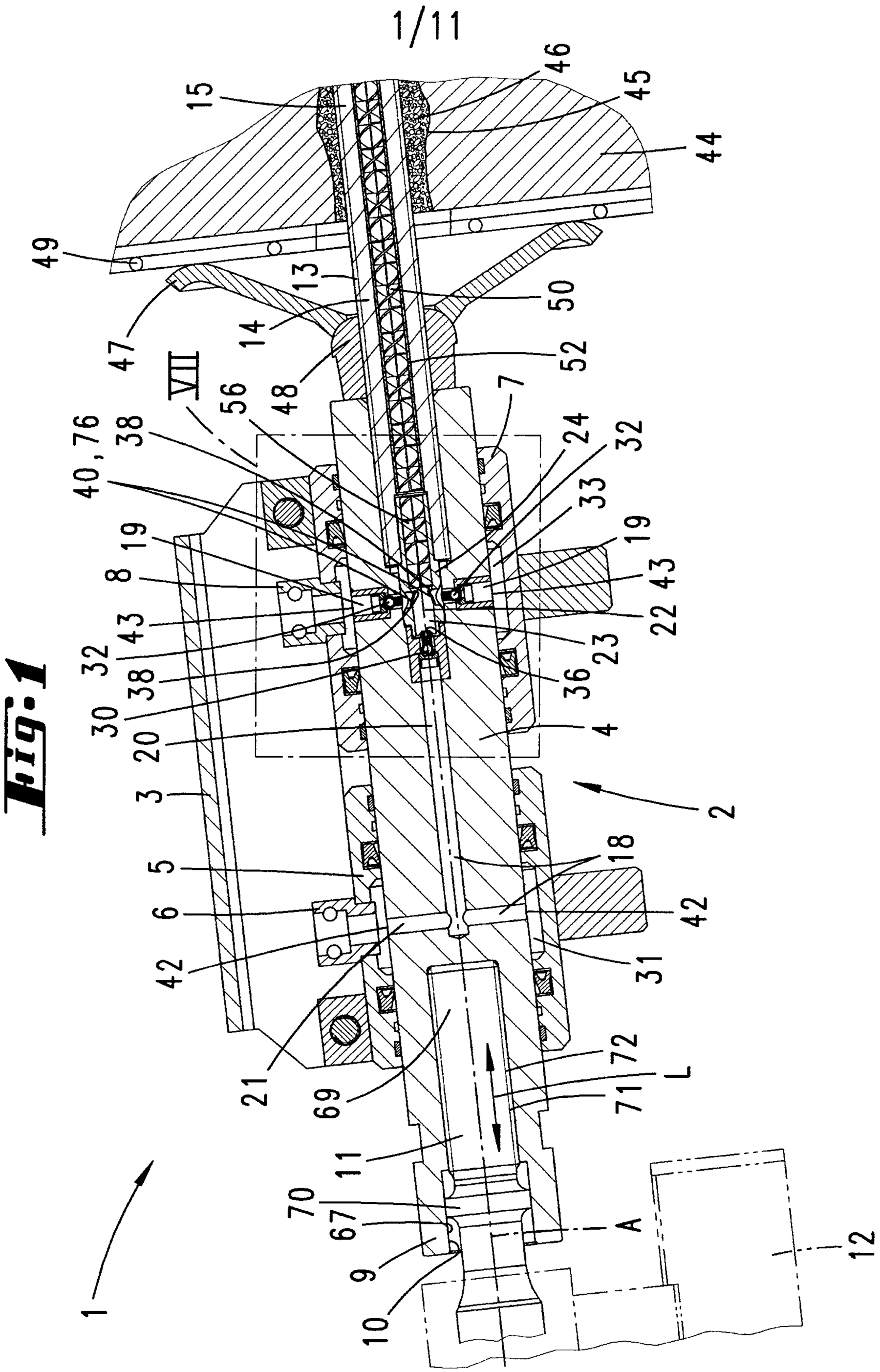
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Fig. 1

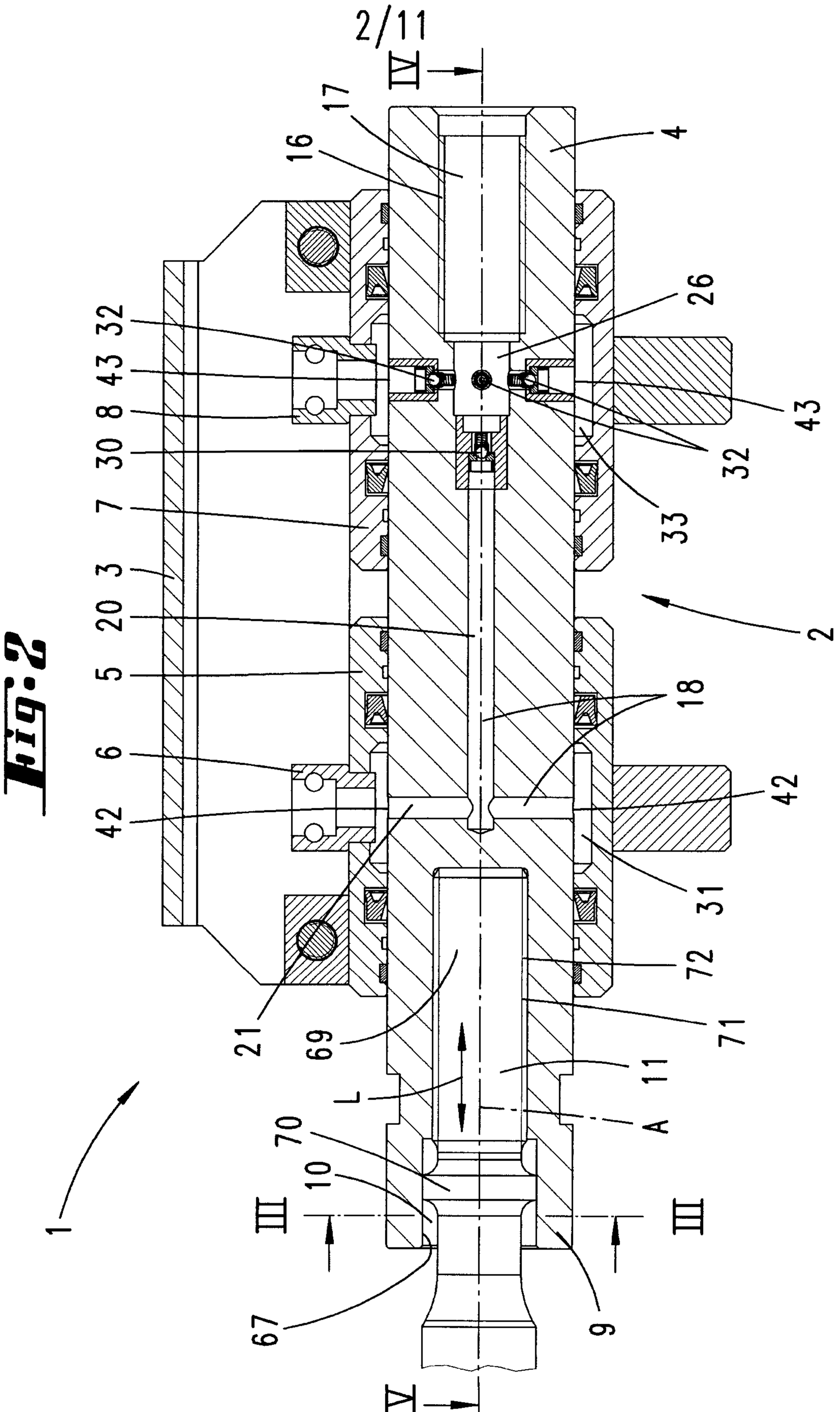
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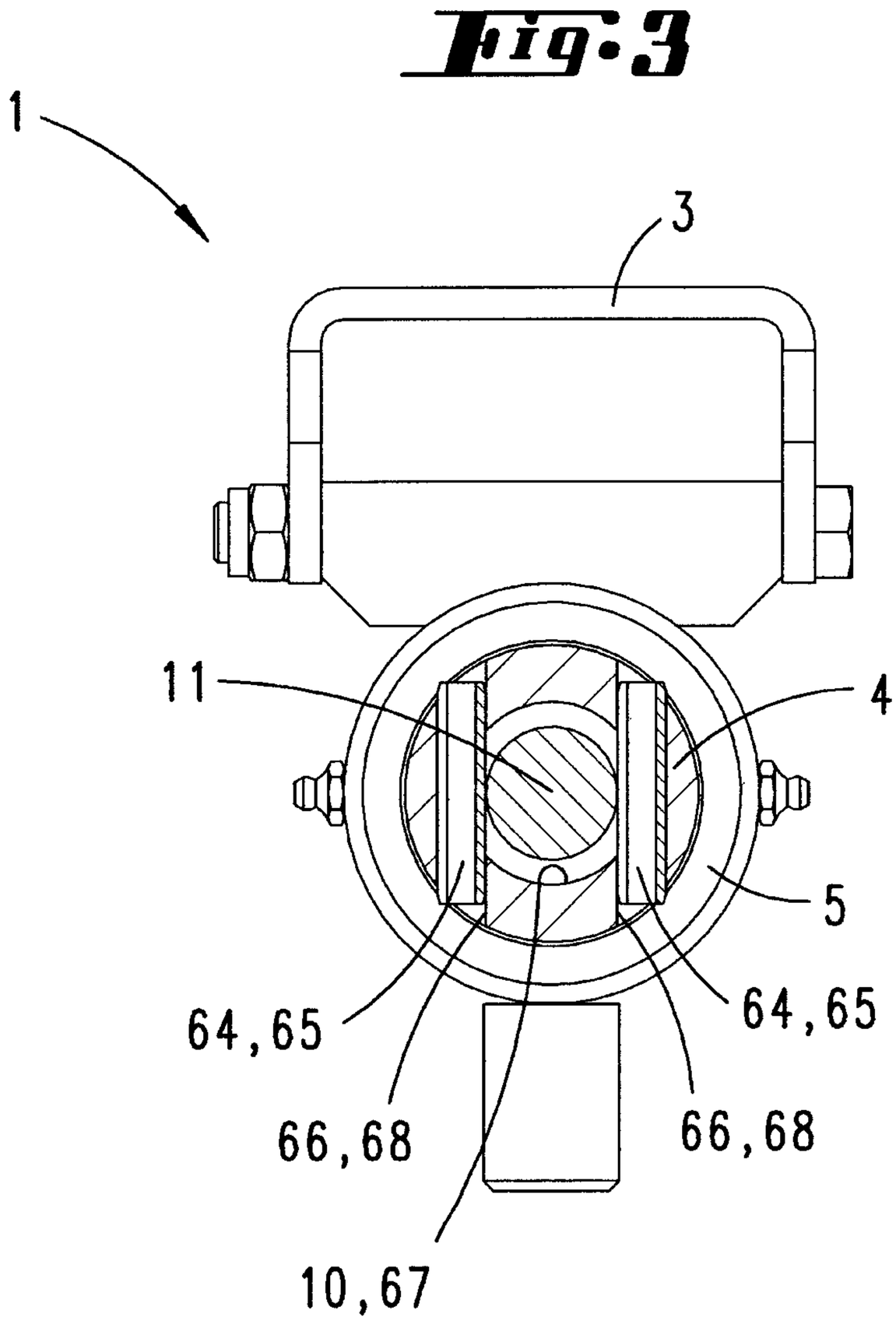
Fig. 2

Fig. 3



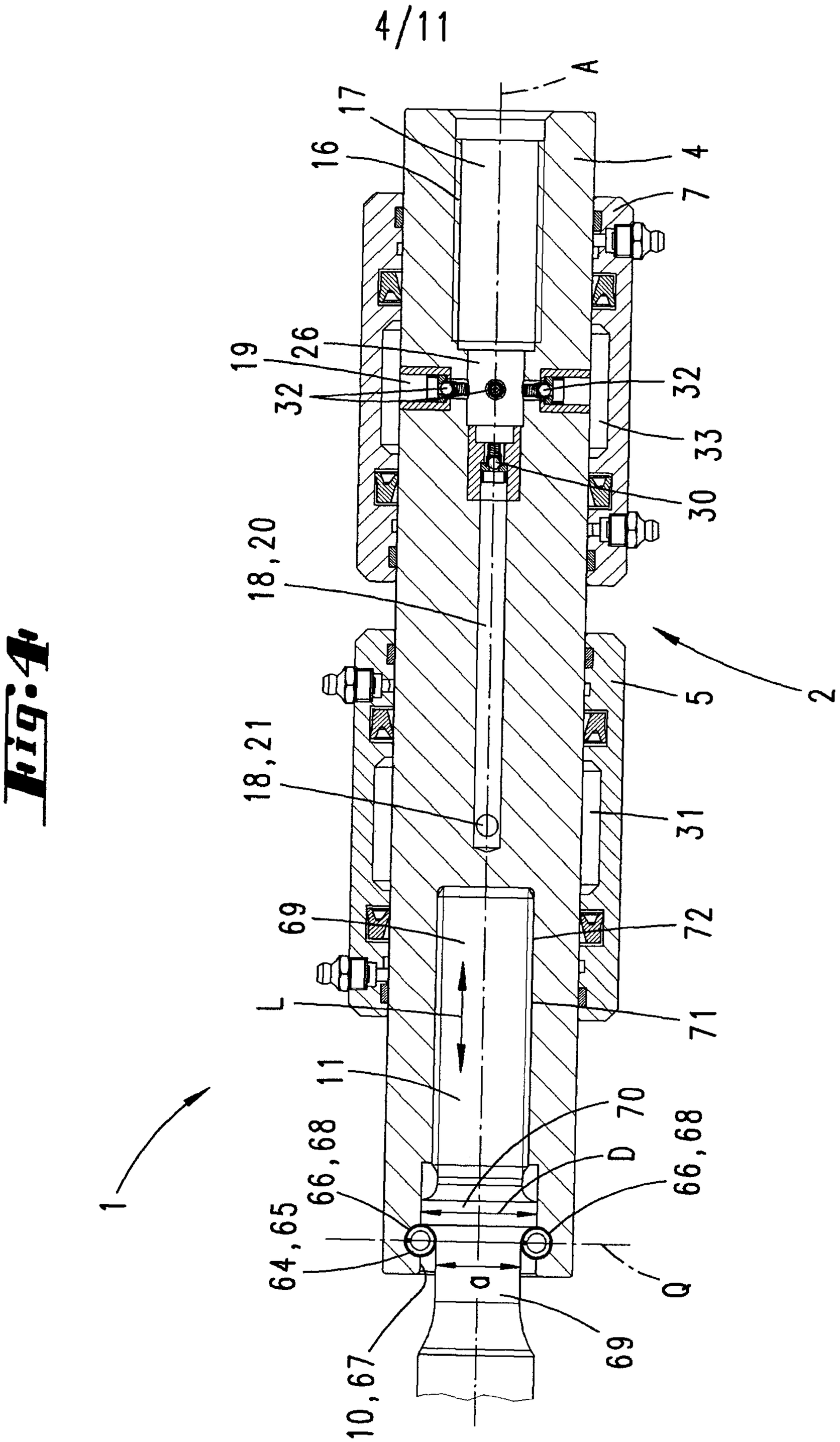

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Fig. 4

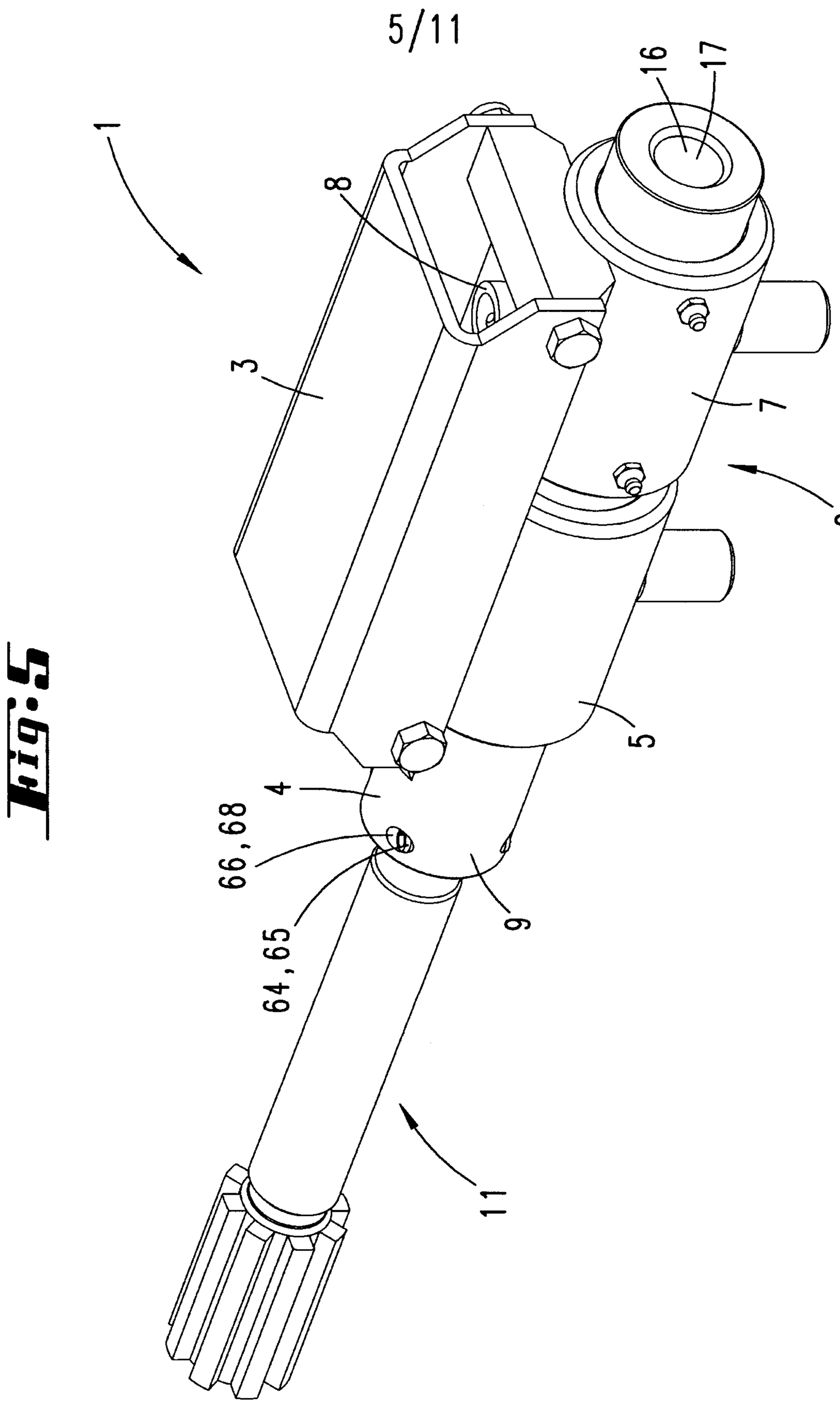

Fig.5

Fig. 6

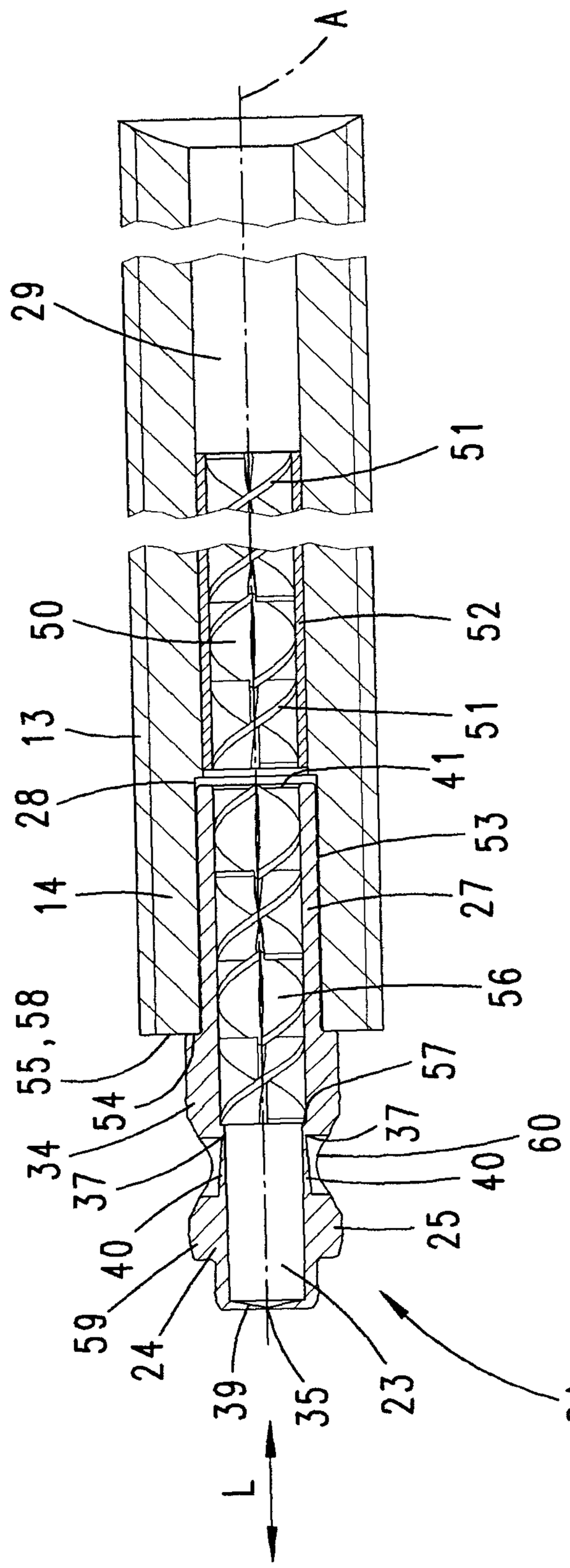
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Fig.1

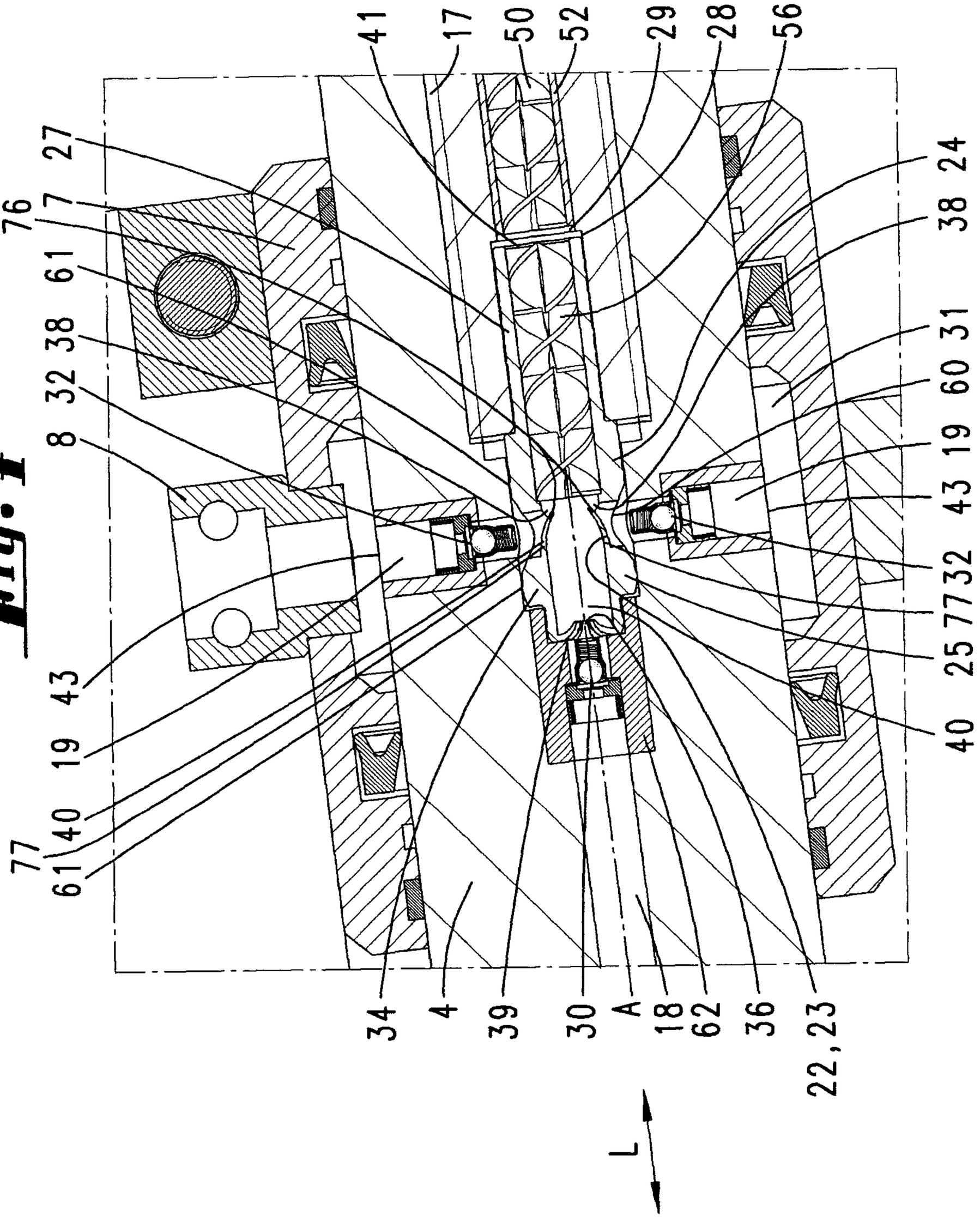
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Fig. 8

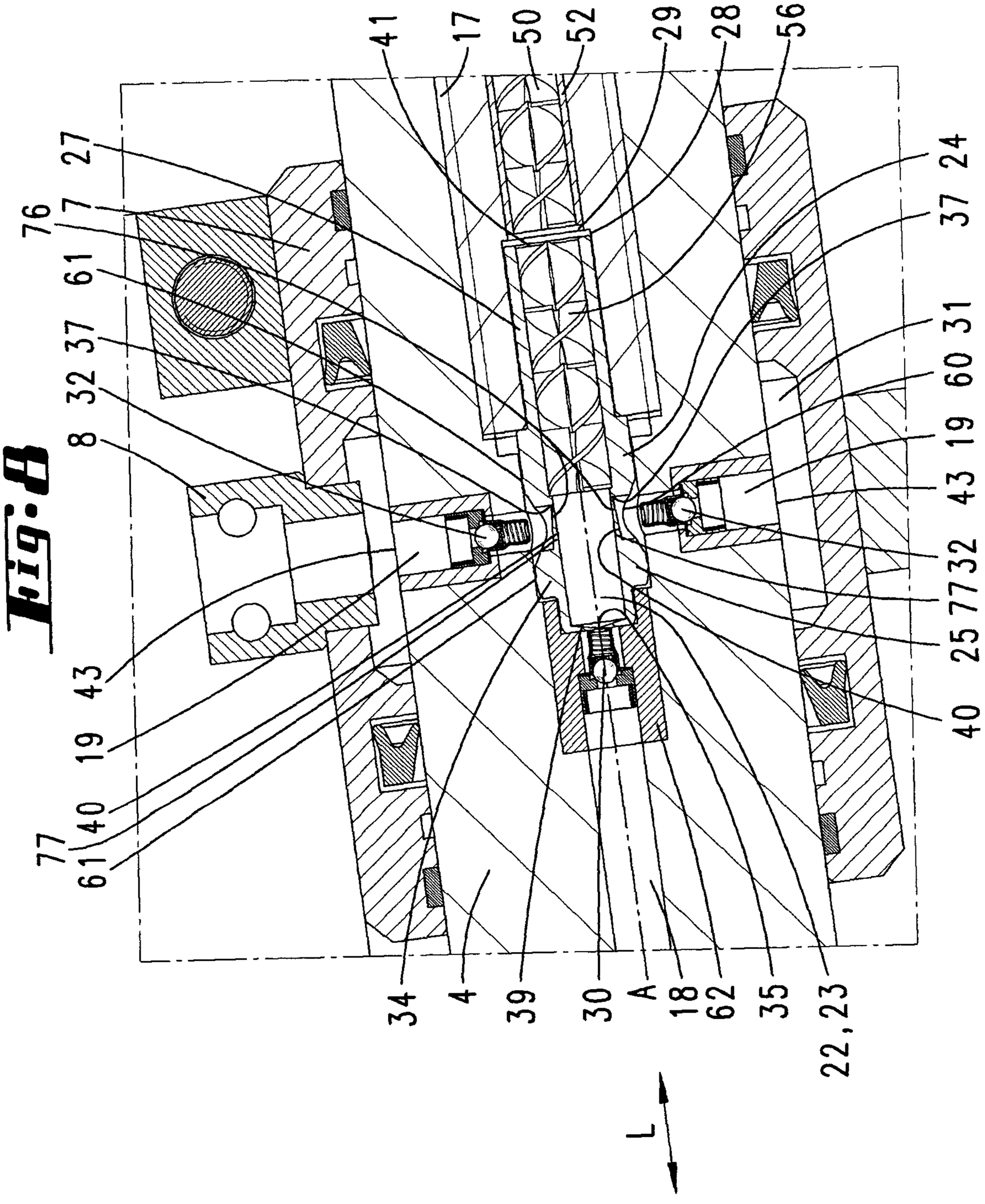
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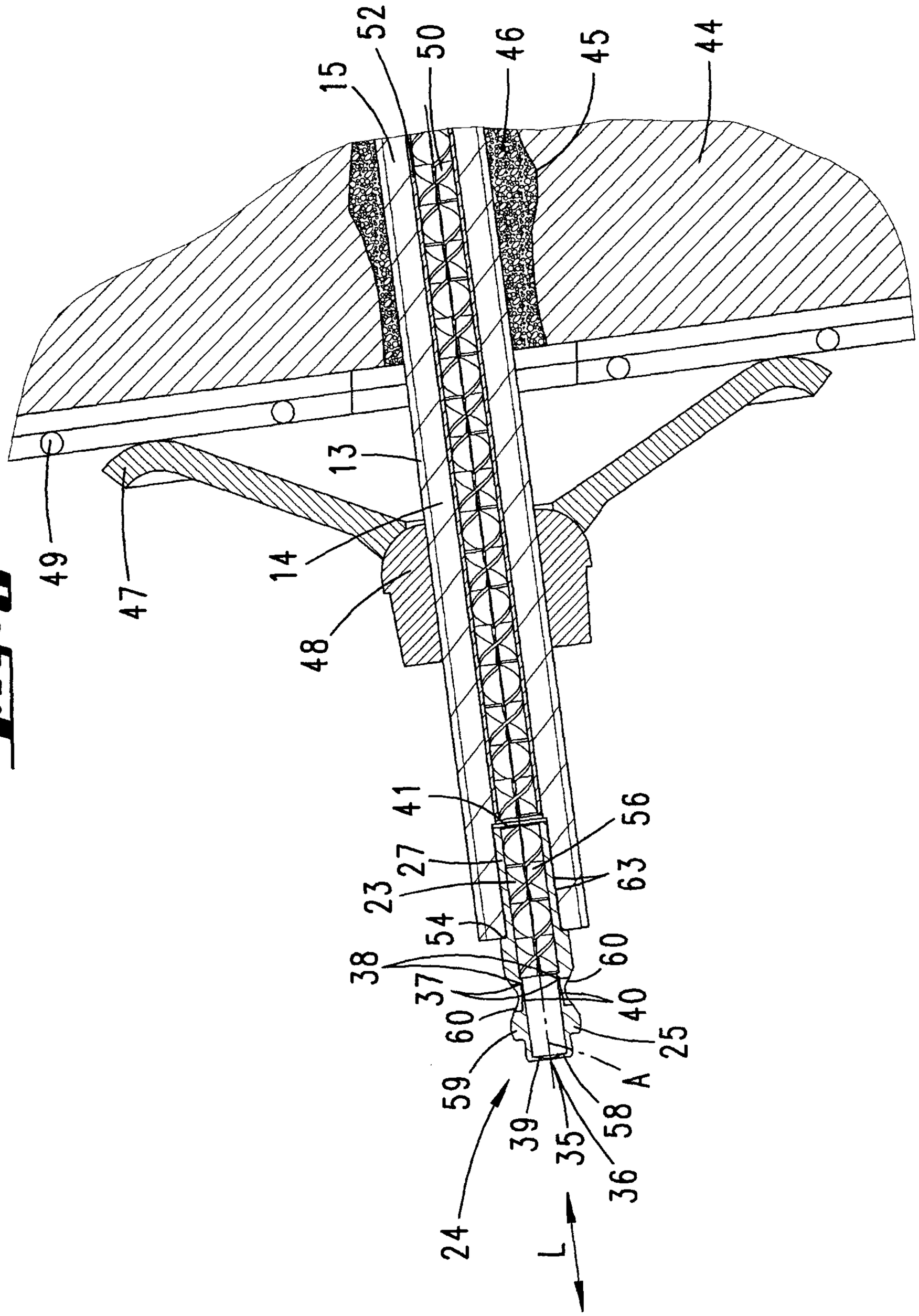
Fig. 9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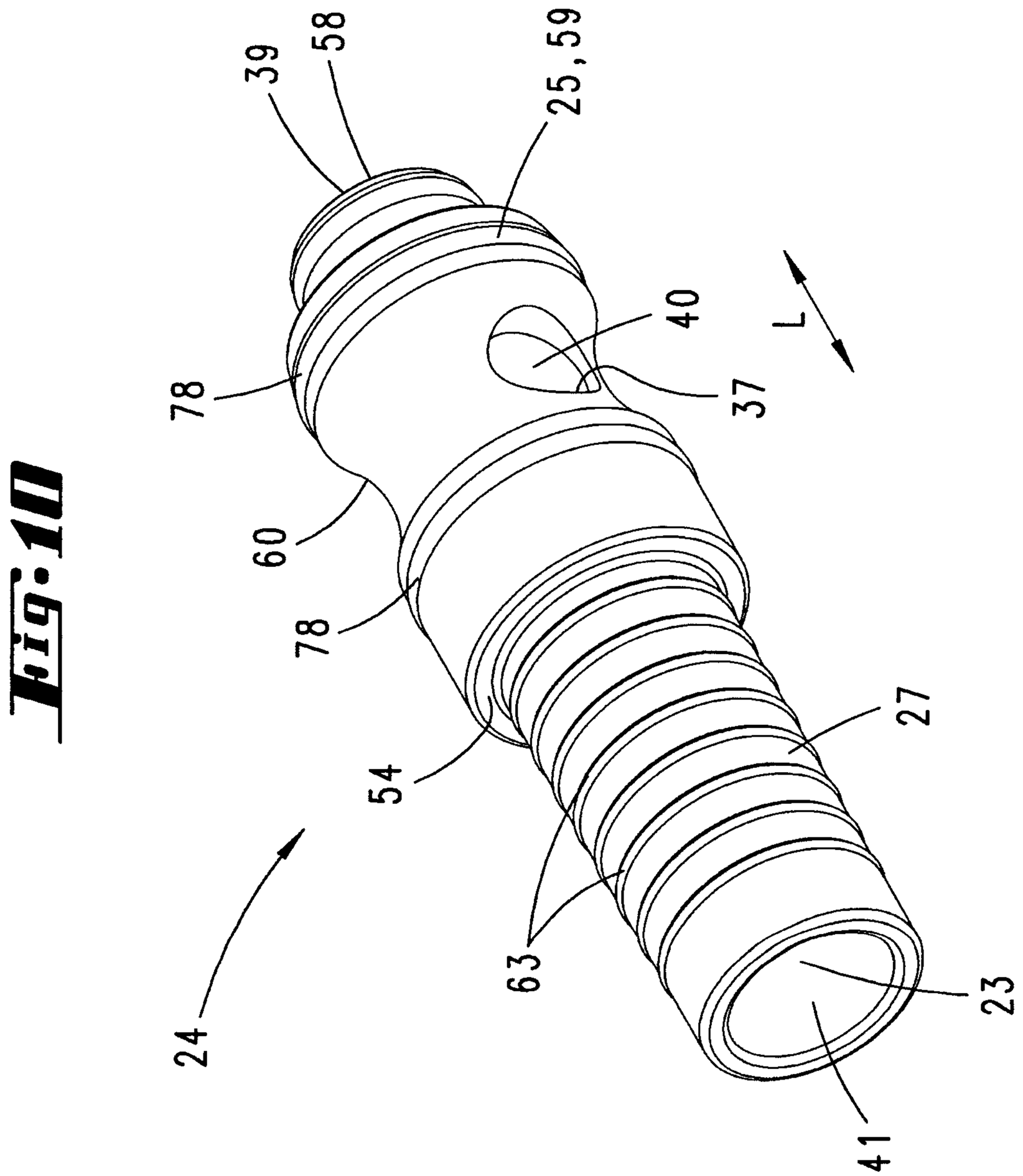

Fig: 10

Fig. 11

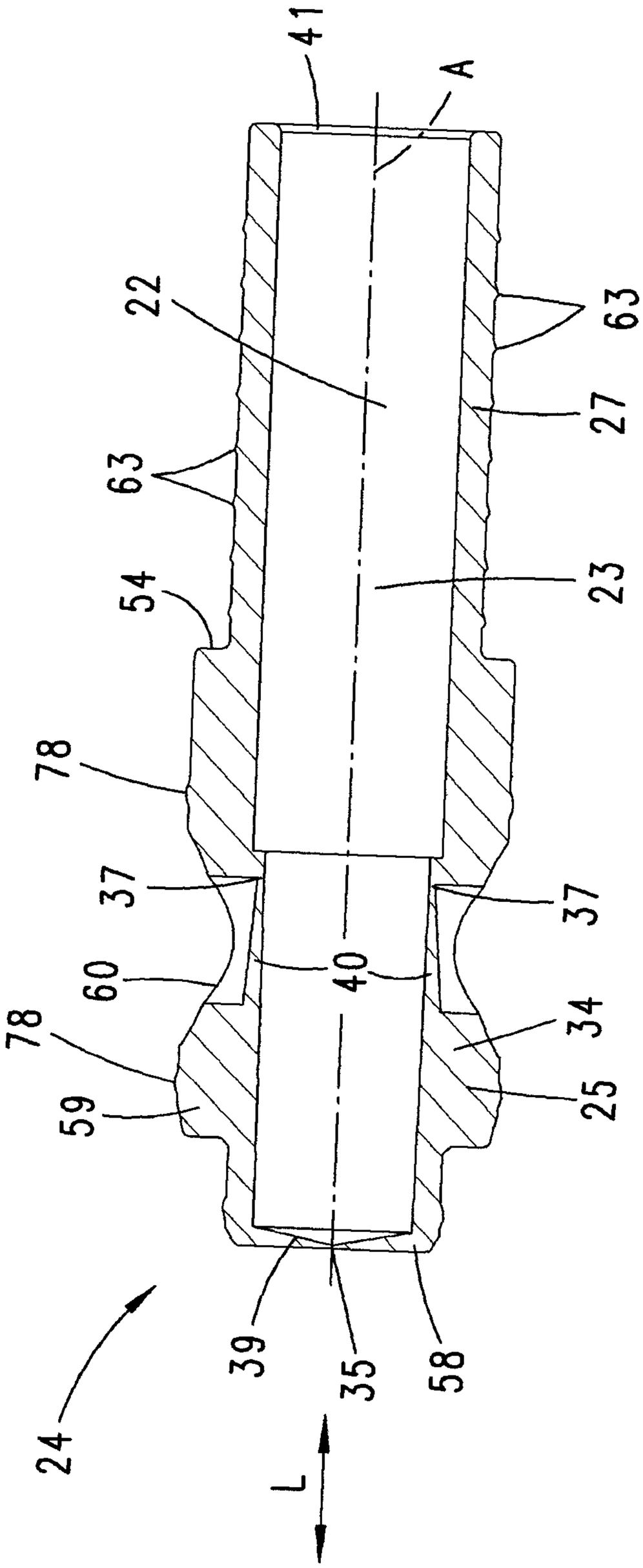

Fig. 11