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## TECHNICAL FIELD

The present invention relates to a fitting according to the preamble of claim 1. The present invention further concerns a method of injection molding for the manufacture of a fitting.

## PRIOR ART

From the prior art, numerous forms of fittings are known. For example, fittings have become known from the prior art in the form of T-pieces or bow shaped pieces. Such fittings serve the connection of pipe branching pieces which are angularly inclined with respect to each other. Such fittings are manufactured from metal or plastic material.

Many fittings from the prior art comprise, in the region of the angularly inclined transition, a form which accounts for great fluidic losses. The form therein is usually presupposed by manufacture, as the region of the angularly inclined transition is not accessible for a tool, such that these regions can be optimized.

From the prior art, solutions to this problem have been known. For example, in DE 10 2009 039 983 it is suggested to form the fitting such that it is divided in a shell-like manner, and that then the two shells are connected in a media-tight manner. The shell-like manner of dividing has the disadvantage that a comparably large separation area between the two shells is present, which negatively influences the durability of the fitting.

From DE 10 2011 013 099, fitting has become known, which comprises a flow guide body within the flow through channel, which improves the branching region in a fluidic manner.

However, DE 10 2011 013 099 results in the disadvantage, that the manufacture is markedly laborious. EP 3 012 084 A1 discloses a fitting according to the preamble of claim 1.

## SUMMARY OF THE INVENTION

Starting from this prior art, the invention is based on an objective to provide a fitting, which overcomes the disadvantages of the prior art. Especially, a fitting shall be provided, in which the flow through channel is formed in an optimized manner with respect to possible pressure losses, and which can yet be manufactured economically. An especially preferred objective is to provide a fitting which, under the provision of a simple and efficient manufacture, only opposes the water flowing through it with a small resistance.

This objective is solved by the subject matter of claim 1. Thereby, a fitting comprises a housing wall, which delimits a flow through channel extending from a fitting inlet to a fitting outlet. The flow through channel comprises a first channel section extending along a first center axis and a second channel section extending along a second center axis. In the region of the transition between the first channel section and the second channel section, an insert is inserted in a breakthrough through the housing wall, said insert being connected to the housing wall by an adhesive bond. A sealing surface extends at least partially along the breakthrough. The sealing surface extends at least partially along the breakthrough in a manner such that during the manufacture of the insert in cooperation with at least one core of an injection molding tool, an intrusion of the injection material into the flow through channel is prevented. The sealing surface is formed offset from the interior wall of the flow through channel. This means that the sealing surface projects from said interior wall. The interior wall is to be understood especially as the interior wall in the region of the breakthrough.

The sealing surface therefore ensures that during the manufacture of the insert, which is inserted into the breakthrough, no injection material can intrude into the flow through channel. Thereby, it is prevented, that during the manufacture, structures, which would increase the resistance for water flowing there through, are formed in the interior of the flow through channel in an uncontrolled manner in the region of the breakthrough. Insofar, an undesired transformation of the flow through channel can be prevented by way of the sealing surface.

The term "in cooperation with a core" is to be understood in that the core can abut on the sealing surface along a sealing line or over a sealing surface, such that no injection material can intrude between the core and the sealing surface.

The arrangement of the insert has the advantage that the structure of the flow through channel can be formed in the interior thereof, with a core projecting in through the breakthrough during the manufacture. Thereby, for example rounded transitions, especially with greater diameters, can be provided for example in case of an angular piece or a T-piece.

Insert and housing wall are preferably formed of the same or of a similar material. Preferably, the entire fitting is formed of plastic material. That means that the housing wall and also the injection material are formed of plastic material.

Preferably, the sealing surface extends in the direction of the center axis of each corresponding section. This means that the sealing surface extends in the direction of the first center axis from the first channel section in the direction of the second channel section and in the direction of the second center axis from the second channel section in the direction of the first channel section.

Preferably, the sealing surface adjoins immediately on the interior wall of each corresponding section and forms a continuation of the interior wall in the region of the breakthrough.

Preferably, the sealing surface remains at least partially in the original state after the manufacture of the insert. Preferably, the part of the sealing surface which lies on the interior side with respect to the flow through channel when viewed from the contact point or the sealing point with said core, respectively, remains in its original state. Depending on the dimension or form of the sealing surface, respectively, the part of the sealing surface which lies on the exterior side with respect to the flow through channel when viewed from the contact point or the sealing point with said core, respectively can be connected to the injection material, such that this part of the sealing surface does not remain in its original state.

Preferably, the sealing surface is a predetermined or determinated surface, respectively, which is identifiable on the component part as a sealing surface.

Preferably the sealing surface is offset in the range of from 0.01 to 0.5 millimeters or in the range of from 0.02 to 0.45 millimeters from the interior wall. By this offset configuration it is ensured that the core can enter into a good and especially a defined contact with the sealing surface.

The sealing surface can therein be part of a rib which extends away from the interior wall.

Preferably, the sealing surface which adjoins the first channel section meets the sealing surface extending away from the second channel section in an intersecting region.

Preferably, the sealing surface essentially completely surrounds the breakthrough with respect to the flow through channel, such that an intrusion of injection material into the flow through channel can be entirely prevented. This means that with respect to the flow through channel, a sealing effect is provided during the manufacture of the insert, such than an intrusion of injection material into the flow through channel can be prevented.

Preferably a sealing surface is arranged in the region of the breakthrough in each case on each side of the flow through channel. This means that the sealing surfaces are arranged opposite to each other with respect to the flow through channel.

Preferably, the sealing surfaces are arranged symmetrically to one another with respect to a symmetry plane which extends centrally through the breakthrough and extends through both center axes.

Preferably, the sealing surface has a width which corresponds to at the most 5% of the circumference of the flow through channel. The width is to be understood as the extent of the sealing surface transversal to the corresponding center axis.

Preferably, the width of the sealing surface is formed in a constant manner over its entire length. A variable width would also be conceivable.

Preferably, the sealing surface is adjoined outside of the flow through channel by a spray surface, which is arranged offset with respect to the sealing surface, wherein by the offset configuration a cavity is created, into which injection material can flow during the manufacture of the insert. The spray surface lies outside of the flow through channel with respect to the flow through channel. The spray surface however preferably is arranged such that it is oriented towards the flow through channel.

In other words, the sealing surface is adjoined by a spray surface onto which the insert is injection-molded, wherein the spray surface adjoins outwardly with respect to the flow through channel und wherein the spray surface preferably extends from the entire length of the exterior edge of the sealing surface outwardly with respect to the flow through channel.

Preferably, the spray surface extends along the edge of the sealing surface which lies on the exterior with respect to the flow through channel.

The housing wall comprises further spray surfaces on the exterior and on the front side with respect to the breakthrough onto which parts of the insert are injection molded.

Preferably the sealing surface is an even or planar surface, respectively. Alternatively, the sealing surface is formed in a concavely rounded manner.

In a first embodiment the two center axes are arranged in an angularly inclined manner, preferably at right angles, to each other and the two channel sections are arranged such that their center axes intersect. In the region of the transition between the first channel section and the second channel section, an interior transition edge is formed from the first channel section to the second channel section. The transition edge is formed in a rounded manner with a curvature. The insert is arranged with respect to the transition edge such that the transition edge with the curvature is accessible during the manufacture of the fitting through the breakthrough, which is covered by the insert.

This first embodiment concerns an angular piece.

The sealing surfaces also extend in an angularly inclined manner to each other in this embodiment, wherein the angle between the sealing surfaces equals the angle between the two center axes.

Preferably, in this first embodiment, the sealing surface extends essentially tangentially to said curvature, away from the corresponding beginning of the curvature.

In a second embodiment, the two center axes are arranged collinearly to each other. Furthermore, the fitting comprises a third channel section, which extends along a third center axis, wherein the third center axis extends in an angularly inclined manner, particularly at right angles, to the first and to the second center axis. In the region of the transition between the first channel section and the third channel section, a first, interior transition edge is formed from the first channel section to the third channel section, wherein said transition edge is formed in a rounded manner with a curvature. In the region of the transition between the second channel section and the third channel section, a further interior transition edge is formed from the second channel section to the third channel section, wherein said further transition edge is formed in a rounded manner with a curvature. Said insert extends at least from the transition edge between the first and third channel section to the transition edge between the second and third channel section.

Preferably, the sealing surface extends in the direction of the first center axis and the second center axis from the first channel section into the second channel section.

Preferably, the sealing surface extends in this second embodiment essentially tangentially to said curvature, away from the corresponding beginning of the curvature.

Preferably, said insert extends at least from the transition edge between the first and second channel section to the further transition section between the second and third channel section. Similarly, said sealing surface extends from the transition edge between the first and second channel section to the further transition edge between the second and third channel section.

The following description of several further preferred embodiments relates to the first and/or the second preferred embodiment or to all previously described variants of the fitting, respectively.

The breakthrough, which is then completely covered by the insert, or into which the insert is inserted, respectively, provides an opening or window, through which during the course of the manufacture of the fitting, a tool can be inserted into the flow through channel, in order to form said curvature. The breakthrough is then covered with said insert in the course of the manufacture. Insofar, the breakthrough is present during the manufacture and is also covered by the insert during the manufacture.

The forming of the breakthrough with the subsequent closing by the insert has the advantage that especially the transition edge on which the curvature lies, is accessible during manufacture, which massively increases the freedom of design. Especially, the curvature can be formed in a very easy and especially economical manner. The interior contour is easily demoldable.

The arrangement of the insert has numerous advantages. The curvature can be formed such that it is as optimized as possible with respect to flow. Furthermore, the insert can be manufactured during the injection molding process, whereby an elaborate and especially retroactive welding of additional parts thereon is dispensed with.

The insert preferably exclusively extends over a partial region of the housing wall, thus only such that the curvature is accessible by an injection molding tool. The insert preferably extends exclusively only partially around the corresponding center axis or the corresponding center axes, respectively, meaning that a complete surrounding of the insert about the center axis is not intended. Preferably, the insert is to be selected as small as possible, such that it only extends such that said curvature or said curvatures, respectively, are accessible.

The insert forms a part of the housing wall and closes the breakthrough which is provided for the tool. Especially preferably the insert comprises, at least in the region of the separation point between breakthrough and insert, a wall thickness, which preferably corresponds to the wall thickness of the neighboring regions of the housing wall. The insert is preferably injected into the breakthrough by an injection molding process and thereby conjoins with the housing wall.

Independently of the embodiment with two or three channel sections, it is advantageous for the form of the insert or of the breakthrough, respectively, if the clearance of the breakthrough is such that the curvatures are accessible by a tool which forms the breakthrough and is moved through the breakthrough.

Preferably, the first channel portion extends, when viewed along the first center axis, to the curvature in a cylindrical manner with an essentially constant diameter. The cylindrical diameter then transitions into the curvature, wherein the transition is defined by a transition point. The transition point is a geometric point on a separation line of the transition from the cylindrical diameter into the curvature, wherein the transition point defines the point on the separation line, which lies the farthest away from the second center axis. The insert extends in the direction of the first center axis from the cylindrical region, thus essentially from the transition point, towards the second center axis beyond said curvature. When viewed in the direction of the first center axis, the insert thus has a length which extends from the cylindrical region preferably to the second center axis, or - depending on the embodiment – beyond the second center axis. Alternatively, the insert extends exactly from the transition point between the cylindrical region and the curvature to the second center axis. When viewed along the direction of the first center axis, the insert then has a length which extends form the transition point preferably to the second center axis or beyond the second center axis.

The fitting with two channel sections for example concerns a pipe bend or an angular piece. The fitting with the three channel sections for example concerns a T-piece. The housing wall on the exterior has the form of a connection branch in each of the channel sections. As a result, each channel section extends within a connection branch, which is provided by the housing wall.

In a pipe bend, the insert extends on the exterior of the bend from the transition point between the cylindrical region of the first channel section and the curvature to the transition point between the cylindrical region of the third channel section and the curvature. Here too, the insert can slightly extend into the cylindrical region.

In a T-piece with the three channel sections, the insert preferably extends as follows: The second channel section extends, when viewed along the second center axis, to the curvature in a cylindrical manner with an essentially constant diameter. The cylindrical diameter then transitions into the curvature, wherein the transition is defined by a transition point. The insert extends in the direction of the second center axis from the cylindrical region to the third center axis beyond said curvature. When viewed in the direction of the second center axis, the insert thus has a length, which extends from the cylindrical region preferably beyond the third center axis to the transition point in the first channel section. The insert can extend beyond said transition points. Alternatively, the insert extends exactly from the transition point between the cylindrical region and the curvature in the second channel section and the same transition point in the first channel section.

Preferably, the insert, especially in the case of three channel sections, extends at least beyond the clearance of the third channel section until beyond or at least till the edge of the curvature. Thereby, a good access to the transition region between the first channel section and the third channel section or between the second channel section and the third channel section, respectively, can be created.

The insert extends, - in all embodiments – especially preferably from curvature to curvature. The insert covers especially preferably viewed essentially the clearance of the third channel section until the curvature, or slightly beyond the curvature, respectively, which surrounds the outlet region from the first or second channel section, respectively, into the third channel section.

Especially preferably, exactly one insert is present, which forms a part of the housing wall, as described above. Preferably, the insert occupies a small part of at the most one fifth of the entire exterior surface with respect to the exterior surface of the housing wall.

The housing wall and the insert are connected to each other by an adhesive bond. A subsequent separation between housing wall and insert is not intended. A one-piece fitting is provided.

The housing wall and the insert are preferably formed of the same plastic material. Especially of the same color. The insert and the housing wall, however, can also each comprise a different color. For example, the insert can be formed of a transparent plastic material and the housing wall of an opaque plastic material.

In case of a T-piece, the insert extends away from a plane which extends at right angles to the third center axis and through the first or the second center axis, respectively, with respect to the third channel section, such that the insert lies across from the third channel section.

The insert preferably is formed in a shell-shaped manner. In case of a T-piece, the insert preferably is formed as a half-cylindrical shell. The half-cylindrical shell preferably extends about the half of the circumference of the first and optionally the second channel section. In case of a pipe bend, the shell has the form of a partial shell of the exterior of the pipe bend.

Preferably, the separation points between the housing wall and the insert are formed as plane or stepped surfaces. The surfaces can be oriented in various manners and for example can also comprise undercuts or the like.

Said surfaces of the separation points preferably extend at right angles or parallel to the center axes. The surfaces however can also extend in an angularly inclined manner to the center axes. A combination is also conceivable, for example the surfaces of the separation points or parts of the separation surfaces, can extend at right angles, parallel to and angularly inclined to said center axes.

Preferably, each of the channel sections is arranged on its outside with a sealing contour, on which a pipe can be mounted in a fluid-tight manner. The sealing contour therein projects into the pipe and the pipe is pressed against the sealing contour.

The radius of the curvature preferably lies in the range of 20% to 60%, especially in the range of 30% to 40%, of the interior diameter of the corresponding channel sections. Preferably, all the channel sections comprise the same interior diameter.

An method of injection molding according to the invention for the manufacture of a fitting according to the above description is characterized in that

in a first step, the housing wall is manufactured without the insert, wherein per channel section one cylindrical core is provided, and wherein during the manufacture, an additional core for the provision of the interior form of the flow-through channel projects into the flow through channel through the breakthrough which is covered by the insert, and

that in a second step at least one core is inserted along the first and/or the second channel section into the flow through channel until into the region of the breakthrough, wherein the core comes into contact with the sealing surface such that the flow through channel is closed tightly with respect to the injection material to be injection molded onto the insert, and wherein the breakthrough is closed with the insert by injection molding.

With respect to the interior form, said curvature is particularly manufactured on the transitions.

The two steps are especially preferably carried out in the same injection mold. The mold therein can be charged by the same injection unit or by two different injection units.

The injection molding method preferably is a two-stage injection molding method.

Further embodiments are laid down in the dependent claims.

BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the invention are described in the following with reference to the drawings, which are only for the purpose of illustrating are not to be interpreted as being limiting. In the drawings,

Fig. 1 shows a perspective view of a fitting according to a first embodiment;
Fig. 2 shows a partially sectioned view of the fitting according to figure 1;
Fig. 3 shows a sectional illustration of the fitting with an inserted core;
Fig. 4 shows the sectional illustration according to figure 3 without the core;
Fig. 5a/b/c show further sectional illustrations of the fitting without the core (Fig. 5a/5b) and with the core (Fig. 5c); and
Fig. 6a/6b show perspective illustrations of a fitting according to a second embodiment.

DESCRIPTION OF PREFERRED EMBODIMENTS

Figures 1 to 5 show a first embodiment of a fitting in the form of an angular piece and figures 6a and 6b show a second embodiment of a fitting in the form of a T-piece.

The fitting 1 according to the two embodiments comprises a housing wall 2, which delimits a flow through channel 3, which extends from a fitting inlet 4 to a fitting outlet 5. The flow through channel 3 comprises a first channel section 6 extending along a center axis M6 and a second channel section 7 extending along a second center axis M7. In the region of the transition between the first channel section 6 and the second channel section 7, an insert is inserted into a breakthrough 11 through the housing wall 2. The insert 9 is connected to the housing wall 2 by an adhesive bond. Therein, the insert 9 essentially completely covers the breakthrough 11.

In a first embodiment the two center axes M6, M7 are arranged at an angularly inclined manner, here at right angles, with respect to each other. In the second embodiment, the two center axes M6, M7 are arranged collinear to each other, wherein in the second embodiment a third channel section 18 is further provided, which extends along a third center axis M18 and is arranged at an angularly inclined manner, here at right angles, to the first center axis M6 and to the second center axis M7. The third channel section 18 comprises a further fitting outlet 30.

Both embodiments comprise a sealing surface 10. The sealing surface 10 cooperates with at least one core of an injection molding tool during the manufacture of the insert 9. The sealing surface 10 extends at least partially along the breakthrough 11 such that during the manufacture of the insert 9 in cooperation with at least one core of an injection molding tool a penetration of injection material into the flow through channel 3 is prevented. In other words, the at least one core of an injection molding tool abuts to the sealing surface 10 such that in cooperation with the surface of the at least one core and the sealing surface 10 a sealing line is provided, such that no injection material can penetrate from outside into the flow through channel 3. In other words, the injection material cannot penetrate from the point, in which the insert 9 is to be produced, into the interior of the flow through channel 3. This results in the advantage that in the region, in which the insert 9 comes to lie or in neighboring regions thereof, respectively, the geometry of the flow through channel 3 is not negatively influenced by uncontrolled intrusion of sealing material. The insert 9 therefore can be produced without any negative influence on the flow through channel.

With reference to figures 2 to 5, the design of the sealing surface according to the first embodiment is now further explained. The sealing surface 10 continues, as seen in figure 2, in the direction of the center axis M6 or M7, respectively, from the first channel section 6 or from the second channel section 7, respectively. In the first embodiment, a first section 27 of the sealing surface 10 continues starting from the first channel section 6 essentially parallel to the center axis M6. From the second channel section 7 a further section 28 of the sealing surface 10 also continues essentially parallel to the center axis M7. In an intersecting region 25, the section continuing from the first channel section 6 meets the section of the sealing surface 10 extending from the second channel section 7. The sealing surface 10 extends without interruption from the first channel section 6 to the second channel section 7. As the two channel sections 6, 7 are arranged at an angularly inclined manner to each other in the first embodiment, the two sections 27, 28 of the sealing surface 10 also are arranged at an angularly inclined manner to each other.

In figure 3, and also in figure 5c, sectional representations are shown, in which the core K of the injection molding tool is shown. The core K therein extends from the channel sections 6, 7 into the region in which the insert 9 is formed, thus into the region of the breakthrough 11. Typically, in each case one core K extends away from each channel section 6, 7 into the corresponding region. In figures 3 and 5c it can be well recognized how the exterior side 26 of the core K abuts against the sealing surface 10 and thus an intrusion of injection material with which the insert 9 is formed, can be prevented. In other words, the injection material cannot penetrate into the flow through channel 3 along the arrow P.

In figures 3 and 5c, furthermore the insert 9 is shown with a different hatching than the remaining parts of the fitting. Therein, it can also be well recognized that the insert 9 flows into a cavity 29 during the manufacture.

The sealing surface 10, as shown in figure 2, immediately adjoins the interior wall 12 of the corresponding section of the flow through channel 3 and forms a continuation of the interior wall 12 into the breakthrough 11. With respect to the circumference, a part of the surface of the interior wall 12 of the channel sections 6 and 7 continues into the region of the breakthrough 11.

From figures 6a and 6b, the formation of the sealing surface 10 according to the second embodiment is shown. Here, the sealing surface 10 also extends from the first channel section 6 and from the second channel section 7 into the region of the breakthrough 11. As the two channel sections 6, 7 run collinear to each other, the section 27 of the sealing surface 10 coming from the first channel section 6 also extends collinear to the section 18 of the sealing surface 10, which is guided from the second channel section 7 into the breakthrough 11. In other words, the sealing surface 10, according to the second embodiment does not comprise an intersecting region, as is the case in the first embodiment.

At least some parts of the sealing surface 10 remain in the original state at least partially after the manufacture of the insert 9. In other words, the sealing surface 10 is at least partially recognizable also after the manufacture of the insert 9 has been completed. Typically, the parts of the sealing surface 10 which with respect to the sealing line between the core K and the sealing surface 10 lie in the interior of the flow through channel 3, remain in the original state. The other parts of the sealing surface 10, which with respect to the sealing line between the core K and the sealing surface 10 lie outside of the flow through channel 3, do not remain in the original state, as corresponding injection material is injected on here.

From the interior wall 13 which is the interior wall 13 of the flow through channel 3 in the region of the transition 8, the sealing surface 10 is formed in an offset manner in both embodiments. In other words, the sealing surface 10 is formed in a projecting manner with respect to said interior wall 13, or the sealing surface 10 is formed in an elevated manner from the interior wall 13, respectively, or forms a ledge from the interior wall 13, respectively. Preferably, the sealing surface 10 is offset in the range of 0.01 to 0.5 millimeters or in the range of 0.02 to 0.45 millimeters from the interior wall 13. This offset arrangement has the advantage that a determinated sealing surface is created.

The sealing surface 10 surrounds the breakthrough 11 essentially completely with respect to the flow through channel 3. In both embodiments, in each case two sealing surfaces 10 are arranged opposite each other with respect to the flow through channel 3. In the region of the breakthrough 11, on each side of the flow through channel 3 a sealing surface 10 is arranged. An intrusion of injection material into the flow through channel 3 can be prevented by said arrangement, because a sealing line can be provided along the interior wall 13 of the flow through channel 3 in the region of the breakthrough 11.

The sealing surface 10 preferably comprises a width B, which corresponds to a maximum of 5% of the circumference of the flow through channel 3. The width B therein is a measure which extends essentially transverse to the corresponding center axis M6, M7.

Here, the sealing surface 10 is formed in a rib-like manner in both embodiments.

On the exterior of the flow through channel 3, an injection surface 14 adjoins the sealing surface 10. The injection surface 14 is arranged in an offset manner with respect to the sealing surface 10. In other words, the sealing surface 10 is offset from the injection surface 14. Thereby, by this offset arrangement, a cavity 29 is created, into which injection material can flow during the manufacture of the insert 9. This cavity 29 is correspondingly shown in figure 3. Similarly, a corresponding cavity 29 is also created in in the second embodiment.

A further injection surface with the reference numeral 31 is arranged on the exterior around the breakthrough 11. In the embodiment shown, the injection surface is part of an injection molding flange 32, which extends from the breakthrough towards the exterior on the front side, and is part of an injection molding element 33 which extends laterally with respect to the breakthrough 11.

The sealing surface 10 is formed even or planar with respect to its surface. In other words, the sealing surface 10 can be a planar or even surface, respectively. Alternatively, the sealing surface 10 can also be rounded in concave manner, wherein the radius of the curvature preferably essentially corresponds to the radius of the core.

As already mentioned, the two center axes M6, M7 are arranged at an angularly inclined manner with respect to each other in the first embodiment. In particular, the two center axes M6, M7 are arranged at right angles with respect to each other and the two channel sections 6, 7 are also oriented at right angles with respect to each other. The two channel sections are both arranged such that their center axes intersect. In the region of the transition 8 between the first channel section 6 and the second channel section 7, an interior transition edge 15 is formed from the first channel section 6 to the second channel section 7. The interior transition edge 15 is formed with a curvature 16. The curvature 16 has the advantage that the transition between the first channel section 6 and the second channel section 7 can be formed in as an optimized manner as possible with respect to flow. The insert 9 is arranged with respect to the transition edge 15 in such a manner that during the manufacture of the fitting, the transition edge 15 with the curvature 16 is accessible through the breakthrough 11, which is covered by the insert 9.

In figures 6a and 6b, the second embodiment is shown in the form of the T-piece. As already mentioned, the two center axes M6, M7 of the first channel section 6 and the second channel section 7 extend collinearly to each other here. Furthermore, a third channel section 18 is arranged, which extends along a third center axis M18. The third center axis M18 is arranged at an angularly inclined manner, especially at right angles to the first and second center axis M6, M7. The three center axes M6, M7, M18 intersect each other at one mutual point.

In the region of the transition 19 between the first channel section 6 and the third channel section 18, a first inner transition edge 20 is arranged. The transition edge 20 is formed with a curvature 21. In the region of the transition 22 between the second channel section 7 and the third channel section 18, a further inner transition edge 23 is arranged. The transition edge 23 is formed with a curvature 24. Said insert 11 extends from the transition edge 20 between the first channel section 6 and the third channel section 18, until it reaches the transition edge 23 between the second channel section 7 and the third channel section 18. The sealing surface 10 extends in the direction of the first center axis M6 and the second center axis M7 from the first channel section into the second channel section. The sealing surface 10 therefore essentially seals off the transition region between the three channel sections from the region in which the insert 9 comes to lie, in the direction of the flow through channel 3.

In both embodiments, the sealing surface 10 extends tangentially to the curvature 16, 21, 24 of the corresponding beginning 17 of the curvature.

Both embodiments preferably comprise a sealing structure 34 which is arranged on the exterior.

An injection molding process for the manufacture of a fitting according to the above mentioned description comprises the following steps:

In a first step, the housing wall 2 is manufactured without the insert 11, wherein per channel section 6, 7, 18, one cylindrical core is provided and wherein an additional core protrudes through the breakthrough which is covered by the insert 9. The additional core serves for the provision of the interior form of the flow through channel 3, especially of said curvature 10.

In a second step, at least one core K is inserted into the flow through channel 3 along the first and/or the second channel section 6, 7 until it reaches the region of the breakthrough 12, wherein the core comes into contact with the sealing surface 10 such that the flow through channel 3 is tightly closed with respect to the injection material to be injected with the insert 9, and wherein the breakthrough is closed with the insert 11 by injection molding.

LIST OF REFERENCE SIGNS

| | | | |
|---|---|---|---|
| 1 | fitting | 21 | curvature |
| 2 | housing wall | 22 | transition |
| 3 | flow through channel | 23 | further transition edge |
| 4 | fitting inlet | 24 | curvature |
| 5 | fitting outlet | 25 | intersecting region |
| 6 | first channel section | 26 | exterior side |
| 7 | second channel section | 27 | section |
| 8 | transition | 28 | section |
| 9 | insert | 29 | cavity |
| 10 | sealing surface | 30 | fitting outlet |
| 11 | breakthrough | 31 | further injection surface |
| 12 | interior wall | 32 | injection flange |
| 13 | interior wall | 33 | injection element |
| 14 | injection surface | 34 | sealing structure |
| 15 | interior transition edge | | |
| 16 | curvature | B | width |
| 17 | beginning of curvature | K | core |
| 18 | third channel section | P | arrow |
| 19 | transition | | |
| 20 | first transition edge | | |

**Patentkrav**

**1.** Fitting (1), især af plast, der omfatter:
en husvæg (2) som afgrænser en gennemstrømningskanal (3), der strækker sig fra et fittingsindløb (4) til et fittingsudløb (5),
hvilken gennemstrømningskanal (3) omfatter en første kanalsektion (6), der strækker sig langs en første centerakse (M6), og en anden kanalsektion (7), der strækker sig langs en anden centerakse (M7),
hvor der i området for overgangen (8) mellem den første kanalsektion (6) og den anden kanalsektion (7) er indsat en indsats (9) i et åbning (11) gennem husvæggen (2), hvilken indsats (9) er forbundet sammenhængende med husvæggen (2),
hvor en tætningsflade (10) strækker sig mindst delvist gennem åbningen (11), således at der under fremstillingen af indsatsen (9) i samarbejde med mindst en kerne af et sprøjtestøbeværktøj kan forhindres en indtrængning af sprøjtematerialet i gennemstrømningskanalen (3), **kendetegnet ved, at** tætningsfladen (10) er forskudt fra den indre væg (13) af gennemstrømningskanalen (3).

**2.** Fittingen (1) ifølge krav 1, **kendetegnet ved, at** tætningsfladen (10) fortsætter i retning af centeraksen (M6, M7) for den respektive sektion (6, 7).

**3.** Fittingen (1) ifølge krav 2, **kendetegnet ved, at** tætningsfladen (10) støder umiddelbart op til den indre væg (12) i den respektive sektion (6, 7) og danner en fortsættelse af den indre væg (12) i området for åbningen (11).

**4.** Fitting (1) ifølge et af de foregående krav, **kendetegnet ved, at** tætningsfladen (10) forbliver mindst delvist i den oprindelige tilstand efter fremstillingen af indsatsen (9).

**5.** Fitting (1) ifølge et af de foregående krav, **kendetegnet ved, at** tætningsfladen (10) er forskudt i området fra 0,01 til 0,5 millimeter eller i området fra 0,02 til 0,45 millimeter fra den indre væg (13).

**6.** Fitting (1) ifølge et af de foregående krav, **kendetegnet ved, at** tætningsfladen (10), der støder op til den første kanalsektion (6), kommer i kontakt med tætningsfladen (10) i et krydsende område (25), der strækker sig væk fra den anden kanalsektion (7).

**7.** Fitting (1) ifølge et af de foregående krav, **kendetegnet ved, at** tætningsfladen (10) i det væsentlige fuldstændigt omgiver åbningen (11) i forhold til gennemstrømningskanalen (3), således at en indtrængning af sprøjtemateriale i gennemstrømningskanalen (3) fuldstændigt kan forhindres.

**8.** Fitting (1) ifølge et af de foregående krav, **kendetegnet ved, at** der i området for åbningen (11) på hver side af gennemstrømningskanalen (3) er anbragt en tætningsflade (10), og/eller at tætningsfladen (10) omfatter en bredde (B), der svarer til et maksimum på 5 % af omkredsen af gennemstrømningskanalen.

**9.** Fitting (9) ifølge et af de foregående krav, **kendetegnet ved, at** en indsprøjtningsflade (14) støder op til tætningsfladen (10) på ydersiden af gennemstrømningskanalen (3), hvilken indsprøjtningsflade (14) er anbragt forskudt i forhold til tætningsfladen (10), hvorved der ved den forskudte indretning dannes et hulrum (29), i hvilket sprøjtemateriale kan strømme under fremstillingen af indsatsen (9).

**10.** Fitting (1) ifølge et af de foregående krav, **kendetegnet ved, at** tætningsfladen (10) er henholdsvis en jævn eller plan flade; eller at tætningsfladen (10) er afrundet på en konkav måde.

**11.** Fitting (1) ifølge et af de foregående krav, **kendetegnet ved, at** de to centerakser (M6, M7) er anbragt på en skråtstillet måde, især vinkelret i forhold til hinanden, og at de to kanalsektioner (6, 7) er anbragt således, at deres centerakser (M6, M7 ) krydser hinanden, og

at der i overgangsområdet (8) mellem den første kanalsektion (6) og den anden kanalsektion (7) er dannet en indre overgangskant (15) fra den første kanalsektion (6) til den anden kanalsektion (7), hvilken overgangskant (15) er udformet med en afrunding (16) på en afrundet måde,
hvor indsatsen (9) er anbragt i forhold til overgangskanten (15), således at overgangskanten (15) med afrundingen (16) er tilgængelig gennem åbningen (11), som er dækket af indsatsen (9), under fremstillingen af fittingen (9).

**12.** Fitting (1) ifølge et af kravene 1-10, **kendetegnet ved, at**
de to centerakser (M6, M7) er anbragt kollineært i forhold til hinanden og
at fittingen (1) omfatter en tredje kanalsektion (18), der strækker sig langs en tredje centerakse (M18), hvilken tredje centerakse (M18) forløber på en skråtstillet måde, især retvinklet, til den første og til den anden centerakse (M6, M7),
hvor der i området for overgangen (19) mellem den første kanalsektion (6) og den tredje kanalsektion (18) er dannet en første indre overgangskant (20) fra den første kanalsektion (6) til den tredje kanalsektion (18), hvilken overgangskant (20) er udformet med en afrunding (21) på en afrundet måde,
hvor der i området for overgangen (22) mellem den anden kanalsektion (7) og den tredje kanalsektion (18) er dannet en yderligere indre overgangskant (23) fra den første kanalsektion (7) til den tredje kanalsektion (18), hvilken yderligere overgangskant (23) er udformet med en afrunding (24) på en afrundet måde,
og hvor indsatsen (11) mindst strækker sig fra overgangskanten (20) mellem den første og tredje kanalsektion (6, 7) til overgangskanten (23) mellem den anden og tredje kanalsektion (7,18).

**13.** Fittingen ifølge krav 12, **kendetegnet ved, at** tætningsfladen strækker sig i retning af den første centerakse og den anden centerakse fra den første kanalsektion til den anden kanalsektion.

**14.** Fitting (1) ifølge et af kravene 11 til 13, **kendetegnet ved, at** tætningsfladen (10) strækker sig væk fra den respektive begyndelse (17) af afrundingen tangentielt til afrundingen (16, 21,24).

**15.** Fremgangsmåde til sprøjtestøbning til fremstilling af en fitting (1) ifølge et af de foregående krav, **kendetegnet ved**
**at** husvæggen (2) uden indsatsen (11) fremstilles i et første trin, hvorved der for hver kanalsektion (6, 7,18) tilvejebringes en cylindrisk kerne, og hvorved en yderligere kerne til at tilvejebringe den indre form af gennemstrømningskanalen (3) stikker ud gennem åbningen (11), som er dækket af indsatsen (9), ind i gennemstrømningskanalen (3), og
**at** mindst en kerne (K), i et andet trin, skubbes ind i gennemstrømningskanalen (3) langs den første og/eller den anden kanalsektion (6, 7), indtil den når åbningsområdet (12), hvilken kerne kommer i kontakt med tætningsfladen (10), således at gennemstrømningskanalen (3) er tæt lukket i forhold til det sprøjtemateriale, der skal sprøjtestøbes med indsatsen (9), og hvorved åbningen (12) sprøjtestøbes med indsatsen (11).

**16.** Fremgangsmåden til sprøjtestøbning ifølge krav 15, **kendetegnet ved, at** de to trin udføres i den samme sprøjtestøbeform.

FIG. 1

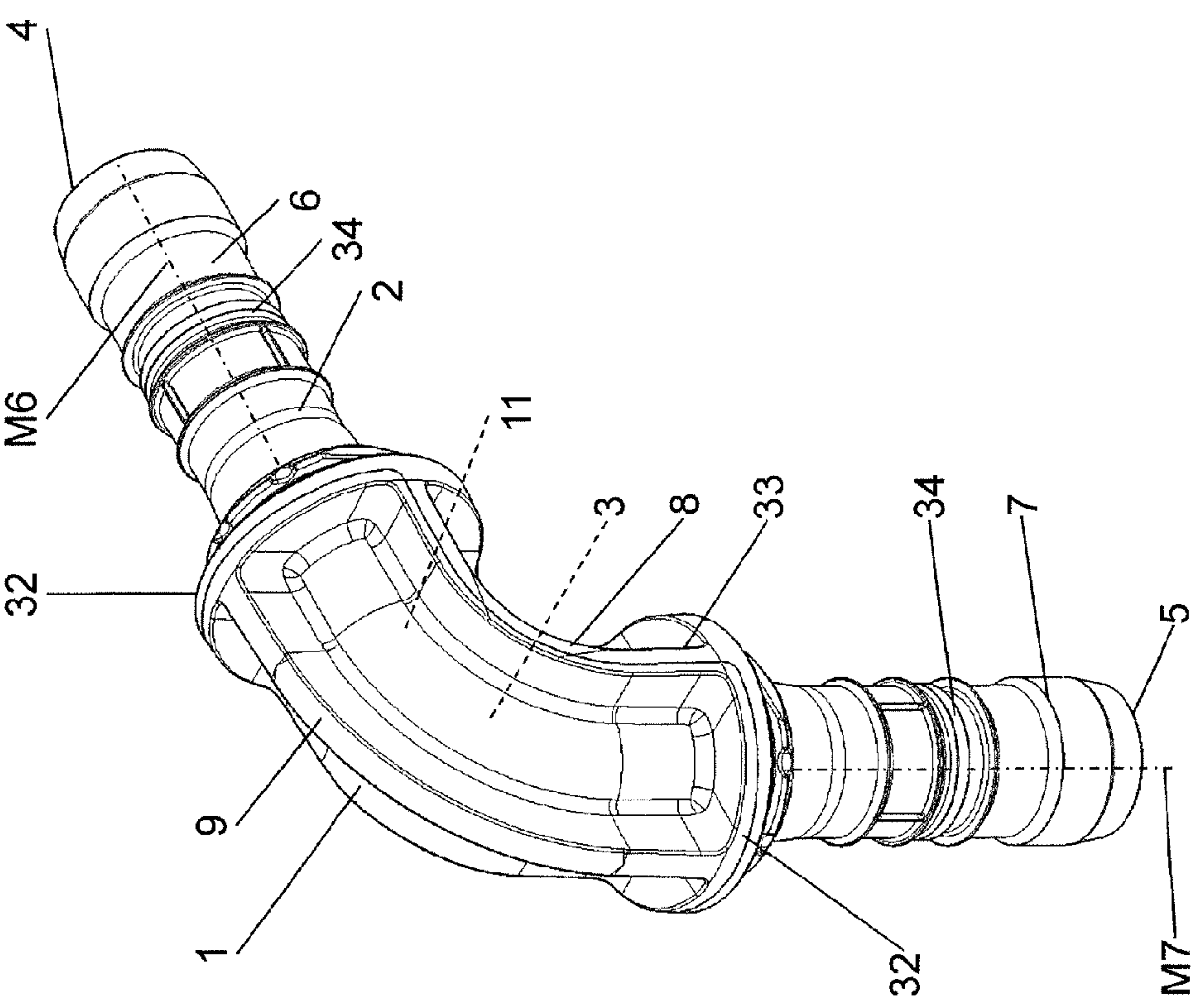
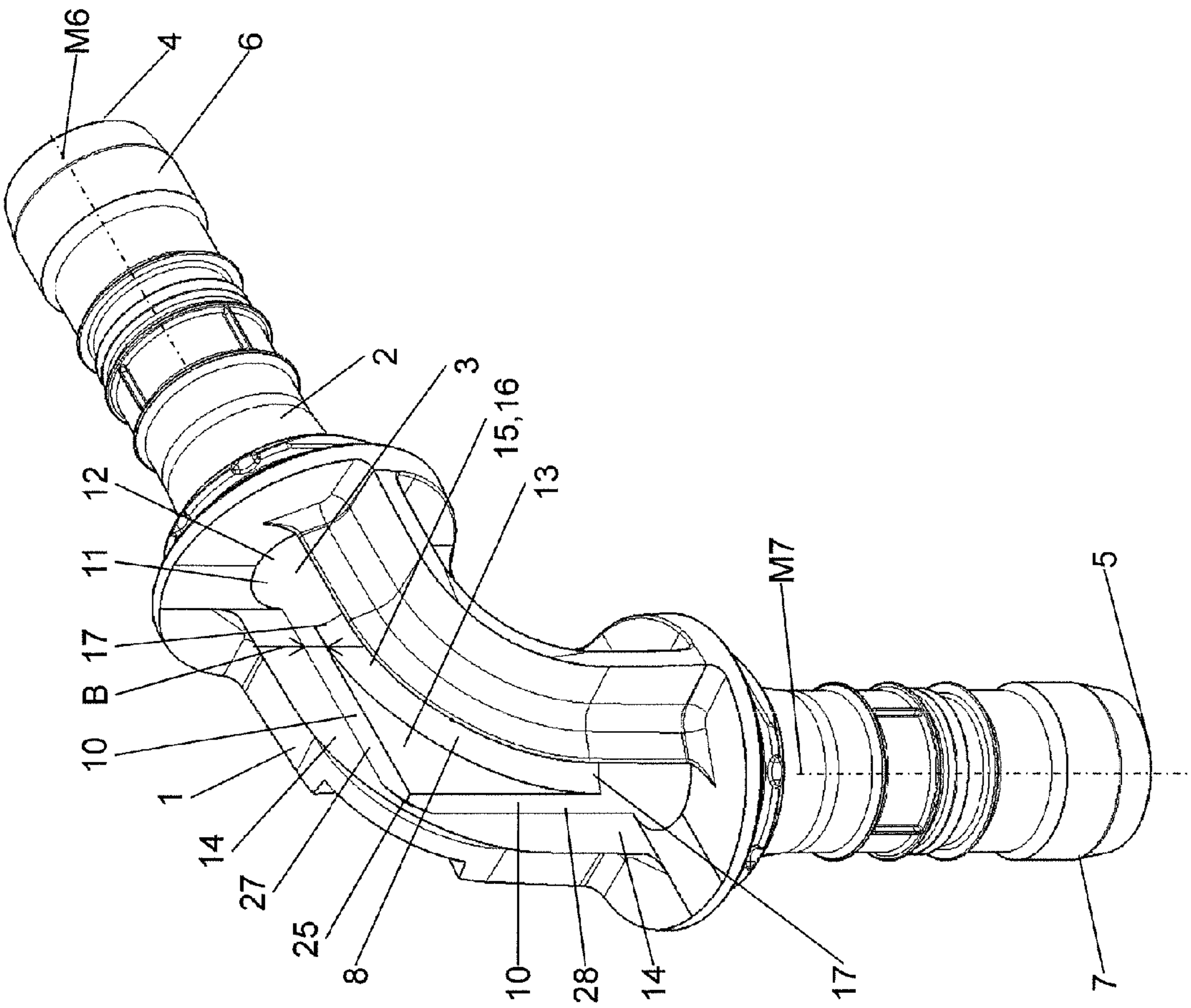


FIG. 2



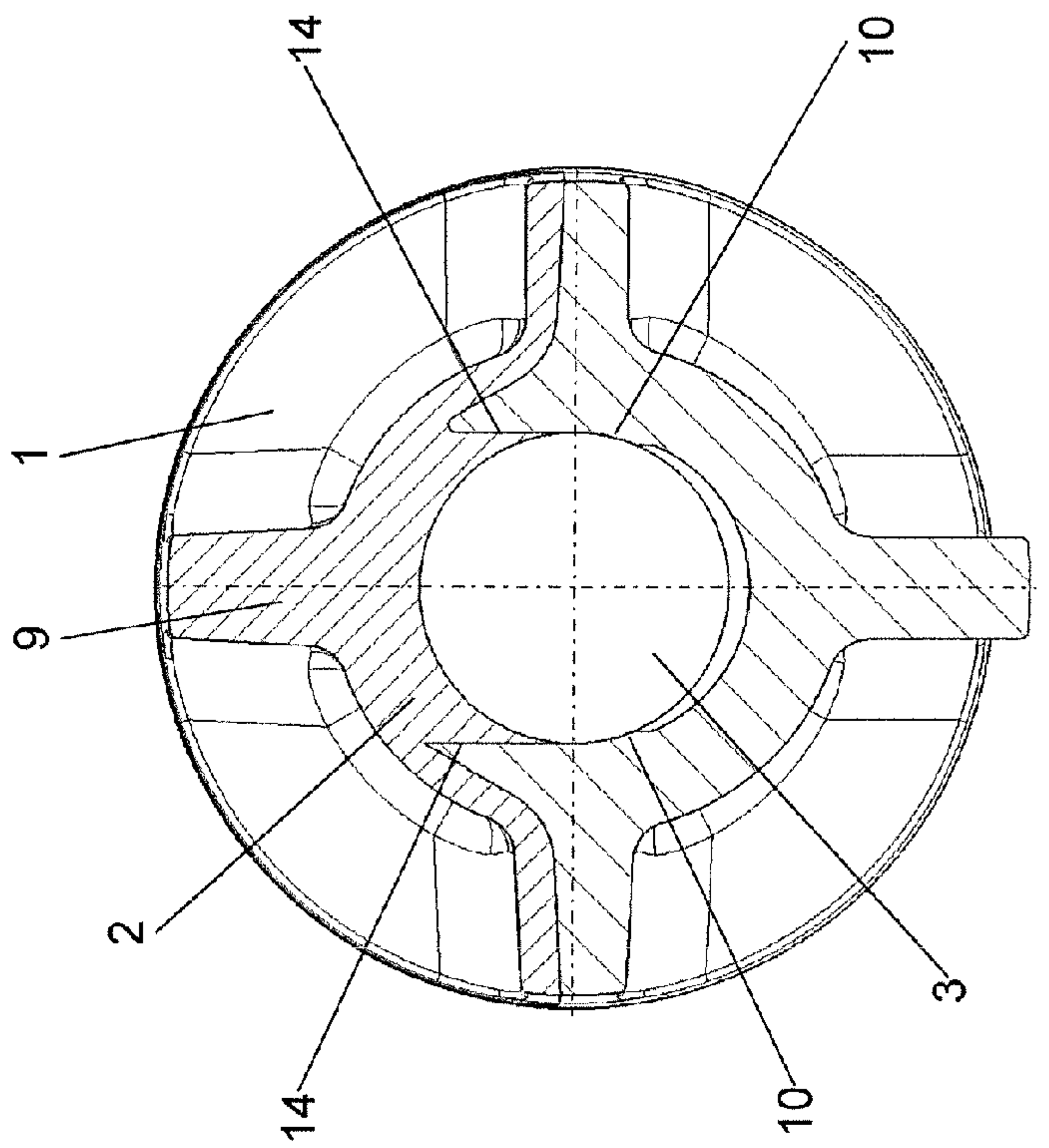



FIG. 4

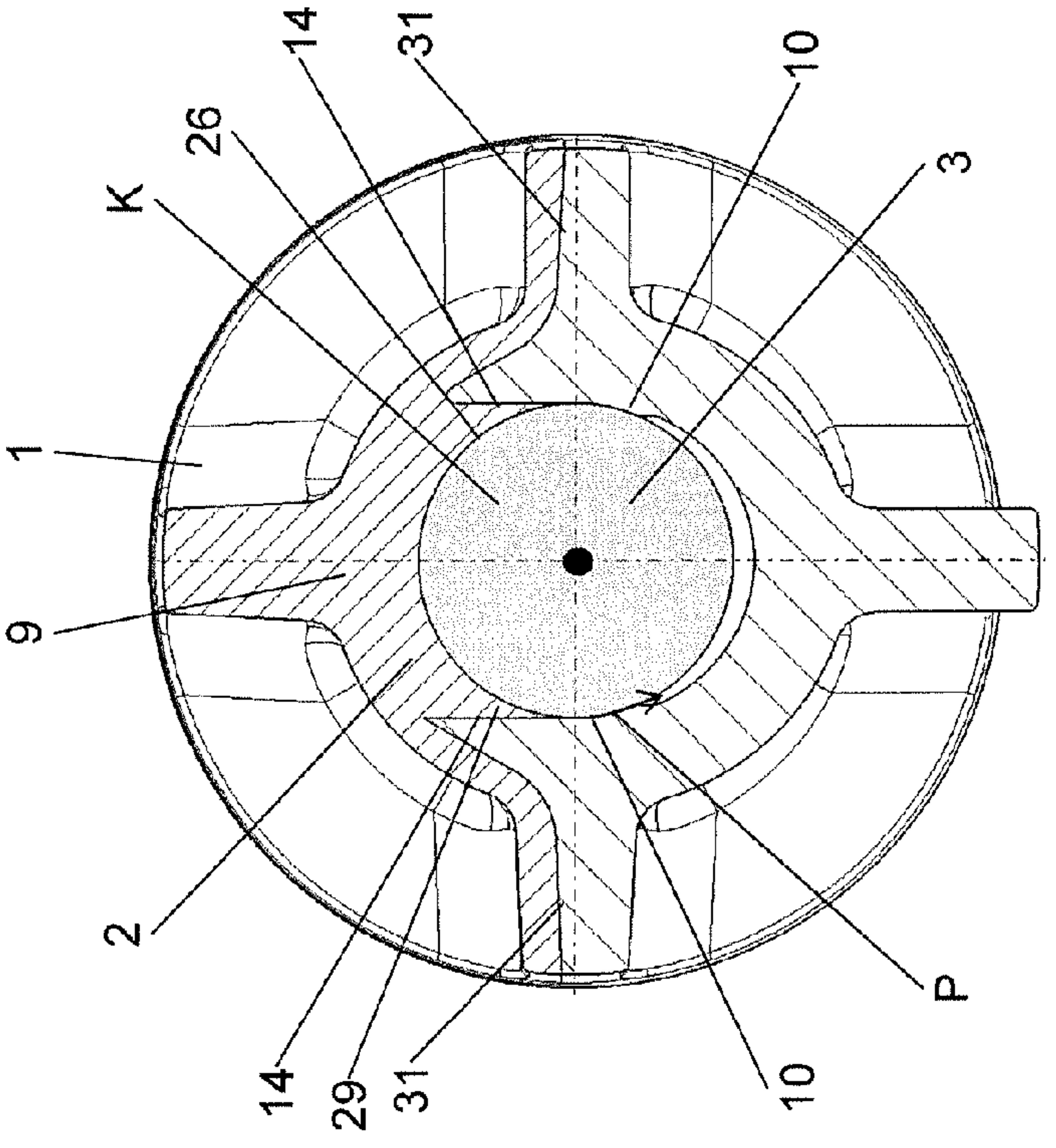



FIG. 3

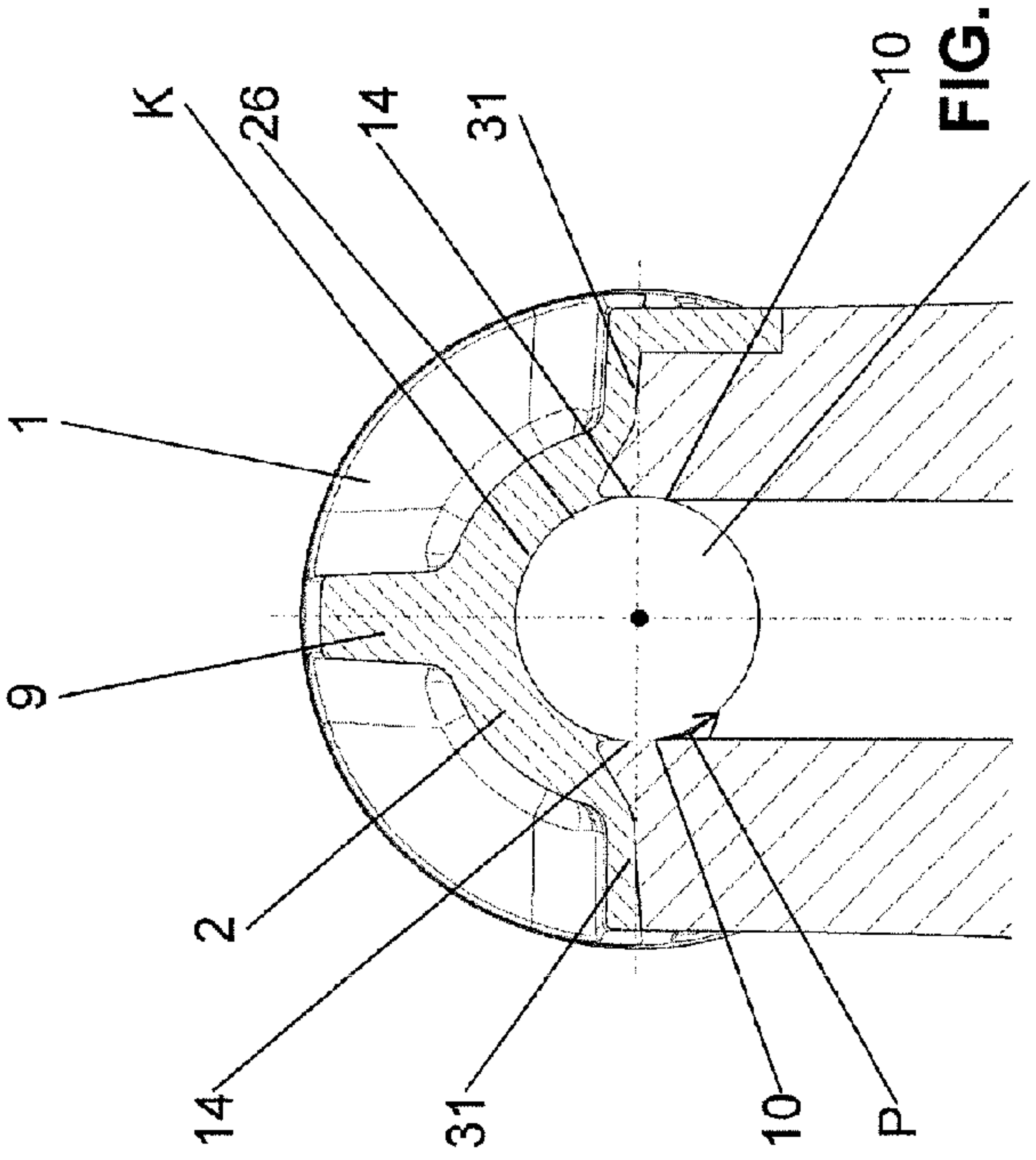



FIG. 5b

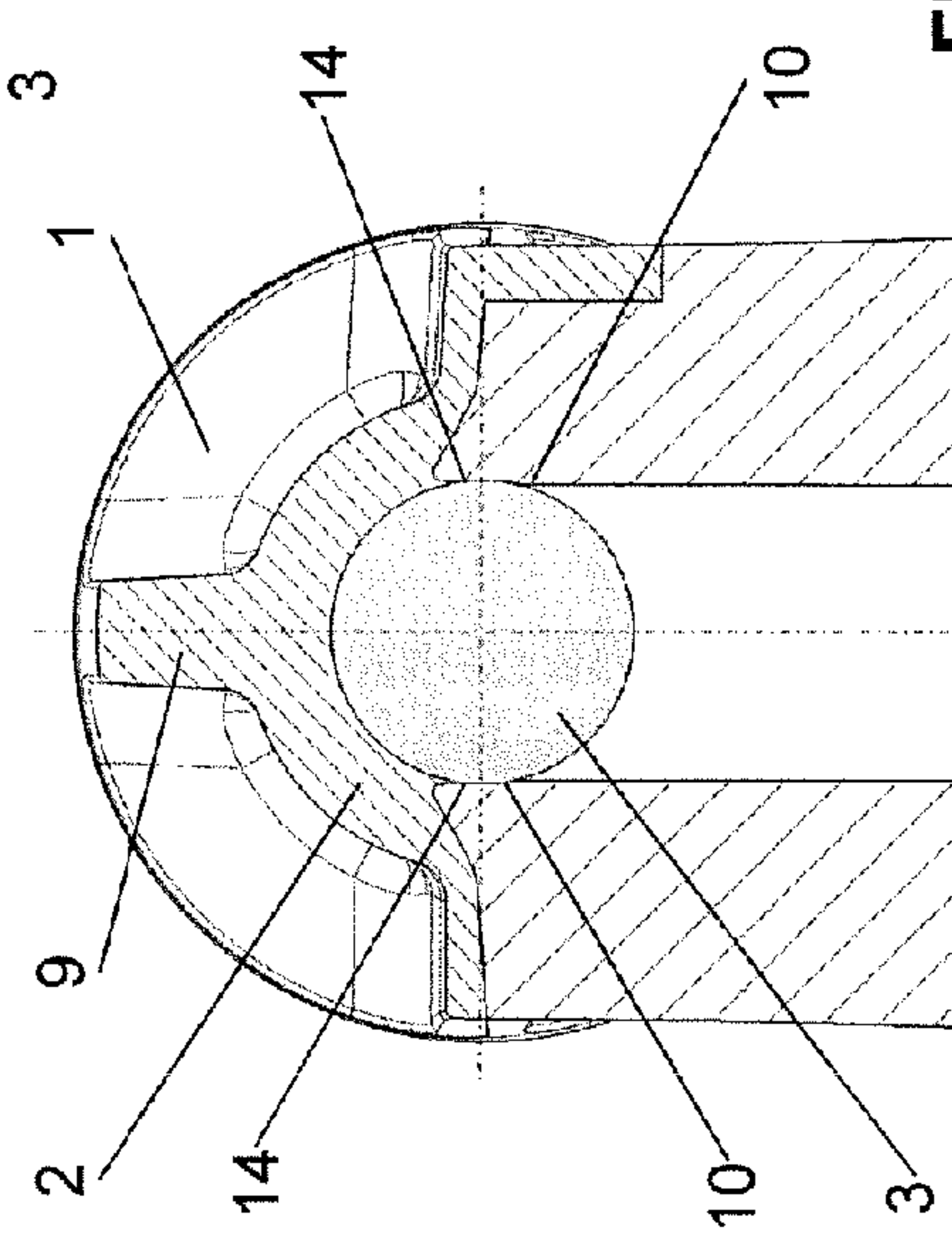



FIG. 5c

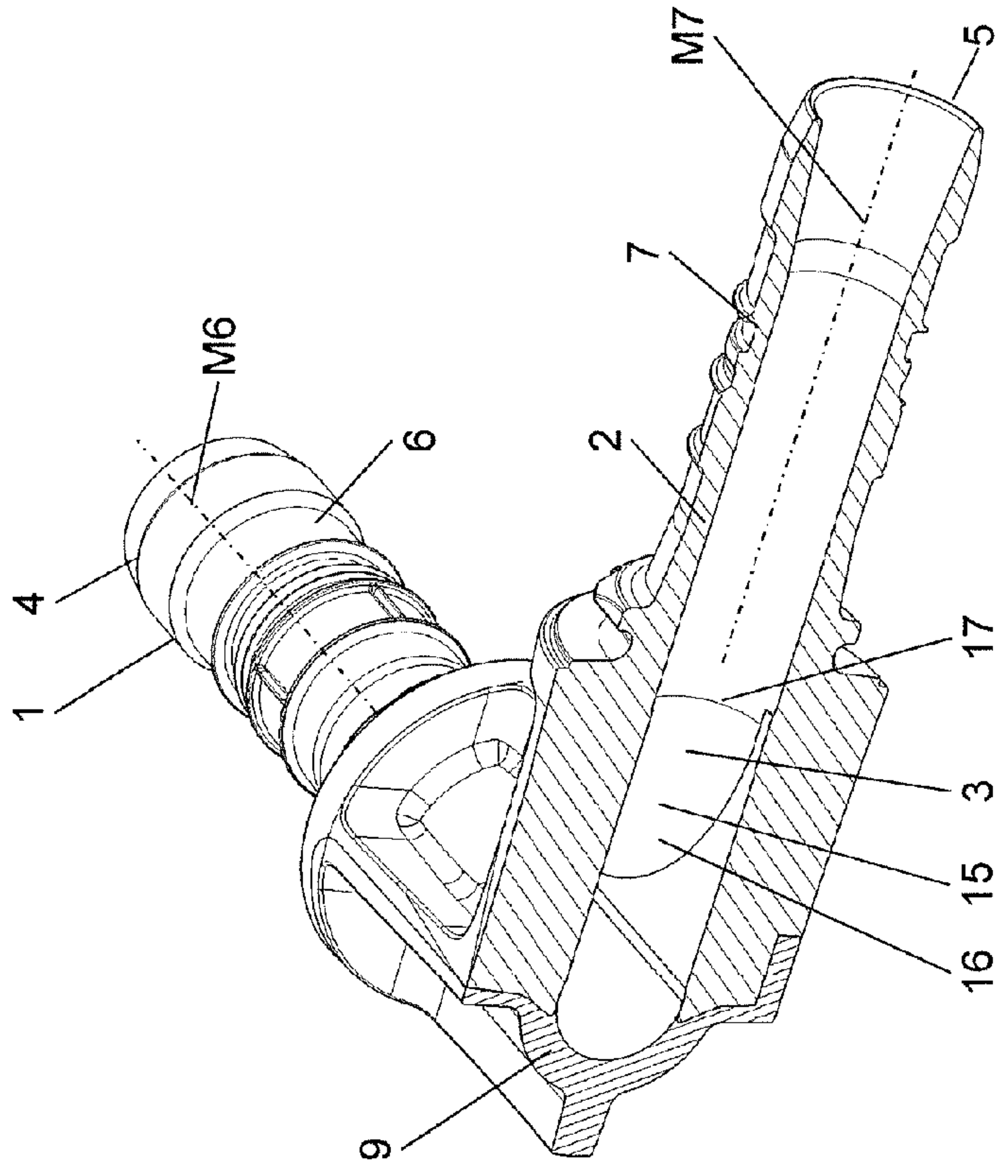



FIG. 5a

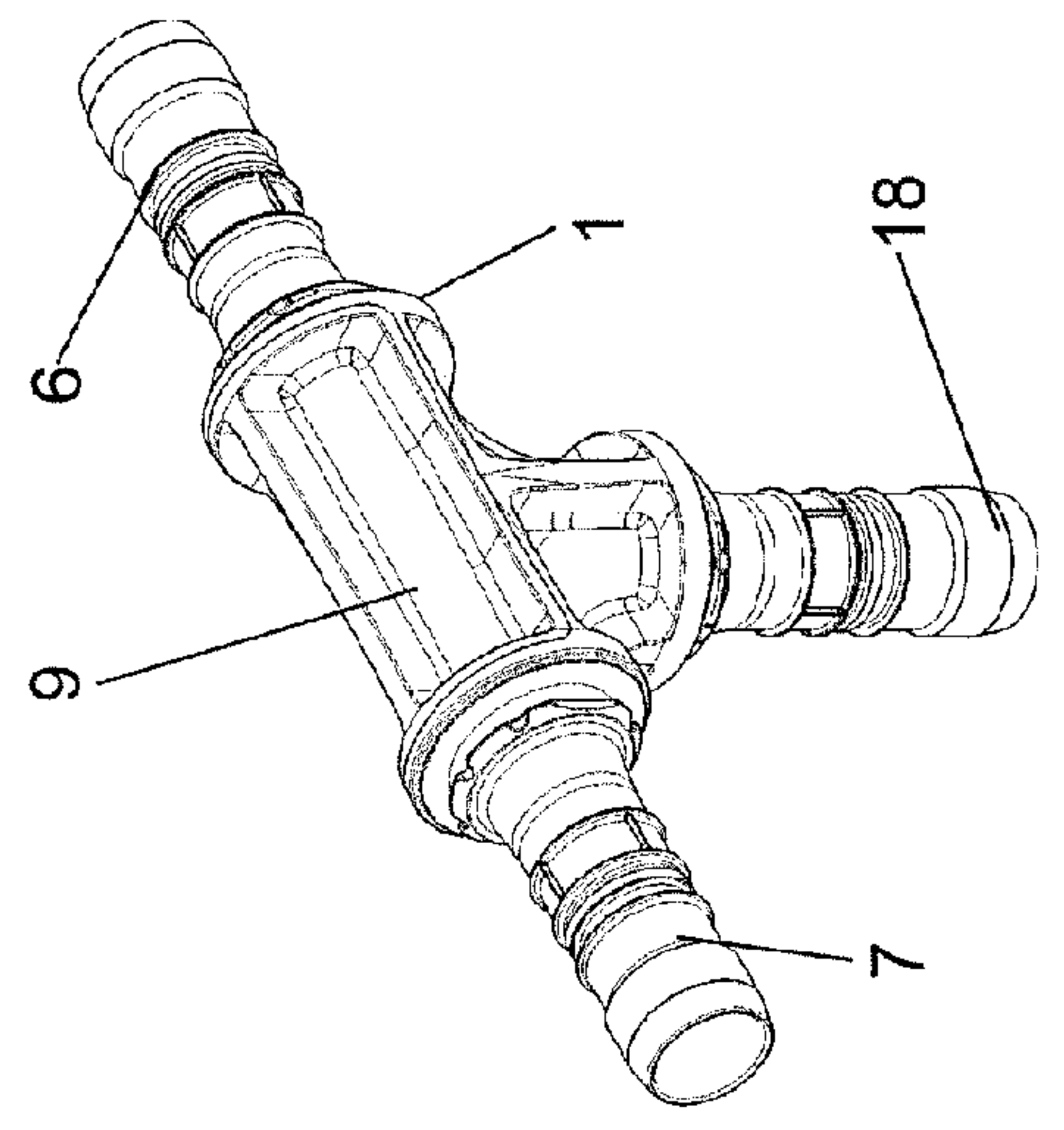



FIG. 6b

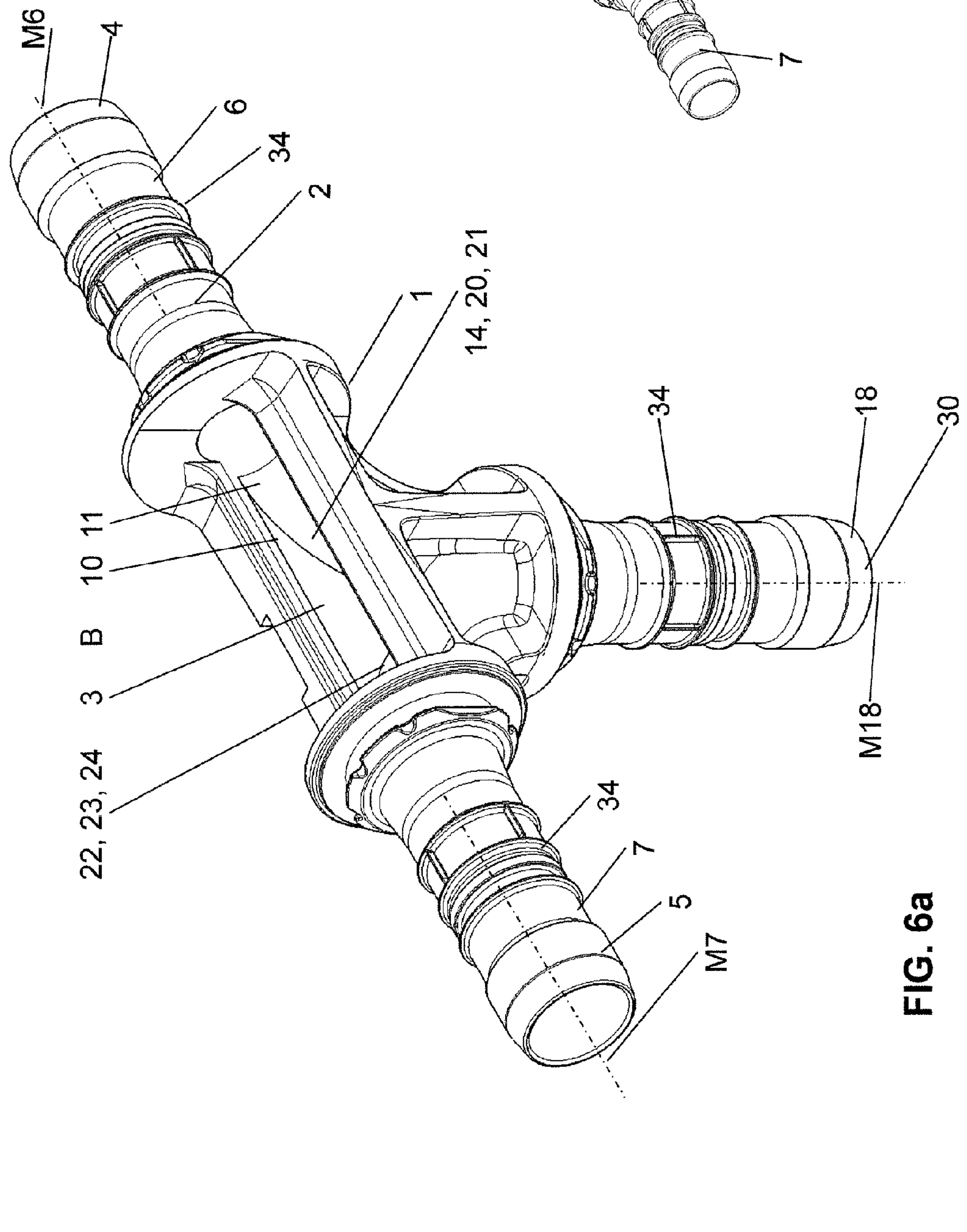



FIG. 6a