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- (73) Patenthaver: **Lüdecke GmbH, Heinrich-Hauck-Strasse 2, 92224 Amberg, Tyskland**
- (72) Opfinder: **MEIER, Ringo, Dr.-Steininger-Strasse 26, 92224 Amberg, Tyskland**
- (74) Fuldmægtig i Danmark: **Dennemeyer & Associates S.A, P.O. Box 700425, DE-81304 Munich, Tyskland**
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COUPLING SYSTEM FOR HOSE AND / OR PIPE LINES AND METHOD FOR PRODUCING AND BLOCKING A FLUID FLOW

The present invention relates to a coupling system for hose lines and/or pipelines as well as to a method for producing and shutting off a fluidic flow.

If hose lines and pipelines, as used, for example, in the field of pneumatics, have to be connected to one another, quick-action closure systems are known for this purpose from the prior art which consist of a coupling and a nipple. The pipelines and hose lines can be plugged to the coupling, wherein the coupling can have a fastening lug and a plug part for this purpose, on which the corresponding pipelines and hose lines are plugged. In order to be able to release the nipple from the coupling, corresponding locking sleeves exist, which can be displaced axially relative to the coupling, wherein the connection between the coupling and the nipple is removed.

Such a coupling is known, for example, from the utility model DE 20 2007 006 090 U1. The coupling of the German utility model has a coupling part and a locking sleeve. Furthermore, a latching element is provided, by means of which a plug can be affixed to the coupling part. The latching connection is released by a movement of the locking sleeve, wherein the plug is automatically guided away from the coupling part by means of a spring force being applied. In order to avoid an unintentional release of the plug from the coupling part, the locking sleeve can be brought into a stable rotational position. The coupling part according to the German utility model can be connected to a first hose line and/or pipeline. The plug can be connected to a second hose line and/or pipeline. If the coupling part and the plug are fastened to one another, a fluid or liquid or air can be passed on from the first hose line and/or pipeline via the coupling to the second hose line and/or pipeline.

Practice has shown that when the plug is separated from the coupling part, medium can escape unintentionally. This can be the case if there is still medium in a hose line and/or pipeline that is connected to the plug.

If compressed air is passed on via the coupling, it may be the case that an overpressure prevailing in a hose line and/or pipeline is released immediately when the plug is separated from the coupling part. This can be accompanied by an unintentionally high noise level. It can also be the case that when the overpressure is released, a recoil occurs so that the disconnection of the plug from the coupling part is awkward or, in the event of an unexpected recoil, can even lead to injuries.

US 2,850,297 A1 discloses a quick-action closure coupling with a male part and a

female part. The female part comprises multiple detent balls that engage a recess in the male part to detachably attach the male part to the female part. The connection can be released by actuating a sleeve. Both the male part and the female part of the quick-action closure coupling can each comprise a valve mechanism.

It would be desirable to be able to easily modify already existing coupling systems in such a manner that they do not have the problems described after modification.

For this reason, one object of the invention can be seen as improving existing coupling systems in such a manner that a fluidic connection can be uncoupled easily, with a low risk of injury and with a reduced noise level.

The above object is achieved by the subject matter comprising the features in independent claims. Further advantageous embodiments are described by the dependent claims.

The invention relates to a coupling system for hoses and/or pipelines. The coupling system comprises a plug nipple and a valve body, into which the plug nipple can be inserted with an associated detachable fastening via the valve body. It has proven useful if the valve body comprises multiple latching elements, optionally formed by detent balls, which engage in a corresponding recess and/or groove of the plug nipple when the fastening between the plug nipple and the valve body is formed.

The valve body comprises a first valve mechanism, which is opened via the plug nipple by means of the plug nipple being inserted into the valve body, and which closes independently when the plug nipple is separated from the valve body. The first valve mechanism can be arranged or positioned at least in regions and preferably completely within a housing of the valve body. Furthermore, the first valve mechanism may comprise a valve sleeve that carries an O-ring. When the first valve mechanism is closed, the O-ring may abut in a sealing manner on an inner lateral surface of a housing formed as part of the valve body, thereby shutting off a flow of fluid through the valve body. The valve sleeve can also have an opening through which a fluid flow can pass when the first valve mechanism is open. It is therefore possible that the valve sleeve designed as part of the first valve mechanism can be moved relative to a housing of the valve body, wherein fluid is able to flow through the valve body in a first relative position and a flow of fluid through the valve body is shut off in a second relative position.

It may also be that the first valve mechanism comprises a spring which interacts with the valve sleeve in a force-loaded manner the O-ring carried by the valve sleeve to fasten the inner surface of the housing when the first valve mechanism is closed or in the second relative position.

The coupling system can be designed as a quick-action closure coupling or safety coupling for hoses and/or pipelines. Furthermore, the valve body can comprise a housing and a locking sleeve, which is arranged on the housing. The locking sleeve can optionally be designed to be movable relative to the housing in the axial direction, wherein a movement of the locking sleeve in the axial direction and relative to the housing releases a previously existing detachable fastening between the valve body and the inserted plug nipple. In addition to this, it can be provided in various embodiments that the coupling system comprises a spring, wherein the locking sleeve is movable in the axial direction relative to the housing and counter to a restoring force of the spring in order to shut off the detachable fastening previously existing between the valve body and the inserted plug nipple. The spring can be used to move the locking sleeve back into a starting position, optionally independently, relative to the housing and in the axial direction after the detachable fastening between the valve body and the inserted plug nipple has been removed. The housing can be accommodated at least in sections by the locking sleeve or can be arranged within the locking sleeve. It is thus possible for the previously described first valve mechanism of the valve body to be at least partially, and preferably completely, accommodated by the housing, wherein the housing is accommodated at least in sections by the locking sleeve.

It is provided that the plug nipple comprises a second valve mechanism. Furthermore, the coupling system comprises at least one insert which can be removably arranged in a receptacle formed by the valve body and is designed to be removable in the receptacle formed by the valve body when the plug nipple is inserted into the valve body for independently opening the second valve mechanism, which second valve mechanism is part of the plug nipple.

The second valve mechanism can be designed in such a manner that the second valve mechanism closes independently when the plug nipple is separated from the valve body. Embodiments that have proven successful here are those in which the first valve mechanism of the valve body and the second valve mechanism of the plug nipple open at least approximately at the same time or synchronously when the plug nipple is inserted into the valve body and/or in which the first valve mechanism and the second valve mechanism close at least approximately at the same time or synchronously when the plug nipple is separated from the valve body. The second valve mechanism can be designed as a component of the plug nipple so that when the plug nipple is separated from the valve body, the second valve mechanism is separated from the valve body together with the plug nipple.

The second valve mechanism of the plug nipple may comprise a closure part and a spring mechanically coupled to the closure part. It is conceivable that, by means of the plug nipple being inserted, the closure part can be transferred into an open position against a restoring force of the spring by the at least one insert, which is removably arranged in the receptacle formed by the valve body, and the closure part is independently transferable into a closed position by the restoring force of the spring when the plug nipple is separated from the valve body.

An O-ring can be assigned to the closure part, which O-ring fluidically seals the closure part in the closed position from an inner lateral surface of the plug nipple. In particular, the closure part can form a groove which is guided radially around the longitudinal axis of the closure part and in which the O-ring is arranged. By means of the spring, the O-ring can be brought into contact with an inner lateral surface of the plug nipple in the closed position, optionally in a force-loaded manner.

The plug nipple may comprise a housing, the second valve mechanism being at least partially, and preferably completely, received within the housing of the plug.

A housing of the valve body and the at least one insert can be designed as two components of the valve body that can be separated from one another. Furthermore, the first valve mechanism of the valve body and the at least one insert are designed as two components of the valve body that can be separated from one another.

Optionally, the valve body can comprise at least one fastening means, which at least one fastening means can be introduced in a detachable manner into a seat formed by the valve body and which interacts with the at least one insert in such a manner that the at least one insert is held by the at least one fastening means in the receptacle formed by the valve body when the at least one fastening means is introduced into the seat formed by the valve body. Furthermore, the at least one insert can optionally be removed from the receptacle formed by the valve body when the at least one fastening means is removed from the seat formed by the valve body. Thus, a housing of the valve body and the at least one fastening means can be designed as two components that can be separated from one another. Furthermore, the first valve mechanism of the valve body and the at least one fastening means can be designed as two components of the coupling system that can be separated from one another.

Embodiments that have proven successful are those in which the first valve mechanism comprises a valve sleeve which can be moved relative to a housing of the valve body in order to open and close the first valve mechanism. It is conceivable here that the receptacle and the seat are formed by the valve sleeve in such a manner that the

at least one fastening means, which is detachably introduced into the seat and is formed by at least one O-ring, fluidically seals the at least one insert which is being held in the receptacle of the valve sleeve from an inner lateral surface of the valve sleeve.

The valve sleeve can support a closure which closes in a first relative position formed between the housing and the valve sleeve and is open in a second relative position formed between the housing and the valve sleeve, or releases a fluid flow through the valve body. The closure can carry an O-ring which, when the first valve mechanism is closed, is in contact with an inner lateral surface of the housing and, when the first valve mechanism is open, is spaced apart from the inner lateral surface of the housing. The aforementioned seat and/or receptacle may, as explained, optionally be provided via the valve sleeve. Thus, the at least one insert can optionally be removably arranged in a receptacle provided via the valve sleeve. As an alternative or in addition to this, the at least one fastening means can optionally be detachably introduced into a seat formed by the valve sleeve.

Furthermore, the at least one insert removably arranged in the receptacle formed by the valve body or the valve sleeve can comprise a projection, preferably formed as a pin, which, by means of inserting the plug nipple, comes into surface contact with the closure part and can transfer the closure part under surface contact in a force-loaded manner into the open position against the restoring force of the spring. If the at least one insert is arranged in the receptacle of the valve body, it may be that the projection, preferably designed as a pin, extends parallel to a longitudinal axis of the valve body or that the projection, preferably designed as a pin, is oriented parallel to a longitudinal axis of the valve body. It is also conceivable that a housing designed as part of the valve body and/or the previously mentioned valve sleeve and/or the projection, preferably designed as a pin, are oriented coaxially to one another if the at least one insert is arranged in the receptacle.

In addition, it may be that a free end or end pointing in the direction of the inserted plug nipple of the projection, which is preferably designed as a pin, tapers to a point. A closure part of the plug nipple can have a correspondingly formed notch, in which the projection, preferably formed as a pin, for opening the second valve mechanism dips.

It is conceivable that the coupling system comprises a further plug nipple, wherein the further plug nipple can be inserted into the valve body instead of the plug nipple with an associated detachable fastening. It can be provided here that the additional plug nipple is designed to open the first valve mechanism by inserting the additional plug nipple into the valve body. In addition, it may be that the further plug nipple has a free through hole

extending through the further plug nipple, which through hole is in each case open, both when there is a detachable fastening formed between the valve body and the further plug nipple and with the further plug nipple being separated from the valve body. Thus, the additional plug nipple may optionally not have a valve mechanism or be designed without a valve mechanism. Such systems are characterised by a high degree of flexibility, so that depending on the respective fluidic coupling, either the already described plug nipple, which has the second valve mechanism, or the further plug nipple, which has the free through hole or is designed without a valve mechanism, can be inserted into the valve body.

The at least one insert can have at least one hole through which fluid can flow if the first and second valve mechanisms are each open or if the plug nipple is inserted into the valve body.

The invention also relates to a method for establishing and shutting off a fluid flow. It may be that the coupling system already described above is designed or prepared for the implementation of the embodiments of the method described below. Features that were previously described for various embodiments of the coupling system can also be provided for various embodiments of the method described below and are not mentioned multiple times. Features described below for various embodiments of the method can also optionally be used in embodiments of the coupling system described above.

The method comprises the following steps:

- inserting a plug nipple into a valve body, wherein, by means of the plug nipple being inserted,
 - a) the plug nipple is detachably fastened to the valve body, and
 - b) a first valve mechanism, which is designed as a part of the valve body, is opened via the plug nipple; and
- separating the plug nipple from the valve body, the plug nipple up to then having been detachably fastened to the valve body, wherein the first valve mechanism independently closes by the plug nipple being separated from the valve body.

It is also provided that, before the plug nipple is inserted into the valve body, at least one insert is to be inserted into a receptacle formed by the valve body, which at least one insert, when inserted in the receptacle formed by the valve body, independently opens a second valve mechanism, which is formed as a part of the plug nipple, by means of the plug nipple being inserted into the valve body.

The second valve mechanism may comprise a spring and a closure part. It may be the case here that by inserting the plug nipple into the valve body, the closure part

comes into surface contact with the at least one insert which is inserted into the receptacle, and the closure part is transferred under surface contact with the at least one insert, which is inserted into the receptacle, into an open position against a restoring force of the spring, which is associated with a flow of fluid through the plug nipple being unblocked. It can also be the case that when the plug nipple is separated from the valve body, the spring moves the closure part into a closed position, which is associated with shutting off the flow of fluid through the plug nipple. The second valve mechanism or the closure part can comprise a sealing means, preferably designed as an O-ring, which in the closed position fluidly seals the closure part against an inner lateral surface of the plug nipple, so that the flow of fluid through the plug nipple is shut off. By means of a movement of the closure part against the restoring force of the spring into the open position, the sealing means, which is preferably designed as an O-ring, can no longer be in surface contact with the inner lateral surface of the plug nipple.

Furthermore, the at least one insert can comprise a projection, preferably designed as a pin, which comes into surface contact with the closure part when the plug nipple is inserted into the valve body and transfers the closure part under surface contact in a force-loaded manner into the open position against the restoring force of the spring.

The at least one insert can have at least one hole through which fluid can pass. In various embodiments, the at least one insert can have multiple holes through which in each case fluid can pass. It is conceivable here that the plurality of holes are positioned about an axis running through the projection, which is preferably designed as a pin.

It may be that after the opening of the second valve mechanism via the at least one insert inserted into the receptacle, the plug nipple previously detachably fastened to the valve body is separated from the valve body and subsequently the at least one insert inserted into the receptacle is removed from the receptacle. Subsequently, a further plug nipple, which has a continuously open through hole, can be inserted into the valve body, wherein the further plug nipple is detachably fastened to the valve body by means of the further plug nipple being inserted, and the first valve mechanism, which is designed as part of the valve body, is opened via the further plug nipple.

It has proven useful if a locking sleeve is actuated and preferably moved relative to a housing of the valve body, with which a fastening previously formed between the plug nipple detachably fastened on the valve body and the valve body is released. Provision can be made for the plug nipple detachably fastened on the valve body to be separated from the valve body after the fastening previously formed between the plug nipple detachably fastened on the valve body and the valve body has been removed.

Embodiments that have proven successful are those in which, with an actuation and preferably relative movement of the locking sleeve relative to the housing,

- a) the fastening previously formed between the plug nipple detachably fastened to the valve body and the valve body is released and in addition,
- b) the plug nipple, which is detachably fastened on the valve body, is independently or automatically separated from the valve body.

The independent or automatic separation of the plug nipple detachably fastened on the valve body from the valve body can be brought about by a restoring force of a spring formed as part of the first valve mechanism and/or by a restoring force of a spring formed as part of the second valve mechanism. In conceivable embodiments, the spring formed as part of the first valve mechanism and the spring formed as part of the second valve mechanism can close the first valve mechanism and the second valve mechanism at the same time as the independent or automatic separation of the plug nipple from the valve body.

It may be that the at least one insert is inserted into the receptacle provided by the valve body and subsequently at least one fastening means is detachably introduced into a seat formed by the valve body, which results in the at least one insert inserted into the receptacle by the at least one fastening means being held in the receptacle. The plug nipple can then be inserted into the valve body, wherein the second valve mechanism is opened via the at least one insert inserted into the receptacle and held via the at least one fastening means.

It is conceivable that after opening the second valve mechanism via the at least one insert inserted into the receptacle and held via the at least one fastening means, the plug nipple previously detachably fastened on the valve body is separated from the valve body. Subsequently, the at least one fastening means introduced detachably into the seat formed by the valve body can be removed from the valve body. The at least one insert inserted into the receptacle can then be removed from the receptacle or separated from the valve body. Subsequently, the at least one fastening means can be detachably introduced into the seat which is formed by the valve body, and subsequently, a further plug nipple, which has a continuously open through hole, can be inserted into the valve body, wherein the further plug nipple is detachably fastened to the valve body by means of the further plug nipple being inserted, and the first valve mechanism, which is designed as part of the valve body, is opened via the further plug nipple.

The at least one fastening means can be formed by at least one O-ring, which, when introduced in a detachable manner into the seat formed by the valve body, abuts in

a fluidically sealing manner on the at least one insert inserted into the receptacle. Embodiments which have proven themselves successful are those in which the at least one fastening means formed by at least one O-ring is introduced into a seat, which is formed by a valve sleeve of the first valve mechanism and the fastening means, having been introduced into the seat formed by the valve sleeve, fluidically seals off the at least one insert inserted in the receptacle from an inner lateral surface of the valve sleeve.

Exemplary embodiments are used below to describe the invention and the advantages thereof in more detail on the basis of the appended drawings. In the drawings, the proportions of the individual elements with respect to one another do not always correspond to real proportions since some forms are simplified and other forms have been enlarged in relation to other elements for better illustration.

The embodiments, examples and variations from the preceding paragraphs, the claims or the following description and the drawings, including their various views or respective individual features, may be used independently or in any combination.

Although the figures generally refer to "schematic" representations and views, this does not mean that the representations of the figures and their description are of secondary importance with respect to the disclosure of the invention. The person skilled in the art is capable of extracting enough information from the schematically and abstractly drawn representations to facilitate his understanding of the invention without being impaired in any way in his understanding, for example, by the drawn and possibly not exactly to scale proportions. The figures thus enable the person skilled in the art as the reader to derive a better understanding of the idea of the invention formulated in more general and/or abstract terms in the claims as well as in the general part of the description on the basis of the more concretely explained implementations of the method according to the invention and the more concretely explained functioning of the apparatus according to the invention.

Figure 1 shows a schematic longitudinal section through an embodiment of a valve body, as can be provided as a component in various embodiments of a coupling system according to the invention;

Figure 2 shows a schematic perspective view of the valve body from the exemplary embodiment according to Figure 1;

Figure 3 shows a further schematic longitudinal section through the embodiment of a valve body from Figures 1 and 2, clarifying further aspects;

Figure 4 shows a perspective view of the embodiment of a valve body according to the longitudinal section shown in Figure 3;

Figure 5 shows a schematic longitudinal section through an embodiment of a plug nipple as can be provided as a component in various embodiments of a coupling system according to the invention;

Figure 6 shows a schematic perspective view of the plug from the exemplary embodiment according to Figure 5;

Figure 7 shows a schematic longitudinal section through an embodiment of a further plug nipple, as can be provided as a component in various embodiments of a coupling system;

Figure 8 shows a schematic longitudinal section through an embodiment of a coupling system, wherein the plug nipple in Figure 8 is separated from the valve body;

Figure 9 is a schematic perspective view of the embodiment of a coupling system of Figure 8 wherein the plug nipple is separated from the valve body;

Figure 10 shows a schematic longitudinal section through the embodiment of a coupling system according to Figures 8 and 9, wherein the plug nipple of Figure 9 is inserted into the valve body;

Figure 11 shows a schematic perspective view of the embodiment of a coupling system according to Figures 8 to 10, wherein the plug nipple is inserted into the valve body;

Figure 12 shows individual steps in a flow chart, as can be provided individually or in the combination shown according to Figure 12 in various embodiments of the method according to the invention.

Identical reference signs are used for identical or identically functioning elements of the invention. Furthermore, for the sake of clarity, the individual figures only show reference signs that are required for describing the respective figures. The illustrated embodiments are only examples of how the invention can be designed and do not constitute a definitive limitation.

Figure 1 shows a schematic longitudinal section through an embodiment of a valve body 3, as can be provided as a component in various embodiments of a coupling system 1 according to the invention (cf. Figure 8).

The valve body 3 comprises a housing 16 on which a locking sleeve 42 is arranged. The housing 16 and the locking sleeve 42 can be moved relative to each other in the axial direction. As a result, a locking device, which will be described below and is formed between a plug nipple 5 and the valve body 3, can be released, whereby an engagement between the latching elements 6 formed by detent balls 8 and the plug nipple 5 is released and the plug nipple 5 can be separated from the valve body 3. The housing

16 and the locking sleeve 42 are also connected to one another via a spring 43, which can once again move the locking sleeve 42 into an initial position after the plug nipple 5 has been separated from the valve body 3.

In practice, a pneumatic line connection is coupled to the connecting piece 18 formed as part of the housing 16. If the plug nipple 5 (cf. Figures 5 and 6) is separated from the valve body 3, a first valve mechanism 10 arranged inside the housing 16 closes in order to prevent fluid from escaping unintentionally from the valve body 3. A component of the first valve mechanism 10 is a valve sleeve 14 already shown in Figure 1, which can also be seen in detail again in Figures 3 and 4. An opening 15 is introduced into the valve body 14. In order to open the first valve mechanism 10 or to unblock a fluid flow through the valve body 3, the valve sleeve 14 is moved in the direction of the connecting piece 18 when a plug nipple 5 is inserted into the valve body 3 via the plug nipple 5. The open state or a position of the valve sleeve 14 in which the valve mechanism 10 is open can be seen in Figures 10 and 11, respectively. A fluid flow can move through the opening 15 in the open state.

In Figure 1, the valve mechanism 10 is closed, so that no fluid flow is moved through the opening 15. The valve sleeve 14 carries a closure 12 with an O-ring 13 which, in the closed state, rests against the housing 16 in a sealing manner and thereby shuts off the flow.

The first valve mechanism 10 also comprises a spring 11. If the first valve mechanism 10 is opened, the plug nipple 5 moves the valve sleeve 14 in the axial direction and relative to the housing 16 against the restoring force of the spring 11 into an open position according to Figures 10 and 11. If the plug nipple 5 is then separated from the valve body 3, the spring 11 automatically moves the valve sleeve 14 back into the closed position according to Figure 1 so that a flow of fluid through the valve body 3 via the closure 12 is shut off, wherein the O-ring 13 rests against the housing 16 in a sealing manner.

Practice has shown that a hose line and/or pipe line, to which a plug nipple is connected, often still has fluid or residual pressure. If the plug nipple is separated from the valve body 3, the residual pressure can be released immediately when the plug nipple is separated from the valve body 3. This is associated with an undesirably high noise level. Since the residual pressure can also cause recoil, such coupling systems known from the prior art carry a certain risk that a user will be injured when separating a valve body from the plug nipple.

In a coupling system 1 (see Figures 8 to 11), which optionally comprises a valve

body 3 as shown in Figure 1, the plug nipple 5 has a second valve mechanism 20, described below, which interrupts a fluid flow through the plug nipple 5 when the plug nipple 5 is separated from the valve body 3. An insert 60 is provided in order to be able to open this second valve mechanism 20 when the plug nipple 5 is inserted into the valve body 3. In order to ensure that fluid can flow through the valve body 3 when the first valve mechanism 10 is open or that the insert 60 does not impede such a flow, multiple holes 68 are made in the insert 60, of which in the longitudinal section shown in Figure 1, a hole 68 can be seen. The insert 60 is separated from the valve body 3 in Figure 1. In order to accommodate the insert 60 in the valve body 3, the valve body 3 comprises a receptacle 34. In the present case, the receptacle 34 is provided via the first valve mechanism 10 or via the valve sleeve 14 of the first valve mechanism 10. By designing the insert 60 as a separate component or as a component that can be separated from the valve sleeve 14, the insert 60 can be inserted into the receptacle 34 and removed from the receptacle 34 again at a later point in time. Since the valve sleeve 14 is moved relative to the housing 16 when the first valve mechanism 10 is opened and since the insert 60 is then located in the receptacle 34, the insert 60 is moved together with the valve sleeve 14 relative to the housing 16 when the first valve mechanism 10 is opened. Figure 1 also shows that the valve sleeve 14 forms a stop 67. The insert 60 is brought into contact with the stop 67 via a shoulder 66 when it is inserted into the receptacle 34.

If the insert 60 is in the receptacle 34 or if the insert 60 was inserted into the receptacle 34, then the insert 60 can initially be moved out of the receptacle 34 in the axial direction. In order to keep the insert 60 in the receptacle 34 after it has been inserted, a fastening means 54 designed as an O-ring 56 is provided. The fastening means 54 designed as an O-ring 56 can be introduced into the seat 32 which is also formed by the valve sleeve 14 of the first valve mechanism 10. After the fastening means 54 designed as an O-ring 56 has been inserted, the insert 60 is fastened in the receptacle 34 in a form-fitting manner. It is also clear from Figure 1 that the fastening means 54 designed as an O-ring 56 has an additional function via the form-fit fastening of the insert 60 in the receptacle 34. In this way, the fastening means 54 designed as an O-ring 56 and inserted into the seat 32 also fluidly seals the insert 60 arranged in the receptacle 34 relative to the valve sleeve 14.

If the insert 60 is then to be separated from the valve body 3, the fastening means 54 designed as an O-ring 56 must first be removed from the seat 32, whereupon the insert 60 can be moved in the axial direction.

Due to the fact that the insert 60 can be separated from the valve sleeve 14, the

valve body 3 can be easily adapted to the respective work requirements or modified for this purpose. It may be the case that for various fluidic couplings, instead of the plug nipple 5, which has the second valve mechanism 20, a further plug nipple 70 is connected to the valve body 3 in accordance with Figure 7. The other plug 70 has a simple structure without a valve mechanism. A free through hole 72 (cf. Figure 7) of the further plug nipple 70 is continuously open and is never closed. If the additional plug nipple 70 is to be detachably connected to the valve body 3 instead of the plug nipple 5, the fastening means 54 designed as an O-ring 56 can first be removed from the seat 32. As a result, the insert 60 is no longer held in the receptacle 34 by the fastening means 54 so that the insert 60 can be removed from the valve body 3 and the valve body 3 is thereby prepared for a detachable connection to the additional plug nipple 70. The first valve mechanism 10 can also be opened via the additional plug nipple 70 when plugged into the valve body 3. In practice, the fastening means 54 designed as an O-ring 56 is reinserted into the seat 32 provided by the valve sleeve 14 before the further plug nipple 70 is inserted into the valve body 3.

Figure 2 shows a schematic perspective view of the valve body 3 from the embodiment of Figure 1. The perspective view according to Figure 2 clearly shows that the insert 60 has multiple holes 68 which are introduced into the insert 60 about a longitudinal axis running along the projection 62 designed as a pin 64 and through which a fluid flow can pass. The insert 60 has also been removed from the receptacle 34 in Figure 2. As already mentioned above, the insert 60 can be introduced into the receptacle 34, whereupon the insert 60 is form-fittingly fastened in the receptacle 34 via the fastening means 54 designed as an O-ring 56.

Figure 3 shows a further schematic longitudinal section through the embodiment of a valve body 3 from Figures 1 and 2, with further aspects clarified. It has already been mentioned that the valve sleeve 14 is moved in the axial direction relative to the housing 16 against the restoring force of the spring 11 when the plug nipple 5 is inserted into the valve body 3. If the plug nipple 5 is separated from the valve body 3, the spring 11 can use its restoring force to move the valve sleeve 14 back into the starting position, wherein, as shown in Figure 3, the O-ring 13 carried by the closure 12 coming into contact with the valve housing 16 and shutting off a flow of fluid through the valve body 3. This arrangement of the O-ring 13 on the housing 16 can again be clearly seen in Figure 3. In addition, Figure 3 clearly shows that a further O-ring is held in a recess 17 formed through the housing 16.

Figure 4 shows a perspective view of the embodiment of a valve body 3 according

to the longitudinal section shown in Figure 3. The recess 17 formed by the housing 16, in which a further O-ring is accommodated, can be seen again in Figure 4. In addition, Figure 4 again shows the opening 15 through which fluid can flow when the first valve mechanism 10 is open.

Figure 5 shows a schematic longitudinal section through an embodiment of a plug nipple 5, as can be provided as a component in various embodiments of a coupling system 1 according to the invention. The plug nipple 5 comprises a housing 21 and a second valve mechanism 20 which is accommodated in the housing 21. The second valve mechanism 20 has a closure part 22 which carries an O-ring 26. The spring 24 of the second valve mechanism 20 applies spring force to the closure part 22 in the axial direction so that the O-ring 26 bears against an inner lateral surface of the housing 21 under force when the second valve mechanism 20 is closed according to Figure 5. The second valve mechanism 20 is thus closed so that no fluid can be guided through the plug nipple 5 or through the housing 21 of the plug nipple 5.

When the plug nipple 5 is inserted into the valve body 3, the second valve mechanism 20 opens independently. For this purpose, the projection 62 designed as a pin 64 (see Figures 1 to 4) of the insert 60 arranged in the receptacle 34 plunges into the notch 27 of the closure part 22 and then moves the closure part 22 relative to the housing 21 in the axial direction against the restoring force of the spring 24. The O-ring 26, which is carried by the closure part 22, is no longer in surface contact with the inner lateral surface of the housing 21, so that a fluid flow can pass through the plug nipple 5 when the second valve mechanism 20 is open. In this case, the fluid is moved along an annular gap which extends along the closure part 22. In the longitudinal section according to Figure 5, a depression 28 can also be seen, which extends radially around a longitudinal axis of the plug nipple 5. If the plug nipple 5 is plugged into the valve body 3, the plug nipple 5 is held positively on the valve body 3 via the detent balls 8 or latching elements 6 (see Figures 1 to 4), wherein the detent balls 8 or latching elements 6 are arranged in the depression 28 of the plug nipple 5. If the locking sleeve 42 is actuated or moved in the axial direction relative to the housing 16, the locking elements 6 or detent balls 8 can be moved in the radial direction out of the depression 28, so that the plug nipple 5 may be moved via the restoring force of the reference number 11 is independently separated from the valve body 3 by the spring shown in Figures 1 to 4.

Figure 6 shows a schematic perspective view of the plug nipple 5 from the exemplary embodiment according to Figure 5. In particular, Figure 6 again shows the O-ring 26 carried by the closure part 22 in the area of the free end. The spring 24, which

can apply the necessary restoring force for restoring the closure part 22, has a plurality of turns in the embodiment according to Figure 6 and is completely received by the housing 21 of the plug nipple 5. The course of the depression 28, in which the detent balls 8 or latching elements 6 are accommodated when the plug nipple 5 is detachably fastened to the valve body 3, is again clearly illustrated in the perspective view of the plug nipple 5 according to Figure 6.

Figure 7 shows a schematic longitudinal section through an embodiment of a further plug nipple 70, as can be provided as a component in various embodiments of a coupling system 1. The additional plug nipple 70 also comprises a depression 78 running radially around the longitudinal axis of the additional plug nipple 70, in which detent elements 6 or detent balls 8 are arranged when the additional plug nipple 70 is inserted into the valve body 3. If the other plug nipple 70 is to be inserted into the valve body 3 instead of the plug nipple 5 already shown in Figures 5 to 6. It is conceivable here for the insert 60 to continue to be arranged in the receptacle 34 when the additional plug nipple 70 is inserted into the valve body 3. It is also possible that when the further plug nipple 70 is inserted into the valve body 3 there is no insert 60 in the receptacle 34 or that the insert 60 was previously removed from the receptacle 34.

When viewed together with Figures 4 to 6, Figure 7 makes it clear that the further plug nipple 70 differs from the plug nipple 5 shown in Figures 4 to 6 in that the further plug nipple 70 does not have a valve mechanism. On the other hand, the other plug nipple 70 has a free through hole 72, which is continuously open and cannot be closed.

Figure 8 shows a schematic longitudinal section through an embodiment of a coupling system 1, wherein the plug nipple 5 in Figure 8 is separated from the valve body 3. The embodiment of the plug nipple 5 corresponds to the embodiment from Figures 5 and 6 and the embodiment of the valve body 3 corresponds to the embodiment from Figures 1 to 4, so that reference can be made to the previous description. Figures 8 and 9 each show that before the plug nipple 5 is inserted into the valve body 3, the plug nipple 5 and the valve body 3 are aligned with one another. Starting from the position according to Figures 8 and 9, the plug nipple 5 and the valve body 3 are moved in the axial direction relative to one another, so that the plug nipple 5 enters the valve body 3 and via those shown in Figures 1 and 2 and latching elements 6 designed as detent balls 8 on the valve body 3 is fastened.

The opening of the first valve mechanism 10 and the second valve mechanism 20, which is compulsorily associated with the insertion of the plug nipple 5 into the valve body 3, becomes particularly clear when Figures 8 and 10 are viewed together. This synopsis

shows that when the plug nipple 5 is inserted into the valve body 3, the projection 62 designed as a pin 64 comes into contact with the closure part 22 and moves the closure part 22 against a restoring force of the spring 24 relative to the housing 21 of the second valve mechanism 20. As a result, the closure part 22 is no longer in surface contact, which was formed before insertion, with an inner lateral surface of the housing 21, so that the second valve mechanism 20 is opened in accordance with Figures 10 and 11.

It can also be seen that when the plug nipple 5 is inserted, the valve sleeve 14 of the first valve mechanism 10 is pushed over the plug nipple 5 from the closed position according to Figure 8 into the open position according to Figure 10. The O-ring 13 still in contact with the housing 16 in Figure 8, which is supported by the valve sleeve 14, loses its surface contact to the housing 16 when inserting the plug nipple 5 into the valve body 3 so that the first valve mechanism 10 is opened and fluid can flow through the valve body 3. With the displacement of the valve sleeve 14 via the plug nipple 5, the spring 11, which is connected to the housing 16 and the valve sleeve 14, is also compressed.

If the locking sleeve 42 is now actuated or displaced in the axial direction relative to the housing 16, with the plug nipple 5 inserted into the valve body 3 according to Figures 10 and 11, a fastening of the plug nipple 5 to the valve body 3 is thereby released. The plug nipple 5 is independently moved out of the valve body 3 by the restoring force of the spring 24 of the second valve mechanism 20 and the restoring force of the spring 11 of the first valve mechanism 10. Furthermore, the restoring force of the spring 24 of the second valve mechanism 20 moves the closure part 22 relative to the housing 21 of the plug nipple 5 so that the O-ring 26 (cf. Figures 5 and 6) carried by the closure part 22 comes into contact with an inner lateral surface of the housing 21 and shuts off a flow of fluid through the plug nipple 5.

At the same time, or at least approximately at the same time, the restoring force of the spring 11 of the first valve mechanism 10 moves the valve sleeve 14 back relative to the housing 16 into the position according to Figures 8 and 9 so that the O-ring 13 carried by the valve sleeve 14 comes into contact with an inner lateral surface of the housing 16 and shuts off a flow of fluid through the valve body 3. The first valve mechanism 10 and the second valve mechanism 20 can therefore close at the same time, or at least approximately at the same time, when the plug nipple 5 is separated from the valve body 3. After the plug nipple 5 has been separated from the valve body 3, the insert 60 is still arranged in the receptacle 34 and can be removed from the valve body 3 or from the valve sleeve 14 after the fastening means 54 designed as an O-ring 56 has been removed.

Figure 12 shows individual steps in a flow chart, as can be provided individually or in the combination shown according to Figure 12 in various embodiments of the method 100 according to the invention. The method 100 can be implemented or carried out with a coupling system 1 according to the embodiment previously described in relation to Figures 8 to 11.

Thus, as part of a first step illustrated by reference number 110, an insert 60 is inserted into a receptacle 34 of a valve body 3. In step 120, the insert 60 inserted into the receptacle 34 of the valve body 3 is fastened using a fastening means 54, which is designed as an O-ring 56. In step 130, the plug nipple 5 is inserted into the valve body 3, whereby a first valve mechanism 10 designed as part of the valve body 3 is opened via the plug nipple 5 and also a second valve mechanism 20, designed as a part of the plug nipple 5 is opened via the insert 60 inserted into the receptacle 34 of the valve body 3, which is fastened via the fastening means 54. In step 140, the plug nipple 5 is separated from the valve body 3, wherein the first valve mechanism 10 of the valve body 3 and the second valve mechanism 20 of the plug nipple 5 each close independently.

The invention has been described with reference to a preferred embodiment. However, it is conceivable to a person skilled in the art that modifications or changes can be made to the invention without departing from the scope of protection of the claims below.

List of reference signs

- 1 Coupling system
- 3 Valve body
- 5 Plug nipples
- 6 Latching element
- 8 Detent ball
- 10 First valve mechanism
- 11 Spring
- 12 Closure
- 13 O-ring
- 14 Valve sleeve
- 15 Opening
- 16 Housing
- 18 Connecting piece
- 20 Second valve mechanism

21 Housing
22 Closure part
24 Spring
26 O-ring
27 Groove
28 Depression
32 Seat
34 Receptacle
42 Locking sleeve
43 Spring
54 Fastening means
56 O-ring
60 Insert
62 Projection
64 Pin
66 Shoulder
67 Stop
68 Hole
70 Further plug nipple
72 Free through hole
100 Method
110 First method step
120 Second method step
130 Third method step
140 Fourth method step

**KOBLINGSSYSTEM TIL SLANGER OG/ELLER RØRLEDNINGER SAMT
FREMGANGSMÅDE TIL FREMSTILLING OG SPÆRRING AF ET
FLUIDGENNEMLØB**

Patentkrav

1. Koblingssystem (1) til slanger og/eller rørledninger, der omfatter
 - en indstiksnippel (5) og
 - et ventillegeme (3), som indstiksnippen (5) kan indsættes i med en hermed forbundet løsbar fiksering via ventillegemet (3), hvor
 - a) ventillegemet (3) indeholder en første ventilmekanisme (10), der som følge af indsættelse af indstiksnippen (5) i ventillegemet (3) åbnes via indstiksnippen (5) og i forbindelse med en adskillelse af indstiksnippen (5) fra ventillegemet (3) lukker automatisk igen, og hvor
 - b) indstiksnippen (5) indeholder en anden ventilmekanisme (20), hvor
 - koblingssystemet (1) omfatter mindst én indsats (60), hvor ventillegemets (3) første ventilmekanisme (10) og den i det mindste ene indsats (60) er udformet som to komponenter i ventillegemet (3), der kan adskilles fra hinanden, og hvilken i det mindste ene indsats (60)
 - kan placeres aftageligt i en holder (34), der dannes af ventillegemet (3), og, når den er aftageligt placeret i holderen (34), der dannes af ventillegemet (3), når indstiksnippen (5) indsættes i ventillegemet (3), er udformet til automatisk at åbne den anden ventilmekanisme (20), hvilken anden ventilmekanisme (20) er en bestanddel af indstiksnippen (5).
2. Koblingssystem ifølge krav 1, ved hvilket den anden ventilmekanisme (20) i indstiksnippen (5) omfatter en lukningsdel (22) og en fjeder (24), der er koblet mekanisk til lukningsdelen (22), hvor
 - lukningsdelen (22) som følge af indsættelse af indstiksnippen (5) af mindst én indsats (60), der er placeret i holderen (34), der dannes af ventillegemet (3), kan overføres til en åben position mod en returkraft af fjederen (24), og ved en adskillelse af indstiksnippen (5) fra ventillegemet (3) kan overføres automatisk til en lukket position via fjederens (24) returkraft.
3. Koblingssystem ifølge krav 2, ved hvilket der er tilordnet en O-ring (26) til

lukningsdelen (22), hvilken O-ring (26) tætnes lukningsdelen (22) fluidmæssigt i den lukkede position i forhold til en indvendig sideflade af indstiksnipen (5).

4. Koblingssystem ifølge et af kravene 1 til 3, ved hvilket ventilleget (3) omfatter mindst ét fikseringsmiddel (54), hvilket i det mindste ene fikseringsmiddel (54) kan indføres løsbart i et sæde (32), der dannes af ventilleget (3), og samvirker med den i det mindste ene indsats (60) på en sådan måde, at
 - den i det mindste ene indsats (60) via det i det mindste ene fikseringsmiddel (54) holdes i holderen (34), der dannes af ventilleget (3), når det i det mindste ene fikseringsmiddel (54) er indført i sædet (32), der dannes af ventilleget (3), og hvor
 - den i det mindste ene indsats (60) kan tages ud af holderen (34), der dannes af ventilleget (3), når det i det mindste ene fikseringsmiddel (54) er fjernet fra sædet (32), der dannes af ventilleget (3).
5. Koblingssystem ifølge krav 4, ved hvilket det i det mindste ene fikseringsmiddel (54) er dannet af mindst én O-ring (56), der, når den er indsat løsbart i sædet (32), der dannes af ventilleget (3), med fluidmæssigt tætnende virkning ligger op til den i det mindste ene indsats (60), der holdes i holderen (34) i ventilleget (3).
6. Koblingssystem ifølge krav 5, ved hvilket
 - den første ventilmekanisme (10) omfatter en ventilmuffe (14), der kan bevæges til at åbne og lukke den første ventilmekanisme (10) i forhold til et hus (16) til ventilleget (3), og hvor det er indrettet, således at
 - holderen (34) såvel som sædet (32) dannes af ventilmuffen (14) på en sådan måde, at det i det mindste ene fikseringsmiddel (54), som er indført løsbart i sædet (32), og som er dannet af mindst én O-ring (56), fluidmæssigt tætnes den i det mindste ene indsats (60), der holdes i ventilmuffens (14) holder (34), i forhold til en indvendig sideflade af ventilmuffen (14).
7. Koblingssystem ifølge et af kravene 2 til 6, ved hvilket den i det mindste ene indsats (60), der er placeret i holderen (34), der dannes af ventilleget (3), omfatter et fremspring (62), som fortrinsvis er udformet som en stift (64) og som følge af indsættelse af indstiksnipen (5) kan komme i overfladekontakt med lukningsdelen (22) og overføre lukningsdelen (22) til den åbne position under overfladekontakt og

kraftpåvirket mod returkraften af fjederen (24) i den anden ventilmekanisme (20).

8. Koblingssystem ifølge et af kravene 1 til 7, der omfatter en yderligere indstiksnippel (70), hvor den yderligere indstiksnippel (70) i stedet for indstiksnippen (5) kan indsættes i ventilleget (3) med en hermed forbundet løsbar fiksering, hvor
 - den yderligere indstiksnippel (70) er udformet til at åbne den første ventilmekanisme (10) ved hjælp af indsættelse af den yderligere indstiksnippel (70) i ventilleget (3), og hvor
 - den yderligere indstiksnippel (70) har en fri gennemgangsboring (72), som strækker sig gennem den yderligere indstiksnippel (70), og som både er åben i forbindelse med en løsbar fiksering, der er udformet mellem ventilleget (3) og den yderligere indstiksnippel (5), og når den yderligere indstiksnippel (70) er adskilt fra ventilleget (3).
9. Fremgangsmåde (100) til fremstilling og spærring af et fluidgennemløb, hvilken fremgangsmåde omfatter følgende trin:
 - indsættelse af en indstiksnippel (5) i et ventilleget (3), hvor som følge af indsættelsen
 - a) indstiksnippen (5) fikseres løsbart på ventilleget (3), og
 - b) en første ventilmekanisme (10), der er udformet som en bestanddel af ventilleget (3), åbnes via indstiksnippen (5), og
 - adskillelse af indstiksnippen (5), der indtil da er fikseret løsbart på ventilleget (3), fra ventilleget (3), hvor den første ventilmekanisme (10) som følge af adskillelsen af indstiksnippen (5) fra ventilleget (3) lukker automatisk, hvor
 - der er tilvejebragt mindst én indsats (60), hvor den første ventilmekanisme (10) i ventilleget (3) og den i det mindste ene indsats (60) er udformet som to komponenter i ventilleget (3), der kan adskilles fra hinanden, og hvor
 - den i det mindste ene indsats (60) tidsmæssigt inden indsættelsen af indstiksnippen (5) i ventilleget (3) indsættes i en holder (34), der er dannet af ventilleget (3),
 - hvilken i det mindste ene indsats (60), når den er indsat i holderen (34), der dannes af ventilleget (3), som følge af indsættelsen af indstiksnippen (5) i ventilleget (3) automatisk åbner en anden ventilmekanisme (20), der er udformet som en bestanddel af indstiksnippen (5).
10. Fremgangsmåde ifølge krav 9, ved hvilken den anden ventilmekanisme (20) omfatter

en fjeder (24) og en lukningsdel (22), hvor

- lukningsdelen (22) som følge af indsættelsen af indstiksniplen (5) i ventilleget (3) kommer i overfladekontakt med den i det mindste ene indsats (60), der er indsat i holderen (34), og under overfladekontakt med den i det mindste ene indsats (60), der er indsat i holderen (34), mod en returfors af fjederen (24) overføres til en åben position, i hvilken forbindelse et gennemløb for fluid gennem indstiksniplen (5) frigives, hvor
- fjederen (24) i forbindelse med adskillelsen af indstiksniplen (5) fra ventilleget (3) overfører lukningsdelen (22) til en lukket position, i forbindelse med hvilken et gennemløb for fluid gennem indstiksniplen (5) spærres.

11. Fremgangsmåde ifølge krav 10, ved hvilken den i det mindste ene indsats (60) omfatter et fremspring (62), som fortrinsvis er udformet som en stift (64), og som i forbindelse med indsættelse af indstiksniplen (5) i ventilleget (3) kommer i overfladekontakt med lukningsdelen (22) og overfører lukningsdelen (22) til den åbne position under overfladekontakt og kraftpåvirket mod fjederens (24) returfors.

12. Fremgangsmåde ifølge et af kravene 9 til 11, ved hvilken tidsmæssigt efter åbningen af den anden ventilmekanisme (20) via den i det mindste ene indsats (60), der er indsat i holderen (34),

- indstiksniplen (5), der indtil da er fikseret løsbart på ventilleget (3), adskilles fra ventilleget (3), og tidsmæssigt herefter
- den i det mindste ene indsats (60), der er indsat i holderen (34), tages ud af holderen (34), og tidsmæssigt herefter
- en yderligere indstiksnippel (70), der har en uafbrudt åben gennemgangsboring (72), indsættes i ventilleget (3), hvor den yderligere indstiksnippel (70) som følge af indsættelsen fikseres løsbart på ventilleget (3), og den første ventilmekanisme (10), der er udformet som en bestanddel af ventilleget (3), åbnes via den yderligere indstiksnippel (70).

13. Fremgangsmåde ifølge et af kravene 9 til 12, ved hvilken

- tidsmæssigt efter indsættelsen af den i det mindste ene indsats (60) i holderen (34), der dannes af ventilleget (3),
- mindst ét fikseringsmiddel (54) indføres løsbart i et sæde (32), der dannes af ventilleget (3), hvorved den i det mindste ene indsats (60), der er indsat i

holderen (34), via det i det mindste ene fikseringsmiddel (54) holdes i holderen (34), hvor tidsmæssigt herefter

- indstiksniplen (5) indsættes i ventilleget (3), hvor den anden ventilmekanisme (20) åbnes via den i det mindste ene indsats (60), der er indsat i holderen (34) og holdes via det i det mindste ene fikseringsmiddel (54).

14. Fremgangsmåde ifølge krav 13, ved hvilken tidsmæssigt efter åbningen af den anden ventilmekanisme (20) via den i det mindste ene indsats (60), der er indsat i holderen (34) og holdes via det i det mindste ene fikseringsmiddel (54),

- indstiksniplen (5), der indtil da er fikseret løsbart på ventilleget (3), adskilles fra ventilleget (3), og tidsmæssigt herefter
- det i det mindste ene fikseringsmiddel (54), der er indført løsbart i sædet (32), der dannes af ventilleget (3), fjernes fra ventilleget (3), og tidsmæssigt herefter
- den i det mindste ene indsats (60), der er indsat i holderen (34), tages ud af holderen (34), og tidsmæssigt herefter
- det i det mindste ene fikseringsmiddel (54) igen indføres løsbart i sædet (32), der dannes af ventilleget (3), samt tidsmæssigt herefter
- en yderligere indstiksnippel (70), der har en uafbrudt åben gennemgangsboring (72), indsættes i ventilleget (3), hvor den yderligere indstiksnippel (70) som følge af indsættelsen fikseres løsbart på ventilleget (3), og den første ventilmekanisme (10), der er udformet som en bestanddel af ventilleget (3), åbnes via den yderligere indstiksnippel (70).

15. Fremgangsmåde ifølge krav 13 eller 14, ved hvilket det i det mindste ene fikseringsmiddel (54) er dannet af mindst én O-ring (56), der, når den er indsat løsbart i sædet (32), der dannes af ventilleget (3), med fluidmæssigt tætnende virkning ligger op til den i det mindste ene indsats (60), der er indsat i holderen (34).

16. Fremgangsmåde ifølge krav 15, ved hvilken det i det mindste ene fikseringsmiddel (54), der er dannet af mindst én O-ring (56), indføres i et sæde (32), som en ventilmuffe (14) i den første ventilmekanisme (10) danner, og idet det er indført i sædet (32), der er dannet af ventilmuffen (14), fluidmæssigt tætnes den i det mindste ene indsats (60), der er indsat i holderen (34), i forhold til en indvendig sideflade af ventilmuffen (14).

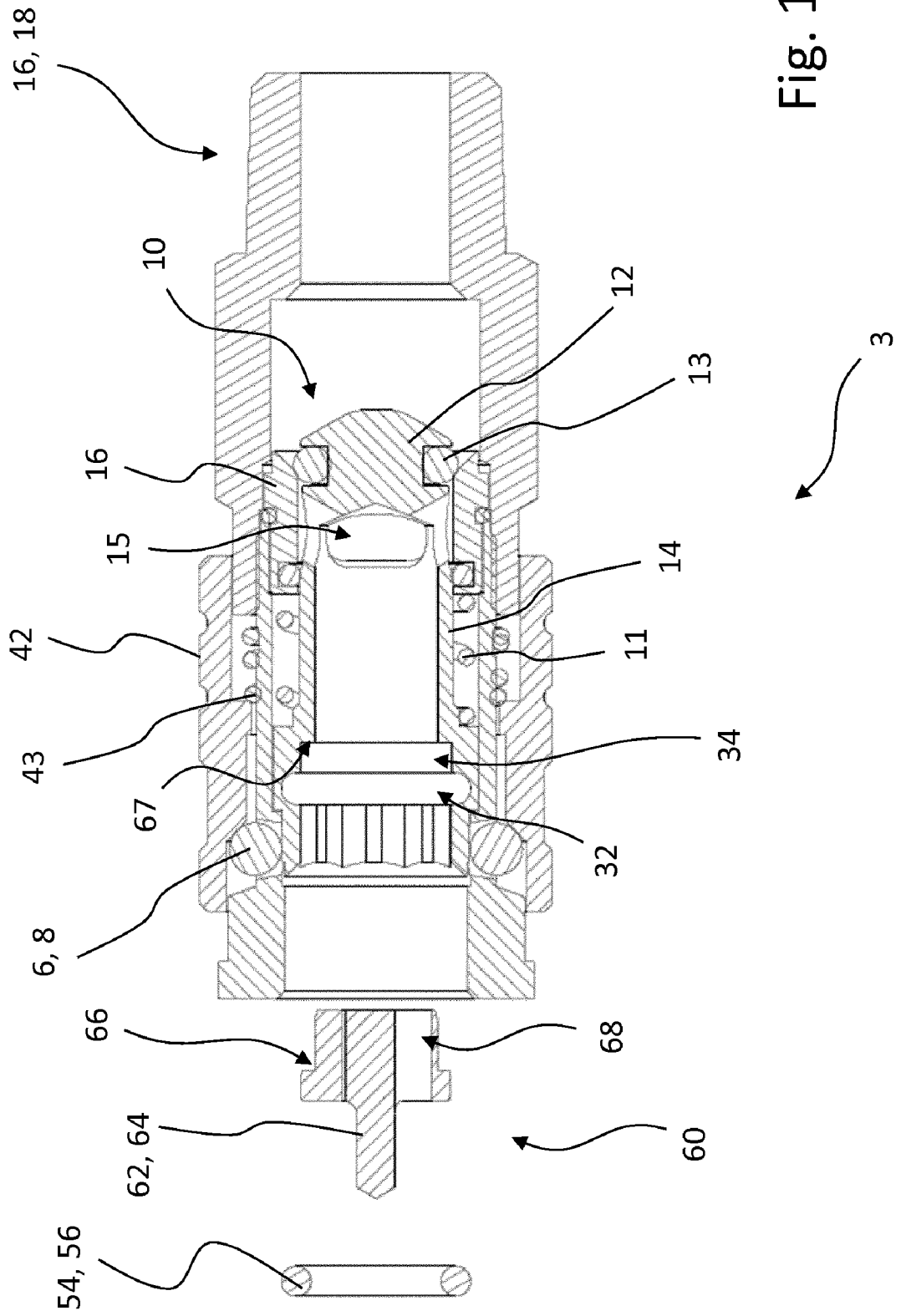
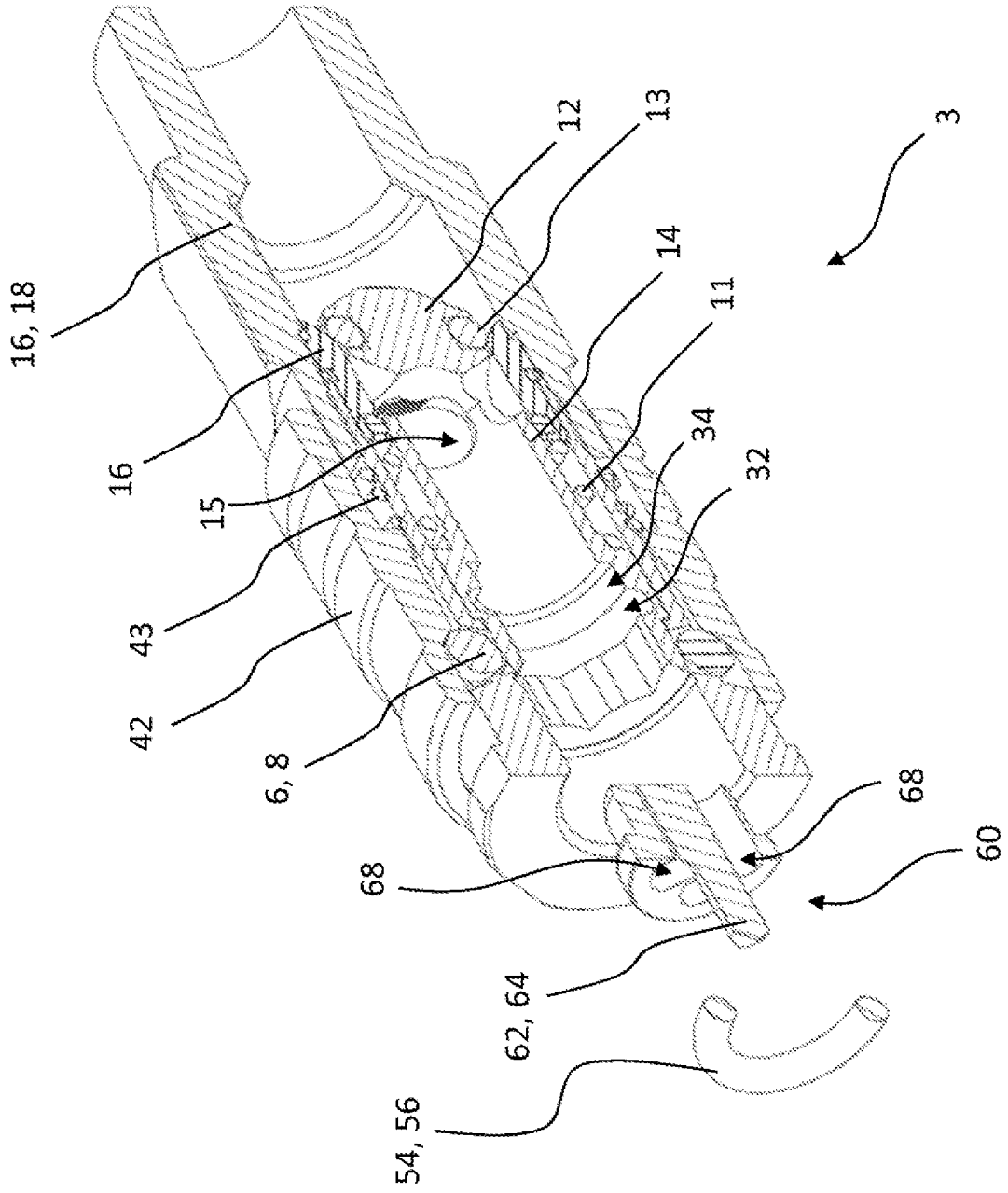


Fig. 1

Fig. 2



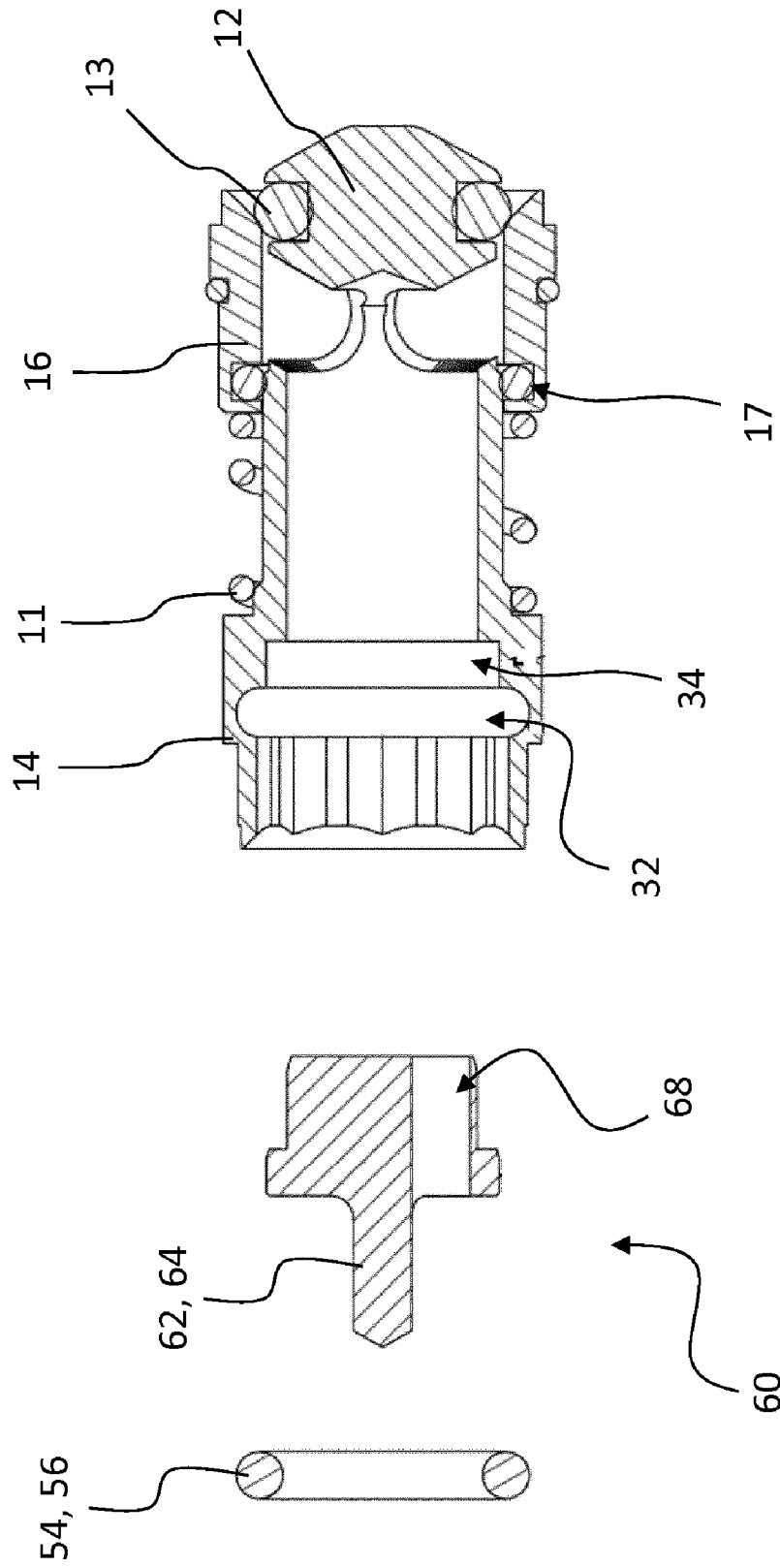
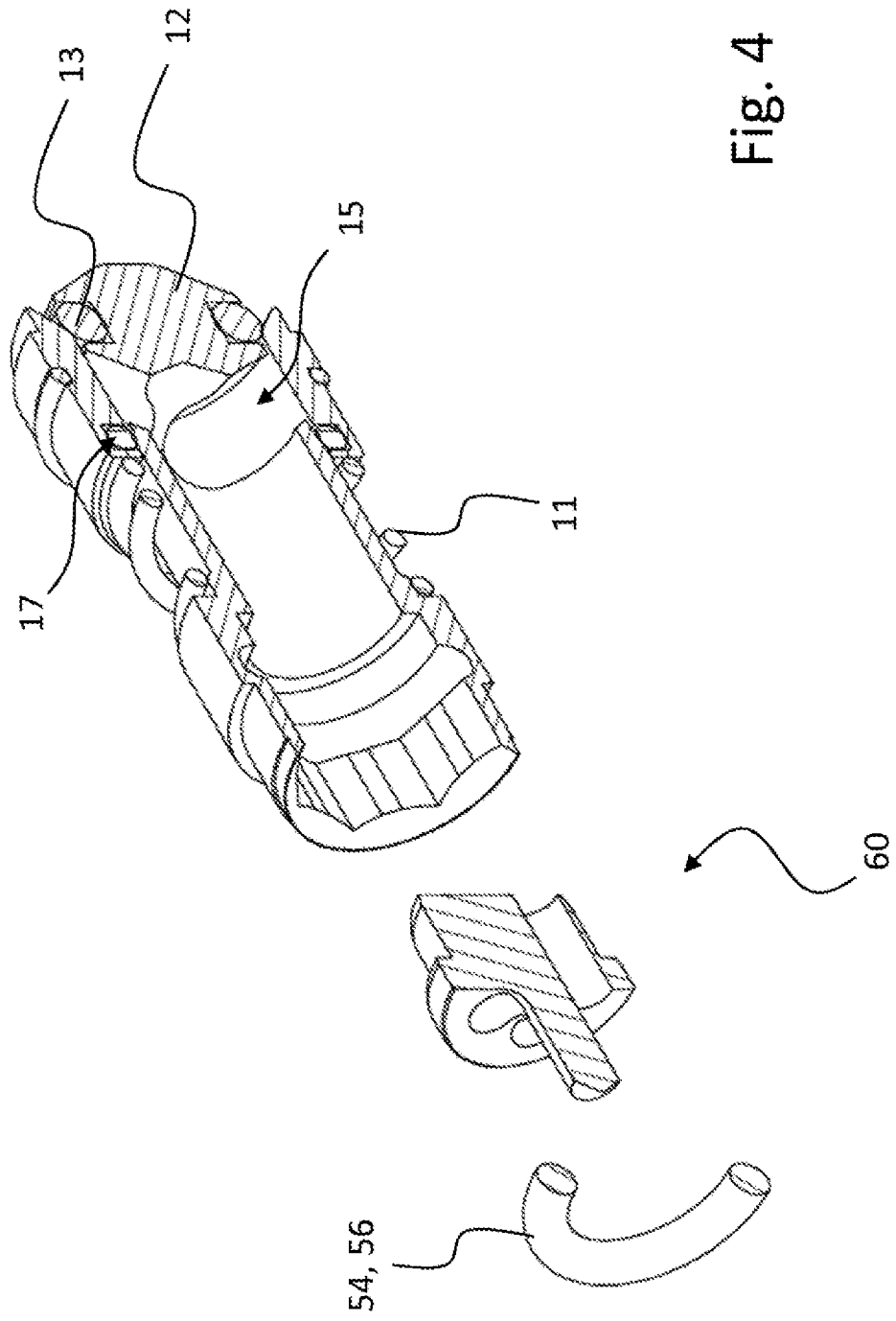


Fig. 3



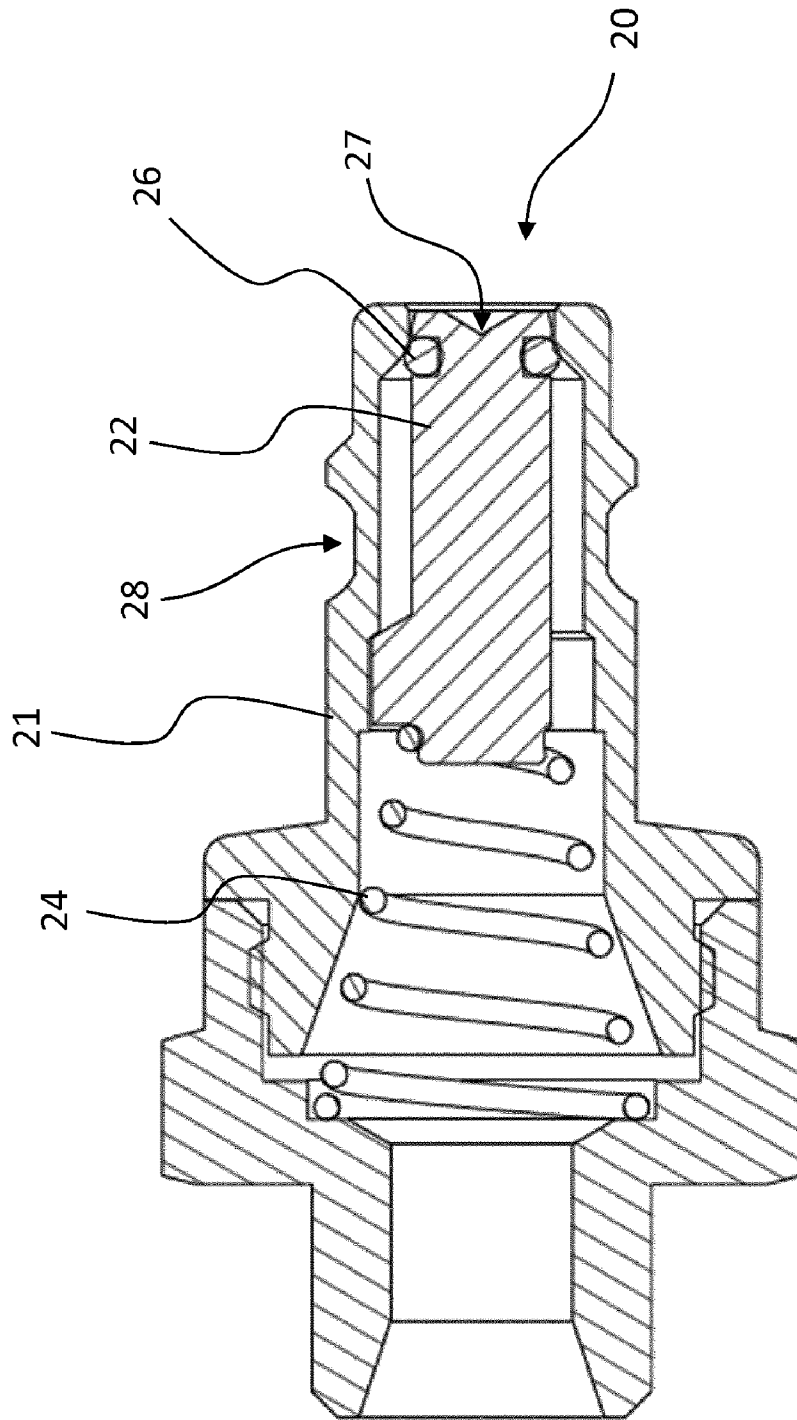


Fig. 5

Fig. 6

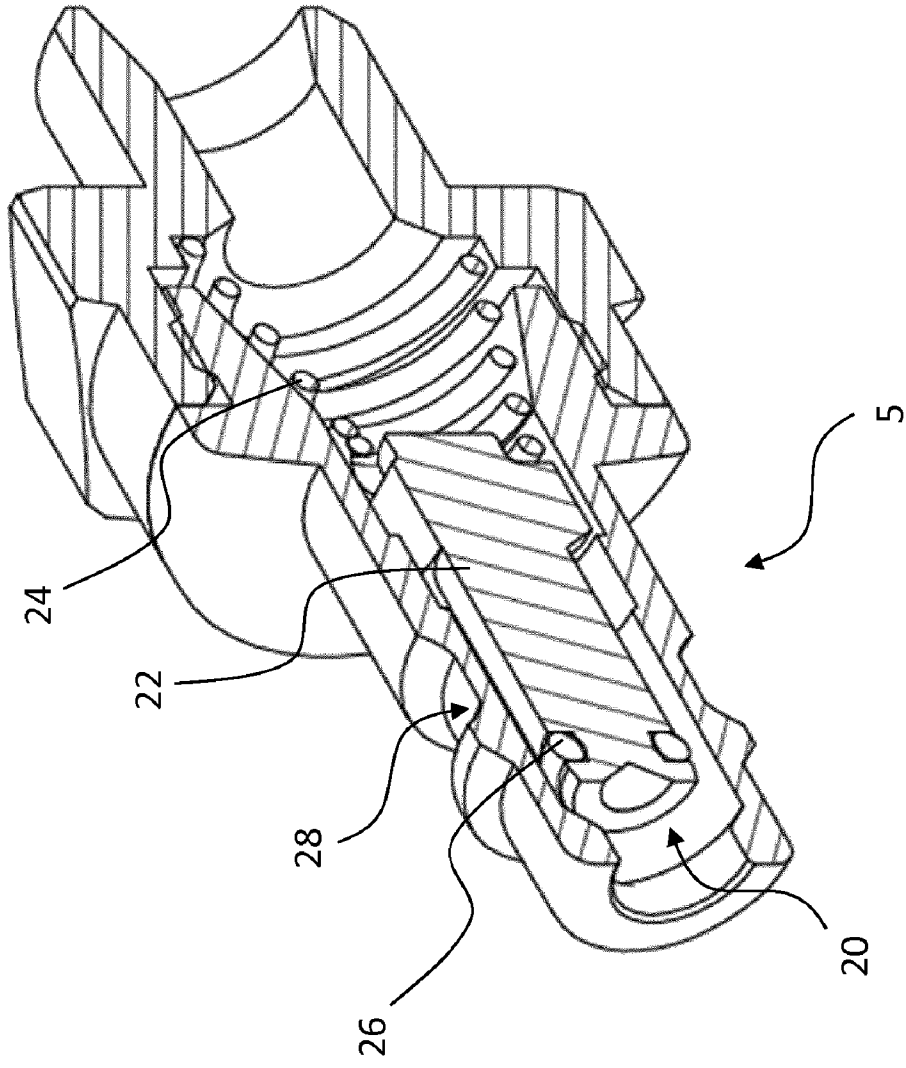
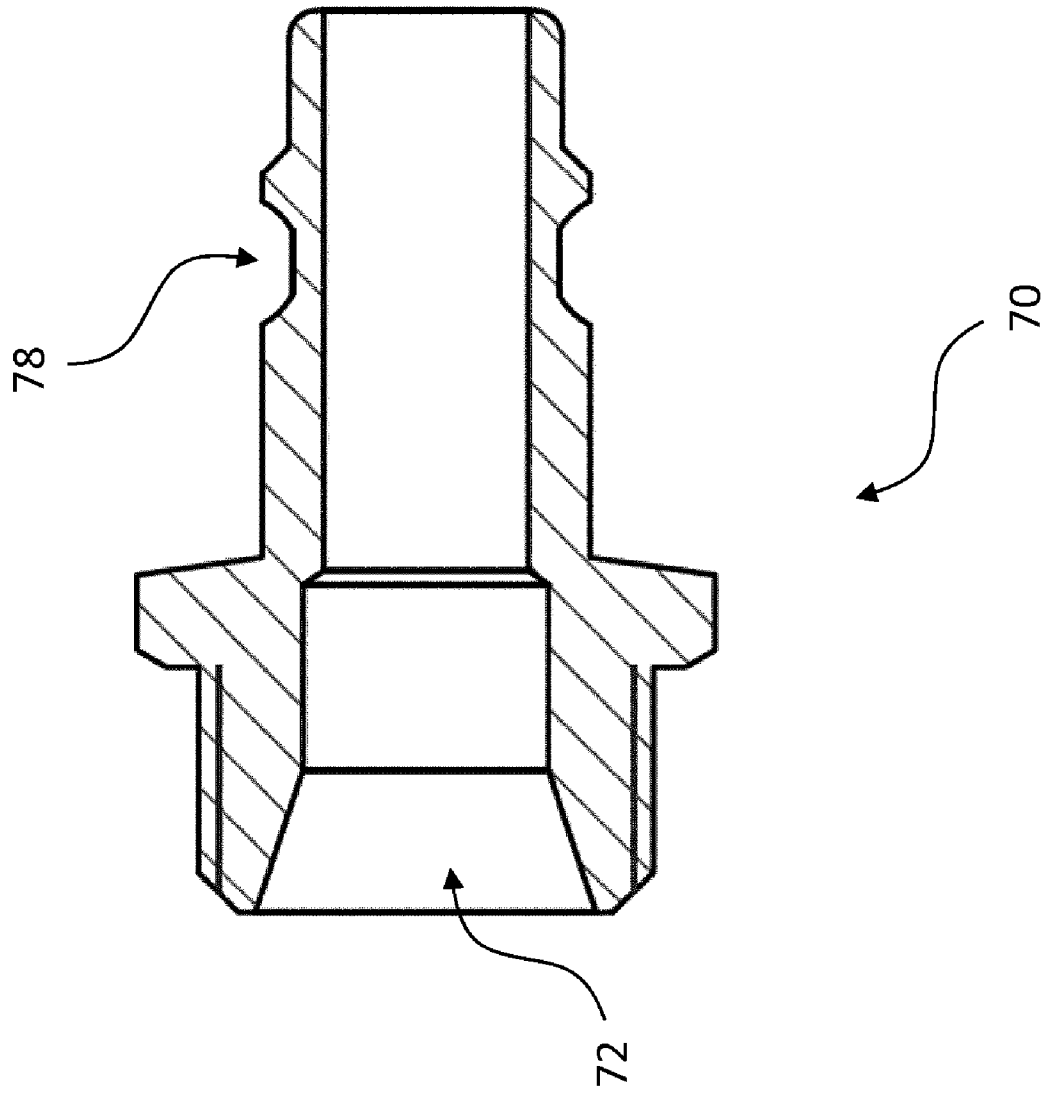
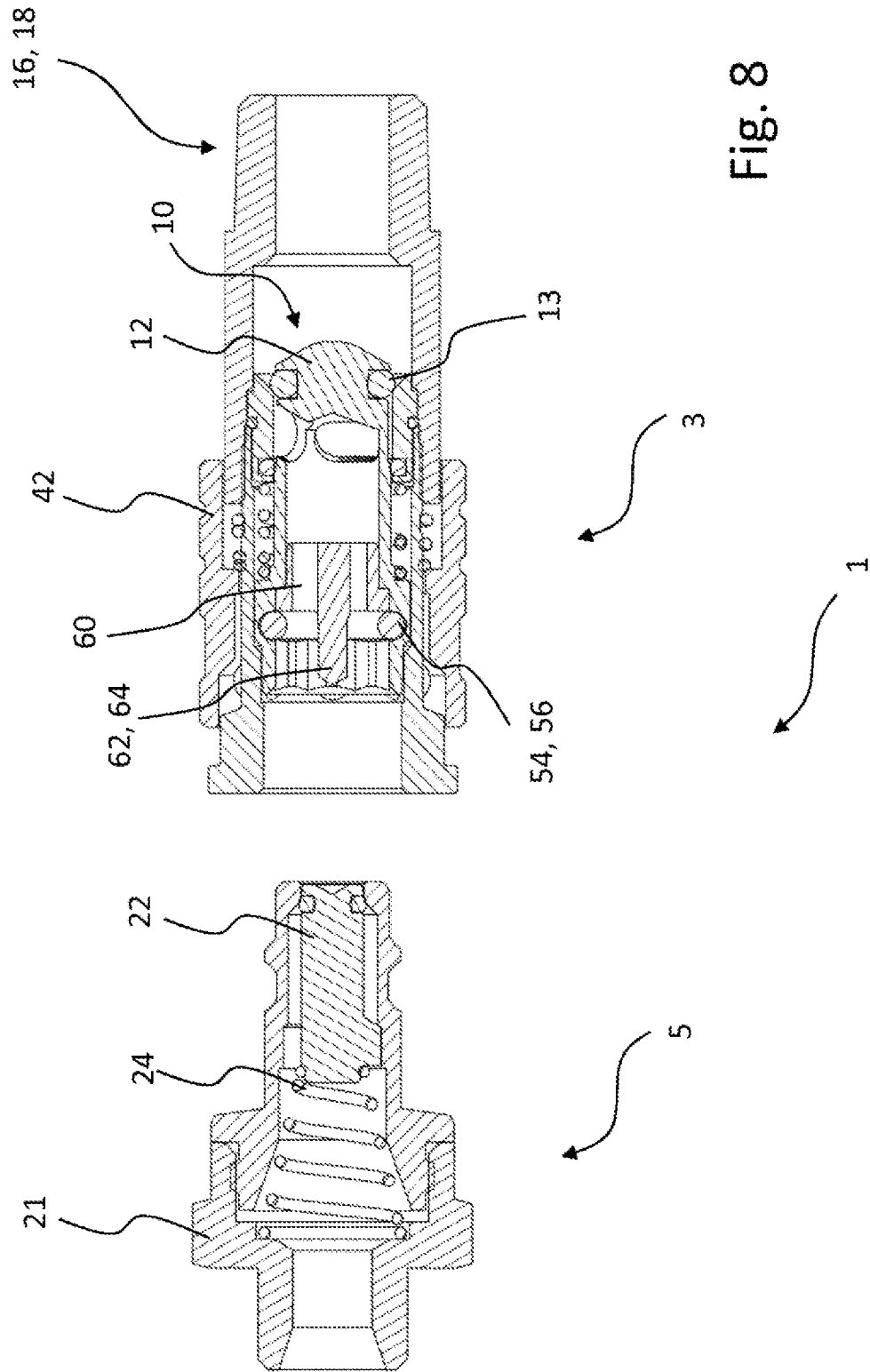


Fig. 7





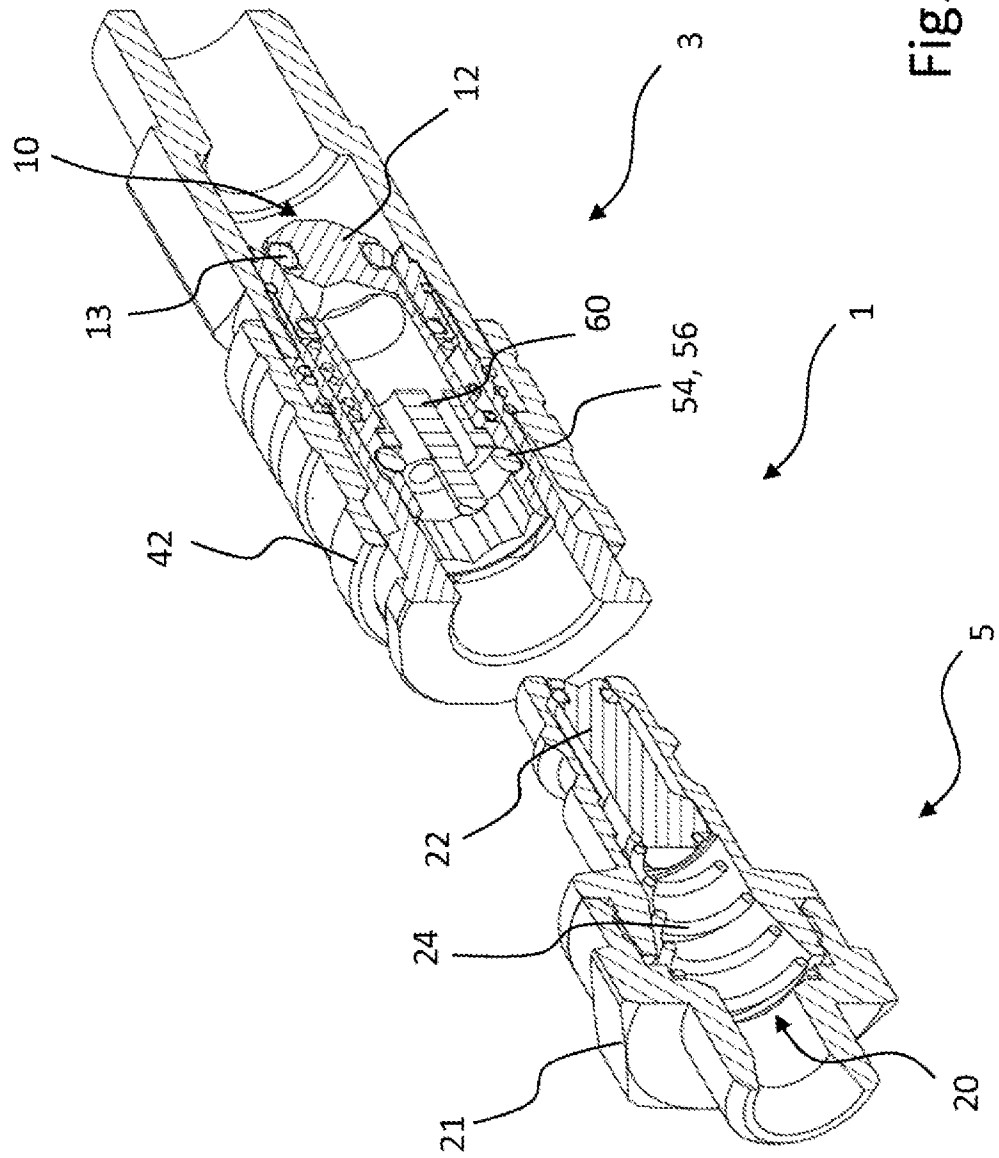


Fig. 9

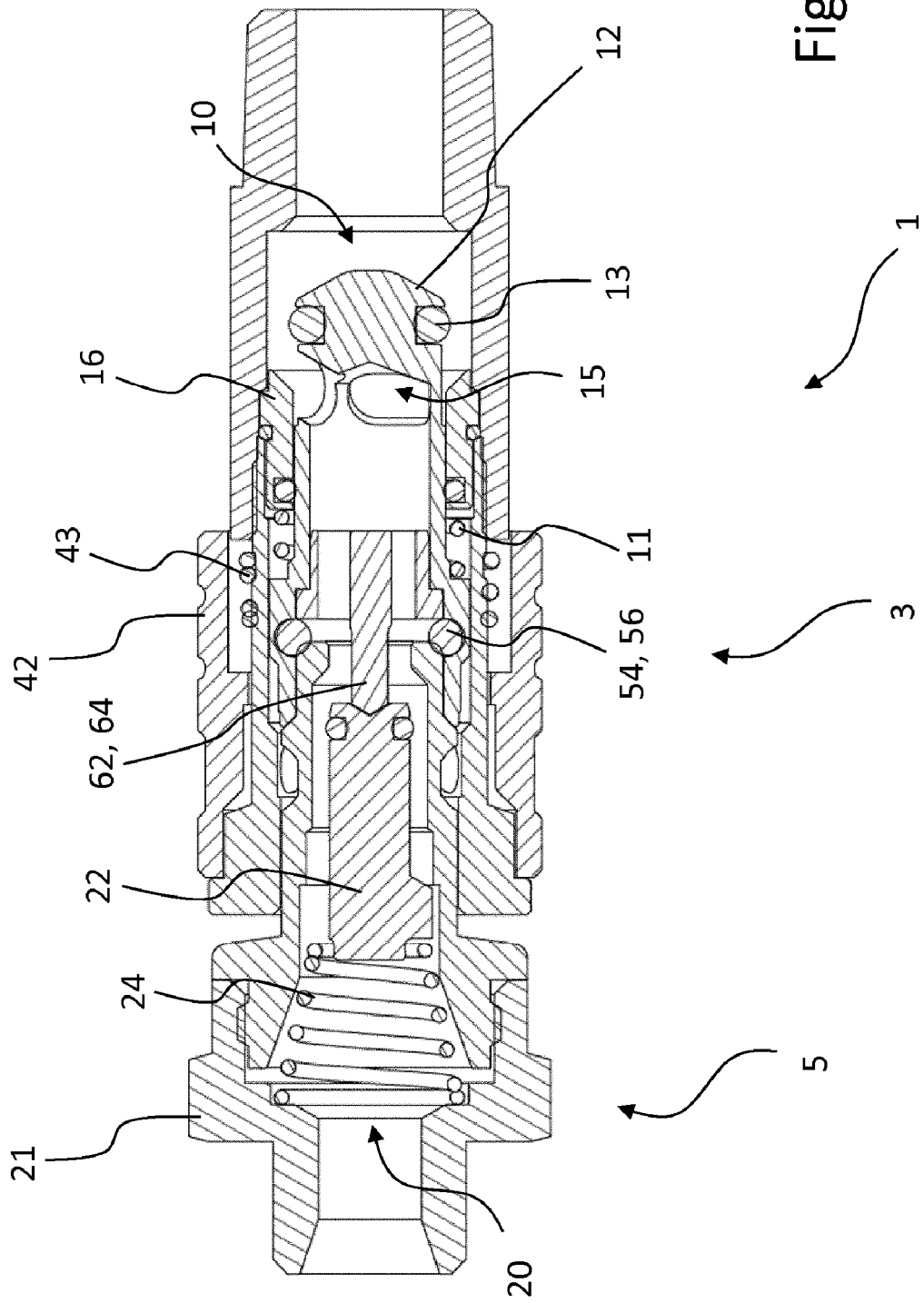


Fig. 10

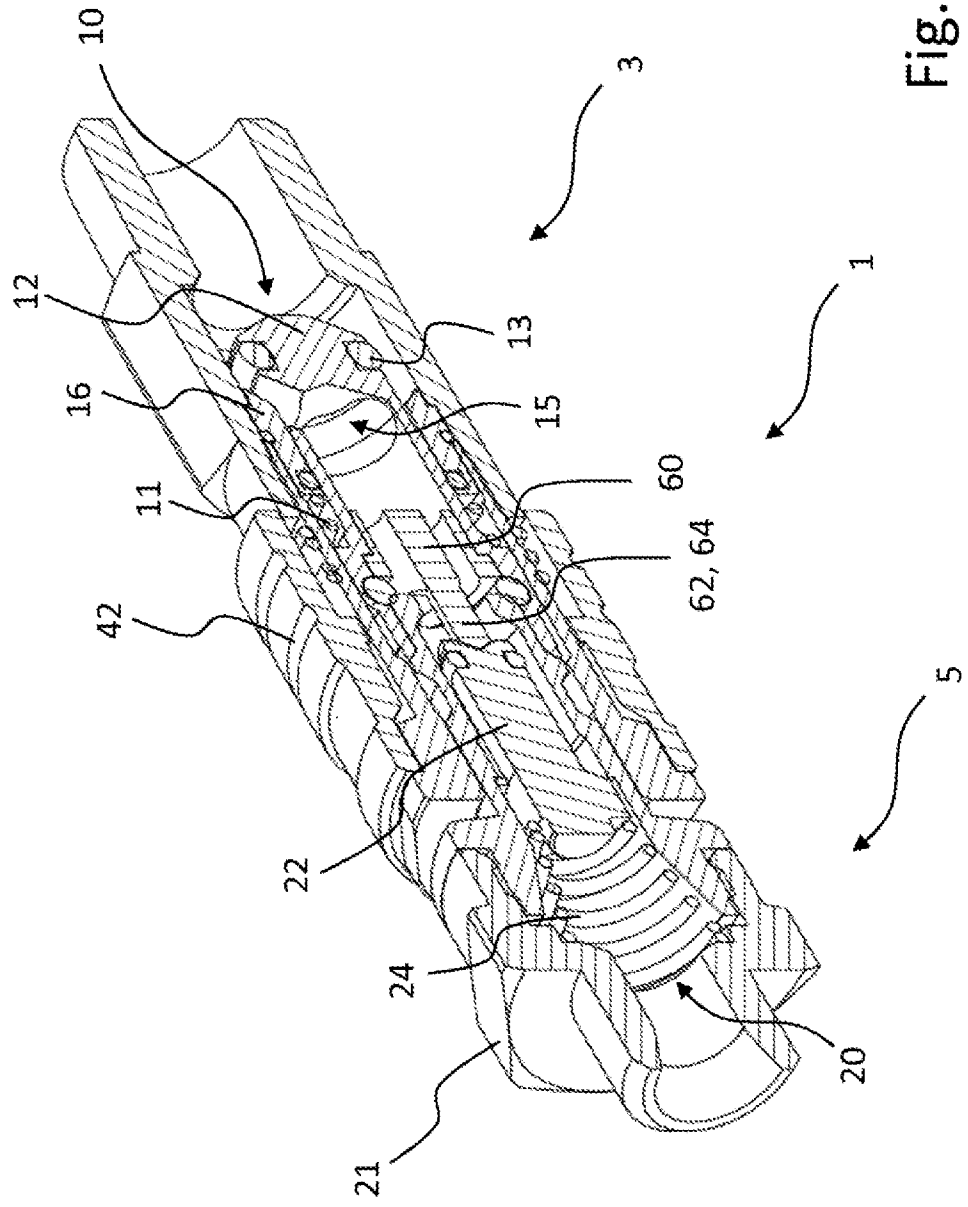


Fig. 11

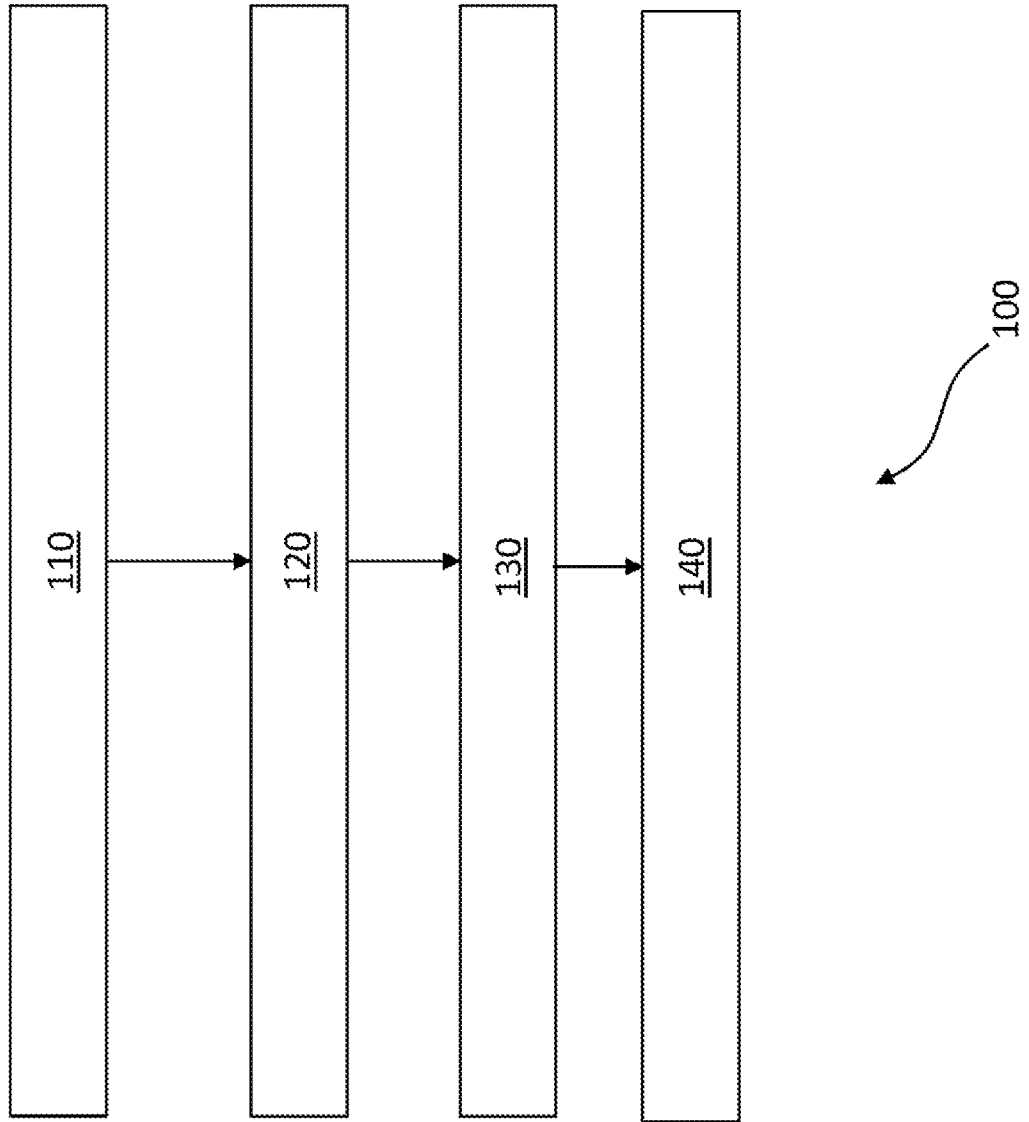


Fig. 12