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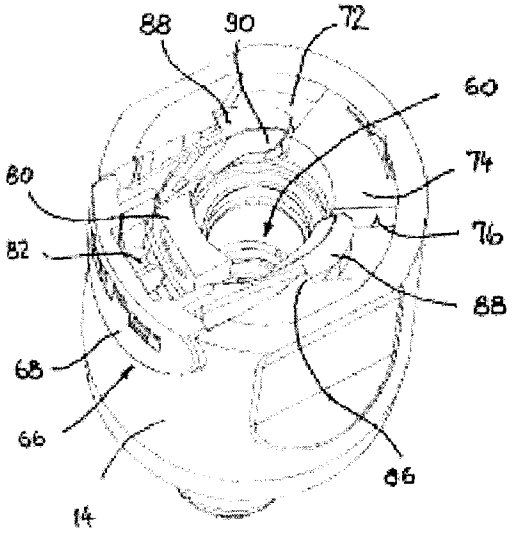

(57) Abrégé/Abstract:
The invention relates to a fluid coupling consisting of a socket (14) and a plug (12) and is used to connect two liquid hoses. The plug (12) has a neck (18) which can be inserted into the socket (14), said neck comprising an annular groove (62) for engaging with a locking element (66). The locking element (66) consists of a push-button (68) which can be actuated in a radial manner from outside the socket (14) and from which two flexible fork arms (70) protrude, said fork arms engaging into a seat (72) of the socket (14) and having diagonal ramp surfaces (90) on the two opposing inner faces of the fork arms, wherein the diagonal ramp surfaces engage around the neck (18) in the region of the annular groove (62) around a part of the circumference of same. The annular groove (62) is delimited by two opposing and diverging diagonal surfaces (64).

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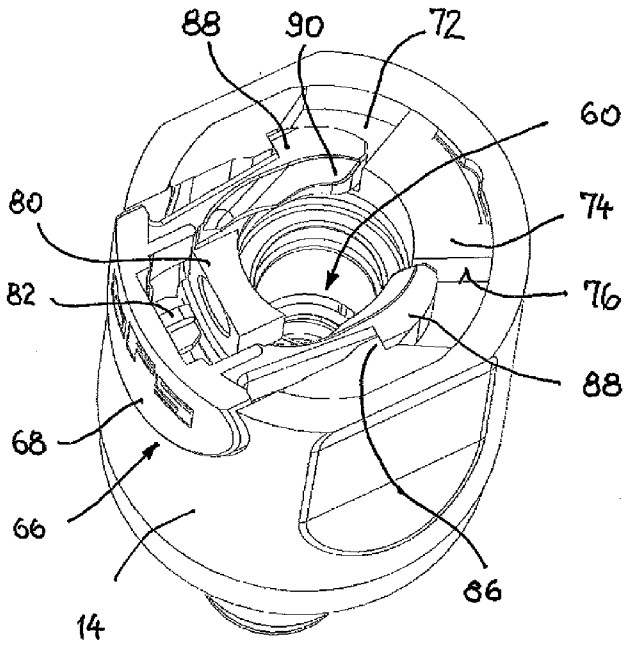

Fig. 3

(57) **Abstract**: The invention relates to a fluid coupling consisting of a socket (14) and a plug (12) and is used to connect two liquid hoses. The plug (12) has a neck (18) which can be inserted into the socket (14), said neck comprising an annular groove (62) for engaging with a locking element (66). The locking element (66) consists of a push-button (68) which can be actuated in a radial manner from outside the socket (14) and from which two flexible fork arms (70) protrude, said fork arms engaging into a seat (72) of the socket (14) and having diagonal ramp surfaces (90) on the two opposing inner faces of the fork arms, wherein the diagonal ramp surfaces engage around the neck (18) in the region of the annular groove (62) around a part of the circumference of same. The annular groove (62) is delimited by two opposing and diverging diagonal surfaces (64).

(57) **Zusammenfassung**: Die Fluidkupplung besteht aus einer Buchse (14) und einem Stecker (12) und dient zum Verbinden von zwei Flüssigkeitsschläuchen, wobei der Stecker (12) einen in die Buchse (14) einschiebbaren Hals

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(18) mit einer Ringnut (62) für den Eingriff eines Verriegelungselementes (66) hat. Das Verriegelungselement (66) besteht aus einem von der Außenseite der Buchse (14) radialbetätigbaren Druckknopf (68), von dem zwei flexible Gabelarme (70) abstehen, die in einen Sitz (72) der Buchse (14) eingreifen und an ihren beiden gegenüberliegenden Innenseiten schräge Auflaufflächen (90) haben, die den Hals (18) im Bereich der Ringnut (62) auf einem Teilihres Umfangs umgreifen. Die Ringnut (62) ist durch zwei einander gegenüberliegende, divergierende Schrägflächen (64) begrenzt.

Fluid Coupling

Description

The invention relates to a fluid coupling with a socket and a plug for connecting two fluid hoses.

Such couplings are particularly suitable for connecting pipe hoses for water with a relatively low pressure of up to 10 bar. To connect the plug and socket, known systems have a coaxial sheath on the socket or on the plug that must be pushed back manually for engaging or disengaging the two coupling halves, which makes the process of coupling and decoupling, respectively, complicated.

The invention is based on the objective of making available a fluid coupling that provides a simplified operation with only one hand, both for connecting as well as for disconnecting the coupling halves, and that is compatible with most of the popular coupling systems.

The achievement of this objective results from a fluid coupling with a socket and a plug suitable for connecting two fluid hoses, wherein the plug has a neck, which may be inserted into the socket, said neck comprising an annular groove for engaging a locking element, which comprises a push-button, which may be actuated in a radial manner from an exterior of the socket, and from which protrude two flexible fork arms, which engage into a seat of the socket and have diagonal ramp surfaces on the their two opposing inner faces, which engage around the neck in an area of the annular groove around a part of the circumference of same, wherein the annular groove is delimited by two opposing and diverging diagonal surfaces, wherein the free ends of the two fork arms are each located on a diagonal expanding surface of the seat and comprise barbs on their exterior, which, in the locked state and with the push-button not having been actuated, come into contact with a latching step of the seat, said latching step being constructed by means of two opposing end abutment surfaces on which the barbs of the fork arms are propped against each other in the locked state.

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In one embodiment, the diagonal ramp surfaces of the fork arms diverge in an axial direction toward the plug, and wherein the two ramp surfaces constructed on free ends of the two fork arms and engaging into the annular groove reach up to a mid-plane of the neck and exceed same by a small excess in a locked state.

In another embodiment, a return spring is propped against an interior surface of the push-button, which return spring, in the locked state, pushes the barbs of the two fork arms against their latching step

In another embodiment, both in a cavity of the plug, as well as of the socket, a valve stem that may be displaced axially and onto which a calotte bearing has been moulded, against a concavity of which is propped a compressed spring, which, in a disengaged state of the socket and plug, pushes a spherical exterior of the calotte bearing against an annular seal in the plug and in the socket.

In another embodiment, in an engaged state of the plug and socket, the opposing ends of the two valve stems are in contact with each other, whereby axial displacement occurs.

A significant advantage of the invention compared with the state of the art is that, in order to connect the two coupling halves, these need only be inserted into one another and are self-locking, while the disconnecting process only requires the push-button on the side to be pressed with the thumb.

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The invention is explained below in an illustrated design example. The following are shown:

Figure 1 A longitudinal section through the coupling in its disengaged state;
Figure 2 The coupling in its connected and interlocked state;
Figure 3 A scaled perspective representation of the socket;
Figure 4 A top view of the socket in Figure 3 without the push-button;
Figure 5 The push-button outside of the socket;
Figure 6 A top view of the socket with the push-button in the locked setting;
and
Figure 7 The socket in Figure 6 in its disengaged state with the push-button pushed in.

As Figures 1 and 2 indicate, according to the invention, the coupling, 10, comprises two parts, namely a plug, 12, and a socket, 14, which are both constructed as plastic parts.

The plug, 12, has a cylindrical casing, 16, from which centrally protrudes a cylindrical neck, 18, of a smaller diameter, which is used for engagement with the socket, 14. The casing, 16, is formed in two parts and has a base, 20, projecting from the neck, 18, from which base protrudes a cylinder, 22, which extends over a cylinder, 24, of smaller diameter, from which a connecting piece, 26, with a Christmas-tree profile, 28, protrudes axially, and onto which may be slid a fluid hose (not shown). A stepped annular seal, 30, is fitted into the cylinder, 22, which annular seal is pressed against the base, 20, by the free end of the smaller cylinder, 24. A gripping sleeve, 32, is placed onto the larger cylinder, 22.

The socket, 14, also comprises several plastic parts and has a casing, 34, that is essentially cylindrical with an anterior receiving cylinder, 36, for the neck, 18, of the socket, 12, and one posterior cylinder, 38, with a base, 40, inserted therein and from which protrudes a connecting piece, 42, with a Christmas-tree profile, 44, for a fluid hose.

Here as well, a gripping sleeve, 46, has been placed on the circumferential surface of the socket, 14. An annular seal, 48, has been clamped between the receiving cylinder, 36, and the posterior cylinder, 38, of the casing, 34.

Both in the cavity of the socket, 14, and in the cavity, 50, of the plug, 12, an axially displaceable valve stem, 52, with a calotte bearing, 54, is located, against the concavity of which a compression spring, 56, is propped; Figures 1 and 2 show the compression spring for the socket, 14, while it is not further depicted for the plug, 12.

In the disengaged state of the coupling, 10, the two compression springs, 56, which are propped by casing 16 and casing 34, respectively, ensure that the calotte bearing, 54, of the valve stem, 52, is pressed against the appropriate annular seal, 30 or 48, respectively, so that any water present in the plug, 12, and in the socket, 14, cannot flow above the respective connecting piece, 26 or 42, respectively.

When, according to Figure 2, the coupling, 10, is connected with the socket, 14, by inserting the neck, 18, of the plug, 12, the ends of the two valve stems, 52, that are positioned opposite each other are brought to bear against each other and shift axially against the force of the two compression springs, 56. As a result, the two calotte bearings, 54, are lifted off their sealing surfaces, 58, on the annular seal, 30 and 48, respectively, so that the supplied liquid may run off via the connecting piece, 26 or 42, respectively.

With reference to Figures 3 and 7, the construction and operation of the system for locking the plug, 12, and socket, 14, are explained hereinafter according to the invention. In the middle of the socket, 14, a through-bore, 60, is incorporated, into which the neck, 18, of the plug, 12, is sheathed to connect the fluid hoses. The exterior, 14, of the neck comprises an annular groove, 62 (see also Figures 1 and 2), which is delimited by two opposing and diverging diagonal surfaces, 64, which are tilted toward the radial plane by 45°. The neck, 18, is locked in the bore, 60, of the socket, 14, as shown in Figure 5, with a locking element, 66, which is made of plastic and comprises a push-button, 68, from which protrude two flexible fork arms, 70. The fork arms, 70, engage into a multi-part hub, 72, of the socket, 14 (see Figure 3), which is constructed on the free end side of the socket, 14, and which is shown in black in Figures 6 and 7. On the side of the socket, 14, that is located opposite the push-button, 68, an abutment projection, 74, protrudes axially, whereby a diagonal expanding surface, 76, is constructed on either side of said expanding surface. On same, the free ends, 78, of the fork arms, 70, come into engagement with the locking element, 66, inserted into the hub, 72. When the push-button, 68, is pressed in order to disengage the plug, 12, from the socket, 14, the free ends, 78, of the fork arms, 70, slide along the two expanding surfaces, 76, and in the process push apart the fork arms, 70. Thus is it possible to disengage the fork arms, 70, from the annular groove, 62, of the neck, 14, so that said neck is automatically disengaged by the pressure from both compression springs, 56, and may be extracted via the bore, 60.

When the push-button, 68, is subsequently released again, a return spring inserted between said push-button and an abutment, 80, located opposite an abutment protrusion, 74, ensures

that the locking element, 66, with its two fork arms, 70, is pushed back by a return spring, 92, into the starting position of not being pressed. The said return spring, 92, is placed on a pin, 82, protruding from the push-button, 68. In order to prevent that, the return spring, 92, pushes the push-button, 68, out of its hub, 72, and thus out of the socket, 14, two diametrically opposing, axial protrusions, 84, are constructed in the hub, 72 (see Figure 4, as well as Figures 6 and 7), which have two diametrically opposing radial end abutment surfaces, 86, that form a latching step and against which are propped the ends, shaped into barbs, 88, of the two fork arms, 70, when the push-button, 68, is not pressed, i.e., in the locked condition.

In particular, Figures 5 and 6 indicate that the fork arms, 70, on both their opposing inner faces, have diagonal ramp surfaces, 90, that engage around the neck, 18, of the socket, 12, in the area of its annular groove, 62, around a part of the circumference of same. The diagonal ramp surfaces, 90, are constructed in such a way that they diverge in a trough shape in an axial direction toward the plug, 12. In this manner, a ramp-like guiding surface is formed for the neck, 18 (to be inserted into the socket, 12), which facilitates the insertion of the neck, 18, and the spreading of the two fork arms, 70.

When the neck, 18, has been inserted up to the end abutment according to Figure 2, whereby the opposing end surfaces of the plug, 12, and the socket, 14, come into contact with each other, the locking element, 66, is pushed out in a radial manner into its starting position (Figure 6) by the return spring, 92, so that the two fork arms, 70, glide into the annular groove, 62, of the neck, 18. Without actuating the push-button, 68, the two coupling elements, 12 and 14, cannot be disengaged.

It is indicated in Figure 6 that, in the locked state, the ramp surfaces, 90, constructed on the free ends, 78, of the fork arms, 70, which engage into the annular groove, 62, of the neck, 18, reach at least up to the mid-plane, m, of the neck, 18, or exceed same by a small excess, u, of, for instance, 1 mm. This ensures that if a pull is exerted on the plug, 12, the coupling, 10, will not be automatically disengaged.

What is claimed is:

1. A fluid coupling with a socket and a plug suitable for connecting two fluid hoses, wherein the plug has a neck, which may be inserted into the socket, said neck comprising an annular groove for engaging a locking element, which comprises a push-button, which may be actuated in a radial manner from an exterior of the socket, and from which protrude two flexible fork arms, which engage into a seat of the socket and have diagonal ramp surfaces on the their two opposing inner faces, which engage around the neck in an area of the annular groove around a part of the circumference of same, wherein the annular groove is delimited by two opposing and diverging diagonal surfaces, wherein the free ends of the two fork arms are each located on a diagonal expanding surface of the seat and comprise barbs on their exterior, which, in the locked state and with the push-button not having been actuated, come into contact with a latching step of the seat, said latching step being constructed by means of two opposing end abutment surfaces on which the barbs of the fork arms are propped against each other in the locked state.

2. The fluid coupling according to claim 1, wherein the diagonal ramp surfaces of the fork arms diverge in an axial direction toward the plug, and wherein the two ramp surfaces constructed on free ends of the two fork arms and engaging into the annular groove reach up to a mid-plane of the neck and exceed same by a small excess in a locked state.

3. The fluid coupling according to claim 1 or 2, wherein a return spring is propped against an interior surface of the push-button, which return spring, in the locked state, pushes the barbs of the two fork arms against their latching step.

4. The fluid coupling according to any one of claims 1 to 3, wherein both in a cavity of the plug, as well as of the socket, a valve stem that may be displaced axially and onto which a calotte bearing has been moulded, against a concavity of which is propped a compressed spring, which, in a disengaged state of the socket and plug, pushes a spherical exterior of the calotte bearing against an annular seal in the plug and in the socket.

5. The fluid coupling according to claim 4, wherein, in an engaged state of the plug and socket, the opposing ends of the two valve stems are in contact with each other, whereby axial displacement occurs.

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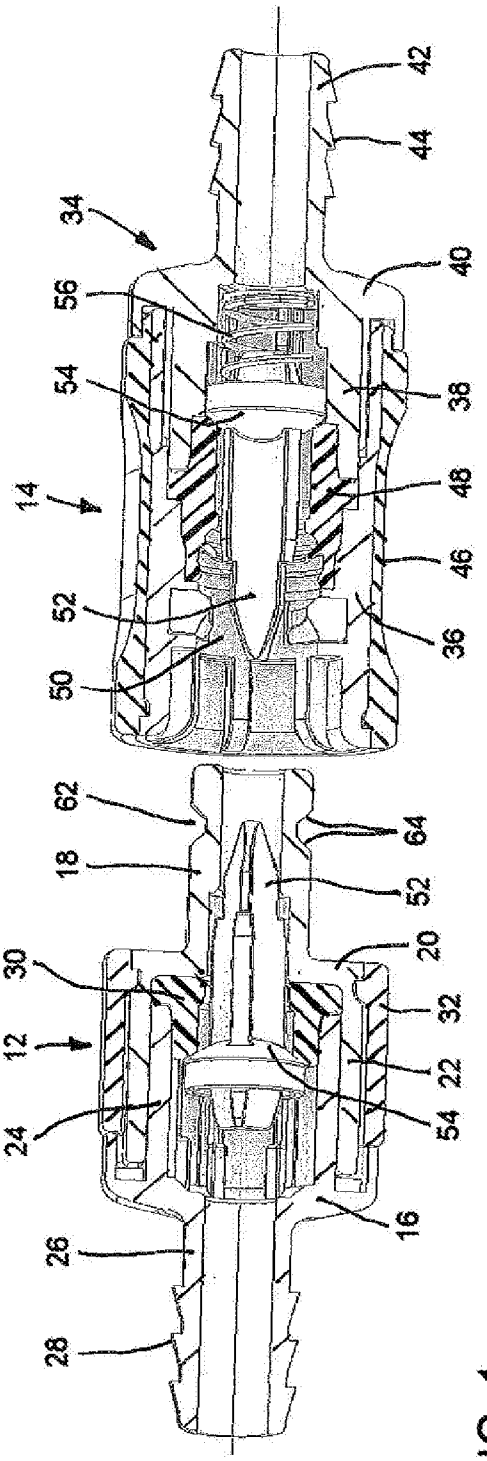

FIG. 1

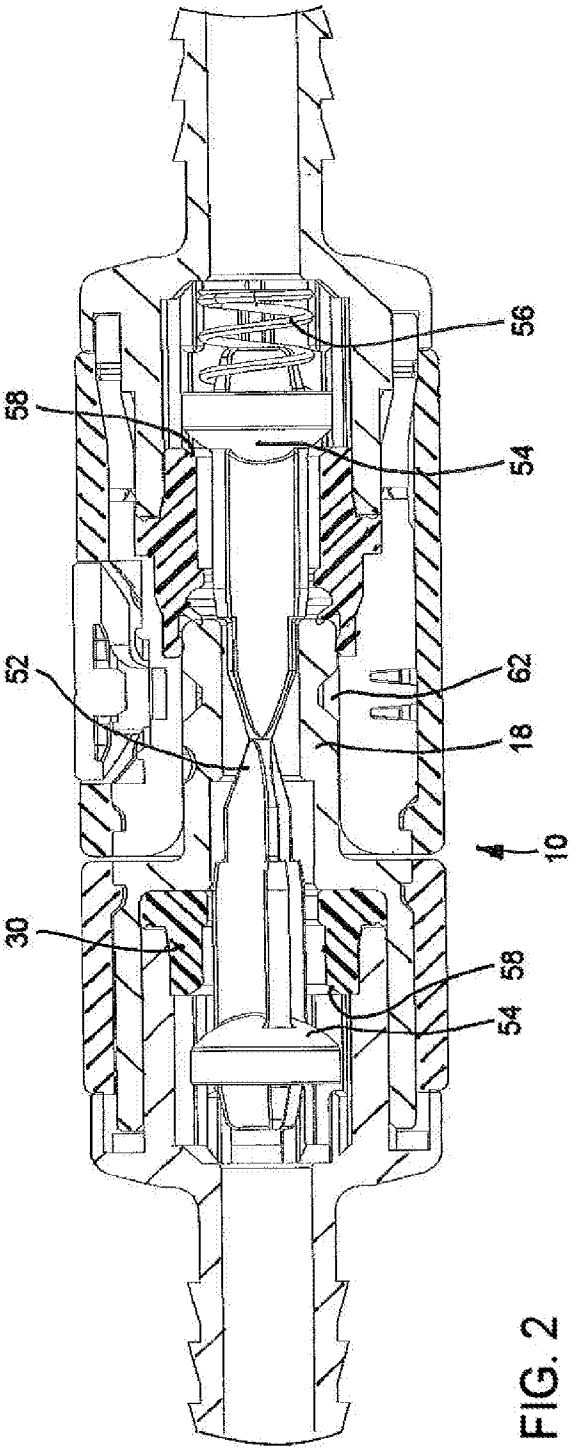

FIG. 2

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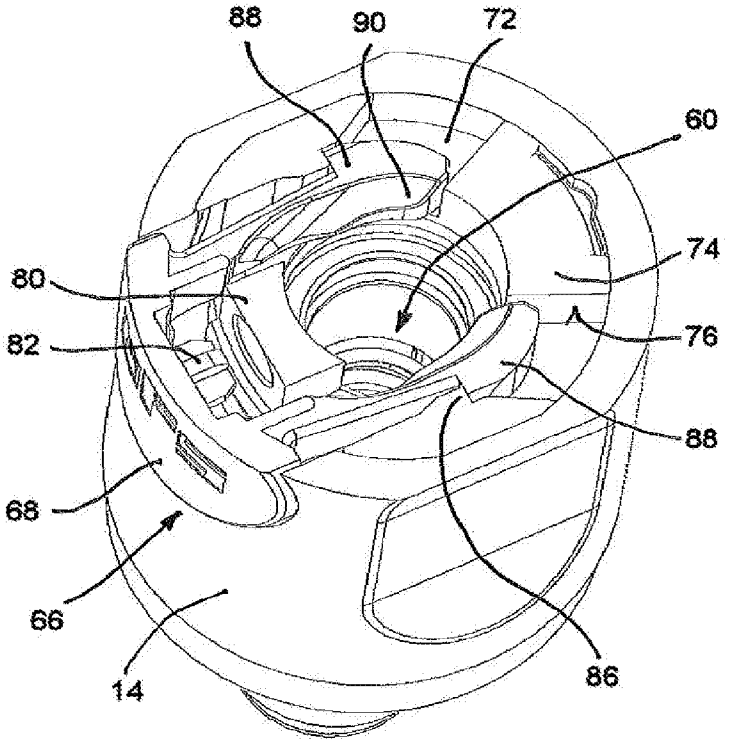

FIG. 3

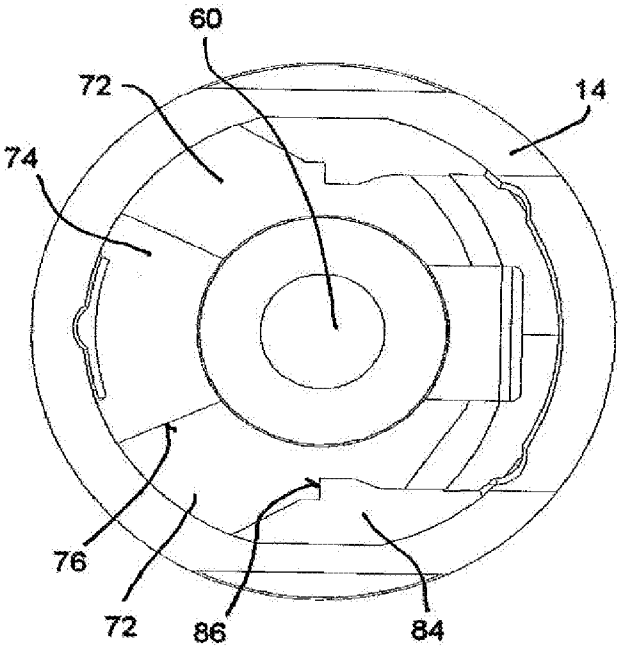

FIG. 4

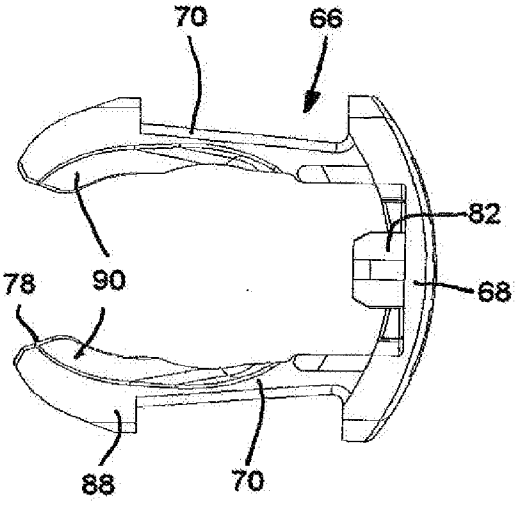

FIG. 5

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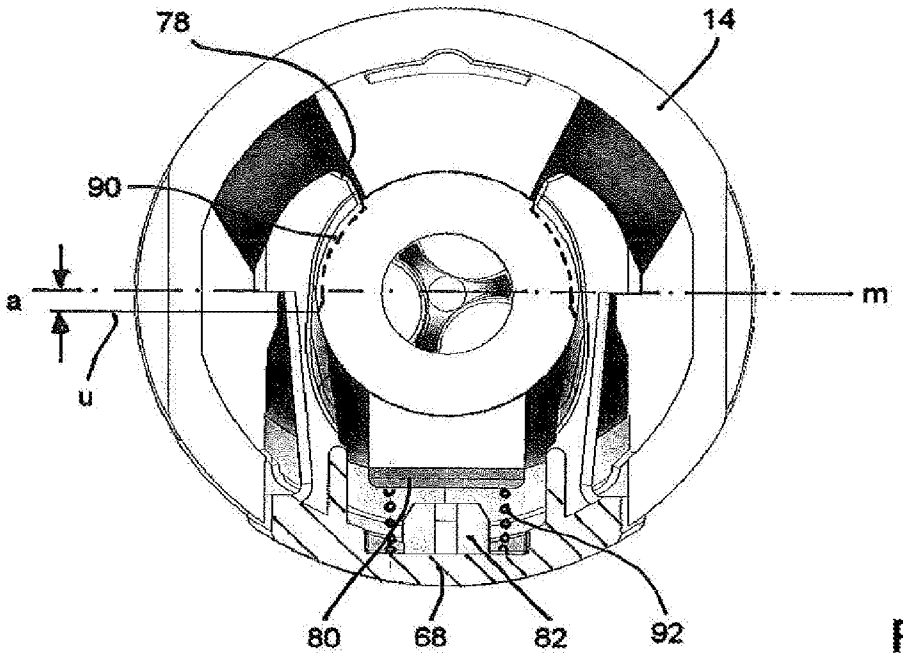

FIG. 6

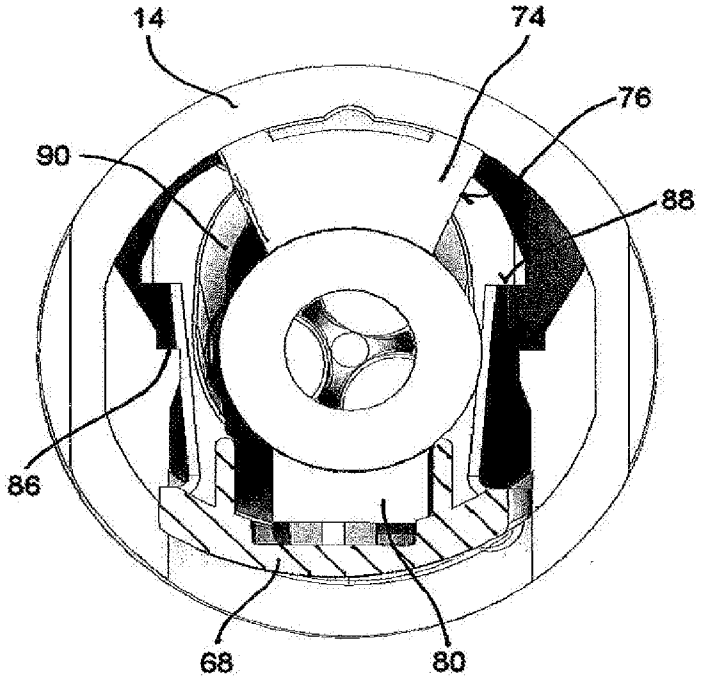

FIG. 7

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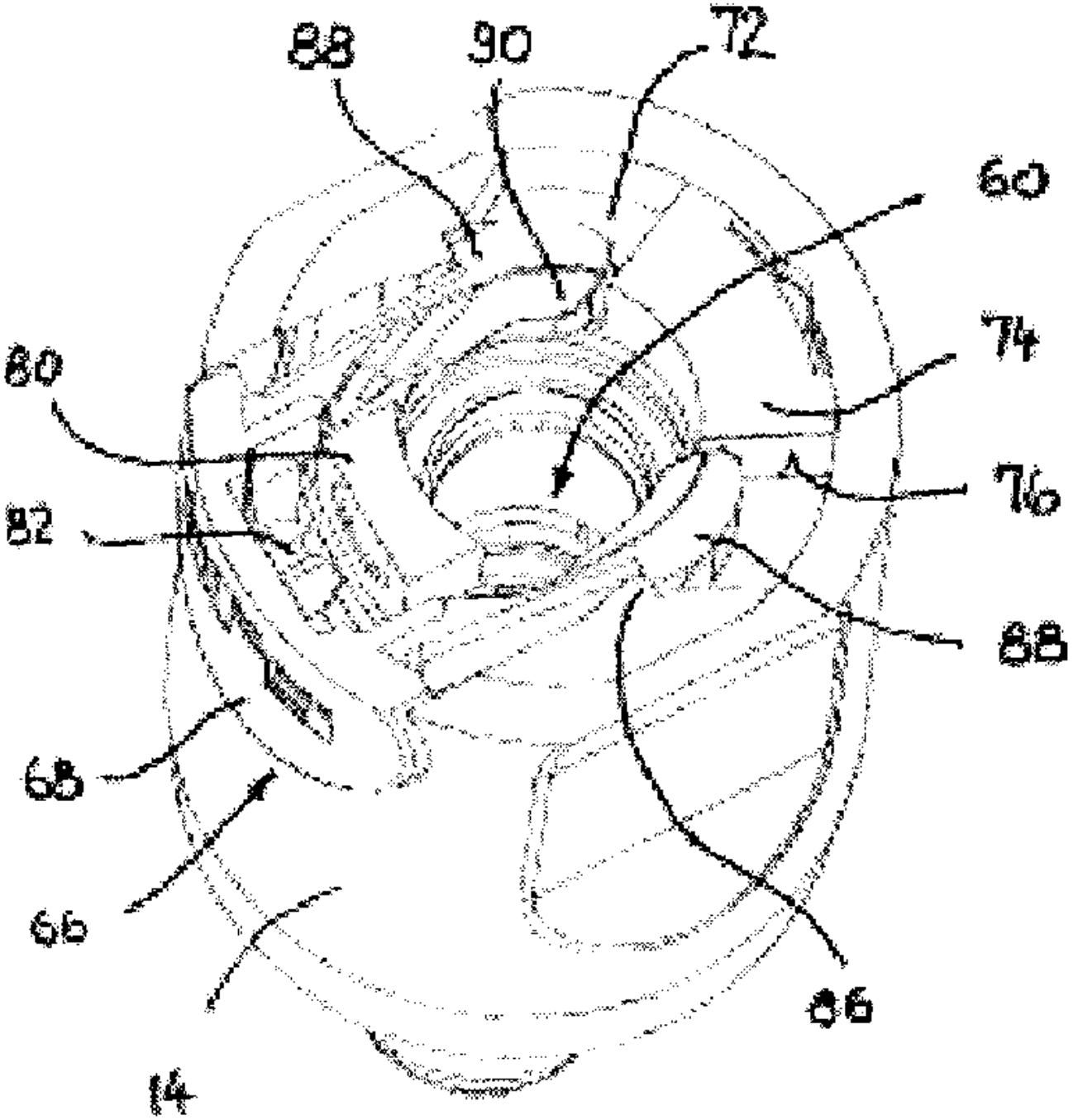
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