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(54) **Áramlásmérő eszköz**

Flow Recording Device

Specification

[0001] The present invention relates to a flow detection device for determining flow signals, the use of such flow detection devices in a line system and a method for manufacturing the devices.

[0002] Devices for detecting flow signals are known in prior art. For example, flow detection devices for detecting flow signals, e.g., flow rates, are used in known medium-carrying plants, and have certain disadvantages as functional or modular groups of the kind utilized in medium-carrying plants. The medium-carrying plants or systems are thus limited strictly to standardized construction sites and defined environmental conditions, and do not provide for access and free exchangeability in all cases. In addition, limited serviceability in some applications itself leads to complete replacement of the functional assemblies, and service technicians have no way of sensibly cleaning systems in the area of application / during a service call. In some instances, this means that functional assemblies must be completely replaced, even though potentially only one subordinate component is actually defective.

[0003] For example, such systems are flow meters, which are used as assemblies.

[0004] EP 1 693 651 A2 relates to a water meter with an impeller and a permanent magnet, as well as a hall sensor, wherein the permanent magnet is connected with the impeller, and the hall sensor is separated from the permanent magnet by a wall of the housing.

[0005] EP 1 773 092 A2 relates to a housing with sealing device for distributing and guiding sound waves and developing an expanded sound chamber, wherein the sealing device seals the junction between the housing and expanded sound chamber, and the exterior of the housing relative to the housing interior or expanded sound chamber.

[0006] US 4,440,30 relates to a liquid flow meter with a rotatable impeller, mounted in a cylindrical cavity.

[0007] EP 1 596 062 A1 relates to an axially mounted impeller arranged in a cylindrical or wind channel-like passage, as well as to the method for manufacturing the axially mounted impeller.

[0008] DE 3104134 A1 relates to a flow meter for liquids with a liquid inlet and liquid outlet channel, which in conjunction with a flat cylindrical measuring chamber having a measuring rotor with blades for generating digitally detectable pulses.

[0009] DE 100 38 598 A1 relates to a liquid counter with dry rotor configuration containing a meter housing with drying compartment, a measuring chamber with liquid inlet and liquid outlet, as well as a screw head, which separates the measuring chamber from the drying compartment.

[0010] DE 10 2005 027 888 relates to a flow measuring device for detecting the volume of a liquid flowing through a sanitary fitting, faucet or outlet valve. The measuring device comprises a flow channel and a rotor, which can be driven by the liquid and is rotatably mounted in the flow channel.

[0011] The object of the present invention is to at least partially avoid the disadvantages known in prior art, and to provide an improved system.

[0012] According to the invention, the flow detection device for determining flow signals has at least one carrier element with an axis, wherein the carrier element and axis are integrally designed.

In addition, the flow detection device has a propeller, wherein the propeller is rotatably arranged on the axis, and the axis has a circumferential groove at its end. Also present is a securing element, which comprises a snap-in element that engages and snaps into the groove. The flow detection device is here characterized in that the carrier element is designed as a detachable closing element, and has an integrated and/or injection molded seal. Furthermore, the rotational axis of the detection element is movably, in particular rotatably fixed with a securing element.

[0013] In an embodiment, the carrier element is adjusted to the adjacent structures, in particular in the assembly opening of the medium-carrying system. Among other things, this means that the medium-carrying line systems can accommodate the carrier element on the one hand, or in an alternative embodiment in particular the assembly opening is itself configured in such a way that elements of the kind used to function as a seal engage into the adjacent structures of the medium-carrying system or housing adjacent thereto, in which the medium-carrying system is accommodated, so that a sealing function of the carrier element is provided for the medium-carrying line systems, for example.

[0014] In an embodiment of the invention, the carrier element has connectors, which are selected from a group comprising bayonet connections, screwed connections, combinations thereof and the like. According to the invention, the handle area allows the user to both assemble and disassemble the corresponding device. For example, this can be a handle area arranged essentially parallel to the rotational axis, which can be used to operate a bayonet or screwed connection, and remove the flow detection device from the assembly opening after opening the sealing element. It is here especially advantageous in one embodiment that the flow detection device be integrally designed, and hence provide an overall arrangement secured against loss, in particular for partial robust use during assembly at construction sites.

[0015] The propeller and a magnet for signal transmission especially preferably form a rotatable group in relation to the sealing or carrier element, wherein the rotational velocity or speed of the propeller and the magnet coupled thereto can be tapped or detected by means of a corresponding sensor. Such techniques are known in prior art, and reference is made to the functionality for data transmission only for the sake of completeness.

[0016] According to another especially preferred embodiment, the flow detection device is assembled inside of the assembly opening, preferably essentially parallel to the rotational axis of the functional element.

[0017] According to another embodiment, the propeller is used in particular for determining a flow speed, a flow volume or the viscosity of the corresponding medium.

[0018] According to another embodiment, the flow detection device is built into the assembly opening of the medium-carrying system without any tools.

[0019] At least individual components of the flow detection device or even all components, in particular the functional groups, are preferably fabricated out of at least one material selected from a group having thermosetting plastics and/or thermoplastic materials, in particular polyphenylene sulfide, polypropylene, poly-1-butene, polyvinyl chloride, polyvinylidene chloride, polymethyl methacrylate, polyacrylonitrile, polystyrene, polyacetal, polyvinyl alcohol, polyvinyl acetate, ionomers, fluoroplastics,

polyethylene, polyamide, in particular a partially aromatic polyamide, polycarbonate, polyester, polyphenylene oxide, polysulfone, polyvinyl acetal, polyurethane, and chlorinated polyether, cellulose nitrate, cellulose acetate, cellulose ether, phenol resin, urea resin, thiourea resin, melamine resin, alkyd resin, allyl resin, silicone, polyimide, polybenzimidazole, epoxide resin, casein plastic, cross-linked polyurethane, unsaturated polyester resin, combinations hereof and the like, and metals, in particular steels, such as stainless steels, and/or the sealing element is made out of plastic and/or the axes are made out of steel or plastic and/or the propeller fabricated out of plastic is configured with a magnet.

[0020] At least individual components, preferably the entire flow detection device, are fabricated in an injection molding process, preferably in a multistage injection molding process, for example the two-component injection molding process, and in particular in the multicomponent injection molding process.

[0021] The present invention further encompasses the use of one of the aforementioned flow detection devices for a closed or open line system.

[0022] According to the present invention, a securing element is preferably understood as a bearing or a sleeve, which comprises a snap-in element into which a correspondingly designed end of the rotational axis engages and snaps. The advantage to this in particular is that it becomes clear to the user when the corresponding flow detection device assumes the correct position in relation to the installation opening.

[0023] The correspondingly configured flow detection devices are preferably arranged as so-called pressure-neutral devices inside of a line system, and as a further, non-integrated component have the cover or a sealing element, with which the corresponding line system is sealed.

[0024] The present invention here enables the service-oriented replacement of functional elements. The ease of assembly and serviceability relate especially to a flow detection device, which in the case shown is used as a system-closing or system-open functional assembly.

[0025] The system-closing flow detection device is preferably integrated into a medium-carrying line system in such a way that the assembly opening provided for this purpose is essentially completely sealed, and in particular the flow detection device can be serviceably maintained and cleaned. This means in particular that the functional assembly is preferably frontally secured in the overall device, and can be disassembled without using tools, for example with bayonet, clamping or screwed connections being used as the connecting elements.

[0026] Examples for especially preferred features of the invention include that the system-closing flow detection device at least partially uses the existing housing structures as carriers or functional areas.

[0027] The system-closing flow detection device can preferably be serviceably assembled and disassembled, and embedded decoupled in terms of function and movement in the overall system.

[0028] Among other things, the invention described in what follows invention makes it possible to place flow detection devices in medium-carrying plants and/or systems specific to the application in such a way as to yield compact, functionally reliable units secured against loss for service calls, and arrange them in particular frontally in the overall system or change them out in this area. The functional assembly further preferably forms a flow detection system that is easy to maintain and can be

detached without any tools, and in particular can be flexibly replaced. For example, these systems are preferably used in instantaneous water heaters, heat exchangers, gas stoves or the like.

[0029] The flow detection device as a system-closing element is a closed functional assembly whose individual parts can be put together in various material combinations. Possible combinations include a plastic sealing element, a steel axis, a plastic propeller with magnet or a combination with a plastic axis.

[0030] The invention will be described below based on two exemplary embodiments; however, the latter do not limit the protective scope of the present invention, but merely provide an exemplary explanation.

[0031] Shown on

Fig. 1 and 2 are perspective views of a first embodiment of the present invention;

Fig. 3 and 4 are two different embodiments of a propeller for the flow detection device according to Fig. 1 and 2;

Fig. 5 to 7 are perspective views of an alternative flow detection device, which is not part of the present invention, in various phases of assembly;

Fig. 8 is a cut, side view of the flow detection device according to Fig. 7;

Fig. 9 is an arrangement of an embodiment according to Fig. 1 in a medium-carrying line system;

Fig. 10 is a sectional view of the flow detection device from Fig. 9 along the cutting line A-A.

[0032] Fig. 1 and 2 show two perspective views of a first exemplary embodiment of the flow detection device 1 according to the invention as a so-called system-closing element, in which the handle piece 8, sealing element 7 and gasket 4 are visible on the upper side of the carrier element 2 as parts of the carrier element 2. Among other things, the functional assembly 3 comprises the rotational axis 6, the propeller assembly 5 and a guiding sleeve 9. The sealing element is here designed as an integrated sealing cover, in which the functional element is arranged in the form of the propeller assembly with the magnet. The rotational axis has a circumferential groove at its lower end, which in particular serves as a snap-in element, interacting with the securing element (not shown).

[0033] Shown on Fig. 3 and 4 are two different embodiments of the propeller assembly, wherein the propeller blades on Fig. 3 are essentially perpendicular to the rotational axis, and on Fig. 4 are tilted by a prescribed angle to the rotational axis. Reference number 13 denotes the magnet plate, which among other things also serves to stabilize the propeller blades 12. Fig. 3 and 4 do not show the rotational axis itself, but only the sleeve 11 used for accommodating the rotational axis. The rotational blades 12 are arranged on this sleeve 11, wherein the corresponding propeller assembly is preferably designed as an integral injection molded part.

[0034] Fig. 5 to 8 show an embodiment of an alternative flow detection device not according to the invention, in which the flow detection device is understood as an open element, wherein the latter comprises the two half shells 24' and 24" of the carrier element, which are pivotably connected to each other by means of a hinge connection 23. The propeller assembly 25 with the rotational axis 26 is accommodated in the interior formed by the two half shells, and in the closed state is supported in the bearing 27 or in the securing element. Reference number 28 denotes a through-flow opening for the closed state of the flow detection device 21. Fig. 6 shows the flow detection device 21 according to Fig.

5 in the closed state, wherein the securing element 27 does not yet engage into the rotational axis 26. Only on Fig. 7 is the securing element pushed in, and accommodates the end section of the rotational axis 26, thereby fixing in particular the two half shells of the carrier element 24', 24" relative to each other.

[0035] Fig. 8 is a cut side view of the exemplary embodiment according to Fig. 5 to 7 for a flow detection device 21 as a system-closing element, which in addition to the propeller assembly 25 reveal parts of the medium-carrying line system 28, which extends through the flow detection device. Also depicted are the securing element 27 and rotational axis 26, with the two half shells 24' and 24" along with the hinge area 23 being visible as well.

[0036] Fig. 9 shows the functional principle in the mounted state for another alternative exemplary embodiment of a medium-carrying line system, in which the medium-carrying line system 30 has a flow detection device as a system-closing element 34, through which the medium flows. The assembly direction or disassembly direction is indicated by the double arrow 35, wherein the flowing direction of the medium is denoted by the arrows 37 and 38. Shown together with the component 33 is another functional element for determining other parameters for the medium-carrying line system.

[0037] Fig. 10 is a sectional view through the flow detection device according to Fig. 9 along the cutting line A-A, which illustrates the arrangement of the flow detection device in the assembly opening and its sealing function or effect with the securing element. The flow detection device here has the handle area 6 and sealing area 4, which seals the medium-carrying line system 30. The securing element 14 accommodates the rotational axis 6, which is movably arranged in the assembly opening. Reference number 34 denotes the flow detection device as a system-closing element or assembly, which is mounted or dismounted inside of the assembly opening according to arrows 35' and 35".

ÁRAMLÁSMÉRŐ ESZKÖZ

Szabadalmi igénypontok

1. Áramlásmérő eszköz (1) közeg közegszállító vezetékrendszeren keresztüli átömlési folyadékmennyiségének vagy átömlési sebességének meghatározására, amely áramlásmérő eszköz (1) tartalmaz

tengellyel (6) rendelkező hordozóelemet (2), ahol a hordozóelem (2) és a tengely (6) egyetlen elemként vannak kiképezve,

propellert (5), ahol a propeller (5) a tengelyen (6) forgathatón van elrendezve, **azzal jellemezve**, hogy

a tengely (6) alsó végén körülfutó horonnyal rendelkezik,

a horonyba történő bekapcsolódáshoz és reteszelődéshez reteszelőelemet tartalmazó biztosítóelemmel (14) van ellátva,

a hordozóelem (2) oldható záróelemként (7) van kialakítva és fogódarabbal (8) rendelkezik,

ahol a záróelem (7) zárófedélként van kiképezve és integrált és/vagy fröccsöntött tömítéssel rendelkezik,

ahol a közegszállító vezetékrendszer szerelőnyílásába történő szerszámmentes be- és kiszereléshez a hordozóelem (2) legalább egy csatlakozóelemmel rendelkezik.

2. Az 1. igénypont szerinti áramlásmérő eszköz, **azzal jellemezve,** hogy a propeller fordulatszámának szenzorral történő méréséhez a propeller (5) mágnessel (13) rendelkezik.

3. Az előző igénypontok bármelyike szerinti áramlásmérő eszköz, **azzal jellemezve,** hogy az csatlakozóelemek a bajonettzáras, szorítós, csavaros csatlakozók és ezek kombinációi alkotta csoportból vannak választva.

4. Az előző igénypontok bármelyike szerinti áramlásmérő eszköz, **azzal jellemezve,** hogy az áramlásmérő eszköznek (1) a közegszállító vezetékrendszerbe történő beszerelése lényegében a tengellyel (6) párhuzamosan történik.

5. Az előző igénypontok bármelyike szerinti áramlásmérő eszköz, **azzal jellemezve,** hogy a hordozóelem (2), a propeller (5) és/vagy a biztosítóelem (14) egy a hőre keményedő és hőre lágyuló műanyagokat tartalmazó csoportból választott anyagból vannak előállítva.

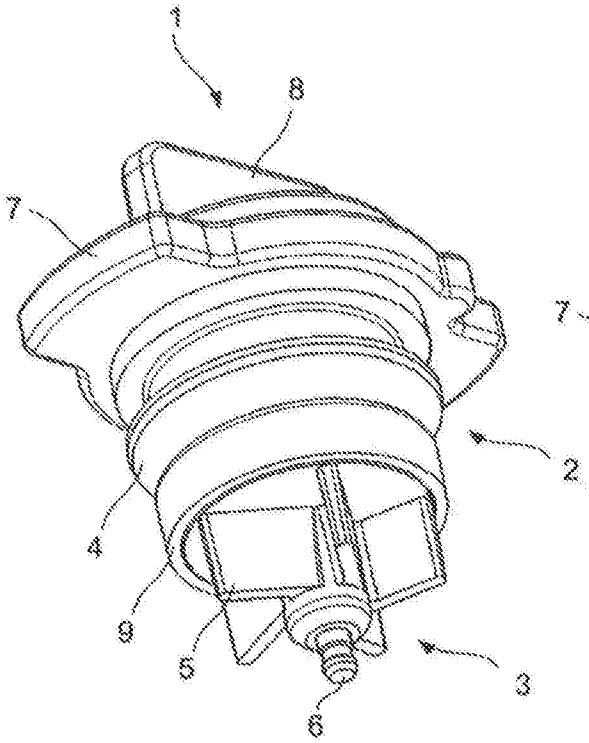

Fig. 1

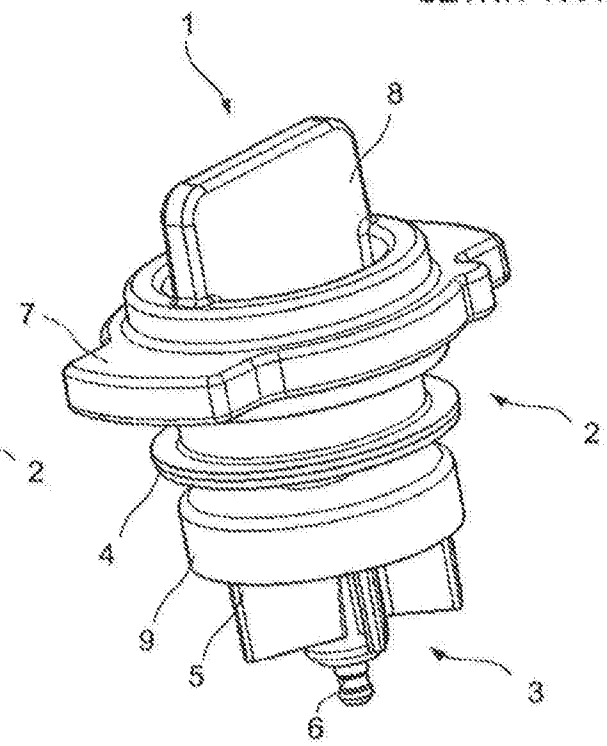

Fig. 2

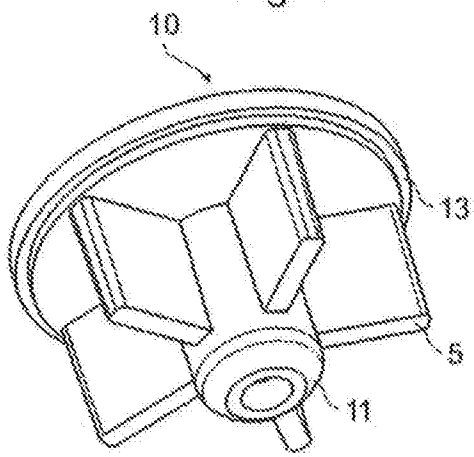

Fig. 3

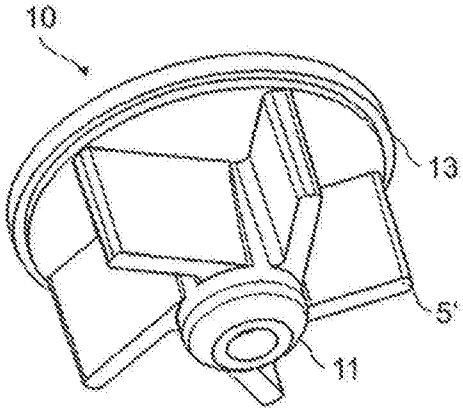

Fig. 4

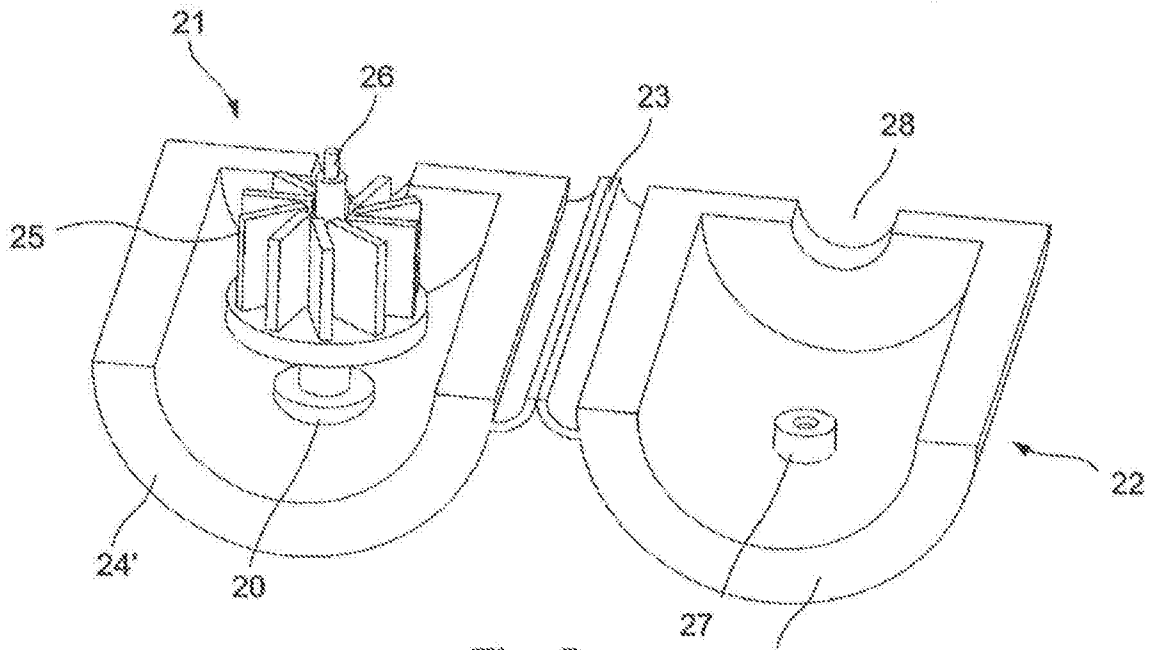

Fig. 5

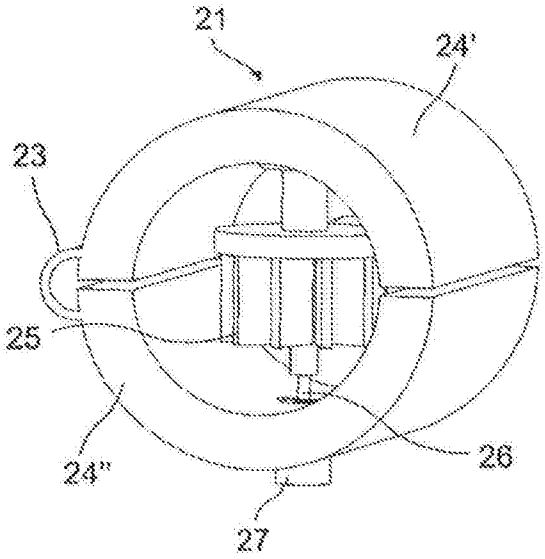

Fig. 6

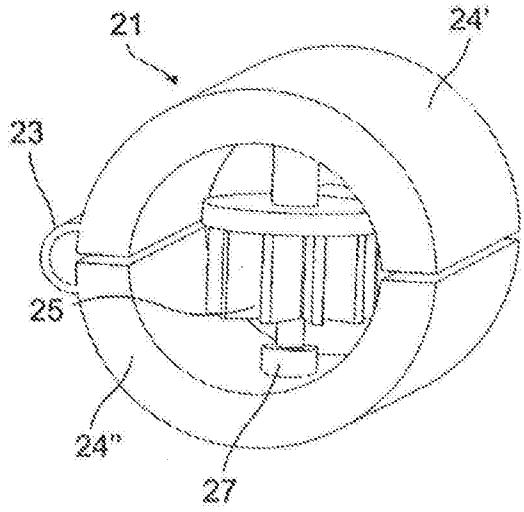

Fig. 7

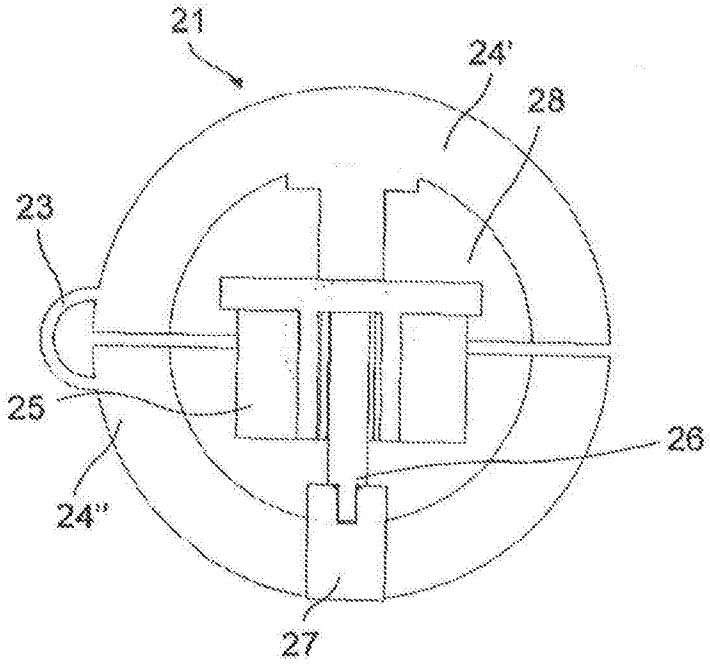

Fig. 8

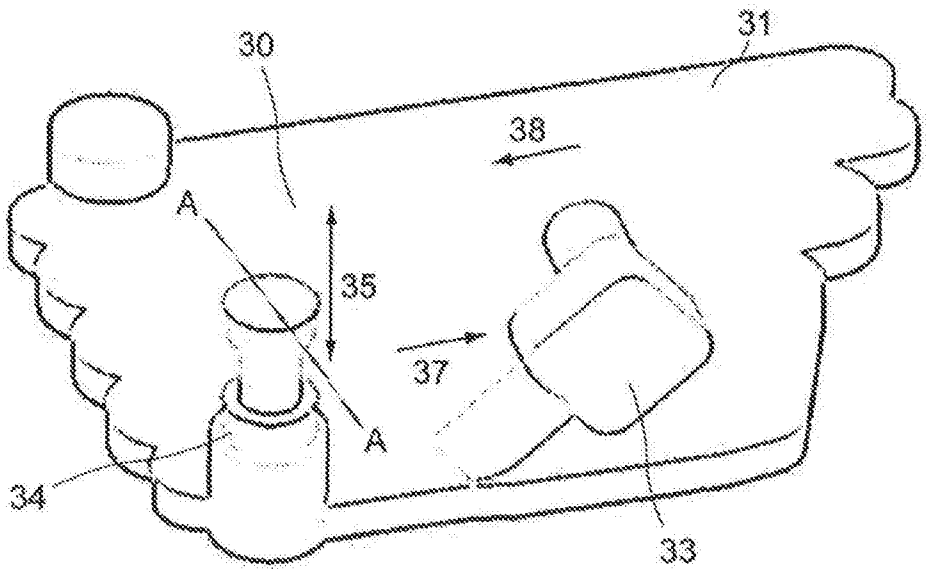

Fig. 9

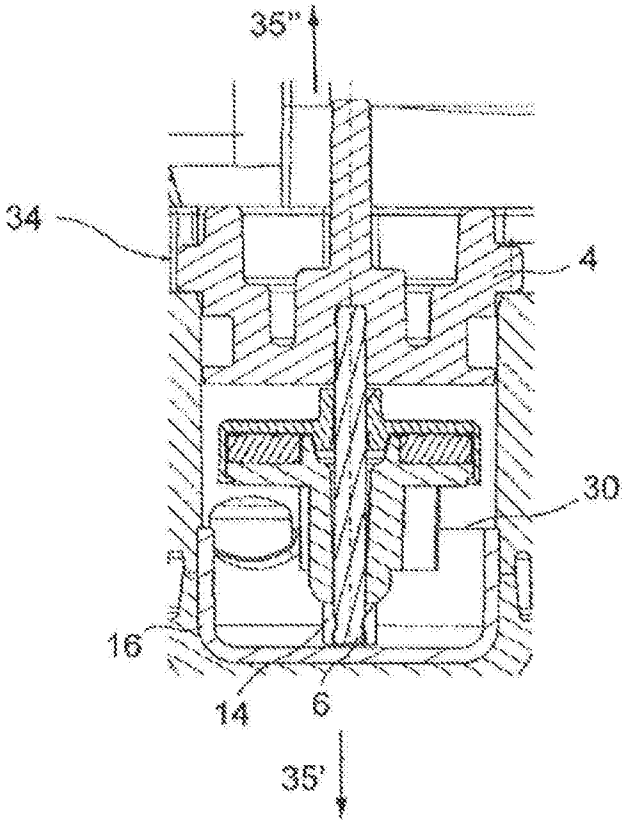

Fig. 10