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Nagynyomású összeköttetés

Az európai szabadalom ellen, megadásának az Európai Szabadalmi Közlönyben való meghirdetésétől számított kilenc hónapon belül, felszólalást lehet benyújtani az Európai Szabadalmi Hivatalnál. (Európai Szabadalmi Egyezmény 99. cikk(1))

A fordítást a szabadalmas az 1995. évi XXXIII. törvény 84/H. §-a szerint nyújtotta be. A fordítás tartalmi helyességét a Szellemi Tulajdon Nemzeti Hivatala nem vizsgálta.

Description:

The invention relates to a high-pressure connection for transferring of gaseous and/or liquid media, in particular for refueling of vehicles with hydrogen, comprising the pre-characterizing features of claim 1.

Such high-pressure connections, as known from EP 1 577 598 A1, are provided for secure transfer of a fluid from a pressure source, for example from a filling system. Important is a leak-free design to avoid discharge to the environment, especially at high pressures of up to 700 bar and more. Further, AU 2009 100 267 A4 discloses a check valve, wherein a sealing is in contact with a rounded seal head, but being configured for water pipes having low pressures.

Of particular importance is a leak-free seal of check valves in such high-pressure connections. However, with raising pressure values of 700 bar and more, these ports are increasingly sensitive to leakage, such that a discharge of such cryogenic hydrogen gas has to be expected. This could cause an accident, especially leaks in pressurized lines might cause substantial damages. One reason is that the commonly used PTFE seals are resistant to cold, but have at constant pressure negative impacts on deformation (so-called "cold flow", cf. homepage of the Elring-company). Thus, it is proposed to use PTFE compounds with enhanced pressure stability, for example with carbon or glass fibers as a filler. However, a deformation of less than 10% is difficult to reach. Further, composite seals are known from ball valves and include graphite layers. These seals are however mostly designed for higher temperatures.

Thus, the invention is based on the object to improve safety of a high-pressure connection with a simple construction and to avoid risks or damage.

This problem is solved by a high-pressure connection according to the features of claim 1. Preferred embodiments of the invention are the subject of dependent claims.

The proposed high-pressure connection is characterized by a particularly high security and easy construction, since the two-part design of the seal carrier and the sealing insert can be optimally adapted to the requirements at high pressure. Thus, the seal carrier is made of a harder plastic, in particular PEEK, and the sealing insert consists of a softer plastic, in particular PTFE. The terms "harder - softer" can be accurately defined by the modulus of

elasticity (E or Young's modulus) can. Regular plastics such as polyester (PE) or polypropylene (PP) have a modulus of elasticity of about 1 to 2 kN/mm². The preferred materials of PEEK (polyetherketones) are at about 4 kN/mm² and PTFE is approximately at 0.6 kN/mm². This results in a double or two-stage seal, as two sealing edges are provided on the sealing ring, one on the "softer" sealing insert and one on the "harder" seal carrier. Thus, the PTFE "hugs" the sealing of the piston of the check valve and with increasing "cold flow" (depending on the exposure time, the pressure value and temperature), the sealing is additionally supported by the sealing edge on the PEEK seal carrier. This results in a very good seal even at high pressures of 700 bar and more, namely a double seal towards the check valve piston, on the one hand in the low pressure area to the "softer" sealing insert and on the other hand in the high pressure region predominantly "stiffer" against the seal carrier. Thus, a failure of the ring seal can be prevented and the proposed high-pressure connection can avoid, that gas or liquid escapes at secure long-term. This is particularly important for accident protection reasons, but also for the environment.

It should be noted that the proposed high-pressure connection is suitable for couplings, in particular for vehicle refueling connections in vehicle, but also in industrial plants. This high-pressure connection can be installed at any location in a compact manner and have other valves as check valves. An exemplary embodiment is based on the accompanying drawings explained and described below. Herein shows:

Fig. 1 a linear high-pressure connection in a longitudinal section, and

Fig. 2 an enlarged view of the ring seal of Fig. 1.

Fig. 1 shows an embodiment of a high-pressure connection 1 with a two-part housing 2, which is here screwed with a thread 2' to form at the right side an inlet to a passage P. The medium, in particular a gas, flows to the left according to the arrow F, to be forwarded to a non-illustrated pressure tank. In the interior of the housing 2, in addition to conventional O-ring seals 6, a check valve 3' is provided, that contacts with its sealing piston 3 or its front end to a ring seal 4, thus tightly sealing against the flow direction F. The sealing piston 3 is here biased by a spring 3a and is pressed to the right, in this case.

The novel seal 4 is made of two parts, namely a seal carrier 4a, into which a sealing insert 4b is inserted. The seal carrier 4a consists of a harder plastic and the seal insert 4b of a softer plastic. Preferably, the seal carrier 4a is formed from PEEK and the sealing insert 4b is made of PTFE. In an advantageous embodiment, the seal carrier 4a has a graded ring shape with a step 4c (cf. Fig. 2), wherein the sealing insert 4b is mounted in this step 4c, in particular in a screwed manner. This results in a secure seal of the gaps and to the environment.

In Fig. 2 the sealing insert 4b has a larger inner diameter D than the passage d (here corresponding to the cross section of the passage P) of the seal carrier 4a and preferably the sealing insert 4b has a conical inner shape, which widens towards the sealing piston 3. Thus, a streamlined transfer of the medium achieved, but also a reliable sealing engagement of the front end of the sealing piston 3, which can be rounded (see Fig. 1). Thus, the seal 4 has two "cascaded" sealing edges 5, 5', one on the sealing insert 4b and one on the seal carrier 4a.

The housing 2 can be adapted to the fluid to be transferred, in particular as to the desired feed angle, passage cross-sections, etc., for example, can be designed in a cranked or angled way. Preferably, the sealing insert 4b and thus its annular sealing edge 5 is made of PTFE, while the seal carrier 4a and its sealing edge 5' is produced from PEEK (polyether etherketone), as this durable material offers high chemical resistance and impermeability even at extremely low temperatures and/or high pressures.

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NAGYNYOMÁSÚ ÖSSZEKÖTTETÉS

Szabadalmi igénypontok

1. Nagynyomású összeköttetés gáz alakú és/vagy folyékony közegek átvitelére, különösen járművek hidrogénnel való feltöltéséhez, amely összeköttetés házat (2) tartalmaz egy járattal (P) a közegek számára és egy tömítődugattyúval (3), amelynek homlokoldali vége tömítve illeszkedik egy gyűrűs tömítéshez, a tömítés (4) tömítéstartót (4a) tartalmaz, amelybe tömítőbetét (4b) van behelyezve, továbbá a tömítéstartó (4a) keményebb műanyagból, és a tömítőbetét (4b) lágyabb műanyagból van,

azzal jellemezve, hogy

a tömítésnek (4) két tömítőele (5, 5') van, egy a tömítőbetéten (4b), és egy a tömítéstartón (4a).

2. Az 1. igénypont szerinti nagynyomású összeköttetés, **azzal jellemezve, hogy a** tömítéstartó (4a) PEEK-ből van.

3. Az 1. vagy 2. igénypontok egyike szerinti nagynyomású összeköttetés, **azzal jellemezve, hogy a** tömítőbetét (4b) PTFE-ből van.

4. Az 1.-3. igénypontok egyike szerinti nagynyomású összeköttetés, **azzal jellemezve, hogy a** tömítéstartónak (4a) lépcsős gyűrű alakja van egy lépcsővel (4c), és a tömítőbetét (4b) a lépcsőben (4c) van rögzítve, különösen be van csavarva.

5. Az 1.-4. igénypontok egyike szerinti nagynyomású összeköttetés, **azzal jellemezve, hogy** a tömítőbetét (4b) belső átmérője (D) nagyobb, mint a tömítéstartó (4a) áteresztőnyílása (d).

6. Az 1.-5. igénypontok egyike szerinti nagynyomású összeköttetés, **azzal jellemezve, hogy** a tömítőbetét (4b) belül kúpos alakú, amely a tömítődugattyú (3) felé bővül.

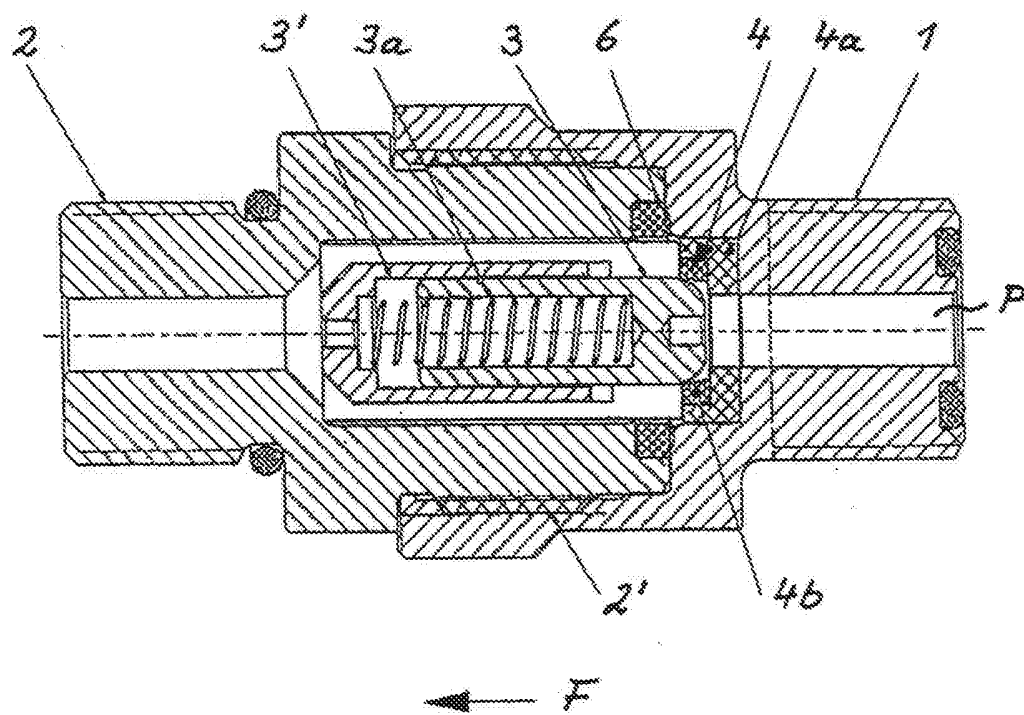


Fig. 1

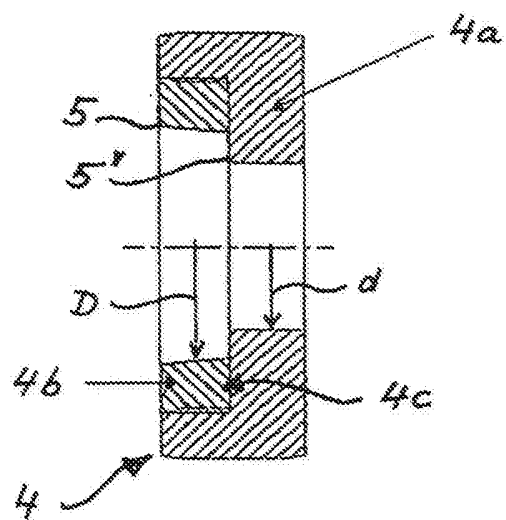


Fig. 2