



- (51) **International Patent Classification:**
F24D 19/00 (2006.01)
- (21) **International Application Number:**
PCT/CZ2022/000040
- (22) **International Filing Date:**
12 October 2022 (12.10.2022)
- (25) **Filing Language:** Czech
- (26) **Publication Language:** English
- (30) **Priority Data:**
PUV 2021-39367 15 November 2021 (15.11.2021) CZ
- (71) **Applicant:** KORADO, A.S. [CZ/CZ]; Bří Hubálků 869, 560 02 Česká Třebová (CZ).
- (72) **Inventors:** HRDLIČKA, Tomáš; Roesslerova 1397, 560 02 Česká Třebová (CZ). PAUKERT, Tomáš; Rybník 286, 560 02 Česká Třebová (CZ). PIRKL, Jiří; Ústecká 64, 561 17 Dlouhá Třebová (CZ).
- (74) **Agent:** DLABÁČEK, Lukáš; Bolzanova 5, 618 00 Brno (CZ).
- (81) **Designated States** (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM,

AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CV, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

- (84) **Designated States** (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, ME, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))

- (54) **Title:** SET FOR HEATING WATER DISTRIBUTION TO AND FROM A TWO-PLATE OR SINGLE-PLATE RADIATOR

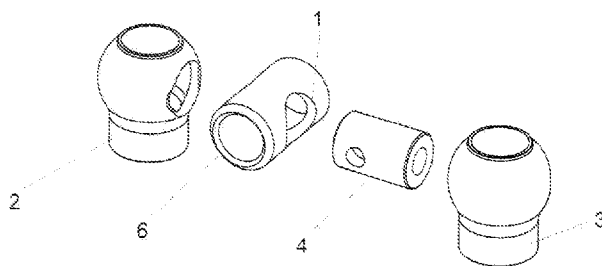


Fig. 1

- (57) **Abstract:** The set (G) for heating water distribution to and from the two- or single-plate radiator consisting of the inlet bushing (2), outlet bushing (3) of the traversing roller (4) and the connecting tube (6) wherein the connecting tube (6) of the set (G) is equipped with cross through hole (1) into which a traversing roller (4) is slid that forms an impermeable barrier (P) in the connecting tube (6) and containing two through right-angled angular guide channels (5, 9), i.e. an inlet guide channel (5) connected at one end to the inlet bushing (2) and at the other end connected to the inlet end (7) of the connecting tube (6) and the outlet guide channel (9) connected, at one end to the outlet bushing (3) and at the other end connected to the outlet end (8) of the connecting tube (6), wherein the inlet end (7) of the connecting tube (6) is connected and welded to the front plate (A) of the radiator (R) and the outlet end (8) of the connecting tube (6) is connected and welded to the back plate (B) of the radiator (R).



Published:

— *with international search report (Art. 21(3))*

Set for heating water distribution to and from a two-plate or single-plate radiator

Field of the Invention

The invention covers the set for heating water distribution to and from the two-plate or single-plate radiator and for hidden placement of a thermostatic valve and head in the radiator.

State of the Art

The state of the art in the field, at production of radiators is characterized by use of various sets, both for input water running in both radiator plates or only in the front radiator plate, wherein some enable connection of the radiator to the heating system in the middle of its bottom side. Those sets are designed either as one piece or two pieces with their common feature being the position of the integrated thermostatic valve (hereinafter referred to as integrated valve) on the radiator side in its upper part. Further common feature of the used sets is the fact they tend to be complex in terms of technology or, if designed as one piece, many of their variants must be made since they must always be dimensionally assimilated to each height and length of the radiator on which these will be embedded. Considering the current wide range of radiators, this results in great demands for production logistics, storage etc. The design of the set is known - water connection to the radiator (see DE20002269U or EP1279904A2 = CZ20022567A3) but solution of these sets is demanding both in term of structure and technology what applies also to embedding of these sets in the radiator. Further example is solution according to DE19709534A1 which does not allow simply (i.e. symmetrically) perforate the radiator plates what results in difficult welding of the sets to the radiator plates. Simplification of the sets and possibility to weld them in the radiator as any other

currently used sets or bushing is an advantage of our solution.

Nature of the Invention

The disadvantages of the existing sets are eliminated by the invention aimed at designing the sets to be usable for a wide dimensional range of radiators and which lead to limitation of the amount of the sets variants. The solution is based on the fact that the sets are a modular structure consisting only of several parts, the replacement of which allows production of various set variants so as to be able to cover the entire dimension and type range of radiators. Wherein, replacement of parts does not influence the production technology, applied preparations etc. It is applicable that in case of two- and triple-plate radiators (i.e. multi-plate radiators) the same set can be used at least for all dimensions (height and length) of the given variant and radiator type. The set as a connecting system for heating water inlet and outlet appropriate for various dimensions of plate radiators and allowing hidden assembly of the integrated valve with a head on and between the plates of plate radiators is in the basic embodiment consisting of the connecting tube equipped with cross through hole into which a traversing roller is slid that forms an impermeable barrier in the connecting tube. The traversing roller contains two through right-angled angular guide channels, i.e. inlet guide channel connected at one end to the inlet bushing and at the other end connected to the inlet part of the connecting tube. Furthermore, it contains outlet guide channel connected at one end to the outlet bushing and at the other end connected to the outlet part of the connecting tube wherein the front inlet end of the connecting tube is connected and welded to the front radiator plate and the back outlet end of the connecting tube is connected and welded to the back radiator plate. All parts of

the set are together on contact surfaces connected by permanent and waterproof joints created for example by welding or soldering.

The radiator embedded with these set functions in a way that water is supplied to the set through the inlet bushing and from there it continues through the traversing roller, inlet guide channel into the connecting tube and through its front inlet end it flows to the front radiator plate. The water flows through the radiator and return water from the radiator flows from its back plate into the back outlet end of the connecting tube of the set and from there it flows off via the guide channel of the traversing roller through the outlet bushing out of the radiator.

The set variant for the radiator with a hidden head differs only by the outlet bushing being equipped with a side outlet for installation of the integrated valve which fits on embedding on the traversing roller. Heating water flows through the radiator in the same way as when using the basic set variant with the only difference that return water flows out from the traversing roller into the outlet bushing through the embedding of the traversing roller and through the integrated valve.

If a plug is installed in the set for the radiator with a hidden head instead of the integrated valve, the set functions in the exact same manner as in the basic variant.

The derived version of the set for single-plate radiators is designed in a way that the given set must always be produced for individual heights of the radiator what is determined by the fact the set must ensure water inlet into the upper part of the single plate of the radiator.

To cover the entire dimension range of single-plate radiators (it is especially the radiator height), it is enough to change only length or, alternatively, shape of the vertical tube. Other parts remain unchanged.

The set design, except for the described advantages, allows simple replacement of parts during production without the need to modify production procedures or preparations, moreover, it allows production of an embodiment with a hidden head, i.e. with a thermostatic valve integrated in the radiator in a way that the thermostatic head is after installation hidden behind the radiator (single-plate radiators) or inside the radiator (multi-plate radiators). In this way, the head is protected from damage with concurrent improvement of the radiator appearance. A possible disadvantage of difficult handling with the head at manual adjustment of the radiator temperature is not decisive at present any more, since at the current pressure concerning energy savings when it is increasingly necessary to use electrically controlled heads remotely managed by superior control systems, in some cases it is even impossible to use manually controlled thermostatic heads.

Placement of the set and therefore the thermostatic head in the bottom, i.e. colder part of the radiator, is more preferable also in terms of physics.

The set design allowed to change the structure so that it is very simple and very modular, thus by means of several few parts it is possible to produce set for various versions and types of radiators. Huge advantage of this solution is that the sets are unified for all heights and lengths of the given type and embodiment of the radiator (except for single-plate radiators) which allows significant simplification of logistics in radiator production and stock reduction of both necessary parts and produced set.

Overview of Figures in Drawings

Fig. 1 illustrates a basic set of the set parts for two-or multi-plate radiators.

Fig. 2 illustrates vertical and horizontal section through the basic embodiment for two-or multi-plate radiators.

Fig. 3 illustrates a set of the set parts for multi-plate radiators with a hidden thermostatic head.

Fig. 4 illustrates a horizontal section through the set for multi-plate radiators with a hidden head.

Fig. 5 illustrates a set embodiment in both vertical and horizontal section when an end cap is installed in the side outlet of the outlet bushing instead of the integrated valve.

Fig. 6 illustrates a set of parts of the derived set variant intended for multi-plate radiators.

Fig. 7 illustrates a horizontal section through the set according to Fig. 6.

Fig. 8 illustrates a set of parts of the derived set variant intended for single-plate radiators.

Fig. 9 illustrates a vertical and horizontal section through the set according to Fig. 8.

Fig. 10 illustrates a set of the set parts for single-plate radiators with a hidden thermostatic head.

Fig. 11 illustrates a vertical and horizontal section through the set according to Fig. 10.

Examples of Invention Embodiments

The examples below of possible arrangement of inlets and outlets of the heat carrier to and from the heating element

represent the main ones, however, not all possible variants of this technical solution.

Example 1

Basic embodiment of the set for multi-plate radiators is shown in Fig. 1 and 2. Connecting tube 6 of the set G is equipped with cross through hole 1 into which a traversing roller 4 is slid that forms an impermeable barrier P in the connecting tube 6 and containing two through right-angled angular guide channels 5, 9, i.e. an inlet guide channel 5 connected at one end to the inlet bushing 2 and at the other end connected to the inlet end 7 of the connecting tube 6 and the outlet guide channel 9 connected at one end to the outlet bushing 3 and at the other end connected to the outlet end 8 of the connecting tube 6, wherein the inlet end 7 of the connecting tube 6 is connected and welded to the front plate A of the radiator R and the outlet end 8 of the connecting tube 6 is connected and welded to the back plate B of the radiator R.

The set function is shown on Fig. 2 and it is as follows:

Heating water is supplied to the set G through the inlet bushing 2. From there water flows in through the inlet channel 5 of the traversing roller 4 and through the inlet end 7 of the connecting tube 6 into the front plate A of the radiator R. Water flows out from the radiator R from its back plate B again through the set G in a way that from the back plate B it flows, at first, into the outlet end 8 of the connecting tube 6 and from there through the outlet guide channel 9 of the traversing roller 4 into the outlet bushing 3 and from there out of the radiator R.

At the same time, the traversing roller 4 serves as an impermeable barrier P and as a connecting part which interconnects all other parts of the set G, i.e. inlet bushing 2, outlet bushing 3 and connecting tube 6 which are welded (or soldered) into one whole, into the set G. The inlet bushing 2

and the outlet bushing 3 are equipped with threads for attaching, for example, of the external regulation fixtures. Ends of the connecting tube 6 are produced in a way so as to comply with the production technology that will be used to fasten the set in the radiator (most frequently for electric resistance welding).

Example 2

Set for multi-plate radiators with a hidden head is shown in Fig. 3 and 4. The basic arrangement of the set G is compliant with the set from the example 1, i.e.: Connecting tube 6 of the set G is equipped with cross through hole 1 into which a traversing roller 4 is slid that forms an impermeable barrier P in the connecting tube 6 and containing two through right-angled angular guide channels 5, 9, i.e. an inlet guide channel 5 connected at one end to the inlet bushing 2 and at the other end connected to the inlet end 7 of the connecting tube 6 and the outlet guide channel 9 connected at one end to the outlet bushing 3 and at the other end connected to the outlet end 8 of the connecting tube 6, wherein the inlet end 7 of the connecting tube 6 is connected and welded to the front plate A of the radiator R and the outlet end 8 of the connecting tube 6 is connected and welded to the back plate B of the radiator R. At the same time, the traversing roller 4 serves as an impermeable barrier P and as a connecting part which interconnects all other parts of the set G, i.e. inlet bushing 2, outlet bushing 3 and connecting tube 6 which are welded (or soldered) into one whole, into the set G. The inlet bushing 3 is, however, in this case equipped with a side outlet 11 intended for connection of the integrated valve 12.

The inlet bushing 2 and the outlet bushing 3 are equipped with threads for attaching, for example, of the external regulation fixtures. Ends of the connecting tube 6 are produced in a way so as to comply with the production technology that will be

used to fasten the set in the radiator (most frequently for electric resistance welding).

The set function is shown on Fig. 4 and it is as follows:

Heating water is supplied to the set G through the inlet bushing 2. From there water flows in through the inlet channel 5 of the traversing roller 4 and through the inlet end 7 of the connecting tube 6 into the front plate A of the radiator R. Water flows out from the radiator R from its back plate B again through the set G in a way that from the back plate B it flows, at first, into the outlet end 8 of the connecting tube 6 and from there through the outlet guide channel 9 and the coupling 10 of the traversing roller 4 into the integrated valve 12 controlled by the not shown regulation head which is installed in the side bushing 11 of the outlet bushing 3 equipped with a suitable thread. Water flows off from the integrated valve 12 into the outlet bushing 3 and from there out from the radiator R.

At the same time, the traversing roller 4 serves as a connecting part which interconnects all other parts of the set G, i.e. inlet bushing 2, outlet bushing 3 and connecting tube 6 which are welded (or soldered) into one whole forming the set G. The inlet bushing 2 and the outlet bushing 3 are equipped with threads for attaching, for example, of the external regulation fixtures. Ends of the connecting tube 6 are produced in a way so as to comply with the production technology that will be used to fasten the set G in the radiator R (most frequently electric resistance welding).

Example 3

Set for multi-plate radiators is shown in Fig. 5. The basic arrangement of the set G is compliant with the set from example 2 with the following difference: The plug 13 instead of the integrated valve 12 is installed in the side outlet 11 of the outlet bushing 3. In such case, the presented set G and

the not shown radiator connected to them function in the same way as the set described in example 1.

Example 4

The example illustrated in Fig. 6 and 7 represents the derived variant of the set intended for multi-plate radiators which is determined for placement of the integrated valve 12 between two plates A and B of the radiator R, though the coupling 18 installed in the outlet bushing 2.

The traversing roller 4 is in this case equipped with the coupling 18. In case of installation, the traversing roller 4 with a coupling 18 shall be slid in the cross through hole 1 in the connecting tube 6 and at its ends inlet bushing 2 and outlet bushing 3 will be placed. The whole will be connected by welding or soldering so that all joints are waterproof.

The set function is shown on Fig. 7 and it is as follows:

Heating water is supplied to the set G through the inlet bushing 2. From there water flows in through the inlet channel 17 and the coupling 18 of the traversing roller 4 into the integrated valve 12 located in the traversing valve 4 with the coupling 18 which creates the side outlet of the inlet bushing 2 equipped with the suitable thread. From the integrated valve 12 water flows off through the channel 20 and through the inlet end 7 of the connecting tube 6 into the front plate A of the radiator R. Water flows out from the radiator R from its back plate B again through the set G in a way that from the back plate B it flows, at first, into the outlet end 8 of the connecting tube 6 and from there through the outlet guide channel 9 of the traversing roller 4 into the outlet bushing 3 and from there out of the radiator R.

If instead of the integrated valve 12, the end cap plug 13 is installed in the side outlet 19, the illustrated set G and the not shown radiator in which they are embedded function similarly as the set shown in Fig. 3, with the difference that

the inlet guide channel 5 of the traversing roller 4 in this case substitutes the inlet channel 17 and the channel 20 of the traversing roller 4.

At the same time, the traversing roller 4 serves as a connecting part which connects all other parts of the set G, as it is described in the previous examples of embodiment.

Example 5

The example shown in Fig. 8 and 9 represents the derived set variant for single-plate radiators.

The traversing roller 4 is slid using the cross through hole 1 into the connecting tube 6 and the inlet bushing 2 shall be placed at its one end and the outlet bushing 3 shall be placed at its other end. The connecting tube 6 is at the front inlet end 7 which is not connected to the plate B of the radiator R closed using the end cap 14. The inlet bushing 2 is connected via the vertical tube 15 to the upper bushing 16 connected to the plate B of the radiator R in its upper part. The whole will form the set by welding or soldering so that all joints are waterproof.

The set function is shown in Fig. 9 and it is as follows:

Heating water is supplied to the set G through the inlet bushing 2. From here water is supplied through the vertical tube 15 to the upper bushing 16 and then to the upper part of the plate B of the radiator R. Water flows out from the radiator R or from its plate B from its bottom part again through the set G in a way that from the plate B water flows, at first, into the outlet end 8 of the shortened connecting tube 6 and from there through the outlet guide channel 9 of the simplified traversing roller 4 water flows off into the outlet bushing 3 and from there out of the radiator R.

At the same time, the traversing roller 4 serves as a connecting part which interconnects all other parts of the set G, i.e. inlet bushing 2, outlet bushing 3 and connecting tube

6 which are welded (or soldered) into one whole. The inlet bushing 2 and the outlet bushing 3 are equipped with threads for attaching, for example, of the external regulation fixtures. The mutual position of the upper bushing 16 and the connecting tube 6 is selected in a way so as to be positioned on the plane perpendicular to the longitudinal axis of the plate B of the radiator R so as to enable using standard welding lines for radiator production for their installation to the radiator R. End of the connecting tube 6, similarly as the connecting part of the upper bushing 16, are produced in a way so as to comply with the production technology that will be used to fasten the set in the radiator (most frequently electric resistance welding)

Example 6

The example shown in Fig. 10 and 11 represents further derived set variant for single-plate radiators modified for placement of the integrated valve 12 to the outlet bushing 3 using the side outlet 11. The set according to the example (Fig. 3 or Fig. 4) cannot be used at radiators with only one plate. For those radiators the set variant with the tube supplying water into the upper part of the radiator plate was derived.

The upper bushing 16 for supply of water to the radiator R is connected to the vertical tube 15 which is from the top connected to the inlet bushing 2 which is through the traversing roller 4 slid in the connecting tube 6 interconnected to the outlet bushing 3 equipped with the side outlet 11 for connection to the integrated valve 12. The connecting tube 6 is equipped with the end cap 14 at one end and at the other end it is connected to the plate B of the radiator R.

The set function is shown in Fig. 11 and it is as follows:

Heating water is supplied to the set G through the inlet bushing 2. From here water is supplied through the vertical

tube 15 to the upper bushing 16 and then to the upper part of the plate B of the radiator R. Water flows out from the radiator R or from its plate B in the bottom part of the plate B again through the set G in a way that from the back plate B it flows, at first, into the outlet part 8 of the connecting tube 6 with its one end blinded using the end cap 14 and from there through the outlet channel 9 and the coupling 10 of the traversing roller 4 into the integrated valve 12 controlled by the not shown regulation head which is installed in the side bushing 11 of the outlet bushing 3 equipped with a suitable thread. Water flows off from the integrated valve 12 into the outlet bushing 3 and from there out from the radiator R. At the same time, the traversing roller 4 serves as a connecting part which interconnects all other parts of the set G, i.e. inlet bushing 2, outlet bushing 3 and connecting tube 6 which are welded (or soldered) into one whole. The inlet 2 and the outlet 3 bushings are equipped with threads for attaching e.g. the external regulation fixtures. End of the connecting tube 6, similarly as the connecting part of the upper bushing 16, are produced in a way so as to comply with the production technology that will be used to fasten the set in the radiator (most frequently electric resistance welding).

Industrial Applicability

Due to its universality and possibility of its rational production, the set is usable for a wide range of plate radiators in heating systems.

Patent claims

1. The set (G) for heating water distribution to and from the two- or single-plate radiator **characterized in that** it consists of the inlet bushing (2), outlet bushing (3) of the traversing roller (4) and the connecting tube (6) wherein the connecting tube (6) of the set (G) is equipped with cross through hole (1) into which a traversing roller (4) is slid that forms an impermeable barrier (P) in the connecting tube (6) and containing two through right-angled angular guide channels (5, 9), i.e. an inlet guide channel (5) connected at one end to the inlet bushing (2) and at the other end connected to the inlet end (7) of the connecting tube (6) and the outlet guide channel (9) connected at one end to the outlet bushing (3) and at the other end connected to the outlet end (8) of the connecting tube (6), wherein the inlet end (7) of the connecting tube (6) is connected and welded to the front plate (A) of the radiator (R) and the outlet end (8) of the connecting tube (6) is connected and welded to the back plate (B) of the radiator (R).

2. The set (G) for heating water distribution to and from the two- or single-plate radiator **characterized in that** it consists of the inlet bushing (2), outlet bushing (3) of the traversing roller (4) with firmly allocated coupling (18) and the connecting tube (6) wherein the connecting tube (6) of the set (G) is equipped with cross through hole (1) into which a traversing roller (4) is slid that forms an impermeable barrier (P) in the connecting tube (6) and containing three through right-angled angular guide channels (9, 17 and 20), i.e. an inlet guide channel (17) connected at one end to the inlet bushing (2) and at the other end connected to the coupling (18), channel (20) connected at one end to the coupling (18) and at the other end connected to the inlet end

(7) of the connecting tube (6) and the outlet guide channel (9) connected at one end to the outlet bushing (3) and at the other end connected to the outlet end (8) of the connecting tube (6), wherein the coupling (18) is equipped with the side outlet (19) which is closed by a plug (13) or integrated valve (12) and wherein the inlet end (7) of the connecting tube (6) is connected and welded to the front plate (A) of the radiator (R) and the outlet end (8) of the connecting tube (6) is connected and welded to the back plate (B) of the radiator (R).

3. The set (G) for heating water distribution to and from the two- or single-plate radiator **characterized in that** it consists of the inlet bushing (2), outlet bushing (3) of the traversing roller (4) and the connecting tube (6), of the vertical tube (15) and of the upper bushing (16) wherein the connecting tube (6) of the set (G) is equipped with cross through hole (1) into which a traversing roller (4) is slid that forms an impermeable barrier (P) in the connecting tube (6) and a right-angled angular outlet channel (9) connected at one end to the inlet bushing (3) and at the other end connected to plate radiator (R) wherein the connecting tube (6) is at the outlet end (7) closed using the cap end (14) and the inlet bushing (2) is connected via the vertical tube (15) to the upper bushing (16) wherein the upper bushing (16) is connected and welded to the upper part of the radiator (R) while the connecting tube (6) is connected and welded to the bottom part of the radiator (R) plate .

4. The set (G) for heating water distribution according to claim 1, **characterized in that** the outlet bushing (3) is equipped with the side outlet (11) to place the integrated valve (12) and the traversing roller (4) is at the end of the outlet channel (9) equipped with the external embedding

forming the coupling (10) to connect the integrated valve (12).

5. The set (G) for heating water distribution according to claims 1, 2 or 3 **characterized in that** the connecting tube (6) with the slid traversing roller (4), inlet bushing (2) and outlet bushing (3) are permanent and waterproof on contact surfaces and merged into one whole representing the set (G) by welding or soldering.

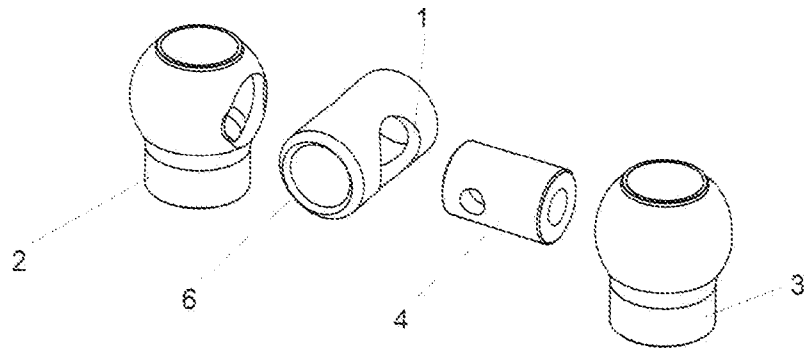


Fig. 1

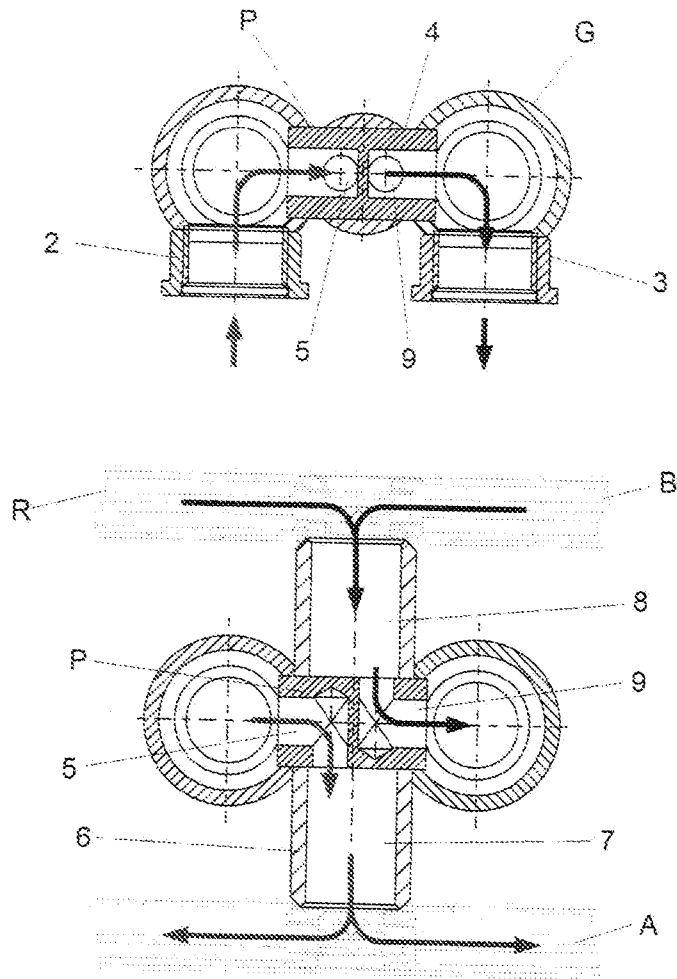


Fig. 2

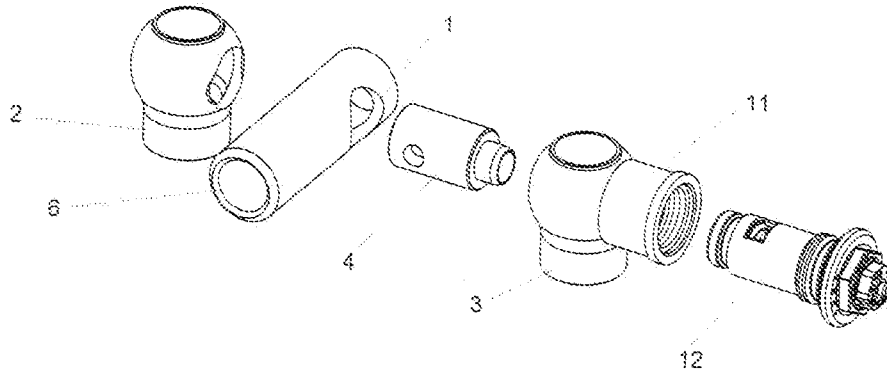


Fig. 3

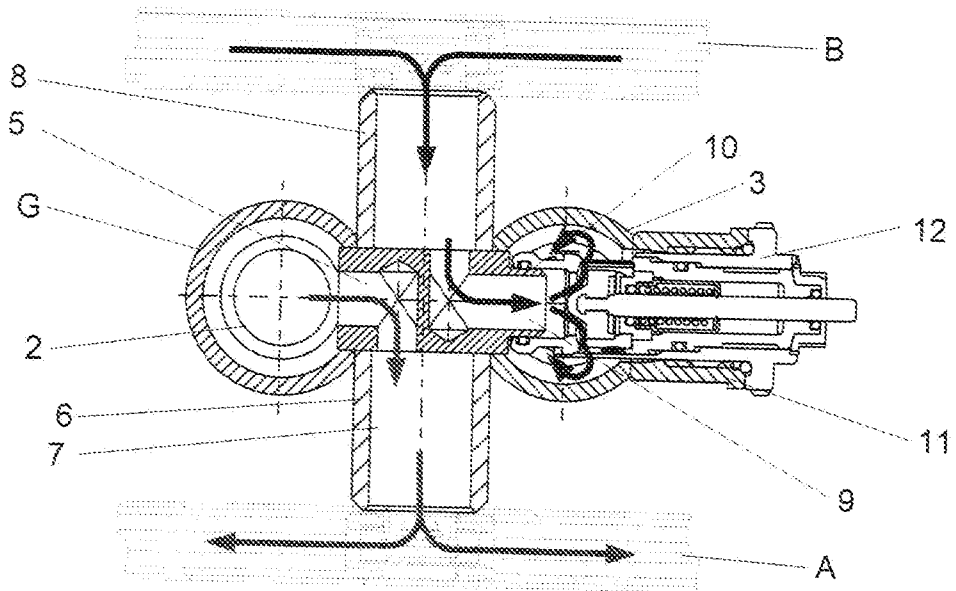


Fig. 4

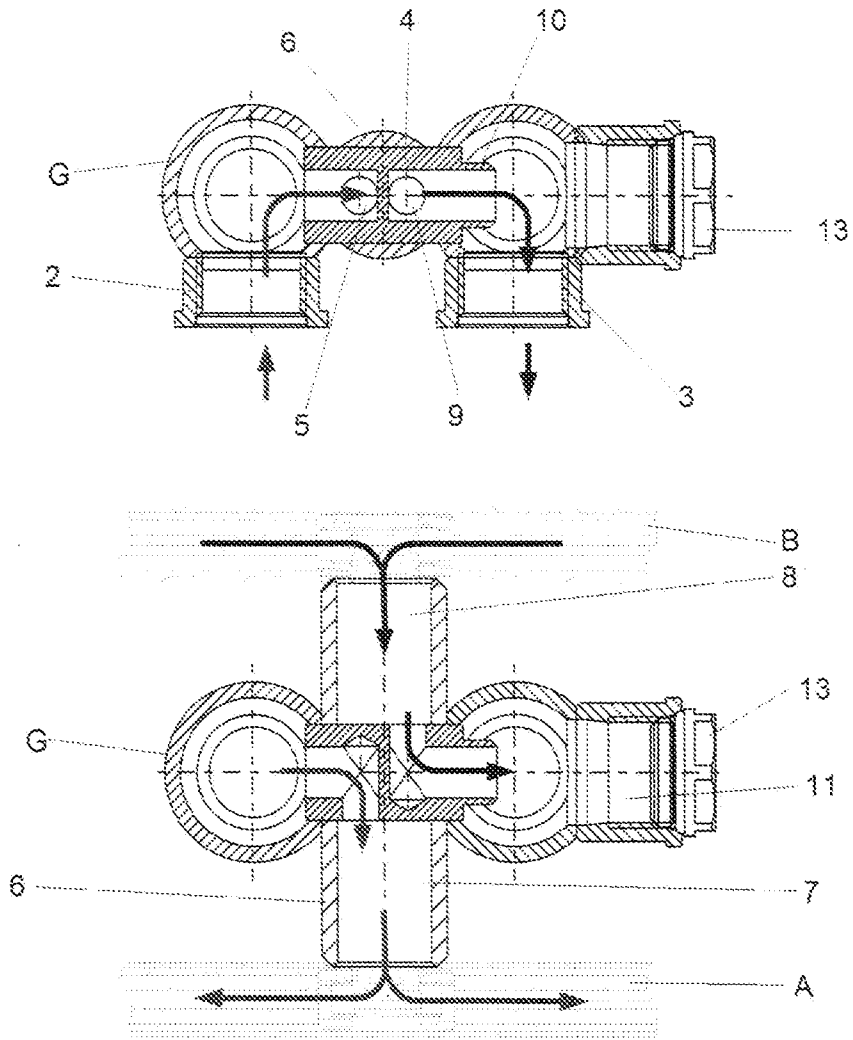


Fig. 5

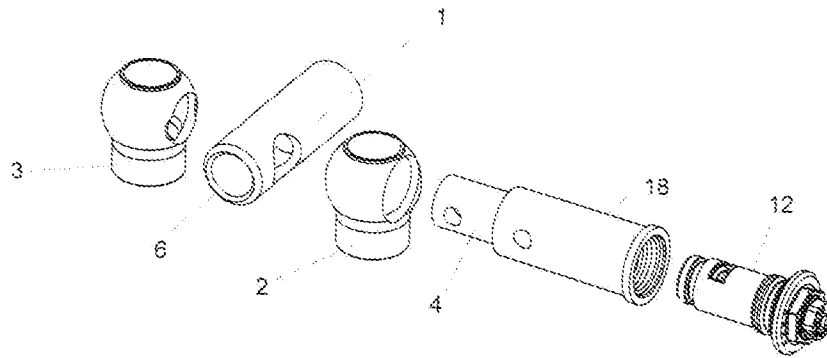


Fig. 6

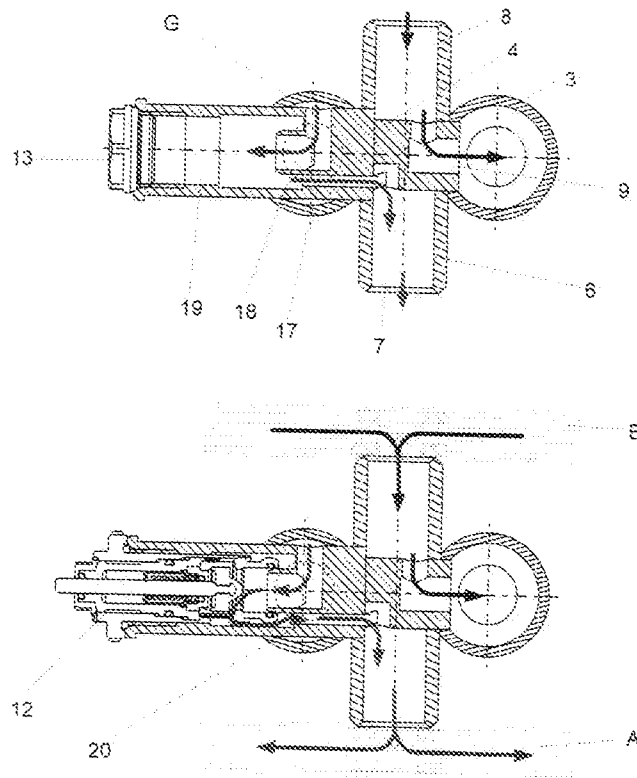


Fig. 7

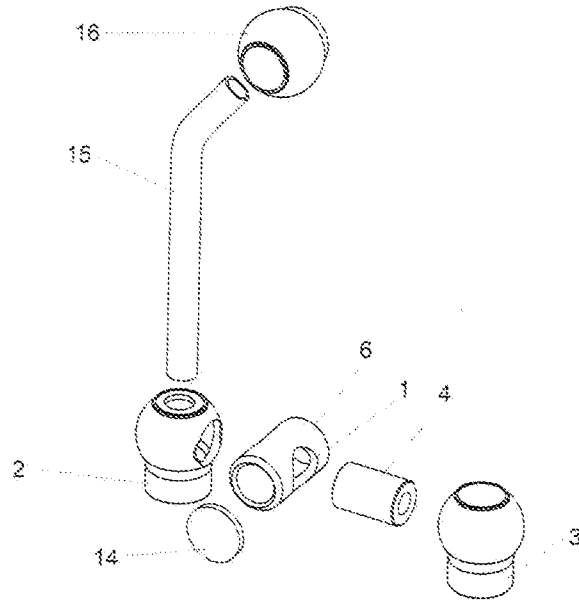


Fig. 8

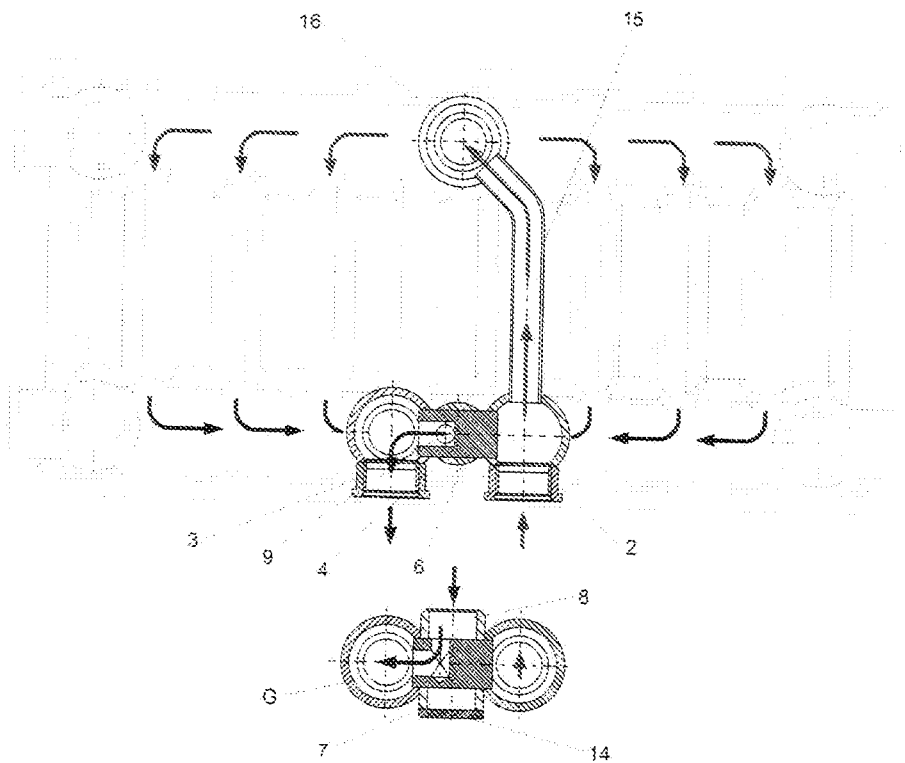


Fig. 9

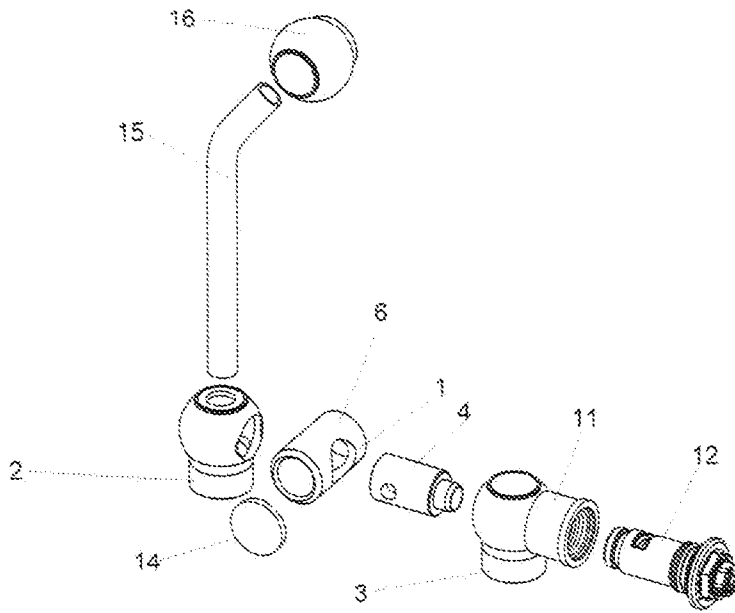


Fig. 10

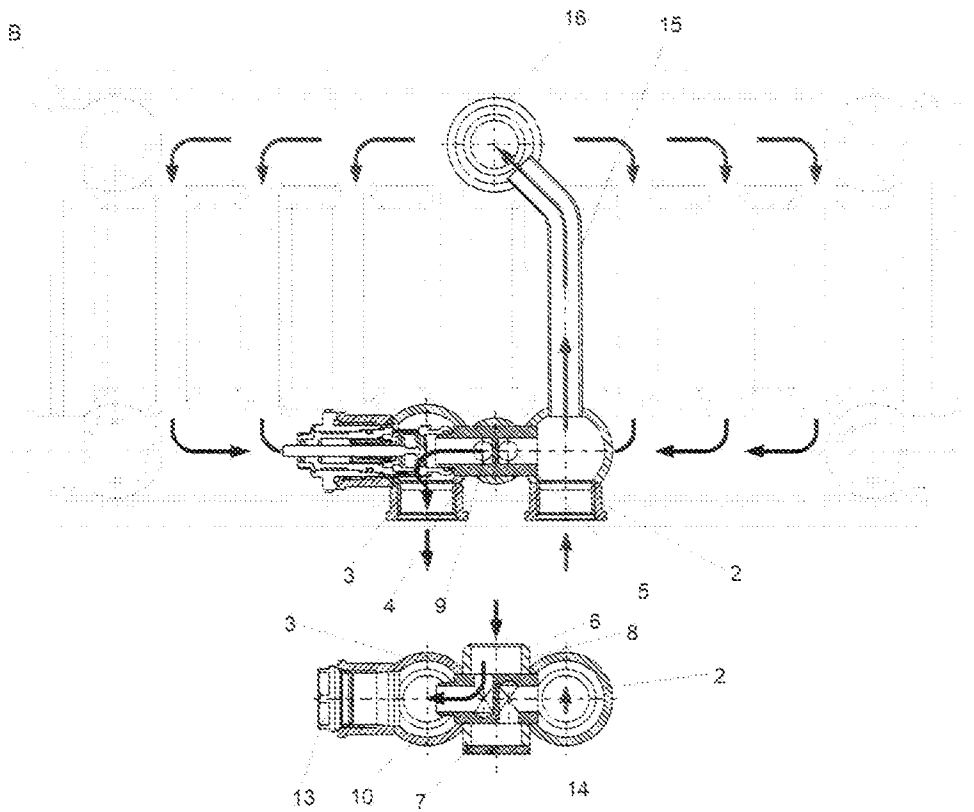


Fig. 11

INTERNATIONAL SEARCH REPORT

International application No
PCT/CZ2022/000040

A. CLASSIFICATION OF SUBJECT MATTER
INV. F24D19/00
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
F24D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 2 428 748 A2 (CARADON STELRAD BV [BE]) 14 March 2012 (2012-03-14) paragraph [0011] - paragraph [0038]; figures 1-9 -----	1-5
X	EP 0 624 761 A1 (KERMI GMBH [DE]) 17 November 1994 (1994-11-17) page 11, line 37 - page 15, line 26; figures 1-4 -----	1-5
X	DE 295 05 728 U1 (WILFER MANFRED [DE]) 27 July 1995 (1995-07-27) the whole document -----	1-5
A	EP 2 474 789 A1 (BERG HANS GMBH & CO KG [DE]) 11 July 2012 (2012-07-11) the whole document -----	1-4

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier application or patent but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search

18 January 2023

Date of mailing of the international search report

27/01/2023

Name and mailing address of the ISA/
 European Patent Office, P.B. 5818 Patentlaan 2
 NL - 2280 HV Rijswijk
 Tel. (+31-70) 340-2040,
 Fax: (+31-70) 340-3016

Authorized officer

Ast, Gabor

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/CZ2022/000040

Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
EP 2428748	A2	14-03-2012	DE 102010037526 A1	15-03-2012
			EP 2428748 A2	14-03-2012

EP 0624761	A1	17-11-1994	NONE	

DE 29505728	U1	27-07-1995	NONE	

EP 2474789	A1	11-07-2012	NONE	
