(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
20 November 2014 (20.11.2014)

WIPO | PCT

(10) International Publication Number
WO 2014/183732 A1

(51) International Patent Classification:
F24D 19/00 (2006.01) *F16K 11/085* (2006.01)

(21) International Application Number:
PCT/CZ2014/000040

(22) International Filing Date:
23 April 2014 (23.04.2014)

(25) Filing Language: Czech

(26) Publication Language: English

(30) Priority Data:
PUV 2013-27915 14 May 2013 (14.05.2013) CZ

(71) Applicant: **KORADO, a.s.** [CZ/CZ]; Bří Hubálků 869, 560 02 Česká Třebová (CZ).

(72) Inventor: **HRDLIČKA, Tomáš**; Roesslerova 1397, 560 02 Česká 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, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, 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, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, 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, 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, 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))*

Published:

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

(54) Title: CONNECTING ELEMENT PROVIDING CONNECTION OF TWO HEATING RADIATOR PLATES

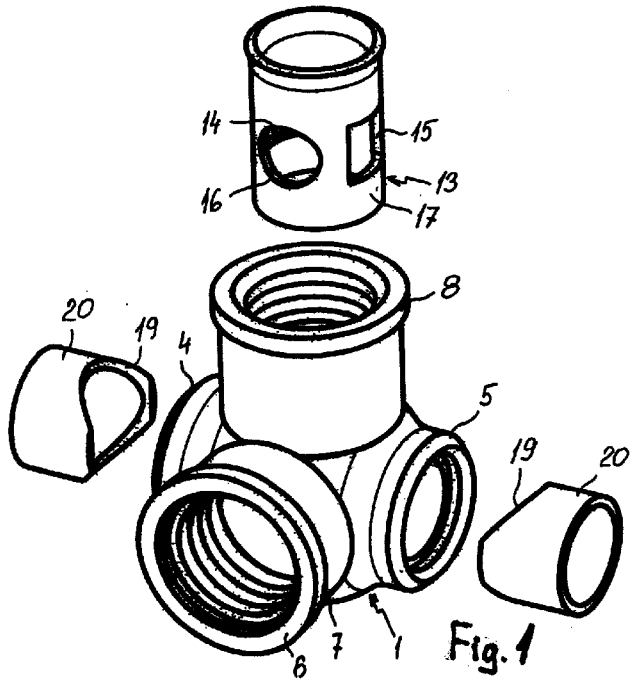

Fig. 1

(57) Abstract: A connecting element (1) for connecting two heating plates (2,3) of the heating radiator (100), said connecting element (1) consisting of lateral connecting sockets (4,5) and of the first threaded connection bushing (6), which is usually situated on the return branch of the heating system and that are arranged to form a T-shaped casing formed around a central spherical part (7) of the connecting element (1), whereat the second threaded connection bushing (8) for the valve shaft (9) group is attached to the central spherical part (7) of the connecting element (1), such an interconnection being made across the plane of the intersections of the principal axes of the lateral connecting sockets (4,5) and of the first threaded connection bushing (6) and said valve shaft (9) group penetrates sealed into the central spherical part (7) of the connecting element (1) by means of its cylindrical obturator (11) with its control shaft (12), and for said cylindrical obturator (11) a cylindrical seat (13) is formed with its lateral holes (14,15,16) emptying into the lateral connecting sockets (4,5) and into the threaded connection bushing (6), whereat the cylindrical seat (13) consisting of the distributing tube (17) with its lateral holes (14,15,16) penetrates, in a sealed manner, through the second threaded bushing (8), up to the opposite inner wall of the central spherical part (7), whereat the correspondingly shaped protrusions (19) of the tubular fittings (20) are seated against the body of the distributing tube (17) through the connecting sockets (4,5), tightly embedded into these connecting sockets (4,5).

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Connecting element providing connection of two heating radiator plates

Field of the Invention

This invention relates to a connecting element providing connection of two heating radiator plates, wherein said connecting element consists of composite connecting and attaching cylindrical components and attaching bushings to form T-shaped casings with shut-off inserts or valves arranged in the interior of a multi-row radiator, in particular for the multi-row plate radiator when importance is given on a higher heating output of its front plate facing the heated room / space.

Description of the Prior Art

Connecting elements providing connection of two heating radiator plates are themselves known. The document DE 101 35 215 C1 describes a heating plate radiator consisting of at least two heating plates. Here, the centre holes of the heating plates that are mutually offset are assigned in the longitudinal direction individually in angle or as T-shaped casings, connecting and attaching sleeves that are composed of spherical sections with connecting sockets. The flow distribution inside the attaching and connecting sockets makes sure that the heating medium seamlessly streams from the inlet into one of the heating plates and from other heating plate again to the outlet.

DE 299 80 186 U1 also describes a multi-row radiator with connecting elements. A shut-off insert with a closing element can be introduced into the connecting element. To enable the shut-off insert to carry out the function of a bleeding member, the end of the shut-off insert situated in the neck comprises a sealing plate with a through hole, which is closable by a sealing component carrying a spindle. On its front side, the shut-off element is provided with corresponding vent holes, through which the air can stream out through the sealing plate.

One example of approach that consists in preferring higher heating output of the front heating plate facing a heated room at a multi-row heating plate radiator, is known from the published patent application (PV 1998-2158), according to which the relevant double-row

or multi-row heating plate radiator is preferably provided with a single inlet port, which is connected only with the front heating plate facing the heated room. The heating medium, which flows through this inlet port, is distributed along the upper edge of the front heating plate and by means of suitably dimensioned feeding channels situated perpendiculary to them and that are preferably equally spaced in the frontal area facing the heated room. Regardless of whether the radiator is operated at full or partial load, the heating medium is in that way primarily supplied to the front heating plate and subsequently to the remaining heating plates of the multi-row heating plate radiator. Consequently, the front radiator plate with the same heating output will be warmer, thus presenting more pleasant touch feeling than existing systems. Preferably, this advantageous effect is even intensified by the fact that the front heating plate features a higher radiation ratio.

To facilitate the flow of heating medium from the front heating plate to at least one subsequent heating plate or similar item that are positioned behind it, at least one connecting element or possibly a tube is arranged in the system, and said connecting element is preferably situated at the bottom front corner area of the frontal radiator heating plate, from which then the partly cooled-down heating medium flows into the lower part of the second heating plate situated behind it or possibly into the subsequent plate in the case of the multi-row heating radiator. Regarding this second heating plate, the heating medium is supplied at first upwards to the upper longitudinal edge of the second or possibly the subsequent heating plate, where the liquid is again directed through the upper distribution channel provided, then it is supplied by means of perpendicularly attached flow channels to its second lower corner area with a connected outlet port. In such a arrangement, it is supposed that the heating medium transfers the greater part of its heat to said front heating plate, while entering, already partially cooled down, the second or subsequent heating plates, ensuring, in such a way, a reduced heating output.

The obvious drawback of this arrangement is that the control of the reduced heating output of the second or subsequent heating radiator plates of the multi-row heating unit can not be done. Another drawback of this solution consists in the fact that if compared with standard solutions of the multi-row heating radiators, where the hot heating medium streams equally in all heating plates to be cooled down, the heating output of the entire heating plate radiator is generally lower because the hot heating medium flows into the front heating

plate at first while a second or subsequent heating plates are supplied with already cooled-down heating medium, thereby reducing the heating output of the second and possibly subsequent heating plates.

In terms of a controlled streaming of the heating medium into the multi-row heating radiator and with regard to the specific conditions in its partial load mode and in order to comply with achievable heating output and to increase comfort in the heated space and especially to improve the control possibility, a solution was proposed (WO 2009015706), which uses another valve in combination with one of the upper connecting elements that are connected to the inlet port of the heating medium, by means of which it is possible to direct the mass flow of the heating medium to the second rear heating plate through an overflow connection, and the used connecting element is provided with an internal screen.

A disadvantage of the solution consists in using an overflow connection or overflow coupling, which significantly complicates and increases the production cost of multi-row heating radiators of such a design, and moreover, it causes problems with radiator cleaning for the end-user, and therefore the mentioned solution did not prove enough in practice.

Nature of the Invention

The purpose of the invention is to improve the connecting elements used for multi-row radiators and to introduce a radiator with such a connecting element. The shut-off or control inserts integrated in the connecting elements should be manufacturable particularly easily and inexpensively while another objective is to improve the process of controlling the flow of the heating medium through the radiator, in particular in case of the multi-row plate radiator with inlet and outlet ports for the heating medium and usually with the first fully passable heating plate facing a heated room / space with at least one other heating plate that is arranged in a row behind it and said heating plate being designed for the intended reduction of the heating medium flow for cutting down or controlling the heating output. This objective is achieved by a solution where the connecting element for connecting two heating plates of the radiator consists of lateral connecting sockets and of the first threaded connecting bushing which is usually installed in the return branch of the heating system, said components being arranged to form a T-shaped casing located around

a central spherical part of the connecting element, characterized in that the second threaded connection bushing for the valve shaft is attached across the plane of the intersections of the principal axes of the connecting sockets and of the first threaded connection bushing, said valve shaft extending sealed into the central spherical part of the connecting element with its with the radial recess or other adaptation provided cylindrical obturator, for which a cylindrical seat is formed with its lateral holes emptying into the lateral connecting sockets and into the threaded connection bushing.

The invention ensures the achievement of the desired versatility and ease of manufacturing of the aforementioned connecting element whose essential design consists in the solution that it is designed in the way that the cylindrical seat consists in a cylindrical distributing tube with side holes that penetrates, in a sealed manner, through the second threaded bushing up to the opposite inner wall of the central spherical part, the correspondingly shaped protrusions of the tubular fittings being fitted to the body of the distributing tube through the connecting sockets tightly embedded into these connecting sockets.

According to the present invention it is advantageous in terms of production, that the contact fitting sections of the distributing tube with the protrusions and the opposite ends of the elements of this system in contact with the body of the connecting element are interconnected by overlapping, resistance welding or brazing, and / or combinations of these methods.

Description of the Drawings

Further advantages and effects of the invention are apparent from the attached drawings, wherein the individual figures depict:

Fig. 1: oblique view of the connecting element in the exploded condition,

Fig. 2: longitudinal cross-section of the connecting element with the second threaded connection bushing for the valve shaft,

Fig. 3: cross-section of the connecting element according to Fig. 2

Fig. 4: cross-section of the connecting element with the inserted valve shaft,

Fig. 5: longitudinal cross-section of the connecting element showing the modified tubular connecting sockets and with a representation of the circular segment intended for different

positions of the radial recess in the cylindrical obturator of the valve shaft to the lateral openings in the cylindrical seat,

Fig. 6: longitudinal cross-section of the connecting element with the modified valve shaft for the purpose of bleeding of the multi-row radiator,

Fig. 7: schematic oblique representation of the multi-row radiator with the indication of the emplacement locations of the connecting element.

Examples of the Versions of the Invention

Example 1

Connecting element 1 for connecting two heating plates 2,3 of the heating radiator 100, partcurarly for its area A, said connecting element 1 consisting of lateral connecting sockets 4,5 and of the first threaded connection bushing 6, which is usually situated on the return branch of the heating system and that are arranged to form a T-shaped casing formed around a central spherical part 7 of the connecting element 1, whereat the second threaded connection bushing 8 for the valve shaft 9 group is attached to the central spherical part 7 of the connecting element 1, such an interconnection being made across the plane of the intersections of the principal axes of the lateral connecting sockets 4,5 and of the first threaded connection bushing 6 and said valve shaft 9 group penetrates sealed into the central spherical part 7 of the connecting element 1 by means of the cylindrical obturator 11 that is provided, for example, with the radial recess 10, said cylindrical obturator 11 having a control shaft 12, and for said cylindrical obturator 11 a cylindrical seat 13 is formed with its lateral holes 14,15,16 emptying into the lateral connecting sockets 4,5 and into the threaded connection bushing 6.

In the here presented embodiment the cylindrical seat 13 (Fig.1) is preferably constituted by a distributing tube 17 with the lateral holes 14,15,16, said cylindrical seat 13 penetrating sealed through the second threaded connection bushing 8 up to the opposite inner wall of the central spherical part 7, where, for example, a cylindrical groove 18 or a circular area etc. for it is created to seal its end on the one hand and to ensure its axial centering relative to the valve shaft 9 group on the other hand. For the centering purposes and also against

possible unwanted distortion when inserting the distributing tube 17 in said cylindrical groove 18 through the second threaded connecting bushing 8, and also to ensure its reliable crimping and sealed condition, the respective end of the distributing tube 17 is provided, for example, with a partial bottom 19 with an internal opening, or with a here not depicted full bottom and a like (Fig.2).

The correspondingly shaped protrusions 19 of the tubular fittings 20 are fitted to the body of the distributing tube 17 through the connecting sockets 4,5 of the connecting element 1, additionally tightly embedded into these connecting sockets 4,5, for example by pressing (Fig.3).

In other embodiment of the invention, the tubular fittings 20 partially encircle, by their correspondingly shaped protrusions 19, the distributing tube 17 around the lateral holes 14,15 that are pre-created therein (Fig.1), or penetrate, according to another modified embodiment, with their correspondingly shaped protrusions 19, into these connecting sockets 14,15 while their shape is adapted as to not disturb the inner cylindrical profile of the cylindrical seat 13, or they might be subject to subsequent mechanical processing, such as reaming etc. (Fig.5).

The contact fitting sections of the distributing tube 17 with the shaped protrusions 19 of the tubular fittings 20, and the opposite ends of the elements of this system in contact with the body of the connecting element 1, are interconnected by overlapping, resistance welding or brazing, and / or combinations of these methods.

The cylindrical obturator 11 of the valve shaft 9 as described above is provided, at the level of the lateral holes 14,15,16 of the distributing tube 17, with the radial recess 10 (Fig. 4) that enables, by means of the remaining circular segment 21, repeated handling operations to modify the function of the connecting element 1 with respect to the heating medium flow through said connecting element 1.

In Figure 5 that indicates the basic settings of the cylindrical obturator 11, the heating medium can flow in or out in three directions, thus the connecting element 1 acts for

example as a common outflow fitting of the classic multi-row plate radiator 100, this fitting being typically installed in the return branch of the not depicted heating system.

By rotating the cylindrical obturator 11 through its shaft 12 by 180^0 its circular segment 21 closes the lateral opening 16 in the distributing tube 17 that discharges into the first threaded connection bushing 6, whereupon the connecting element 1 becomes passable in both directions through the lateral connecting sockets 4,5 only.
However, the main purpose of the connecting element 1 is represented by the fact that under a certain modified angle of rotation other than showed above, the circular segment 21 optionally overlaps one of the lateral holes 14,15 in the distributing tube 17 in such a way that it is throttling the flow of the heating medium, thus the connecting element 1 acts as a flow divider of the heating medium by determining the volume of the heating medium in each of the particular heating plates 2,3 of the multi-row plate radiator 100, with the preference of the heating output control of the heating plate 2, facing a heated room / space or it may possibly control the intended medium flow reduction in order to cut down or control the heating output of the rear heating plate 3 at the wall of the heated room / space (Fig.7).

In the indicated embodiment, the encapsulation of the cylindrical obturator body 11 of the valve shaft 9, its axial guidance and the sealing of the second threaded bushing 8 is done by the guiding sleeve 22 and the necessary sealing means.

Example 2

Regarding the connecting element 1 of the radiator 100 in the bleeding area B, the cylindrical obturator 11 (Fig.6) is provided at the level of the lateral holes 14,15,16 of the distributing tube 17 with the transverse channel 23, which is connected with the axial channel 24 leading to its control shaft 12 that is provided at its end with a classic vent kit with a nut 25 and the threaded worm 26 for the venting passage 27. For such an arrangement, the connecting element 1 need not be equipped with the threaded connection bushing 6, but it is advantageous to make use of the versatility of the cylindrical seat 13 and of thereto belonging tubular shaped fittings 20.

In the arrangement suggested in Figure 6, the bleeding can be done through the connecting element 1 for at least two heating plates 2,3 simultaneously. By rotating the cylindrical obturator 11 by 90 degrees of its shaft 12, the air flow or the stream of the heating medium with the air through the transverse passage 23 is interrupted, whereby the simple bleeding process will be interrupted, too.

Detailed description of the functions of all the various arrangement variants of the connecting element 1, as well as its integration into various systems of connection of the radiator 100 to the heating system, the equipment with additional elements, such as actuators etc., is not described in detail, because the topic is familiar for experts in the field.

PATENT CLAIMS

1. A connecting element (1) for connecting two heating plates (2,3) of the heating radiator (100), said connecting element (1) consisting of lateral connecting sockets (4,5) and of the first threaded connection bushing (6), which is usually situated on the return branch of the heating system and that are arranged to form a T-shaped casing formed around a central spherical part (7) of the connecting element (1), whereat the second threaded connection bushing (8) for the valve shaft (9) group is attached to the central spherical part (7) of the connecting element (1), such an interconnection being made across the plane of the intersections of the principal axes of the lateral connecting sockets (4,5) and of the first threaded connection bushing (6) and said valve shaft (9) group penetrates sealed into the central spherical part (7) of the connecting element (1) by means of its cylindrical obturator (11) with its control shaft (12), and for said cylindrical obturator (11) a cylindrical seat (13) is formed with its lateral holes (14,15,16) emptying into the lateral connecting sockets (4,5) and into the threaded connection bushing (6), **characterized in that** the cylindrical seat (13) consisting of a distributing tube (17) with its lateral holes (14,15,16) penetrates, in a sealed manner, through the second threaded bushing (8) up to the opposite inner wall of the central spherical part (7), whereat the correspondingly shaped protrusions (19) of the tubular fittings (20) are seated against the body of the distributing tube (17) through the connecting sockets (4,5)), tightly embedded into these connecting sockets (4,5).

2. A connecting element (1) according to claim 1, **characterized in that** the matched contact points of the distributing tube (17) with shaped protrusions (19) of the tubular fittings (20) and the opposite ends of the elements of this system in contact with the body of the connecting element (1) are interconnected by overlapping, resistance welding or brazing, and / or combinations of these methods.

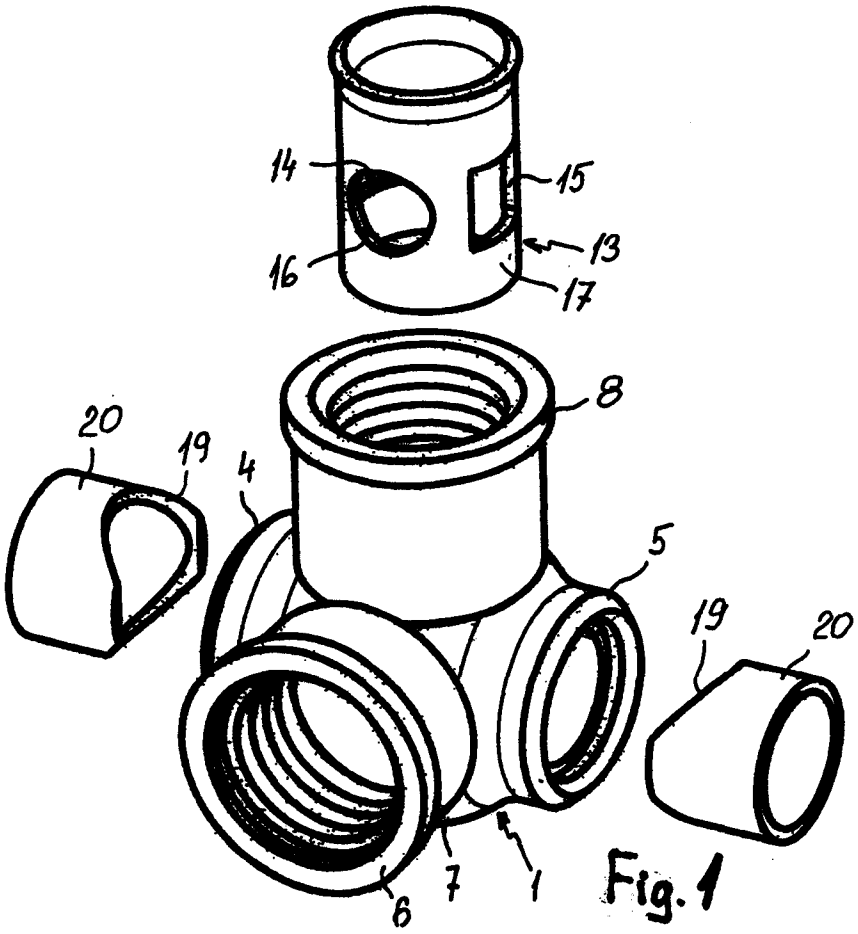

Fig. 1

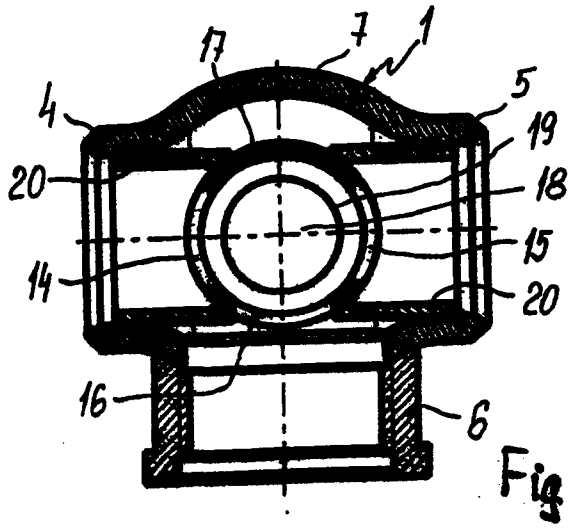

Fig 3

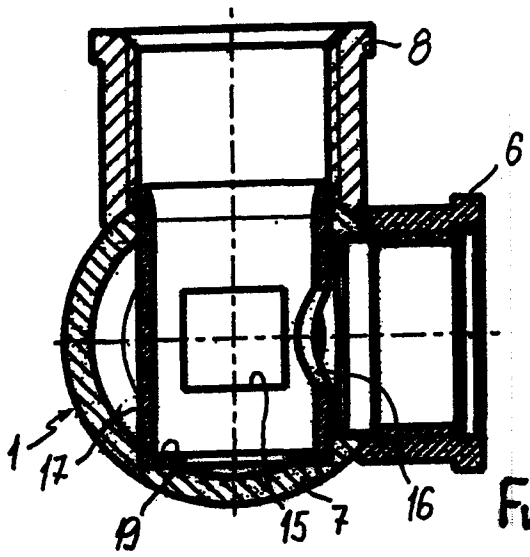

Fig. 2

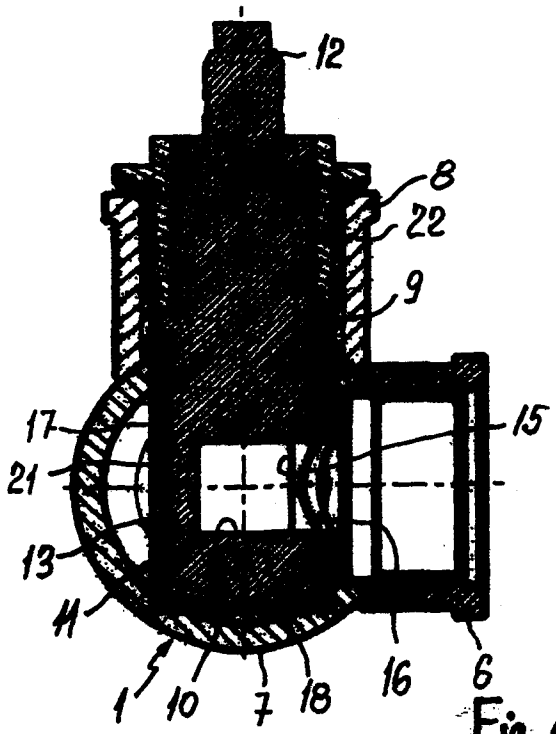

Fig. 4

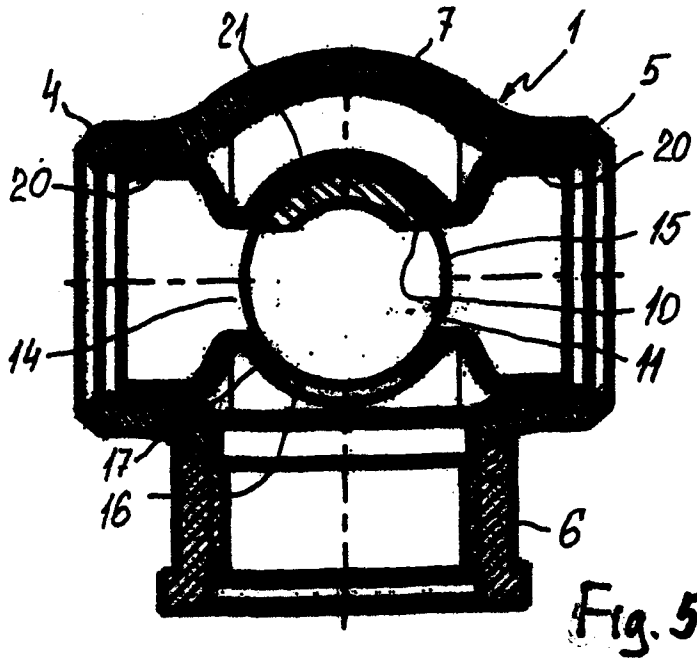

Fig. 5

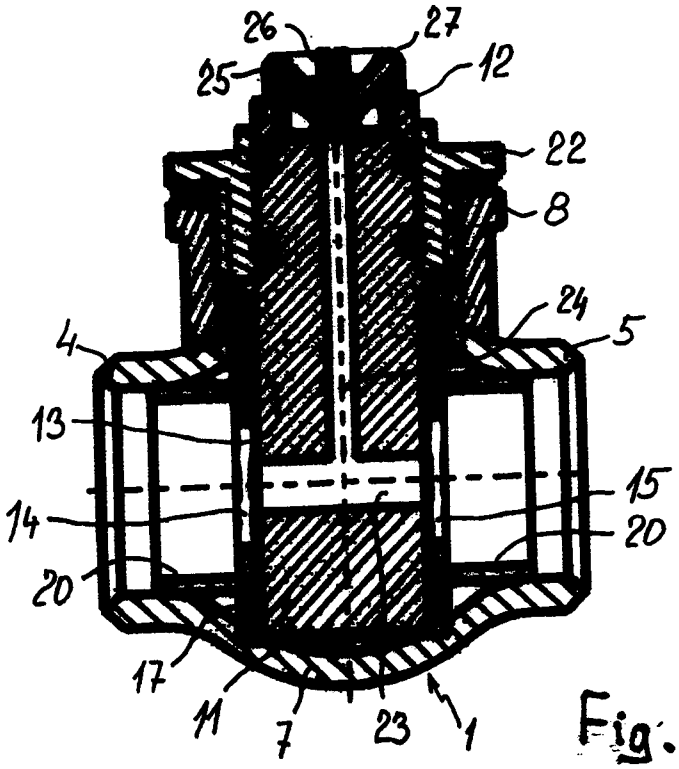

Fig. 6

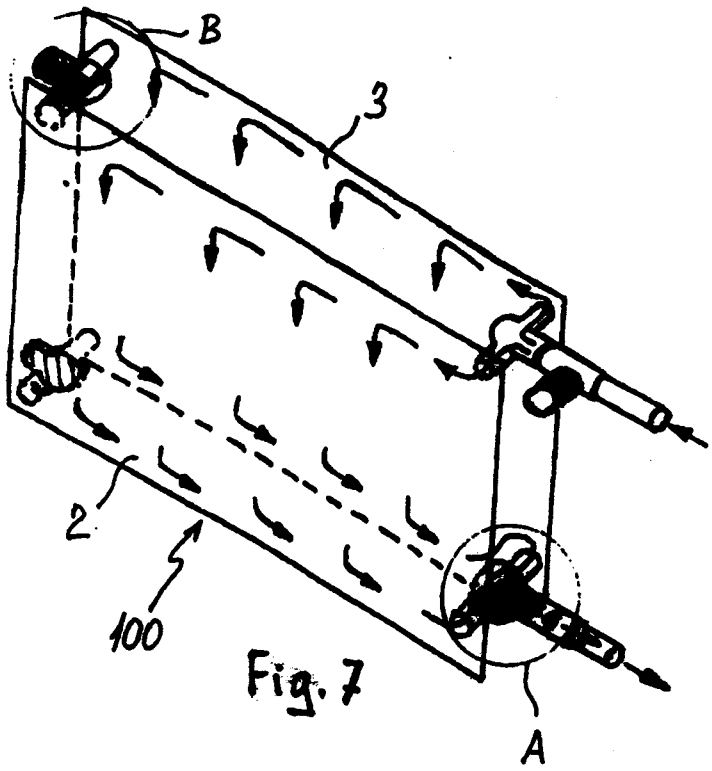

Fig. 7

INTERNATIONAL SEARCH REPORT

International application No
PCT/CZ2014/000040

A. CLASSIFICATION OF SUBJECT MATTER
INV. F24D19/00 F16K11/085
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 F16K

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.
Y	CZ 25 283 U1 (KORADO A S [CZ]) 9 May 2013 (2013-05-09) Description of fig. 13; claim 1; figures 1-5,13	1,2
Y	EP 0 916 912 A2 (KERMI GMBH [DE]) 19 May 1999 (1999-05-19) column 7, paragraphs 40,41; figures 4,5	1,2
A	GB 1 381 242 A (MASCHINENFABRIEK BRUGMAN NV) 22 January 1975 (1975-01-22) claim 1; figures 1,2	1,2
A	DE 40 41 191 A1 (BUDERUS HEIZTECHNIK GMBH [DE]) 2 July 1992 (1992-07-02) column 2, lines 21-32; figure 2	1,2

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

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Date of the actual completion of the international search	Date of mailing of the international search report
9 July 2014	22/07/2014

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

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/CZ2014/000040

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