

(43) International Publication Date
17 September 2015 (17.09.2015)

(51) International Patent Classification:

F28D 1/053 (2006.01) *F24D 19/00* (2006.01)
F28F 9/02 (2006.01) *F28F 1/16* (2006.01)
F28F 9/26 (2006.01) *F28F 21/08* (2006.01)

(21) International Application Number:

PCT/IB2015/051860

(22) International Filing Date:

13 March 2015 (13.03.2015)

(25) Filing Language:

Italian

(26) Publication Language:

English

(30) Priority Data:

MI2014A000423 14 March 2014 (14.03.2014) IT

(71) Applicant: FONDITAL S.P.A. [IT/IT]; Via Cerreto, 40, I-25079 Vobarno (IT).

(72) Inventor: SASSI, Fabio; Via Villaggio Nuovo, 10, I-25079 Carpeneda Di Vobarno (IT).

(74) Agents: CERNUZZI, Daniele et al.; c/o STUDIO TORTA S.p.A., Via Viotti, 9, I-10121 Torino (IT).

(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,

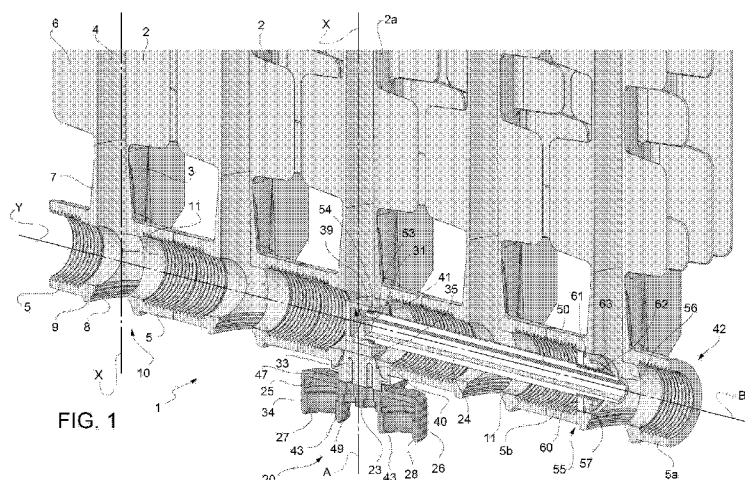
BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, 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, 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, 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).

Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

(54) Title: CONNECTION DEVICE FOR CONNECTING A HEATING RADIATOR TO A PLUMBING SYSTEM



(57) Abstract: A connection device (20) for connecting a heating radiator to a plumbing system comprises a joint element (23) and a service tube (24); the joint element (23) comprises an insert (33) insertable into an end part (7) of a radiator element (2) and provided with a delivery opening (31) and a return opening (32); and a connecting body (34) provided with an inlet (27) and an outlet (28), connectable to respective delivery and return pipes of the plumbing system; the service tube (24) is insertable into a transverse duct (11) of the radiator (1) and extends between a first axial end (51), provided with a coupling portion (53) for connecting the tube (24) to the delivery opening (31) of the joint element (23), and a second axial end (52), provided with a sealing device (55) fitted around the tube (24) for cooperating in a fluid-tight manner with an inner lateral surface (56) of the transverse duct (11).

**"CONNECTION DEVICE FOR CONNECTING A HEATING RADIATOR TO A
PLUMBING SYSTEM"**

TECHNICAL FIELD

The present invention relates to a connection device for connecting a heating radiator (in particular, a die-
5 cast aluminum radiator) to a plumbing system, in particular for connecting the radiator itself from the bottom.

The invention also relates to a heating radiator equipped with a connection device for connecting the
10 radiator to a plumbing system.

BACKGROUND ART

As known, the heating radiators used for heating buildings, usually consisting of an array of radiator elements placed side-by-side, are fed with a hot fluid
15 (typically water) circulating in a hydraulic circuit consisting of a network of tubes.

Each radiator has an inlet opening and an outlet opening, typically arranged on a lateral side of an end radiator element.

20 At each portion in which the installation of a radiator is required, the plumbing system comprises a delivery tube and a return tube, to which the radiator is connected by means of specific joints.

The tubes of the plumbing system typically protrude

from a wall of the room in which the radiator must be installed and the radiator is provided with side inlet and outlet openings, so as to be easily connected to said tubes.

5 In some cases, the tubes intended to be connected to the radiator protrude from the floor.

 In these situations, or in similar situations in which the delivery and return tubes are underneath the radiator, and especially if the radiator is a die-cast
10 aluminum radiator, specifically designed or at least modified radiators must be used for the connection to the tubes from the bottom; therefore, radiators provided with downward facing attachments are required; however, supplementary components and tubes, and/or adapter
15 devices, are commonly needed to connect the tubes of the plumbing system to the inlet and outlet openings of the radiator.

 However, the known systems for connecting a radiator to delivery and return tubes protruding from the floor do
20 not appear fully satisfactory, in particular in terms of constructional simplicity, efficacy, dimensions, and ease of assembly, especially the systems in which the delivery and return tubes are engaged onto the same radiator element.

25 In particular, known systems are not adapted to centrally connect the radiator to the delivery and return

tubes of the plumbing system, i.e. to connect the delivery and return tubes of the plumbing system to respective radiator elements which are not placed at a side end of the radiator.

5 DISCLOSURE OF INVENTION

It is an object of the present invention to provide a connection device which allows a heating radiator (in particular, a die-cast aluminum radiator) to be connected to a plumbing system so as to solve the problems of the
10 prior art identified herein.

In particular, it is an object of the invention to provide a connection device which allows the radiator to be connected to tubes of the plumbing system which are placed under the radiator and in central position with
15 respect to the radiator (instead of at a side end of the radiator), in a simple, fast and effective manner.

The present invention thus relates to a connection device for connecting a heating radiator, in particular a die-cast aluminum heating radiator, to a plumbing system,
20 and to a plumbing system as defined in essential terms in appended claim 1 and, in the additional features thereof, in the dependent claims.

The connection device of the invention allows a radiator (also a radiator designed with side connection)
25 to be connected to delivery and return tubes placed under the radiator, and also in central position with respect to

the radiator, in a simple, fast, and effective manner.

BRIEF DESCRIPTION OF THE DRAWINGS

Further features and advantages of the present invention will become apparent from the following description of a non-limitative embodiment thereof, with
5 reference to the figures in the accompanying drawings, in which:

- figure 1 is a partial diagrammatic, perspective, longitudinal section view, with parts removed for clarity,
10 of a heating radiator provided with a connection device according to the invention;

- figure 2 is a longitudinal section view of the radiator in figure 1;

- figures 3 and 4 are a front perspective view and a
15 longitudinal section view, respectively, of a component of the connection device of the invention;

- figures 5 and 6 are a perspective view and a cross section view, respectively, of a further component of the connection device of the invention;

20 - figure 7 is an exploded, longitudinal section view of a further component of the connection device of the invention.

BEST MODE FOR CARRYING OUT THE INVENTION

With reference to figures 1 and 2, a heating radiator
25 1, in particular a tube radiator, consists of an array of radiator elements 2.

Each radiator element 2 comprises: a tubular body 3, for example made of die-cast aluminum, substantially extending along an axis X (substantially vertical in use) and provided with an inner chamber 4 for water
5 circulation; two pairs of transverse connecting sleeves 5 (only one of which is shown in figures 1 and 2) arranged at respective, axially opposite ends of body 3; and a plurality of fins and/or heat exchange plates 6 variously connected to one another and/or to body 3.

10 Body 3 comprises a substantially tubular end part 7 arranged at a lower end 10 of body 3; the end part 7 is provided with a bottom opening 8 arranged substantially about axis X and delimited by a radially outer collar 9. The openings 8 are normally closed by means of plugs
15 (known and not shown).

The two pairs of sleeves 5 are arranged at the lower end 10 and at an upper end (not shown) of body 3, respectively; the sleeves 5 of each pair extend from opposite sides of body 3, substantially orthogonal to axis
20 X, and extend along respective axes substantially parallel to each other and orthogonal to axis X.

In particular, the lower sleeves 5 (arranged at the lower end 10 of body 3) extend from opposite sides of the end part 7 and are aligned along an axis Y, which is
25 substantially orthogonal to axis X (and thus substantially horizontal in use).

The lower sleeves 5 of the various radiator elements 2 define a transverse duct 11 which extends along axis Y and is perpendicular to the chambers 4 (similarly, the upper sleeves 5 define an upper traverse duct, not shown).

5 The sleeves 5 of each pair of adjacent radiator elements 2 are joined together by means of specific nipples (known and not shown for simplicity), screwed into the adjacent sleeves 5 (which are internally threaded).

10 Radiator 1 consists of a plurality of radiator elements 2 arranged side-by-side; the sleeves 5 of the radiator elements 2 placed at respective opposite side ends of radiator 1 may be used to connect radiator 1 to an external plumbing system (not shown), in the case of side connection. The sleeves 5 which are not used to join two
15 adjacent radiator elements 2 or for the connection to the plumbing system are closed by means of plugs (known and not shown).

 In accordance with the invention, instead, radiator 1 is connected to the plumbing system from the bottom, the
20 delivery and return tubes of the system being arranged side-by-side under radiator 1, in particular in a substantially central position with respect to radiator 1 (instead of at a side end of radiator 1).

 Radiator 1 is connected to the system by means of a
25 connection device 20.

 Device 20 comprises a joint element 23, fixable to a

radiator element 2, and a service tube 24, insertable into the transverse duct 11 of radiator 1 and connectable to the joint element 23.

5 The joint element 23 extends along a longitudinal axis A which in use, i.e. when the joint element 23 is mounted on a radiator element 2, is aligned with the axis X of the radiator element 2 on which the joint element 23 is mounted.

Also referring to figures 3-6, the joint element 23
10 is internally provided with two separate channels 25, 26 and has: an inlet 27, connectable to a delivery tube of the plumbing system; an outlet 28, connectable to a return tube of the plumbing system; a delivery opening 31 connected to the inlet 27 of channel 25; and a return
15 opening 32 connected to the outlet 28 of channel 26.

The delivery opening 31 and the return opening 32 are arranged on respective different planes and at different heights along axis A. Preferably, but not necessarily, the openings 31, 32 are substantially
20 orthogonal to each other.

In particular, the joint element 23 comprises an insert 33, insertable into the end part 7 of a radiator element 2, and a connecting body 34, joined to insert 33 and protruding, in use, outside the end part 7.

25 In the example shown, but not necessarily, the

insert 33 and the connecting body 34 are two separate pieces, assembled to each other. It is understood that the insert 33 and the connecting body 34 can also form a monolithic piece, as well as they can consist in turn of
5 several assembled pieces.

Specifically referring to figures 1-2 and 3-4, insert 33 extends along axis A and comprises an insert portion 35, shaped so as to be inserted into the end part 7 of a radiator element 2 through the opening 8 along axis
10 A and having a top face 36 provided with the return opening 32; a radially outer flange 37, which radially extends, substantially orthogonal to axis A, from the insert portion 35 and abuts against a front edge 38 of collar 9 which delimits opening 8; and an end portion 39,
15 projecting from the face 36 parallel to axis A and provided with the delivery opening 31.

Insert 33 is joined in a fluid-tight manner to the end part 7, in particular by means of the insert portion 35, optionally with the aid of a seal 40 (or several seals
20 40).

The return opening 32 is arranged on face 36 in an eccentric position (i.e. laterally displaced) with respect to axis A; the end portion 39 with the delivery opening 31 is also eccentric with respect to axis A. In particular,
25 the return opening 32 and the end portion 39 (and thus the

delivery opening 31) are arranged on opposite sides of axis A.

The delivery opening 31 is arranged on a side face 41, substantially orthogonal to the face 36, of the end
5 portion 39, facing a side end 42 of radiator 1.

Specifically referring to figures 1-2 and 5-6, the connecting body 34 extends from flange 37 in a direction opposite to the end portion 39 and, when the joint element 23 is mounted on a radiator element 2, externally
10 protrudes from the radiator element 2.

The connecting body 34 is provided with a pair of bottom openings 43, arranged side-by-side at a lower end of the connecting body 34, and with a pair of top openings 44, arranged side-by-side on a top plate 45 of the
15 connecting body 34 and aligned with respective inner channels of insert 33 which communicate with the delivery opening 31 and the return opening 32, respectively. The bottom openings 43 and the top openings 44 are aligned along respective axes, substantially orthogonal to one
20 another (and horizontal in use).

The bottom openings 43 are provided with respective couplings (known) for joints and/or tubes and define the inlet 27 to be connected to the delivery tube of the plumbing system, and the outlet 28 to be connected to the
25 return tube of the system, respectively.

The connecting body 34 is internally provided with two separate channels 46, each of which connects a bottom opening 43 to a top opening 44.

Joint element 23 is attached to the radiator element
5 2 in any known manner.

In the non-limiting example shown, the joint element 23 is attached to the radiator element 2 by means of an annular coupling element 47 (shown in detail in figure 4), fitted about insert 33 and specifically about flange 37,
10 and having a peripheral edge 48 which axially fastens the flange 37 of insert 33 against the collar 9 of the end part 7 of the radiator element 2 and is plastically deformed and folded about collar 9, or is either welded or fused thereon.

15 The connecting body 34 is joined to insert 33 by means of screws (not shown), inserted into respective seats 49 formed so as to be aligned in the connecting body 34 and insert 33.

Optionally, gaskets are arranged between the insert
20 23 and the connecting body 34, e.g. housed in respective annular seats formed on plate 45 about the openings 44.

Also referring to figure 7, the service tube 24 comprises a tubular body 50 extending along a longitudinal axis B which in use, i.e. when tube 24 is inserted into
25 the transverse duct 11 and is joined to the joint element

23 (namely to insert 33), is perpendicular to axis A and to the axes X and aligned to axis Y.

Tube 24 extends between two axial ends 51, 52.

The axial end 51 is provided with a coupling portion
5 53 to connect tube 24 to the joint element 23, by engaging a fastening seat 54 formed in the end portion 39 and provided with the delivery opening 31.

For example, the coupling portion 53 is an externally threaded portion of tube 24 and is shaped so as
10 to be screwed into the fastening seat 54, which is internally threaded.

Optionally, a gasket may be arranged between the coupling portion 53 and the fastening seat 54.

The axial end 52 is provided with a sealing device
15 55, mounted about tube 24 to cooperate in a fluid-tight manner with an inner lateral surface 56 of the transverse duct 11.

The sealing device 55 comprises an internally hollow ring nut 57, provided with an internal threaded through
20 seat 58 to be screwed onto a threaded portion 59 of tube 24; an abutment ring 60, fitted onto tube 24 and also screwed on the threaded portion 59 of tube 24; and a sealing ring 61, axially interposed between the ring nut 57 and the abutment ring 60.

25 The ring nut 57 extends along and about axis B and

comprises a control head 62, for example hexagonal in shape, which can be operated by an operator, possibly by means of a tool; a radially outer flange 63; and a free end collar 64, facing the abutment ring 60 and having a front annular edge 65.

The abutment ring 60 extends about axis B and has two axially opposite faces 66, 67; face 66 abuts against an axial shoulder 68, which delimits the threaded portion 59 of tube 24, when the abutment ring 60 is screwed onto the threaded portion 59 of tube 24.

Face 67 faces the ring nut 57 and abuts against the front annular edge 65 of the ring nut 57.

The sealing ring 61 is fitted about collar 64. The sealing ring 61 is shaped so as to expand radially when the ring nut 57 is screwed onto tube 24 and fastened against the abutment ring 60. Indeed, the sealing ring 61 is axially compressed between the flange 63 of the ring nut and the face 67 of the abutment element 60, thus radially expanding.

In use, the following procedure is performed in order to connect radiator 1 to a pair of tubes placed under radiator 1 and in central position with respect to radiator 1 (figures 1 and 2).

A central radiator element 2a to which the delivery and return tubes of the plumbing system must be connected

is selected; central radiator element means an intermediate radiator element between the two outermost radiator elements, placed at respective side ends of the radiator.

5 The joint element 23 is mounted on the central radiator 2a through opening 8.

 In particular, insert 33 is inserted into the end part 7, through opening 8, of the radiator element 2a; insert 33 is fixed to collar 9 by means of the annular
10 coupling element 47, fitted about insert 33, and the connecting body 34 is then fixed to insert 33 by means of the specific screws.

 Insert 33 is shaped so as not to close the end part 7, i.e. not to close the chamber 4 or the transverse duct
15 11 of the radiator element 2a, thus leaving water free to circulate along the transverse duct 11 and in chamber 4; the chamber 4 and the transverse duct 11 of the radiator element 2a communicate with each other even when insert 33 is inserted into the end part 7.

20 Tube 24, already provided with the sealing device 55, is inserted through an outer sleeve 5a of an end radiator element 2b, placed at the side end 42 of radiator 1 (which may be the right or left end side); for this purpose, such a sleeve 5a is free from its own closure
25 plug. An internal sleeve 5b, aligned along axis Y and

opposite to the external sleeve 5a, joins the radiator element 2a to the adjacent radiator element.

Tube 24 is introduced into the transverse duct 11 to insert 33. Tube 24 is thus joined to insert 33, by
5 screwing the coupling portion 53 of tube 24 into the fastening seat 54.

The length of tube 24 is such that when the axial end 51 is joined to insert 33, the axial end 52 is placed in the inner sleeve 5b which joins the end radiator
10 element 2b to the adjacent radiator element 2.

By tightening the ring nut 57 on the threaded portion 59 of tube 24, the sealing ring 61 is compressed between the flange 63 and the abutment ring 60; the sealing ring 61 radially expands and comes into contact
15 with the inner lateral surface 56 of the transverse duct 11, namely of sleeve 5b, thus closing the transverse duct 11 in a fluid-tight manner.

The sleeve 5a used for the insertion of tube 24 is closed with a specific plug (not shown).

20 Finally, the inlet 27 and the outlet 28 of the joint element 23 are connected to the delivery and return tubes of the system in a known manner.

The delivery tube is connected to inlet 27: the water enters into radiator 1, in particular into the
25 central radiator 2a, through channel 25; the water

transits through the delivery opening 31, crosses the tube 24 and reaches the radiator element 2b, thus exiting into the transverse duct 11 behind the sealing device 55; the water moves up into the chamber 4 of the radiator element 2b and is distributed in the following radiator elements 2.

Once the water has been circulated in radiator 1, it exits from the central radiator element 2a, through the return opening 32, the channel 26 and the outlet 28.

10 Obviously, tubes 24 of various lengths may be provided to be adapted to radiators 1 of different size.

Finally, it is understood that changes and variations can be made to the connection device described and shown herein, without departing from the scope of the appended 15 claims.

CLAIMS

1. A connection device (20) for connecting a heating radiator (1) to a plumbing system, comprising a joint element (23) attachable to a radiator element (2) of the radiator (1); the joint element (23) comprising an insert (33) insertable at least partially in an end part (7) of a radiator element (2) and provided with a delivery opening (31) and a return opening (32); and a connecting body (34) provided with an inlet (27) and an outlet (28), connectable to respective delivery pipe and return pipe of the plumbing system and connected to the delivery opening (31) and the return opening (32) respectively via respective internal channels (25, 26) of the joint element (23); the device (20) being characterized by comprising a service tube (24) insertable in a transverse duct (11) of the radiator (1) and extending between a first axial end (51), provided with a coupling portion (53) for connecting the tube (24) to the delivery opening (31) of the joint element (23), and a second axial end (52), provided with a sealing device (55) fitted around the tube (24) for cooperating in a fluid-tight manner with an inner lateral surface (56) of the transverse duct (11).

2. A connection device according to claim 1, wherein the joint element (23) and the tube (24) extend along respective longitudinal axes (A, B) perpendicular to each

other.

3. A connection device according to claim 1 or 2, wherein the coupling portion (53) is an externally threaded portion of the tube (24) and is so shaped as to
5 screw inside an internally threaded fastening seat (54), formed in an end portion (39) of the insert (33) and provided with the delivery opening (31).

4. A connection device according to one of the preceding claims, wherein the sealing device (55)
10 comprises an internally hollow ring nut (57), having an internal threaded through seat (58) for screwing on a threaded portion (59) of the tube (24); an abutment ring (60), fitted on the tube (24) and also screwed on the threaded portion (59) of the tube (24); and a sealing ring
15 (61), axially interposed between the ring nut (57) and the abutment ring (60).

5. A connection device according to claim 4, wherein the sealing ring (61) is shaped so as to expand radially when the ring nut (57) is screwed on the tube (24) and
20 tightened against the abutment ring (60), pressing axially the sealing ring (61) between the ring nut (57) and the abutment ring (60).

6. A connection device according to one of the preceding claims, wherein the delivery opening (31) and
25 the return opening (32) are positioned on respective

different planes.

7. A connection device according to one of the preceding claims, wherein the insert (33) extends along an axis (A) and comprises an insert portion (35), shaped so as to be inserted in the end part (7) of a radiator element (2) and having a top face (36) provided with the return opening (32); and an end portion (39), projecting from the top face (36) parallel to the axis (A) and provided with the delivery opening (31).

10 8. A heating radiator (1), characterized by being equipped with a connection device (20) according to one of the preceding claims for connecting the radiator (1) to a plumbing system.

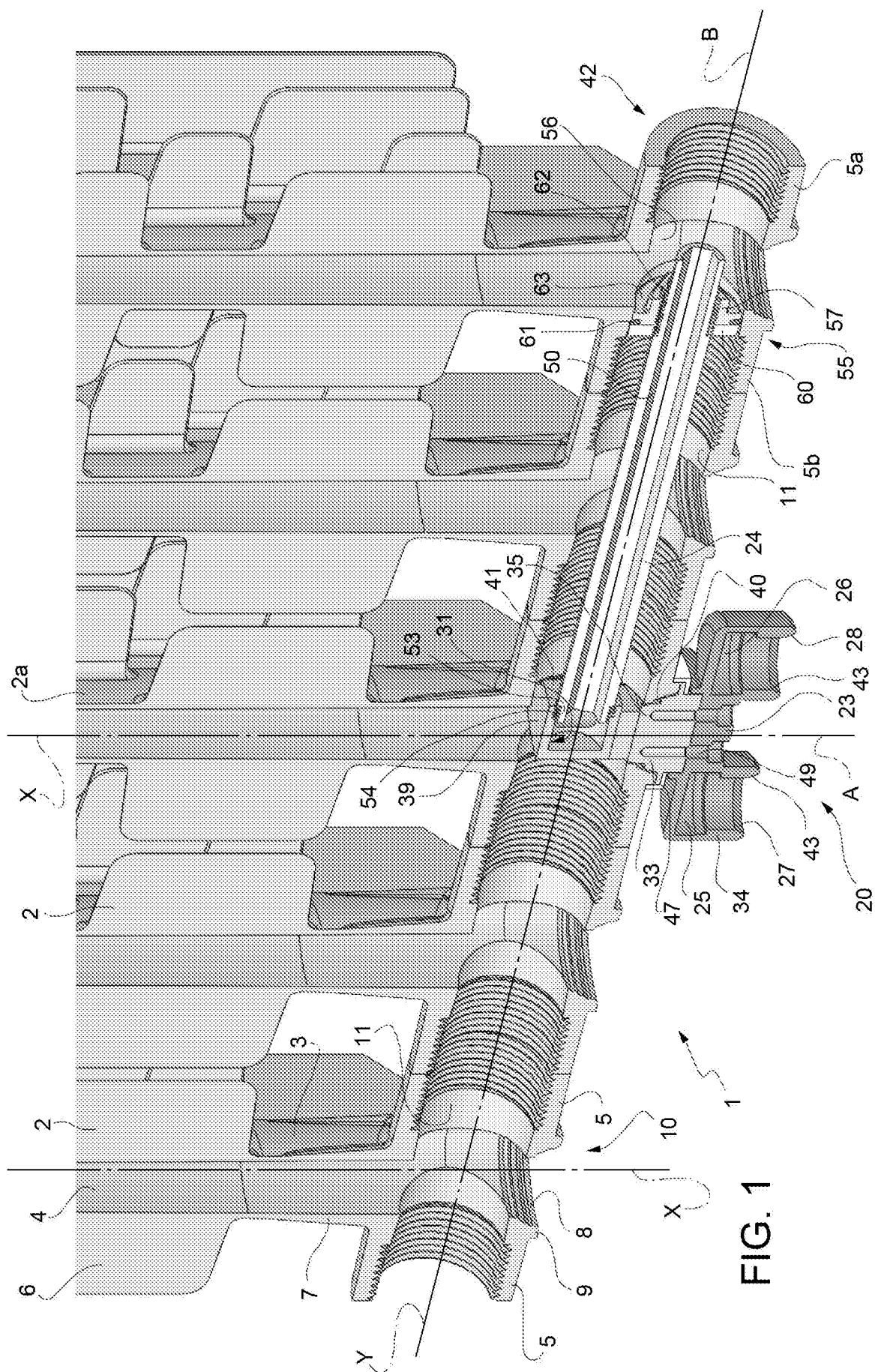
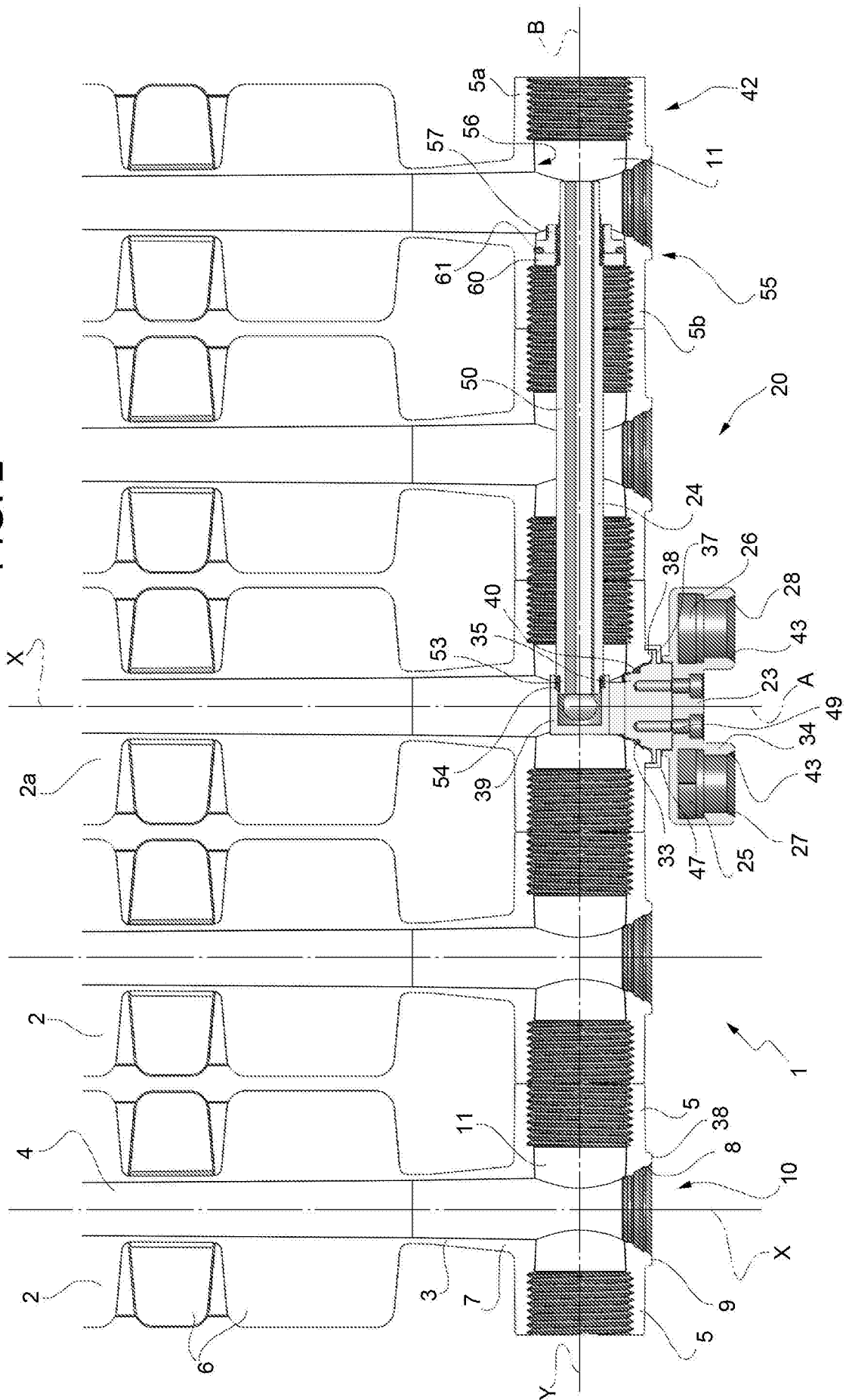


FIG. 2



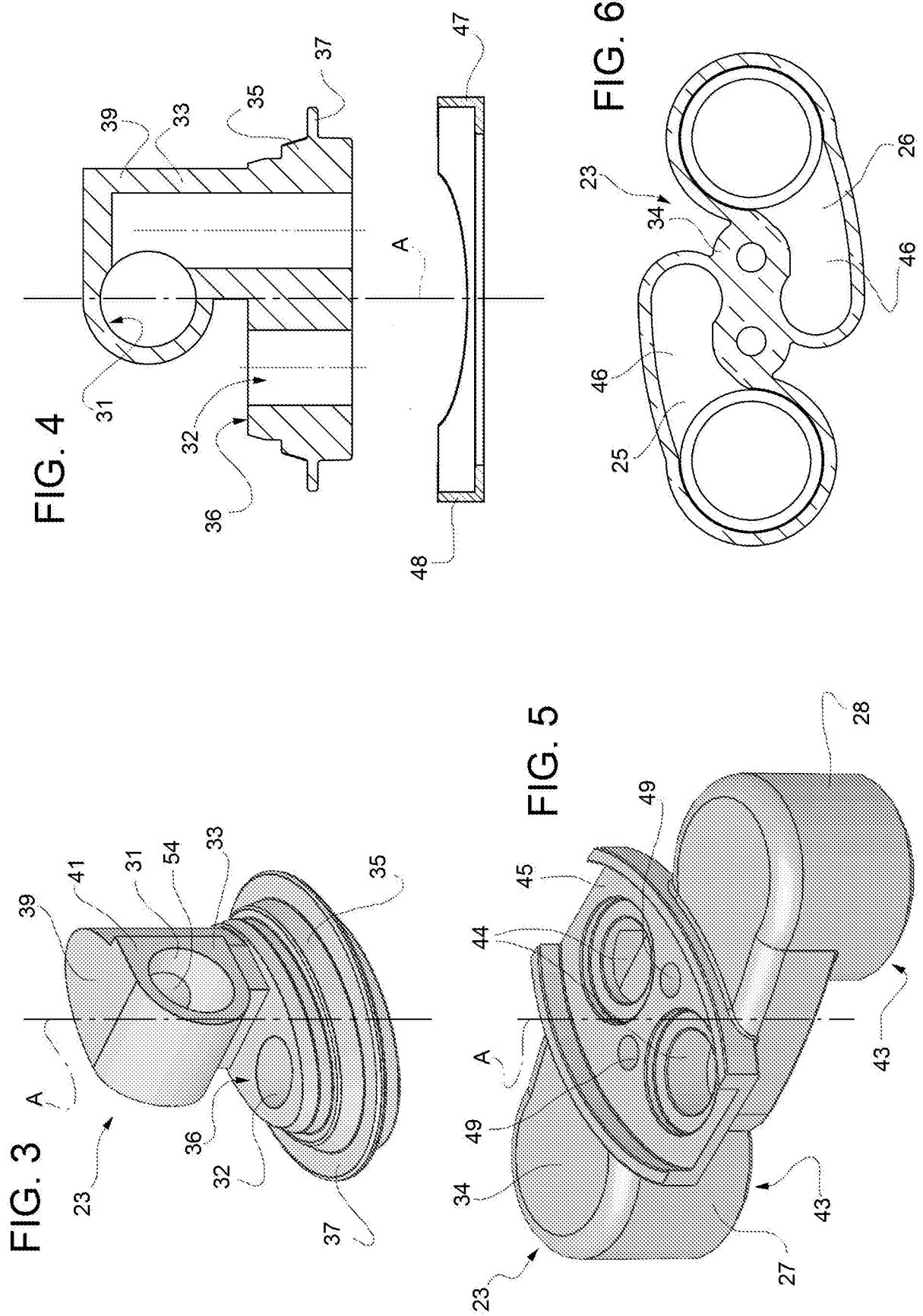
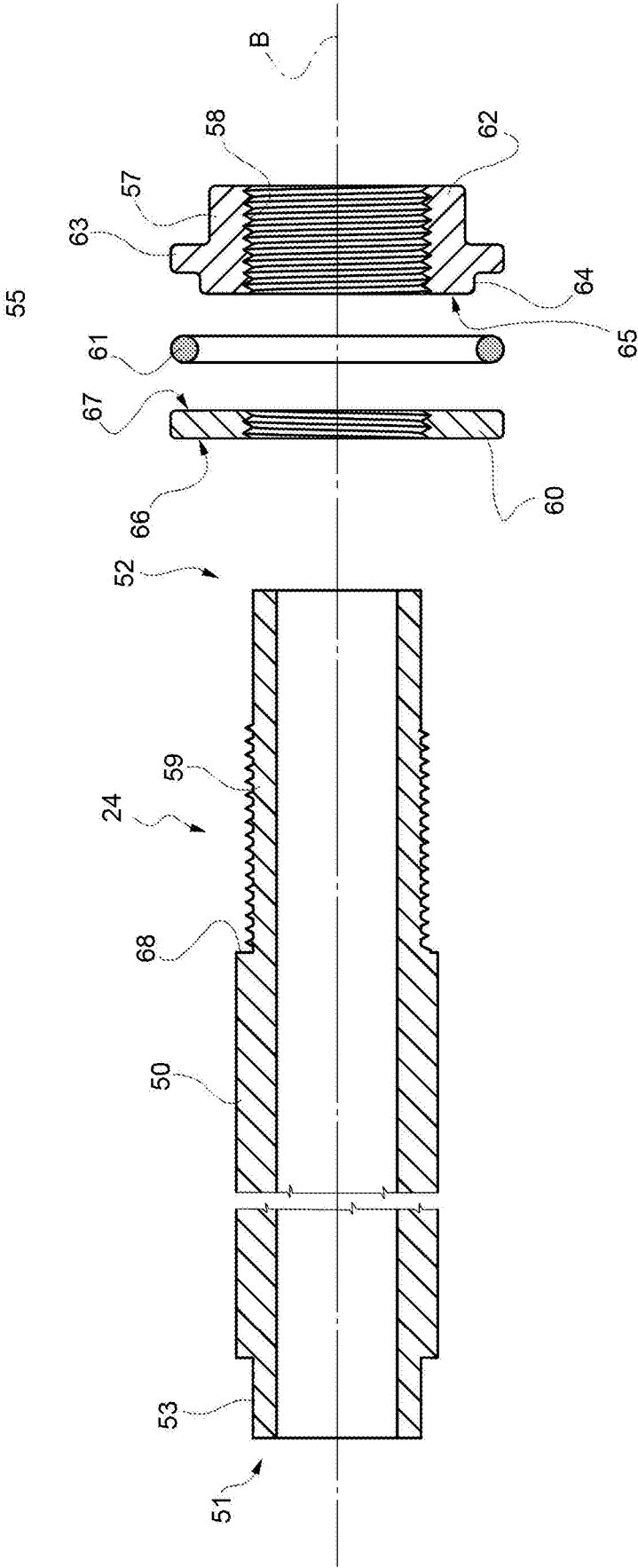


FIG. 7



INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2015/051860

A. CLASSIFICATION OF SUBJECT MATTER

INV. F28D1/053 F28F9/02 F28F9/26 F24D19/00
 ADD. F28F1/16 F28F21/08

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)

F28D F28F 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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	AT 349 693 B (BENTELER WERKE AG [DE]) 25 April 1979 (1979-04-25) page 2, lines 1-43 page 3, line 19 - page 4, line 4; figures 1-3	1-5,8
Y	DE 15 00 238 B1 (SANITAERTECHNIK WOLFSBURG REIM) 4 September 1969 (1969-09-04) figure 1	1-3,8
A	DE 66 05 715 U (MARKOWZ KARL HEINZ [DE]) 9 July 1970 (1970-07-09) page 3, lines 12-25; figures 7-9	1-3,8
Y	DE 10 2009 011150 A1 (DANFOSS AS [DK]) 9 September 2010 (2010-09-09) abstract; figures 1-5	4,5
	-/--	



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

8 July 2015

Date of mailing of the international search report

27/07/2015

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

Leclaire, Thomas

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2015/051860

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 198 30 307 A1 (HEIMEIER GMBH METALL THEODOR [DE]) 20 January 2000 (2000-01-20) column 3, lines 8-65; figure 1 -----	1-3,8
A	EP 0 814 308 A2 (ZEHNDER VERKAUF VERWALTUNG [CH]) 29 December 1997 (1997-12-29) column 1, line 32 - column 4, line 42; figures 1-5 -----	1-3,8
A	WO 2012/120440 A1 (FONDITAL SPA [IT]; SASSI FABIO [IT]) 13 September 2012 (2012-09-13) figure 1 -----	1,6-8
A	GB 608 972 A (ALUMINIUM PLANT & VESSEL CO; STANLEY WILLIAM THOMAS PAINE) 23 September 1948 (1948-09-23) figures 7,8 -----	1,2,8

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2015/051860

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
AT 349693	B	25-04-1979	AT 349693 B 25-04-1979
		DE 2526581 A1	30-12-1976
		FR 2314451 A1	07-01-1977
DE 1500238	B1	04-09-1969	-----
DE 6605715	U	09-07-1970	NONE
DE 102009011150	A1	09-09-2010	CN 101865528 A 20-10-2010
			DE 102009011150 A1 09-09-2010
			TR 201001457 A2 21-07-2010
DE 19830307	A1	20-01-2000	NONE
EP 0814308	A2	29-12-1997	AT 228229 T 15-12-2002
			DE 29610869 U1 29-08-1996
			EP 0814308 A2 29-12-1997
WO 2012120440	A1	13-09-2012	CN 103582783 A 12-02-2014
			EA 201391279 A1 30-01-2014
			EP 2681494 A1 08-01-2014
			WO 2012120440 A1 13-09-2012
GB 608972	A	23-09-1948	DK 73523 C 17-12-1951
			FR 945215 A 28-04-1949
			GB 608972 A 23-09-1948
