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(54) **Regulator device for a choke element**

(57) Regulator device for a choke element (15) that can be inserted in a connection pipe (12) of at least two plates (11a, 11b) of a heat exchanger (24), wherein the device is suitable to regulate the sizes of a flow passage aperture (26) defined by at least one membrane (16) of the choke element (15), the membrane (16) having, or not, a transit slot (17), and a possible hole (23). The device comprises a handle (20) and at least one arm (19) associated to the handle (20) and provided, at one of its ends, with a regulator tooth (21; 21a, 21b, 21c, 121) extending angled with respect to the longitudinal extension of the arm (19).

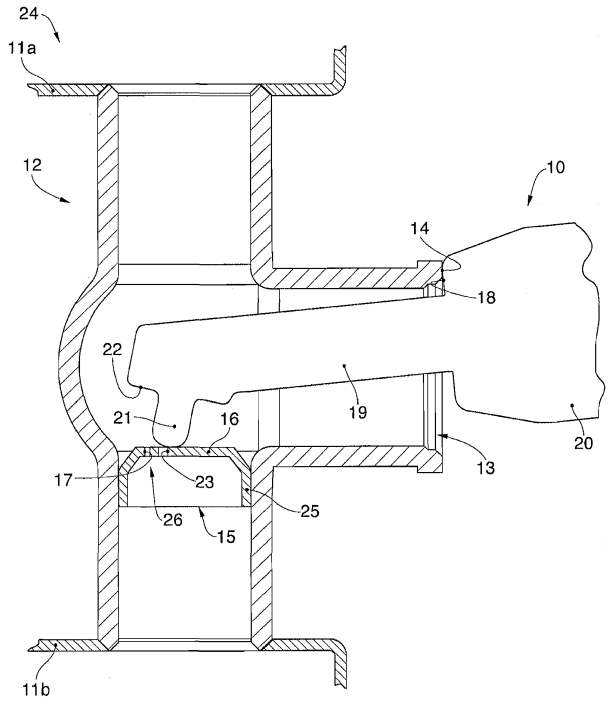

fig. 1a

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Description

FIELD OF THE INVENTION

[0001] The present invention concerns a regulator device for a choke element that can be inserted in pipes provided, advantageously but not exclusively, in order to connect the plates of a heat exchanger.

[0002] In particular, the regulator device according to the present invention is suitable both to regulate the positioning of the choke element and also to modify its configuration and regulate the passage section and consequently the flow rate through the pipe in which it is inserted.

BACKGROUND OF THE INVENTION

[0003] It is known to connect two or more plates of a heat exchanger by means of connection pipes or connectors, in order to heat rooms.

[0004] It is also known that the connection pipes are T-shaped, so as to associate other functions to them as well.

[0005] It has been proposed to insert choke elements or flow dividers in the pipes, so as to control the quantity of flow that transits between one plate and the other.

[0006] The choke elements comprise an insertion body that, during use, engages with the walls of the pipe and provides to at least partly block the passage of the flow.

[0007] The insertion body is provided with one or more fins or membranes, defined for example by lines of intended bending or by incision slots made in the blocking surface of the insertion body.

[0008] The fins are solid with the insertion body and can be suitably deformed to define an aperture for the fluid to pass through.

[0009] This solution allows different hypotheses for regulating the flow transiting between one plate and the other, which are determined by the sizes of the aperture which are determined on each occasion.

[0010] It is therefore possible to prepare the exchangers in the factory equipped with said choke elements and, depending on the needs of the user, to regulate the sizes of the aperture and therefore the flow between the plates.

[0011] It is also possible, once the exchanger has been installed, to regulate the choke element in order to satisfy new needs, such as to modify the place of installation, or should a technical calculation be wrong.

[0012] Currently the regulation of the aperture of the choke element is carried out using common tools such as screwdrivers, which do not allow a precise gradation of the aperture. Choking is determined only by the experience and ability of the operator who carries out said operation. Moreover, the conformation of known tools used does not allow access to the choke element disposed inside the pipe.

[0013] Purpose of the present invention is therefore to make a regulator device that allows to regulate the level of choking of the flow of the choke element in a precise, simple and rapid way.

[0014] The Applicant has devised, tested and embodied the present invention to overcome the shortcomings of the state of the art and to obtain these and other purposes and advantages.

SUMMARY OF THE INVENTION

[0015] The present invention is set forth and characterized in the independent claim, while the dependent claims describe other characteristics of the invention or variants to the main inventive idea.

[0016] In accordance with the above purpose, a regulator device according to the present invention is suitable to regulate, increasing or reducing, the sizes of the flow passage aperture of a choke element inserted in a pipe or connector, for example of the type used for connecting the plates of a heat exchanger.

[0017] According to one aspect of the present invention the regulator device comprises a handle and at least one arm associated to the handle and provided, at one of its ends, with a regulator tooth extending angled with respect to the longitudinal extension of said arm.

[0018] In fact, if the choke element is located in a T-shaped connector, with the two axial connections associated to the plates, the fin or fins of the choke element can be deformed by acting from the outside by means of the device according to the present invention in order to modify and consequently define an aperture of a desired and predetermined amplitude.

[0019] The regulator device, according to a variant, is conformed according to the desired modification of the disposition of the choke element so as to be able to graduate the sizes, for example every 5%, 10%, 15%, 20% or more, up to 50%, of the free aperture that conditions the passage of the fluid.

[0020] According to another variant, if the fin of the choke element has a hole, it is possible, always with the device according to the present invention, to attach the fin or fins in order to reduce the sizes of the aperture and thus reduce or restore the free area or section that conditions the passage of the fluid.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] These and other characteristics of the present invention will become apparent from the following description of some forms of embodiment, given as a non-restrictive example with reference to the attached drawings wherein:

- fig. 1a shows a regulator device according to the present invention, in the case where the aperture of the flow passage is increased, in a first operating condition;
- fig. 1b shows the regulator device in fig. 1a in a second operating condition;

- fig. 2 shows an example of a possible regulator device according to the present invention.

[0022] To facilitate comprehension, the same reference numbers have been used, where possible, to identify identical common elements in the drawings. It is understood that elements and characteristics of one form of embodiment can conveniently be incorporated into other forms of embodiment without further clarifications.

DETAILED DESCRIPTION OF SOME FORMS OF EMBODIMENT

[0023] With reference to figs. 1a and 1b a heat exchanger 24 consists, by way of example, of two or more plates 11 a, 11b, through which the heat-carrying fluid transits.

[0024] The plates 11a, 11b are connected to each other by a T-shaped connection pipe or connector 12 that has two branches connected to the plates 11a, 11b and one branch provided with a free mouth 13 accessible from the outside and that, during use, can be connected to feed/discharge pipes of the heat-carrrying fluid or possibly closed by stoppers or valves to release the air.

[0025] The connector 12 can be conformed in various ways, and its conformation has no influence on the invention.

[0026] The free mouth 13 can be personalized in the most various ways, and may or may not have internal and/or external threadings, or other.

[0027] The free mouth 13 is provided with a terminal abutment edge 14.

[0028] Inside the connector 12, in relation to the desired direction of transit of the flow of heat-carrying fluid, a choke element 15 is provided.

[0029] Advantageously, but not exclusively, the choke element 15 is the prefabricated type and is then inserted into the connector 12.

[0030] According to a variant embodiment, it is provided that the choke element 15 is made directly in the connector 12.

[0031] The choke element 15 can have different configurations and comprises an insertion body 25 that, during use, engages against the inside walls of the connector 12 into which it is inserted. The insertion body 25 is provided with one or more fins or membranes 16 defined by at least a slot or slit 17. The slot 17 initially determines, in practice, an aperture 26 preset for a guaranteed minimum passage of the heat-carrying fluid through the choke element 15.

[0032] The fin 16 can be provided with a possible hole 23, with sizes which have no influence on the passage of the fluid.

[0033] The fin 16 can be suitably deformed by means of a regulator device 10 according to the present invention, in order to modify the sizes of the aperture 26 (fig. 1b) in a predetermined or variable way.

[0034] The regulator device 10 according to the present invention comprises a handle 20, of various type and sizes to which an arm 19 is associated that has a regulator tooth 21 at the end.

[0035] The handle 20 and the arm 19 have substantially oblong development and are associated with each other, disposed along a common axis.

[0036] Some forms of embodiment provide that the handle 20 and the arm 19 are made in a single body.

[0037] Other forms of embodiment provide that the handle 20 and the arm 19 each have a plate conformation.

[0038] The handle 20 has a section size greater than that of the arm 19 in order to define, together with the latter, a shoulder 18 that during use allows the correct positioning of the arm 19 inside the connector 12 and resting against the terminal abutment edge 14.

[0039] As shown in fig. 1a, the regulator tooth 21 extends transversely to the longitudinal extension of the arm 19, and its length determines various and specific adjustments of the aperture 26 in the choke element 15. The regulator tooth 21 is suitably rounded at its end.

[0040] The terminal end of the arm 19 can be provided with an abutment surface or limiting surface 22, that cooperates during use with the regulator tooth 21.

[0041] The regulator tooth 21 in this case is disposed substantially orthogonal to the limiting surface 22.

[0042] The limiting surface 22 can extend on both one side and the other with respect to the regulator tooth 21.

[0043] The presence of the limiting surface 22, coordinated with the length of the regulator tooth 21, determines the degree of deformation of the fin 16 and therefore the sizes of the aperture 26.

[0044] During use the limiting surface 22 rests against the occlusion surface of the insertion body 25, in practice determining an end-of-travel condition for the regulator tooth 21.

[0045] In the form of embodiment in figs. 1a and 1b, the limiting surface 22 is angled with respect to the axis of longitudinal extension of the arm 19.

[0046] One form of embodiment provides that the limiting surface 22 is inclined by an angle comprised between 3° and 25° with respect to the axis of longitudinal extension of the arm 19.

[0047] This solution increases the useful support surface between the limiting surface 22 and the insertion body 25.

[0048] We shall now describe the functioning of the device 10 according to the present invention with reference to figs. 1a and 1b.

[0049] The arm 19 is inserted into the connector 12, through the free mouth 13, disposing the regulator tooth 21 in correspondence to the fin 16. The shoulder 18 of the handle 20 is disposed resting against the terminal edge 14 of the connector 12.

[0050] The handle 20 is subsequently rotated with fulcrum between the shoulder 18 and the terminal edge 14, and the regulator tooth 21, pressing on the fin 16, deforms the latter determining the desired sizes of the aperture 26.

[0051] According to another form of embodiment of the present invention, shown in fig. 2, a regulator device 110 is the multifunction type with several positions.

[0052] The regulator device 110 comprises two handles 20 disposed and associated transversely with respect to each other.

[0053] Each of the two ends of the handles 20 is provided with a respective arm 19.

[0054] The ends of the arms 19 are provided with respective regulator teeth 21a, 21b, 21c, which can cooperate, as described above, with respective limiting surfaces 22a, 22b, 22c.

[0055] The regulator teeth 21 a, 21 b, 21 c each have a different length from each other so that using one or the other determines the variable level of deformation of the fin 16.

[0056] One of the ends of the arms 19 is provided with a regulator tooth 121 that has a hook conformation.

[0057] It should be noted that the hook 121 is conformed depending on the shape and size of the possible hole 23 provided in the fin 16 of the choke element 15. The hook 121 allows to possibly reduce the sizes of the aperture 26 which was previously made by deforming the fin 16 of the choke element 15.

[0058] It is clear that modifications and/or additions of parts may be made to the regulator device as described heretofore, without departing from the field and scope of the present invention.

[0059] It is also clear that, although the present invention has been described with reference to some specific examples, a person of skill in the art shall certainly be able to achieve many other equivalent forms of regulator device, having the characteristics as set forth in the claims and hence all coming within the field of protection defined thereby.

Claims

1. Regulator device for a choke element (15) that can be inserted in a connection pipe (12) of at least two plates (11a, 11b) of a heat exchanger (24), wherein said device is suitable to regulate the sizes of a flow passage aperture (26) defined by at least one membrane (16) of said choke element (15), said membrane (16) having, or not, a transit slot (17) and a possible hole (23), **characterized in that** it comprises a handle (20) and at least one arm (19) associated to said handle (20) and provided, at one of its ends, with a regulator tooth (21; 21a, 21b, 21c, 121) extending angled with respect to the longitudinal extension of said arm (19).

2. Device as in claim 1, **characterized in that,** together with said arm (19), said handle (20) defines a shoulder (18) that, during use, cooperates with a mouth (13) for access to said connection pipe (12) from the outside.

3. Device as in claim 2, **characterized in that** said handle (20) has a section size greater than that of said arm (19) to define said shoulder (18).

4. Device as in any claim hereinbefore, **characterized in that** the terminal end of said arm (19) is provided with an abutment surface (22) that cooperates during use with said regulator tooth (21).

5. Device as in claim 4, **characterized in that** said regulator tooth (21) is disposed substantially orthogonal with respect to said abutment surface (22).

6. Device as in claim 4 or 5, **characterized in that** said abutment surface (22) is angled with respect to the axis of longitudinal extension of the arm (19).

7. Device as in claim 6, **characterized in that** said abutment surface (22) is inclined by an angle comprised between 3° and 25° with respect to the axis of longitudinal extension of the arm (19).

8. Device as in any claim hereinbefore, **characterized in that** said regulator tooth (21), on each occasion, has predefined lengths depending on the sizes of the flow passage aperture (26).

9. Device as in any claim hereinbefore, **characterized in that** said regulator tooth (121) is conformed as a hook in order to engage in the possible hole (23), to pull said membrane (16), and to reduce the sizes of said aperture (26).

10. Device as in any claim hereinbefore, **characterized in that** said handle (20) and said arm (19) are made in a single body.

11. Device as in any claim hereinbefore, **characterized in that** said handle (20) and said arm (19) each have a plate conformation.

12. Device as in any claim hereinbefore, **characterized in that** it comprises a plurality of handles (20) associated with each other and each of which is provided with at least a respective arm (19) each having a regulator tooth (21; 21a, 21b, 21c, 121).

13. Device as in any claim hereinbefore, **characterized in that** said connection pipe (12) is T-shaped.

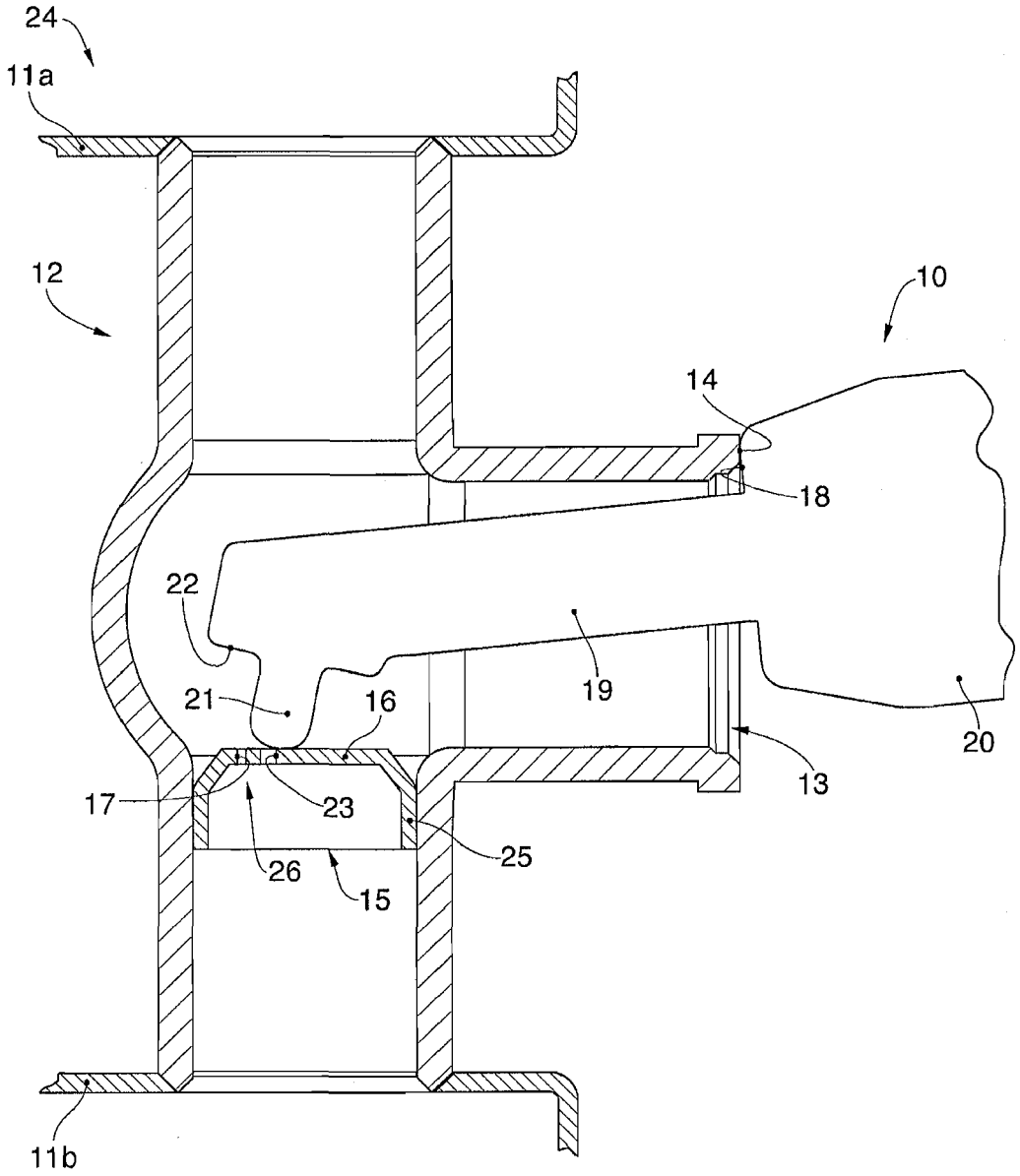


fig. 1a

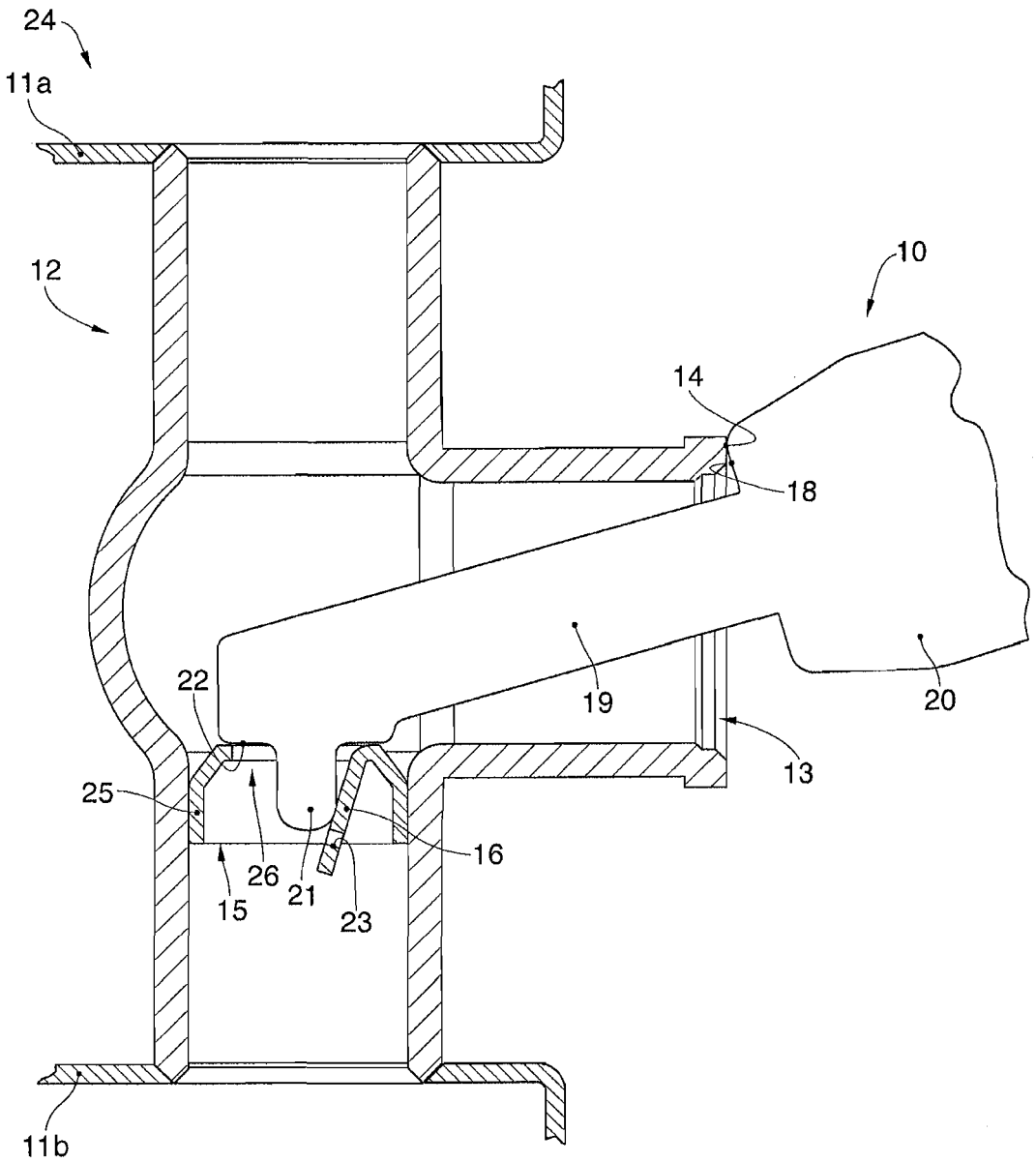
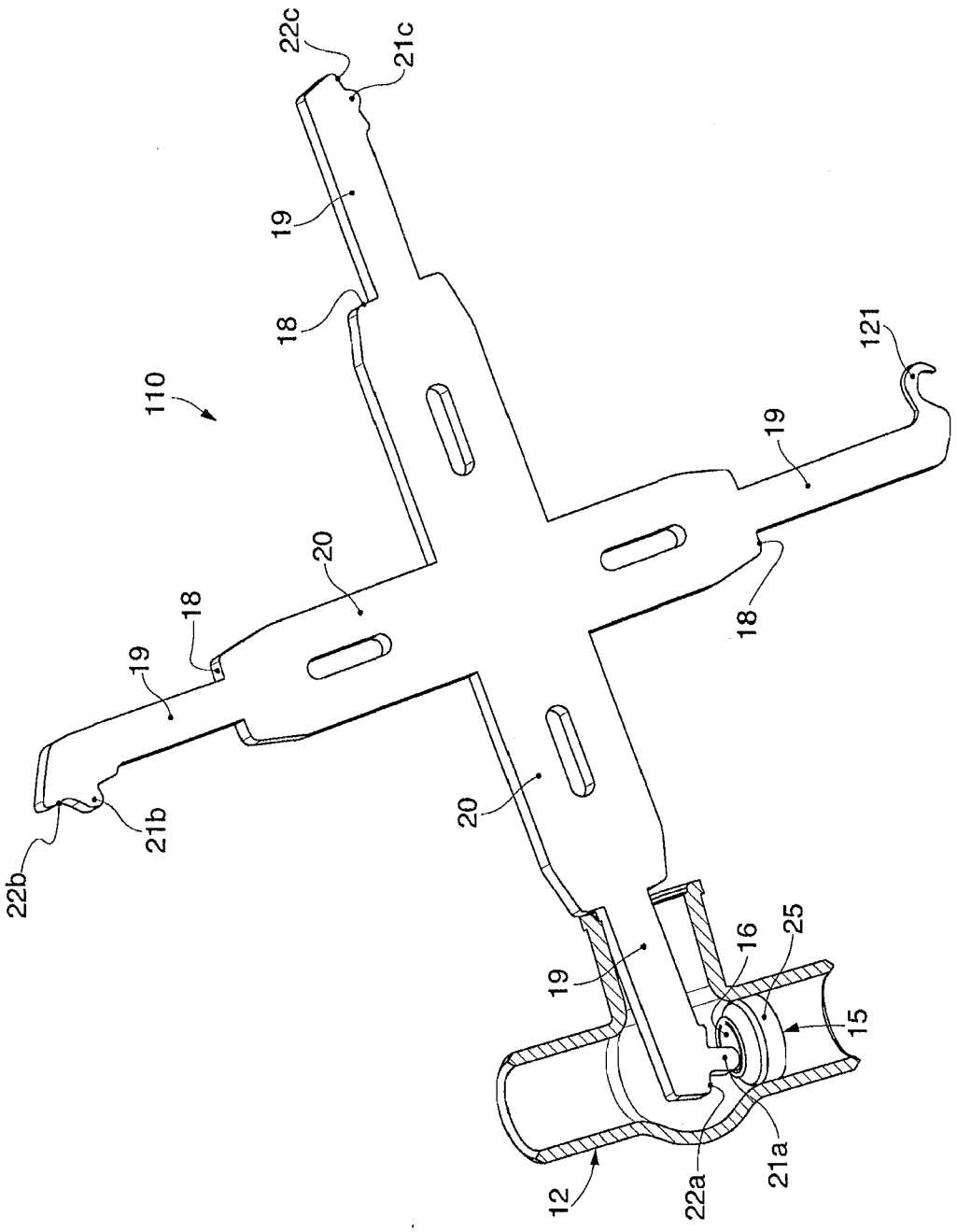


fig. 1b


22c
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21a

fig. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 14 15 8338

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 198 42 233 A1 (KERMI GMBH [DE]) 6 April 2000 (2000-04-06)	1	INV. F24D19/00
A	* column 2; figure 1 *	2-13	F16K1/16 F24D19/10
X	EP 2 078 914 A1 (IRSAP SPA [IT]) 15 July 2009 (2009-07-15)	1	F28F9/26 F28F27/02
A	* abstract; figure 1 *	2-13	G05D7/01
A	US 3 877 514 A (BECK THEODORE A) 15 April 1975 (1975-04-15) * abstract; figures 1-6 *	1	
A	DE 20 2012 007648 U1 (BALG HANS ALFRED [DE]) 13 September 2012 (2012-09-13) * abstract; figures 1-10 *	1-13	
A	DE 10 2010 010315 A1 (BERG HANS GMBH & CO KG [DE]) 8 September 2011 (2011-09-08) * abstract *	1-13	

TECHNICAL FIELDS SEARCHED (IPC)

F24D
F16K
F28F
G05D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	21 October 2014	García Moncayo, O

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 14 15 8338

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21-10-2014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 19842233 A1	06-04-2000	NONE	
EP 2078914 A1	15-07-2009	EP 2078914 A1	15-07-2009
		IT BO20080004 U1	11-07-2009
US 3877514 A	15-04-1975	CA 1026316 A1	14-02-1978
		US 3877514 A	15-04-1975
DE 202012007648 U1	13-09-2012	DE 202012007648 U1	13-09-2012
		EP 2696145 A1	12-02-2014
DE 102010010315 A1	08-09-2011	NONE	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82