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(54) **THE MULTI-ROW RADIATOR WITH A CONTROLLED FLOW OF HEATING MEDIUM**

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RADIATEUR MULTI-RANGÉE À ÉCOULEMENT RÉGULÉ DU FLUIDE CHAUFFANT

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EP 2 909 538 B1

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Description

Field of the Invention

[0001] This invention relates to a multi-row heating plate radiator with a controlled flow of heating medium, with an inlet port and an outlet port of the heating medium, with the first passing-through heating plate facing the heated room / space and with at least one heating plate situated behind said first plate intended for reducing flow of the heating medium for cutting or controlling the heating output, while said heating plates are mutually connected on the corner areas at their upper distributing channels by means of an inflow fitting and connected to the inlet port of the heating medium by means of the inflow fitting or by a connecting set combined with the inflow fitting, and connected by an outflow fitting for the outlet port at their lower distributing channels.

Description of the Prior Art

[0002] Currently, radiators, especially the heating plate units are manufactured as single- or multi-row units, inside of which a space for the flow of heating medium, which is usually heating water, is provided. The heating medium is supplied to the individual heating plates from the inlet port through the supply outlets and flows always symmetrically in each of their heating plates, i.e. the same amount is directed in all heating plates, or asymmetrically, usually preferably in the first of the heating plates facing a heated room, using a system for flow distribution such as different screens, but there is always no possibility to control flow ratio distributed among individual heating plates, or to shut off the relevant inlet, etc. Moreover, the interiors of heating plates or those of other similar radiators are always hydraulically interconnected, so that it is impossible to control the flow of heating medium in a particular heating plate without having to influence the flow of the heating medium through the second or subsequent heating plates of the known mutually hydraulically interconnected multi-row heating radiators.

[0003] One example of approach that consists in preferring higher heating output of the front heating plate facing the heated room with a multi-row heating radiator, is known from the published patent application (CZ PV 1998-2158), according to which the relevant double-row or multi-row heating radiator is preferably provided with a single inlet port, which is connected only with the frontal heating plate facing the heated room. The heating medium, which flows through this inlet port, is distributed along the upper edge of the front plate and through suitably dimensioned feeding channels situated perpendicularly thereto, and which are preferably spaced equally in the frontal region 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 radiator. Conse-

quently the front radiator plate 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 of the heating plate has a higher radiation ratio.

[0004] To facilitate the flow of the heating medium from the front heating plate to at least one heating plate or similar item that are positioned behind it, at least one connecting tube or possibly a supply outlet are arranged in the system, and said supply outlet is preferably situated at the lower corner area of the radiator heating front plate, from which then the cooled-down heating medium flows into the lower part of the second heating plate situated behind it or possibly into subsequent plate of the multi-row heating radiator. In this second heating plate the heating medium is supplied at first upwards to the upper longitudinal edge of the second or possibly subsequent heating plate, wherein the liquid is again directed through the upper distribution channel provided and then by means of perpendicularly attached flow channels it is supplied to its second lower corner area with a connected outlet port. However, it is supposed that the heating medium transfers the greater part of its heat capacity to said frontal heating plate, while entering, already partially cooled, the second or subsequent heating plates, ensuring, in such a way, a reduced output.

[0005] The obvious drawback of this arrangement is that the regulation of the reduced heating output of the second or subsequent heating radiator plates of the multi-row heating unit can not be controlled. 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 into all heating plates to be cooled down, the thermal performance of the entire heating plate radiator is generally lower because the hot heating medium flows into the front heating plate at first while the 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.

[0006] In order to control the inflow of the heating medium into a multi-row radiator with regard to the specific conditions in its partial load mode as well to ensure achievable heating capacity and to increase the comfort of the heated space and especially to improve the system control, a solution (PCT/EP2008/002963) has been proposed, which uses another valve in combination with one of the upper supply outlets, connected to the inlet port of the heating medium whereby it is possible to direct the mass flow of the heating medium back to the second heating plate through an overflow connection, whereby the used outflow is provided with an inner separating screen.

[0007] A disadvantage of such a solution is the application of the 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 solutions did not prove enough in practice. The patent application No. DE 10 2010 010315 A1 discloses the valve connection fitting that has a valve receiving piece for receiving a valve, particularly regulating valve, ventilating valve or check valve, two connecting pieces for heating medium conductive connection with heater plates, and a unit for channel separation between both connecting pieces. A partially tubular insert element provided with a lateral opening is arranged inside a valve connection mounting in projection of a valve housing piece or the valve housing piece is prolonged inside the valve connection mounting and is provided with another lateral opening. Independent claims are also included for the following: a valve adapter element for use with a valve connection fitting; an insertion element with a sealing- or flow channel piece; and a method for pressing an inserting element formed of silicon as an extension of a socket-like valve receiving piece of a T-shaped valve connection mounting. However, this solution uses fittings with valves mostly to control the flow from plate to plate. In this case, there is functionally a radiator with serially connected plates when water flows into one plate, then flows through the valve into the second plate and from here out. This technical solution is not applicable to a standard heating plate radiator.

[0008] The radiator according to the preamble of claim 1 is described in patent application No. DE 10 2010 010541 A1. This document discloses the device which has an actuating or valve device e.g. differential pressure control, for controlling supply of a heat medium to two heating elements e.g. front heating plate and rear heating plate, respectively. The actuating or valve device is formed in such a manner that the heating medium does not flow from one of the heating elements into another one of the heating elements during partial load operation. The actuating or valve device comprises a piston and/or a valve disk for opening and closing openings for supplying the heating medium to the two heating elements. In this document, there is a variant of parallel connection of the panels but the ratio of leaking into individual plates is solved in a very complicated way at the input into the radiator which means that it must use specially prepared fittings and connecting sets, mostly in combination with non-standard thermostatic valves, which is always difficult and expensive to manufacture.

[0009] The utility model No. DE 20 2012 007648 U1 discloses a radiator valve insert for controlling the flow rate of a heating medium from a heating supply to a first heating element and a second heating element of a heating element, comprising a hollow body, characterized in that the piston has a first closure element for closing the first opening, and a first closure element for the closure of the first opening for closing the second opening, the first closure element having a greater closure path than the second closure element.

Nature of the Invention

[0010] The substance of the present invention is to improve the flow control method of the heating medium through the multi-row radiator, as defined in claim 1.

[0011] Although not claimed, it appears advantageous that the interfaces of the inflow or outflow fittings are formed by a filling core of their central parts as an integral part of their casing.

[0012] Although not claimed, it appears advantageous that with regard to the current development and properties of plastic materials the interfaces of the inflow or outflow fittings are carried out by introducing an injection insert made of composite material in their central part, including the created curved and mutually separated channels and with a passing-through hole for the throttling member and / or control element.

[0013] The proposed invention provides advantageously a large number of various arrangements of the throttling member and / or the control element, as for example, this being formed by an axially movable cylinder together with the stem with a height exceeding the diameter of the curved channel, this being formed by a shaft connected to a rotary valve with an angularly arranged channel etc.

[0014] Another advantage is that the shaft of the throttling member and / or control element can be fitted - in several ways - with a hand knob, a thermostatic head action shaft, or an actuator spindle etc.

Description of the Drawings

[0015] Further advantages and effects of the invention are apparent from the attached drawings, wherein they depict:

Fig. 1: longitudinal section of the supply fitting with its internal interfaces with two mutually separated curved channels, whereby at least one of them is equipped with the throttling / control element protruding inside and operable from outside,

Fig. 2: longitudinal horizontal section of a supply fitting drawn at the level of one of the curved channels showing a space for throttling / control element,

Fig. 3: side view of the supply fitting according to Fig. 1,

Fig. 4: longitudinal section of the supply fitting with its internal interface with two mutually separated curved channels, whereby at least one of them is equipped with the throttling / control element protruding inside in a modified design of the rotary corner valve operable from outside,

Fig. 5: longitudinal horizontal section of the supply fitting drawn at the level of one of the curved channels showing a space for throttling / control element and its transversal profile,

Fig. 6: schematic depiction of the two-row radiator showing the inlet of the heating medium from the

inflow fitting into the radiator system and individual streaming of the heating medium flows between the mutually hydraulically not connected individual radiator plates and their controlled separated outflows from mutually separated channels through the outflow fitting and further through the shut-off fitting into the outlet port,

Fig. 7: schematic depiction of the two-row radiator showing the inlet of the heating medium from the connecting set in the inflow fitting and individual streaming of the heating medium flows between the mutually hydraulically not connected individual radiator plates and of their controlled separated outflows from the mutually separated curved channels through the outflow fitting and further through the shut-off fitting into the outlet port, and moreover showing the manually operable element on the body of the outflow fitting in the throttle / regulatory element arranged for it.

Examples of the Versions of the Invention

[0016] A multi-row radiator 1 with controlled flow of heating medium, in particular the multi-row heating plate unit is connected to the inlet port 2 and the outlet port 3 of the heating medium. The multi-row radiator 1 is usually conceived as having a passing-through first heating plate 4 facing a heated room / space and with at least one heating plate situated behind said plate intended for reducing flow of the heating medium for cutting or controlling the heating output. The heating plates 4,5 are mutually connected to each other on the corners at their upper distributing channels (not shown in more detail) by means of the inflow fittings 6 or by an inflow fitting 6 of the connecting set 7 for the inlet port 2 of the heating medium and at lower distributing channels (not shown in more detail) by an outflow fitting 9 for the outlet port 3. Other supply outflows 10, which interconnect the heating plates 4,5 at their corners, are blind.

[0017] Any one of the inflow fittings 6 or outflow fittings 9 may be adjusted for the purpose of controlling the flow of heating medium through the multi-row radiator 1 as a divider with the internal interface intended for the separation of the heating medium flows either into or out of the individual heating plates 4,5, and which is provided to that end with an internal interface 11 with two curved channels 12,13, mutually separated and at least one of them is equipped with a throttling and / or a control element 14.

[0018] Said interface 11 of the inflow fittings 6 or the outflow fittings 9 may be formed by filling core 15 in their central part as an integral part of their casing. Consequently it is obvious to experts in the field that the curved, hence the as example depicted angular channels 12,13 in the interface 11 are in practice manufactured by drilling.

[0019] Another example is that the interface 11 of the inflow fittings 6 or the outflow fittings 9 is formed by filling core 15 of their central parts, for example in the form of

an injection insert (not shown here) made of composite material, including the created mutually separated curved channels 12,13 and with a through hole 16 for throttling and / or control element 14.

[0020] The throttling and / or control element 14 is formed by an axially movable cylinder together with the shaft 17 with a height exceeding the diameter of the corresponding curved channel 12 or 13 (Fig. 1) or it is alternatively formed by a shaft 17 connected to a rotary valve 18 with an angularly arranged channel 19 (Fig. 4, 5) etc. The manually controlled knob 20, or a shaft of a thermostatic head (not shown here), or a spindle of an actuator (not shown here) are assigned to the shaft 17 of the throttling and / or control element 14. The shaft 17 of the throttling and / or the control element 14 is sealed by a common seal, O-ring, etc. under the lock nut 21.

[0021] The function of the heating radiator 1 with controlled flow of the heating medium, in particular the multi-row heating plate unit with an inlet port 2 and an outlet port 3 of the heating medium, which are variably connected with said ports 2,3, by their inflow fittings 6 or their outflow fittings 9, is explained particularly in using Fig. 6, which depicts schematically the two-row radiator showing the inflow of the heating medium from the inflow fitting 6 in this particular radiator 1 and several streams of individual flows of the heating medium through individual not hydraulically interconnected radiator plates 4,5 and their controlled separated outflows via mutually separated curved channels 12,13 in the interface 11 of the outflow fitting 9 and further, after having been mutually mixed, to the outlet through the shut-off fitting 22 into the outlet port 3.

[0022] The heating medium coming from the inlet port 2 and through the usual control valve 23, at present predominantly equipped with the thermostatic head 24, flows through the inflow fitting 6 in both heating plates 4,5 with a volume corresponding to their hydraulic resistance. The difference of the hydraulic resistance is created in the outflow fitting 9 as explained above, due to the interface 11 that is permeable in the direction of the outlet port 3 only and solely through its two mutually separated curved channels 12,13, whereby one of them, for example the channel 12, which is accordingly curved and which connects the socket 24 of the outflow fitting 9 with the rear heating plate 5, is somehow throttled or controllable or completely closable, as it is obvious from the introducing description of such an outflow fitting 9, respectively inflow fitting 6.

[0023] The heating radiator 1 (Fig. 7) works quite similarly, with the connecting set 7 for the so-called bottom connection of the radiator 1 on the here not depicted heating system with the connecting ports 2,3, routed from the floor of the heated room / space.

Claims

1. A multi-row heating plate radiator (1) with controlled

flow of heating medium with an inlet port (2) and outlet port (3) of the heating medium, equipped with the first passing-through heating plate (4) facing the heated room / space and with one subsequent heating plate (5) situated behind said plate and which is intended for reducing flow of the heating medium for cutting or controlling the heating output, said first and subsequent heating plates (4,5) comprising upper and lower distributing channels, said first and subsequent heating plates (4,5) being mutually connected on the corners at their upper distributing channels by means of an inflow fitting (6) and connected to the inlet port of the heating medium by means of the inlet fitting (6) or by a connecting set (7) combined with the inflow fitting (6), and at their lower distributing channels by an outflow fitting (9) for the outlet port (3), wherein other supply outflows (10) interconnect the heating plates (4, 5) at their other corners, **characterized in that** the other supply outflows (10) which interconnect the heating plates (4,5) at their other corners are blind, and wherein the outflow fitting (9) is configured as a divider with an internal interface (11) for the separation of the heating medium flows into the individual heating plates (4,5) or out of them, wherein the outflow fitting (9) is provided with an internal interface (11) with two mutually separated curved channels (12,13), and one of them is equipped with a throttling and / or a control element (14) that protrudes in the inner section of said channel (12).

2. The multi-row radiator according to claim 1, **characterized in that** the throttling and / or the control element (14) is formed by an axially movable cylinder together with a shaft (17) with a height exceeding the diameter of the curved channel (12).
3. The multi-row radiator according to claim 1, **characterized in that** the throttling and / or the control element (14) is formed by a shaft (17) connected to a rotary valve (18) with an angularly arranged channel (19).
4. The multi-row radiator according to claim 1, **characterized in that** the shaft (17) of the throttling and / or the control element (14) is fitted with a hand knob (20), or a thermostatic head action shaft, or an actuator spindle.

Patentansprüche

1. Mehrreihiger Heizkörper (1) mit gesteuertem Heizmedienfluss, angeschlossen am Einlassanschluss (2) und Auslassanschluss (3) des Heizmediums, mit einer ersten voll durchgängigen Heizplatte (4), die dem beheizten Raum zugewandt ist und einer weiteren dahinter angeordneten Heizplatte (5) mit vor-

gesehener Reduktion des Heizmedienflusses zur Minderung oder Regelung seiner Heizleistung, wobei die erste Heizplatte (4) und die weitere Heizplatte (5) miteinander verbunden sind, und dies in Ecken deren Verteilerkanäle durch den Zulauf (6) und/oder Anschlussgarnitur (7) mit Zulauf (6), und bei unteren Verteilerkanälen durch Ablauf (9) für Auslassanschluss (3), wobei andere Auslässe (10) die Heizplatten (4, 5) in deren übrigen Ecken verbinden, **dadurch gekennzeichnet, dass** andere Auslässe (10), die die Heizplatten (4, 5) in deren übrigen Ecken verbinden, blind sind und der Ablauf (9) als ein Verteiler mit einer inneren Schnittstelle (11) angeordnet ist, um die Flüsse des Heizmediums in einzelne Heizplatten (4,5) oder nach außen hin zu trennen, der über eine innere Schnittstelle (11) verfügt, versehen mit zwei voneinander getrennten abgelenkten Kanälen (12,13), wobei in einen von ihnen ein Drossel- und/oder Regelelement (14) eingreift.

2. Mehrreihiger Heizkörper nach Anspruch 1, **dadurch gekennzeichnet, dass** das Drossel- und/oder Regelelement (14) zusammen mit dem Schaft (17) aus einem axial verschiebbaren Zylinder gebildet wird, mit einer Höhe, die den Durchmesser des abgelenkten Kanals (12) überschreitet.
3. Mehrreihiger Heizkörper nach Anspruch 1, **dadurch gekennzeichnet, dass** das Drossel- und/oder Regelelement (14) mit einem Schaft (17) gebildet wird, verbunden durch einen Drehschieber (18) mit einem im Winkel angeordneten Kanal (19).
4. Mehrreihiger Heizkörper nach Anspruch 1, **dadurch gekennzeichnet, dass** dem Schaft (17) des Drossel- und/oder Regelements (14) ein manuell steuerbares Rad (20), ein Schaft des Thermostatkopfes oder Spindelantrieb zugeordnet ist.

Revendications

1. Radiateur (1) multi-rangées à écoulement régulé du fluide chauffant, raccordé au raccord (2) d'arrivée et au raccord (3) de sorti du fluide chauffant, avec un premier panneau (4) chauffant à débit entier tourné vers l'intérieur / l'espace de la pièce chauffée et un autre panneau (5) chauffant formant la rangée suivante et destiné à réduire le débit du fluide chauffant afin de réduire ou de contrôler sa puissance de chauffage, le premier panneau (4) chauffant et le panneau (5) chauffant suivant étant reliés au niveau des angles de leurs canaux de distribution supérieurs par une douille (6) d'arrivée et/ou par une garniture (7) de raccordement avec une douille (6) de arrivée et au niveau des canaux de distribution inférieurs par une douille (9) de sortie pour un raccord (3) de sortie, les autres douilles (10) reliant les pan-

neaux (4, 5) chauffants au niveau de leurs autres angles, **caractérisé en ce que** les autres douilles (10) reliant les panneaux (4, 5) chauffants au niveau de leurs autres angles sont borgnes et la douille (9) de sortie est conçue comme un diviseur avec une interface (11) intérieure pour séparer les flux du fluide chauffant arrivant vers les différents panneaux (4, 5) chauffants ou sortant de ces derniers, l'interface (11) intérieure étant en plus munie de deux canaux (12, 13) séparés l'un de l'autre et courbés, l'élément (14) d'étranglement et/ou de régulation s'insérant dans l'un d'eux.

2. Radiateur multi-rangées selon la revendication 1, **caractérisé en ce que** l'élément (14) d'étranglement et/ou de régulation est formé d'une tige (17) et d'un rouleau déplaçable axialement dont la hauteur dépasse le diamètre du canal (12) courbé.
3. Radiateur multi-rangées selon la revendication 1, **caractérisé en ce que** l'élément (14) d'étranglement et/ou de régulation est formé d'une tige (17) reliée au moyen d'un tiroir (18) rotatif au canal (19) agencé en angle.
4. Radiateur multi-rangées selon la revendication 1, **caractérisé en ce qu'**un galet (20) à commande manuelle, une tige d'actionnement de la tête thermique ou une broche du servo-entraînement sont reliés à la tige (17) de l'élément (14) d'étranglement et/ou de régulation.

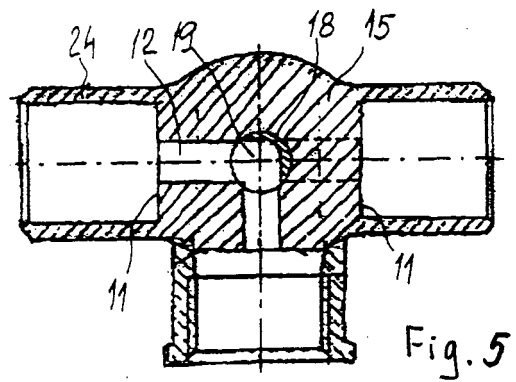
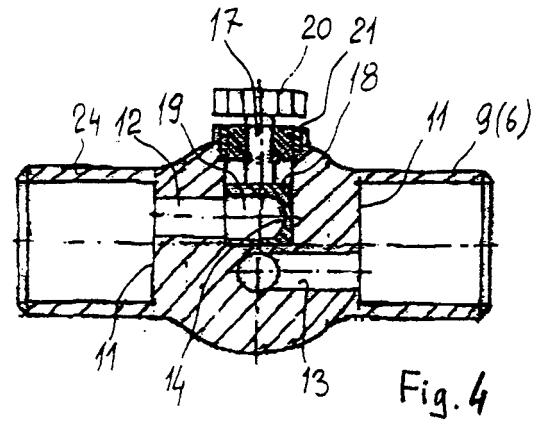
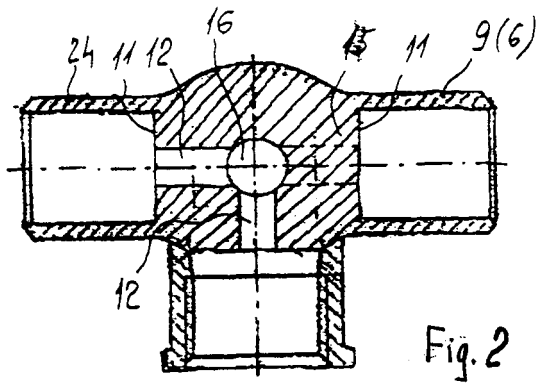
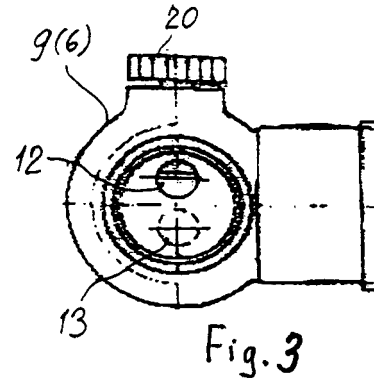
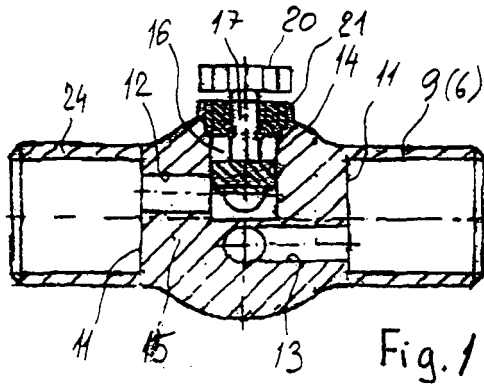
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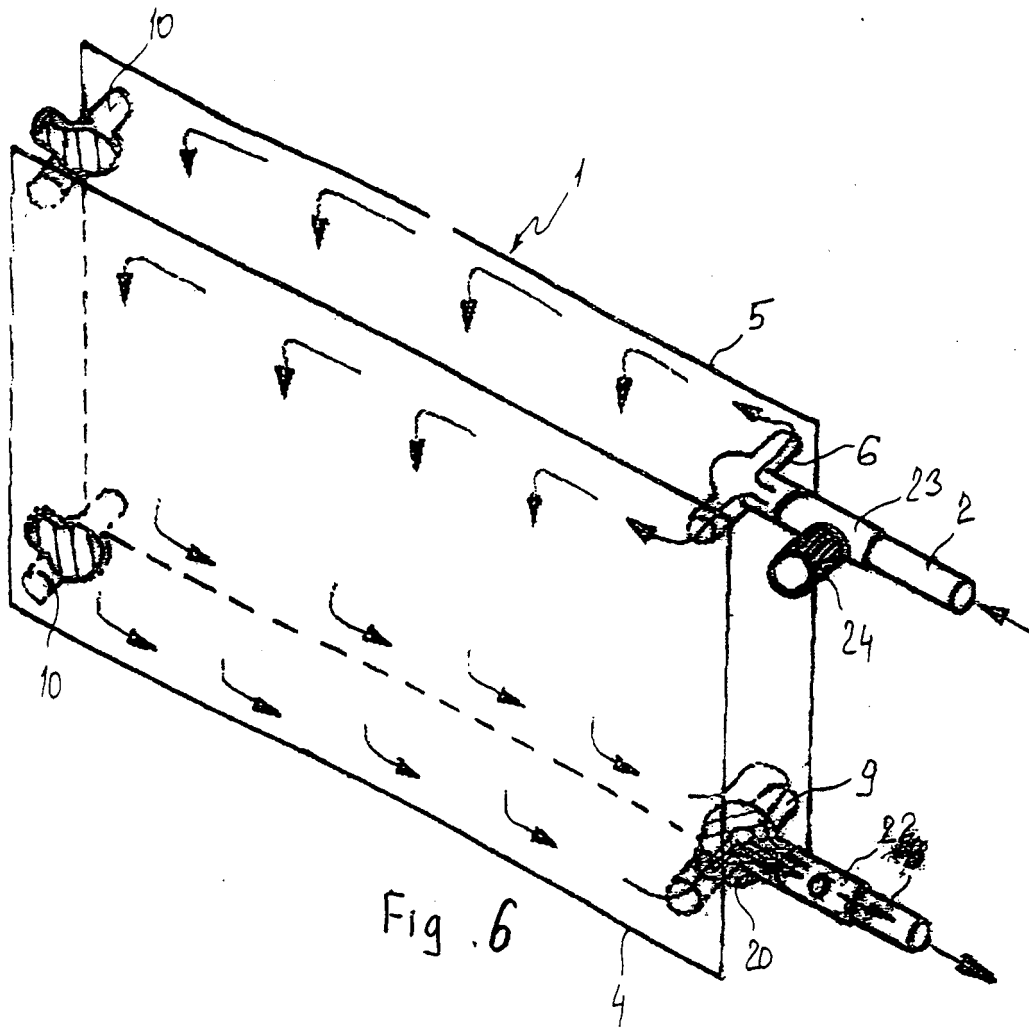
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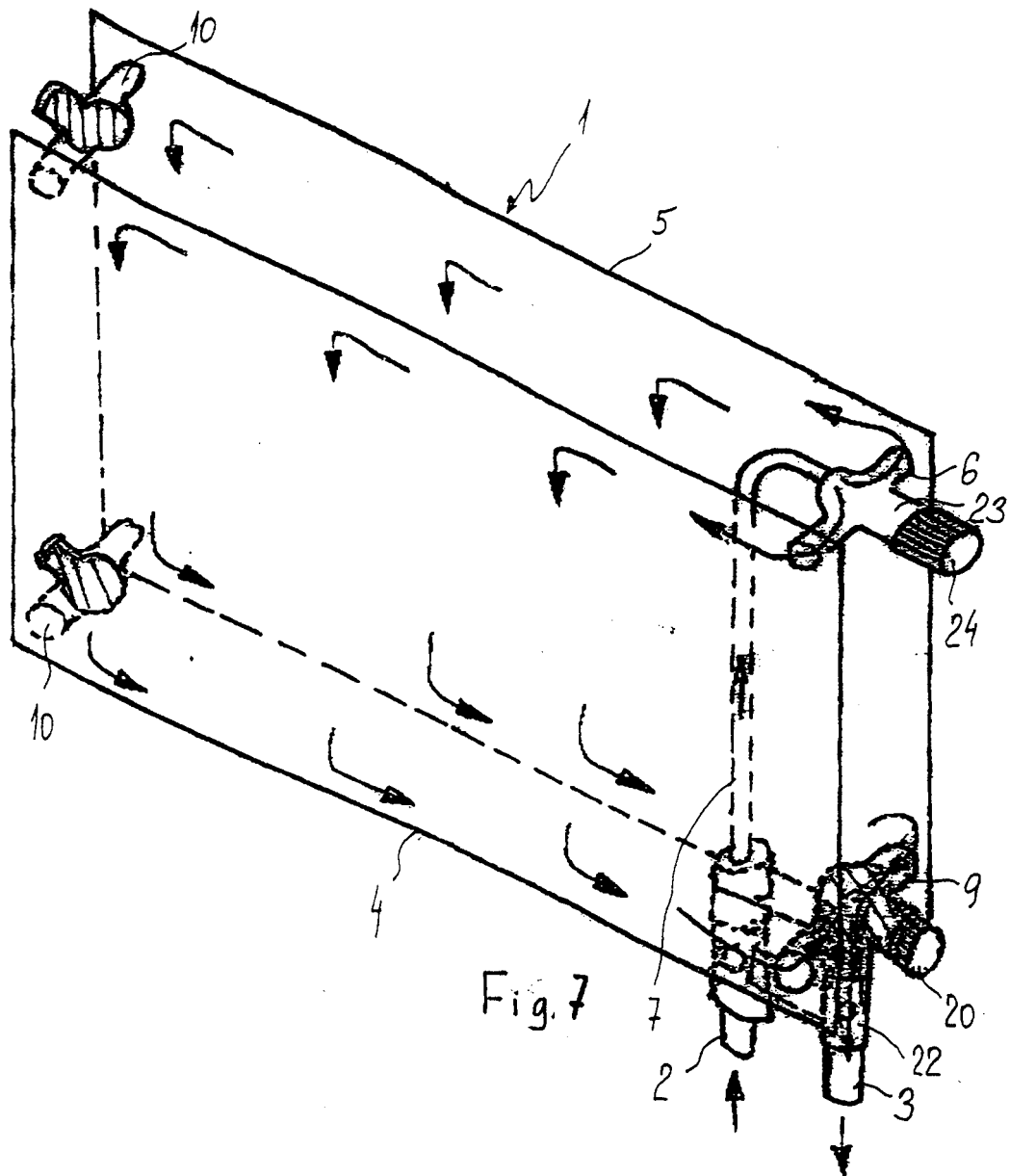
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