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(54) **Method for producing radiant groups for thermal radiators**

Verfahren zur Herstellung von Heizkörpergliedern

Méthode de fabrication de sections de radiateurs

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(56) References cited:
FR-A- 801 452 **FR-A- 1 201 614**
FR-A- 1 425 677 **FR-A- 2 115 497**
FR-A- 2 119 405 **FR-A- 2 220 053**

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Description

[0001] The present invention relates to a method of producing thermal radiators according to the preamble of claim 1. Such a method is known for instance from FR-A-1 201 614.

[0002] Thermal equipment industry, in particular for domestic heating, uses radiators formed by tubular radiant elements arranged vertically and equipped at their ends with relative heads that define suitable reciprocal connection means; the heads are connected one to another by e.g. threaded couplings, provided with suitable sealing means.

[0003] The above mentioned radiant groups are entirely obtained by die-casting or otherwise made of a pair of heads obtained by die-casting, to which a tubular element is connected; in some cases the tubular element is suitably finned so as to improve heat diffusion. The radiant groups obtained in this way are usually expensive.

[0004] Moreover, known radiant groups are often little efficient, as far as heat exchange is concerned, they are also relatively heavy and not always connections are water-tight.

[0005] Document FR-A-1.201.614 relates to a composite element for thermal radiators. A head element is provided, by which four pipes are connected to each other at their ends.

[0006] The head element is made by die casting a fusible material, leaving an hollow space therein. The hollow space inside the head element is obtained by inserting a core that is broken in small pieces, after the head element has cooled, to take it out therefrom. The inside of the head element is therefore not well clean, smooth and perfectly formed. Pieces of the core can remain inside the head element, thus provoking problems during operation or requiring further cleaning operation. Smoothing, finishing and cleaning must be performed while working inside the hollow of the head element, which is rather complicated.

[0007] Document FR-A-1.425.677 discloses a tubular radiator in which vertical pipes are connected to head elements by means of gluing.

[0008] The object of the present invention is to provide a method which allows to obtain cheap end heads for radiant groups of thermal radiators.

[0009] Another object of the present invention is to provide a method for producing safe to use and highly efficient end heads for thermal radiators in simple and economical way.

[0010] The above mentioned objects are obtained in accordance with the content of the claims.

[0011] The characteristics of the invention will be better understood from the following description, with particular reference to the attached drawings, in which:

Figure 1 shows a side, partially sectional view of the body of one head that is used for production

of radiant groups according to the subject method;

Figure 2 is a corresponding plan, partially sectional view;

Figure 3 is a corresponding cross section taken along the plane III-III of the Figure 1;

Figure 4 shows the same view as the Figure 3, of a subsequent production step of the above mentioned head;

Figures 5, 6, 7 and 8 show lateral schematic views of subsequent steps of assembly of the radiant groups, according to the subject method;

Figure 9 shows a corresponding front view of radiant group obtained in this way.

[0012] With reference to the above described figures, the subject method includes first, die-casting of the bodies 20 of a pair of end heads 2 of a radiant group 1. These heads are preferably made of aluminium.

[0013] Each body 20 has a flattened form, with outer corners suitably rounded, and has a cavity 21 extending on a median plane from its top narrow surface. An opening 25 extends along the top surface of the body 20, so that the cavity is open to the outside. The edges of the opening 25 are bevelled.

[0014] In the body 20 there are also made cylindrical channels 22, e.g. 3 like in the example illustrated, which are set in communication with each other because of the cavity 21.

[0015] The channels 22 have circular section and limited axial extension. Moreover, on their inner surface, the channels 22 feature respective shoulders 24.

[0016] The cavity 21 communicates also with a pair of pipe stubs 23, extending from opposite sides of the body 20. The axis of each pipe stub is perpendicular to the median plane of the body.

[0017] The inner surface of the pipe stubs 23 is threaded, so as to form threaded sections 26, so that respective couplings 4 can be screwed thereto for connecting two or more adjacent radiant groups 1.

[0018] At the mouth of the threaded pipe stubs 23, there is made a ring-like seat 27 that houses a suitable seal 5 for the coupling 4 (see Figure 8).

[0019] Afterwards, the cavity 21 of the body 20 is closed on the side opposite to the channels 22 by a shaped plate 28, whose form is complementary to the opening 25; the closing plate 28 is firmly joined to the body 20 by a peripheral welding 29 (Fig. 4).

[0020] In practice, the closing plate 28 has preferably a rounded profile, so as to reconstruct the continuity of the outer surface of said head 2.

[0021] The so made heads 2 are firmly joined by the channels 22 to the opposite ends of a corresponding plurality of tubular radiant elements 3, arranged coaxial

to the same channels 22 (Fig. 5).

[0022] The tubular elements 3 are preferably obtained by extrusion.

[0023] The tubular radiant elements 3 are aimed at being tightly introduced inside the channels 22 and, at their ends, these elements 3 are provided with respective tapered mouths 30, which engage with the narrow part of these channels 22 defined by the relative shoulders 24.

[0024] Respective gaskets 31 are mounted on the mouths 30 for keeping them tight against the above mentioned shoulders 24.

[0025] The tubular radiant elements 3 are firmly joined to the heads 2 by suitable glues, spread on the coupling housings defined by the channels 22 of the heads 2.

[0026] During the gluing step, the so obtained radiant group 1 is put in a vice equipped with a centring device 10 which precisely determines the distance between the centres of said threaded pipe stubs 23 of the heads 2 (Fig. 6).

[0027] The device 10 is substantially formed by a frame 11 equipped, on its ends, with a pair of pegs 12, protruding transversally and aimed at engaging said pipe stubs 23 of the heads 2 of the radiant group 1. The distance between the pegs 12 is adjustable.

[0028] Moreover, on its ends, the device 10 supports respective vices 13 which clamp the above mentioned heads 2 of the radiant group 1.

[0029] Therefore, the radiant group 1 is mounted on the device 10 by introducing the pegs 12, whose distance is precisely determined, into the pipe stubs 23 of the heads 2 and then by tightening these heads 2 between the vices 13 (Fig. 7).

[0030] The radiant group 1 is kept in the vice for a period of time sufficient for completing the step of gluing the tubular elements 3 to the heads 2.

[0031] Then, different radiant groups 1 are reciprocally fastened, so as to form the thermal radiator, by the couplings 4 which are screwed into the threaded pipe stubs 23 of the heads 2 (Fig. 8).

[0032] The couplings 4 feature, in known way, sections threaded in opposite directions, separated by the above mentioned seal 5.

[0033] The couplings 4 are preferably obtained from a metallic sheet, as disclosed in the Patent Application No. BO95A 000175, filed by the same Applicant.

[0034] Therefore, the subject method allows to obtain, in a simple way, radiant groups for heat radiators, formed by a pair of end die-cast heads and a plurality of tubular radiant elements.

[0035] In the illustrated case, the above mentioned radiant groups support three tubular elements between the heads.

[0036] Anyway, more tubular elements arranged in line can be provided, the number of which depends on requirements.

[0037] These tubular elements can be arranged not only in one line, but also in two or more lines, by provid-

ing the end heads with a corresponding number of channels connecting with these tubular elements.

[0038] Obviously, the length of the tubular elements can vary in relation to use specifications.

[0039] The production of radiant groups according to the described method is cheap, since they are produced by a limited number of simple operations and with a considerable material saving, in particular in correspondence to the end heads.

[0040] The last feature results in advantageous lightness of the radiant groups, which facilitates their transport and assembling.

[0041] The claimed invention provides for an opening made in the top wall of the end head. The opening left in the top wall permits to obtain the inside hollow by means of a rigid core, which is made from hard material. The rigid core can be very smooth and is each time surely fully removed. Therefore, the head thus obtained do not need any operation in the inside, neither cleaning nor finishing.

[0042] The position of the opening, the top wall, makes it possible to place therein a plate, e.g. with slanting edges, and to weld it very easily. Then a finishing operation is required, e.g. machining, to smooth the region of the welding, but these operation are carried out on the outside of the head, therefore very easily and quickly. Moreover, the result of the further operation is readily apparent without any need of special devices do get sight of the inside of the head. There is also no risk of leaving a part of the core inside the head.

[0043] An important feature of the radiant groups obtained according to the subject method is their best heating efficiency.

[0044] Moreover, these radiant groups are really tight, are easy to assemble and look pleasant, mainly due to the absence of sharp corners.

Claims

1. Method for producing end heads for radiant groups for thermal radiators, the method including:

die-casting of the bodies (20) of a pair of end heads (2) of a radiant group (1), with each one of said body (20) having a cavity (21) and a plurality of parallel channels (22) formed therein and set in communication with each other by said cavity, and with a pair of pipe stubs (23) extending from opposite sides of said body (20) and opening into said cavity;

threading of said pipe stubs (23), so that respective couplings (4) can be screwed thereto for connecting the adjacent radiant groups (1);

firm joining of the tapered mouths (30) of respective tubular radiant elements (3), to said

channels (22) of the heads (2), so that said tubular elements are arranged coaxial with the channels (22);

the method being **characterised in that** said cavity (21) of said body (20) has an opening (25) in the region of the top surface of said body, which opening is then closed by a shaped plate (28), whose form is complementary to said opening (25) of said cavity (21), said closing plate (28) being firmly joined to said body (20) by a peripheral welding (29), so as to reconstruct the continuity of the outer surface of said head (2).

2. Method, according to claim 1, **characterised in that** said respective tubular radiant elements (3) are joined to said channels (22) of said heads (2) by being glued to the coupling housings defined by these channels (22), said housings having relative shoulders (24) that define corresponding narrowed portions of said channels (22), with which said tapered mouths (30) of said tubular elements (3) engage.
3. Method, according to claim 1, **characterised in that**, during the joining of said tubular radiant elements (3) to said channels (22), the radiant group (1) is put in a vice on a centring device (10) that maintains the distance between the centres of said threaded pipe stubs (23) of said end heads (2), said device (10) being equipped, on its ends, with a pair of pegs (12), protruding transversally and with adjustable distance, aimed at engaging said pipe stubs (23).

Patentansprüche

1. Verfahren zum Herstellen von Kopfstücken für Heizkörperglieder von Heizkörpern, welches Verfahren die folgenden Schritte aufweist:

das Gehäuse (20) eines Paares von Kopfstücken (2) eines Heizkörpergliedes (1) wird gegossen, wobei jedes der Gehäuse (20) einen Innenraum (20) und mehrere parallele Kanäle (22) hat, die darin gebildet sind und durch den Innenraum miteinander in Verbindung stehen, und wobei zwei Rohrstutzen (23) von entgegengesetzten Seiten des Gehäuses (20) aus verlaufen und in den Innenraum hinein offen sind;

die Rohrstutzen (23) werden mit Gewinde versehen, so dass entsprechende Kupplungen (4) zwecks Verbindung mit benachbarten Heizkörpergliedern (1) mit ihnen verschraubt werden können;

die schräg verlaufenden Anschlussöffnungen (30) entsprechender Heizkörper-Rohrstücke (3) werden mit den Kanälen (22) der Kopfstücke (2) fest verbunden, so dass die Rohrstücke koaxial zu den Kanälen (22) angeordnet sind; welches Verfahren **dadurch gekennzeichnet ist, dass** der Innenraum (21) des Gehäuses (20) im Bereich der Oberseite des Gehäuses eine Öffnung (25) hat, die dann von einer geformten Platte (28) verschlossen wird, deren Form komplementär zu der Öffnung (25) des Innenraums (21) ist, wobei die Verschlussplatte (28) mit dem Gehäuse (20) durch eine Umfangsschweißung (29) fest verbunden wird, um die Kontinuität der Außenfläche des Kopfstückes (2) wieder herzustellen.

2. Verfahren nach Anspruch 1, **dadurch gekennzeichnet, dass** die entsprechenden Rohrstücke (3) mit den Kanälen (22) der Kopfstücke (2) dadurch verbunden werden, dass sie mit den von diesen Kanälen (22) gebildeten Kupplungsgehäusen verklebt werden, wobei die Kupplungsgehäuse Schultern (24) haben, die entsprechende verengte Abschnitte der Kanäle (22) bilden, an denen die schräg verlaufenden Anschlussöffnungen (30) der Rohrstücke (3) angreifen.
3. Verfahren nach Anspruch 1, **dadurch gekennzeichnet, dass** während der Verbindung der Rohrstücke (3) mit den Kanälen (22) das Heizkörperglied (1) in einen Spannrahmen an einer Zentrier- vorrichtung (10) eingesetzt wird, die den Abstand zwischen den Mittelpunkten der mit Gewinde versehenen Rohrstutzen (23) der Kopfstücke (2) aufrecht erhält, wobei die Zentriervorrichtung (10) an ihren Enden mit zwei Dornen (12) versehen ist, die in Querrichtung und mit verstellbarem Abstand vorstehen, um mit den Rohrstutzen (23) in Eingriff zu treten.

Revendications

1. Procédé de fabrication de têtes terminales pour sections radiantes de radiateurs thermiques, le procédé comprenant les étapes consistant à :

couler sous pression les corps (20) d'une paire de têtes terminales (2) d'une section radiante (1), chacun desdits corps (20) comportant une cavité (21) et plusieurs canaux parallèles (22) formés à l'intérieur de celle-ci et positionnés de manière à communiquer entre eux par l'intermédiaire de ladite cavité, et une paire de bouts (23) de tuyaux, dans le prolongement des côtés opposés dudit corps (20), s'ouvrant dans ladite cavité ;

fileter lesdits bouts (23) de tuyaux de sorte que des raccords (4) respectifs puissent y être visés afin de raccorder les sections radiantes (1) adjacentes ;

raccorder solidement les bouches coniques (30) des éléments radiants tubulaires (3) respectifs auxdits canaux (22) des têtes (2), de sorte que lesdits éléments tubulaires sont disposés coaxialement par rapport aux canaux (22) ;

le procédé étant **caractérisé en ce que** ladite cavité (21) dudit corps (20) comporte une ouverture (25) dans la région de la surface supérieure de ce dernier, cette ouverture étant ensuite fermée par une plaque façonnée (28) dont la forme est complémentaire de ladite ouverture (25) de ladite cavité (21), ladite plaque de fermeture (28) étant raccordée solidement audit corps (20) par une soudure périphérique (29), ce qui permet de reconstruire la continuité de la surface extérieure de ladite tête (2).

2. Procédé selon la revendication 1, **caractérisé en ce que** lesdits éléments radiants tubulaires (3) respectifs sont raccordés auxdits canaux (22) desdites têtes (2) en étant collés aux logements d'accouplement que définissent ces canaux (22), lesdits logements comportant des parties épaulées (24) relatives qui définissent des portions rétrécies correspondantes desdits canaux (22) avec lesquelles lesdites bouches coniques (30) desdits éléments tubulaires (3) s'accouplent.

3. Procédé selon la revendication 1, **caractérisé en ce que**, pendant le raccordement desdits éléments radiants tubulaires (3) auxdits canaux (22), la section radiante (1) est placée dans un étau sur un dispositif de centrage (10) qui maintient la distance entre les centres desdits bouts (23) de tuyaux filetés desdites têtes terminales (2), ledit dispositif (10) étant équipé en ses extrémités d'une paire de chevilles (12), transversalement en saillie et à distance réglable, destinées à s'engager dans lesdits bouts (23) de tuyaux.

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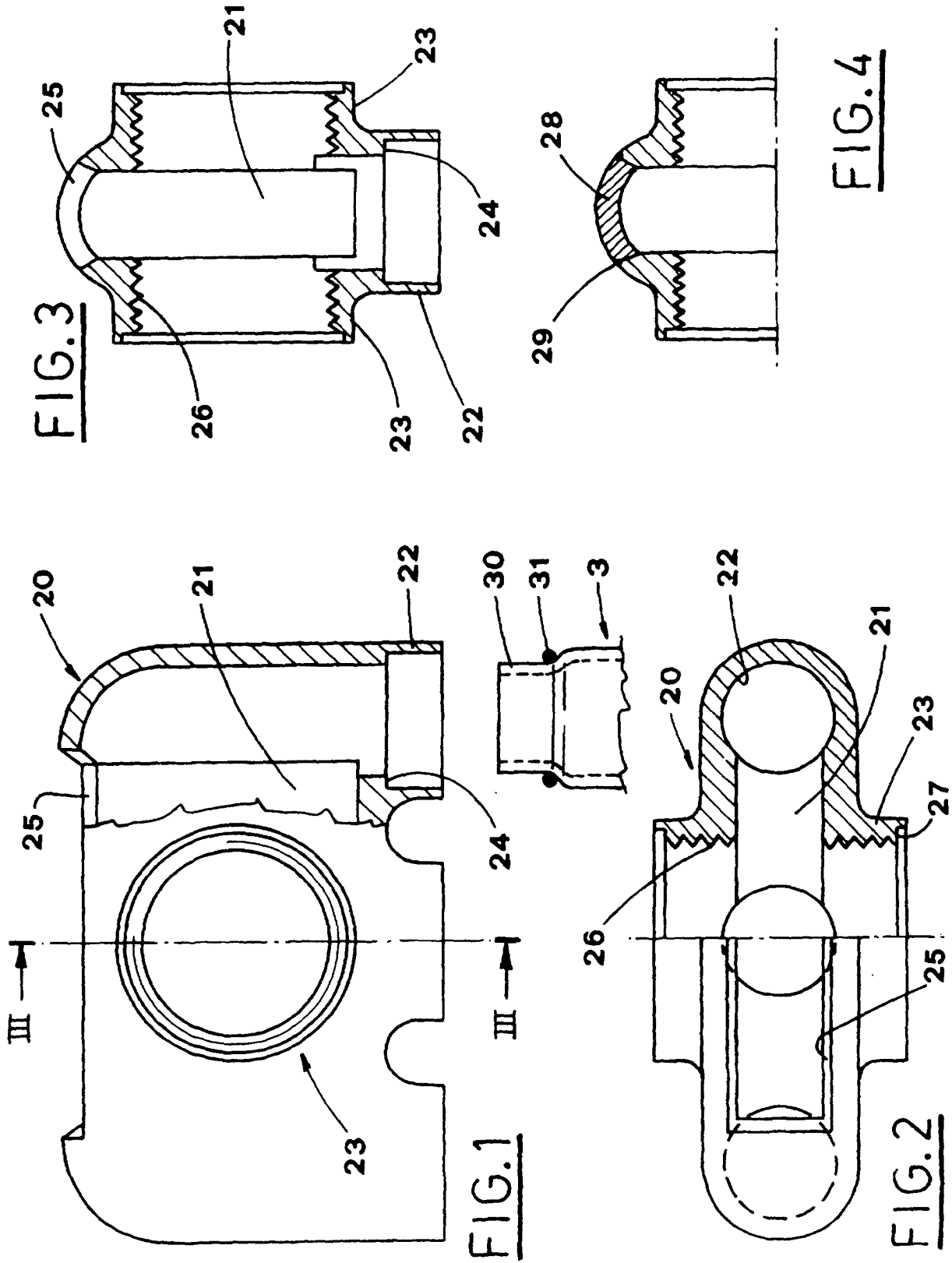


FIG. 5

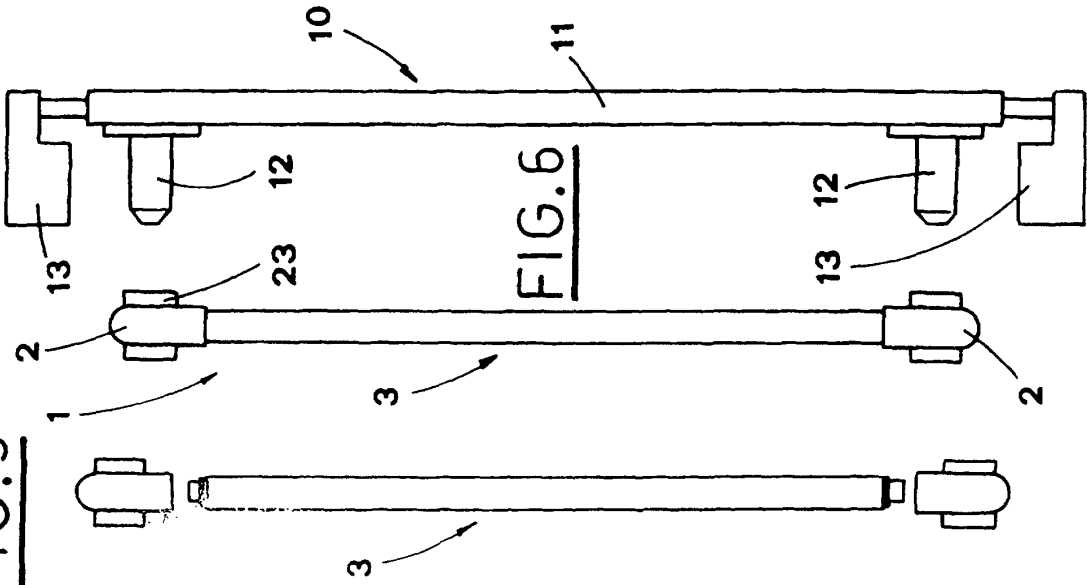


FIG. 6

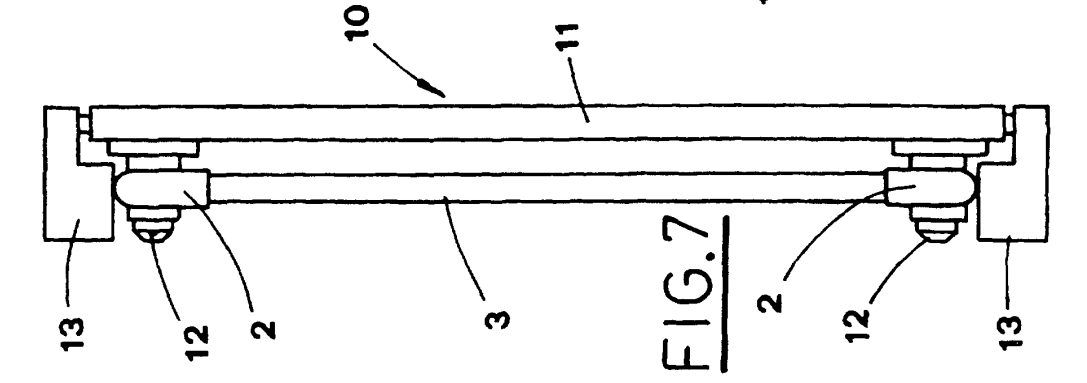


FIG. 7

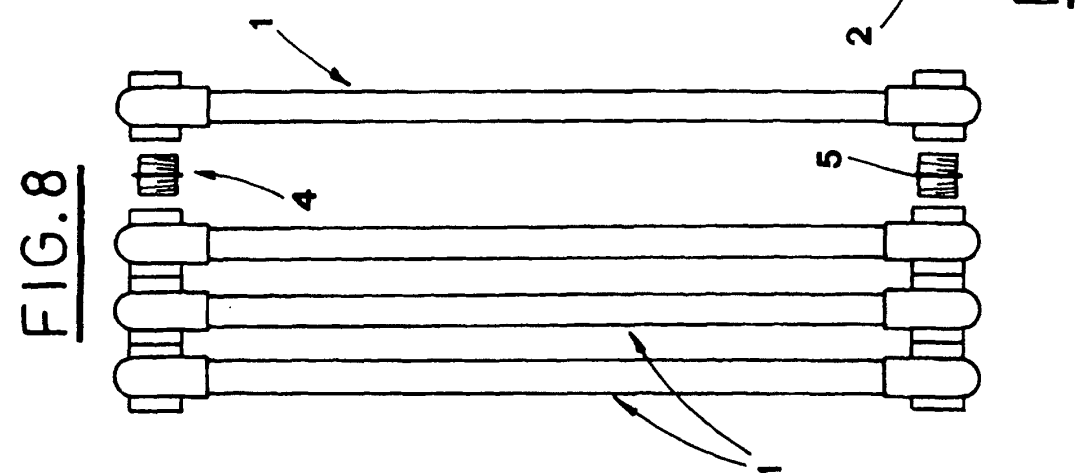


FIG. 8

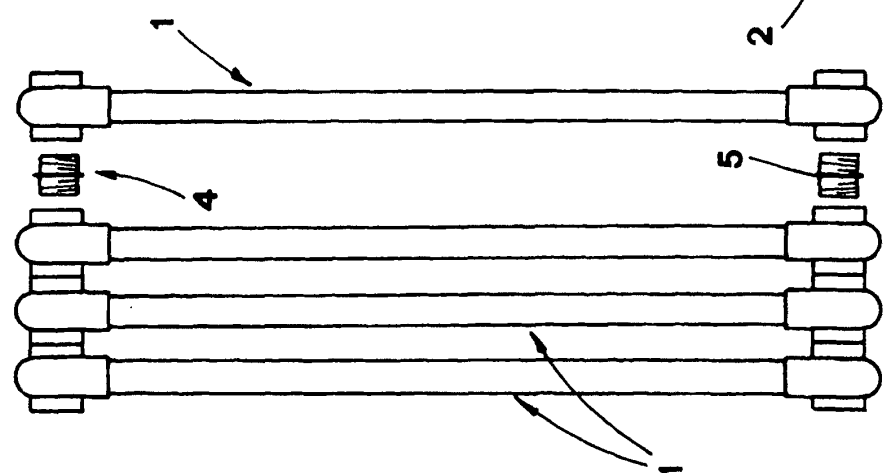


FIG. 9

