(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 085 284 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
21.03.2001 Bulletin 2001/12

(51) Int Cl.[7]: **F28D 1/053**, F28F 9/02, F28F 9/26, F28F 9/14

(21) Application number: **00830558.3**

(22) Date of filing: **03.08.2000**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **17.09.1999 IT BS990089**

(71) Applicant: **Ballardini, Claudio**
38070 Ragoli (Trento) (IT)

(72) Inventor: **Ballardini, Claudio**
38070 Ragoli (Trento) (IT)

(74) Representative: **Manzoni, Alessandro**
MANZONI & MANZONI,
UFFICIO INTERNAZIONALE BREVETTI,
P.le Arnaldo 2
25121 Brescia (IT)

(54) Structure for radiators and/or towel warmers consisting of modular elements

(57) This invention concerns a structure for heating appliances with fluid circulation, such as radiators and/or towel warmers. It consists of a number of radiator bodies made of tubes or columns (13) connected to end heads (12). Each head (12) consists of head modules (14) joined in line, with two or more connecting branches (17) for fastening to the tubes or columns (13). Each head module (14) consists of two complementary and facing elements, which are fixed together longitudinally along the facing parts, each one having at least one perforated branch (17) that communicates with said collector-hole and with the tube fixed to the branch itself.

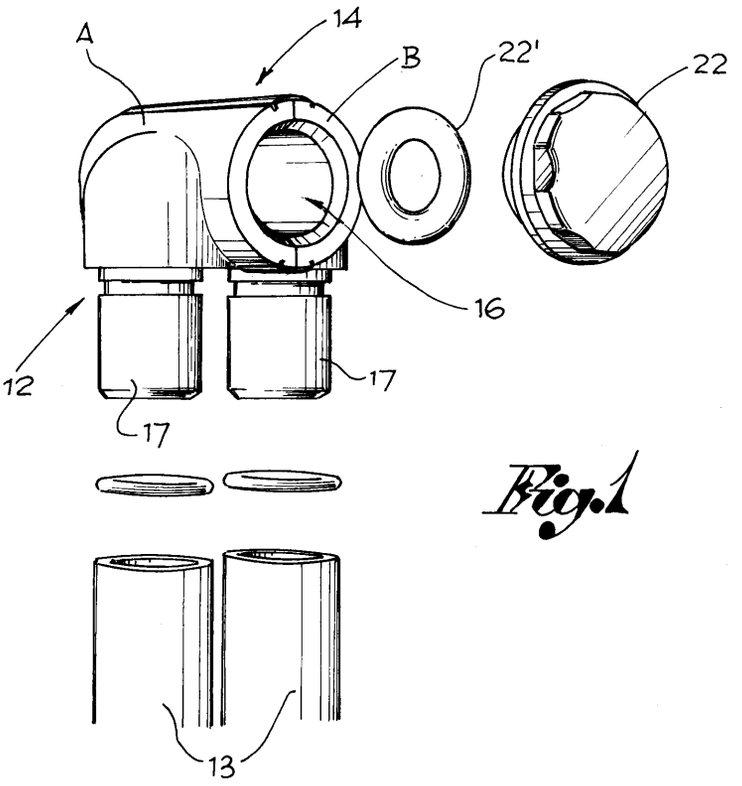


Fig.1

EP 1 085 284 A2

Description

[0001] This invention concerns the sector of radiators for heating systems or towel warmers with fluid circulation and, in particular, the manufacture of such devices using modular elements.

[0002] There already exist various models of radiators or towel warmers, from those with heads and elements or bodies extruded in aluminium, to those composed of tubular elements in steel, for example.

[0003] However, it is the purpose of this invention to propose a new way of making radiators and/or towel warmers that will bring significant improvements and simplify the technique of manufacturing, assembling and composition of these devices, and, what is more, without requiring the use of complex and costly machinery and the initial heavy capital outlay at the beginning.

[0004] Another aim of the invention is to supply a radiator or towel warmer with a practical and easy composition, based on modular elements that may be made in metal or even in plastic, at least partially, and in such a way as to allow the formation, when necessary, of devices with 2, 3, 4 or more tubes or columns, employing each time the same components as used for the heads.

[0005] Said aims are achieved by a structure for radiators and/or towel warmers as described in claim 1.

[0006] The advantages of the present invention can be summarised as follows:

- modular composition of heating devices without need for special equipment,
- use of pre-formed components, that is, pieces forged by simple and relatively economic machinery;
- the need for fewer warehouse parts, since the appropriate use of a few modular components will suffice for devices of various sizes and thermal capacity, even for low temperatures;
- components that are easy to assemble and maintain, with the possibility of replacing them, even partially, without having to dismantle the whole appliance;
- versatility in combining the components, both horizontally and vertically, to form heating devices with a number of different tubes;
- water-tight and mechanically reliable, whatever the method of coupling;
- elimination of the phenomenon of stray currents thanks to a proper choice of materials;
- the possibility of enclosing the heads in covers made in various shapes and/or colours.

Greater detail about the invention will become clear from the following description, made with reference to the enclosed drawings, which are indicative but not binding, and where:

Fig. 1 shows a first module of a radiator head for two tubes;

Fig. 2 shows another module of a radiator head for three tubes;

Fig. 2a is a view of the two separate elements that compose the head module in Fig. 2;

Fig. 2b shows, separately and in cross-section, two finishing covers designed to enclose the head module in Fig. 2;

Fig. 2c shows a cross-section of the finishing covers applied to the head module;

Fig. 3 shows yet another module for a radiator head for four tubes;

Figs 4, 5, 6, 7, 8 and 9 each show views of heating devices for assembling, with a choice of the head modules in Figs 1-3;

Fig. 10 is a view of a head module designed for connecting to adjacent head modules by means of internal nippling;

Fig. 11 is a similar view of a head module for connection to adjacent head modules by means of external nippling;

Figs 12, 13 and 14 each show ways of connecting a tube to a head;

Fig. 15 shows a heating appliance in the form of a towel warmer and with collectors formed by tubes;

Fig. 16 shows the view of a collector tube for the appliance in Fig. 15;

Fig. 17 shows a washer to be used in the assembled model in Fig. 15; and

Fig. 18 shows a different version of the heating appliance that can be obtained.

[0007] A heating appliance according to the invention consists of a number of radiator bodies 11, set side by side in parallel and with an end head 12.

[0008] Each radiator body 11 consists of two, three, four or more columns or tubes 13, parallel and co-planar, which may be in aluminium, steel or other compound, plasticised internally, etc., and may be round, elliptical or similar in cross-section.

[0009] Each head 12 consists of head modules 14 that can be connected together in line, directly or by means of a tube 15, as explained below.

[0010] The heads may be horizontal and the tubes or columns vertical, in the making of radiators for heating systems, or, on the contrary, the heads may be vertical and the tubes or columns horizontal for special installations or requirements, for example in towel warmers.

[0011] In any case, the head modules 14 are each composed of two elements, A and B, which are complementary, opposite each other, coupled longitudinally and fastened together to define a collector hole 16 and as many joint branches 17 as there are tubes or columns 13 for each radiator body. Each branch is perforated and communicates with the collector hole 16 and may be round, elliptical or otherwise in shape, according to the form of the tubes or columns to which it is connected.

[0012] In one version, each head module 14 consists

of two symmetrical elements A and B. each with a single branch 17 for connecting to a tube 13, in such a way as to form radiator bodies 11 that each have two tubes 13 - Figs 1 and 4.

[0013] In another version, each head module 14 consists of a first element A with a single branch 17 for connecting to a tube 13, and a second element B, opposite the first one and with two branches 17 for connecting to another two tubes 13, so as to form radiator bodies 11, each with three tubes - Figs 2 and 5.

[0014] In a further version, each head module 14 consists of a first element A with a single branch 17, and another element B, opposite the first one and with three branches 17, for connecting to three tubes 13, so as to form radiator bodies 11, each with four tubes - Figs 3 and 7.

[0015] The basic elements for building the heads are essentially three: one, two or three branches for connecting to a similar number of tubes, thereby forming radiator bodies with a varying number of tubes or columns, as described above.

[0016] Clearly then, by coupling two elements B', both with two branches 17, it is possible to create radiator bodies with four tubes or columns - Fig. 6; by coupling two elements, B' and B", to two and three branches, respectively, it is possible to create radiator bodies with five tubes or columns - Fig. 8; by coupling two B" elements, both with three branches, it is possible to compose radiator bodies with six tubes or columns - Fig. 9. In addition, it is even possible, where necessary, to prepare head elements with four or more branches for other combinations of radiator bodies, although heating appliances with over six tubes or columns are not often requested.

[0017] Anyway, the two elements (A, B; A, B'; A, B", etc.) of each head module 14 are joined together by means of abrasion plates 18 running along the facing parts of the elements themselves, or by ring elements - not shown. This washer ensures that the coupling is mechanically reliable and water-tight. In order to further improve the washer, the facing parts of the elements of each module may be furnished with means of reciprocal tapping.

[0018] Each tube 13 couples with the respective branch 17 of a head module 14 and is fastened to the branch itself either by gluing, or mechanically by chamfering or burnishing, with the insertion of one or more water-tight washers 19. Figs 12-14 illustrate examples of the mechanical fastening, where each branch 17 has at least one throat 17' on the external surface and each tube 13 has at least one part 13' deformed mechanically in such a way as to catch in said throat 17', and where one or two washers 19 are foreseen on one or opposite sides of the throat or throats to ensure that the point is water-tight.

[0019] The radiator bodies 11, once they have been formed by fastening the ends of the tubes or columns 13 to the modular head elements, which are, in turn, joined together, are then assembled to make the desired heating appliance.

[0020] In one version, the assembly is carried out by fixing the head modules 14 directly together in line, by means of nippling and with the insertion of a washer. This connection can be obtained with an internal nippling, using nipples 20 screwed into the collector hole 16 of the adjacent head modules, which have been previously threaded - Fig. 10. As an alternative, this connection can be achieved with an external nippling and the use of nipples 21 screwed onto parts of the adjacent head modules which are threaded externally - Fig. 11.

[0021] The ends of each head may be closed by a cap 22, with relative grommet 22'.

[0022] In another version, several radiator bodies 11 may be assembled by using tubes 15, which act as collectors at the level of the heads.

[0023] Each tube-collector 15 is equipped with radial holes 15' - Fig. 16 - and the head modules 14 of the radiator bodies 11 with two, three or more tubes or columns 13 are threaded onto said tube 15 and each positioned over a hole 15', with a washer 23 placed in-between to make it water-tight as well as fastening the respective module to the tube. As can be seen from Fig. 17, part of the washer 23 has a rounded edge 24 which is designed to fit a housing inside the head module, and a stem 25 designed to enter the hole 15' of the tube, where it is held fast. Therefore, by varying the distance between the holes 15' of the tube 15, it is possible to distance the radiator bodies 11, creating towel warmer structures with various shapes, one example being shown in Fig. 15.

[0024] It should also be noted that by using one of the modular elements A, B' or B" and a complementary flange 26, with which it is coupled rather than with another modular element, it is possible to obtain an asymmetric structure for the heating appliance, where the tubes or columns are all located to one side of the collectors of the respective heads.

[0025] The elements A, B, B' and B" which make up the head modules may be produced in aluminium, steel or plastic. It is even possible for each one to be formed by an internal shell in metal and an external finishing shell C in plastic, in the shape and colour preferred - Figs 2b, 2c.

[0026] Finally, where requested, the elements that make up the head modules 14 may be soldered, for greater stability, where the assembled whole uses nippling, especially if internal.

Claims

1. Structure for heating appliances with fluid circulation, such as radiators and/or towel warmers, consisting of numerous radiator bodies made from tubes or columns (13) connected to end heads (12), characterised by the fact that each head (12) con-

sists of head modules (14) joined together in line and with two or more connecting branches (17) for fixing said tubes or columns (13) and where each head module (14) is made of two complementary and facing elements (A, B, B', B"), which are fixed together longitudinally along facing parts, defining together a collector hole (16) and where they each have a perforated branch (17), which communicates with said collector hole and with the tube fixed to the branch itself.

2. Structure for heating appliance according to claim 1, in which a head module (14) consists of two symmetrical elements (A, B) fixed together longitudinally and each having a single connecting branch.

3. Structure for heating appliance according to claim 1, in which a head module (14) consists of a first element (A), with a single connecting branch (17), and a second element (B'), with two connecting branches, the first and second elements (A and B) being fastened together longitudinally.

4. Structure for heating appliance according to claim 1, in which a head module (14) consists of one element (A) with a single connecting branch (17) and another element (B") with three connecting branches (17), the two modular elements (A and B") being fastened together longitudinally.

5. Structure for heating appliance according to claim 1, in which a head module (14) consists of two symmetrical modular elements (B, B'), each having two connecting branches and being fixed together longitudinally.

6. Structure for heating appliance according to claim 1, in which a head module (14) consists of two symmetrical modular elements (B", B"), each having three connecting branches (17) and being fixed together longitudinally.

7. Structure for heating appliance according to claim 1, in which a head module (14) consists of one modular element (B'), with two connecting branches (17), and another modular element (B"), with three connecting branches (17), said elements (B', B") being fastened together longitudinally.

8. Structure for heating appliance according to any of the claims 1-7, in which the two complementary elements of each head module are fastened together longitudinally by means of abrasion plates that straddle both facing parts of the two elements or by means of ring elements.

9. Structure for heating appliance according to any of the claims 1-7, in which the two complementary elements of each head module are fastened together by means of soldering or gluing.

10. Structure for heating appliance according to any of the claims 2-9, in which the head modules (14) are connected directly in line by means of nippling, with either internal or external joint nipples.

11. Structure for heating appliance according to claim 1 and any of the other claims 2-9, in which the head modules (14) are threaded and aligned along a tube-collector (15), with radial holes (15'), where each head module is positioned according to a hole in said tube and held fast in that position by means of a washer (23), which makes the point mechanically tight and leak-proof, and where the radiator bodies can be varied in their distance apart according to the position of said holes in the tube.

12. Structure for heating appliance according to any of the previous claims, in which each tube or column (13) is fixed to the respective branch (17) of a head module, by mechanical means or glue, by chamfering or burnishing, and with the positioning of at least one water-tight washer in-between.

13. Structure for heating appliance according to any of the previous claims, in which the elements of each head module are enclosed in finishing covers.

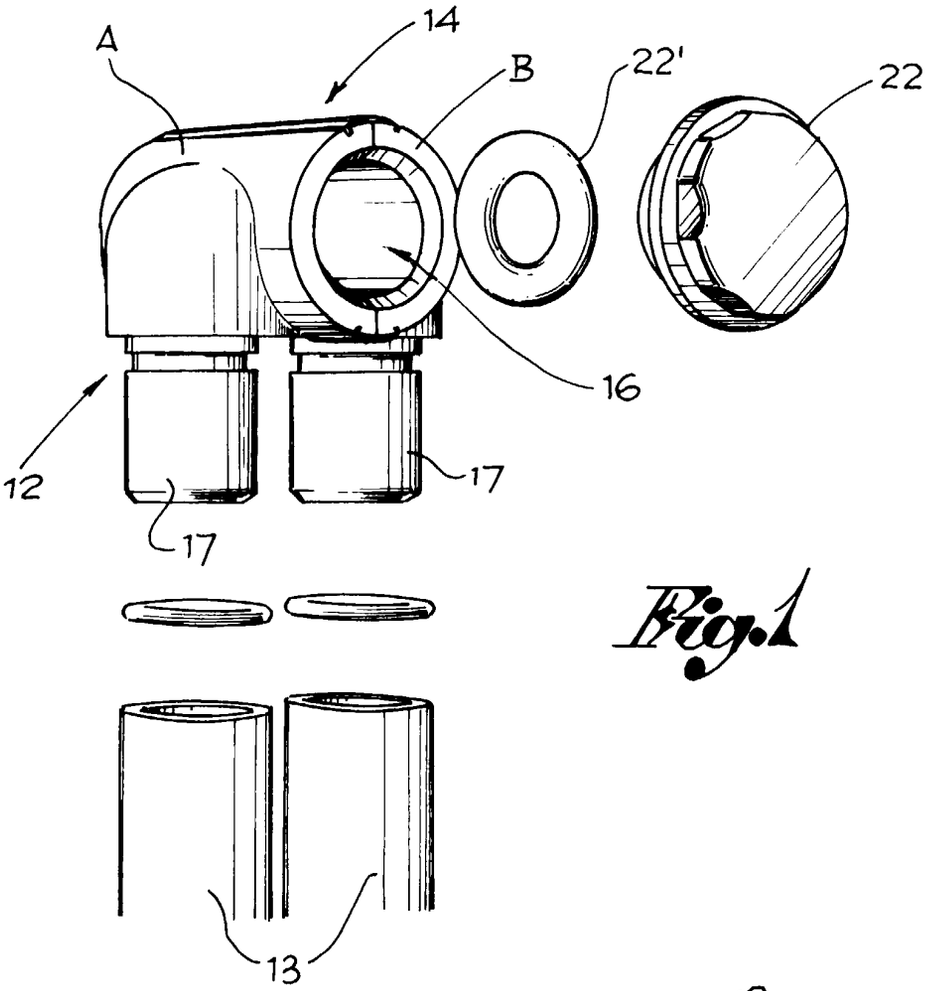


Fig.1

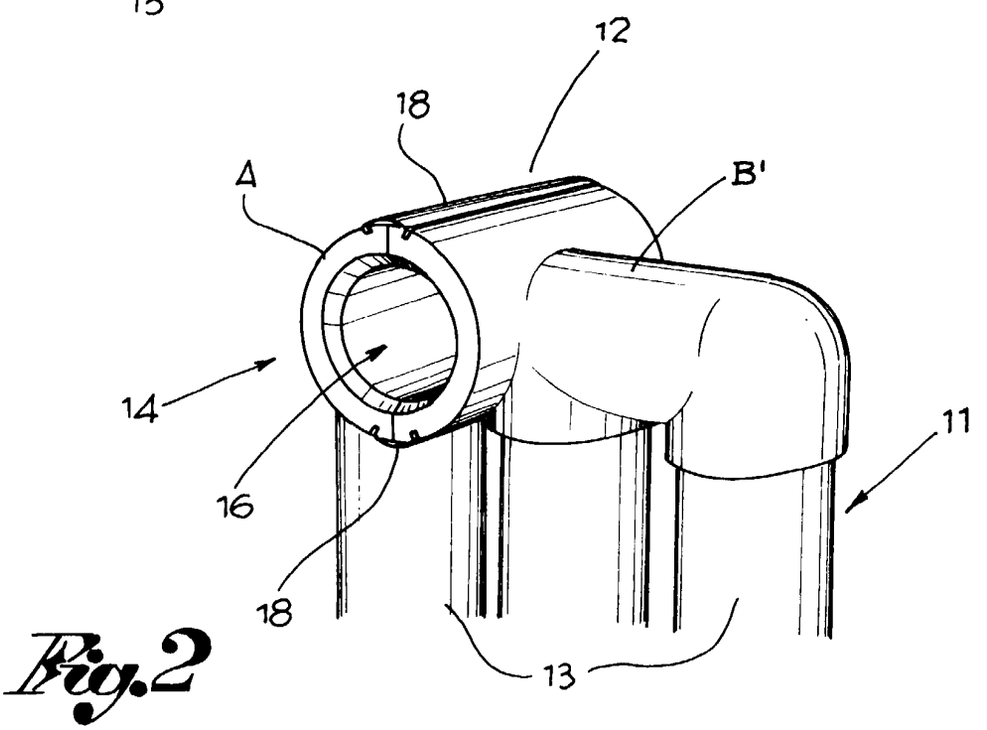


Fig.2

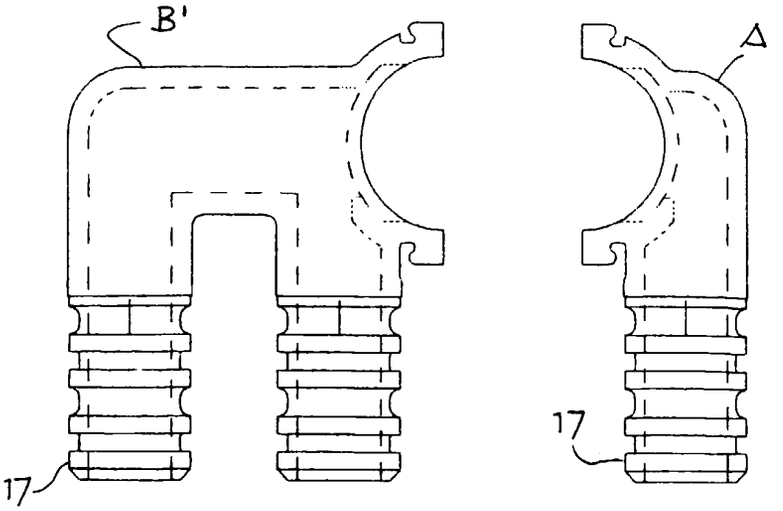


Fig. 2a

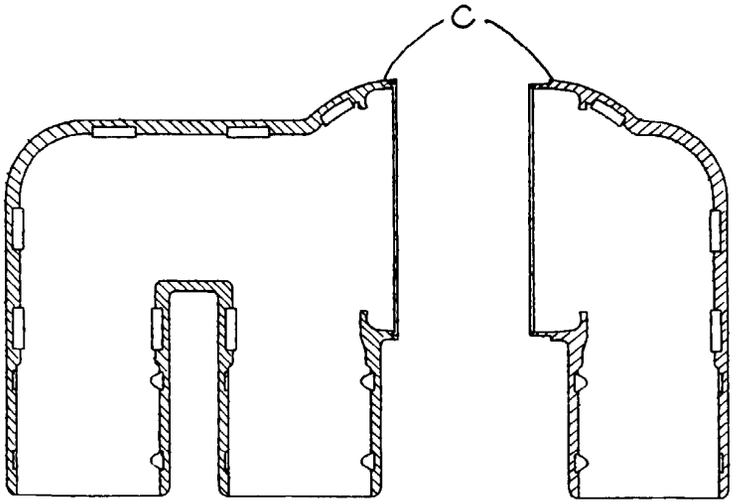


Fig. 2b

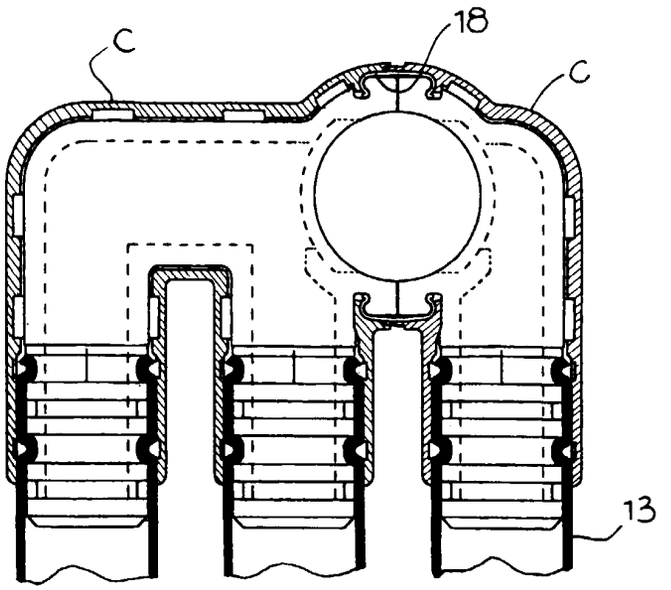


Fig. 2c

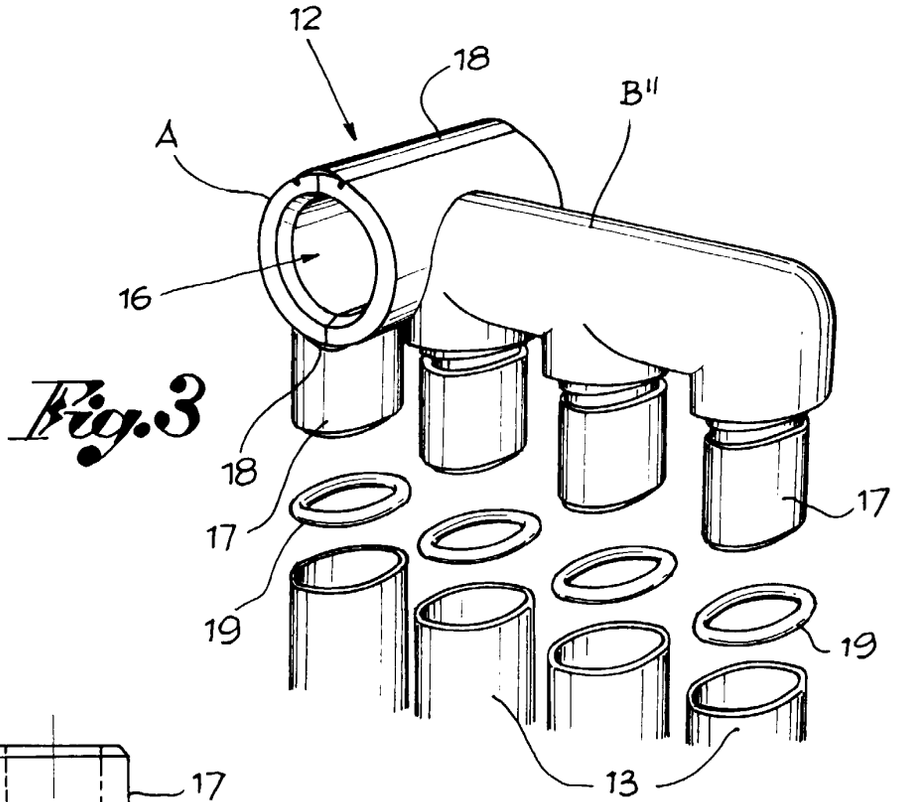


Fig.3

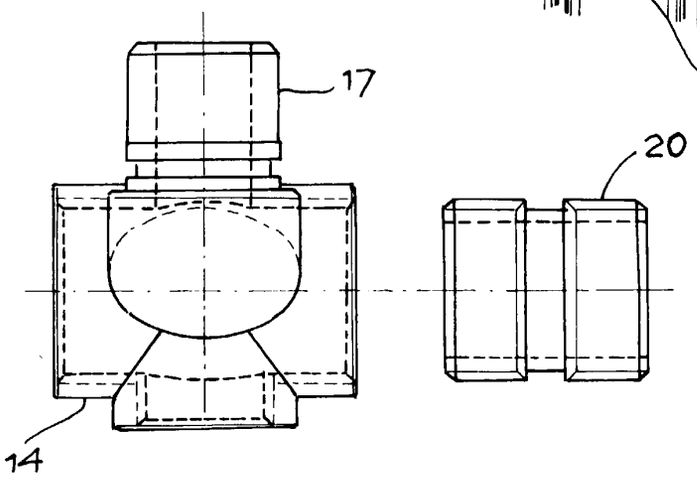


Fig.10

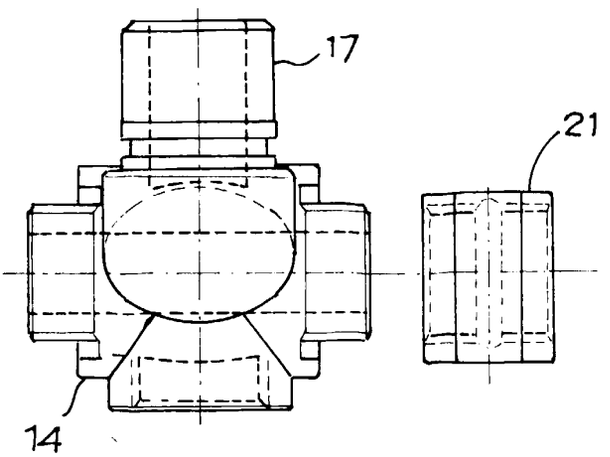


Fig.11

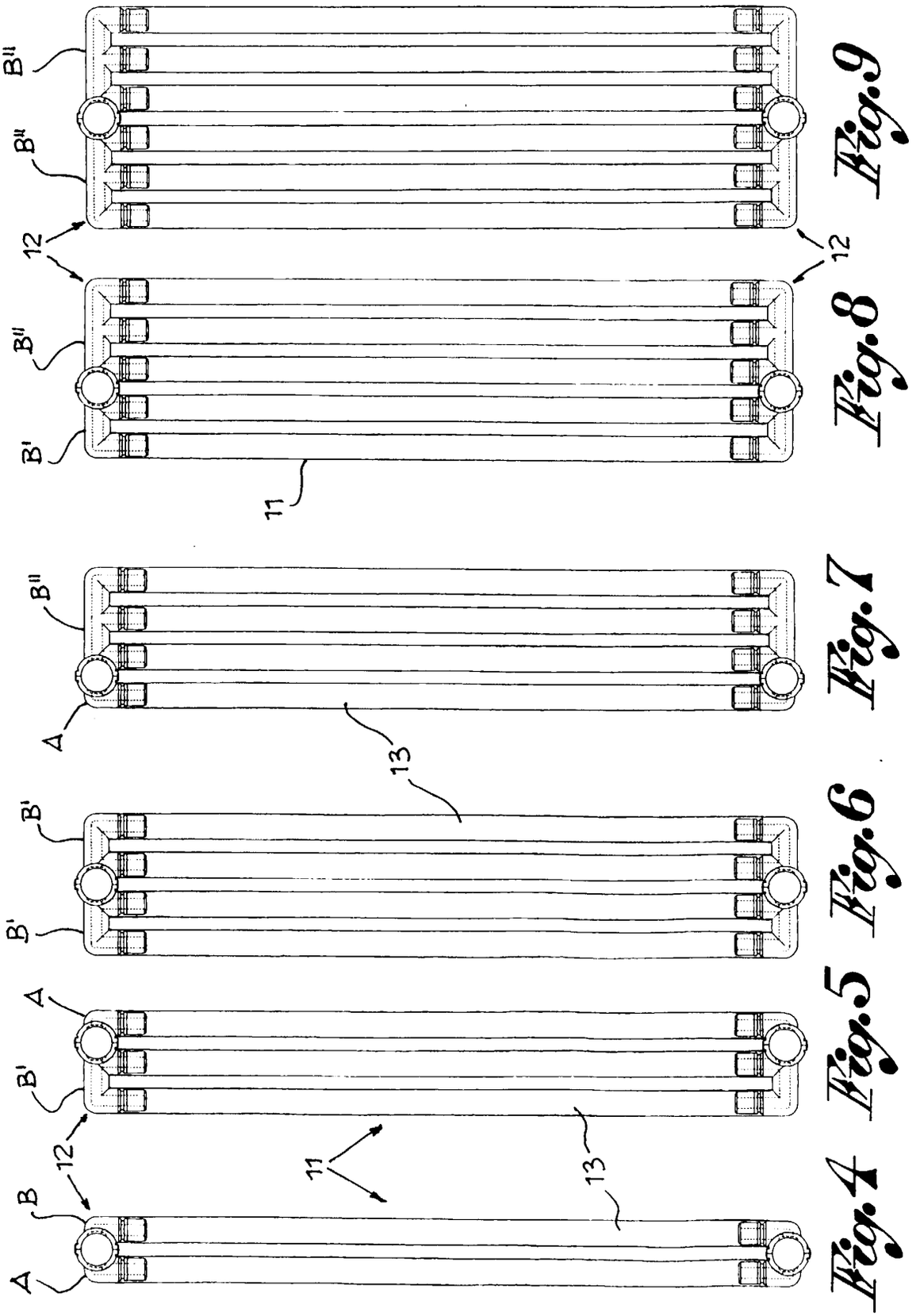


Fig.9 Fig.8 Fig.7 Fig.6 Fig.5 Fig.4

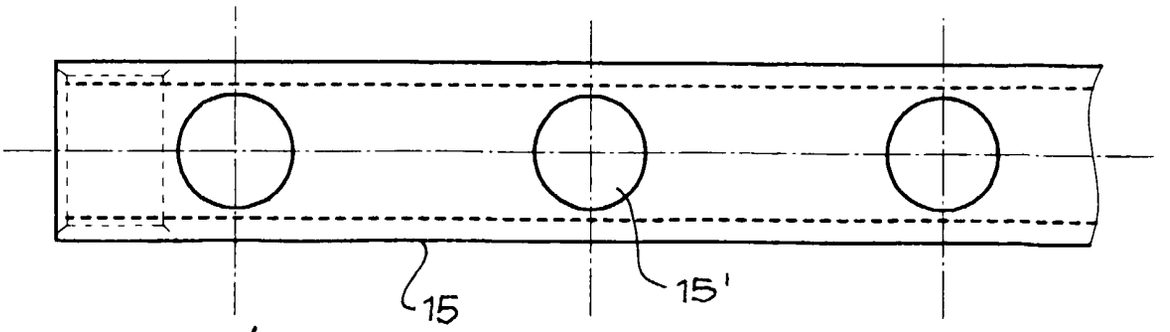


Fig.16

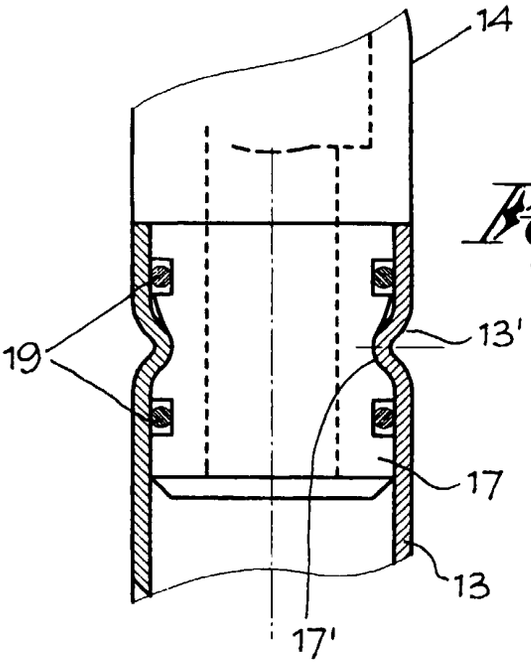


Fig.14

Fig.13

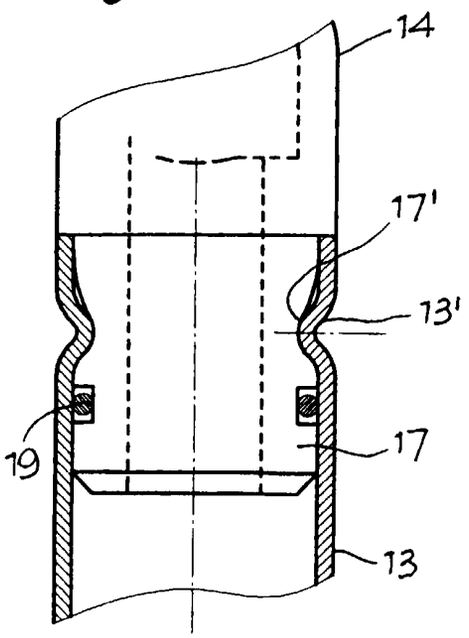
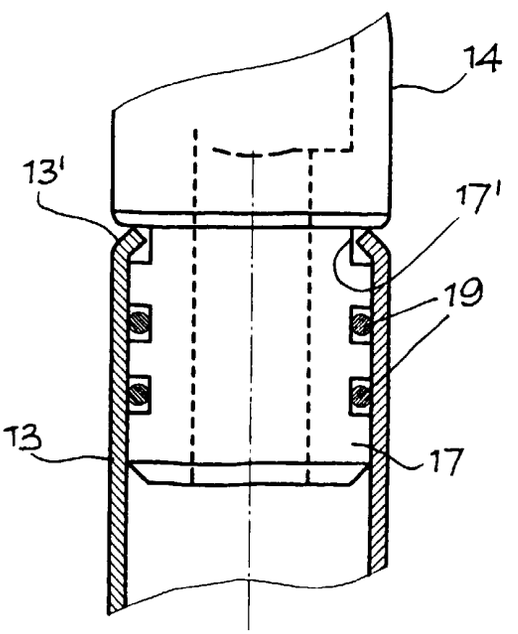


Fig.12



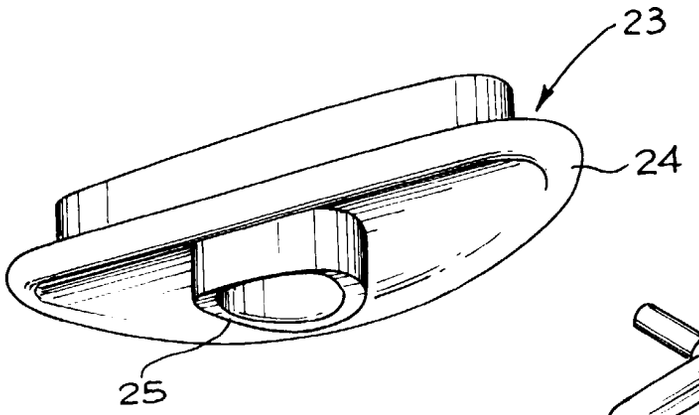


Fig.17

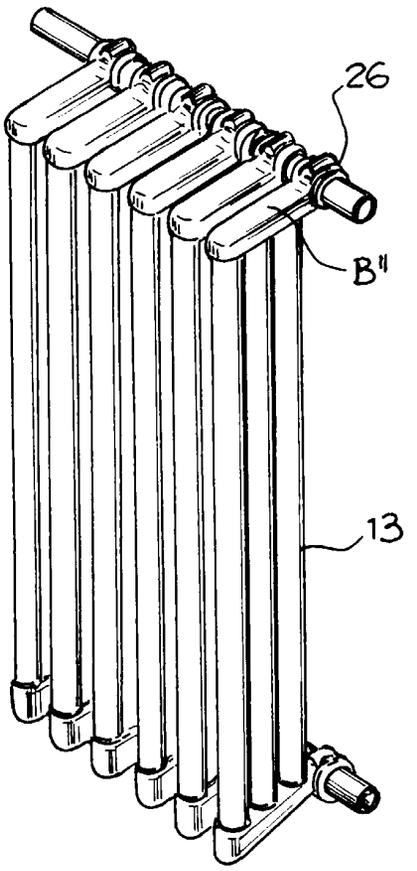


Fig.18

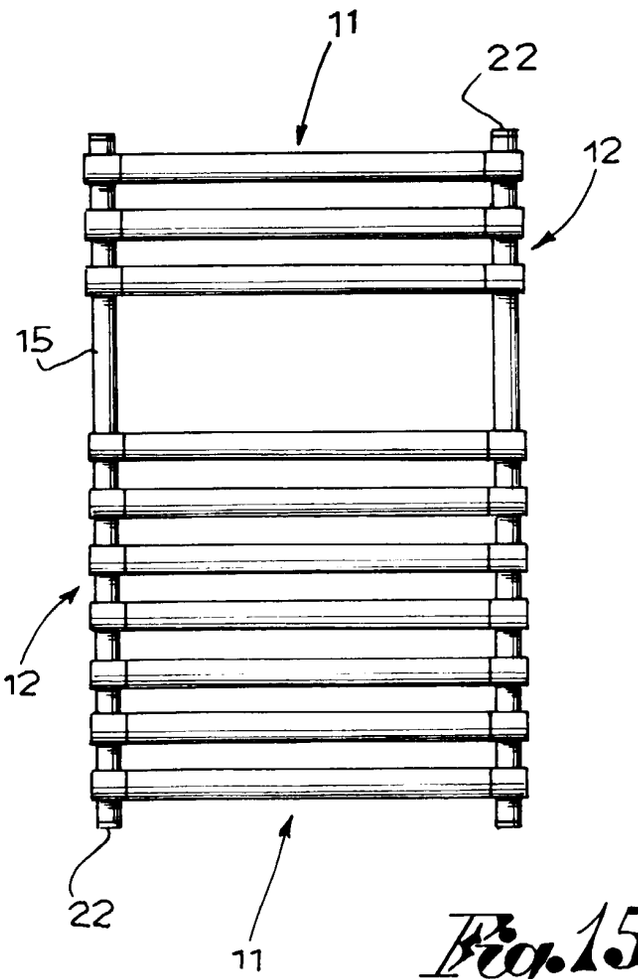


Fig.15