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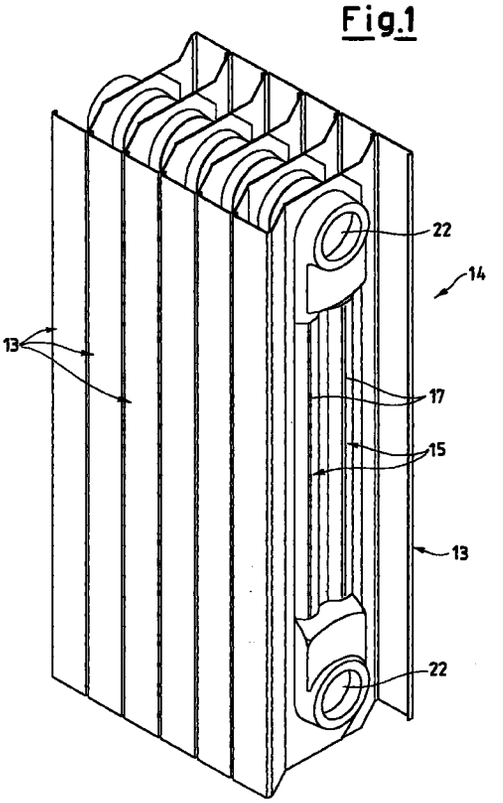
(54) Electric oil radiator for heating rooms

(57) An electric oil radiator for heating rooms, of a type constituted by a battery (14) of radiating elements (13) set side-by-side, each of which being formed by the coupling of a pair of plate-type elements (16) each comprising a convex portion (17) holding a diathermic fluid tank (15) and a radiating portion (18a, 18b, 18c, 18d, 18e), where each individual plate-type element (16) is fitted with two holes in line (22) for connecting to the plate-type elements (16) of adjacent radiating elements, where each plate-type element (16) comprising a radiating portion (18a, 18b, 18c, 18e) on only one side is positioned off-center with respect to a central axis of the individual plate-type element (16) and where the coupling of a pair of plate-type elements (16) is achieved so that the vertical axes of the convex portions (17) of a pair of plate-type elements (16) mate after coupling.

Fig.1



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Description

[0001] This invention refers to an electric oil radiator for heating rooms.

[0002] As known, a large number of oil radiators are currently used for heating rooms. One type of these radiators is formed by a battery of metallic radiator elements, containing a hot fluid, for instance diathermic oil heated by an electrical resistance, capable of diffusing its heat over the entire radiating metallic structure.

[0003] Such radiating elements have at least one central portion composed of a tightly sealed tank, communicating with a tank in common with an adjacent element by two round holes set next to the two upper and lower extremities of said tank. In particular, the lower holes form a cylindrical cavity housing the electrical resistance, while the upper cavity is used to allow the proper circulation of the applied diathermic fluid.

[0004] While in the elements of conventional radiators the variously shaped tank extends over the full length of the element, except an outer perimetral edge, certain structures have been built in recent years where said tank constitutes only the central portion of said element. The outermost portion, in particular along the two sides, has variously been profiled for the main purpose of reducing the temperature of the radiator's outer surfaces and of modifying its traditional esthetic appearance.

[0005] Despite the introduction of these modifications, it can still be said that the overall number of radiator elements, while widely differing from each other, are characterized by their being formed by the coupling of two essentially identical plate-type elements, each strictly symmetrical to the central vertical axis coinciding with the axis of the inner tank and with the two circular holes used for connecting to other similar elements.

[0006] These plate-type elements in turn lead to the production of elements symmetrical with respect to both the centrical vertical axis as well as the two vertical and horizontal axes constituted by the coupling lines of the two plate-type elements. It was moreover noted that the shape of the plate-type elements is rather complex and demands several manufacturing process steps.

[0007] Such a production therefore necessarily entails a substantial usage of material, with the resulting high costs, as well as processing costs for the development of the various phases needed to achieve a product of such diverse configuration.

[0008] Moreover, such a symmetrical arrangement of the two elements makes it impossible to achieve the objective of an important and substantial temperature reduction at the radiator's outer surface.

[0009] The purpose of this invention is therefore to produce a radiator having some radiating elements constituted by two plate-type elements, but of the simplest possible design and lowest cost.

[0010] This purpose may be achieved by a structure based on plate-type elements of an oil radiator for heating rooms, as outlined in claim 1.

[0011] An electric oil radiator for heating rooms produced according to this invention affords considerable advantages.

[0012] Because the tank occupies only the central portion of an element, it can be seen that the objective of attaining a reduction of the radiator's outer surface temperature is attainable.

[0013] Thanks to the particular simplicity of the individual plate-type element, it is also possible to realize a advantageous cost reduction.

[0014] It can further be noted that outside the perimeter of the tank itself no particular symmetry need be maintained between the two coupled plate-type elements. On the contrary, significant advantages can be found in the fact that the plate-type elements are developed only on one side with respect to the central tank, meaning in an entirely asymmetrical manner with respect to the vertical axis of the central tank.

[0015] In summary, the structure exhibits the following advantages:

- It can easily be shown that such a radiator is more economical, as every plate-type element is built with an obviously lesser amount of materials.
- It is in any case possible to produce a radiator element symmetrical along its edges or outer surfaces with respect to its central axis.
- It is possible to produce structures with essentially planar outer side surfaces, and thus of a safe nature and pleasant esthetic appearance.
- It is possible to keep the edges or outer side surfaces at temperatures far more reduced with respect to the temperature of the fluid in the element's central tank.
- It is also possible to apply some slots along the surface of the plate-type elements in order to increase their heat transfer capacity, or holes capable of further increasing their thermal resistance toward the outside.

[0016] The characteristics and advantages of an electric oil radiator for heating rooms according to this invention will prove to be better evident from the description that follows, referred to the simplified drawings in which;

Figure 1 is a prospective view of an electric oil radiator for heating rooms, according to a first embodiment of this invention,

Figure 2 is a prospective view of an single element of the radiator, constituted by two plate-type elements coupled to each other, essentially identical but asymmetrical with respect to the vertical axis of a central tank and having essentially planar outer side surfaces,

Figure 3 is an enlarged side view of the same radiator element, produced as in Figure 2, along the line III-III of Figure 4,

Figure 4 is a elevation front view of the element of the radiator shown in Figure 2.

Figure 5 is an enlarged sectional view of an element according to the line V-V of Figure 6,

Figure 6 is a elevation front view of the radiator element shown in Figure 5,

Figure 7 is a topside ground view of a second radiator element produced with two plate-type elements according to this invention,

Figures 8 and 9 are a front view and a raised side view of the element of Figure 7,

Figure 10 is a topside ground view of a single element of the radiator shown in Figures 7, 8 and 9,

Figures 11 and 12 are a front view and a raised side view of the single element shown in Figure 10.

Figure 13 is a topside ground view of a third radiator element produced with two plate-type elements according to this invention, in which the asymmetrical plate-type elements carry a few slots to increase their heat exchanging capacity.

Figures 14 and 15 are a front view and a raised side view of the element shown ion Figure 13,

Figure 16 is a prospective view of an electric oil radiator for heating rooms according to a further embodiment of this invention, generally comparable to that shown in the Figures 7- 12,

Figures 17 and 18 are a elevation view and a raised side view of the single element shown in Figure 16,

Figure 19 is an enlarged sectional view along the line XIX-XIX of Figure 17, and

Figure 20 is a prospective view of an electric oil radiator for heating rooms according to a further embodiment of this invention.

[0017] With reference to Figure 2 a single compound radiating element, indicated in its overall form by 13, is of a type designed to be mounted side by side with other identical radiating elements 13 arranged in a battery to form a radiator 14 as shown in Figure 1.

[0018] The single compound radiating element 13 includes a diathermic fluid tank 15, heated by an electrical resistance not shown in the figures.

[0019] In detail this single radiating element 13 is composed of two identical coupled plate-type elements 16, of an essentially rectangular and vertically elongated form. The plate-type elements are obtained by profiling planar metallic elements, made of an appropriate material and treated to be compatible with their intended application.

[0020] Each plate-type element 16 has a particular convex off-center or eccentric part 17 that occupies nearly its entire height and serves to form - whenever the two plate-type elements are combined - the mentioned diathermal oil tank 15. Every single plate-type element 16 is further fitted, at the opposite extremities of the convex portion 17, with two holes in line for connecting to the plate-type elements 16 of adjacent radiating elements.

[0021] Each plate-type element 16 also carries, on the side opposite to the convex eccentric part 17, a part defined as "radiating", which is also eccentric with respect to the single plate-type element 16.

[0022] This radiating part comprises a central body 18a surrounding the convex part 17 and a part on only one vertical long side which is eccentric with respect to the central body 18a.

[0023] In the example shown in the Figures 1-6, the radiating part is profiled in the shape of a V, and a first portion 18b of the V-shaped profile is firmly attached to the central body 18a and arranged in a fold with respect to the latter.

[0024] A second portion 18c of the V-shaped profile is arranged perpendicularly to the central body 18a, so as to offer a planar side surface toward the outside. This portion 18c is thus arranged perpendicularly to a coupling plane of the two plate-type elements 16.

[0025] Some short connecting stretches 18d may be provided between the first and the second portion 18b and 18c, so as to be parallel to the central body 18a.

[0026] The central body 18a of the radiating part may also have rounded edges 19 on one side, extending up to and connecting between the terminal side edge of the central body 18a and the upper and lower edges of the same central body 18a.

[0027] At the time of assembling the two plate-type elements 16 are arranged in a manner so that the two convex parts 17, combined with their central bodies 18a, may be coupled to each other by welding to form the mentioned diathermic fluid tank 15.

[0028] The resulting element, shown in the Figures 2 - 4, will thus essentially be constituted by three vertical zones. A central zone is practically constituted by the diathermic fluid tank 15 and the two central bodies 18a overlaying each other, and a pair of lateral zones.

[0029] Each of the lateral zones is constituted by the radiating part 18b, 18c, 18d of one of the two plate-type elements 16 forming the single radiating element 13.

[0030] The radiating element shown in the Figures from 1 to 6 shows that the element, while having lost its symmetry with respect to the coupling plane of the two plate-type elements 16, still maintains a symmetric appearance as regards the portions 18c, meaning the two planar surfaces facing the outside.

[0031] Figure 1 further shows that once the radiating elements 13 are arranged in a battery to form the radiator 14, the latter assumes a well sealed and compact structure.

[0032] The Figures 7-12 show a further example of a radiating element for radiators according to this invention, which achieves a highly simplified structure.

[0033] Once built, this radiating element barely reveals the asymmetry of the single plate-type element, despite its actual presence.

[0034] For a better understanding, this further example will use the same reference numbers for the same parts.

[0035] The two plate-type elements 16 constituting the radiating element 13 also comprise an eccentric convex part 17 and a radiating part, which is in turn eccentric with respect to the single plate-type element 16.

[0036] In this case, a planar radiating part 18e extends on only one side around the convex part, on one side of the central body 18a. The two planar radiating parts 18e of the two plate-type elements 16 are therefore practically resting on the coupling plane of the two plate-type elements themselves.

[0037] This example may be fitted with rounded edges 21, to give the single radiating element 13 a more pleasant appearance.

[0038] It is quite obvious from these examples that the asymmetry of the plate-type elements forming the radiating element 13 does not affect the symmetry of the resulting battery of elements or radiator 14.

[0039] Moreover, the particular asymmetrical configuration according to this invention does not involve the production of two plate-type elements: a "right" one and a "left" one. This is thanks to the fact that the radiating element is constituted by two identical plate-type elements, identified only by being simply asymmetrical along their vertical central axis.

[0040] It is finally worth noting that the size of these plate-type elements is reduced (by about one third) with respect to the plate-type elements used to this date in electric radiators.

[0041] This invention has therefore made it possible to keep the edges and outer side surfaces at a temperature far lower than that of the fluid in the element's central tank.

[0042] This result derives in an advantageous manner from the halving (after removing the surface of one of the two plate-type elements from each side of the central tank) of the heat transfer section and thus doubling of the thermal resistance from the center of the structure toward the outside. This also achieves the possibility of forming convection channels between one element and the following at the two sides of the hot central part.

[0043] As further shown by the Figures 13-15, it is always possible to apply a multiple number of slots 20 and 20' along the planar radiating part 18e or at the surface of the plate-type elements 16, so as to open toward the two sides of the radiating part 18e and increase its heat exchanging capacity. These slots 20 and 20' may also be fitted in the first portions 18b of the V-shaped radiating part or at any rate of any radiating part capable of applying the innovative concept of this invention. The slots may alternatively be substituted or supplemented by holes designed to further increase the thermal resistance toward the outside.

[0044] This invention has thus produced a radiator having radiating elements constituted by two plate-type elements, generally of a still essentially identical, but no longer symmetrical shape, as those shown in the state of the art, with respect to the vertical axis of the central tank. Apart from the convex portions producing the central tank, these plate-type elements in fact have an essentially asymmetrical form with respect to the vertical axis of the same.

[0045] This arrangement also allows a series of functional and economic advantages, as listed above.

[0046] The Figures 16-19 show an electrical oil radiator for heating rooms according to a further example, of a type comparable to that shown in the Figures 7-12, where equal reference numbers are utilized for equal elements.

[0047] This example shows a battery 14 of radiating elements 13, where each plate-type element 16 is fitted with folds 30 on parts of its peripheral edge, clearly visible in the section of Figure 19. These folds 30 produce in their cross section a tubular zone, for example a cross section of a circular or other form, open lengthwise in 33 and arranged along the four sides of the single radiating element. Apart from improving the esthetic appearance, these folds 30 form a rounded portion or similar, which minimizes the potential hazard arising from a live edge.

[0048] In order to produce these folds 30, an excess of metallic material must be provided along these lateral portions and a hollow 31 at their opposite extremities, so as to allow achieving the tubular zones.

[0049] The remaining advantages of this further example are entirely similar to those of the previously mentioned example. Moreover, the folds 30 may also achieve an improved heat distribution over the radiating element.

[0050] The Figure 20 shows a prospective view of yet another example, in which a continuous folds 32, also of a tubular cross section, is achieved along the perimetral edge. If produced on two plate-type elements 16, this tubular fold 32 forms a continuous tubular edge along the entire perimeter, thus further enhancing the above mentioned features of risk-prevention and esthetic appearance of the finished radiating element.

Claims

1. An electric oil radiator for heating rooms of a type constituted by a battery (14) of radiating elements (13) set side by side, each of which is produced by the coupling of two plate-type elements (16), each comprising a convex portion (17) forming a diathermic fluid tank (15) and a radiating portion (18a, 18b, 18c, 18d, 18e), where each single plate-type element (16) is fitted with two holes (22) in line for connecting with plate-type elements (16) of adjacent radiating elements, characterized in that each plate-type element (16) comprises said radiating portion (18a, 18b, 18c, 18d, 18e) on only one side set off-center with respect to a central axis of the single plate-type element (16), where said union of two plate-type elements (16) is produced so that the vertical axes of said convex portions (17) of two plate-type elements (16) mate after their coupling.

2. An electrical oil radiator according to claim 1, characterized in that said radiating portion on only one side is a planar portion (18e).

3. An electrical oil radiator according to claim 1, characterized in that said radiating portion on only one side is a variously profiled portion (18b, 18c, 18d).

4. An electrical oil radiator according to claim 1, characterized in that said radiating portion on only one side is a V-shaped portion (18b, 18c, 18d).

5. An electrical oil radiator according to claim 4, characterized in that said V-shaped radiating portion comprises a portion (18c) arranged perpendicularly to a coupling plane of said two plate-type elements (16).

6. An electrical oil radiator according to claim 4, characterized in that said V-shaped radiating portion comprises a first portion (18b) firmly attached to and bent over with respect to a central body (18a), surrounding the convex part (17) formed and a second portion (18c) set perpendicular to said central body (18a), so as to offer a planar side surface toward the outside.

7. An electrical oil radiator according to claim 6, characterized in that it provides, between said first and second portion (18b, 18c) some planar connecting portions (18d) arranged parallel to said central body (18a).

8. An electrical oil radiator according to claim 1, characterized in that said radiating portion is fitted with a multiple number of slots (20, 20') capable of increasing its heat-exchanging capacity.

9. An electrical oil radiator according to claim 1, characterized in that it exhibits three vertical zones: a central zone providing for said convex portions (17) of each of the two plate-type elements (16) welded together to form said diathermic fluid tank (15), and two lateral zones, each constituted by a single radiating zone (18a, 18b, 18c, 18d, 18e) of one of the two plate-type elements (16) forming the element.

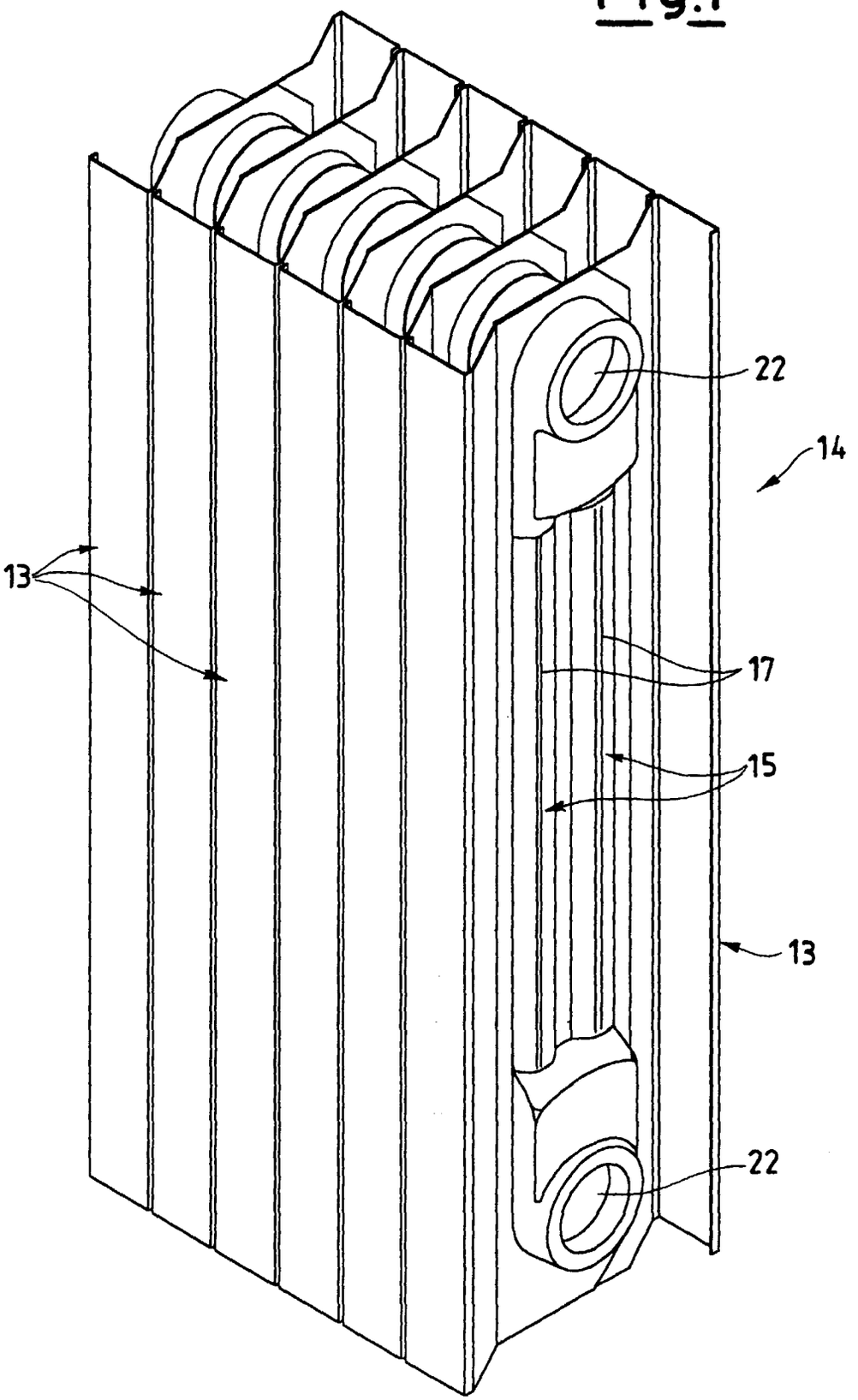
10. An electrical oil radiator according to claim 2, characterized in that said radiating portion, having a planar portion (18e) on only one side, comprises certain folds (30) along peripheral zones of its edge, producing tubular zones in their cross section.

11. An electrical oil radiator according to claim 10, characterized in that said folds (30) are opened lengthwise (in 33) and arranged according to the 4 sides of a single radiating element (13).

12. An electrical oil radiator according to claim 10, characterized in that said folds (30) are identified by an excess of metallic material along portions of said planar radiating part (18e) and a hollow (31) at the opposite extremities of said excess.

13. An electrical oil radiator according to claim 2, characterized in that said radiating portion, having a planar portion on only one side (18e), comprises a fold (32) along its entire peripheral edge, which forms a cross section of a tubular type.

Fig.1



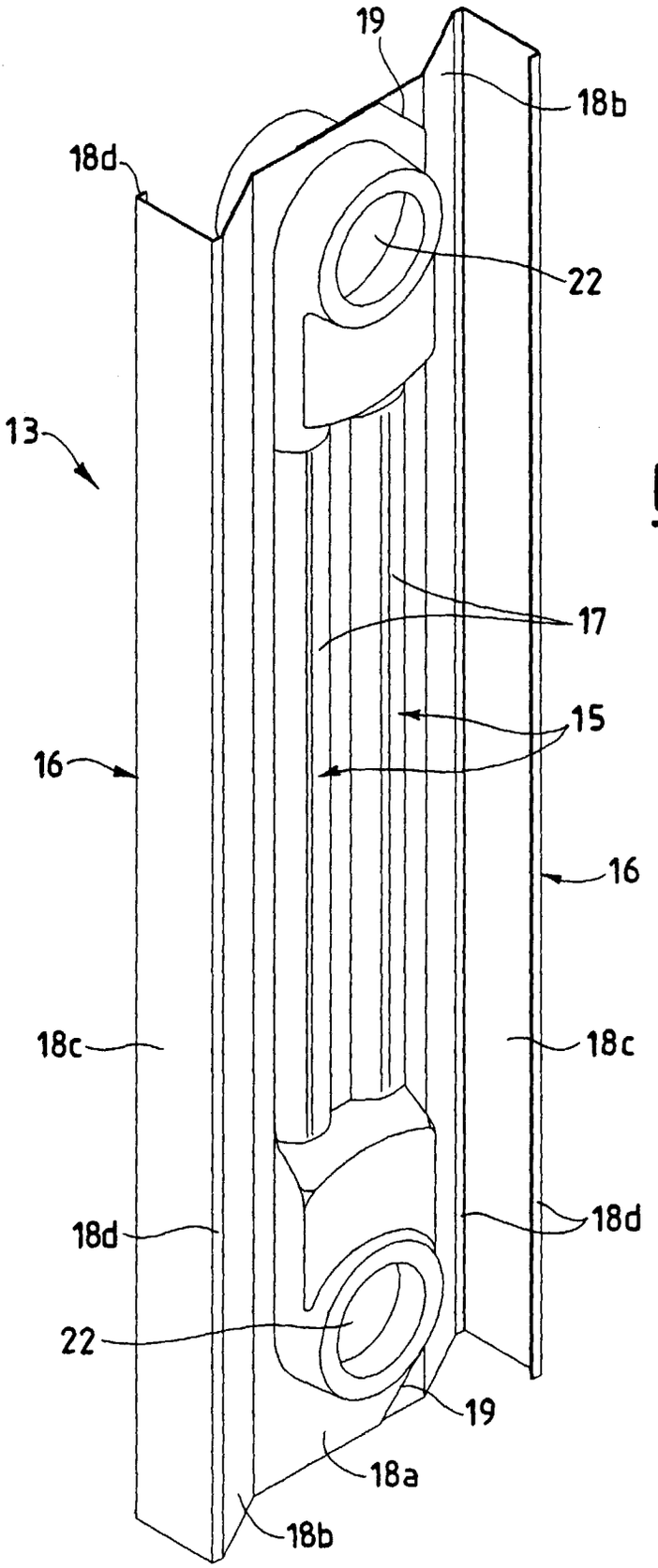
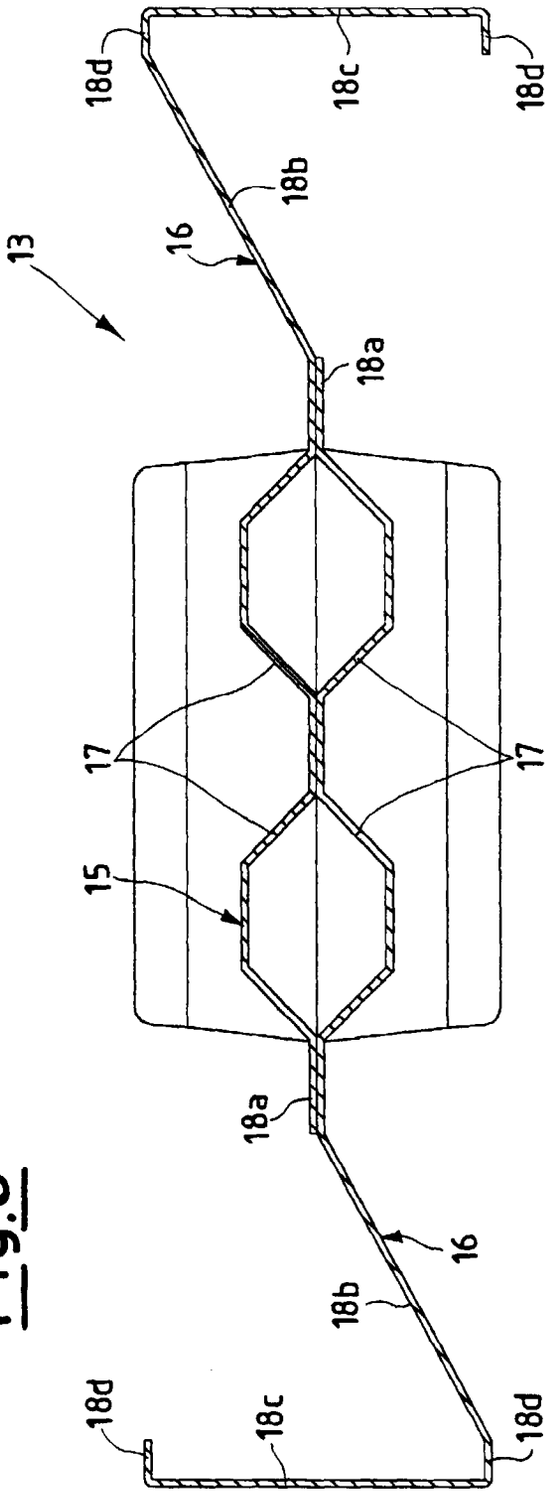


Fig.2

Fig.3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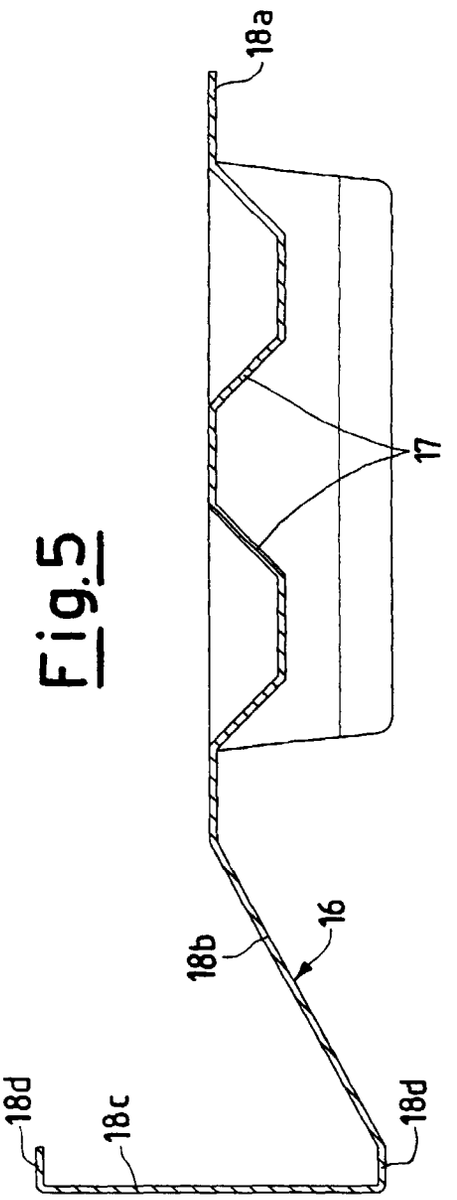
18d

Fig.5


17
18a
18b
16
18c
18d
18d

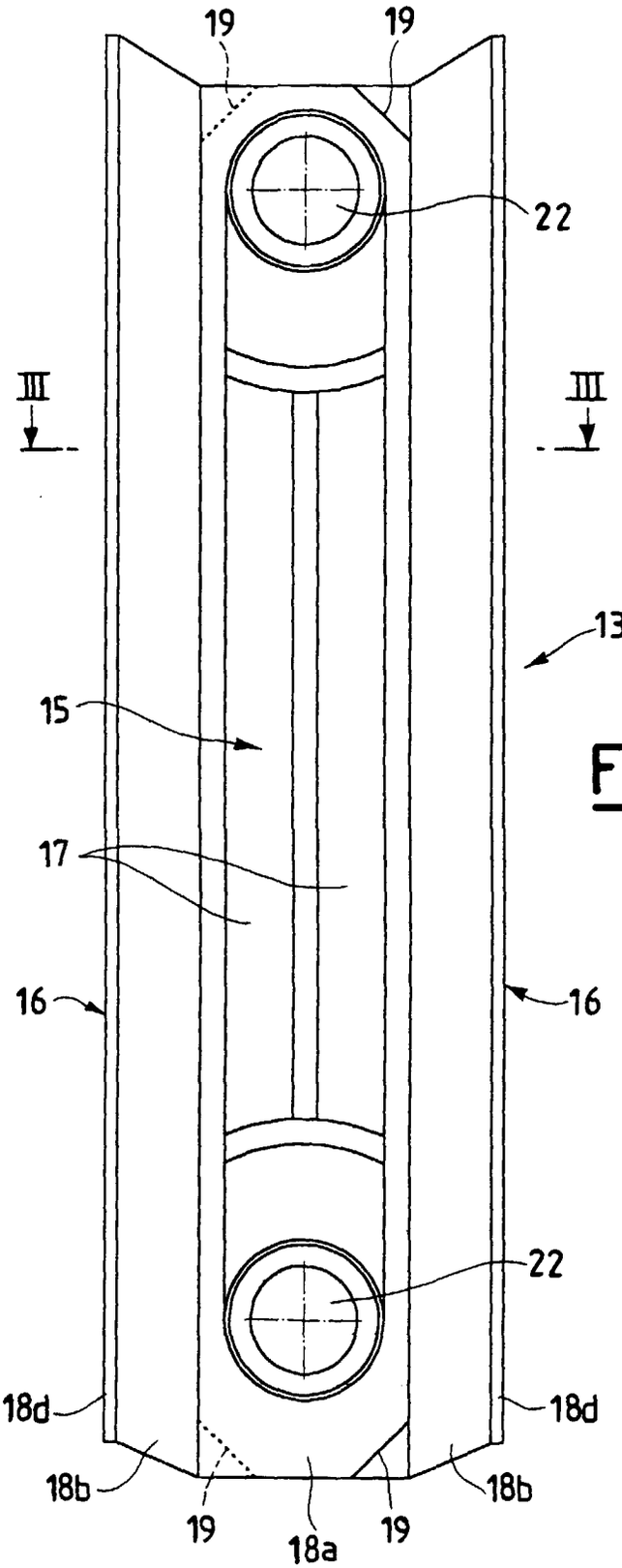


Fig.4

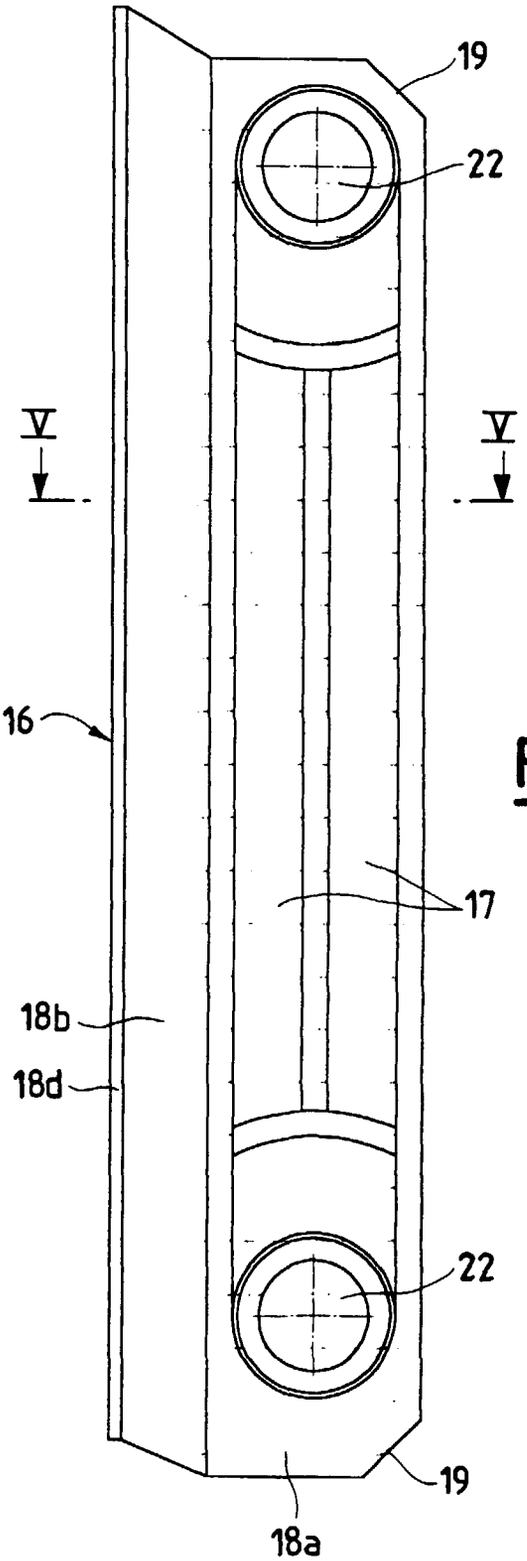


Fig.6

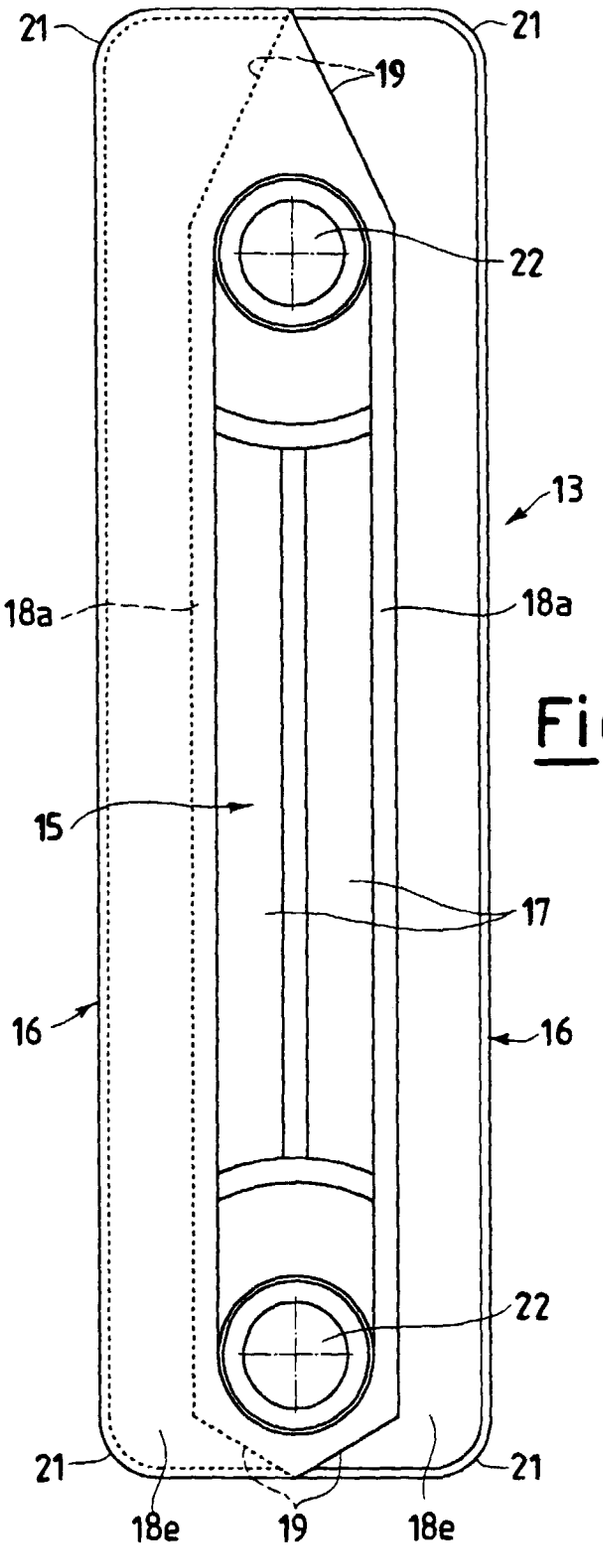


Fig.8

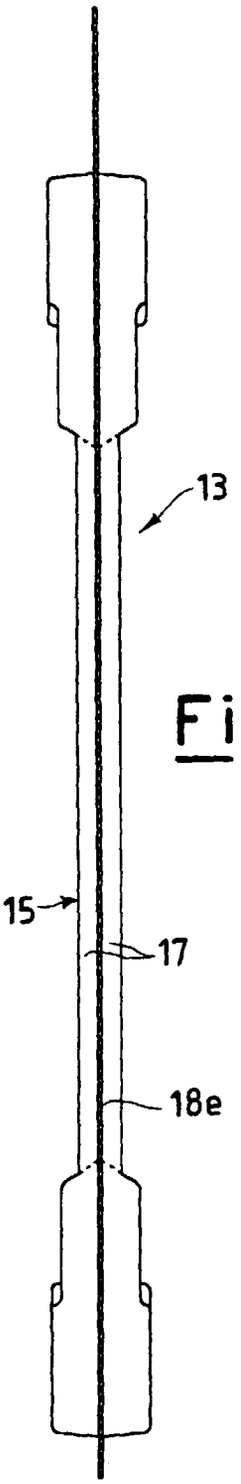


Fig.9

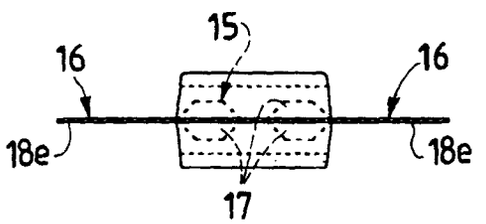


Fig.7

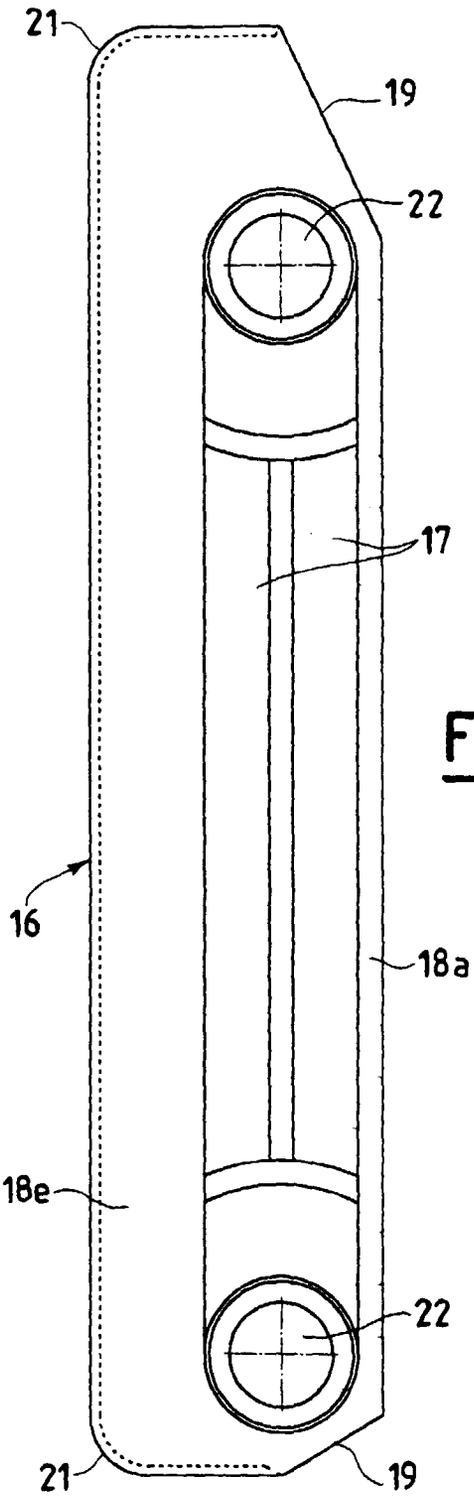


Fig.11

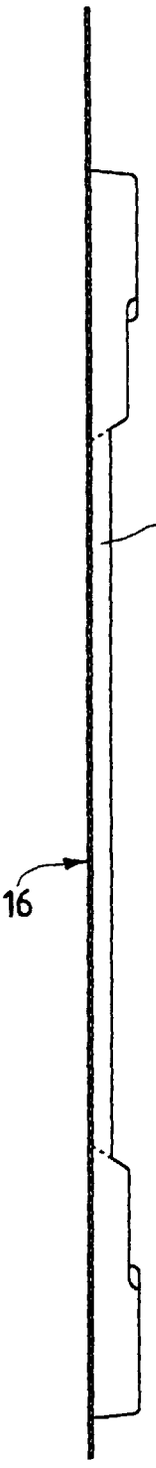


Fig.12

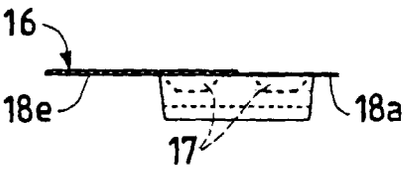


Fig.10

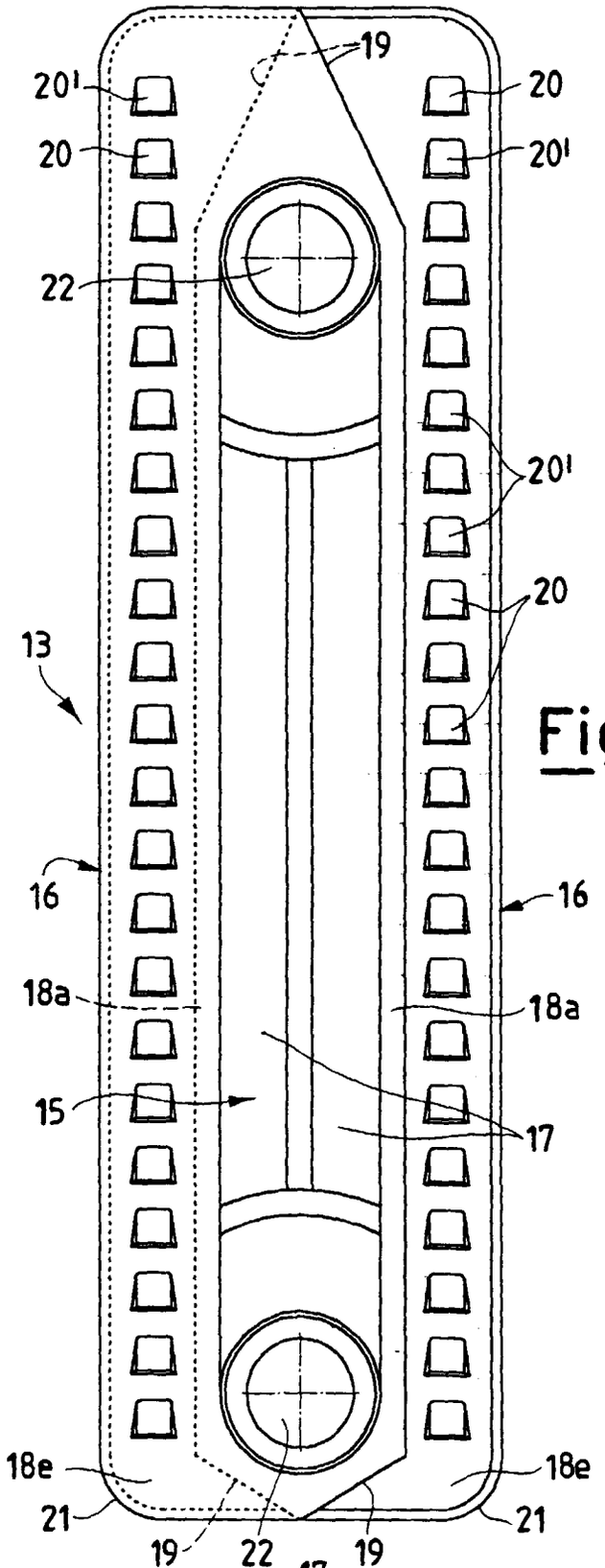


Fig.14

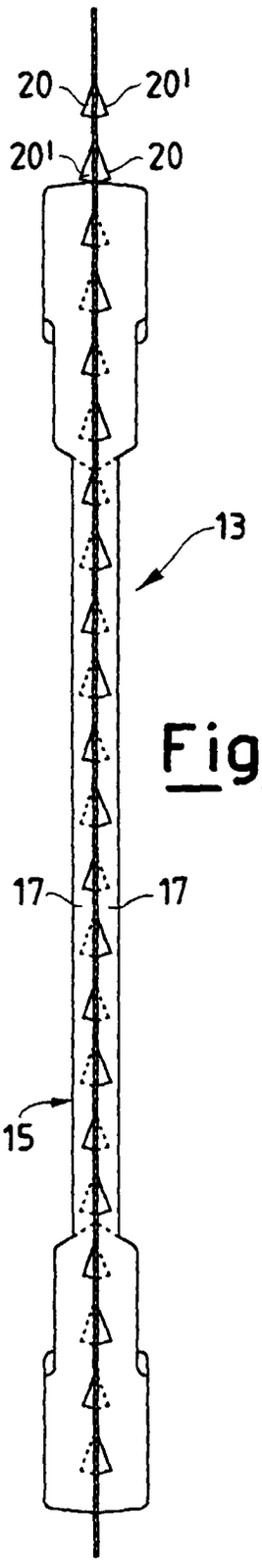


Fig.15

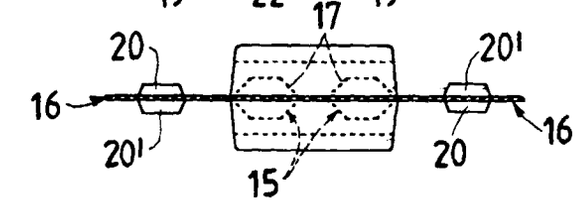


Fig.13

Fig.16

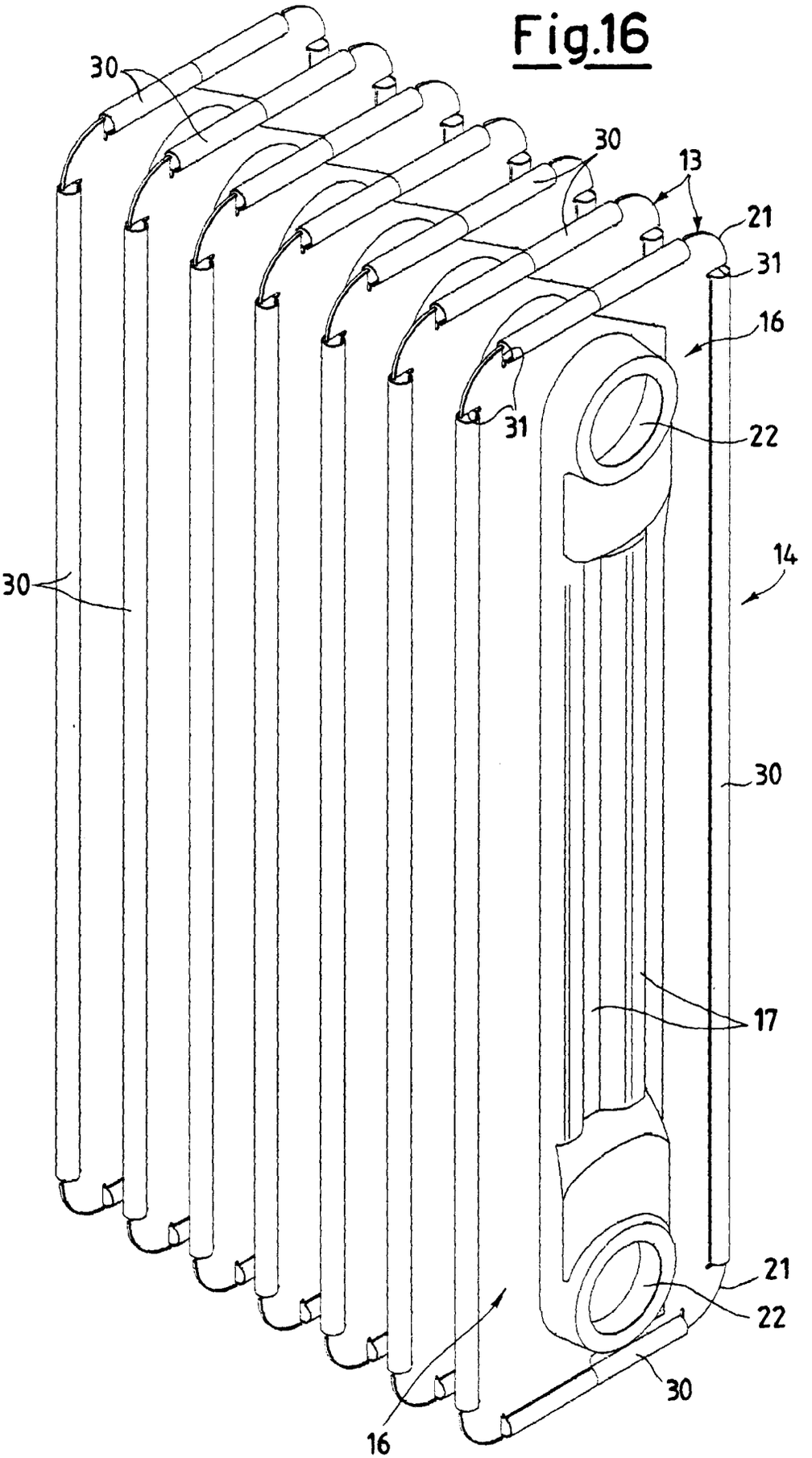
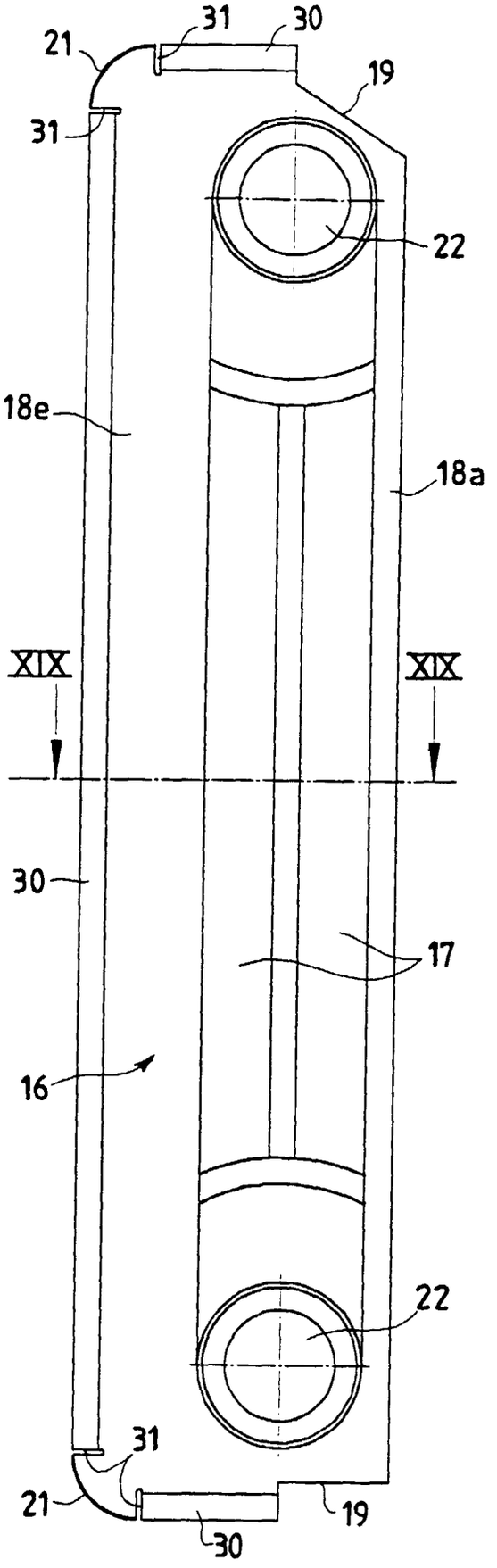


Fig.17


31
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22
18e
18a
XIX
XIX
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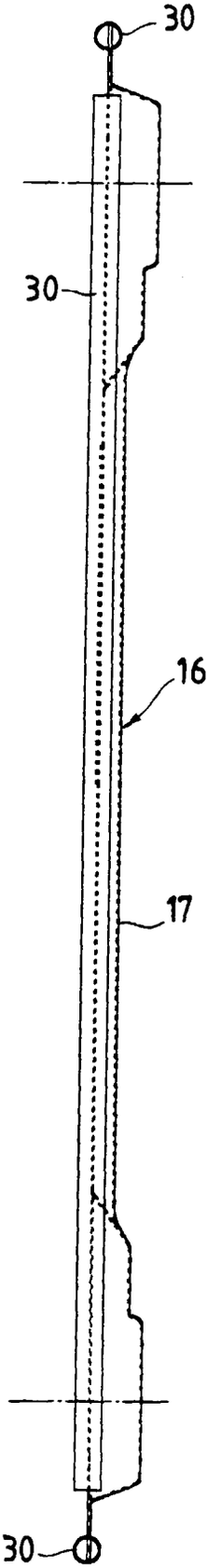
Fig.18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16
17
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Fig.19

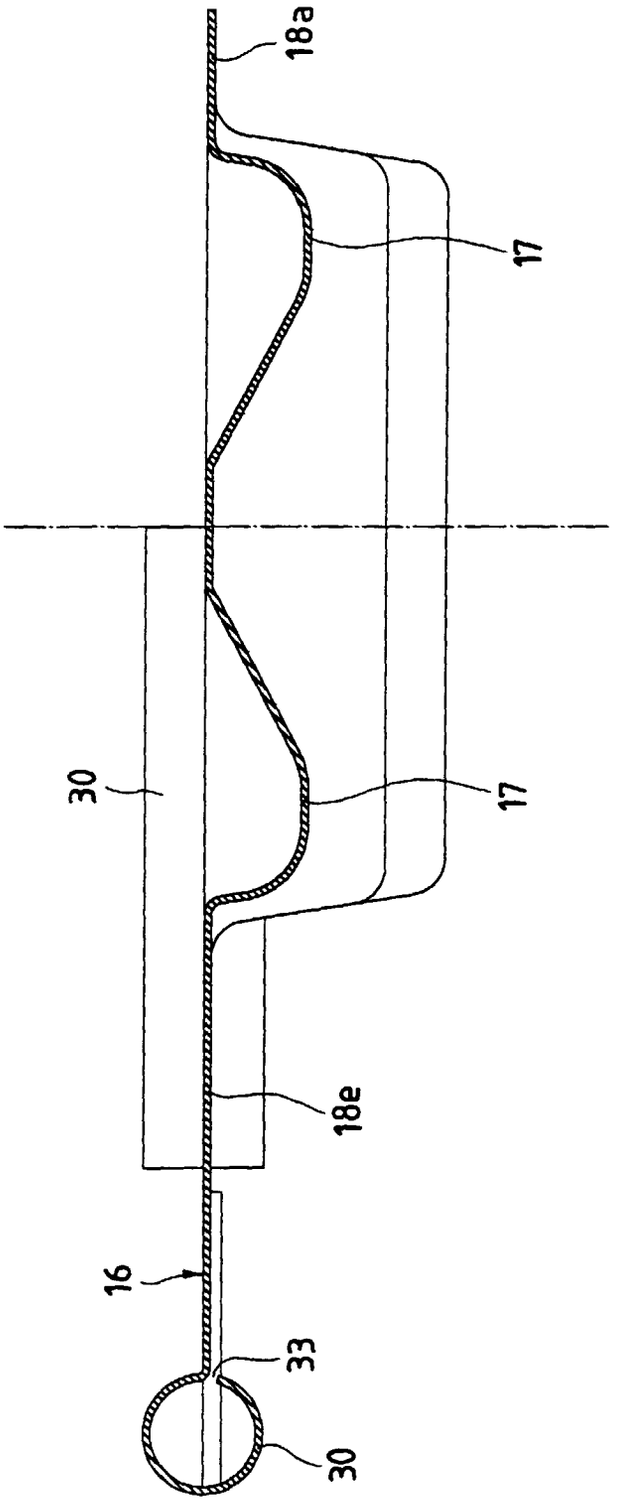

Fig.20