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(54) **Heating element for a convector**

(57) Heating element (1) for a convector heater, comprising one or more hollow pipes for the passage of a heating medium. To each pipe a large number of plate shaped fins (6) has been arranged, which are substantially transverse to the pipe. Each hollow pipe is built up from a number of sub pipes (11) with a supply end (12) and a leading-back end (13). Each sub pipe (11) is provided with a pre-determined length. Each supply end (12) is provided with a first attachment element (14) and each leading-back (13) end is provided with a second attachment element (15). A first (14) and a second (15) attachment element of various sub pipes (11) are attachable to each other for liquid-proof connecting the supply end (12) and the leading-back (13) end respectively, of sub pipes (11) concerned. A pre-determined number of plate-shaped fins (6) are arranged to each sub pipe (11) of a sub element (10).

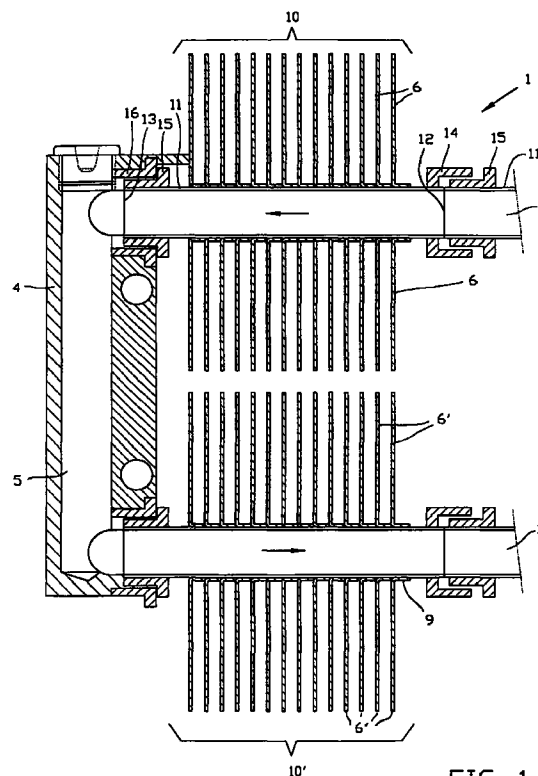


FIG. 1

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Description

[0001] The present invention relates to a heating element for a convector heater, which heating element comprises a hollow pipe for the passage of a heating medium, to which pipe a large number of plate shaped fins has been arranged, which fins are substantially transverse to the pipe. The present invention also relates to a heating element for a convector heater, which heating element comprises a number of two or more hollow pipes for the passage of a heating medium, to which number of pipes a large number of plate-shaped fins has been arranged, which fins are substantially transverse to the pipes.

[0002] Such heating elements for convector heaters of many kinds have already been used for a long time. Here the heating element is manufactured to length in advance in order to be used in the wanted convector heater. Said heating element therefore has to be transported in its entirety to the location of assembly, which, taking the usual dimensions of such heating elements into consideration, is often a very elaborate happening. A further drawback of the known heating elements is that when they are damaged their repair is time consuming and sometimes requires a complete replacement of the heating element.

[0003] It is among others an object of the present invention to provide a heating element which can be transported more easily, allows a simple assembly on the site and which can be repaired or replaced cheaply.

[0004] To that end according to a first aspect of the present invention a heating element is provided for a convector heater, which heating element comprises a hollow pipe for the passage of a heating medium, to which pipe a large number of plate shaped fins has been arranged, which fins are substantially transverse to the pipe, characterized in that the heating element is built up from a number of sub elements, each sub element comprising a hollow sub pipe with a supply end and a leading-back end, each sub pipe having a pre-determined length, each supply end being provided with a first attachment element and each leading-back end being provided with a second attachment element, a first and a second attachment element of various sub pipes being attachable to each other for liquid-proof connecting for instance the supply end and the leading-back end of the sub pipes of the sub elements concerned, and a pre-determined number of plate-shaped fins being arranged to each sub pipe of a sub element.

[0005] According to a second aspect of the present invention a heating element for a convector heater is provided, heating element comprises a number of two or more hollow pipes for the passage of a heating medium, to which number of pipes a large number of plate-shaped fins has been arranged, which fins are substantially transverse to the pipes, characterized in that the heating element is built up from a number of sub elements, each sub element being built up from a

number of sub pipes, which number is equal to the number of hollow pipes, each sub pipe having a supply end and a leading-back end, each sub pipe having a pre-determined length, each supply end being provided with a first attachment element and each leading-back end being provided with a second attachment element, a first and second attachment element of sub pipes of various sub elements being attachable to each other for liquid-proof connecting for instance the supply end and the leading-back end of the sub pipes of the sub elements concerned, and each sub element containing a pre-determined number of plate-shaped fins arranged on the number of sub pipes.

[0006] The heating elements according to the invention are thus built up from separate sub elements that are prefabricated. The dimensions of these sub elements as well as the plate-shaped fins each sub element contains can be standardized, for instance with a length of 10 cm, 20 cm, 40 cm, 80 cm, etc. Transporting such sub elements can take place more simply than the transportation of a complete heating element. The sub elements are also more simple to handle than a complete heating element as a result of which the assembly on the site can take place more easily. When the heating element is damaged it will suffice to repair or replace the defect sub element, which strongly reduces the costs all this entails in comparison to the repair or replacement of a complete heating element.

[0007] The invention also relates to a sub element to be used in a heating element according to the invention, which sub element comprises a sub pipe with a supply end and a leading-back end, each sub pipe having a pre-determined length and a pre-determined number of plate-shaped fins being arranged to each sub pipe. Such sub elements, in which the sub pipes are straight, can for instance be liquid-proof attached to each other by means of clamp couplings. A cheaper liquid-proof connection of sub pipes is obtained when each supply end and leading-back end is provided with a flange directed to the outside, and each supply end being provided with a first attachment element and each leading-back element being provided with a second attachment element.

[0008] The invention further relates to a sub element to be used in a heating element according to the invention, with two or more hollow pipes, each sub element being built up from a number of sub pipes, each sub pipe having a supply end and a leading-back end, each sub pipe having a pre-determined length, and each sub element having a pre-determined number of plate-shaped fins arranged on the number of sub pipes. Preferably each supply end and leading-back end is provided with a flange directed to the outside, and each supply end is provided with a first attachment element and each leading-back end is provided with a second attachment element.

[0009] Preferably the first and second attachment element are swivel elements, which makes a quick and cor-

rect liquid-proof attachment if sub elements possible.

[0010] For a correct liquid-proof sealing in all cases, preferably a sealing element has been arranged between each supply end of a sub pipe and the leading-back end of the adjacent sub pipe to be attached to it. Particularly the sealing element is a ring made of synthetic material.

[0011] Some embodiments of a heating element according to the invention, or a sub element to be used in it, will below be described by way of example on the basis of the drawing, in which:

Figure 1 schematically shows a first embodiment of a heating element according to the present invention in cross-section;

Figure 2 schematically shows a second embodiment of a heating element according to the present invention in cross-section;

Figure 3 schematically shows a sub element according to the present invention in cross-section;

Figure 4 schematically shows a sub element according to the present invention in cross-section; and

Figure 5 schematically shows the attachment of a first and second attachment element of a heating element according to the present invention in cross-section.

[0012] Figure 1 shows a heating element 1 for a convector heater. With such heating heat is spread by the air, which is heated and brought into motion by the heating element. In this embodiment the heating element is built up from a supply pipe 2, a lead-back pipe 3 parallel to it. Both the supply pipe 2 and the leading-back pipe 3 are provided with a large number of fins 6 and 6' respectively, made of a plate-shaped material with favourable heat conductive properties, for instance plate metal, such as copper. Other possible materials are for instance aluminium, aluminium zinc, aluminized, electrolytic, hot-galvanized or white steel. The fins 6, 6' for instance are of rectangular shape. The supply pipes and leading-back pipes themselves can also be made from a variety of materials, such as copper, steel, aluminium or the like. Furthermore it is possible that the fins and pipes are made from different materials.

[0013] The convector heater further comprises a connection piece 4 for instance made of a metal, such as free-cutting steel or the like, to which both the supply pipe 2 and the leading-back pipe 3 are connected. The connection piece 4 comprises an internal cavity 5 through which hot water or another heating medium can flow from a supply pipe 2 to the leading back pipe 3.

[0014] According to the invention the heating element 1 is built up from a number of sub elements 10, 10'.

Below the sub element 10 will be described in more detail. It will be clear however, that the other sub elements are the same as this sub element. The sub element 10 comprises a hollow sub pipe 11 with a supply end 12 and a leading back end 13. The sub pipe 11 has a pre-determined length, which preferably is standardized. Each supply end 12 is provided with a flange 48 (see figure 5) and a first attachment element and each leading-back end 13 is provided with a flange 49 (see figure 5) and a second attachment element 15. The first attachment element 14 of the sub element 10 can be attached to a second attachment element 15' of the sub pipe 11' of an adjacent sub element, for liquid-proof connecting the sub pipes 11 and 11' to each other. In order to obtain an in all cases liquid-proof sealing, synthetic rings 51, 52 or other sealing elements are placed between the parts to be connected. A predetermined, preferably standardized, number of plate-shaped fins 6, has been arranged on the sub pipe 11 of the sub element 10. Alternatively it is possible to use entirely straight sub pipes, liquid-proof connection one to the other for instance being effected with a clamp coupling.

[0015] In case, as is shown in figure 1, the leading-back end 15 of the sub pipe 11 of the sub element 10 is attached to the connection piece 4 this may take place by providing the connection piece 4 with an attachment element 16 which can be attached to the second attachment element 15 of the sub pipe 11. Said attachment is of course such that a liquid-proof connection between the connection piece 4 and the sub pipe 11 is obtained.

[0016] A sub element 10 to be used in a heating element 1 shown in figure 1 is separately shown in figure 3.

[0017] Figure 2 shows a second embodiment of a heating element 1' according to the invention. The heating element 1' here comprises two parallel passage pipes 17, which both conduct a heating medium for instance hot water, through in the same direction. It will be clear that the number of parallel passage pipes could also be more than two. On both ends both passage pipes 17 are connected to each other via an internal cavity 5' of a connection piece 4'. The internal cavity 5' in the connection piece 4' ends in a supply opening 18 and leading-back opening 19, respectively, for the supply and leading-back, respectively, of the medium. The heating medium runs in the direction of the arrows shown in figure 2 and therefore is supplied at one side of the heating element, whereas it is discharged at the other end.

[0018] The heating element 1' shown in figure 2 is built up from a number of sub elements 20, each sub element 20 being built up from two sub pipes 29, 30. Each sub pipe 29, 30 has a supply end 31, 32 and a leading-back end 33, 34. Here as well each sub pipe 29, 30 has a pre-determined, preferably standardized length. Each supply end 31, 32 is provided with a first attachment element 22, 22' and each leading-back end 33, 34 is provided with a second attachment 23, 23'. Each first attachment element 22, 22' can be attached to a second

attachment element 25, 25' of an adjacent sub element, for liquid-proof connecting the sub pipes 29', 30' to the sub pipes 29, 30. Here as well each sub element has a pre-determined number of plate-shaped fins 21, which have been arranged on the number of sub pipes.

[0019] Each second attachment element 23, 23' of the sub element 20 can be attached to the attachment elements 24, 24' arranged on the connection piece 4' for liquid-proof connecting the sub element 20 to the cavity 5' of the connection piece 4'.

[0020] A sub element 20 to be used in the heating element 1' shown in figure 2, is shown separately in figure 4.

[0021] Although the several connection elements can be used for connecting the sub pipes one to the other and to the connection pieces, swivel connection elements are preferred because of their simple manner of connection one to the other. A depiction of an attachment with the help of swivel elements and a synthetic ring 50 is schematically shown in figure 5.

Claims

1. Heating element for a convector heater, which heating element comprises a hollow pipe for the passage of a heating medium, to which pipe a large number of plate shaped fins has been arranged, which fins are substantially transverse to the pipe, **characterized in that** the heating element is built up from a number of sub elements, each sub element comprising a hollow sub pipe with a supply end and a leading-back end, each sub pipe having a pre-determined length, each supply end being provided with a first attachment element and each leading-back end being provided with a second attachment element, a first and a second attachment element of various sub pipes being attachable to each other for liquid-proof connecting for instance the supply end and the leading-back end of the sub pipes concerned, and a pre-determined number of plate-shaped fins being arranged to each sub pipe of a sub element.
2. Sub element to be used in a heating element according to claim 1, which sub element comprises a sub pipe with a supply end and a leading-back end, each sub pipe having a pre-determined length and a pre-determined number of plate-shaped fins being arranged to each sub pipe.
3. Sub element according to claim 2, each supply end and leading-back end being provided with a flange directed to the outside, and each supply end being provided with a first attachment element and each leading-back end being provided with a second attachment element.
4. Heating element for a convector heater, which heat-

ing element comprises a number of two or more hollow pipes for the passage of a heating medium, to which number of pipes a large number of plate-shaped fins has been arranged, which fins are substantially transverse to the pipes, **characterized in that** the heating element is built up from a number of sub elements, each sub element being built up from a number of sub pipes, which number is equal to the number of hollow pipes, each sub pipe having a supply end and a leading-back end, each sub pipe having a pre-determined length, each supply end being provided with a first attachment element and each leading-back end being provided with a second attachment element, a first and second attachment element of the sub pipes of the various sub elements being attachable to each other for liquid-proof connecting for instance the supply end and the leading-back end of the sub pipes of the sub elements concerned, and each sub element containing a pre-determined number of plate-shaped fins arranged on the number of sub pipes.

5. Sub element to be used in a heating element according to claim 4, each sub element being built up from a number of sub pipes, each sub pipe having a supply end and a leading-back end, each sub pipe having a pre-determined length, and each sub element having a pre-determined number of plate-shaped fins arranged on the number of sub pipes.
6. Sub element according to claim 5, each supply end and leading-back end being provided with a flange directed to the outside, and each supply end being provided with a first attachment element and each leading-back end being provided with a second attachment element.
7. Heating element according to claim 1 or 4, **characterized in that** the first and second attachment element are swivel elements.
8. Sub element according to claim 3 or 6, **characterized in that** the first and second attachment element are swivel elements.
9. Heating element according to claim 1 or 4, **characterized in that** between each supply end of a sub pipe and the leading-back end of the adjacent sub pipe a sealing element has been arranged.
10. Heating element according to claim 9, **characterized in that** the sealing element is a ring made of synthetic material.

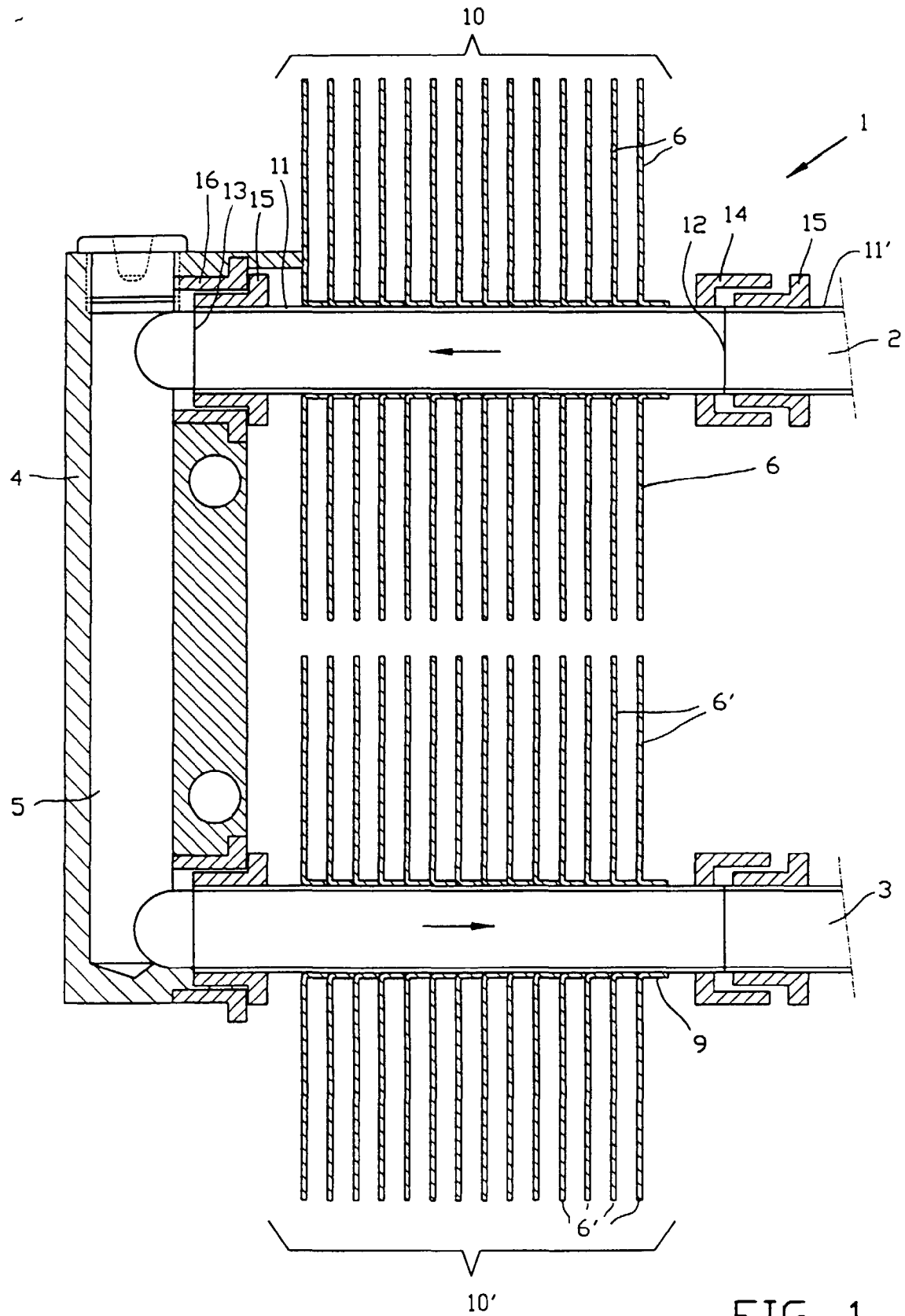


FIG. 1

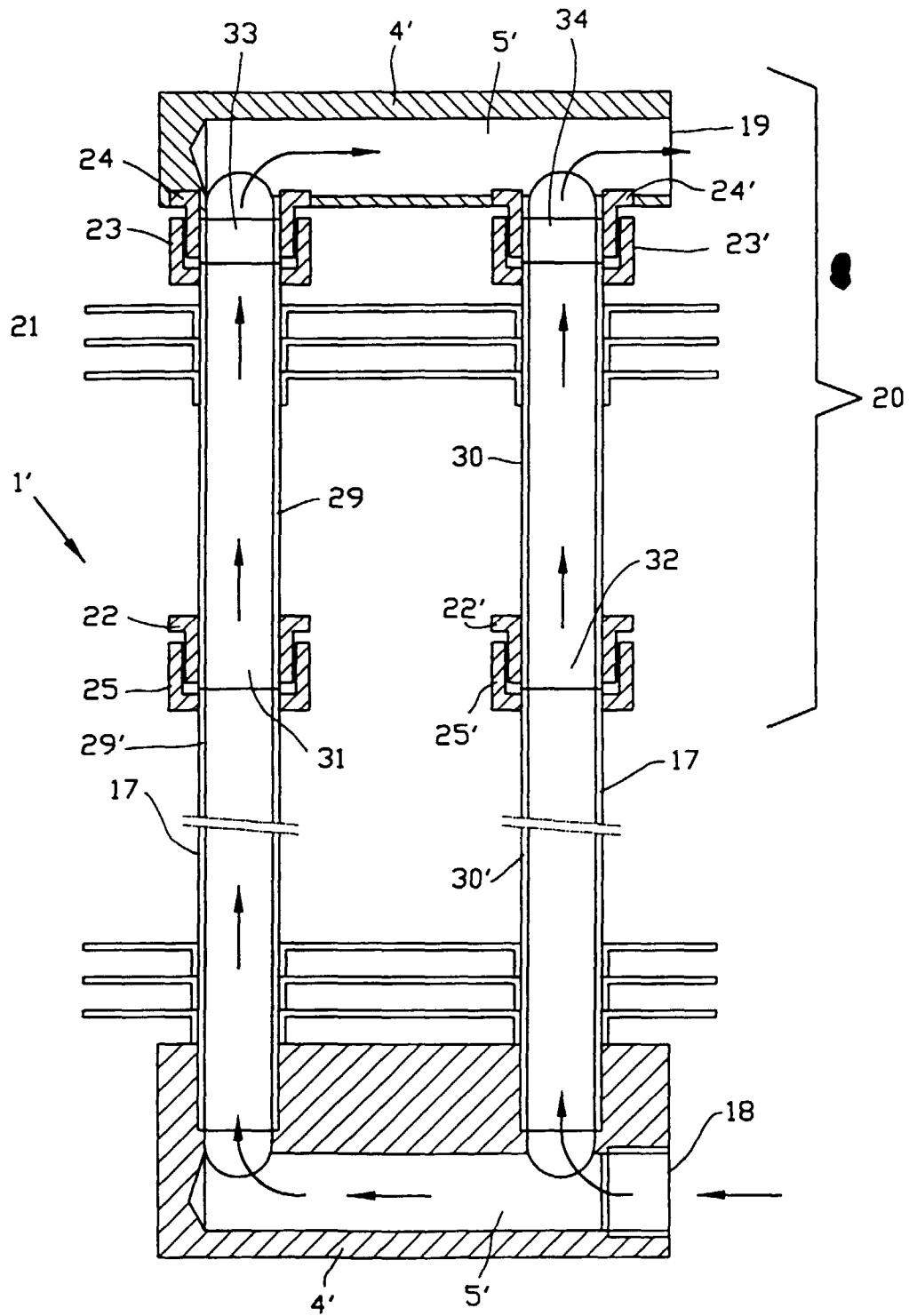


FIG. 2

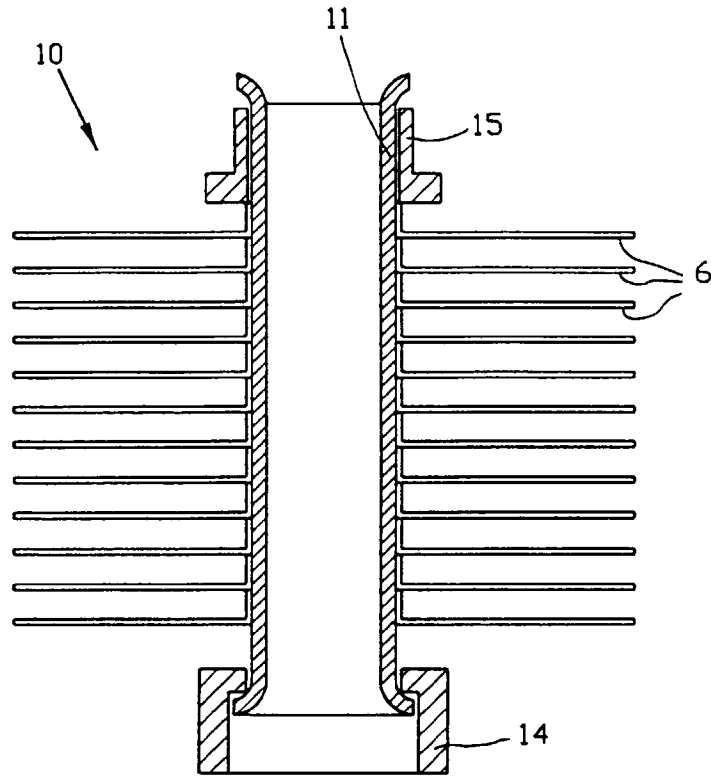


FIG. 3

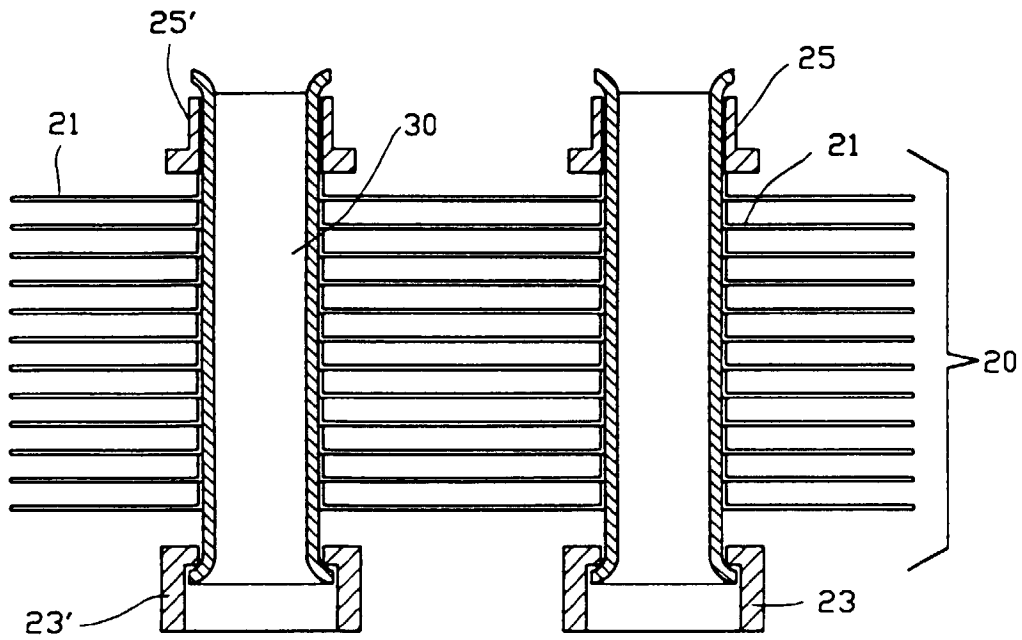


FIG. 4

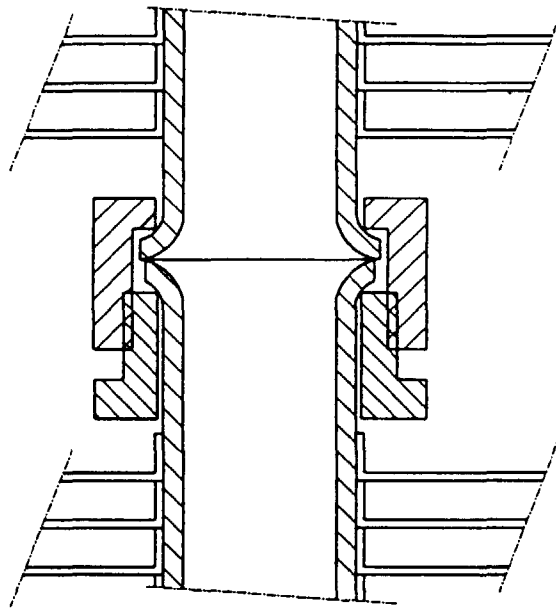


FIG. 5



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EUROPEAN SEARCH REPORT

Application Number
EP 99 20 1933

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.6) F28F F28D
Place of search THE HAGUE		Date of completion of the search 23 September 1999	Examiner Van Dooren, M
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