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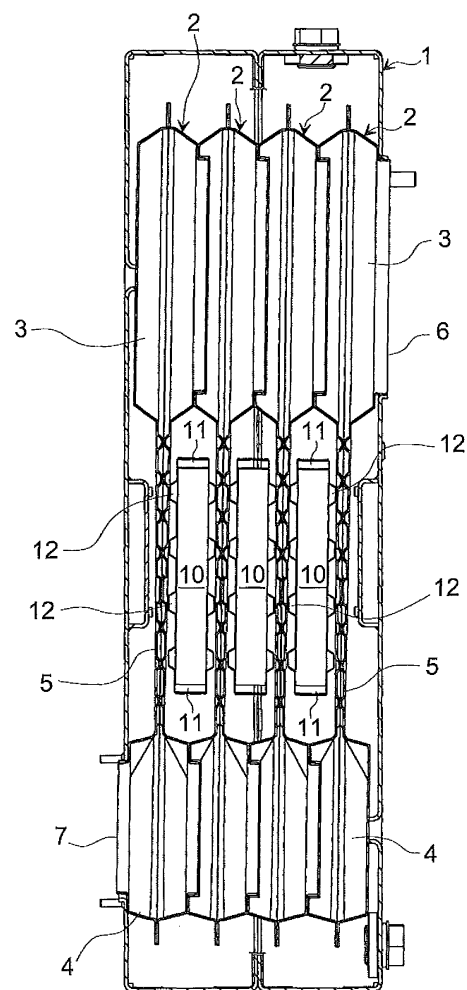
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(54) **A high water content boiler with an improved heat exchange.**

(57) The boiler comprises an external case (1) which may be filled with a high water amount kept in circulation by means of a pump and a plurality of heat exchange elements (2) arranged within said case (1). Open hollow containers (10) are interposed between either said heat exchangers (2) and between said heat exchangers (2) and said external case (1) in order to be crossed by the low-speed water and determine instead a high-speed water circulation between said containers (10) and said heat exchangers (2). Containers (10) are externally equipped with bosses (12) for being rested and spaced with respect to said heat exchangers (2).



**Fig.1**

## Description

[0001] The present invention relates to a high water content boiler with an improved heat exchange.

[0002] High water content boilers are known to have a lower heat exchange per square meter than rapid exchange boilers, which contain a small water amount. This is because in high water content boilers, the water passage or circulation area is very wide, whereby the water speed close to the heat exchanger elements of the boiler is quite low, while in rapid exchange boilers the water passage or circulation area is very small and paths are very long and narrow, whereby the water speeds are very high with a consequent improved heat exchange.

[0003] On the other hand, right because of the high heat exchange speeds, rapid exchange boilers need very sophisticated temperature controls and therefore are more prone to considerable, sudden heat variations which may cause boiler malfunctions and damages.

[0004] In view of this state of the art, it is the object of the present invention to implement a high water content boiler which allows to obtain heat exchange results equal or similar to those of rapid exchange boilers, while keeping their features of quiet boilers, i.e. with a low water circulation speed.

[0005] In accordance with the present invention, such an object is achieved by a boiler comprising an external case which may be filled with a high water amount kept in circulation by means of a pump and a plurality of heat exchange elements arranged within said case, **characterized in that** it comprises a plurality of open hollow containers, which are interposed between said heat exchangers in order to be crossed by the low-speed water and determine instead a high-speed water circulation between said containers and said heat exchangers.

[0006] Water circulation within the containers is thereby very slow, but between the containers and the heat exchangers it has a high speed with a consequent increase in heat exchange between the heat exchangers and the water which laps them.

[0007] The features of the present invention will become more apparent from the following detailed description of a practical embodiment thereof shown by way of non limiting example in the accompanying drawings, in which:

figure 1 shows a boiler according to the present invention vertically sectioned according to line I-I of figure 2;

figure 2 shows the aforementioned boiler laterally seen from the right with respect to figure 1;

figure 3 shows an axonometric section view of the same boiler;

figure 4 shows a side view of one of the hollow containers interposed between the heat exchangers of the boiler;

figure 5 shows said container sectioned according to line V-V of figure 4.

[0008] The boiler shown in the drawings comprises an external case 1 in which heat exchange elements 2 are accommodated, which are for example of the type described in WO 2007/093231, i.e. consisting of an upper part 3 adapted to serve as combustion chamber, a lower part 4 adapted to serve as combustion fume ejection chamber, and an intermediate part 5 for passing the combustion fumes from the combustion chamber 3 to the ejection chamber 4.

[0009] A hole 6 of a side wall of external case 1 is intended to receive a burner (not shown), inserted into the combustion chamber 3, and another hole 7 of case 1 is intended to connect a fume exhausting pipe (not shown).

[0010] Case 1 is intended to accommodate a high water amount circulated within the case itself by means of a pump (not shown), using for this purpose an inlet hole 8 and an outlet hole 9 (fig. 2).

[0011] Between either the heat exchangers 2 and between the heat exchangers assembly 2 and the side walls of case 1, there are arranged hollow containers 10 (figures 4 and 5) having partially open ends 11 for allowing the water to circulate within the containers 10.

[0012] The side walls of containers 10 are equipped with bosses or bulges 12 resting onto the adjacent side walls of heat exchangers 2 in order to keep containers 10 in place and create a series of narrowed passages, preferably not larger than 5-7 mm, between containers 10 and heat exchangers 2.

[0013] Containers 10, also called "turbulators", allow to create stores of water therein, which water enters and exits with a very slow or almost still circulation, depending only on the temperature difference between the water inlet and outlet and on the conduction heat exchange.

[0014] At the same time, containers 10 also occupy most of the space between the heat exchangers 2, thus leaving only narrowed passages which force the water circulated by means of the pump to lap the heat exchangers 2 with a considerable flow speed and a high heat exchange.

## Claims

1. A boiler comprising an external case (1) which may be filled with a high water amount kept in circulation by means of a pump and a plurality of heat exchange elements (2) arranged within said case (1), **characterized in that** it comprises a plurality of open hollow containers (10), which are interposed between said heat exchangers (2) in order to be crossed by the low-speed water and determine instead a high-speed water circulation between said containers (10) and said heat exchangers (2).
2. A boiler according to claim 1, **characterized in that** said containers (10) are externally equipped with bosses (12) for being rested and spaced with respect

to said heat exchangers (2).

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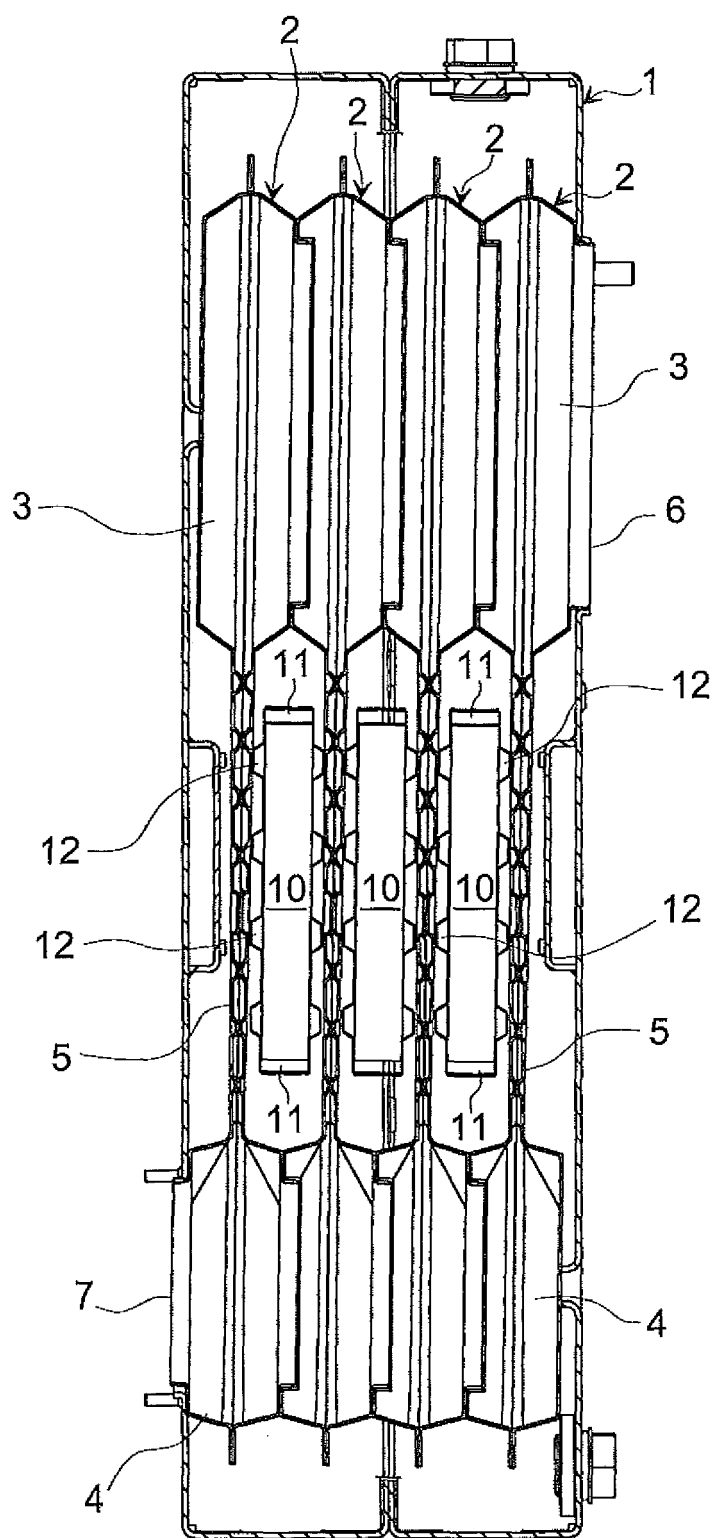


Fig.1

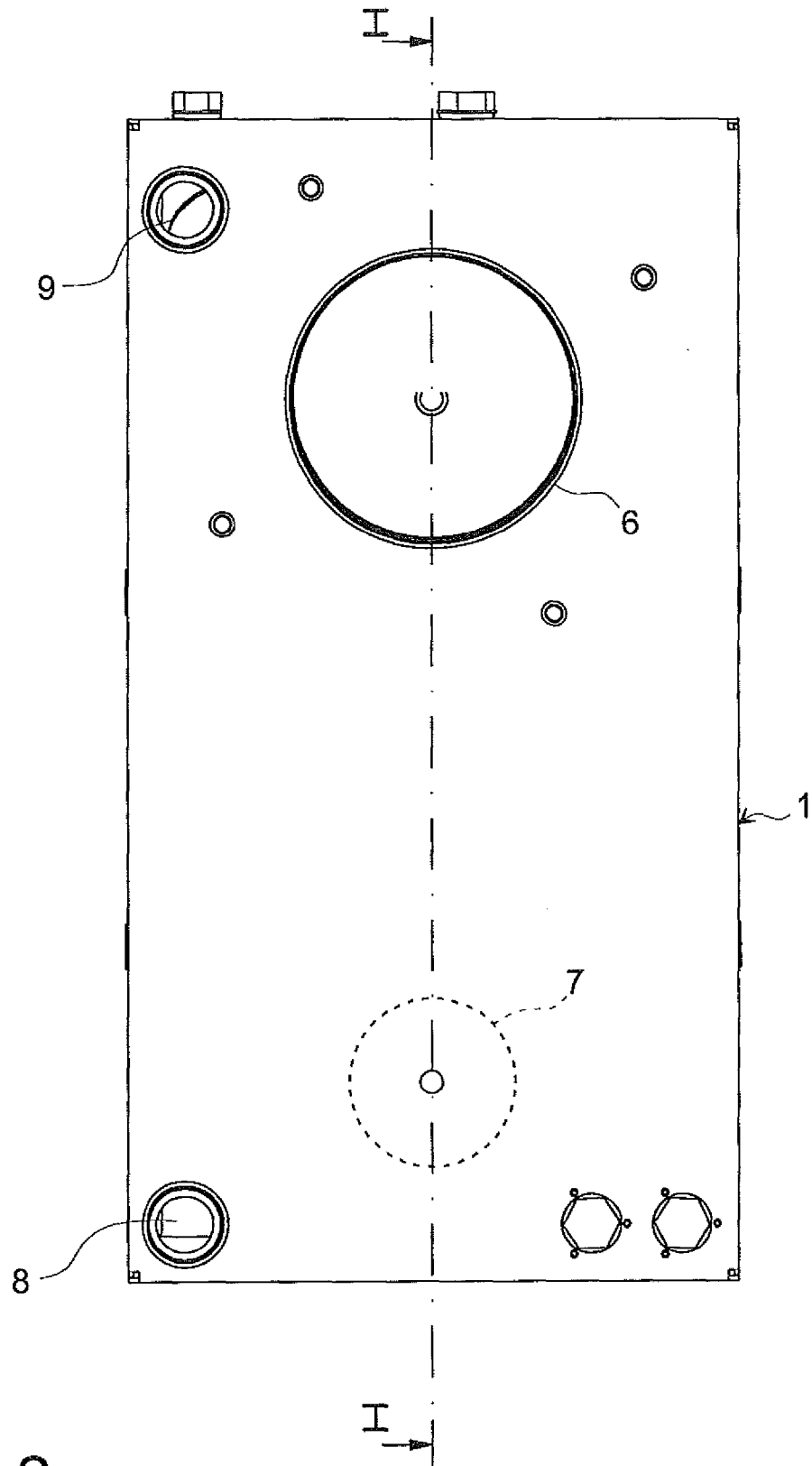


Fig.2

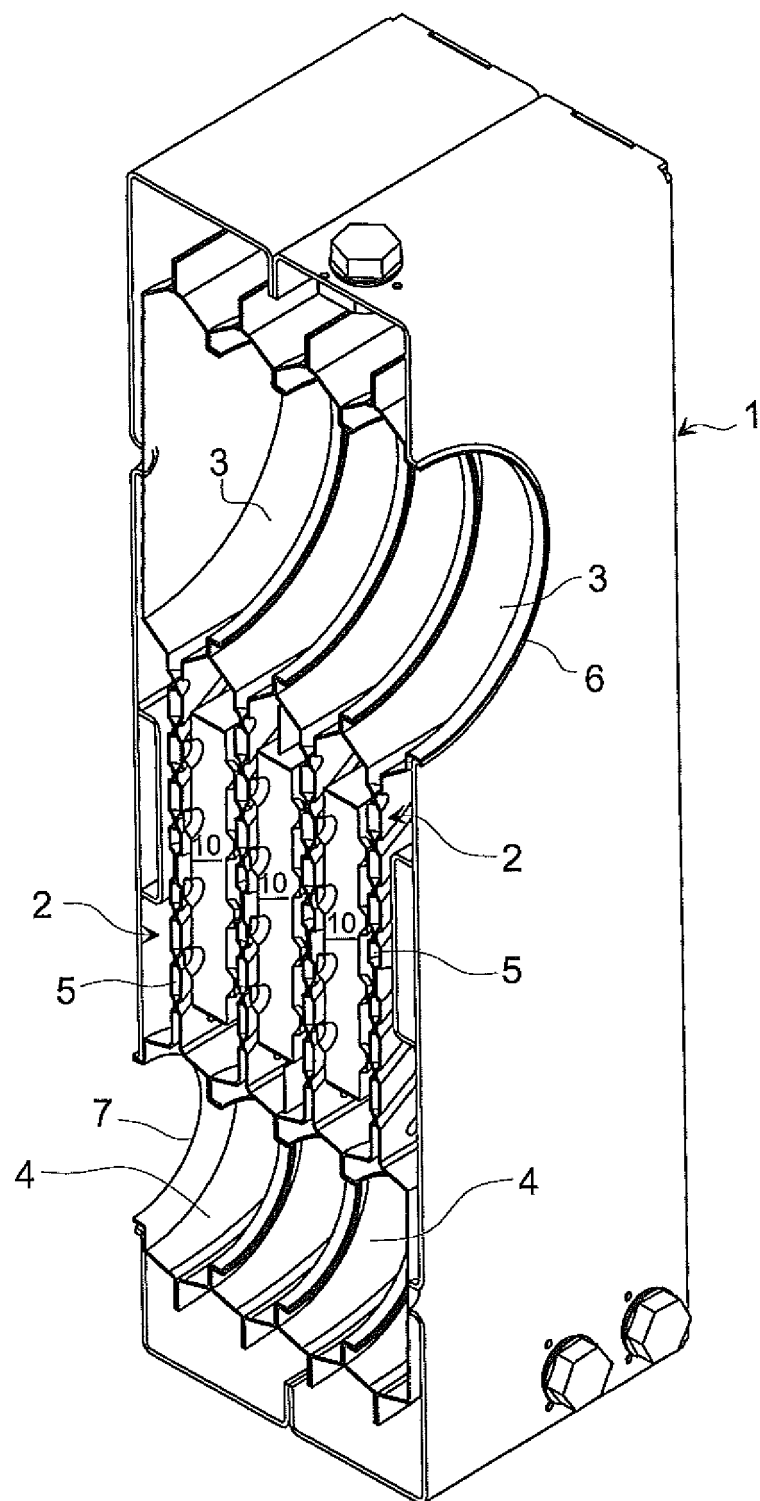


Fig.3

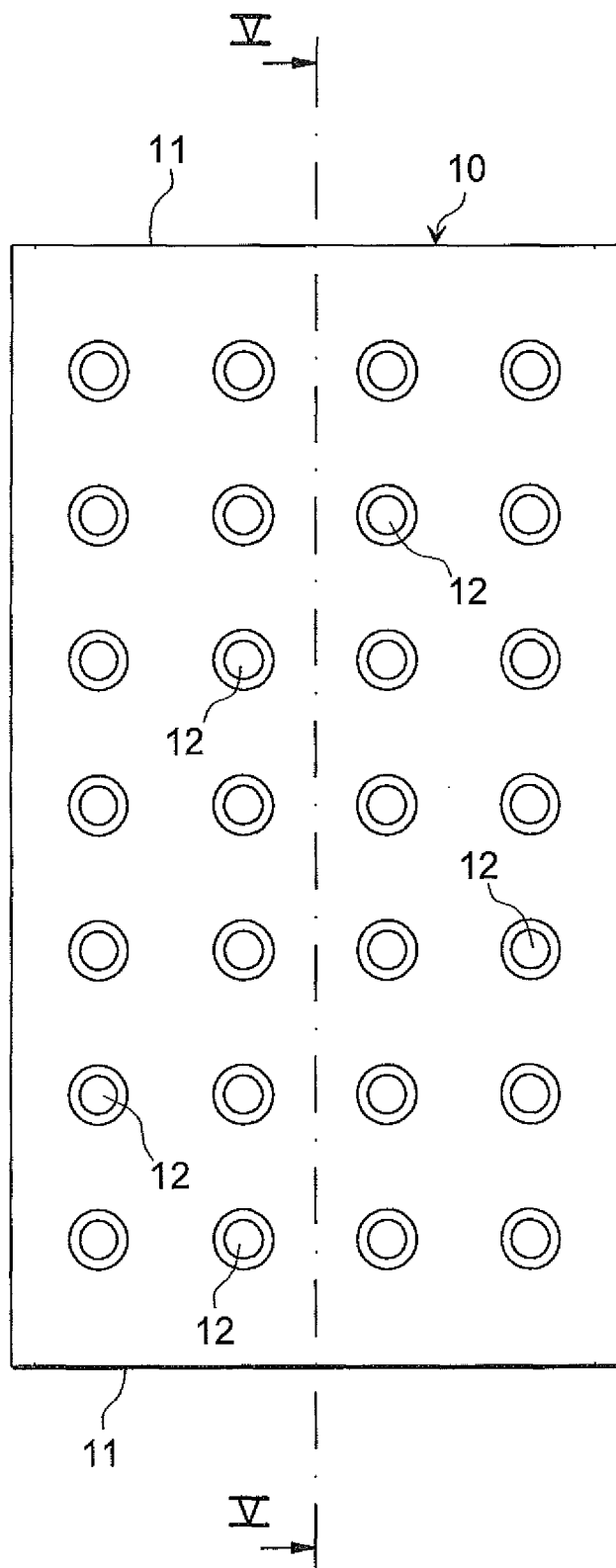


Fig.4

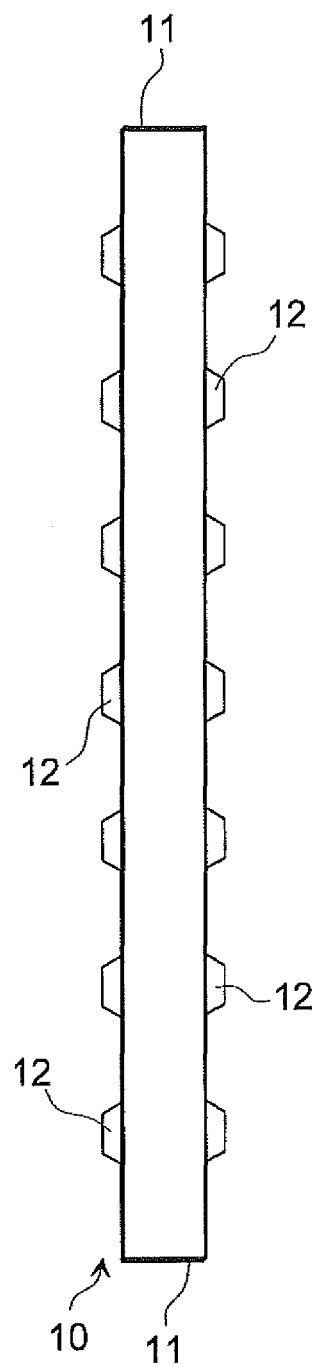


Fig.5

**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

- WO 2007093231 A [0008]