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Källstrand

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[54] **ECONOMIZER WITH FLUES CONNECTED IN SERIES**

[75] Inventor: **Gösta Källstrand,** Jarfalla, Sweden

[73] Assignee: **AB Svenska Maskinverken,** Kallhall, Sweden

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[52] **U.S. Cl.** **122/421**

[51] **Int. Cl.** **F22d 1/02**

[58] **Field of Search** ..... 122/235 T, 412, 421

[56] **References Cited**

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Primary Examiner—Kenneth W. Sprague

Attorney—Elliott I. Pollock et al.

[57] **ABSTRACT**

An economizer, comprising a plurality of vertical gas passageways disposed with their axes parallel to each other and having inlets and outlets therein so that a heated gas can flow serially therethrough, the walls of said vertical gas passageways comprising a plurality of tubes that are disposed in essentially parallel relationship to each other and welded together to form screens, the interior of said vertical gas passageways containing vertical screens composed of a plurality of tubes arranged in parallel relationship, and means for passing a cooling fluid in series through said screens and tubes.

1 Claim, 2 Drawing Figures

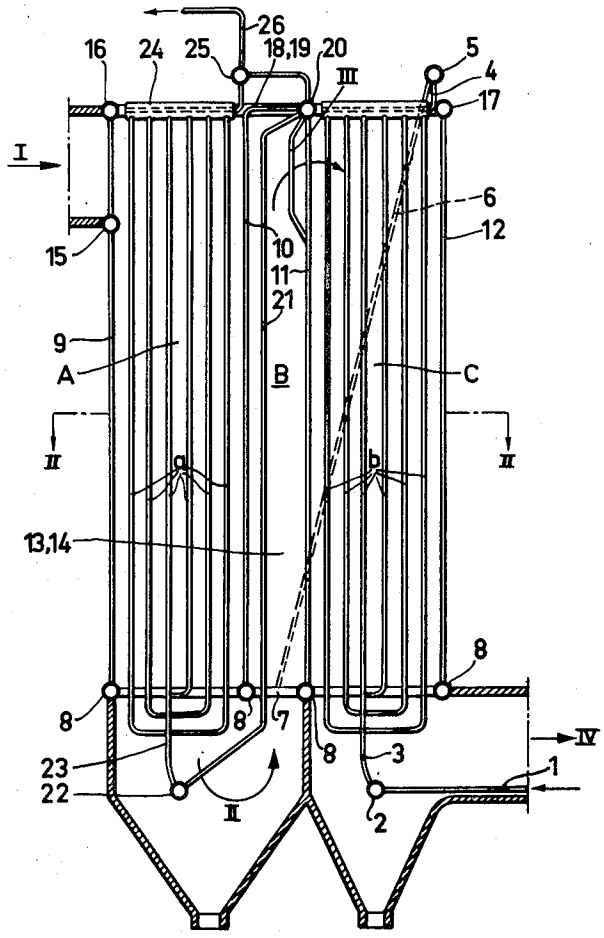

FIG.1

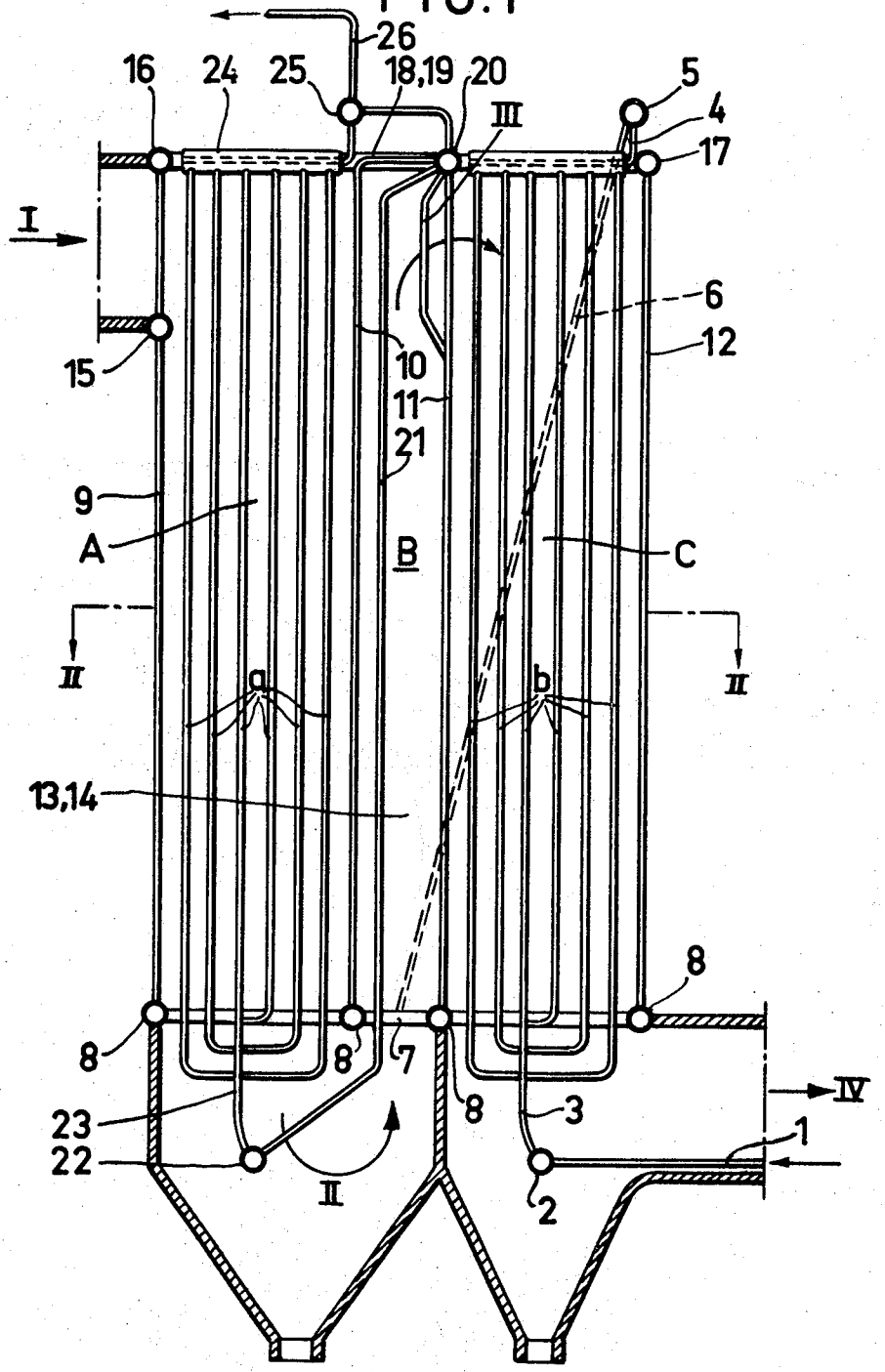
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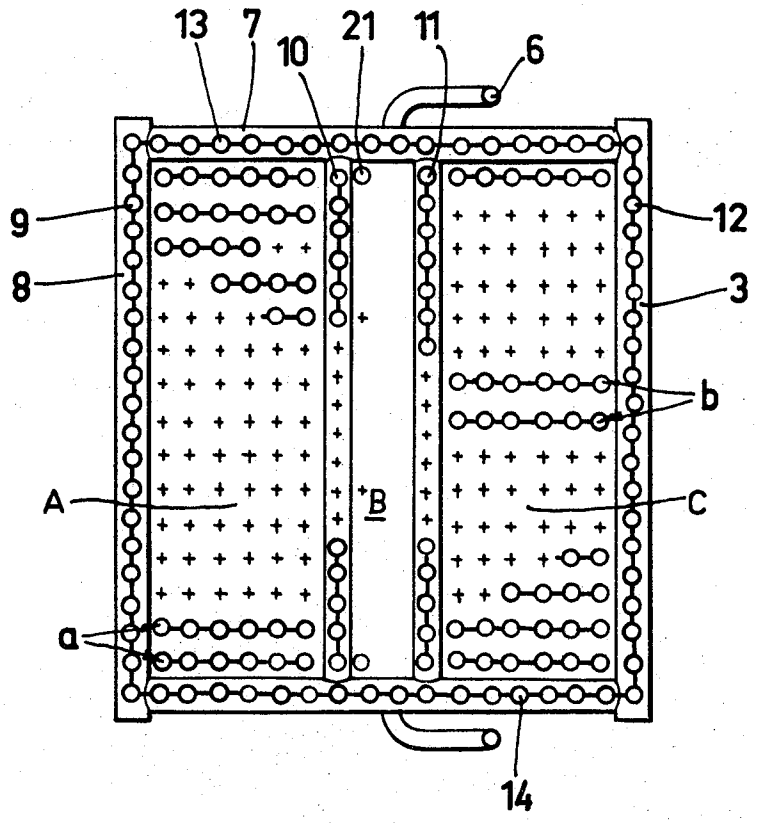
FIG. 2



ECONOMIZER WITH FLUES CONNECTED IN SERIES

This invention relates to an economizer comprising vertical tube screens arranged in vertical gas flues connected in series.

Economizers of this kind comprise a plurality of tube screens — finned tubes or tubes welded together to panels by sheet metal strips — which are suspended in vertical flue-gas passages or ducts made of sheet metal. The temperature differences in the walls of these passages being high, the passages are to be constructed with great care to master expansions and thermal stresses. The passages also are to be provided with a relatively thick insulation.

The present invention has as its object to solve the aforesaid problems in the simplest way and to lower the manufacturing costs of the construction. The present invention renders it possible to eliminate the costs for the walls between the ducts and can be assumed to eliminate half of the manufacturing costs for the remaining walls.

The invention is characterized in that the walls of the gas passages or ducts are panel walls flown through by water and connected in series with the water circulation system of the economizer, that the walls are placed before, after or between groups of economizers and constitute a part of the heat-absorbing surface of the economizer.

An embodiment of the invention is described in the following with reference to the accompanying Figures.

FIG. 1 shows in a schematical way a vertical section, and

FIG. 2 shows a cross-section through an economizer according to the invention.

Economizers of the kind referred to by the invention are advantageously applied in connection with soda recovery units, and preferably it is the heat of the flue gases from soda recovery units which is to be recovered in the economizer according to the invention. The economizer comprises three ducts designated A, B, C. The ducts are separated from each other, and the flue gases flow from the arrow I into the duct A and downwards therethrough, turn at the pocket II and flow upwards through duct B. At III the flue gas is led into duct C and leaves the economizer in the lower portion of duct C at the arrow IV. Feed water for absorbing the heat content in the flue gases is introduced through the pipe **1** to a distribution box **2.** In the duct C a number of screens *b* are mounted through which the water can flow upwards. The water is led from the distribution box **2** via distribution pipes **3** to each of the screens *b*, which include tubes welded together in a manner known per se to form screens. Alternatively to their arrangement within the duct, the distribution box **2** and distribution pipes **3** may be located outside the duct with connection to the tube screens *b*. The tube screens *b* are upwardly in the duct C connected to a collecting box **5**, from which pipes **6** lead the water to further distribution boxes **7** and **8** at the lower edge of duct B, which boxes are interconnected and constitute a communicating system. From said distribution boxes **7** and **8** the water flows through the tubes in the walls **9–14** – all of which, thus, are connected in parallel — to the collecting boxes **16–20**, which are interconnected in the same way as the aforementioned distribution boxes. From the collecting boxes **16–20** the water is led through pipes **21** downwards to further distribution boxes **22** and, respectively, **23** in the lower edge of duct A. The pipes **21** preferably may extend through the duct B. In the duct A there are provided economizer screens *a* in the form of tube screens in the same known manner as described above, which lead the water to collecting boxes **24** and **25**, from which the water is led away from the economizer through the pipes **26.**

It is to be observed, thus, that the ducts A, B and C are defined by tube screens **9, 10, 11, 12** and **13/14**, which receive their feed water through the distribution boxes **7** and **8** located downwardly in each duct. For providing an entrance for the flue gases at the arrow I, the tube screen **9** must have an opening, which preferably is so arranged that a collecting pipe **15** is placed in the lower edge of the opening. Said collecting pipe distributes the water outwards to the sides so that the water can rise around the opening and is re-collected in collecting pipes **16** in the upper edge of the duct. The tube screen wall **12** has in the same way a collecting pipe **17** in the upper edge of duct C, but here no opening through the tube screen wall **12** is required, because the flue gases at duct C go off downwardly.

The invention provides the further advantage, in addition to those mentioned in the introductory portion, that in the entire passage wall system a temperature of highest possible uniformity is obtained and that, furthermore, the insulation thickness of the walls can be reduced. It is to be noted, thus, that the feed water flows in series through the tube screens and in a counterflow to the flue gases.

What I claim is:

1. An economizer, comprising in combination

a. a plurality of vertical gas passageways disposed with their axes parallel to each other and having inlets and outlets therein so that a heated gas can flow serially therethrough,

b. the walls of said vertical gas passageways comprising a plurality of tubes that are disposed in essentially parallel relationship to each other and welded together to form screens,

c. the interior of said vertical gas passageways containing vertical screens composed of a plurality of tubes arranged in parallel relationship, and

d. means for passing a cooling fluid in series through the screens of (c) and the tubes of (d).

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