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(54) Apparatus for separating a two-phase flow into a plurality of partial flows with a like liquid to gas ratio

(57) The present invention relates to an apparatus (1) for separating a two-phase flow or stream into a plurality of partial flows with a like liquid to gas ratio, comprising a separating chamber (2) communicating with an inlet duct (3) for supplying a two-phase flow and defining a bottom region (10) for collecting the liquid phase and a top region (11) for collecting the gaseous phase.

The main feature of the invention is that the apparatus (1) further comprises a plurality of outlet tubes (20) arranged in the separating chamber (2) and leading to the top surface of the separating chamber (2).

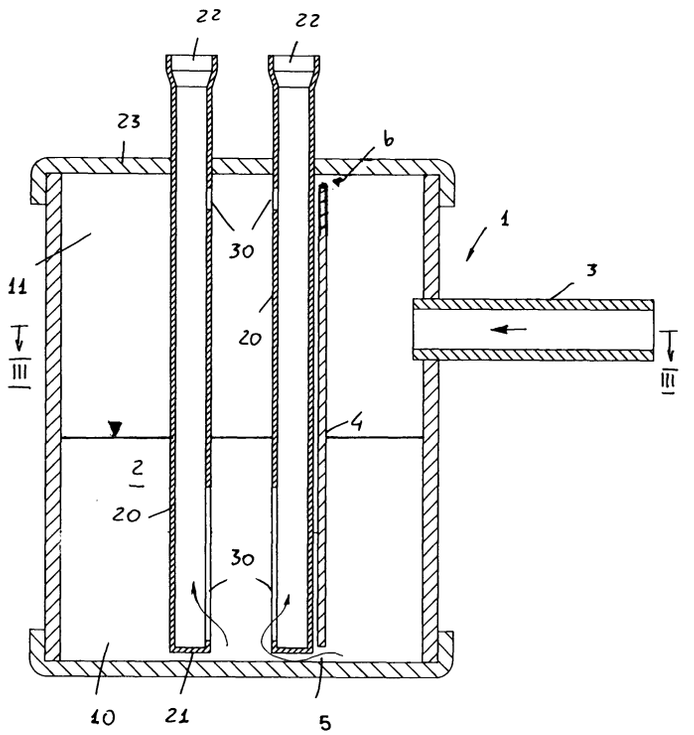

FIG. 2

EP 1 278 029 A1

Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to an apparatus for separating a two-phase flow or stream into a plurality of partial flows having a like liquid to gas ratio.

[0002] As is known, in refrigerating systems are conventionally used apparatus for separating a two-phase flow or stream into a plurality of partial flows, with a like liquid to gas ratio.

[0003] The above mentioned apparatus substantially comprise a separating chamber, to which leads a duct for supplying the gas-liquid mixture which is affected by suitably designed elements which so hinder the flow to provide inside the separating chamber a bottom region for collecting liquid therein and a top region for collecting gas therein.

[0004] In said separating chamber are arranged a plurality of outlet tubes or lines which usually comprise ducts including a plurality of longitudinally extending slots, and which ducts axially extend inside the separating chamber and lead to the bottom portion of the latter.

[0005] With the above mentioned arrangement, it is rather difficult to overcome possible drawbacks related to a migration of the liquid downstream of the separating device as the system is put out of operation.

SUMMARY OF THE INVENTION

[0006] Accordingly, the aim of the present invention is to overcome the above mentioned problems, by providing an apparatus for separating a two-phase flow into a plurality of partial flows, with a like liquid to gas ratio, allowing to always obtain a constant ratio of the liquid and gas.

[0007] Within the scope of the above mentioned aim, a main object of the present invention is to provide such an apparatus assuring, by a very simple construction, an optimum operation under different operating conditions.

[0008] Another object of the present invention is to provide such an apparatus which is very reliable and safe in operation.

[0009] Yet another object of the present invention is to provide such an apparatus for separating a two-phase flow or stream into a plurality of partial flows or streams, with a like liquid to gas ratio, which can be easily made by using easily available elements and materials and which, moreover, is very competitive from a mere economic standpoint.

[0010] The above mentioned aim and objects, as well as yet other objects, which will become more apparent hereinafter, are achieved by an apparatus for separating a two-phase flow into a plurality of partial flows, with a like liquid to gas ratio, comprising a separating chamber communicating with a duct for supplying a two-phase flow and defining a bottom region for collecting the liquid phase therein and a top region for collecting the gaseous phase therein, characterized in that said apparatus further comprises a plurality of outlet tubes, arranged in said separating chamber and leading to the top of said separating chamber through a top surface of said separating chamber.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] Further characteristics and advantages of the present invention will become more apparent hereinafter from the following detailed disclosure of a preferred, though not exclusive, embodiment of an apparatus for separating a two-phase flow into a plurality of partial flows, with a like liquid to gas ratio, which is illustrated, by way of an indicative, but not limitative example, in the accompanying drawings, where:

Figure 1 is a schematic perspective view illustrating the apparatus according to the present invention;
Figure 2 is a cross-sectional view, substantially taken through a vertical plane, illustrating the separating apparatus according to the invention; and
Figure 3 illustrates a further cross-sectional view, substantially taken along the section line III-III of figure 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0012] With reference to the number references of the above mentioned figures, the apparatus for separating a two-phase flow or stream into a plurality of partial flows or streams with a like liquid to gas ratio comprises an apparatus body 1, having preferably a substantially cylindric configuration, defining in its inside a separating chamber 2, which communicates with an inlet duct for supplying into said separating chamber a two-phase flow 3, said duct being substantially radially arranged of said body 1.

[0013] In said separating chamber 2, in front of said inlet duct, a separating wall 4 thereagainst is supplied the flow of the ducts 3, so as to facilitate the separation of the liquid phase from the gaseous phase, is arranged.

[0014] Said separating wall 4 defines a bottom gap 5 and a top gap 6, designing for reducing the rate of the two-phase flow, and to hold stable the free surface of the liquid held in said separating chamber 2.

[0015] The latter is provided with an inner bottom region 10 for collecting therein the liquid phase and a top region 11 for collecting therein the gaseous phase.

[0016] The main feature of the invention is that a plurality of outlet tubes 20 are provided, said outlet tubes being arranged beyond the region delimited by the mentioned separating wall 4 and, advantageously, being evenly distributed with respect to the center of the apparatus body 1.

[0017] In particular, the outlet tubes 20 are provided with a closed inner bottom 21 and a top opening 22,

passing through the top cover of the separating chamber 2.

[0018] The outlet tubes 20 are provided, through their surface, with a plurality of longitudinally extending slots 30 which are variously distributed and which, advantageously, are open toward the inner portion of the separating chamber 2.

[0019] The above disclosed device, which comprises a plurality of outlet tubes upward projecting, allows to always provide a constant ratio of the outlet liquid and gas flow ratio, independently from possible small inclinations with respect to the vertical line of the vessel axis.

[0020] Thus, the disclosed device allows to provide even liquid phase/gaseous phase ratios, through the outlet ducts, differently from the prior art approaches, while also providing a discrete region between the two-phase flow inlet region and the region therefrom the outlet tubes depart.

[0021] The invention, as disclosed, is susceptible to several modifications and variations, all of which will come within the inventive idea scope.

[0022] Moreover, all of the constructional details can be replaced by other technically equivalent elements.

[0023] In practicing the invention, the used materials, as well as the contingent size and shapes, can be any, depending on requirements.

Claims

1. An apparatus for separating a two-phase flow into a plurality of partial flows, with a like liquid to gas ratio, comprising a separating chamber communicating with a duct for supplying a two-phase flow and defining a bottom region for collecting the liquid phase therein and a top region for collecting the gaseous phase therein, **characterized in that** said apparatus further comprises a plurality of outlet tubes, arranged in said separating chamber and leading to the top of said separating chamber through a top surface of said separating chamber.

2. An apparatus, according to the preceding claim, **characterized in that** said separating chamber is formed inside a cylindric body having a vertical axis.

3. An apparatus, according to the preceding claims, **characterized in that** said inlet duct is arranged substantially radially of said separating chamber.

4. An apparatus, according to one or more of the preceding claims, **characterized in that** said apparatus further comprises, in said separating chamber, in front of an inlet port of said inlet duct, a separating wall defining a bottom and top gap for communicating with said separating chamber.

5. An apparatus, according to one or more of the preceding claims, **characterized in that** said outlet tubes have a closed inner bottom and comprise a plurality of slots which extends substantially parallel to an axis of said separating chamber.

6. An apparatus, according to one or more of the preceding claims, **characterized in that** said outlet tubes are circumferentially distributed about the axis of said separating chamber and are arranged **in that** portion of said separating chamber on an opposite portion of said separating wall, with respect to said inlet duct.

7. An apparatus, according to one or more of the preceding claims, **characterized in that** said slots of said outlet tubes are directed toward the center of said separating chamber.

8. An apparatus for separating a two-phase flow into a plurality of partial flows with a like liquid to gas ratio, according to one or more of the preceding claims, and substantially as broadly disclosed and illustrated and for the intended aim and objects.

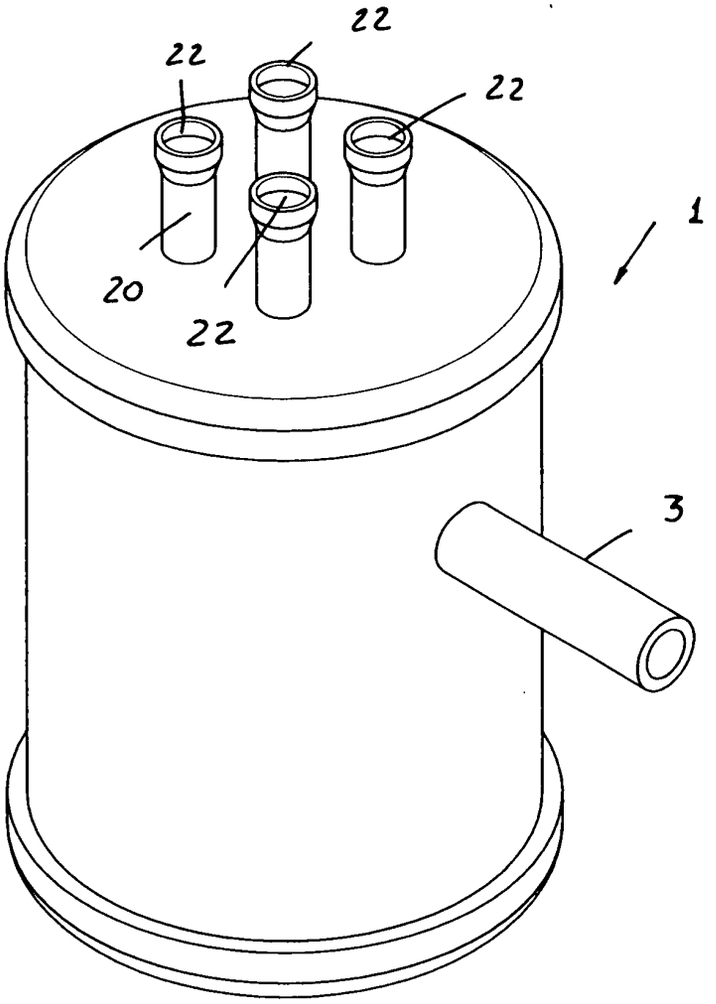

FIG. 1

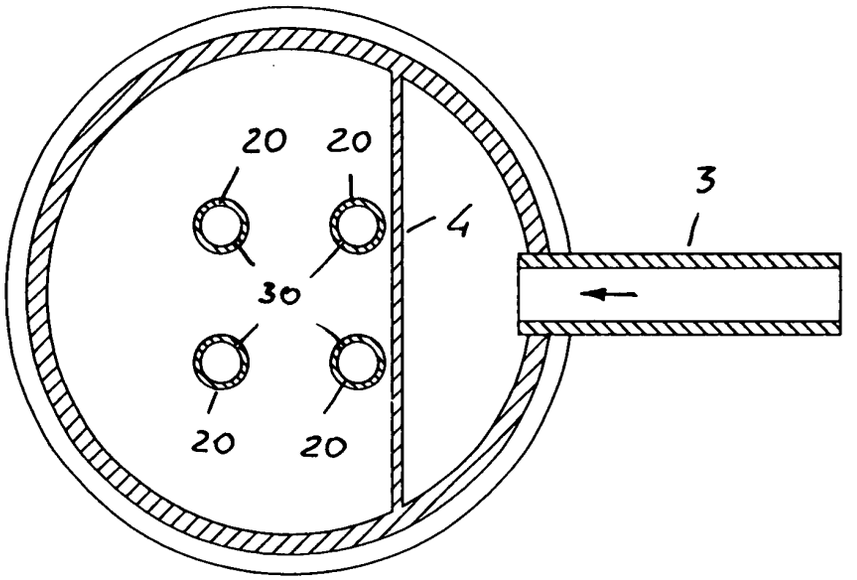

FIG. 3

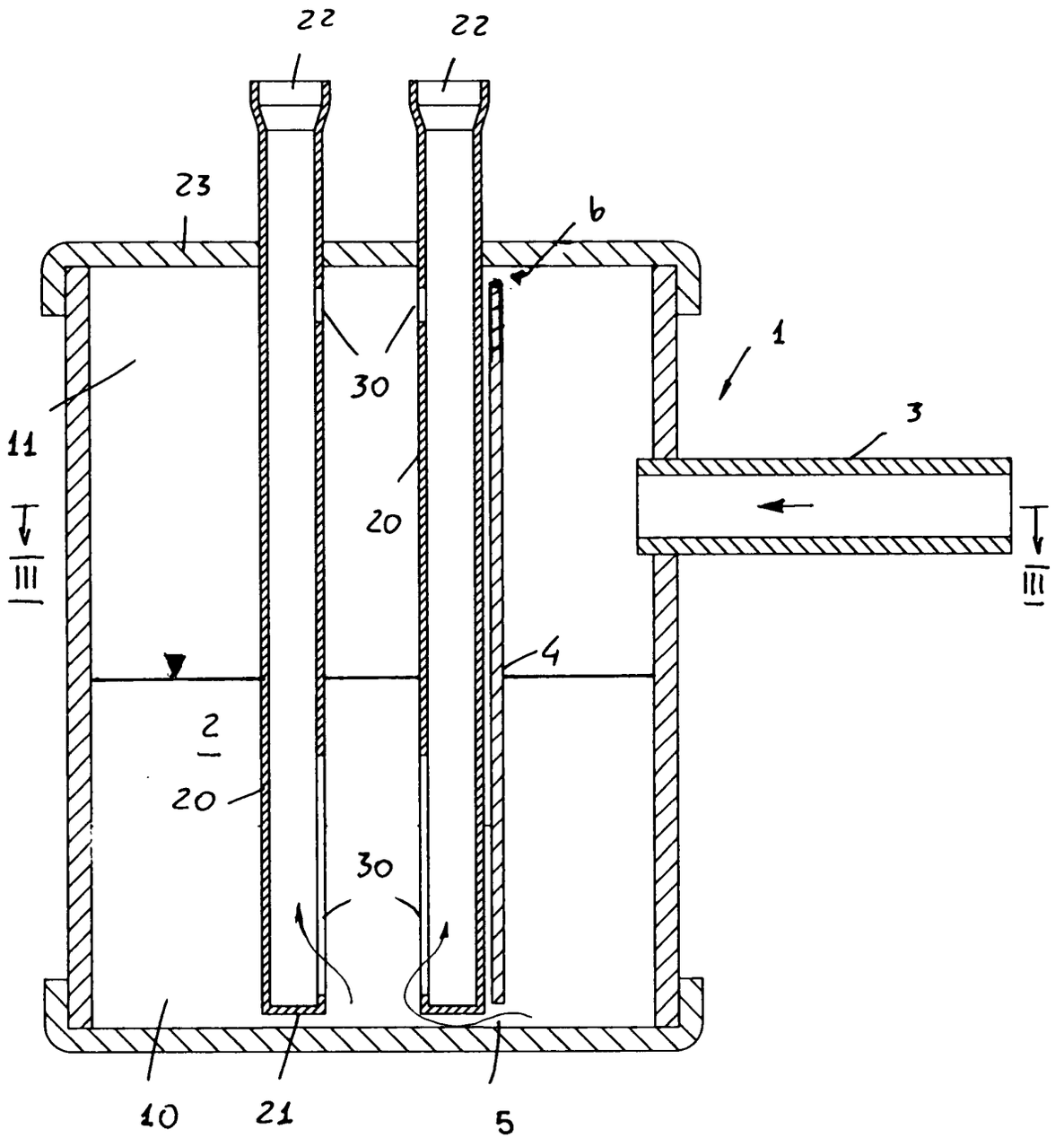

FIG. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 02 00 8819

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.7)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	30 September 2002	Boets, A

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 02 00 8819

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82