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(71) Applicant:
Kroon, Cornelis Joseph
1131 AG Volendam (NL)

(72) Inventor: **Kroon, Cornelis Joseph**
1131 AG Volendam (NL)

(74) Representative:
Jilderda, Anne Ayolt et al
Octrooibureau LIOC B.V.,
Postbus 13363
3507 LJ Utrecht (NL)

(54) Deodorizing device

(57) A deodorizing device for waste gases comprises an at least substantially closed, box-shaped housing (1) with an inlet opening (10) and an outlet opening (20) which are in communication with one another via an internal filtering unit (6). The filtering unit (6) comprises a reservoir (7) with an odour-neutralizing liquid (7). To overcome the internal resistance of the device, a fan (8) is provided in or adjacent at least one of the two openings.

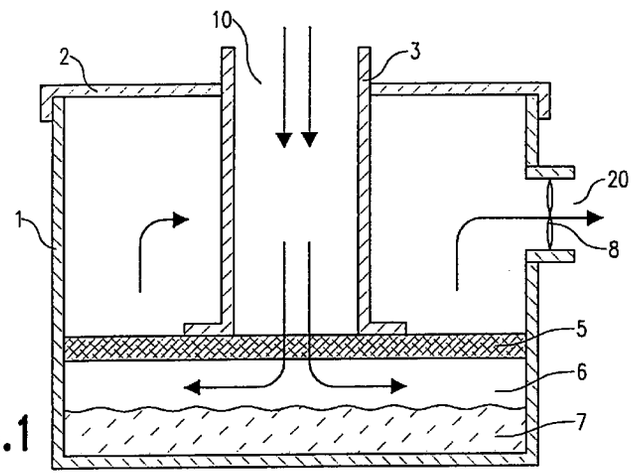

Fig.1

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Description

The invention relates to a deodorizing device for waste gases comprising an at least substantially closed, box-shaped housing with an inlet opening and an outlet opening which are in communication with one another via a filtering unit which is accommodated in the housing.

The invention relates in particular to such a device for use in a deep-frying or frying installation, which may or may not be mobile, and whose waste gases are usually regarded as unpleasant and annoying on account of the odoriferous substances contained therein.

A known device of the kind mentioned in the opening paragraph is marketed by the firm of Hewigo and comprises an elongate, box-shaped housing with an inlet opening and an outlet opening at respective ends. Between the inlet opening and the outlet opening are found in that order in the housing: a bag filter for catching any oil or fat particles and a carbon filter which effects the actual odour filtering. Such a filter is claimed to be capable of achieving a 80% odour absorption.

Apart from the fact that no complete odour elimination takes place in the known device, the carbon filter will also become progressively saturated and become ineffective, so that a gradual deterioration in the filtering efficiency will be observable right from the start. The comparatively expensive carbon filter will accordingly have to be replaced, sometimes after a short period already. This renders the known device comparatively costly, not only as an investment but also as regards its running costs.

The present invention has for its object inter alia to provide a deodorizing device of the kind mentioned in the opening paragraph which counteracts these disadvantages.

According to the invention, a deodorizing device of the kind mentioned in the opening paragraph is for this purpose characterized in that the filtering unit comprises a reservoir containing an odour-neutralizing liquid, and in that a fan is provided in or adjacent one of the two openings. Experiments carried out in the vicinity of a fish stand equipped with a deodorizing device according to the invention have shown that, during frying of fish, the characteristic penetrating smell associated with fried fish was not or hardly noticeable in the surroundings of the fish stand. The smell of fresh herring was predominant in the immediate vicinity of the fish stand. The outlet of the deodorizing device was directed towards the ground and there was no plume of smoke, partly also on account of the temperature. The difference in odour intensity between the incoming gas flow and the outgoing waste gas was very clearly noticeable. The incoming gas flow smelled of fried fish; the outgoing one hardly at all. A similar result could not be achieved even with a completely fresh carbon filter. The fan in the device according to the invention serves to compensate for its internal resistance, so that the device can be used in combination with an existing exhaust device. Although the fan may be placed at the inlet as well as at the outlet side of the device in principle, it is preferably placed at the outlet side. This is found to have a favourable effect on the gas flow through the device in practice.

A special embodiment of the device according to the invention is characterized in that a comparatively fine-mesh network is placed in front of the filtering unit. The network, for example a filter made of stainless steel, serves to retain oil, fat and dust particles floating in the waste gases so that the odour-neutralizing liquid is not polluted thereby and remains active for a longer period.

The waste gases come into contact with the odour-neutralizing liquid in the filtering unit. It is sufficient here for the waste gases to flow past the reservoir with the liquid; it is not necessary for the waste gases actually to be conducted through the liquid. The internal resistance of the device can thus remain limited. It is suspected that the active odouriferous ingredients in the waste gases are adsorbed by the neutralizing liquid and thus rendered inactive, i.e. odourless. A certain minimum dwell time of the waste gases in contact with the liquid should be observed for an optimum effectivity, so that the neutralizing liquid is given an opportunity to bind the odour molecules. To promote the contact between the liquid and the waste gases, a further special embodiment of the device according tot he invention is characterized in that atomizing means are present at the inlet side of the device for fine-spraying of the odour-neutralizing liquid. The waste gases have thus been pretreated and divested of part of their smell(s) before they are conducted over the odour-neutralizing liquid in the filtering unit. The efficiency of the device can be enhanced thereby.

The invention will now be explained in more detail with reference to a number of embodiments and an accompanying drawing. In the drawing:

- Fig. 1 is a cross-section of a first embodiment of the device according to the invention;
- Fig. 2 is a cross-section of a second embodiment of the device according to the invention;
- Fig. 3 is a cross-section of a third embodiment of the device according to the invention;
- Fig. 4 is a cross-section of a fourth embodiment of the device according to the invention; and
- Fig. 5 is a cross-section of a fifth embodiment of the device according to the invention.

The Figures are purely diagrammatic and not true to scale. Some dimensions have been particularly exaggerated for the sake of clarity. Corresponding components have been given the same reference numerals as much as possible.

A first embodiment of the device according to the invention shown in Fig. 1 comprises a box-shaped

housing 1 of stainless steel on which a lid 2 is mounted in an airtight manner. A tube 3, whose lower side rests on a fine-mesh network 5 which is placed in front of the filtering unit 6 proper, is fastened in the lid 2. The network is formed by a conventional stainless steel oil/fat filter and serves to retain any oil, fat, and dust particles which may be present in the waste gases, so that the filtering unit 7 is not polluted thereby.

A profile (not shown) on which the network 5 is supported is provided at the inner wall of the housing, at some distance away from the bottom of the housing. Below the network there is a reservoir 7 containing an odour-neutralizing liquid by means of which odoriferous substances are removed from the waste gases, or are at least rendered inactive. The reservoir volume is adapted to the envisaged filtering capacity and is approximately 3 to 4 litres per 1000 m^3/hour of filtering capacity. Such a quantity is found to be sufficient for an operating period of approximately months in normal use. Several substances are suitable in principle for the removal of odours from waste gases. Besides the CORDA GN™ used here, for example, ECOCARE™ is also suitable, both being commercially available and containing purely natural substances. The former product, however, has proved to have a higher effectivity in the removal of smells associated with the frying of fish. This liquid is accordingly preferred, because the present embodiment of the device was specifically designed for this purpose. It is suspected that the ingredients of the waste gases responsible for the characteristic fried-fish smells are adsorbed by the liquid 7 and are rendered inactive, i.e. odourless thereby. The device described has succeeded in achieving a substantially complete removal of these smells in practice in a mobile fish vending stand.

The tube 3 is integral with the remaining portion of the detachable lid 2, which facilitates a renewal of the liquid 7. To renew the liquid 7, the lid 2 is simply detached together with the tube 3, whereupon the loose network 5 can be removed and, if necessary, cleaned. The liquid is then topped up to the required level, after which the components 2,3,5 are mounted again in reverse order. The tube 3 ensures that the network 5 is pressed home firmly into its seat during this.

The tube 3 projects a little from the lid 2 at its free end and comprises an inlet opening 10 by which the device is connected to the existing waste gas exhaust channel. An outlet opening 20 through which the cleaned waste gases can leave the device is provided in one of the side walls of the housing 1 above the network 5. A driven, possibly controlled fan 8 is mounted in the outlet opening 20, whereby the internal resistance of the device can be overcome and a backflow of the waste gases is prevented. Since the internal resistance is comparatively weak, an electrically driven fan with a power rating of approximately 20 W is sufficient here for obtaining a filtering capacity of 1400 to 4000 m^3/hour.

The device of Fig. 1 is designed for incorporation into a vertical (part of a) waste gas exhaust channel. The device of Fig. 2 on the other hand is a deodorizing device which is to be mounted in a horizontal waste gas exhaust channel. The inlet opening 10 is in one of the side walls of the housing 1 in this case, and an outlet opening 20 with fan 8 is provided in the lid 2. The inlet tube 3 here comprises an inner bend 9 through which the waste gases are guided to the reservoir 7 in the filtering unit 6 via the stainless steel filter. The part of the side wall through which the inlet tube is passed can be detached from the remaining part of the housing so as to facilitate periodic maintenance of the interior of the device.

A third embodiment of the device according to the invention is shown in Fig. 3. A raised partition wall 30 separating a first compartment 15 situated above the network 5 from a second compartment 25 is placed in the housing 1 in this case. The housing is provided with the inlet opening 10 in the first compartment 15, whereas the outlet opening 20 with the fan 8 is arranged in the second compartment. The partition wall 30 extends over the entire width or length, as applicable, of the housing and terminates at some distance above the reservoir 7. The partition wall rests on the network 5, which has been made shorter here. The incoming waste gases fill the first compartment 15 and are subsequently conducted very evenly over the reservoir 7 with the liquid. Not only does this achieve an optimum contact between the two, it also renders possible a reduction in the internal resistance of the device.

It is also possible to spread the incoming gases more evenly over the reservoir 7 in that the inlet tube 3 is split up into a number of sub-tubes 31, 32 as shown in Fig. 4, which depicts a fourth embodiment of the device according to the invention. This embodiment of the device in addition comprises atomizing means 40 at the inlet side for fine-spraying of the liquid in situ, with the object of further improving the contact between the liquid 7 and the waste gases. The atomizing means 40 are provided with their own separate stock of liquid 7, which can be supplied externally. The waste gases have thus been pretreated and divested of smells to a certain extent already before being conducted over the reservoir. This procedure enhances the effectivity of the device.

The effectivity of the device may also be enhanced in that the dwell time of the waste gases in contact with the reservoir is prolonged. The device shown in Fig. 5 for this purpose comprises an elongate housing 1 in which a number of raised partition walls 50 are placed in a row. The partition walls are supported alternately by the one and by the other longitudinal side of the housing, leaving open a passage at the other side each time. Since the partition walls interconnect the top and bottom of the housing, the waste gases are forced to follow a meandering path. The reservoir with the neutralizing liquid again extends over the entire bottom of the housing 1 here, so that the waste gases have to travel a very

long way over the liquid. The correspondingly long contact time with the liquid 7 promotes the dissociation or adsorption of odoriferous substances. A fine-mesh network is again positioned at the inlet side between a partition wall 5 and the opposed wall for stopping any fat, oil, and dust particles.

Although the invention was explained in detail with reference to only a limited number of embodiments, it will be obvious that the invention is by no means limited to the examples given. On the contrary, many more variations and designs are possible to those skilled in the art without departing from the scope of the present invention.

Thus, for example, a reservoir in which the liquid is forced to move about may be used instead of a passive reservoir. For this purpose, for example, air or some other gas is guided into the liquid, whether or not through a porous brick, or the liquid is made to swirl by some other means. An improved contact between the liquid and the waste gases is achieved thereby.

Claims

1. A deodorizing device for waste gases comprising an at least substantially closed, box-shaped housing with an inlet opening and an outlet opening which are in communication with one another via a filtering unit which is accommodated in the housing, characterized in that the filtering unit comprises a reservoir containing an odour-neutralizing liquid, and in that a fan is provided in or adjacent one of the two openings.

2. A deodorizing device as claimed in Claim 1, characterized in that a comparatively fine-mesh network is placed in front of the filtering unit.

3. A deodorizing device as claimed in Claim 2, characterized in that a tube projects beyond the housing at one end and at its other end is supported on the network, the latter lying at least substantially flat inside the housing at a certain distance from the bottom thereof, in that the reservoir is present below the network, and in that the outlet opening is provided in one of the side walls of the housing above the network.

4. A deodorizing device as claimed in Claim 2, characterized in that the network lies at least substantially flat in the housing at some distance above the housing bottom, in that a raised partition wall is placed in the housing separating a first compartment in the housing above the network from a second compartment, in that the first compartment comprises an inlet opening, and in that the second compartment comprises an outlet opening.

5. A deodorizing device as claimed in Claim 1, characterized in that the housing has an elongate cross-section, an inlet opening and an outlet opening being provided at respective end faces thereof, in that a number of raised partition walls each extending over part of the width of the housing are provided between the inlet opening and the outlet opening, said walls interconnecting an upper side of the housing and a lower side of the housing and bearing alternately on the one and on the other longitudinal side wall of the housing, and in that the reservoir is present on the bottom of the housing.

6. A deodorizing device as claimed in Claim 5, characterized in that a fine-mesh network is placed between a partition wall and a longitudinal side of the housing at least at the inlet side.

7. A deodorizing device as claimed in Claim 3, 4, or 5, characterized in that the fan is placed in or at least adjacent the outlet opening.

8. A deodorizing device as claimed in any one of the preceding Claims, characterized in that atomizing means are present at the inlet side for fine-spraying of the odour-neutralizing liquid.

9. A deodorizing device as claimed in any one of the preceding Claims, characterized in that the odour-neutralizing liquid comprises a liquid chosen from a group of commercially available liquids consisting of ECOCARE™ and CORDA GN™.

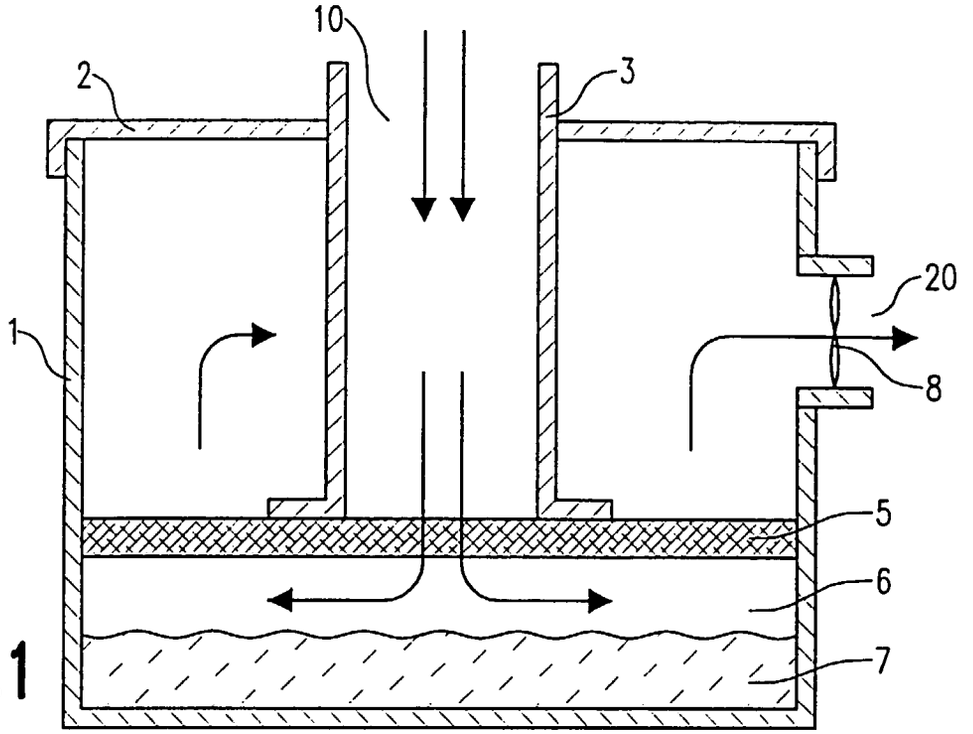

Fig.1

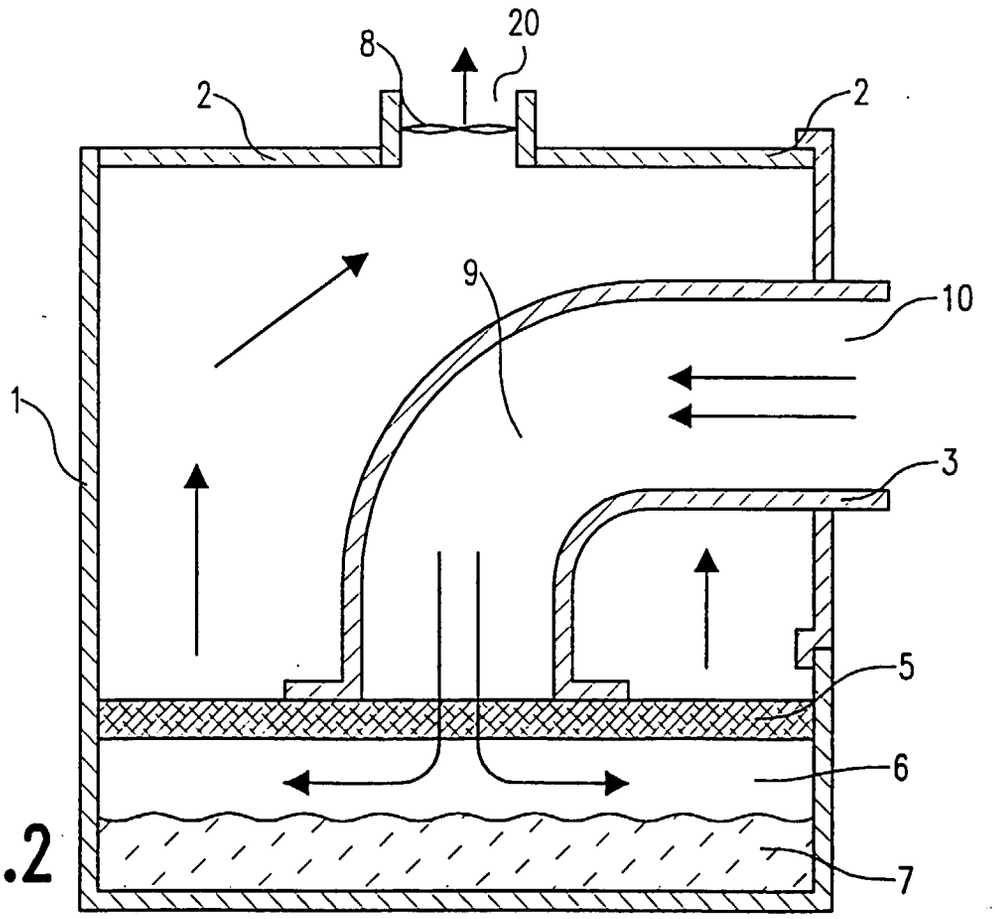

Fig.2

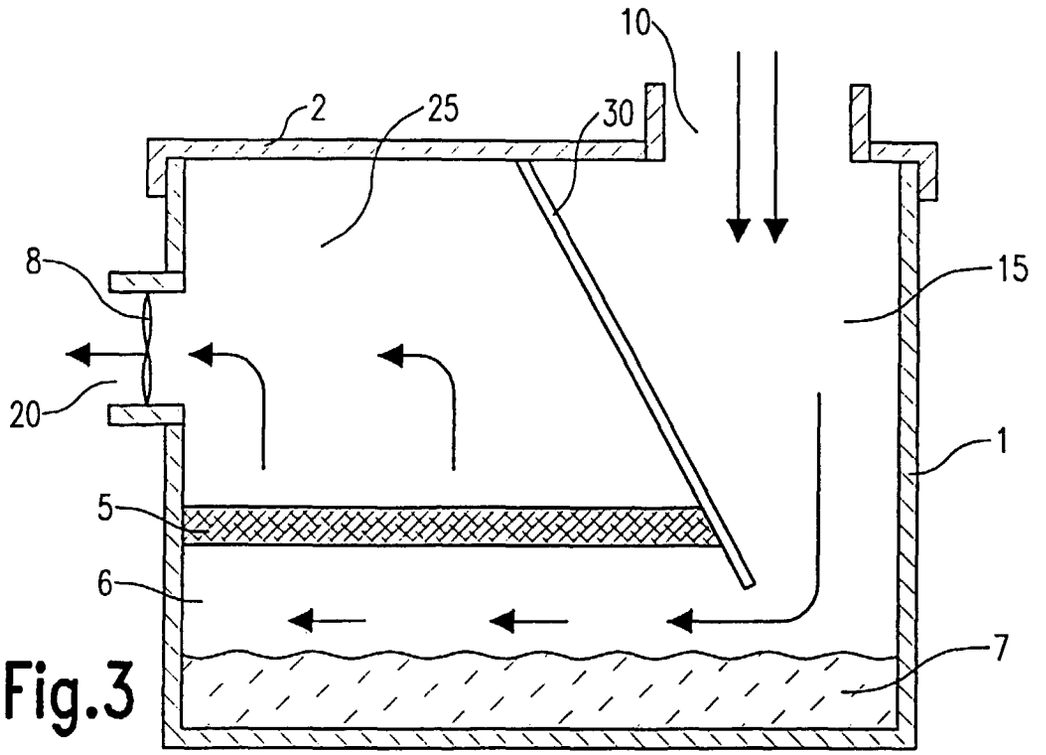

Fig.3

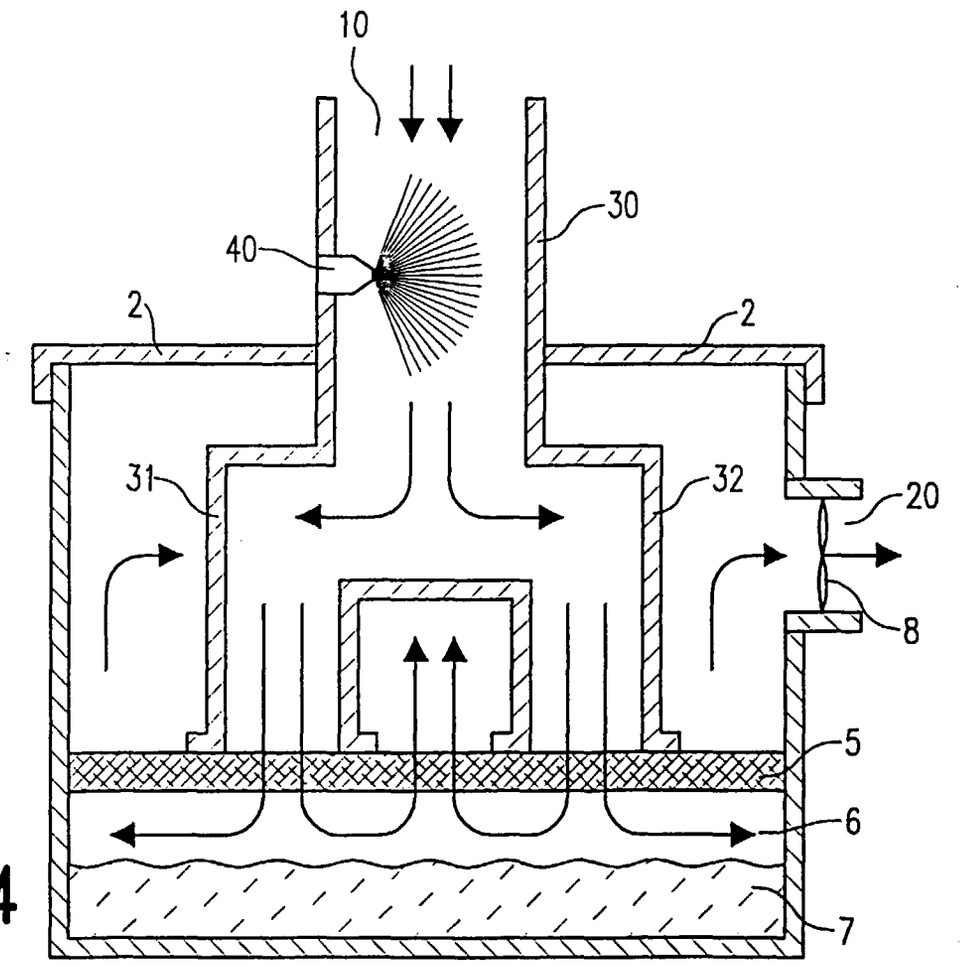

Fig.4

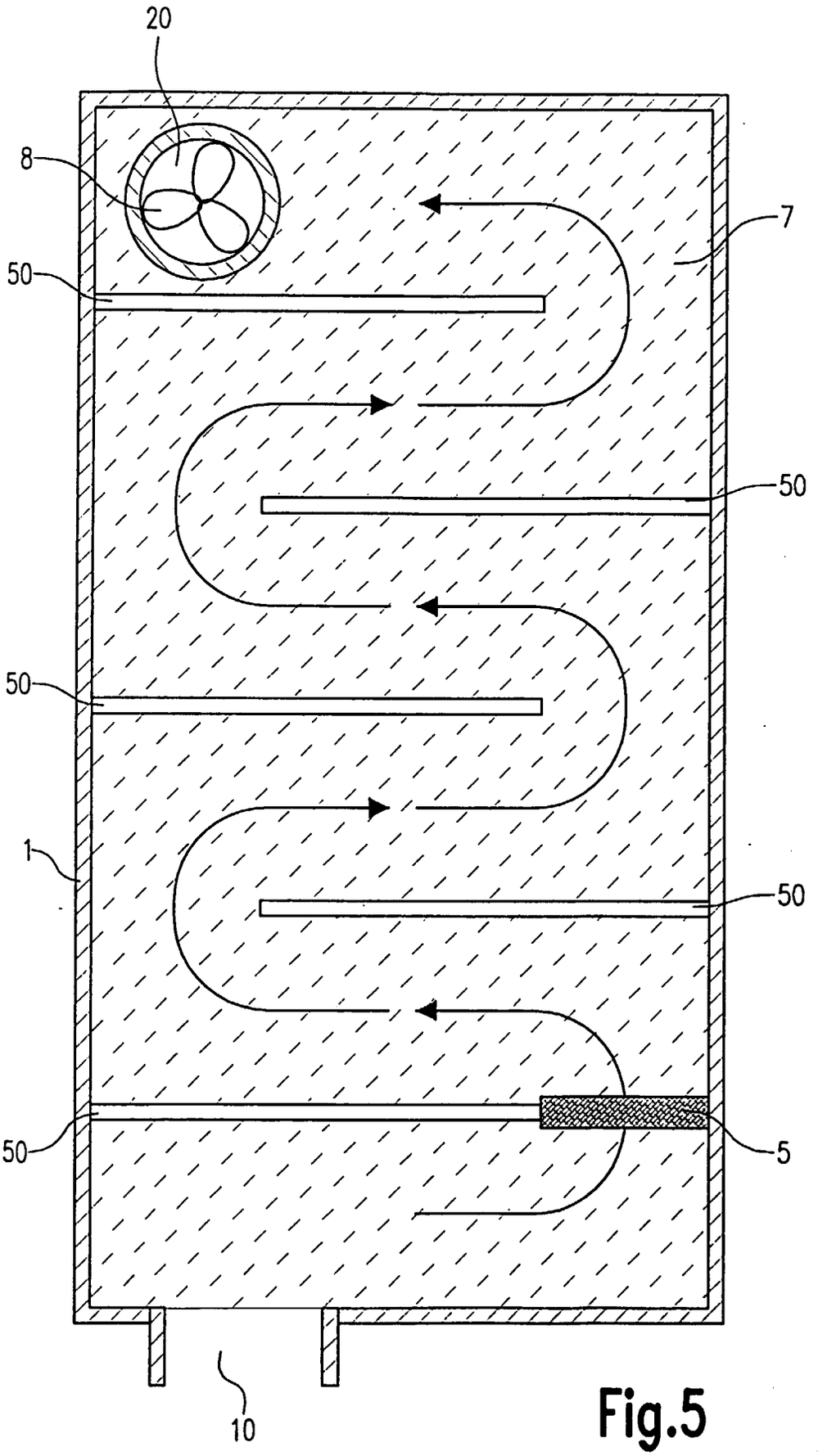

Fig.5

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EUROPEAN SEARCH REPORT

Application Number
EP 97 20 0024

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)
X	DE 31 00 320 A (MAYER) * claims; figures *	1	F24C15/20
A		2	
X	US 4 036 994 A (FRANK P.,EAR) * column 4, line 38 - line 52; figure 1 *	1,8	
X	DE 592 459 C (HEILBRUN) * the whole document *	1	
E	NL 1 000 918 C (CORDAS V O F) 4 February 1997 * the whole document *	1-9	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

F24C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	16 June 1997	Vanheusden, J

CATEGORY OF CITED DOCUMENTS

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