

EUROPEAN PATENT APPLICATION

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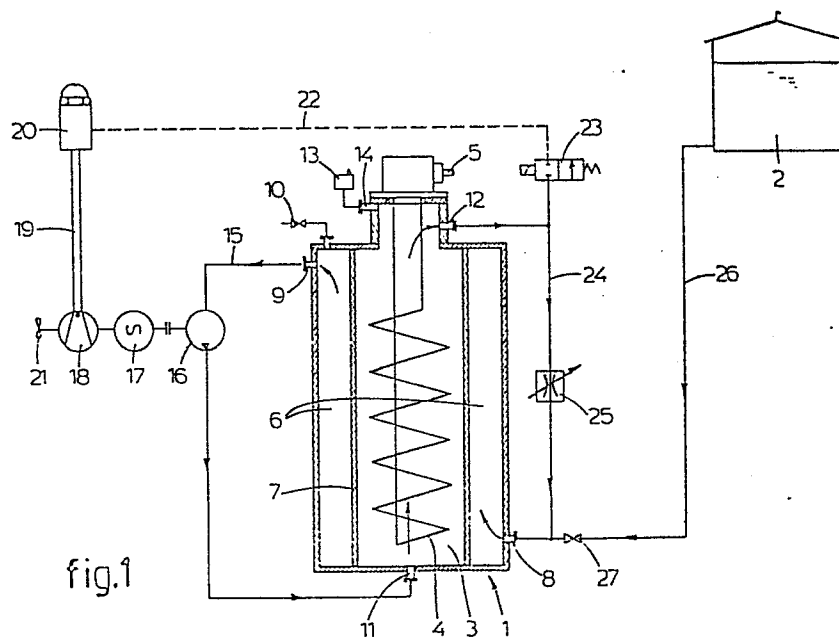
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equipped with means to expell air and vapours from both chambers (6) and (3). The burner (20) is controlled by a flow regulating valve (25) permitting the use of a pump with a constant flow characteristic and a relatively low pressure.



OILBURNER

The invention regards an oilburner with a heating device to heat the oil and with an oilpump to lead the oil through the heating device.

An oilburner of the type mentioned in the beginning
5 is applied for burning, among other things, waste-oil and heavy oil with a high viscosity. To lower the viscosity of these oils and to make these oils appropriate for burning, it is necessary to pre-heat the oil, which takes place in the heating device.

10 In a conventional oilburner the oil is led through a relatively small heating device, whereby the time in which the oil is in contact with this heating device is relatively short. Nevertheless, to effect a sufficient heating of the oil, the heating device of this conventional oilburner has a
15 high surface capacity.

A disadvantage of this conventional oilburner is that because of the high surface capacity of the heating device the oil can start cracking locally, with the result that carbon particles can be formed and can built up upon
20 the heating device. When carbon parts of this carbon residue break loose, they can cause obstructions, especially in the burnerhead of the oilburner, resulting in an irregular

burning or even stop the burning.

The present invention intends to provide an oilburner of the in the beginning mentioned type, in which this inconvenience is solved in a simple, but efficient way.

5 For this purpose the oilburner of the invented type has the characteristic that the heating device includes a first chamber provided with a heating element and an adjacent second chamber, separated from the first by a wall, whereby both chambers are thus connected by oilconduits that
10 the oil is led first through the second chamber, then through the oilpump and finally through the first chamber.

The heat, generated in the first chamber by the heating element is partially transferred to the second chamber via the wall between the first and the second
15 chamber. Thus the oil within the second chamber will already be heated, so that the final heating of the oil in the first chamber requires less heat supply. In fact the time that the oil is in the heating device is considerably longer, so that the surface capacity of the heating element can be
20 considerably lower. Thus the chance of cracking of the oil and the deposition of carbon particles is considerably reduced.

In the preferred embodiment of the oilburner according to the invention, the outlet of the first chamber
25 is connected by a circulation conduit to the inlet of the second chamber and in said conduit is installed a precision flowregulator.



With this flowregulator mounted in this circulation conduit, it is possible to regulate very precisely the quantity of oil that is carried from the outlet of the first chamber to the burnerhead. When the flowregulator is opened
5 up wider, the quantity of oil which will reach the burnerhead will decrease, whereas on the contrary, when the flowregulator is closed more and more, this will increase the quantity of oil flowing towards the burnerhead. Moreover, when the oil flows back through the circulation
10 conduit to the inlet of the second chamber, the heatloss is minimal because the hot oil from the first chamber is added to the second chamber. This in contrary with the conventional oilburner where the oilsurplus that leaves the heating device on the outletside and not directly led to
15 the burnerhead, is fed back to the oilreservoir with cold oil.

In a preferred embodiment of the oilburner of the invented type, both chambers are made cylindrical whereby the second chamber surrounds concentrically the first
20 chamber for almost its complete length.

In this way the heat transportation from the first chamber to the second chamber is extremely efficient.

When in an other embodiment of the oilburner of the invented type the chambers are placed vertically with their
25 inlets on the lower end and their outlets on the upper end, the hottest oil with the lowest viscosity -the oil that is most suitable to be led to the burnerhead- will be on top.

Further it is possible to provide the first chamber with an automatic air-vent at the top of it, with its connection to this chamber higher than the connection of the outlet to the first chamber.

5 Via this automatic air-vent watervapour can escape from the first chamber, in case this is formed out of waterresidue in the oil.

Besides this, the second chamber can be provided with a manually operated air-vent at the top, with its
10 connection to this chamber higher than the outlet connection to the second chamber.

This manually operated airvent can be used when the second chamber has to be filled with oil in the beginning stage of the use of the oilburner, and when the air in the
15 second chamber has to escape. During further use of the oilburner this manually operated air-vent is mainly not used.

The present invention is hereafter described with reference to the accompanying drawings. The drawings
20 reproduce a example of the oilburner of the invented type.

Fig.1 shows in outline an oilburner of the invented type shortly before the actual burning and fig. 2 shows the oilburner of fig.1 during the burning.

The in the figs. only in outline reproduced
25 oilburner has a heating device (1) to heat the oil which is supplied from oilreservoir (2). The oilreservoir (2) sits on a higher level than the heating device (1) so that this



difference in height can be used for the oil transportation.

The heating device (1) comprises a first chamber (3) in which a heating element (4) can be found. The heating element (4) is connected to a not further specified powersource by means of wire (5).

Further the heating device (1) comprises a second chamber (6) which borders the first chamber (3) and is separated from it by wall (7). In the shown example both chambers (3)(6) are made cylindrical, whereby the second chamber (6) concentrically surrounds the first chamber (3) for almost its complete height.

The second chamber is provided with an inlet (8) at the bottom and an outlet (9) at the top. Moreover the second chamber is provided with a manually operated air-vent (10) at the top.

Similar to the second chamber, the first chamber (3) is provided with an inlet (11) at the bottom and an outlet (12) at the top. Further is the first chamber (3) provided with an automatic air-vent at the top, with its connection (14) above the outlet (12) of the first chamber (3).

As shown in the fig. the outlet (9) of the second chamber is connected to the inlet (11) of the first chamber by means of a conduit (15). In this conduit (15) an oilpump (16) is included, which is driven by a motor (17). Motor (17) drives also compressor (18) that forces primary air to the burnerhead (20) via airconduit (19). Besides this, motor

(17) drives the centrifugal fan (21), that forces the so called secondary air to the burnerhead (20).

Outlet (12) of the first chamber is connected to the burnerhead (20) via conduit (22), which conduit (22) comprises a solenoid valve (23). Also connected to outlet (12) of the first chamber is circulation conduit (24), further connected to the inlet (8) of the second chamber, which circulation conduit (24) comprises a flowregulation valve (25).

Conduit (26), connecting oilreservoir (2) to inlet (8) of the second chamber, comprises finally a valve (27).

When heating device (1) is empty and has to be filled with oil, the manually operated air-vent (10) is opened, while via conduit (26) and valve (27) oil flows from the oilreservoir (2) to the second chamber (6). This flow is caused by the height difference between oilreservoir (2) and the heating device (1). When the second chamber (6) is completely filled, the oil will reach the oilpump (16) via outlet (9) and the conduit (15). The oilpump transports the oil via inlet (11) to the first chamber (3).

While the oil flows into the first chamber, air can escape through the automatic air-vent (13). Besides this, steam that can be formed out of water in the oil during the use of the heating device (1), when the oil is heated by the heating element (4), can escape through this automatic air-vent. This prevents water to reach the burnerhead (20), which causes in conventional systems irregular burning or



stopping of the burning. As the result of the application of this automatic air-vent a water percentage of ten percent is tolerable without a negative influence on the burning. Remaining water, if any, which will eventually reach the
5 burnerhead, will be atomised and evaporated in the combustion chamber, without any substantial influence on the combustion.

Fig. 1 shows the oilburner at the moment when it is started. The first chamber (3) and the second chamber (6)
10 are filled with oil and heating element (4) is switched on. The solenoid valve (23) in conduit (22) is closed, so there is no connection between outlet (12) of the first chamber and burnerhead (20). The flowregulating valve (25), on the other hand, is opened, so that outlet (12) of the first
15 chamber is connected to inlet (8) of the second chamber.

When oilpump (16) is started, the oil is sucked via outlet (9) of the second chamber and conduit (15) to the first chamber (3). The oil, pre-heated in the second chamber (6), is heated up further in the first chamber by heating
20 element (4). There is no danger of cracking of the oil because the successive heating in the second chamber (6) and the first chamber (3) is gradually. Also the heating element (4) can have a lower surface capacity, because the oil is pre-heated in the second chamber.

25 The oil, heated in the first chamber (3), leaves this chamber via outlet (12) and flows again to the second chamber via circulation conduit (24) and flow regulating

valve (25). Thus the oil keeps circulating through both chambers.

After a short period of time, for instance 10 seconds, solenoid valve (23) is opened, while flow regulating valve (25) is at least partially closed. This situation is reproduced in fig.2.

Here, the oil flows first through the second chamber (6), next through conduit (15) and oilpump (16), then the first chamber (3) and through conduit (22), to reach finally burnerhead (20). Depending on the position of flow regulating valve (25), a small part of the oil will flow via circulation conduit (24), through inlet (8) back to the second chamber (6).

The application of the flow regulating valve (25) and the circulation conduit (24) makes it possible to regulate very precisely the oilflow towards the burnerhead (20), without the speed of rotation of the oilpump having to be changed. This means in practice that a simple arcuate gear pump can be applied. Such an arcuate gear pump has under these circumstances an extreme long, troublefree life, and works silently.

The oilburner of the invented type has a burnerhead (20) of the low pressure air atomizing type, whereby both air and oil are atomized under low pressure. The overpressure is in general lower than one Bar. It is easy to reach this low overpressure, only the flow regulating valve (25) has to be put in the right position.



As shown in the fig. the heating element is placed vertically. Both inlets (8)(11) are situated at the bottom of the respective chambers, while both outlets are situated near the top. This results in that the hot oil will rise to the top while heating, so that the oil with the lowest viscosity, most suitable to be burned, will be carried off via the outlets.

Resumptively can be stated that the oilburner of the invented type has a number of major advantages. As a result of the lower surface capacity of heating element (4) the oil is prevented from cracking locally. Clogging by carbon particles will therefor occur less frequently. The shown configuration guarantees that the oil with the lowest viscosity is always at top, necessary for an optimal atomizing and burning. The version in which the second chamber surrounds the first chamber, prevents heat losses caused by radiation, while the air-vents solves the problem of air in the conduits. Finally as result of the application of the circulation conduit (24) and the flow regulating valve (25) the quantity of oil to be burned can be regulated very precisely, which is in favor of the burning and the oilpump (16), because the oilpump can work under a lower pressure and thus has a longer life.

The invention is not limited to the embodiment as described above, which can be varied within the framework of the invention.

CLAIMS

1)Oilburner with an oil circulating pump and a heating device for heating the circulating oil, with the characteristic that the heating element is placed in a first chamber, which is separated by a wall from an adjacent
5 second chamber, whereby both chambers are connected to each other by oilconduits, thus, that the oil is forced first through the second chamber, then through the oilpump and finally through the first chamber.

2)Oilburner as claimed in claim 1, with the
10 characteristic that the oilcirculation conduit between the outlet of the first chamber and the inlet of the second chamber comprises a precision flow regulator.

3)Oilburner as claimed in claim 1 or 2, with the characteristic that both chambers are cylindrical and placed
15 thus, that the second chamber surrounds the first chamber for almost its whole height.

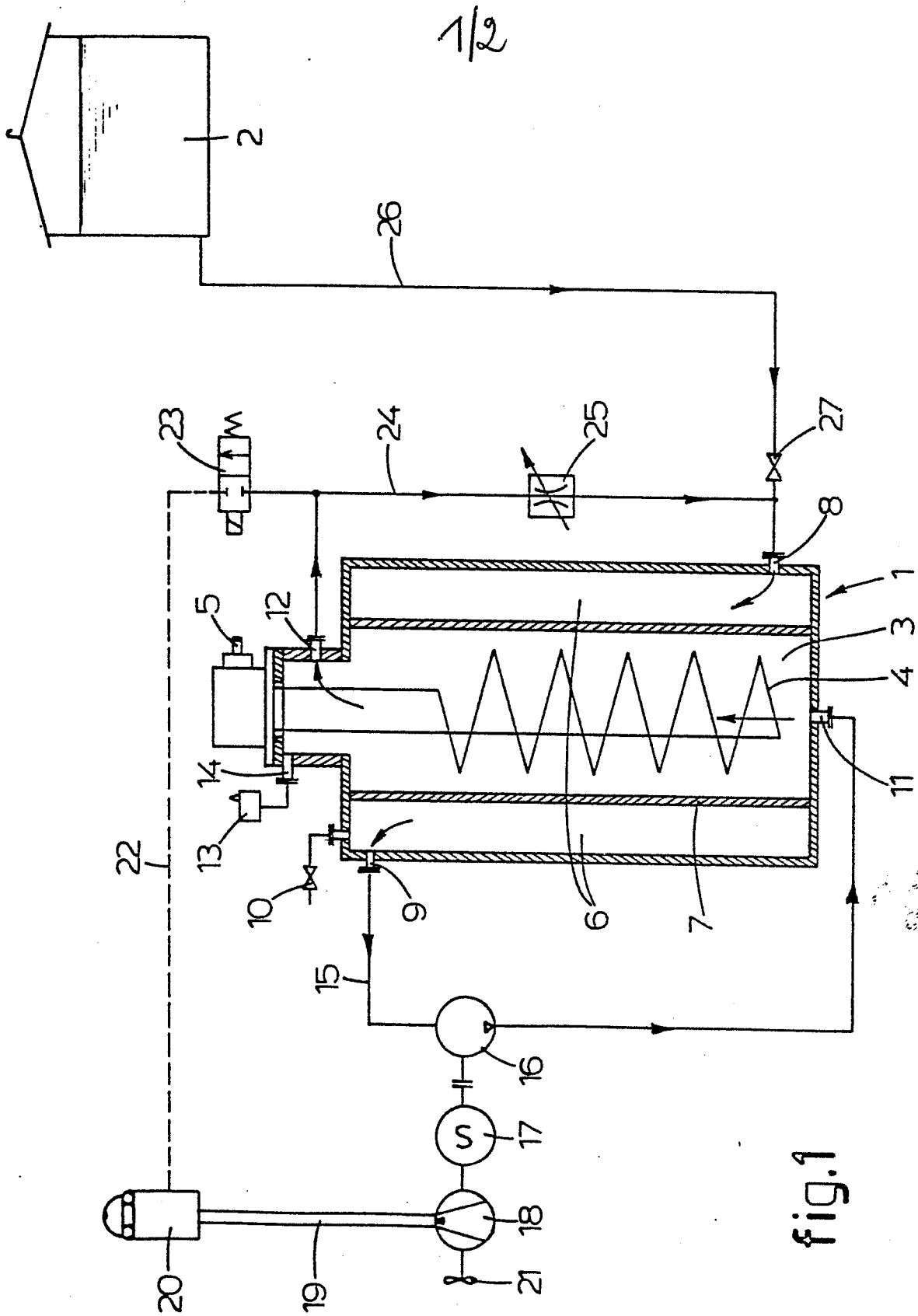
4)Oilburner as claimed in claims 1 through 3, with the characteristic that both chambers are placed vertically, with their respective inlets at the bottom of the chambers
20 and their respective outlets at the top of the chambers.

5) Oilburner as claimed in claim 4, with the characteristic that the first chamber is provided with an automatic air-vent at the top, with its connection to this chamber higher than the connection of the outlet of this first chamber.

6) Oilburner as claimed in claim 4 or 5, with the characteristic that the second chamber is provided with a manually operated air-vent at the top, with its connection to this chamber higher than the connection of the outlet of this second chamber.

7) Oilburner as claimed in claims 2 through 6, with the characteristic that the oilpressure-conduit between the outlet of the first chamber and the burner comprises a solenoid valve.

8) Oilburner as claimed in one of the claims 1 through 7, with the characteristic that the oilpump is an arcuate gear pump.



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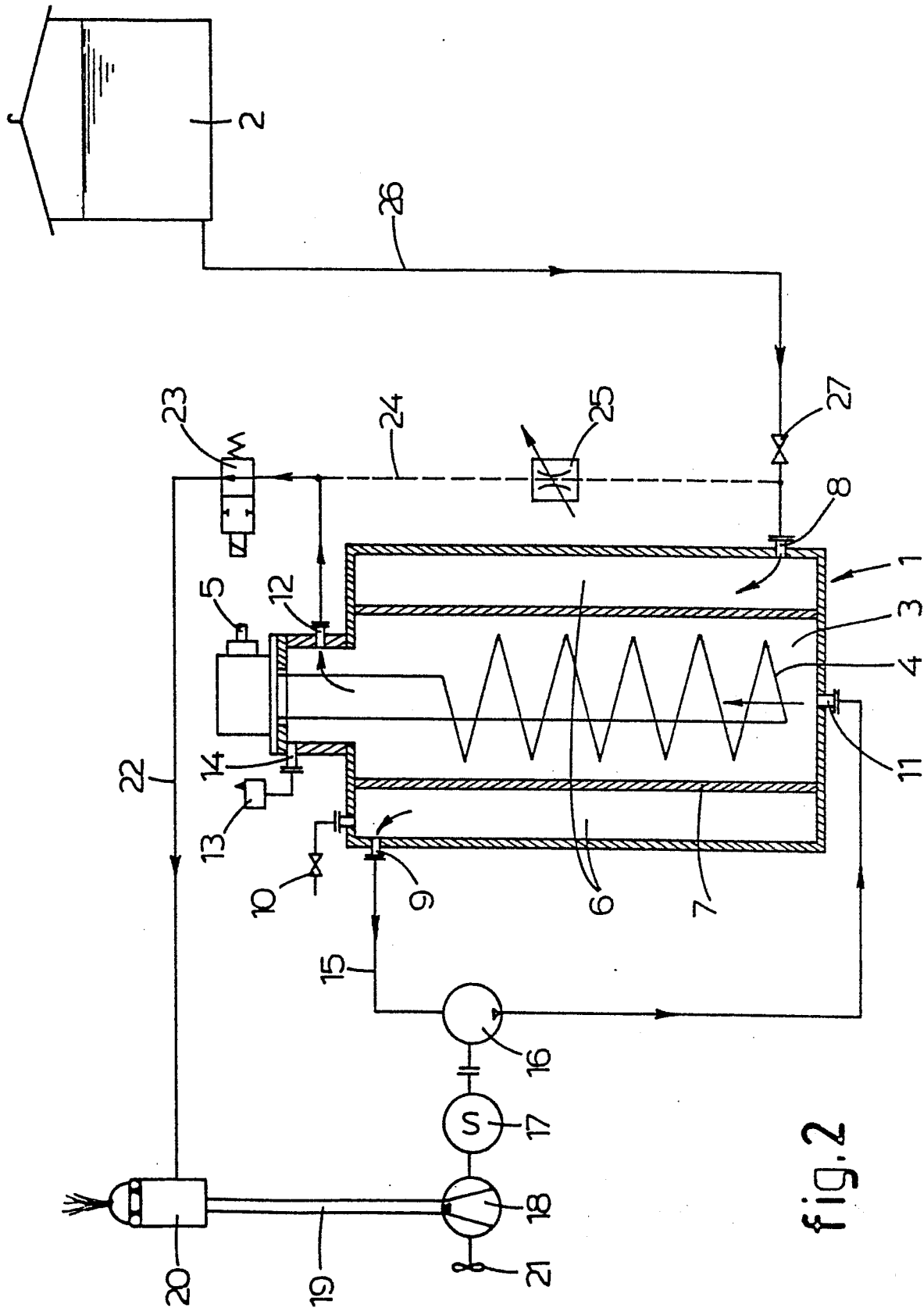


fig. 2



European Patent
Office

EUROPEAN SEARCH REPORT

0261703

Application Number

EP 87 20 1484

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.4)
A	DE-C- 381 069 (DAMPFKESSL- UND GASOMETERFABRIK AG) * Whole document *	1	F 23 K 5/00 F 24 H 1/10
A	PATENT ABSTRACTS OF JAPAN, vol. 80, no. 20 (M-271)[1457], 27th January 1984; & JP-A-58 178 859 (KIYODOU KISEN K.K.) 19-10-1983	1	
A	US-A-2 446 367 (GRAVES) * Column 1, line 28 - column 2, line 19; column 3, lines 23-54; figures 1,2 *	1,3,4	
A	GB-A- 519 017 (TAYLOR) * Page 3, lines 4-116; figure *	1,3,4	
A	GB-A- 982 847 (WEISHAUP) * Page 3, lines 2-15; figure *	7	
A	FR-A-2 488 345 (HARTWIG PAULSEN) * Page 8, lines 1-5; figure 2 *	8	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			F 23 K F 24 H F 02 M
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 12-11-1987	Examiner PHOA Y.E.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	