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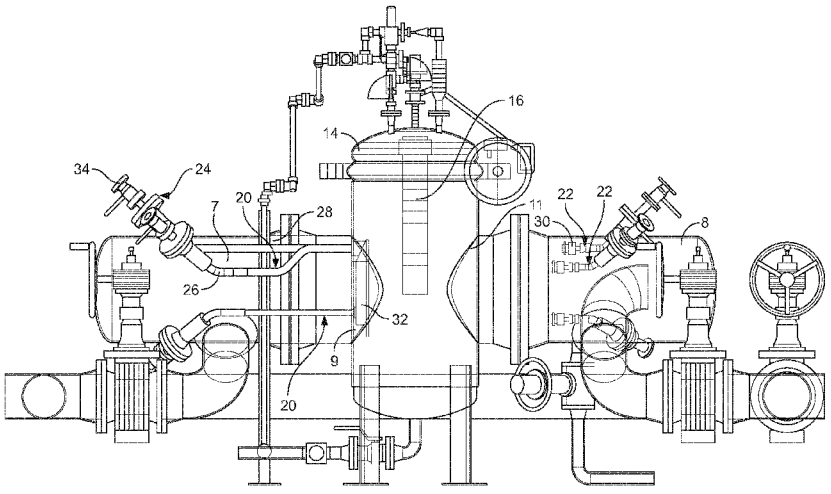

FIG. 2

(57) Abstract: A viewing system (20, 22) for inspecting an interior portion of a fluid vessel (4), such as a magnetic filter vessel, comprises a fluid tight tube extending through a wall of the vessel (4) from a proximal (24) to a distal (28) end of the tube, the tube being arranged to carry optical fibres and being provided with a transparent window (30) at the distal end (28) thereof. A further tube can be provided for carrying a camera. The tubes can be positioned spaced apart and adjacent the magnetic filter (16) for visually inspecting the filter.

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Viewing System for Fluid Vessel

This invention relates to a viewing system for a fluid vessel such as a pressure vessel for a magnetic filter or strainer, in particular such vessels arranged to be used in fuel pipelines.

Fuel such as aviation fuel being delivered to a fuel delivery facility, for example at an airport, may contain contaminants, for example rust particles, from the pipeline or from transport storage such as the hold of a ship. Therefore it is required to filter such fuel before it is dispensed for use.

Fuel filters are well known in the art and usually take the form of in line filtering materials such as a paper, mesh, fibrous or woven filter cartridges. The fuel is passed through the filter material such that any contaminant particles are collected on the upstream surface of the material. A problem with these filters is that they have to be removed and either cleaned or replaced periodically in order to remove the contaminants which gradually block the filter material. Furthermore the pressure differential across the filter builds up as the filter becomes dirty, requiring more energy to pump the fuel through the filter. The magnitude of the pressure differential is an indication of the state of the filter, and therefore can be used to ascertain when the filter should be removed and replaced.

This system of filtering is however costly in terms of replacement costs and energy costs. Magnetic filters or strainers have also been proposed, which can for example be used upstream of filter cartridges in order to remove a proportion of the particles and reduce the load on the filter cartridge. A typical magnetic filter comprises a plurality of magnetic rods extending into the flow of fluid, such that magnetic or magnetised particles flowing around the rods are attracted to the rods and adhere thereto, and are thus removed from the fluid flow. The magnetic rods of the magnetic filter typically are or comprise a strong permanent magnet or magnets, preferably a rare earth magnet, and are constructed such that the magnetic rod is resilient to the fluid within which it is to be used. One particularly suitable type of magnetic rod comprises elongate tubes containing a plurality of magnets within the tube, wherein the magnets are arranged end-to-end within the tube, preferably the magnets contained within this form of magnetic rod are rare earth magnets. As particulate material builds up on the rods, the ability to capture particles flowing past them decreases until the

level of filtration achieved falls below useful levels. However this build up does not create a significant pressure differential, so no clearly identifiable parameter is available to notify the operator that the filter has reached capacity.

It has therefore been proposed to inspect the rods visually. Visual inspection of apparatus in a hazardous or high pressure pipeline such as a fuel line can be achieved by the provision of a window in the pipe or vessel wall. However such windows are difficult and expensive to achieve in an environment such as a fuel line due to the pressure and safety requirements. Thus it may only be practical to provide a small window, and thus more than one window may be required in order to allow sufficient light into the vessel.

The present invention aims to alleviate these problems.

According to the present invention, there is provided a viewing system for inspecting an interior portion of a fluid vessel, the system comprising a fluid tight tube extending through a wall of the vessel from a proximal to a distal end of the tube, the tube being arranged to carry optical fibres and being provided with a transparent window at the distal end thereof.

In one embodiment of the present invention, the viewing system comprises at least two fluid tight tubes extending through a wall of the vessel from a proximal to a distal end of the tube, wherein at least one tube is configured to provide illumination to the interior portion of the fluid vessel, and at least one tube is configured to provide a means to visually inspect the interior portion of the fluid vessel.

The distal end of the tube may be positioned close to the area to be inspected, for example a magnetic filter, thus providing illumination close to the magnetic filter. This relieves problems with light being refracted or absorbed by the liquid, such as hydrocarbon fuel, which is in the vessel. In one particular embodiment of the present invention, there is provided a plurality of optical fibres within one or more tubes, wherein the optical fibres transmits light from outside of the fluid vessel to the interior of the fluid vessel. Advantageously, the wavelength of the illumination light may also be selected to give a clear view of the magnetic rods and amount of particulate collected, and/or to minimise the absorption of light by the specific fluid contained within the vessel. For example, the wavelength of the light provided for illuminating the interior of the fluid vessel may conveniently be between about 0.4 and 0.6 microns when petroleum fuels are contained within the fluid vessel.

Advantageously, the use of fibre optics allows the light source to be provided outside the vessel, which increases safety in the case if hazardous fluids. Also, since the window can be small, the technical requirements for such a window to be fluid tight in the vessel are reduced, which has particular advantages in a high pressure environment. For example, the window at the distal end of the fluid tight tube can comprise fuse bonded glass; preferably, the window at the distal end of the fluid tight tube consists of fuse bonded glass.

The proximal end of the fluid tight tube(s) may comprise an eyepiece or a connector for connecting to a light source or an image capture device. Typically, the proximal end of the fluid tight tube(s) comprises a removable cover.

The fluid tight tubes in the viewing system may conveniently have a relatively small diameter, and may, for example, be between about 10 mm and 50 mm in diameter, preferably about 25 mm in diameter.

the viewing system may be used in pressure vessels connected to a pipeline containing petroleum fuel. Typical conditions in such a vessel are as follows: a pressure of between about 5 and 50 bar, a temperature of between about -10 to +50degrees C, and a flow rate of between about 50 to 500 m^3 per hour, or even up to about 2500 m^3 per hour. The pipeline diameter 20m upstream of the vessel may be greater than about 18 inches (457.2 mm) or 24 inches (609.6 mm), or greater than about 8 inches (203.2 mm) or 6 inches (152.4 mm).

The system may include an image capture device such as a camera. Preferably, there is a plurality of tubes, and the image capture device is provided in or connected to a separate tube also extending through the wall of the vessel and having a transparent window. The use of at least two tubes has been found advantageous, at least one is configured to provide a means to visually inspect the interior portion of the fluid vessel, such as a camera or fibre optic for image transmission, and at least one to provide illumination to the interior portion of the fluid vessel, such as a light source or fibre optic for the light source. This avoids light being internally reflected by the glass window interfering with the quality of the viewing image. The distal ends of the tubes are spaced apart, preferably the distal ends of the tubes are spaced at a distance of between about 200mm and 400mm apart.

The distal end of the tube(s) may conveniently configured such that they remain in a

fixed position within the fluid vessel. Preferably, the distal end of the, or each, tube is supported in fixed relation to the fluid vessel by means of a bracket attached to the vessel.

In another aspect of the present invention, there is provided a fluid filter system comprising a filter vessel, a magnetic filter arrangement provided in the vessel, and a viewing system as defined above.

In another aspect of the present invention, there is provided a fluid filter system comprising a filter vessel, a magnetic filter arrangement comprising a plurality of magnetic rods provided within the vessel, and a system comprises at least two fluid tight tubes extending through a wall of the vessel from a proximal to a distal end of the tube, wherein at least one tube is configured to provide illumination to the interior portion of the fluid vessel, and at least one tube comprises a light detecting means, and wherein the tubes are positioned within the interior of the vessel such that light passing from the tube providing illumination to the tube comprising the light detecting means must traverses an area close to at least one of the magnetic rods.

Preferably, the tubes are positioned within the interior of the vessel such that light passing from the tube providing illumination to the tube comprising the light detecting means must traverses within 20 mm, such as within 15 mm, or 10 mm, or even 5 mm, of at least one of the magnetic rods. Conveniently, light may be provided via fibre optic within at least one tube, and at least one light detector is provided within or attached to at least one other tube. As particles collect on the magnetic rods, the light source is gradually obscured indicating the amount of material collected and time for overhaul. The system according to this aspect of the invention may conveniently be connected to a means for providing an indication to an operator of the filter system to perform a visual inspection of the filter and/or to perform an overhaul of the magnetic filter, wherein when the response of the light detector falls below a pre-set value, the operator is provided with an indication of such a change in the amount of light being detected.

In the fluid filter systems of the present invention, the distal end of the, or each, tube is preferably spaced from the magnetic filter arrangement by a distance in the range of from 200mm and 400mm.

In order that the invention may be more readily understood, reference will now be made, by way of example, to the accompanying drawings, in which:

Figure 1 is a perspective view of a viewing system in a magnetic filter assembly; and

Figure 2 is a side view of the viewing system of Figure 1.

Referring now to Figures 1 and 2, a high pressure pipe line 2 is shown for carrying fluid such as a petrochemical, for example aviation fuel. A filtration path including a pressure vessel 4 is provided in the pipe line by means of a pair of elbow sections 6, and a pair of large diameter pipe sections 7, 8 on either side of the vessel 4. A bypass flow path is also provided in the form of a bypass pipeline 10 for bypassing the pressure vessel 4, with valves 12 for selecting the required path.

The elbow sections 6 are each connected through a wall of one of the large diameter pipe sections 8, which in this example extend substantially parallel to the pipe line. The vessel 4 is substantially cylindrical, extending substantially perpendicular to the large diameter pipe sections 7, 8 and the large diameter sections are connected through the walls of the vessel in opposed relation to provide an inlet 9 and outlet 11 respectively for the fluid flow across the vessel 4. Typical dimensions of the pipeline might be about 8 inches, with the large diameter pipe being about 0.5 metre in diameter, and the tank approximately 1.1 metres tall, and 580mm wide. However, other dimensions and multiple inlets or outlets are also possible.

The vessel 4 supports a magnetic filter 16 extending across the diameter of the vessel perpendicular to the flow direction between the inlet and the outlet. The magnetic rods may be, for example, arranged in offset rows extending vertically in the vessel.

A viewing system comprising a plurality of viewing assemblies 18 is provided for visual monitoring of the condition of the filter rods. In this example, three upstream viewing eyes 20 are provided on the inlet side of the vessel, and a further four viewing eyes 22 are provided on the outlet side of the vessel.

The viewing system may be mounted on the upstream, downstream or any intermediate position within the vessel where practical. Advantageously, the system is mounted on the downstream side to view the final or downstream set of rods. This is to account for magnetic material being preferentially captured by the front rod sets until the vessel nears capacity

Each viewing eye (20, 22) comprises a tube extending into the vessel, through a wall of a vessel in the filter flow path. On the upstream side, the tubes each pass through a wall of the upstream large diameter pipe section 7. Each tube comprises a proximal section 24 extending outside of the pipe 7 and angled away from the pipe, an intermediate olet section

26 which passes through and is bonded to the vessel wall, the olet section providing an angled section of the tube, and a distal section 28 extending substantially axially of the pipe towards the pressure vessel 4. The pipe sections 7, 8 may for example be provided with flanged openings in the wall for receiving a viewing tube.

Each tube ends in a distal viewing window 30. For example the window may be glass which is fuse bonded to an eye piece 36, for example of stainless steel. In this example, on the upstream side each distal end 30 is mounted to a bracket 32, the bracket being secured to the vessel so that the tubes are supported in position for viewing the filter 16.

The proximal end 24 of each eye is provided with a cover 34. The cover can be removed to insert for example a fibre optic cable or a camera, which can be pushed down the tube to a position adjacent the window 30 at the distal end. It has been found that a spacing between an eye used to provide a light source and an eye used to carry a camera of between about 40mm and 400mm can provide optimal viewing conditions in a fuel pipeline. More particularly, the spacing may be between about 100 and 300mm, or between about 100 and 200mm; an example being about 200mm. The proximal ends 24 may be angled away from each other so as to allow space for an operator to insert, remove or maintain the equipment.

With this arrangement a camera can be mounted very close to the magnetic rods, for example between 200mm and 400mm away, giving an enhanced view. In addition, the output of a camera may be fed back to an operator, who can therefore have a 'live' view of the state of the filter rods, and can see when one or more rods have reached capacity and require cleaning or replacement.

As particulate material builds up on the rods, the ability to capture particles flowing past them decreases until the level of filtration achieved falls below useful levels. The rods therefore need to be cleaned or replaced periodically.

An operator may illuminate the filter rods using fibre optics via a first one of the tubes 22. The rods can then be viewed using a camera inserted in an adjacent tube. When the rods appear to be at capacity, they may be removed from the vessel 4 via the hatch 14. In particular, the rods at the downstream end of the filter 16 appearing to be at capacity would indicate that the filter should be cleaned, since the rods further upstream are likely to reach capacity first. In this way it is not necessary to interrupt operation of the filter in

order to check the condition or the filter rods, and thus continuous operation of the filter may be achieved until the time for overhaul is identified.

Claims

1. A viewing system for inspecting an interior portion of a fluid vessel, the system comprising a fluid tight tube extending through a wall of the vessel from a proximal to a distal end of the tube, the tube being arranged to carry optical fibres and being provided with a transparent window at the distal end thereof.

2. A viewing system as claimed in claim 1, comprising at least one further tube being arranged to carry an image capture device, preferably a camera.

3. A viewing system as claimed in claim 1 or claim 2, wherein the viewing system comprises at least two fluid tight tubes extending through a wall of the vessel from a proximal to a distal end of the tube, wherein at least one tube is configured to provide illumination to the interior portion of the fluid vessel, and at least one tube is configured to provide a means to visually inspect the interior portion of the fluid vessel.

4. A viewing system as claimed in any one of the preceding claims, in which the distal ends of the tubes are spaced apart, preferably the distal ends of the tubes are spaced at a distance of between about 200mm and 400mm apart.

5. A viewing system as claimed in any one of the preceding claims, in which the window comprises fuse bonded glass.

6. A viewing system as claimed in any one of the preceding claims, in which the proximal end of the, or each, tube is provided with a removable cover.

7. A viewing system as claimed in any one of the preceding claims, in which the distal end of the, or each, tube is supported in fixed relation to the fluid vessel by means of a bracket attached to the vessel.

8. A viewing system as claimed in any one of the preceding claims, comprising a plurality of optical fibres and a source of light for the optical fibres having a wavelength between about 0.4 and 0.6 microns.

9. A viewing system as claimed in any one of the preceding claims, in which the or each tube has a diameter of between about 10 mm and 50 mm.

10. A fluid filter system comprising a filter vessel, a magnetic filter arrangement provided in the vessel, and a viewing system as defined above.

11. A fluid filter system comprising a filter vessel, a magnetic filter arrangement comprising a plurality of magnetic rods provided within the vessel, and a system comprises at least two fluid tight tubes extending through a wall of the vessel from a proximal to a

distal end of the tube, wherein at least one tube is configured to provide illumination to the interior portion of the fluid vessel, and at least one tube comprises a light detecting means, and wherein the tubes are positioned within the interior of the vessel such that light passing from the tube providing illumination to the tube comprising the light detecting means must traverses an area close to at least one of the magnetic rods..

12. A fluid filter system as claimed in claim 10 or claim 11, in which the distal end of the or each tube is spaced from the magnetic filter arrangement by a distance in the range of from 200mm and 400mm.

13. A viewing system substantially as described herein, with reference to the accompanying drawings.

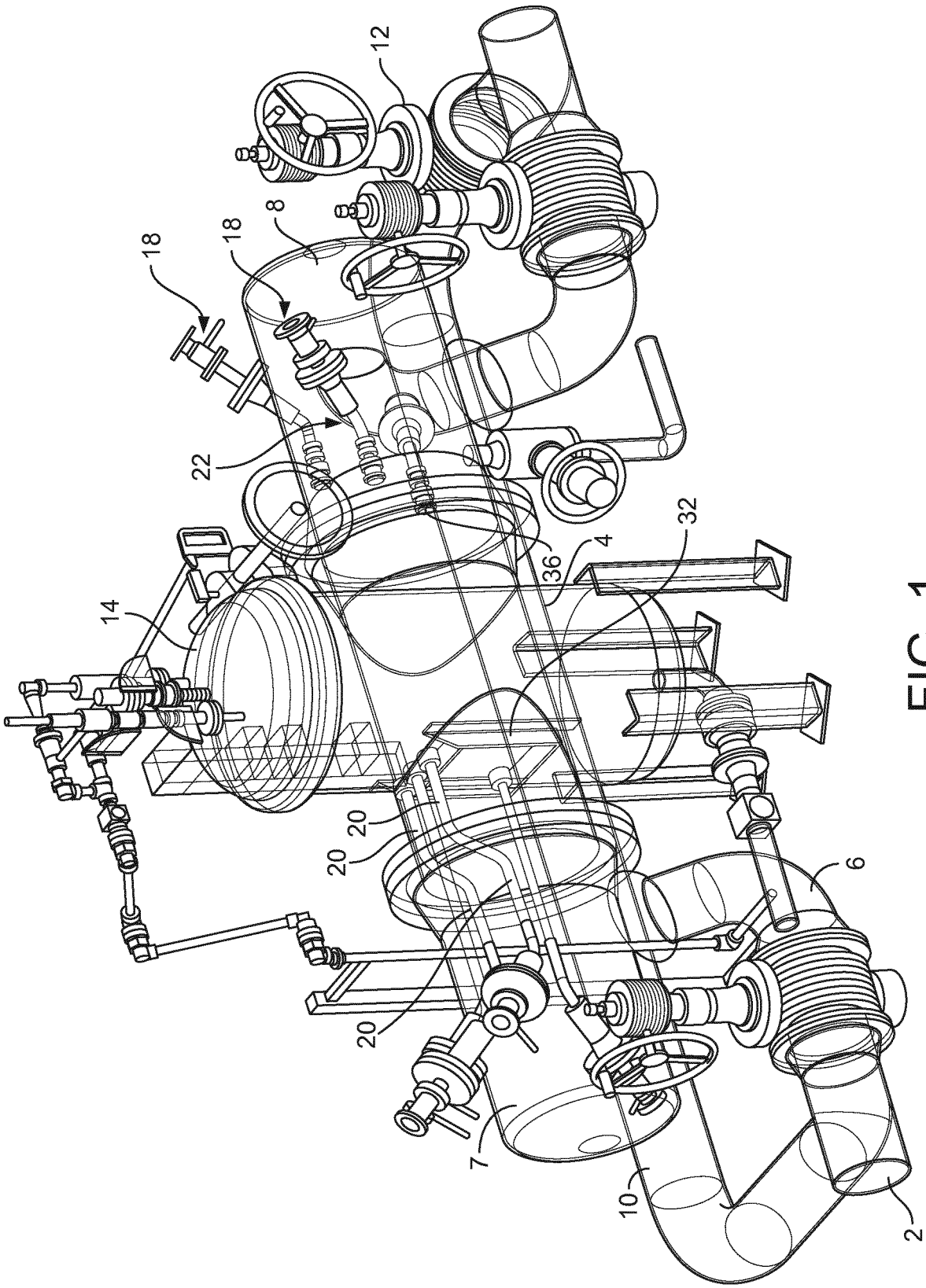

FIG. 1

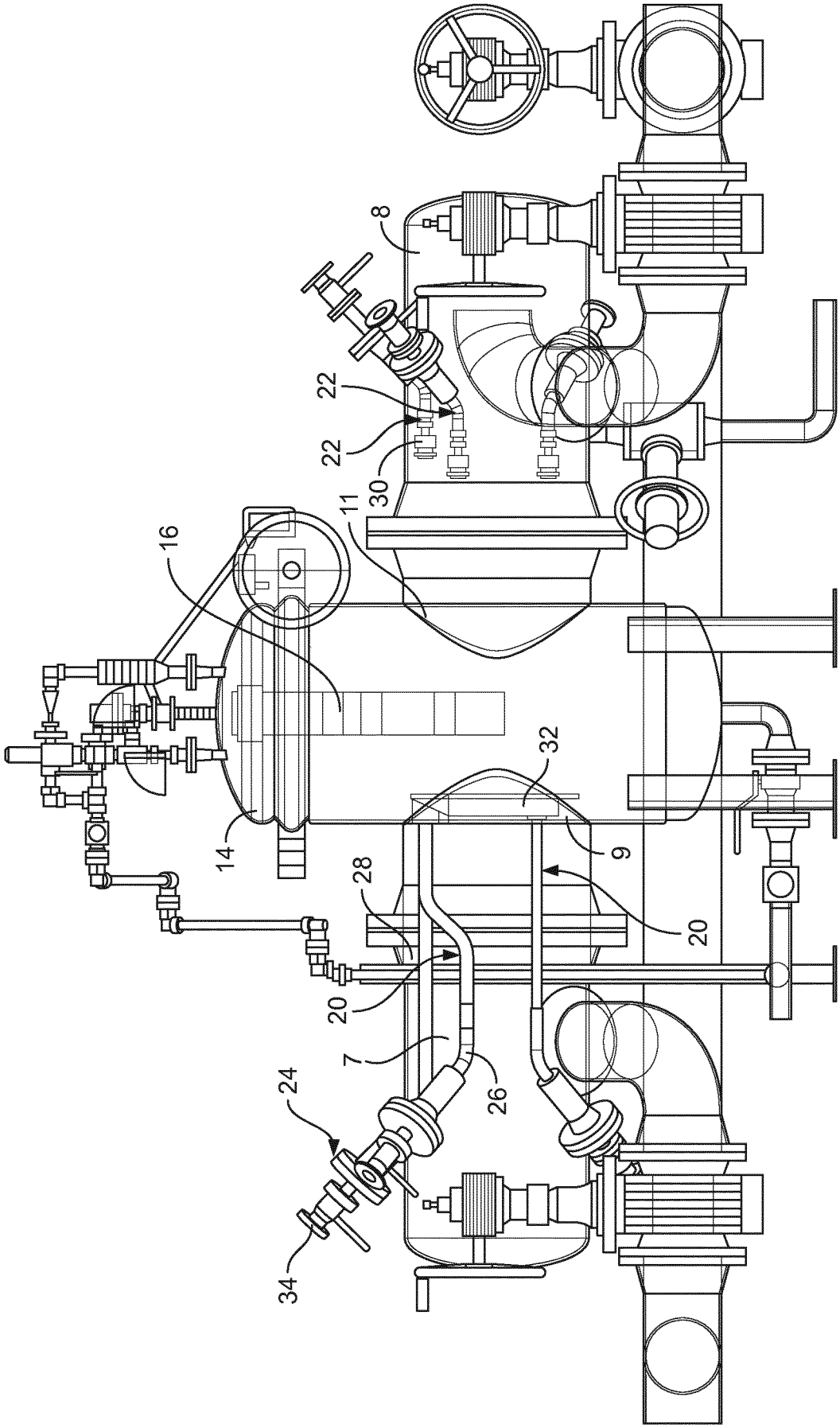

FIG. 2

INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER
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ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G02B B03C G01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 000 533 A (GERWERS HANK [US]) 19 March 1991 (1991-03-19)	1-9,13
Y	column 3, line 29 - column 4, line 49; figures 1,2	10-12

X	US 4 707 075 A (FUKUSHIMA EIJI [JP] ET AL) 17 November 1987 (1987-11-17)	1-9,13
Y	figures 1-3,5 column 3, line 13 - column 4, line 25	10-12

X	US 2002/067622 A1 (WALCK GARY K [US] ET AL) 6 June 2002 (2002-06-06)	1-9,13
Y	figures 1-3 paragraph [0023] - paragraph [0028] paragraph [0032]	10-12

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
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PCT/EP2017/057104

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 31 51 527 A1 (ORTH WOLFGANG DIPL ING) 14 July 1983 (1983-07-14)	1-9,13
Y	figure (not numbered) page 4, last paragraph - page 5, first paragraph	10-12

X	US 4 643 022 A (WERLBERGER PETER [AT] ET AL) 17 February 1987 (1987-02-17)	1-9,13
Y	figures 1,2,4,5,6 column 2, line 47 - column 4, line 41	10-12

X	US 4 746 178 A (CANTY THOMAS M [US]) 24 May 1988 (1988-05-24)	1-9,13
Y	figures 1-3 column 3, line 17 - column 4, line 59	10-12

X	US 5 191 388 A (KILHAM LAWRENCE B [US]) 2 March 1993 (1993-03-02)	1-9,13
Y	figures 2,3 column 3, line 48 - column 7, line 49	10-12

X	US 2003/002036 A1 (HAAN HARALD [CH] ET AL) 2 January 2003 (2003-01-02)	1-9,13
Y	figures 1,2 paragraph [0066] - paragraph [0084]	10-12

X	US 5 230 556 A (CANTY THOMAS M [US] ET AL) 27 July 1993 (1993-07-27)	1-9,13
Y	figures 2-4 column 8, line 4 - column 9, line 25	10-12

X	EP 0 686 860 A2 (KAWASAKI HEAVY IND LTD [JP]; DORYOKURO KAKUNENRYO [JP]) 13 December 1995 (1995-12-13)	1-9,13
Y	figures 1-3 column 3, line 61 - column 5, line 54	10-12

Y	US 2005/247734 A1 (KATO FUMIO [JP]) 10 November 2005 (2005-11-10) figures 2,8 paragraph [0021] - paragraph [0025]	10-12

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2017/057104

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5000533 A	19-03-1991	CA 2033388 A1	10-09-1991
		EP 0445433 A2	11-09-1991
		JP 3043440 B2	22-05-2000
		JP H0611653 A	21-01-1994
		US 5000533 A	19-03-1991
US 4707075 A	17-11-1987	DE 3565724 D1	24-11-1988
		EP 0170513 A2	05-02-1986
		US 4707075 A	17-11-1987
US 2002067622 A1	06-06-2002	NONE	
DE 3151527 A1	14-07-1983	NONE	
US 4643022 A	17-02-1987	AT 384108 B	12-10-1987
		DE 3421106 A1	13-12-1984
		JP S60155929 A	16-08-1985
		US 4643022 A	17-02-1987
US 4746178 A	24-05-1988	CA 1268970 A	15-05-1990
		US 4746178 A	24-05-1988
US 5191388 A	02-03-1993	BR 9205036 A	22-06-1993
		CA 2083681 A1	19-06-1993
		EP 0547787 A1	23-06-1993
		JP H0674891 A	18-03-1994
		US 5191388 A	02-03-1993
US 2003002036 A1	02-01-2003	DE 19821401 A1	25-11-1999
		EP 0996865 A1	03-05-2000
		US 2003002036 A1	02-01-2003
		WO 9959018 A1	18-11-1999
US 5230556 A	27-07-1993	DE 69321803 D1	03-12-1998
		EP 0587275 A1	16-03-1994
		US 5230556 A	27-07-1993
EP 0686860 A2	13-12-1995	DE 69526536 D1	06-06-2002
		DE 69526536 T2	29-08-2002
		EP 0686860 A2	13-12-1995
		JP 2799291 B2	17-09-1998
		JP H07333155 A	22-12-1995
		US 5594548 A	14-01-1997
US 2005247734 A1	10-11-2005	AU 5667601 A	03-12-2001
		DE 10196215 B3	15-05-2014
		DE 10196215 T1	17-04-2003
		US 2005247734 A1	10-11-2005
		WO 0189970 A1	29-11-2001