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(54) **TRANSFER TANK**

ÜBERTRAGUNGSTANK

CUVE DE TRANSFERT

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Description

Field

[0001] The invention relates to a transfer tank comprising a floating, water-borne tank structure for transferring oil or other hazardous material away from a collecting vessel, the tank structure comprising an opening structure for filling and emptying said tank structure.

Background

[0002] Accidents and malfunctions in oil drilling industry as well as ship accidents cause hazardous situations, where oil pollutes seas and other water bodies. Oil collecting vessels may collect oil from water, but a problem is that the oil collecting vessel must return to a port or another discharge site when the on-board oil collecting tank is full, so that the oil collecting tank of the oil collecting vessel could be emptied. Thus, the oil collecting vessel has to interrupt its oil recovery operation for a long time, which causes inefficiency and which may make the effects of the oil spill worse.

[0003] To eliminate said drawback, it is known to use transfer tanks that are described, i.a., in publication World Catalog of Oil Spill Response Products. The use properties of known transfer tanks are not sufficiently good, however. Document DE3230781, which is considered the closest prior art, describes a floating transfer tank with insulated wall.

Brief description

[0004] The object of the invention is to provide a novel transfer tank. To achieve this, the invention is characterized in that the tank structure comprises at least two adjacent tank parts, which comprise a double wall furnished with thermal insulation and that the tank structure also comprises a connecting structure for interconnecting the adjacent tank parts.

[0005] Preferred embodiments of the invention are disclosed in the dependent claims.

[0006] Several advantages are achieved by the tank and the method of the invention. Towability, stability, ease of emptying and other adaptability to operating environment are better than before.

List of figures

[0007] The invention will now be described in greater detail in connection with preferred embodiments, with reference to the accompanying drawings, in which:

Figure 1 is a front view of a transfer tank;
Figure 2 is a side view of the transfer tank;
Figure 3 shows the transfer tank behind a tugboat, when the transfer tank is filled from an oil collecting vessel;

Figure 4 is a partial cross section of a double wall of a tank part.

Description of embodiments

[0008] With reference to Figures 1 to 4, the invention relates to a transfer tank 1. The transfer tank comprises a floating, water-borne tank structure 3 for transferring oil or other hazardous material away from a collecting vessel 5, such as an oil recovery vessel 5. The tank structure 3 comprises an opening structure 71 to 74 for filling and emptying the tank structure. In an embodiment, the opening structure includes a cover structure 81 to 84. In the examples of the figures, there are two opening structures 71 to 74 for each tank part 3a, 3b, but the number may vary; it is essential that efficient filling and emptying will be possible. In an embodiment the hazardous material is a liquid, environmentally hazardous substance, for instance a liquid floating on water.

[0009] Oil or other hazardous liquid may be pumped into the transfer tank either from a recovery tank of an oil collecting vessel 5 or directly from the sea by means of the pumps on the collecting vessel 5 even without intermediate storing of the recovered liquid in the collecting vessel's own recovery tank.

[0010] According to the applicant's observations, it is most practical to fill the transfer tank from the recovery tank of the collecting vessel 5. The transfer tank may be employed such that oil collected in the recovery tank of the collecting vessel 5 is pumped into the floating transfer tank via a hose 51, and the transfer tank is transported on water by a means of haulage, such as a watercraft 200, hauling it away from the oil collecting vessel to a transfer tank discharge site. Transfer tanks may also be transported/towed in tandem. The transfer tank is emptied at the discharge site, and the emptied transfer tank is hauled on water by the means of haulage 200 to the oil collecting vessel. The transfer tank may also be anchored for a subsequent transportation and emptying at the collecting site or in the vicinity thereof.

[0011] The tank structure 3 comprises at least two adjacent tank parts 3a and 3b, which comprise a double wall 13a and 13b furnished with thermal insulation 300. By means of the at least two adjacent tank parts 3a, 3b it is possible to achieve both volumetric capacity and stability. The tank structure further comprises a connecting structure 91 to 96 for interconnecting the adjacent tank parts 3a and 3b. Figure 1 also shows a different connecting structure 97, which is placed at the tank sides facing one another. The connecting structure 97 may comprise a flange or another connecting point 96a included in a reinforcement 126 of the tank part 3a, a flange or another connecting point 97b included in a reinforcement 136 of the tank part 3b, as well as a bolt or another securing element 97c for connecting the flanges.

[0012] In an embodiment the material of the tank parts is polyethylene. A manner to manufacture a tank part is to make it of a long, flexible, band-structured polyethyl-

ene pipe of 15cm * 10cm with heat-sealed spiral seams such that the adjacent spirals of the pipe are welded together by the effect of heat. In this manner it is easy to provide a double-walled structure, which comprises an outer wall 131 and an inner wall 132 as shown in Figure 4. In an embodiment the thickness of the double wall 13a as well as 13b may be determined on the basis of the pipe used in manufacture, and in accordance with the above, it may be 10cm, for instance. If the thickness of the wall 131, 132 is 2cm, there will be a space of 6cm for thermal insulation 300, i.e. the thickness of the double wall in an example is 2cm + 6cm + 2cm = 10cm. The invention is not restricted to any particular measurements, but the measurements may vary. In an embodiment, the outer and inner casings, i.e. outer and inner walls 131, 132 are of polyethylene or the like material, as stated above. The outer and inner casings, i.e. outer and inner walls 131, 132 are interconnected with a layer of insulation 300 or a honeycomb structure 310, thus obtaining a double wall. In Figure 4, for the sake of simplicity, the honeycomb structure 310 is only shown in the area of one spiral of pipe.

[0013] The tank parts 3a and 3b of the tank structure 3 are interconnected, yet in an embodiment the interiors, i.e. the actual storage spaces are separate. Also, both tank parts have opening structures of their own. In the examples of the figures, the tank part 3a comprises opening structures 71 to 72 and the tank part 3b comprises opening structures 73 to 74. The length of the tank part may be 12 metres and the diameter 2.3 metres, for instance. The invention is not restricted to any particular measurements, but the measurements may vary.

[0014] It appears from the figures that the outer circumference of the tank part 3a, 3b comprises reinforcements 121 to 126, 131 to 136, which are arranged in succession seen in the longitudinal direction of the tank part. The reinforcements 121 to 126 are in the tank part 3a and the reinforcements 131 to 136 are in the tank part 3b. In an embodiment the reinforcements are metal bands.

[0015] Particularly in accordance with Figure 2, in one embodiment the successive reinforcements 121 to 126, and also 131 to 136 are interconnected with spacers 141 to 145.

[0016] For the connecting structures 91 to 96 as well as the connecting structures 97, 97a to 97c it may be stated that the connecting structure, which interconnects the tank parts 3a, 3b, is between the reinforcements 121 to 126, 131 to 136 comprised by the adjacent tank parts 3a, 3b. In other words, the connecting structure 91 is between the reinforcement 121 comprised by the tank part 3a and the aligned reinforcement 131 comprised by the tank part 3b, as is the connecting structure 97. There are connecting structures, such as the connecting structure 97, between other reinforcements of the different tank parts as well.

[0017] In an embodiment the thermal insulation 300 of the tank part comprises an air chamber inside the double

wall, or a filler between the wall parts of the double wall. In Figure 4 the thermal insulation is shown to be a filler 300, which may be polyurethane, for instance.

[0018] It appears from Figures 1 to 2, in particular, that in an embodiment the transfer tank comprises a rudder 400. There may be one rudder, or one for each particular tank part 3a, 3b. It appears also that the fore of the tank parts 3a, 3b widens rearwardly, comprising a substantially vertical edge 151a, 151b, which is intended to break waves. The edge, i.e. the "cam" of the tank part may be of the same plastic as the tank part, or for ice conditions it may be of iron, for instance.

[0019] With reference to Figures 1 to 2, the transversal cross section of the tank part is round. In addition, the longitudinal cross section of the tank part is an elongated rectangle, in which the longer side, i.e. the longitudinal side, is at least three times the length of the shorter side, i.e. the transversal side.

[0020] It appears from Figures 2 to 3 that the transfer tank comprises a gripping element 450 for gripping the transfer tank so as to move it on water with an external means of haulage, such as a vessel 200, through a cable 210. Manipulation into and out of water is facilitated by the transfer tank comprising a hoisting element 250 for lifting the tank with an external lifting apparatus such as a hoist.

[0021] Even though the invention is described above with reference to the attached drawings, it is clear that the invention is not restricted thereto, but it may be modified in a variety of ways within the scope of the accompanying claims.

Claims

1. A transfer tank comprising a floating, water-borne tank structure (3) for transferring oil or other hazardous material away from a collecting vessel, the tank structure comprising an opening structure (71 to 74) for filling and emptying said tank structure, wherein the tank structure (3) comprises at least two adjacent tank parts (3a, 3b), which comprise separate interiors having each an opening structure and a double wall (13a, 13b) furnished with thermal insulation (300) and that the tank structure also comprises a connecting structure (91 to 96, 97), which is placed at the tank sides facing one another in order to achieve both volumetric capacity and stability, for interconnecting the adjacent tank parts (3a, 3b), and **characterized in that** the outer wall and the inner wall of the double wall are interconnected with a honeycomb structure (310) and wherein the material of the tank parts (3a, 3b) is polyethylene.
2. The transfer tank of claim 1, **characterized in that** the outer circumference of the tank part (3a, 3b) comprises reinforcements (121 to 126, 131 to 136), which are arranged in succession seen in the longitudinal

direction of the tank part (3a, 3b).

3. The transfer tank of claim 2, **characterized in that** the successive reinforcements (121 to 126) are interconnected with spacers (141 to 145). 5
4. The transfer tank of claims 2 and 3, **characterized in that** the connecting structure (91 to 96, 97) interconnecting the tank parts (3a, 3b) is between the reinforcements (121 to 126, 131 to 136) comprised by the adjacent tank parts (3a, 3b). 10
5. The transfer tank of claim 1, **characterized in that** the thermal insulation (300) of the tank part comprises an air chamber inside the double wall and/or a filler between the walls (131, 132) of the double wall. 15
6. The transfer tank of claim 1, **characterized in that** the transfer tank comprises a rudder (400). 20
7. The transfer tank of claim 1, **characterized in that** the fore of the tank part (3a, 3b) widens rearwardly.
8. The transfer tank of claim 1, **characterized in that** the transversal cross section of the tank part (3a, 3b) is round. 25
9. The transfer tank of claim 1, **characterized in that** the longitudinal cross section of the tank part (3a, 3b) is an elongated rectangle, in which the longer side, i.e. the longitudinal side, is at least three times the length of the shorter side, i.e. the transversal side. 30
10. The transfer tank of claim 1, **characterized in that** the connecting structure (97), which is placed at the tank sides facing one another, comprises a flange or another connecting point (96a) included in a reinforcement (126) of the first tank part (3a), a flange or another connecting point (97b) included in a reinforcement (136) of the second tank part (3b), as well as a bolt or another securing element (97c) for connecting the flanges or other connecting points. 35 40

Patentansprüche

1. Transfertank, der eine schwimmende, wassergetragene Tankstruktur (3) zum Transferieren von Öl oder anderem gefährlichem Material weg von einem Sammelbehälter umfasst, wobei die Tankstruktur eine Öffnungsstruktur (71 bis 74) zum Füllen und Entleeren der Tankstruktur umfasst, wobei die Tankstruktur (3) mindestens zwei benachbarte Tankteile (3a, 3b) umfasst, die separate Innenräume umfassen, die jeweils eine Öffnungsstruktur und eine Doppelwand (13a, 13b), die mit einer Wärmeisolierung (300) ausgestattet ist, umfassen, und dass die Tankstruktur außerdem eine Verbindungs- 50

struktur (91 bis 96, 97), die an den Tankseiten, die einander zugewandt sind, platziert ist, um sowohl eine Volumenkapazität als auch -stabilität zu erreichen, zum Koppeln der benachbarten Tankteile (3a, 3b) umfasst, und **dadurch gekennzeichnet, dass** die Außenwand und die Innenwand der Doppelwand mit einer Honigwabenstruktur (310) gekoppelt sind, und wobei das Material der Tankteile (3a, 3b) Polyethylen ist.

2. Transfertank nach Anspruch 1, **dadurch gekennzeichnet, dass** der Außenumfang des Tankteils (3a, 3b) Verstärkungen (121 bis 126, 131 bis 136) umfasst, die, in der Längsrichtung des Tankteils (3a, 3b) gesehen, in Folge angeordnet sind.
3. Transfertank nach Anspruch 2, **dadurch gekennzeichnet, dass** die aufeinanderfolgenden Verstärkungen (121 bis 126) mit Abstandhaltern (141 bis 145) gekoppelt sind.
4. Transfertank nach Anspruch 2 und 3, **dadurch gekennzeichnet, dass** sich die Verbindungsstruktur (91 bis 96, 97), die die Tankteile (3a, 3b) koppelt, zwischen den Verstärkungen (121 S 126, 131 bis 136) befindet, umfasst von den benachbarten Tankteilen (3a, 3b).
5. Transfertank nach Anspruch 1, **dadurch gekennzeichnet, dass** die Wärmeisolierung (300) des Tankteils eine Luftkammer in der Doppelwand und/oder einen Füller zwischen den Wänden (131, 132) der Doppelwand umfasst.
6. Transfertank nach Anspruch 1, **dadurch gekennzeichnet, dass** der Transfertank ein Ruder (400) umfasst.
7. Transfertank nach Anspruch 1, **dadurch gekennzeichnet, dass** sich das Tankteil (3a, 3b) nach hinten aufweitet.
8. Transfertank nach Anspruch 1, **dadurch gekennzeichnet, dass** der Querschnitt des Tankteils (3a, 3b) in Querrichtung rund ist. 45
9. Transfertank nach Anspruch 1, **dadurch gekennzeichnet, dass** der Querschnitt des Tankteils (3a, 3b) in Längsrichtung ein längliches Rechteck ist, bei dem die längere Seite, d. h. die Längsseite, mindestens dreimal die Länge der kürzeren Seite, d. h. der Querseite, aufweist.
10. Transfertank nach Anspruch 1, **dadurch gekennzeichnet, dass** die Verbindungsstruktur (97), die an den Tankseiten, die einander zugewandt sind, platziert ist, einen Flansch oder einen anderen Verbindungspunkt (96a), der in einer Verstärkung (126) des

ersten Tankteils (3a) beinhaltet ist, einen Flansch oder einen anderen Verbindungspunkt (97b), der in einer Verstärkung (136) des zweiten Tankteils (3b) beinhaltet ist, sowie einen Bolzen oder ein anderes Sicherungselement (97c) zum Verbinden der Flansche oder der anderen Verbindungspunkte umfasst.

Revendications

1. Cuve de transfert comprenant une structure de cuve flottante à flot (3) pour transférer du pétrole ou un autre matériau dangereux à distance d'une cuve de collecte, la structure de cuve comprenant une structure d'ouverture (71 à 74) pour remplir et vider ladite structure de cuve, dans laquelle la structure de cuve (3) comprend au moins deux parties de cuve (3a, 3b) adjacentes qui comprennent des intérieurs séparés ayant une structure d'ouverture et une double paroi (13a, 13b) équipée d'une isolation thermique (300) et en ce que la structure de cuve comprend également une structure de raccordement (91 à 96, 97) qui est placée sur les côtés de cuve se faisant face afin d'atteindre à la fois la capacité volumétrique et la stabilité, pour interconnecter les parties de cuve (3a, 3b) adjacentes, et **caractérisée en ce que** : la paroi externe et la paroi interne de la double paroi sont interconnectées avec une structure en nid d'abeilles (310) et dans laquelle le matériau des parties de cuve (3a, 3b) est du polyéthylène. 5
2. Cuve de transfert selon la revendication 1, **caractérisée en ce que** la circonférence externe de la partie de cuve (3a, 3b) comprend des renforcements (121 à 126, 131 à 136) qui sont agencés en succession, observés dans la direction longitudinale de la partie de réservoir (3a, 3b). 10
3. Cuve de transfert selon la revendication 2, **caractérisée en ce que** les renforcements successifs (121 à 126) sont interconnectés avec des entretoises (141 à 145). 15
4. Cuve de transfert selon les revendications 2 et 3, **caractérisée en ce que** la structure de raccordement (91 à 96, 97) interconnectant les parties de cuve (3a, 3b) est entre les renforcements (121 à 126, 131 à 136) composés par les parties de cuve (3a, 3b) adjacentes. 20
5. Cuve de transfert selon la revendication 1, **caractérisée en ce que** l'isolation thermique (300) de la partie de cuve comprend une chambre à air à l'intérieur de la double paroi et/ou un dispositif de remplissage entre les parois (131, 132) de la double paroi. 25
6. Cuve de transfert selon la revendication 1, **caracté-** 30

risée en ce que la cuve de transfert comprend un gouvernail (400).

7. Cuve de transfert selon la revendication 1, **caractérisée en ce que** l'avant de la partie de cuve (3a, 3b) s'élargit vers l'arrière. 35
8. Cuve de transfert selon la revendication 1, **caractérisée en ce que** la section transversale de la partie de cuve (3a, 3b) est arrondie. 40
9. Cuve de transfert selon la revendication 1, **caractérisée en ce que** la section transversale longitudinale de la partie de cuve (3a, 3b) est un rectangle allongé, dans lequel le côté le plus long, c'est-à-dire le côté longitudinal, représente au moins trois fois la longueur du côté le plus court, c'est-à-dire le côté transversal. 45
10. Cuve de transfert selon la revendication 1, **caractérisée en ce que** la structure de raccordement (97), qui est placée au niveau des côtés de la cuve se faisant face, comprend une bride ou un autre point de raccordement (96a) inclus dans un renforcement (126) de la première partie de cuve (3a), une bride ou un autre point de raccordement (97b) inclus dans un renforcement (136) de la seconde partie de cuve (3b), ainsi qu'un boulon ou un autre élément de fixation (97c) pour raccorder les brides ou les autres points de raccordement. 50

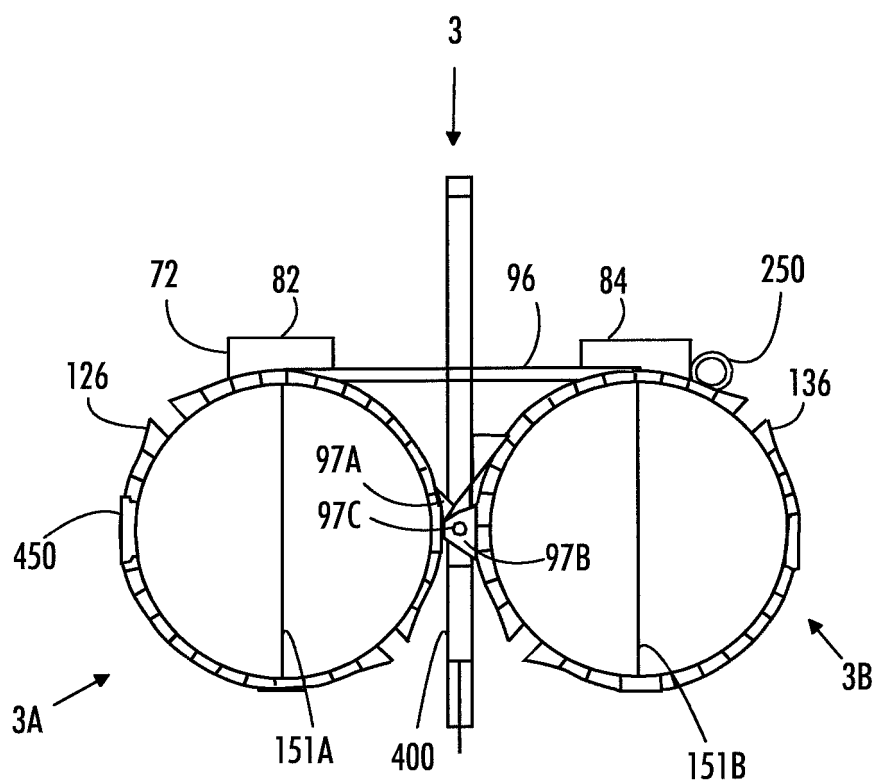


FIG. 1

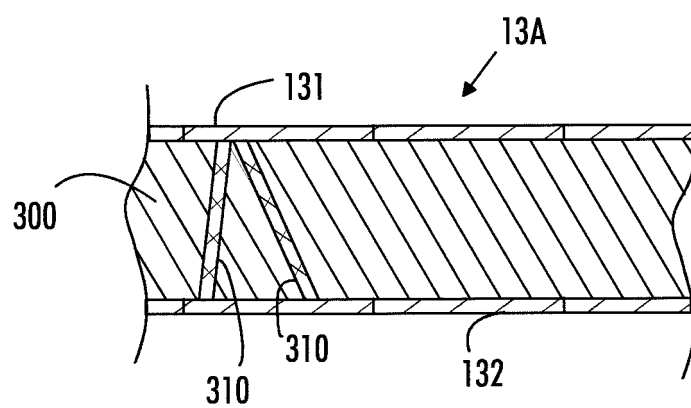


FIG. 4

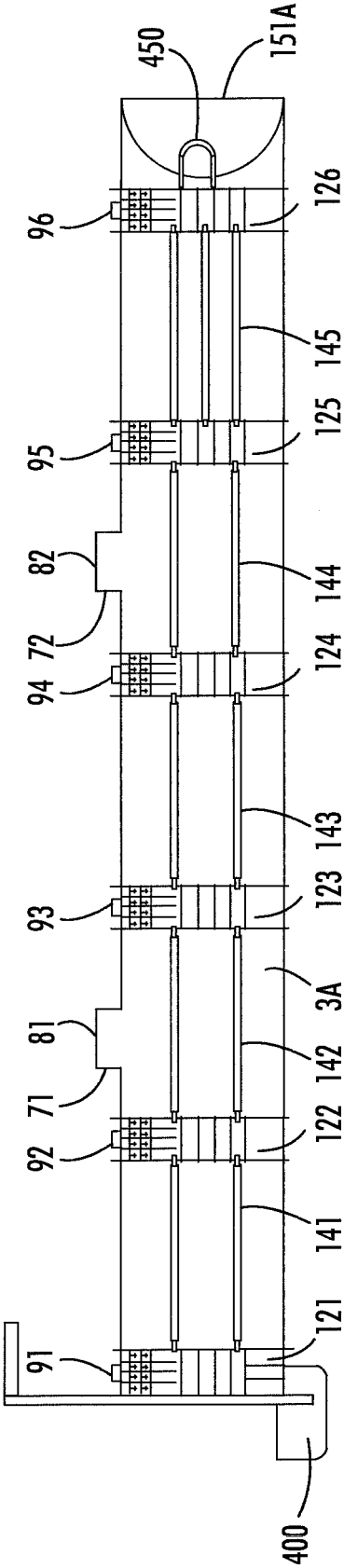


FIG. 2

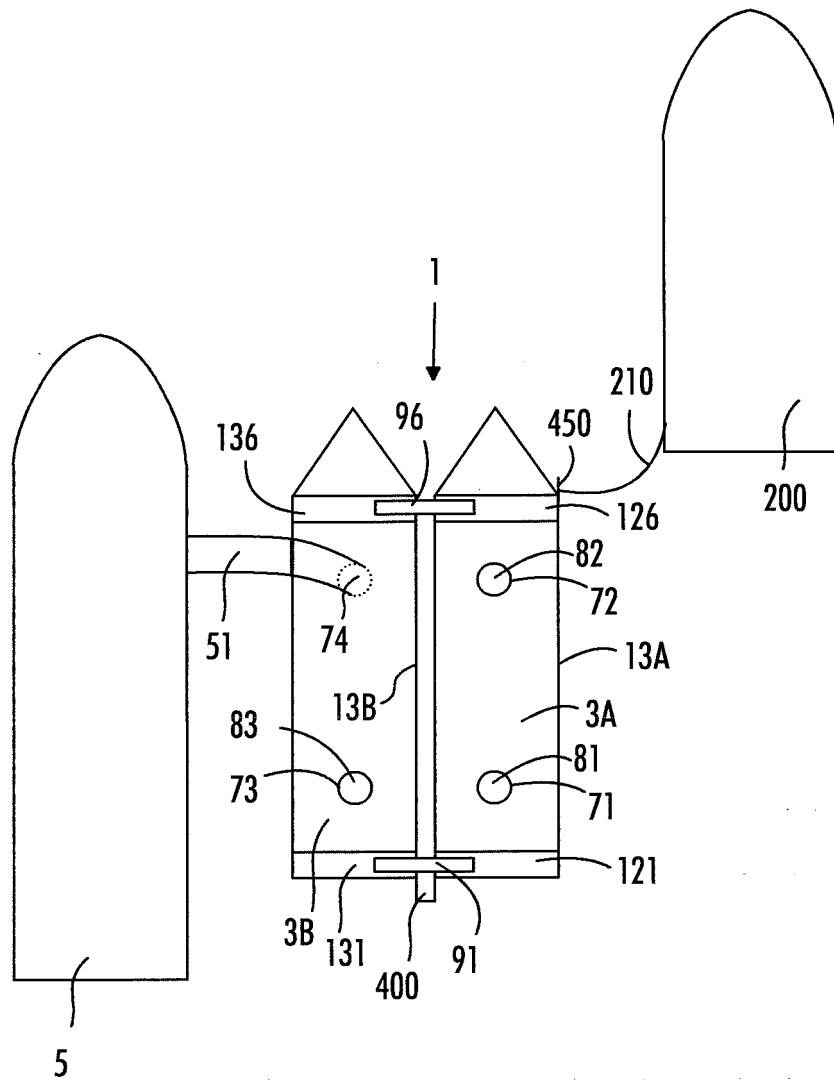


FIG. 3

REFERENCES CITED IN THE DESCRIPTION

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