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• **Catret Mascarell, Juan Vicente**
46008, Valencia (ES)
• **Grosset, Daniel**
35190 Tinteniach (FR)

(71) Applicant: **The European Community,**
represented by the European Commission
1049 Brussels (BE)

(74) Representative: **Schmitt, Armand et al**
Office Ernest T. Freylinger S.A.,
B.P. 48
8001 Strassen (LU)

(72) Inventors:
• **Andritsos, Fivos**
21026, Gavirate (IT)

(54) **Device for collecting fluids escaping from an underwater source**

(57) A device for collecting lighter than water fluids escaping from an underwater source. The device (10) comprises collecting means (16) placed over the underwater source (12) for collecting the fluids (14) rising from the underwater source (12) due to gravity and a transfer tube (18) having a lower end (20) in communication with the collecting means (16) for transferring the collected fluids towards the surface. A submerged buffer reservoir (24) is maintained at a predetermined depth under the surface, the submerged buffer reservoir (24) being in communication with an upper end (26) of the transfer tube (18) for receiving the collected fluids.

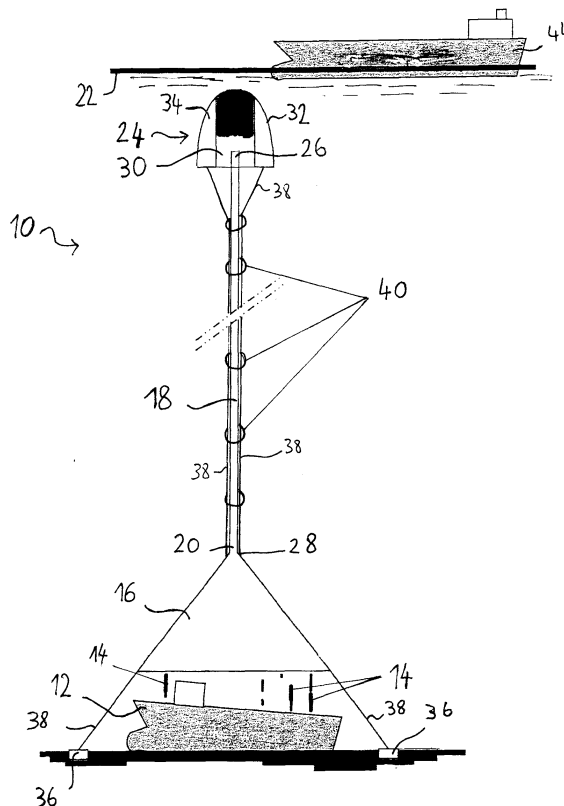


Fig. 1

Description

FIELD OF THE INVENTION

[0001] The present invention generally relates to a device for collecting fluids lighter than water escaping from an underwater source. The device is particularly useful for collecting fluid pollutants, such as e.g. oil, oil products or chemical products, leaking from sunken tankers.

BACKGROUND OF THE INVENTION

[0002] There are many wrecks lying on the sea or ocean bed all over the world, many of them having smaller or larger quantities of fluid pollutants (e.g. oil, oil products, chemical products or the like) trapped in their tanks. Each of these wrecks constitutes, depending on the trapped pollutants, the structural stability of the wreck and the water conditions, a serious threat to the environment in the short or long term. Recent maritime disasters leading to major environmental pollution, such as those created by the sinking of the tanker "PRESTIGE" in November 2002 or "ERIKA" in December 1999, showed the difficulties for collecting oil escaping from such wrecks, in particular when lying at depths of several thousand meters. Thus, the need for improved systems to collect trapped or escaping pollutant fluids is more than ever a topical question.

[0003] Various methods have been proposed to achieve this aim. A first conventional approach consists in pumping the trapped pollutants up to the surface. EP 0 550 682 proposes to assign to each tank of a ship a recovery device having an external floating body connected to a transport hose, which is coiled onto a drum. The external floating body is located on the deck of the ship equipped therewith. A first end of the hose is connected to a tank containing the fluid to be collected. The free second end of the hose is connected to the external floating body. The latter is maintained on the ship's deck in such a way that when the deck comes under water, the external floating body will move upwards due to its buoyancy. The coiled hose will be progressively unwound as the first end of the hose sinks deeper and deeper with the ship. This device gives prompt information to the rescue crew on a sunken tanker's position and on type/amount of oil or other chemicals. To recover the oil/chemicals trapped in the tanks, it suffices to connect the rescue boat to the second hose end attached to the external floating body, and pump the oil/chemicals. Unfortunately, this device loses its interest if the tanker sinks down to a depth which is greater than the length of the hose. Moreover this concept has a considerable cost impact, since one such device is required per tank. A further shortcoming of this concept is that it will not permit the recovery of fluids escaping from a burst open tank, which may happen when e.g. a ship breaks into several parts like the "PRESTIGE".

[0004] Another approach proposes the sealing of the

wreck in a sarcophagus or in a kind of dome that would confine, hopefully forever, the leaking pollutants next to the seabed. It is obvious that such kinds of solutions cannot guarantee the containment forever, the sunken wreck still remaining a threat to the environment.

[0005] Finally, another approach proposes the channelling of leaking pollutant fluxes up to the sea surface, where the pollutant is accumulated e.g. in a collecting vessel or a floating platform.

[0006] In this connection, US 4,643,612 discloses a floating barge having a concave bottom. The barge is adapted to be anchored at the sea surface over a sub sea well or pipeline that is leaking oil. Flexible roll-up skirts extend to the ocean floor. This prevents currents from shifting the oil outside the channel defined thereby. The oil is trapped under the barge and can be pumped from there via a pipe located at the apex of the concave bottom. Unfortunately, such a barge cannot be used in maritime disaster cases where the wreck lies at great depths. Moreover the low flow rate of the gravity driven flux of a viscous fluid, such as heavy oil, towards the surface would require the barge to stay stable in place for months, the whole operation being very dependent on the surface weather conditions.

[0007] Hence, there is a need for an improved system for collecting oil and other fluids escaping from an underwater source. This is achieved by a device for collecting fluids as claimed in claim 1.

SUMMARY OF THE INVENTION

[0008] According to the invention, a device for collecting fluids having a specific density lower than that of the surrounding water and escaping from an underwater source is proposed. The device comprises collecting means placed over the underwater source for collecting the fluids escaped from the source and rising therefrom due to gravity. A transfer tube has a lower end in communication with the collecting means for transferring the collected fluids towards the surface. According to an important aspect of the invention, a submerged buffer reservoir is maintained at a predetermined depth under the surface, the submerged buffer reservoir being in communication with an upper end of the transfer tube for receiving the collected fluids.

[0009] Hence, escaped, collected fluid is transferred to a submerged buffer reservoir, and not directly to the surface. The buffer reservoir will thus store the fluid until it is emptied e.g. by a shuttle ship. As the collected fluid is stored underwater, the fluid recovery procedure is totally independent of the weather conditions. Furthermore, there is no need for a surface platform or a pumping ship to be permanently installed at the vertical of the wreck for the collecting procedure.

[0010] Advantageously, the present device is designed in such a way that the collected fluids are transferred from the collecting means to the submerged buffer reservoir, through the transfer tube, due to gravity.

Such a transfer requires no external energy. Thus, the device of the invention can be comprised of relative simple and non-moving parts. It follows that components like motors, pumps or pressure vessels are not required to transfer the collected fluids to the buffer reservoir, which saves costs and increases the reliability of the device.

[0011] Preferably, the collecting means comprises a dome-shaped element so that the collected fluids converge towards its apex. This permits collecting the escaped, rising fluids over a large area, and confining them to a reduced zone. Such a dome-shaped element may e.g. be formed as an inverted funnel, i.e. a funnel arranged with its small opening above its large opening.

[0012] In a preferred embodiment, the dome-shaped element has about its apex an opening, to which the lower end of the transfer tube is connected. The opening is thus located in the area where the collected fluids converge due to the dome-shape of the collecting means. Again, this allows transferring the collected fluids to the transfer tube through the opening simply by the effect of gravity.

[0013] Preferably, the bottom of the dome-shaped element is positioned proximate to the underwater source. The leaking and escaping fluids are thus collected near the source, which avoids that water currents shift the fluids away from the collecting means.

[0014] In a preferred embodiment, the submerged buffer reservoir comprises a chamber with an open bottom. The transfer tube opens into the chamber with its upper end. In use, the collected fluid rises into the tube and penetrates into the chamber, where it accumulates. Depending on the quantities of fluid leaking from the underwater source, the flow of fluid into the buffer reservoir may be continuous or not. So, as the fluid accumulates in the chamber, it also gradually replaces the initial, heavier water content of the chamber, which is expelled via the open bottom. In the chamber of the submerged buffer reservoir, the water will separate from the fluid due to the difference in specific weight, so that the submerged buffer reservoir also acts like a separator, which concentrates the fluids in the upper part of the submerged buffer reservoir.

[0015] Advantageously, the tube penetrates into the chamber through the open bottom. In that manner, the fluid coming out of the upper end of the transfer tube is not exposed to currents that might shift it outside the catch area of the open bottom. This provides a very easy delivery of the collected fluid from the transfer tube to the submerged buffer reservoir.

[0016] The submerged buffer reservoir is also preferably designed so as to fulfil the function of a terminal buoy. Through its buoyancy, it keeps the transfer tube under tension. The submerged buffer reservoir advantageously comprises a drainage port, through which the chamber can be emptied. A shuttle ship may e.g. connect to this drainage port using standard equipment and pump the stored fluid from the chamber into its own

tanks.

[0017] The submerged buffer reservoir may be maintained at a depth typically between 30 and 50 m. This is considered sufficient for the submerged buffer reservoir not to be affected by weather-induced sea conditions. The buffer reservoir is also normally sufficiently deep to avoid collision with ships cruising in the area while being still easily accessible for recovering the stored fluid.

[0018] Preferably, a plurality of anchoring means for anchoring the collecting means to the ground are distributed at the periphery of the collecting means. The anchoring means allow keeping the collecting means over the underwater source in a predetermined position allowing a good fluid recovery. To share the tensioning stress around the whole collecting means, the anchoring means are advantageously regularly distributed at its periphery. Each of the anchoring means may comprise a suction anchor and an associated cable linking the suction anchor to the collecting means. Suction anchors allow very high anchoring forces and are linked to the collecting means by e.g. steel cables or chains.

[0019] Advantageously, a plurality of tensioning rings are fixed to the transfer tube and distributed therealong, the tensioning rings having a predetermined buoyancy. The tensioning rings are preferably rigid and fixed at predetermined positions along the transfer tube in order to maintain its shape and cross-section. Due to their buoyancy, the tensioning rings also permit to fine-tune the pre-tensioning of the transfer tube and consequently the collecting means. As a result the transfer tube will stay straight and mainly vertical. In this regard, the collecting means and/or the transfer tube shall preferably have close to neutral buoyancy, for an increased stability of the device. The tensioning rings may be spaced e.g. by 5 to 20 m, depending on the prevailing currents across the length of the transfer tube.

[0020] In a preferred embodiment, the cables of the anchoring means further link the collecting means to the submerged buffer reservoir, and are preferably guided along the transfer tube in-between the tensioning rings and the transfer tube.

[0021] The transfer tube preferably has a diameter between 1 and 3 m, more preferably between 1.5 and 2.5 m. Such diameters are preferred for transferring leak rates of large sunken tankers such as the tankers "ERLKA" or "PRESTIGE". In addition, with diameters of about 1.5 to 2 m, problems of clogging due to high oil viscosity should not arise.

[0022] If desired, heating means may be provided in the vicinity of the lower end of the transfer tube. This measure is of particular interest when the fluids have a high viscosity and are susceptible to stick to the inner walls of the transfer tube. The heat provided locally increases the pressure differential along the tube, thereby causing a pumping effect. Alternatively, chemical agents can be used to lower the viscosity of the fluid and/or its specific weight, thereby facilitating its rise in the transfer tube.

[0023] Preferably, the inner surface of the transfer tube is made of a material chosen in order to avoid wall sticking and clogging from the fluids. This is another measure in order to deal with very viscous and sticky fluids and to enhance the transfer operation.

[0024] Referring more particularly to the submerged buffer reservoir, its chamber may have a capacity of 500 to 2000 t of oil, preferably between 1000 and 1500 t. For increased strength, the buffer reservoir preferably has an outer hull made of steel.

[0025] In a preferred embodiment, the collecting means and/or the transfer tube is/are made of fabric. They keep their place and shape by being attached to the tensioned cables and the tensioning rings.

[0026] As already mentioned, the present device is particularly suited to collect fluid pollutants such as oil, oil products, or chemical products that are leaking from sunken tankers. The device also proves advantageous to collect fluids originating from a variety of sources, such as sunken ships but also pipelines or wells. The device is thus of very general applicability, as long as the specific weight of the fluids is lower than that of the surrounding water, and if they do generally not dissolve in water. It follows that the device of the invention presents the best chances for eliminating a pollution threat in a fast, reliable, flexible and cost effective way.

[0027] According to another aspect of the invention, a method for collecting fluids escaping from an underwater source and having a specific density lower than that of the surrounding water is proposed. In the method, the leaking fluids are collected by collecting means placed over the underwater source and transferred towards the surface by a transfer tube in communication with the collecting means. It will be appreciated that the collected fluids are delivered by the transfer tube to a submerged buffer reservoir. The use of a submerged buffer reservoir permits recovering fluids (such as oil, oil products or other chemical products) leaking from an underwater source, regardless of the prevailing weather condition.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028] The present invention will now be described, by way of example, with reference to the accompanying drawing, in which:

FIG. 1: is a sketch illustrating a preferred embodiment of the device in accordance with the invention, wherein the device is employed for collecting oil leaking from a sunken tanker.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

[0029] Fig.1 shows a preferred embodiment of a device 10 for collecting fluids in accordance with the invention. Reference sign 12 indicates a sunken oil tanker ly-

ing on the seabed and having a plurality of holes in its hull and/or tanks. Black trails 14 in Fig.1 represent ascending oil leaking from the wrecked tanker 12.

[0030] The device 10 comprises a collecting means preferably in the form of a dome-shaped element 16 and a transfer tube 18 having a first, lower end 20 in communication with the collecting means for channelling the leaking oil towards the sea surface 22. It will be appreciated that the device 10 includes a submerged buffer reservoir 24 that is maintained at a predetermined depth under the surface and above the collecting means. The submerged buffer reservoir 24 is in communication with the second, upper end 26 of the transfer tube 18 so as to receive the collected oil.

[0031] Hence, in the present device 10, the collected oil is not directly channelled to the surface as is conventionally done, but is stored in the submerged buffer reservoir 24 at a given depth, e.g. 30 to 50 m below the sea surface. The recovery of the leaking oil is thus not affected by rough weather, which would otherwise hinder the oil recovery procedure.

[0032] As shown in Fig.1, the dome-shaped element 16 preferably is like an inverted funnel, i.e. its small opening is arranged above its large opening, so that it covers the wreck like an umbrella. The inverted funnel 16 is anchored to the seabed around the wreck at several points, using anchoring means (described in detail below). Advantageously, the bottom of the inverted funnel 16 is close to the wreck 12, e.g. about 20 m, so as to collect the escaping oil near to the source and thereby avoid oil shifting by water currents away from the collecting means 12. The inverted funnel 16 should preferably be adapted to the size of the wreck 12, and may e.g. have a bottom as large as 50 m in diameter.

[0033] Oil leaking from the wreck rises in the water due to the difference in specific gravity. Still due to gravity, oil emissions entering the inverted funnel 16 will necessarily converge towards its apex. At its apex, the inverted funnel 16 is provided with an opening 28, to which the lower end 20 of the transfer tube 18 is connected. As shown in Fig.1, the transfer tube 18 is preferably vertically arranged above the apex of the inverted funnel 16, so that the collected oil, after converging toward the apex, will be led into the transfer tube 18 and rise therein, still under the effect of gravity and thus without the need of any additional energy.

[0034] Referring now more specifically to the structure of the buffer reservoir 24, the latter preferably has a central, cylindrical chamber 30 with an open-bottom and a bell-shaped outer hull. The buffer reservoir is also advantageously designed so as to fulfil the function of terminal buoy, in order to control the tension on the transfer tube 18. This is achieved by the annular space 34 between the outer shell and the chamber 30, which can thus serve as ballast reservoir for regulating the tension of the transfer tube, and shall also permit housing of auxiliary equipment therein if desired.

[0035] As shown in Fig.1, the transfer tube 18 penetrates into the chamber 30 through the open bottom so that its upper end 26 opens in the chamber 30. The collected oil will thus exit the tube 18 and accumulate in the chamber 30, due to gravity, as represented in the drawing. The channelled, leaked oil thus penetrates into the submerged buffer reservoir 24 through its open bottom in a very simple manner without being exposed to side water currents. As oil accumulates in the chamber 30, it replaces the initial sea water content out of the chamber 30, which is forced out through the open bottom. Thus, progressively, the oil is separated from water, occupying the upper part of the submerged buffer reservoir. It will be also understood that, if an oil/water mix would rise in the tube 18 and arrive in the chamber 30, this mix will separate in the chamber 30 due to gravity. As a result, the submerged buffer reservoir 24 not only acts as storage tank but also as separator.

[0036] The submerged buffer reservoir is advantageously provided in its upper part with a drainage port (not shown) for connection to e.g. a shuttle tanker 44 for emptying the chamber 30. The drainage port may consist of standard equipment through which the shuttle tanker, weather permitting, can recuperate the stored oil rapidly, using standard off-shore loading equipment and methods, typically by pumping. The frequency of emptying operations will depend on the prevailing weather and currents and on the oil leaking rate. In practice, the device 10 is normally kept in place until all the tanks of the wreck 12 are empty and the pollution threat eliminated. Once the device 10 is in place and collects the leaking oil without any problems, the whole operation can be accelerated simply by opening more holes at the tanks of the wreck.

[0037] The dimensions of the transfer tube 18 and the submerged buffer reservoir 24 typically depend on the maximum expected leak rate, the expected weather and sea current patterns.

[0038] For increased strength, the submerged buffer reservoir is preferably made of steel. It shall have a capacity of between 500 to 2000 t of oil, preferably between 1 000 and 1500 t. This would require a chamber having a volume of about 1500 m³.

[0039] The transfer tube 28 is advantageously externally provided with tensioning rings 40, distributed along its length and preferably regularly spaced (e.g. every 10 m). The tensioning rings are preferably rigid in order to maintain the shape and cross-section of the transfer tube 28. Due to their buoyancy, the tensioning rings 40 allow controlling the tension of the transfer tube 28. The tensioning rings 40 may all have the same buoyancy, but varying their buoyancy in function of their position along the transfer is a way to fine tune the tension of the tube 28 along its length. The transfer tube 28 and the inverted funnel 16 may be made of fabric and preferably have close to neutral buoyancy for reasons of stability.

[0040] Referring now more specifically to the anchoring means, they preferably include a plurality of suction

anchors 36 distributed around the inverted funnel 16, each anchor being linked to the funnel by a respective cable 38 (normally steel cable). A suction anchor is a standard anchoring means of the offshore industry, and typically consists in a big inverted bucket pushed deep into the ocean bed by pumping the water out. Preferably, the cables 38 also link the submerged buffer reservoir 24 to the anchors 36. In the present embodiment, each cable 38 extends along the inverted funnel 16 and along the transfer tube 18, up to the bottom side of the buffer reservoir 24, to which it is solidly fixed. Hence, in addition to their tensioning function, the tensioning rings 40 also hold the cables 38 in place along the transfer tube 28, preventing thereby any entanglement during deployment and operation. The number and dimensioning of cables 38 as well as the number, and buoyancy of the tensioning rings 40 allow for the regulation of not only the strength but also the rigidity (by pre-tensioning) of the transfer tube 18. The terminal buoy 34 (buffer reservoir) also helps keeping the whole line in tension.

[0041] If desired, the cables may be clamped to the tensioning rings. The device 10 can be anchored at as many additional points as necessary, using e.g. standard techniques and know-how of the offshore industry. The prime factor for specifying the number and strength of the anchors 26, the transfer tube 28 and the cables 34 is the pattern of the expected sea currents and the resulting static and dynamically induced pull.

[0042] It is to be noted that the fluid to be collected may have a high viscosity, which in conventional system often leads to wall sticking and/or clogging. When implemented to collect highly viscous fluids, such as oil, the transfer tube 18 of the present device preferably has a diameter of about 2 m. Such a diameter should allow to accommodate leaking flows of 1000 t of oil/water mix (e.g. 10% fluids - 90% water) daily without problems. The flow through the transfer tube 28 can advantageously be enhanced by relatively simple means, e.g. by installing a heat source (not shown) in the vicinity of the connection between transfer tube 18 and funnel 16, so as to provoke a pumping effect by rising the pressure differential along the transfer tube. Chemical agents can also be injected at the same point in order to reduce the viscosity and/or the specific weight of the fluid.

[0043] Still in order to alleviate problems of sticking and/or clogging, the inverted funnel 16 and transfer tube 18 are preferably made of a fabric to which adhesion is difficult, such as those commonly used in oil industry. The use of fabric makes the device easily transportable and deployable, as the only solid part of the system is the storage buffer 24. In practice, the cables 38 can e.g. be deployed synchronously, each one from its own drum, extending along the transfer tube 18 while the tensioning rings 40 would clamp the cables 38 at regular distances. The transfer tube 18 could also be formed on the spot.

[0044] The device 10 is thus of simple and handy construction, and can be used for recovering a variety of

fluids, in particular oil and chemical products. As has been explained above, the device is particularly well suited for recovering oil from foundered tankers and allows a prompt and cost effective intervention in case of catastrophes similar to the ERIKA or the PRESTIGE. In fact, it is of general applicability as long the pollutant does generally not dissolve and is of lower specific density than seawater.

[0045] The device 10 presents many significant advantages. Firstly, it is very simple and does not require precise or elaborate manipulations or operations for its manufacturing or on-site deployment. Many of its components can be manufactured and assembled by non-specialised shipyards. The transfer tube configuration can be implemented through a modular design, adding operational flexibility and lowering the cost. The device can be operated entirely by non-specialised personnel. It is entirely passive: the flow of oil is gravity driven. If necessary, it can be enhanced by simple means (i.e. through a heat source or pumping means). Once in place, it does not require regular deep-sea operations or monitoring. The presence of the submerged buffer reservoir makes the operations tolerant to the rough surface weather conditions. The device is highly configurable, since both the transfer tube and the buffer reservoir can be optimised (anchoring parameters, tube and buffer reservoir dimensions, tube/wire tensioning, depth of the buffer reservoir, eventual intermediate buoys etc). Last but not least, due to its flexibility of operation the device can rapidly be installed in deep sea or shallower waters, and therefore can advantageously be a main tool in general intervention procedures to prevent major pollutions.

Claims

1. A device for collecting fluids escaping from an underwater source, said fluids having a specific density lower than that of the surrounding water, said device comprising:

collecting means (16) placed over said underwater source (12) for collecting said fluids (14) rising from said underwater source (12) due to gravity; and

a transfer tube (18) having a lower end (20) in communication with said collecting means (16) for transferring the collected fluids towards the surface;

characterised by

a submerged buffer reservoir (24) maintained at a predetermined depth under the surface, said submerged buffer reservoir (24) being in communication with an upper end (26) of said transfer tube (18) for receiving said collected fluids.

2. The device according to claim 1, **characterised in that** it is designed in such a way that said collected fluids are transferred from said collecting means (16) to said submerged buffer reservoir (24), through said transfer tube (18), due to gravity.
3. The device according to claim 1 or 2, **characterised in that** said collecting means (16) comprises a dome-shaped element (16) so that said collected fluids converge towards its apex.
4. The device according to claim 3, **characterised in that** said dome-shaped element (16) has about its apex an opening (28), to which said lower end (20) of said transfer tube (18) is connected.
5. The device according to claim 3 or 4, **characterised in that** the bottom of said dome-shaped element (16) is positioned proximate to said underwater source (12).
6. The device according to claim 3, 4 or 5, **characterised in that** said dome-shaped element (16) is formed as an inverted funnel.
7. The device according to any one of the preceding claims, **characterised in that** said submerged buffer reservoir (24) comprises a chamber (30) with an open bottom; and **in that** said transfer tube (18) opens into said chamber (30) with its upper end (26).
8. The device according to claim 7, **characterised in that** said transfer tube (18) penetrates into said chamber (30) through said open bottom.
9. The device according to any one of the preceding claims, **characterised in that** said submerged buffer reservoir (24) is designed to act as a terminal buoy (34).
10. The device according to any one of the preceding claims, **characterised in that** said submerged buffer reservoir (24) comprises a drainage port, through which said chamber (30) can be emptied by pumping.
11. The device according to any one of the preceding claims, **characterised in that** said submerged buffer reservoir (24) is maintained at a depth between 30 and 50 m.
12. The device according to any one of the preceding claims, **characterised by** a plurality of anchoring means for anchoring said collecting means (16) to the ground and distributed at the periphery of said collecting means (16).

13. The device according to claim 12, **characterised in that** each of said anchoring means comprises a suction anchor (36) and an associated cable (38) linking said suction anchor (36) to said collecting means (16). 5
14. The device according to any one of the preceding claims, **characterised by** a plurality of tensioning rings (40) fixed to said transfer tube (18) and distributed there along, said tensioning rings (40) having a predetermined buoyancy. 10
15. The device according to claims 13 and 14, **characterised in that** said cables (38) of said anchoring means further link said collecting means to said submerged buffer reservoir (24), and are preferably guided along said transfer tube (18) in-between said tensioning rings (40) and said transfer tube (18). 15
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16. The device according to any one of the preceding claims, **characterised in that** said collecting means (16) and/or said transfer tube (18) has/have close to neutral buoyancy. 25
17. The device according to any one of the preceding claims, **characterised in that** said tensioning rings (40) are spaced by 5 to 20 m, preferably 10 m. 30
18. The device according to any one of the preceding claims, **characterised in that** said transfer tube (18) has a diameter comprised between 1 and 3 m, preferably between 1.5 and 2 m. 35
19. The device according to any one of the preceding claims, **characterised in that** said chamber (30) of said submerged buffer reservoir (24) has a capacity of 500 to 2000 t of oil, preferably between 1000 and 1500 t. 40
20. The device according to any one of the preceding claims, **characterised by** heating means in the vicinity of said lower end of said transfer tube (18). 45
21. The device according to any one of the preceding claims, **characterised in that** the inner surface of said transfer tube (18) is made of a material chosen in order to avoid wall sticking and clogging from said fluids. 50
22. The device according to any one of the preceding claims, **characterised in that** said collecting means (16) and/or said transfer tube (18) is/are made of fabric. 55
23. The device according to any one of the preceding claims, **characterised in that** said submerged buffer reservoir (24) is made of steel.
24. The device according to any one of the preceding claims, **characterised in that** said fluids are pollutants such as oil or chemical products and/or said underwater source (12) is a wrecked ship.
25. A method for collecting fluids escaping from an underwater source, said fluids having a specific density lower than that of the surrounding water, wherein said fluids are collected by collecting means placed over said underwater source and transferred towards the surface by a transfer tube in communication with said collecting means, **characterized in that** said collected fluids are delivered by said transfer tube to a submerged buffer reservoir.

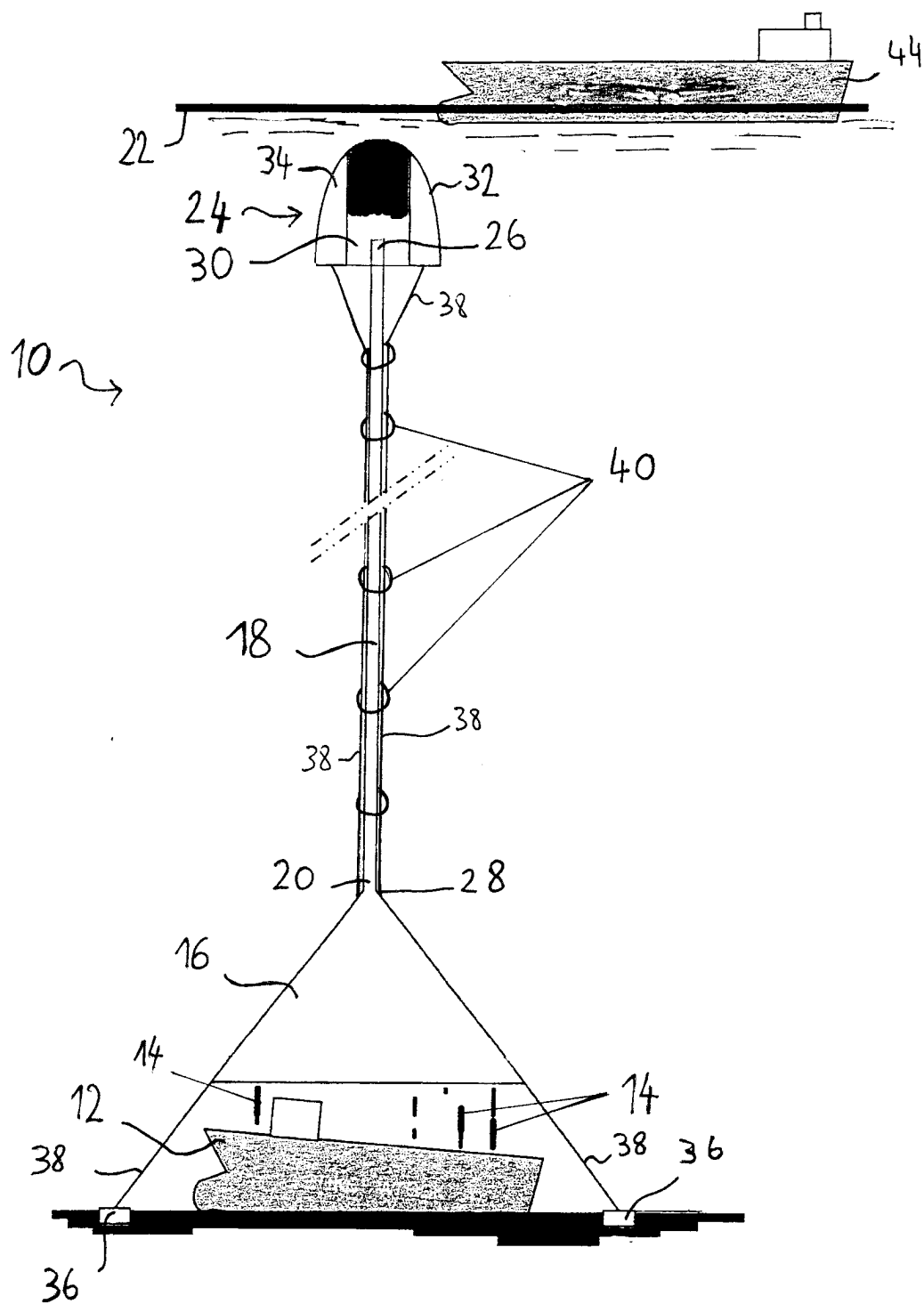


Fig. 1



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 10 3810

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 MUNICH		Date of completion of the search 15 January 2004	Examiner Moya, 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			

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EPO FORM 1503 03 82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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