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TITLE

Offshore Oil Recovery Vessel

FIELD OF INVENTION

The present invention relates to vacuuming an oil gusher up into a ship which separates the oil from the water.

BACKGROUND OF THE INVENTION

The 2010 Gulf of Mexico oil spill has brought out the long sought need to limit environmental damage from an underwater gusher. Offshore drilling is inherently hazardous. Pipes break. Hurricanes weaken drill rigs. Undersea earth movement breaks pipes. Explosions break pipes.

Related environmental inventions include U.S. Pat. No. 5,114,273(1992) to Anderson. A roll up cylindrical sheet can be raised up around a drill rig to contain a spill around the drilling.

U.S. Pat. No. 7,597,811 (2009) to Usher discloses an undersea vacuum for cleaning pollutants from an ocean floor. A submersible work unit can be operated to the pollution site. An elongated pipe has a nozzle into which pollutants are drawn. A vessel above receives and processes the pollutants. This patent is incorporated herein by reference in its entirety.

1 U.S. Pat. No. 5,423,340 (1995) to Campbell et al.
2 discloses an oil and water separator using an agitator and
3 separator. This patent is incorporated herein by reference
4 in its entirety.

5 Pub. No. US2010/0038082 (2010) to Zubrin et al.
6 discloses a portable oil and biomass renewable energy system
7 which converts hydrocarbons into carbon-free electricity.
8 This application is incorporated herein by reference in its
9 entirety.

10 Pub. No. US 2010/0108567 (2010) to Medoff discloses a
11 biomass reactor using plants, animals and waste biomass to
12 produce fuel. Fermentation produces ethanol. This
13 publication is incorporated herein by reference in its
14 entirety.

15 U.S. Pat. No. 4,449,850 (1984) to Cessou et al.
16 discloses an undersea funnel which is lowered by barges over
17 a gusher. Shallow depths such as 150 feet are addressed.
18 Ballast chambers and weights are used to lower the funnel.
19 A gas/water separator allows a burn off stack to burn gases.
20 Oil is collected in containers. Anchors stabilize the
21 funnel. A lower skirt helps stabilize the funnel from the
22 gusher's turbulence. This patent is incorporated herein by
23 reference in its entirety.

24 What is needed in the art is a vessel(s) that can
25 deploy to an underwater gusher. A submersible inverted

1 funnel is needed to retrieve large volumes of hydrocarbon
2 pollutants mixed with the seawater. A pipe to a surface
3 vessel is needed, and the pipe must be detachable from the
4 vessel during heavy weather. The vessel must have an
5 oil/water separator. A barge must have storage tanks for
6 retrieved oil. Optionally a biogas reactor on the vessel
7 can recycle animal and plant remains into fuel to power the
8 machinery on the vessel.

9 The present invention accomplishes all these functions.

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SUMMARY OF THE INVENTION

12 An aspect of the present invention is to provide a
13 submersible funnel unit with a power means to position it
14 over an undersea gusher.

15 Another aspect of the present invention is to provide a
16 camera associated with the submersible to be used to locate
17 the gusher via a controller on the surface vessel which
18 directs the power means.

19 Another aspect of the present invention is to provide a
20 pipe on the outlet of the funnel which communicates the
21 pollutants to the vessel. This pipe must have a flexible
22 joint means to allow movement of the submersible. This pipe
23 must have a floatation device a safe distance under the sea
24 surface to detach from the vessel's connecting pipe to allow

1 the vessel to move away from heavy weather while leaving the
2 submersible and its riser pipe deployed.

3 Another aspect of the present invention is to provide a
4 heater at the inlet of the funnel to prevent ice buildup.

5 Another aspect of the present invention is to provide a
6 pump at the funnel outlet to initiate input of the
7 pollutants.

8 Another aspect of the present invention is to provide
9 an anchor means for the submersible to keep it in place.

10 Another aspect of the present invention is to provide
11 an oil/water separator on the vessel.

12 Another aspect of the present invention is to provide
13 an oil storage facility on the sea surface such as a barge.

14 Another aspect of the present invention is to provide a
15 biomass processor at the sea surface on a vessel to convert
16 animal, plant and oil waste into fuels to power the vessel's
17 machinery.

18 Other aspects of this invention will appear from the
19 following description and appended claims, reference being
20 made to the accompanying drawings forming a part of this
21 specification wherein like reference characters designate
22 corresponding parts in the several views.

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1 of the particular arrangement shown, since the invention is
2 capable of other embodiments. Also, the terminology used
3 herein is for the purpose of description and not of
4 limitation.

5 **DETAILED DESCRIPTION OF THE DRAWINGS**

6 Referring first to Fig. 1 the sea floor 1 is
7 discharging a hydrocarbon gusher 2. The ocean surface S
8 floats a processing vessel 3 and a container barge 4. The
9 term "vessel" herein is defined as one or more vessels
10 including a flotilla of vessels. A submersible funnel 5 has
11 been lowered over the gusher 2. A pipe 6 connects the
12 submersible funnel 5 to the vessel 3. A flexible joint 7 in
13 the pipe 6 allows the submersible funnel 5 to move as shown
14 by dotted lines 5A, 5B. An electric power cable 8 has
15 control cabling and power cabling for the submersible funnel
16 5.

17 The upper pipe 6 has a joint 9 which includes a
18 floatation ballast 10 located a distance D1 under surface S.
19 A connector 11 allows the vessel's connector pipe 6A to
20 disconnect from pipe 6 for emergencies such as hurricanes.
21 Anchors 12 allow the submersible funnel 5 and pipe 6 to
22 remain in place without vessel 3.

23 Onboard vessel 3 a crane 20 can be used to lower the
24 pipe 6 and submersible funnel 5, wherein pipe 6 may be
25 modular as is known in the art. The submersible funnel 5

1 has a ballast system 50 to assist the lowering operation.
2 The oil/water separator 21 is known in the art as shown in
3 U.S. Pat. No. 5,423,340. The separator ejects seawater from
4 discharge hose 22 and recovered oil from hose 23. The barge
5 vessel 4 has containers 40 to store the oil OIL.

6 Referring next to Fig. 2 the vessel 3 is shown
7 completing an oil/water separation. An emergency has caused
8 the crew to disconnect the coupling 200 of vessel pipe 6A
9 from pipe coupling 210. The joint 11 has been unfastened to
10 allow the flotation ballast 10 and pipe 6 to remain in place
11 as the vessel 3 and barge vessel 4 depart. The cable 8 has
12 been separated into the upper cable 8U and lower cable 8L.
13 Cable 8L has a tether 800 to ballast 10.

14 Referring next to Fig. 3 the crane cable 300 is
15 lowering the pipes 6, 6A down. The ballast 10 may be
16 disconnected and reconnected by divers as pipe modules are
17 lowered into the sea. This would allow ballast 10 to remain
18 at a chosen depth D1 under the sea surface S.

19 Referring next to Fig. 4 the control/power cable 8 may
20 be a mile long on a reel 44 aboard the vessel 3.

21 Referring next to Fig. 5 the funnel 5 has an onboard
22 pump 5P. Arrows MANEUVER indicate how the funnel 5 must be
23 able to be maneuvered by the propulsion means 600, 601
24 (lateral movement) and 602, 603 (depth control) shown in
25 Fig. 1. The flexible joint 7 could be made of a skirted

1 material or rubber or equivalents in the art including a
2 hose.

3 Referring next to Fig. 6 the funnel 5 may have an inlet
4 diameter D2 of ninety feet, but this size issue is a matter
5 of design choice. It may have a flexible skirt as disclosed
6 in U.S. Pat. No. 4,449,850. The propulsion means 600-603
7 may be electric motors and propellers 700. An equivalent
8 would be using robot mini-submarines that dock with the
9 funnel 5. Any equivalent must run continuously to fight the
10 gusher's turbulence. Cable 8 can continuously feed
11 electricity to funnel 5. The camera C sends images to a
12 control center (not shown) on the vessel 3 which allow
13 manual maneuvering of the funnel 5. The controller may have
14 a closed loop control system to maintain a location for the
15 funnel 5 after ideal placement has been achieved. The
16 anchor means 12 must hold the funnel 5 and pipe 6 in place
17 without power when the vessel 3 departs. An equivalent
18 would be to weight the funnel to rest on the bottom either
19 with or without a ballast system.

20 Referring next to Fig. 7 the vessel 3 uses known
21 separator technology. A surge tank 211 includes a pump
22 which along with pump 5P maintains an oil/water flow into a
23 separator 210. A bypass valve 212 could divert the
24 oil/water mix to standby storage tanks for maintenance or
25 emergencies.

1 Referring next to Fig. 8 the pump 5P is preferably
2 designed for high viscosity liquids, such as disclosed in
3 U.S. Pat. No. 5,385,447, incorporated herein by reference.
4 It has a venture intake 850 with an inlet 851. A throat of
5 minimum area 852 leads to the outlet 854. The impeller 855
6 has a stator 856. The electric motor 857 powers the
7 impeller 855. Housing 890 connects to pipe 6.

8 Referring next to Fig. 9 the funnel 5 is shown to have
9 four horizontal propulsion means 600, 601, 604, 605 and two
10 for depth, 602, 603. The outlet E for the funnel 5 must be
11 heated with heater H to avoid ice buildup closing the outlet
12 E. Heater H may be electric. An equivalent would be hoses
13 feeding an antifreeze into the outlet E. A fuel cell
14 powered by a downhole air pipe could be equivalent for
15 heater H. Anchor lines 12A are shown.

16 Referring next to Fig. 10 the vessel 333 could be
17 either a separate vessel or a subset of vessel 3 shown in
18 Fig. 1. This component of the environmental cleanup system
19 recycles dead wildlife, seaweed, and oil polluted debris
20 into carbon free generated electricity and/or fuels. This
21 electricity or fuel can power the machinery of vessel 3
22 and/or feed the grid.

23 A conveyor 1001 loads the polluted wildlife 1002 into
24 grinder 1003 creating a slurry 1004. This slurry 1004 is
25 fed into a biomass reformer 1005 of a chosen type. Some are

1 anaerobic digesters which produce methane. Downstream
2 processors such as a heat exchanger 1006 and a CO₂ separator
3 1007 are controlled by controller 1009 to refine the process
4 byproducts into a fuel to run the gas turbine 1008. Myriads
5 of combinations of known biomass energy generating systems
6 can be installed associated with vessel 3 of Fig. 1. Thus,
7 a carbon free flotilla is disclosed to efficiently contain
8 the environmental harm from an undersea gusher. The
9 mobility of the system components allow for rapid deployment
10 to any gusher. The emergency disconnect features provide
11 for crew and equipment safety in hurricanes.

12 Although the present invention has been described with
13 reference to preferred embodiments, numerous modifications
14 and variations can be made and still the result will come
15 within the scope of the invention. No limitation with
16 respect to the specific embodiments disclosed herein is
17 intended or should be inferred. Each apparatus embodiment
18 described herein has numerous equivalents.

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