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(54) METHOD AND APPARATUS FOR SINKING A SUCTION PILE

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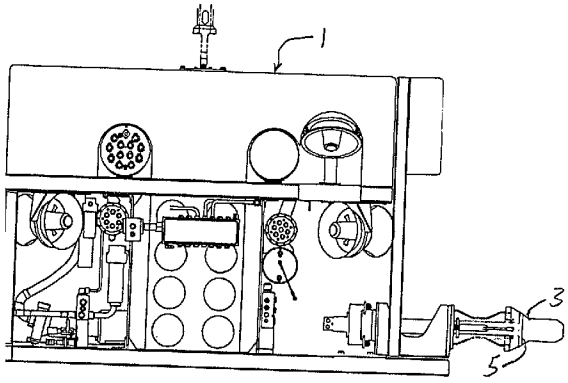
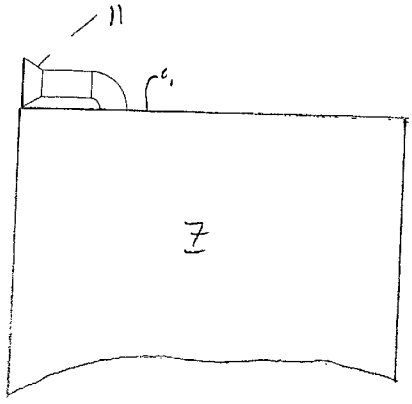
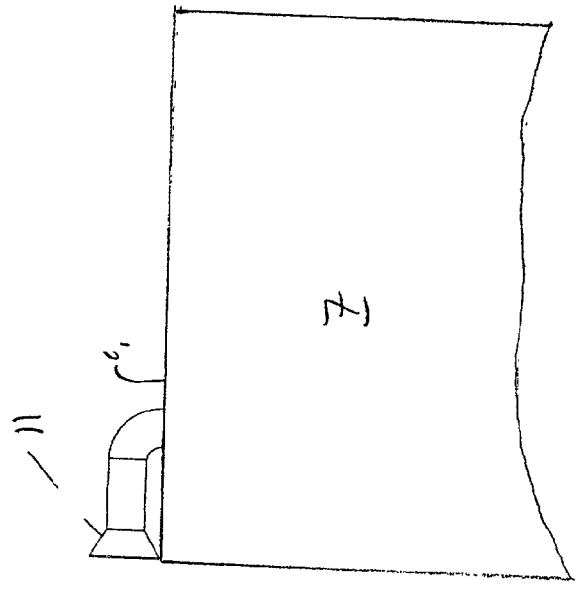
(57) **ABSTRACT**

A remotely operated vehicle-mounted pump is used to pump water from a suction pile, causing the suction pile to sink into the seabed of the ocean. The remotely operated vehicle exhibits a first mating member, and the pile exhibits a second mating member. The mating members define a channeled interface, channeling the first and second mating members to a common axis.







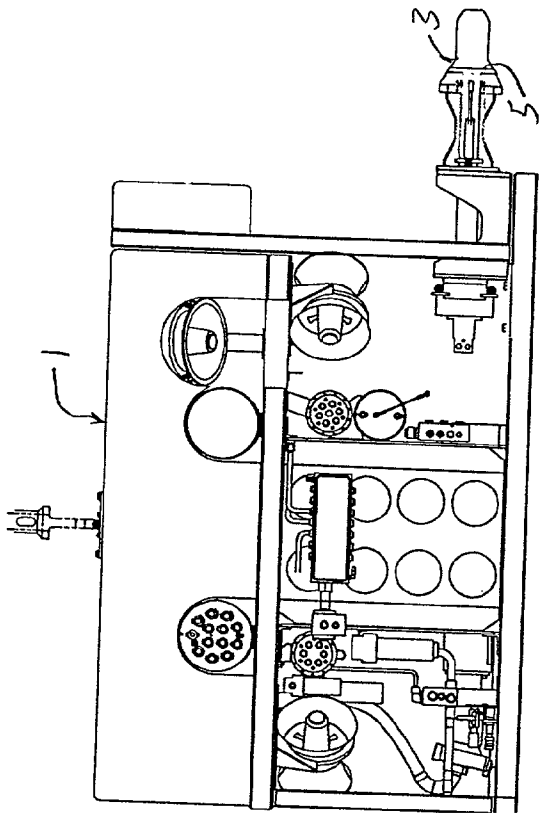


Fig. 1

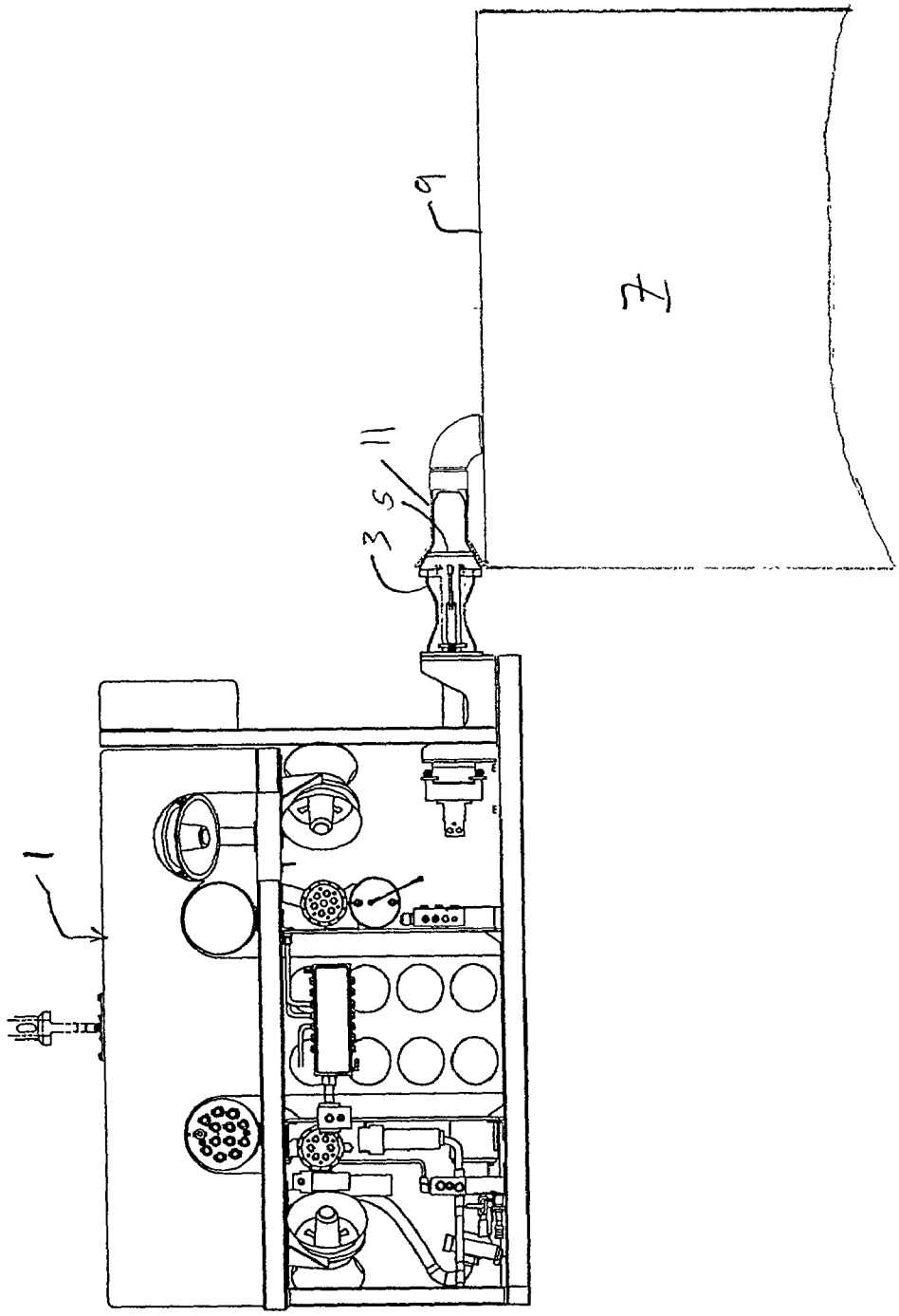


Fig. 2

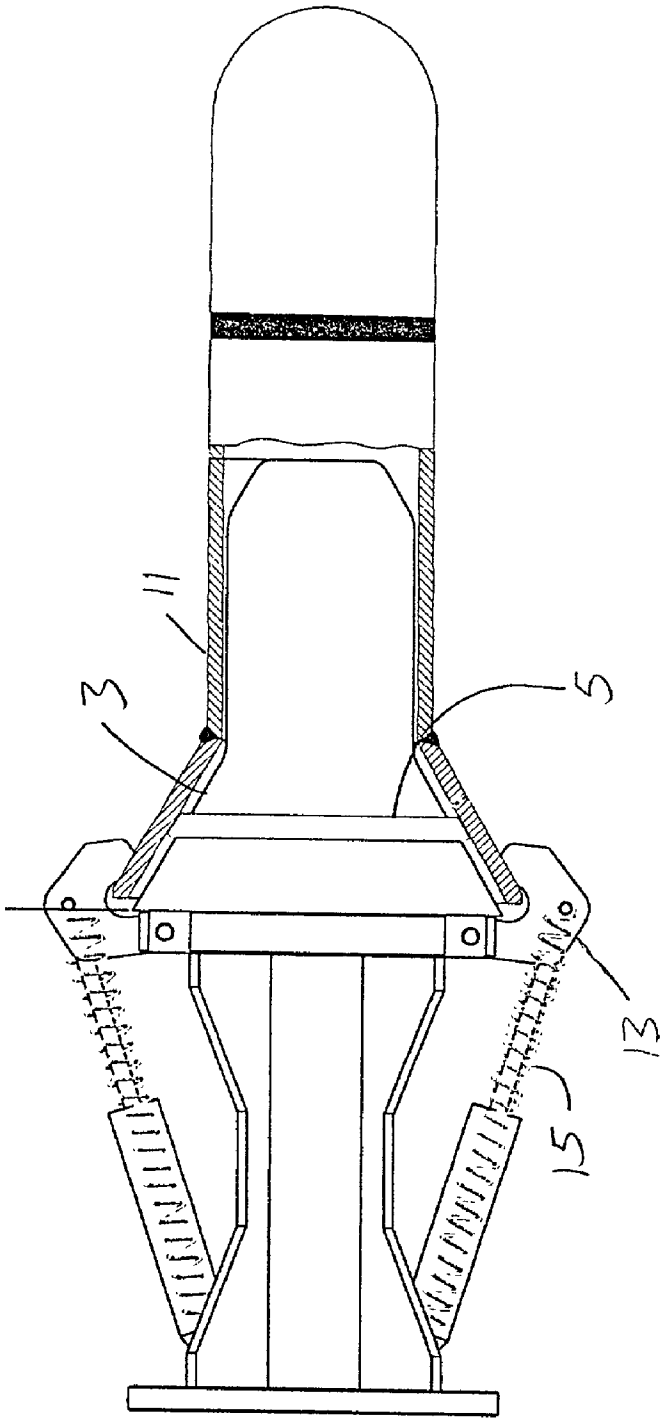


Fig. 3

METHOD AND APPARATUS FOR SINKING A SUCTION PILE

FIELD OF THE INVENTION

[0001] The invention relates to the field of sinking suction piles.

BACKGROUND OF THE INVENTION

[0002] Piles are often sunk into the seabed under bodies of water. Such piles might be used to support structures, such as off-shore drilling platforms. Such piles are often sunk by sealing the upper end of the pile and suctioning the inside of the pile, which suctioning drops the pressure within the pile. The pressure drop causes the pressure of the water to force the pile into the seabed.

[0003] The prior art discloses the use of a remotely operated vehicle that includes a pump to connect a first mating member to a second mating member located on the pile. The mating of the members enables the pump to pump water into or from the interior of the pile. The first and second mating members lie in a vertical axis, and they do not complementarily channel to each other. Thus, it is difficult and time consuming to steer the remotely operated vehicle to connect the first and second mating members.

SUMMARY OF THE INVENTION

[0004] There is disclosed herein a suction pile suction interface comprising a remotely operated vehicle, the remotely operated vehicle exhibiting a first mating member, a pile exhibiting a second mating member, and the first and second mating members defining a channeled interface channeling the first and second mating members to a common axis.

[0005] The common axis may be horizontal. The first mating member may be male and the second mating member may be female. The channeled interface may be conical.

[0006] The apparatus may further comprise a fastener releaseably fastening together the first and second mating members. The fastener may be a hydraulic latch. The channeled interface may exhibit a deflective seal. The deflective seal may be an o-ring.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] **FIG. 1** is a side view of a remotely operated vehicle and pile of the present invention, with the remotely operated vehicle in an undocked position.

[0008] **FIG. 2** is a side view of the remotely operated vehicle and pile of **FIG. 1**, with the remotely operated vehicle in a docked position.

[0009] **FIG. 3** is a cross-sectional view of the interface mechanism of **FIGS. 1 and 2**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0010] **FIGS. 1 and 2** illustrate an embodiment of the present invention. Remotely operated vehicle **1** is remotely steered. Remotely operated vehicle **1** includes a pump and is capable of reversibly pumping water through a suction probe **3**. Suction probe **3** exhibits an o-ring **5** having a square cross section.

[0011] Pile **7** is a substantially vertical column having a sealed end **9**. Pile **7** exhibits a receiver funnel **11** for receiving the suction probe **3**.

[0012] Suction probe **3** and receiver funnel **11** define a channeled interface, meaning that the suction probe **3** and receiver funnel **11** have complementary surfaces angled toward an axis common to the suction probe **3** and receiver funnel **11**. The channeled interface channels the suction probe **3** and receiver funnel **11** to the common axis as the suction probe **3** is driven into the receiver funnel **11** by the remotely operated vehicle **1**.

[0013] **FIG. 1** depicts the remotely operated vehicle **1** as it approaches the receiver funnel **11**. **FIG. 2** depicts the remotely operated vehicle **1** in a docked position, whereby suction probe **3** is fully inserted into receiver funnel **11**.

[0014] **FIG. 3** depicts a detailed view of the suction probe **3** and receiver funnel **11** in engagement. O-ring **5** effects a seal between the suction probe **3** and receiver funnel **11**. Suction probe **3** and receiver funnel **11** may be locked in place by a disengageable hydraulic latch **13** with spring return **15**.

[0015] The channeled interface of the apparatus of FIGS. **1-3** is conical. However, any channeled interface having complementary surfaces angled toward a common axis is suitable. Examples include conical and square funnels, as well as angled guides. The remotely operated vehicle may exhibit either a male or female mating member, provided that the mating member of the pile is complementarily opposite.

[0016] The mating members of the remotely operated vehicle and the pile may be locked in place by any disengageable fastener, such as dogs, pistons, screws, and clamps.

What is claimed is:

1. A suction pile suction interface comprising:

a remotely operated vehicle, the remotely operated vehicle exhibiting a first mating member; and

a pile exhibiting a second mating member, the first and second mating members defining a channeled interface channeling the first and second mating members to a common axis.

2. The apparatus of claim 1 in which the common axis is horizontal.

3. The apparatus of claim 1 in which the first mating member is male and the second mating member is female.

4. The apparatus of claim 1 in which the channeled interface is conical.

5. The apparatus of claim 1 further comprising a fastener releaseably fastening together the first and second mating members.

6. The apparatus of claim 5 in which the fastener is a hydraulic latch.

7. The apparatus of claim 1 in which the channeled interface exhibits a deflective seal.

8. The apparatus of claim 7 in which the deflective seal is an o-ring.

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