

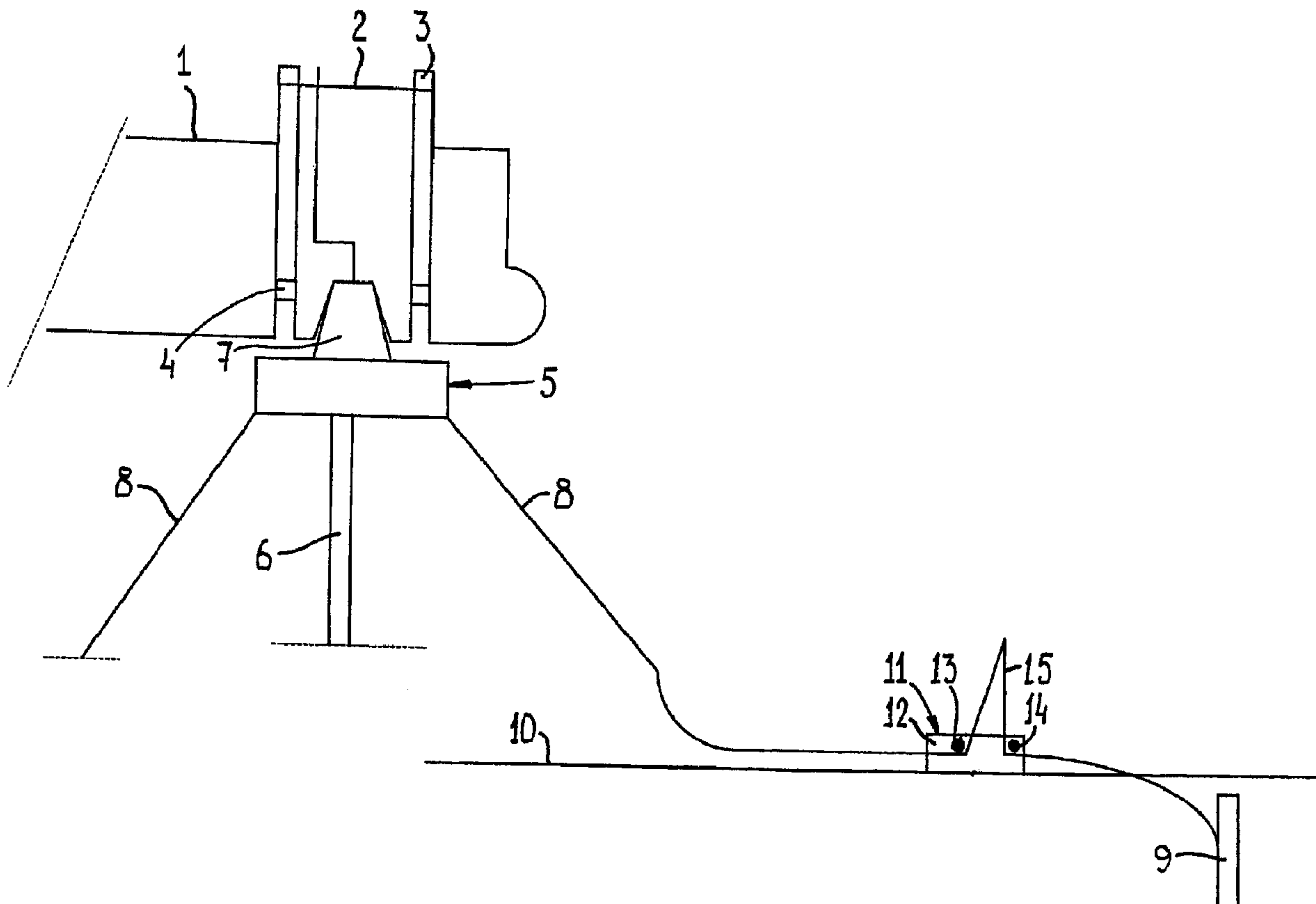


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(54) **Titre : PROCÉDE POUR DECROCHER UNE BOUEE D'UN NAVIRE ET DISPOSITIF DESTINE A ETRE UTILISE AVEC CE PROCÉDE**

(54) **Title: METHOD FOR DISCONNECTING A BUOY FROM A VESSEL AND DEVICE FOR USE THEREWITH**



(57) **Abrégé/Abstract:**

A method is provided for disconnecting a buoy from a turret in an arrangement with a vessel of the type comprising a turret mounted rotatably in the vessel and a buoy supporting risers which is lockable to and disconnectable from the turret. The arrangement further comprises mooring lines connecting the buoy with mooring points on the seabed and loading the buoy with

(57) Abrégé(suite)/Abstract(continued):

mooring forces. Starting before disconnecting the buoy from the turret the mooring lines are manipulated such that at least during the moment of disconnecting the buoy from the turret the mooring forces are lowered or even substantially eliminated. A hold and release device comprises a housing with at least two distanced mooring line gripper means constructed such that an excess length of mooring line may be positioned therebetween and wherein at least one gripper means is adapted to be brought in a state disengaging the mooring line.

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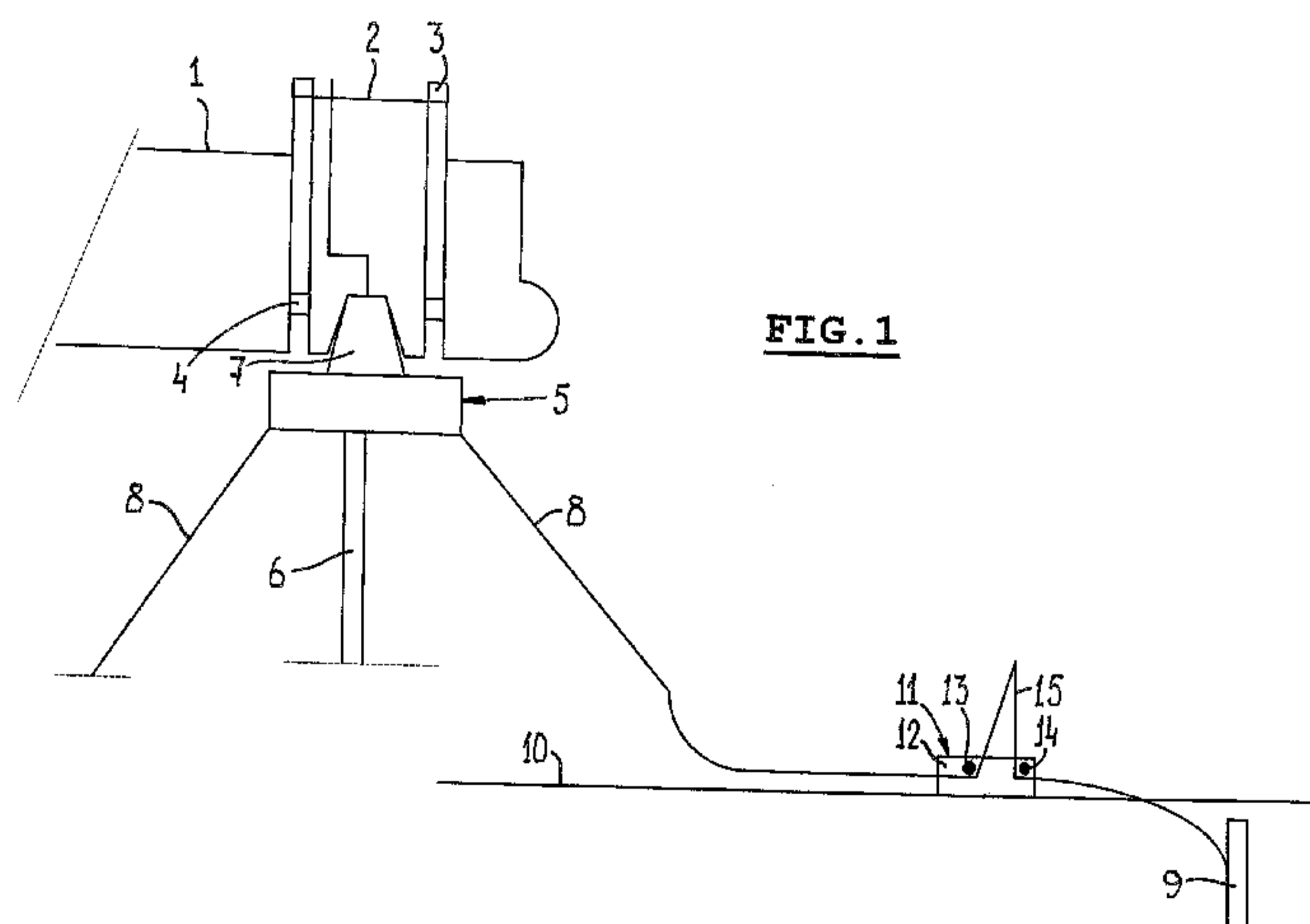
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(54) Title: METHOD FOR DISCONNECTING A BUOY FROM A VESSEL AND DEVICE FOR USE THEREWITH



(57) Abstract: A method is provided for disconnecting a buoy from a turret in an arrangement with a vessel of the type comprising a turret mounted rotatably in the vessel and a buoy supporting risers which is lockable to and disconnectable from the turret. The arrangement further comprises mooring lines connecting the buoy with mooring points on the seabed and loading the buoy with mooring forces. Starting before disconnecting the buoy from the turret the mooring lines are manipulated such that at least during the moment of disconnecting the buoy from the turret the mooring forces are lowered or even substantially eliminated. A hold and release device comprises a housing with at least two distanced mooring line gripper means constructed such that an excess length of mooring line may be positioned therebetween and wherein at least one gripper means is adapted to be brought in a state disengaging the mooring line.

WO 2011/047736 A1

1 Method for Disconnecting a Buoy from a Vessel and Device for Use Therewith**2 FIELD OF THE INVENTION**

3 The invention firstly relates to a method for disconnecting a buoy from a turret in an ar-
4 rangement with a vessel of the type comprising a turret mounted rotatably in the vessel and a
5 buoy supporting risers which is lockable to and disconnectable from the turret, the arrangement
6 further comprising mooring lines connecting the buoy with mooring points on the seabed and
7 loading the buoy with mooring forces.

8 BACKGROUND OF THE INVENTION

9 Vessels of the type referred to above are used in offshore oil and gas fields. Under nor-
10 mal circumstances the turret and buoy are kept in a connected state and the vessel is free to
11 weathervane around the turret under influence of external factors, such as currents, waves and
12 wind. When the need arises the buoy may be disconnected from the turret and the vessel may
13 travel to a different gripper means. Actual disconnection and (re)connection activities can be
14 achieved in relative limited time, whereas the moment of reconnection and sometimes the mo-
15 ment of disconnection is typically constrained by external factors such as current and waves.
16

17 One example of a situation in which it may be required to relocate the vessel is the oc-
18 currence of pack ice. In view of the long time needed for reconnecting a buoy to a turret after a
19 disconnect (and the concurrent loss of production time) one would like to wait as long as possi-
20 ble with the decision to disconnect. It might happen for example that the ice built up in the end
21 does not proceed as feared and that, consequently, a disconnect is not needed. The present
22 combination of turret, buoy and mooring lines, however, does not allow to wait too long before
23 taking a decision to disconnect. The pack ice pushing against the vessel creates enormous
24 mooring forces in the mooring lines which, at the moment of disconnecting the buoy from the
25 turret, act on the buoy in such a manner that it may be jammed in the turret and/or that uncon-
26 trolled movements of the buoy may occur with the risk of damaging parts of the construction,
27 such as for example the risers.

28
29 Therefore it is an object of the present invention to provide an improved method for dis-
30 connecting a buoy from a turret.
31

1 In accordance with the present invention the method is characterised in that starting be-
2 fore disconnecting the buoy from the turret the mooring lines are manipulated such that at least
3 during the moment of disconnecting the buoy from the turret the mooring forces are lowered or
4 even substantially eliminated.

5
6 Lowering or even substantially eliminating the mooring forces enables to disconnect the
7 buoy from the turret without adverse effects, even in situations in which initially high mooring
8 forces are present in the mooring lines. This offers the possibility to delay the moment for decid-
9 ing to disconnect until, for instance, maximum allowable loads are present.

10
11 In a preferred embodiment of the method according to the present invention the manipu-
12 lation of the mooring lines comprises allowing the mooring lines to increase their effective
13 length, which is defined as the maximum distance between the buoy and a respective mooring
14 point allowed by a mooring line. During such an increase the mooring forces temporarily are
15 reduced/eliminated.

16
17 The increase of effective length may be achieved when, in accordance with a special
18 embodiment, each mooring line extends through a hold and release device and is held thereby
19 at two distanced gripper means with an excess length of mooring line between said two dis-
20 tanced gripper means, and wherein the mooring line for the increase of its effective length is
21 released at one gripper means for giving out the excess length of mooring line.

22
23 The hold and release device may be anchored to the seabed, wherein the mooring line
24 for the increase of its effective length is released at the gripper means closest to the buoy.
25 However, as an alternative the hold and release device may be mounted to the buoy, wherein
26 the mooring line for the increase of its effective length is released at the gripper means closest
27 to the mooring point.

28
29 Upon increasing the effective length of the mooring lines the mooring forces are reduced
30 dramatically and the vessel temporarily is free to drift (for example along with drifting pack ice).
31 This situation will last until the excess length of the mooring lines has been given out com-
32 pletely. This excess length should be sufficiently long to provide a period of time with reduced
33 mooring forces within which the disconnection between the buoy and turret may be achieved.

34

1 In accordance with yet another embodiment of the method according to the present in-
2 vention the buoy comprises a first buoy part to which the mooring lines are connected and a
3 second buoy part to which the risers are connected and which is provided with auxiliary mooring
4 lines, wherein previous to manipulating the mooring lines the second buoy part is released from
5 and lowered relative to the first buoy part.

6
7 The main mooring forces occur in the mooring lines and the mooring forces in the auxil-
8 iary mooring lines are limited. Therefore the second buoy part (with risers) already may be dis-
9 connected when the main mooring forces still are present.

10
11 Further it is possible that the connection between the turret and buoy, when connected,
12 is water tight and wherein previous to said manipulation of the mooring lines water is pumped
13 into the turret above the buoy, and preferably until a level above sea level.

14
15 This water generates a large downward force on the buoy assisting in moving the buoy
16 downward after the disconnection has occurred. Use of this water pressure accelerates the in-
17 crease in distance between the buoy and the vessel and therefore limits the probability of the
18 buoy and vessel to collide directly after separation from each other.

19
20 In a second aspect the invention relates to a hold and release device for use in a method
21 for disconnecting a buoy from a turret in an arrangement with a vessel of the type comprising a
22 turret mounted rotatably in the vessel and a buoy supporting risers which is lockable to and dis-
23 connectable from the turret, the arrangement further comprising mooring lines connecting the
24 buoy with mooring points on the seabed, said device comprising a housing with at least two
25 distanced mooring line gripper means constructed such that an excess length of mooring line
26 may be positioned therebetween and wherein at least one gripper means is adapted to be
27 brought in a state disengaging the mooring line.

28
29 The gripper means may be constructed in many different ways, for example as hydraulically
30 operated grippers. It should be kept in mind that the mooring forces are transmitted
31 through these gripper means which therefore have to withstand large forces.

32
33 Depending on the specific embodiment the hold and release device may be adapted to
34 be mounted to the buoy or may be adapted to be anchored to the sea bed.

1

2 BRIEF DESCRIPTION OF THE DRAWINGS

3 Hereinafter the invention will be elucidated while referring to the drawing, in which:

4

5 Fig. 1 schematically shows a first embodiment of an assembly for carrying out a method
6 according to the present invention, and

7

8 Fig. 2 schematically shows a second embodiment of an assembly for carrying out a
9 method according to the present invention.

10

11 DETAILED DESCRIPTION OF THE INVENTION

12 Referring to figure 1 a vessel 1 is represented of the type comprising a turret 2 mounted
13 rotatably (by bearings 3 and 4) in the vessel and a buoy 5 supporting risers 6. In a manner
14 known per se (e.g. by means of a tapering top section 7) the buoy 5 is lockable to and discon-
15 nectable from the turret 2. There further are provided mooring lines 8 connecting the buoy 5 with
16 mooring points 9 (anchors or piles) on the seabed 10 and loading the buoy with mooring forces.

17

18 A hold and release device 11 comprises a housing 12 with at least two distanced moor-
19 ing line gripper means 13 and 14 (for example hydraulically operated grippers) constructed such
20 that an excess length 15 of mooring line 8 may be positioned therebetween. By means not
21 shown in detail the device 11 is adapted to be anchored to the sea bed 10 (in an alternative
22 embodiment it could be adapted to be mounted to the buoy 5). The gripper means 13 is adapted
23 to be brought in a state disengaging the mooring line 8.

24

25 It should be noted that such hold and release devices 11 may need to be provided in
26 each and every mooring line 8.

27

28 The assembly operates as follows. When one desires to disconnect the buoy 5 from the
29 turret 2 under circumstances with high mooring forces in the mooring lines, the mooring lines,
30 starting before disconnecting the buoy from the turret, are manipulated such that at least during
31 the moment of disconnecting the buoy 5 from the turret 2 the mooring forces are lowered or

1 even substantially eliminated. This is achieved by allowing the mooring lines to increase their
2 effective length, which is defined as the maximum distance between the buoy 5 and a respec-
3 tive mooring point 9 allowed by a mooring line 8. Such an increase occurs when the gripper
4 means 13 closest to the buoy disengages the mooring line 8 (for example under remote control
5 from the vessel by an umbilical – not shown -).

6
7 The process of disconnecting any piping from the risers 6 within the turret 2 will then
8 very likely already take place and will not be described here because it is considered standard
9 practise.

10
11 When the gripper means 13 has disengaged the mooring line 8 the buoy 5 will be dis-
12 connected from the turret 2 (for example by releasing locking mechanisms therebetween) and
13 the buoy will drop from the turret. This disconnecting under reduced mooring forces is possible
14 as long as the excess length 15 of mooring line 8 is being handed out by the hold and release
15 device 11.

16
17 A corresponding operation is conceivable in an alternative embodiment in which the hold
18 and release device 11 would be mounted to the buoy 5 and wherein the mooring line 8 for the
19 increase of its effective length is released at the gripper means closest to the mooring point 9.

20
21 It is possible that the connection between the turret 2 and buoy 5, when connected, is
22 water tight. Then one can, previous to said manipulation of the mooring lines and disconnection
23 of the buoy, pump water into the turret 2 above the buoy 5, preferably until a level above sea
24 level. The water pressure then assists in the release of the buoy from the turret.

25
26 Reconnecting the buoy 5 to the turret may be achieved in the following manner: the
27 mooring lines 8 firstly are repositioned in the hold and release devices 11 between the gripper
28 means 13 and 14 (with the excess length 15 restored). For example, a wildcat may be associ-
29 ated with gripper means 13 to pay back released mooring line between gripper means 13 and
30 14.

31
32 A hoisting wire connected to a turret mounted winch (not illustrated) will be lowered and
33 connected to the buoy hovering in the water. The buoy 5 is hoisted with its upper section 7 into

1 a corresponding recess of the turret and is locked. Finally the turret is pumped dry and the risers
2 are reconnected to corresponding piping within the turret.

3
4 Figure 2 relates to an alternative embodiment in which the buoy 5 comprises a first buoy
5 part 5' to which the mooring lines 8 are connected and a second buoy part 5" to which the risers
6 6 are connected and which is provided with auxiliary mooring lines 16. The operation of this
7 alternative embodiment is such that, previous to manipulating the mooring lines 8 as explained
8 above with respect to figure 1, the second buoy part 5" is released from and lowered relative to
9 the first buoy part 5'.

10
11 The invention is not limited to the embodiments described before which may be varied
12 widely within the scope of the invention as defined by the appending claims. Thus the hold and
13 release device, for example, might be constructed in such a manner that the respective mooring
14 line is severed fully in case of an emergency situation, for example by devising gripper means
15 14 as a break element.

We Claim:

1. A method for disconnecting a buoy from a turret in an arrangement with a vessel of the type comprising a turret mounted rotatably in the vessel and a buoy supporting risers which is lockable to and disconnectable from the turret, the arrangement further comprising mooring lines connecting the buoy with mooring points on the seabed and loading the buoy with mooring forces, characterised in that starting before disconnecting the buoy from the turret the mooring lines are manipulated such that at least during the moment of disconnecting the buoy from the turret the mooring forces are lowered or even substantially eliminated.
2. The method according to claim 1, wherein the manipulation of the mooring lines comprises allowing the mooring lines to increase their effective length, which is defined as the maximum distance between the buoy and a respective mooring point allowed by a mooring line.
3. The method according to claim 2, wherein each mooring line extends through a hold and release device and is held thereby at two distanced gripper means with an excess length of mooring line between said two distanced gripper means, and wherein the mooring line for the increase of its effective length is released at one gripper means for giving out the excess length of mooring line.
4. The method according to claim 3, wherein the hold and release device is anchored to the seabed and wherein the mooring line for the increase of its effective length is released at the gripper means closest to the buoy.
5. The method according to claim 3, wherein the hold and release device is mounted to the buoy and wherein the mooring line for the increase of its effective length is released at the gripper means closest to the mooring point.
6. The method according to any one of claims 1 to 5, wherein the buoy comprises a first buoy part to which the mooring lines are connected and a second buoy part to which the risers are connected and which is provided with auxiliary mooring lines, wherein previous to manipulating the mooring lines the second buoy part is released from and lowered relative to the first buoy part.

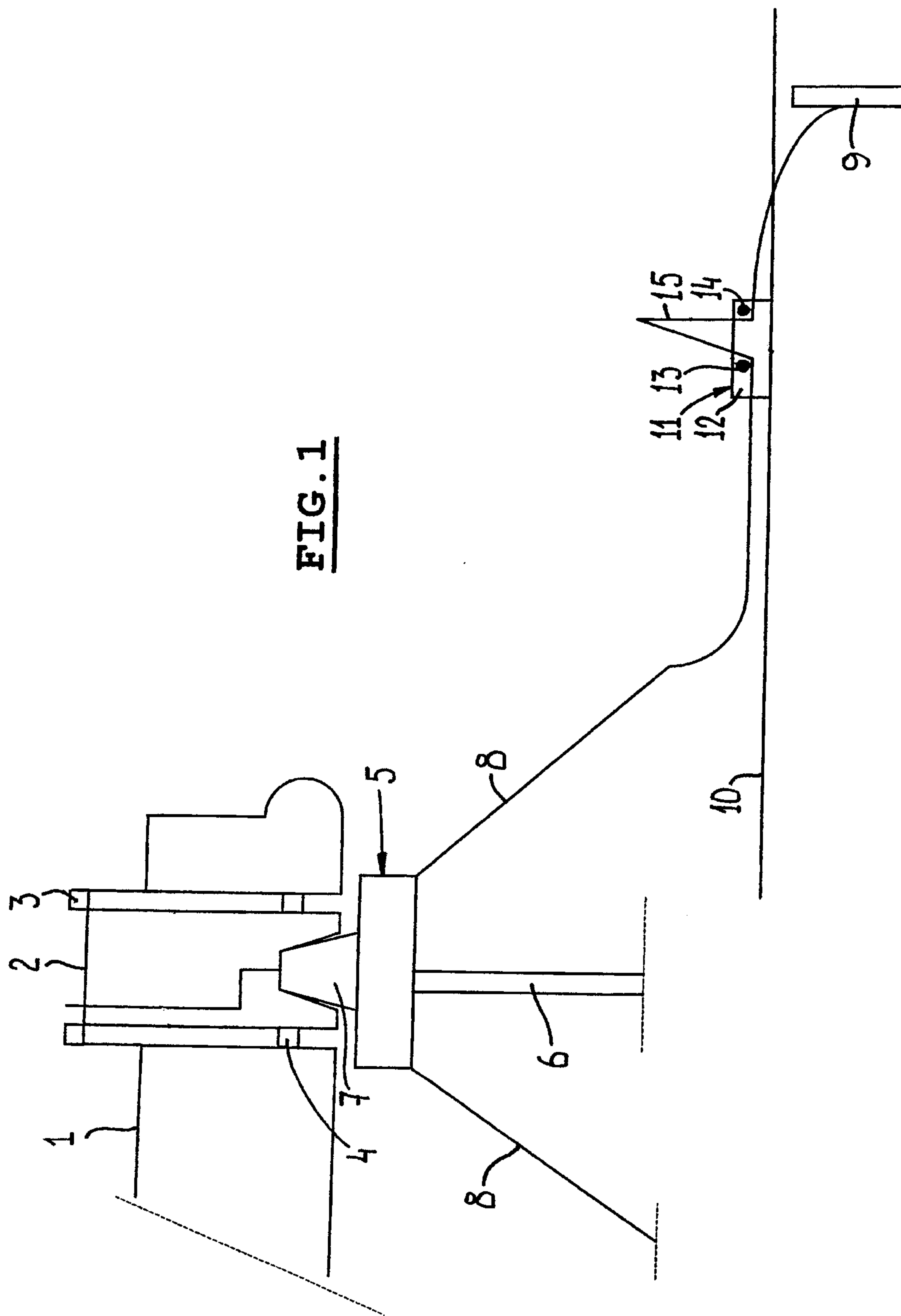
7. The method according to any one of claims 1 to 6, wherein the connection between the turret and buoy, when connected, is water tight and wherein previous to said manipulation of the mooring lines water is pumped into the turret above the buoy.

8. The method according to claim 7, wherein the water is pumped until a level above sea level.

9. A hold and release device for use in a method for disconnecting a buoy from a turret in an arrangement with a vessel of the type comprising a turret mounted rotatably in the vessel and a buoy supporting risers which is lockable to and disconnectable from the turret, the arrangement further comprising mooring lines connecting the buoy with mooring points on the seabed, said device comprising a housing with at least two distanced mooring line gripper means constructed such that an excess length of mooring line may be positioned therebetween and wherein at least one gripper means is adapted to be brought in a state disengaging the mooring line.

10. The hold and release device according to claim 9, wherein it is adapted to be mounted to the buoy.

11. The hold and release device according to claim 9, wherein it is adapted to be anchored to the sea bed.



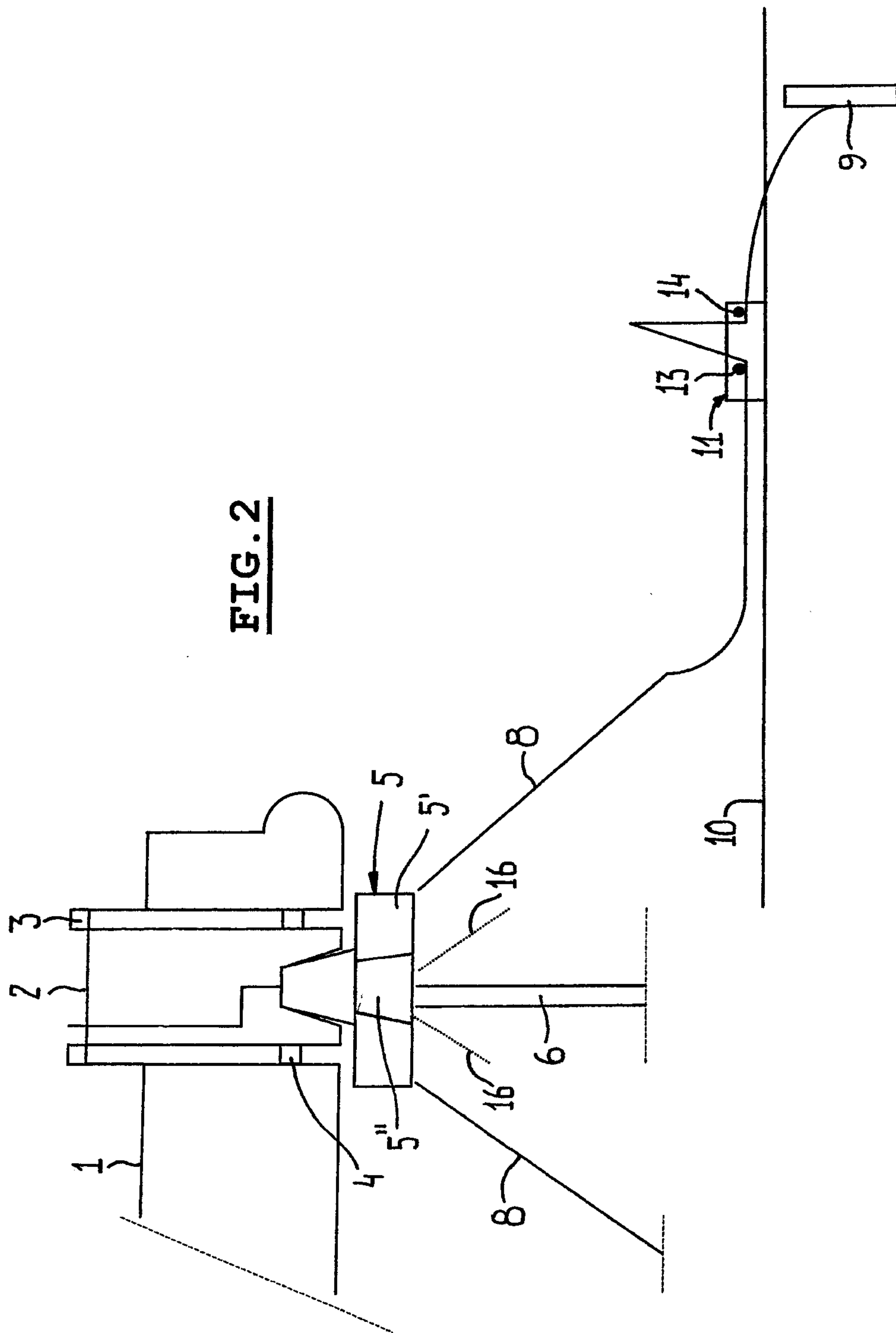


FIG. 2

