

[54] VESSEL ANCHORING APPARATUS

[75] Inventor: **Gerald L. Robertson**, Westminster, Calif.[73] Assignee: **Fluor Corporation**, both of Los Angeles, Calif.[22] Filed: **July 20, 1972**[21] Appl. No.: **273,485**[52] U.S. Cl. **114/206 R**[51] Int. Cl. **B63b 21/26**[58] Field of Search... **114/206 R, 235 WS, 207-208; 89/1 B; 9/8 P, 9**[56] **References Cited****UNITED STATES PATENTS**

3,654,649	4/1972	Richardson	114/206 R
2,979,982	4/1961	Weitzel	114/235 WS
3,084,597	4/1963	Beyer	89/1 B
2,986,888	6/1961	Borrmann et al.	114/206 R
3,151,594	10/1964	Collipp	114/206 R
3,121,889	2/1964	Gentile	9/9

Primary Examiner—Duane A. Reger

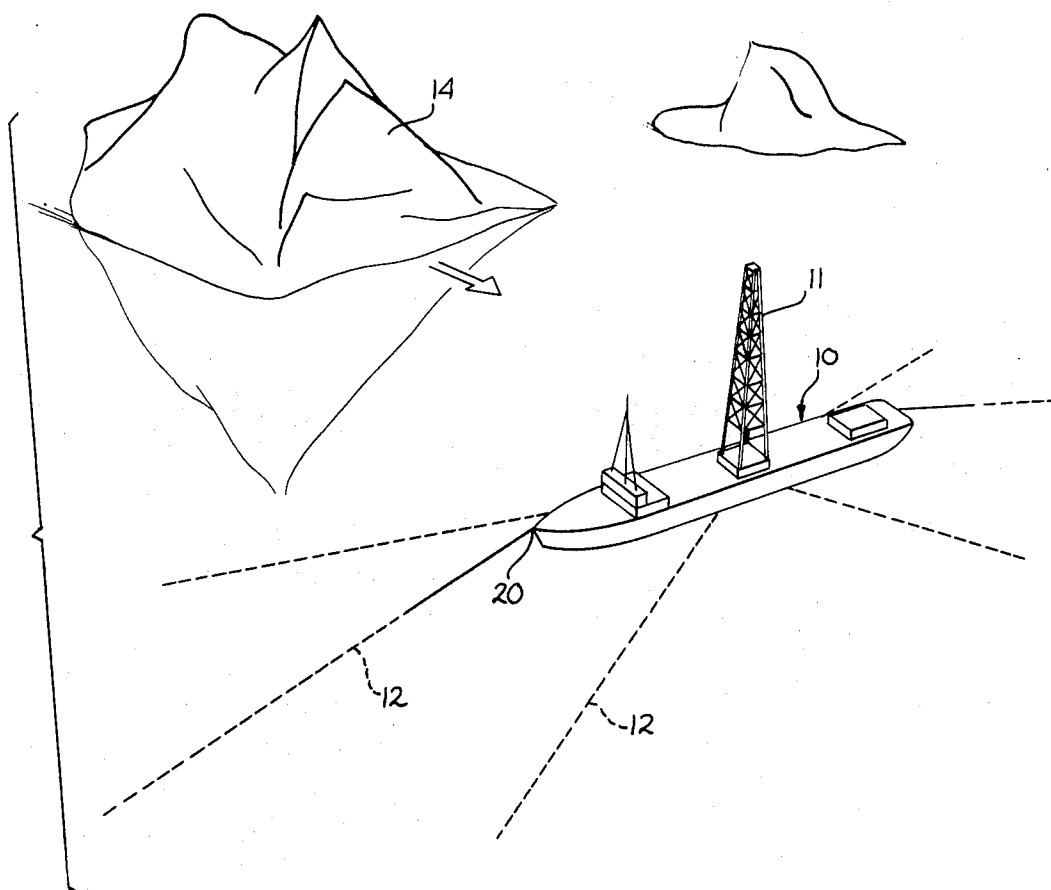
Assistant Examiner—Galen L. Barefoot

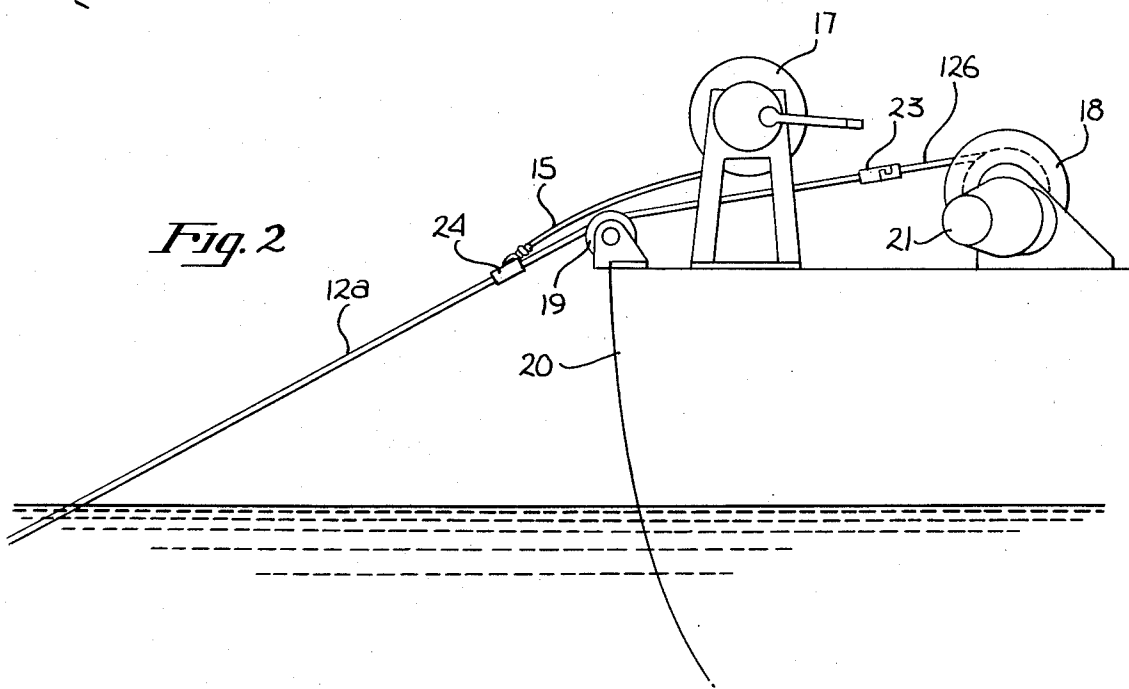
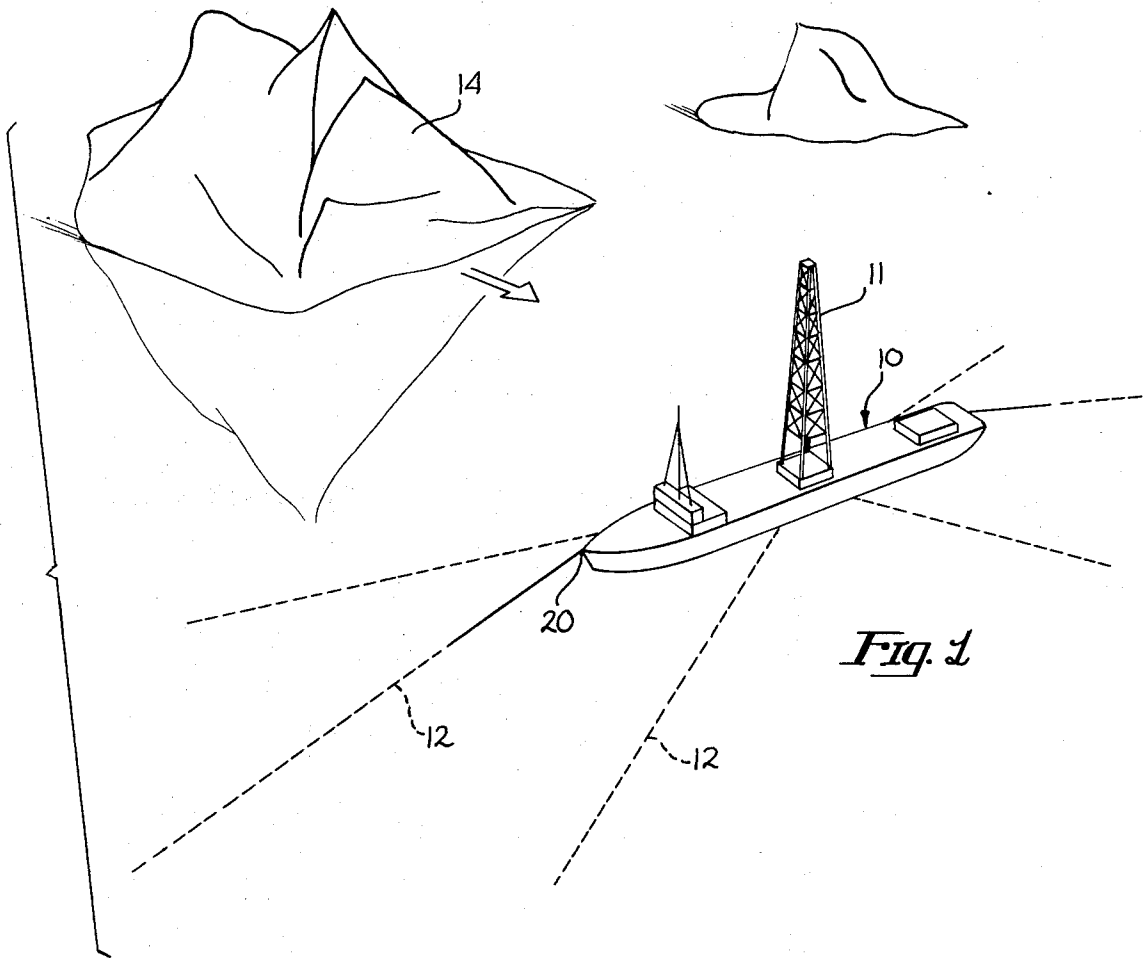
Attorney, Agent, or Firm—Spenseley, Horn & Lubitz

[57]

ABSTRACT

A method and apparatus for quickly releasing and subsequently recovering anchoring lines for a floating structure used for drilling or working operations in the sub-sea floor. The apparatus includes a means for quickly releasing the anchor lines from the structure when it is necessary to move the structure from its location above the sub-sea well site. When quick release of the anchor lines is made, the anchor lines are each connected to a length of buoyant line, such as nylon rope of sufficient length, so that when the heavy anchor cables or chains reach the bottom of the body of water, a portion of the buoyant line is at the water surface. To reposition the ship above the sub-sea drilling or working location, the buoyant lines are recovered and reconnected to the structure. When the buoyant lines are pulled back aboard the structure, the anchor lines are reattached to the structure, hauled in, and when properly tensioned, the structure is again on location above the well site or working location.

4 Claims, 6 Drawing Figures



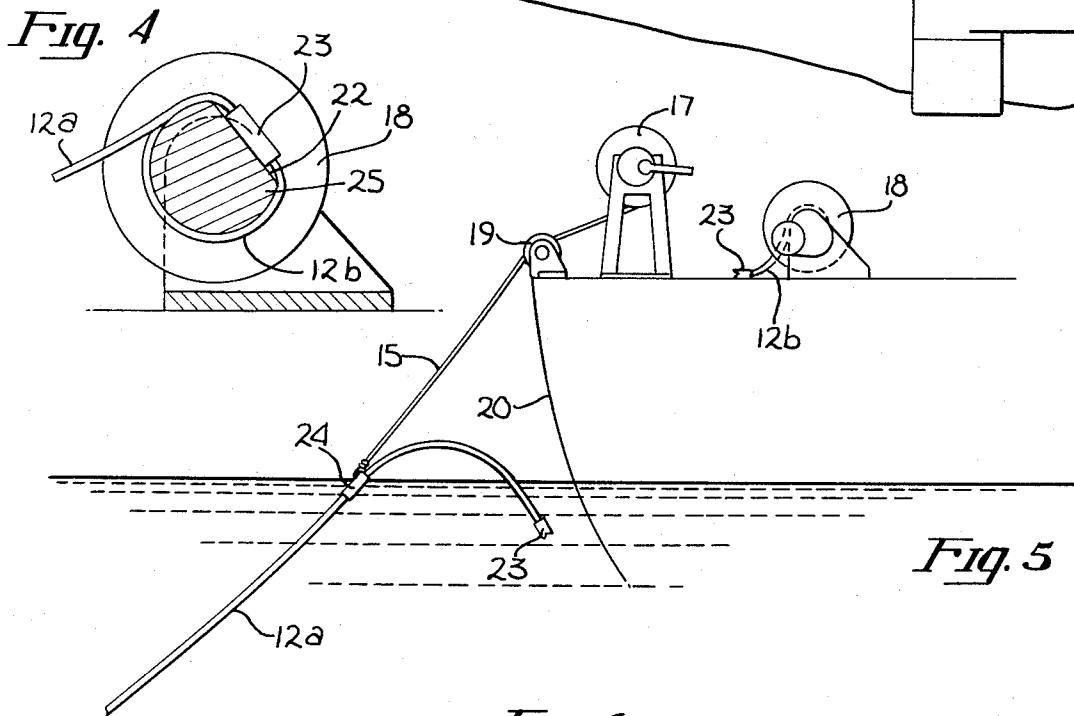
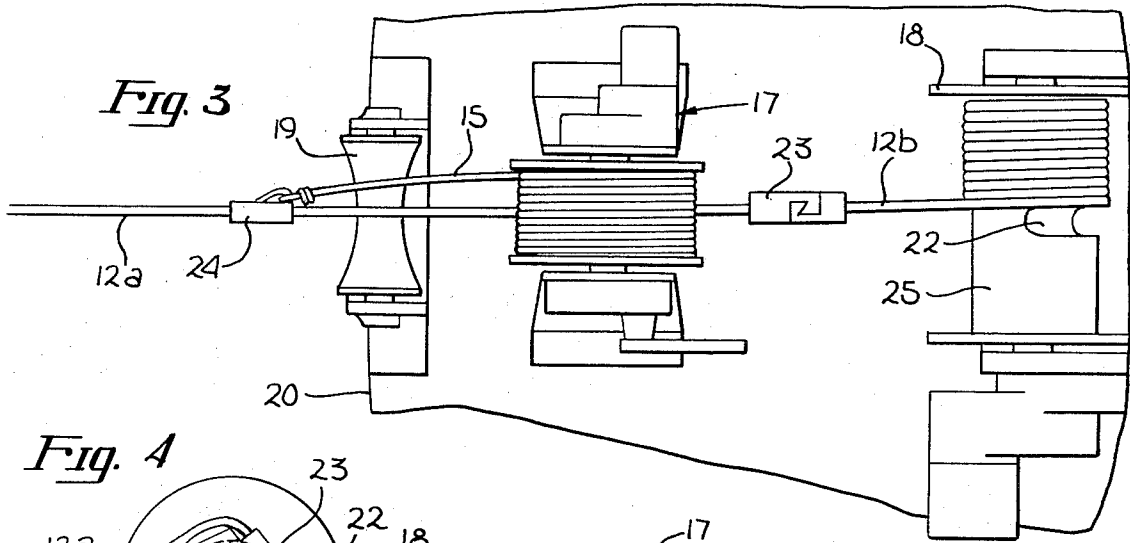
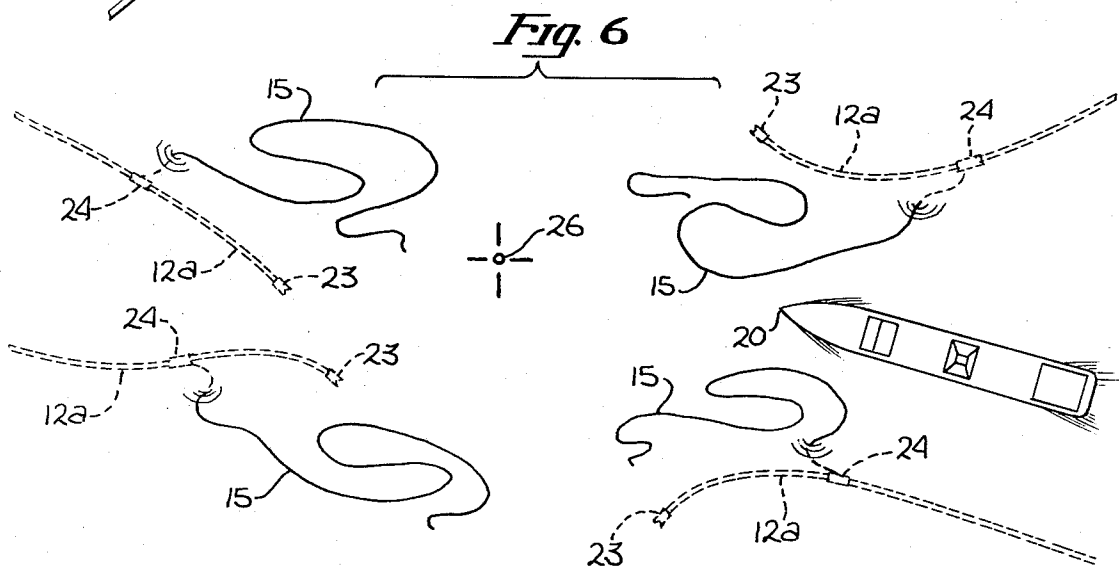


Fig. 5



VESSEL ANCHORING APPARATUS

BACKGROUND OF THE INVENTION

This invention relates to apparatus for quickly releasing and recovering the anchoring lines of floating structures. The present invention is particularly applicable to those types of structures from which drilling operations are conducted in the ocean floor. Although not limited thereto, the present invention is particularly adaptable to floating drilling vessels of the type from which drilling and well working operations are conducted, and accordingly the present invention will be described in that context.

As is well known, the drilling of oil and gas wells under bodies of water has become more common and takes place in both deep and shallow bodies of water. In relatively shallow water, drilling operations are often conducted from fixed platforms. When the depth of the body of water increases, it is necessary to drill from floating vessels or other floating structures, particularly when the water depth is in excess of 300 feet. A most common type of drilling vessel is a ship or barge which has a vertical opening called a moon-pool or center-well through the midsection of the ship. A drilling derrick and other drilling or well working equipment is mounted on the vessel for operation through the center-well and into the earth beneath the body of water.

It is a major operation to properly position the floating vessel above the well site and to maintain it in location relative to the well site during the drilling or well working operations. Also, it is sometimes necessary to leave the location at which the drilling operation is being conducted and to come back to that location subsequently to continue drilling or working on the well. For example, in the north seas and in northern latitudes, it is sometimes necessary to leave the well site because of an on-coming iceberg. It is in other locations often necessary to leave the site because of storm or hurricane conditions. When a site has been left, it is an expensive and time consuming operation to relocate the well site and to properly anchor the vessel relative to that well site. The present invention provides a means for quickly abandoning that working location and coming back to that location and quickly reestablishing the position of the vessel in its previous working position.

SUMMARY OF THE INVENTION

The present invention comprises a means for quick releasing the anchor lines from the anchor line winches when it is necessary to abandon the location of the sub-sea drilling or working vessel. Means are provided, with respect to the quick release mechanism, for attaching to each of the anchoring lines a length of buoyant line which is at least as long as the depth of the water in which the drilling or well working operations are being conducted. As the anchor line sinks, the buoyant line is unreeled, and being buoyant, that amount of the line which is greater than the depth of the water floats on the surface of the water. To reposition the ship, it is necessary then only to return to the proximity of the abandoned location, recover the buoyant lines and retrieve them aboard the vessel. As the buoyant lines are pulled in, the anchor lines are recovered and are reattached to the anchor line winches. As the anchor lines are retensioned, the ship is pulled to the same position

which it occupied before the working location was abandoned.

The various objects of the present invention and a better understanding thereof will become apparent from the following description taken in conjunction with the drawings, in which drawings:

FIG. 1 is a view in perspective of a drilling vessel in a location which is being approached by icebergs;

FIG. 2 is a partially schematic view of the anchor lines having the quick release mechanism attached thereto, with the buoyant line drum having the buoyant line affixed to the anchor line;

FIG. 3 is a plan view of the apparatus illustrated in FIG. 2;

FIG. 4 is a view of the quick release mechanism of the anchor line;

FIG. 5 is a view comparable to FIG. 2, showing the anchor line disconnected and the buoyant line connected to the anchor line when the vessel is prepared to quickly abandon its location; and

FIG. 6 is a view illustrating the well site, with the buoyant lines floating in the proximity thereof ready for recovery of the anchor lines.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, there is shown an illustrative embodiment of the present invention as applied to a floating drilling ship. In a typical sub-sea drilling operation the ship is anchored above a sub-sea well site in which drilling or well working operations are being conducted. In FIG. 1, six anchors and anchor lines are shown as maintaining the ship 10 in position. The drilling ship shown for purposes of illustration is a vessel having a drilling derrick 11 and other well drilling or working equipment mounted above a center-well, extending through the ship, through which well drilling or working operations are conducted. It is to be understood that although a drilling ship is shown for purposes of illustration of the operation and utility of the present invention, it is equally applicable to other floating structures which must be quickly removed from an anchored site and returned to the same site. In the embodiment shown, six anchor lines 12 are arranged in an array which is a typical array when a plurality of anchors are used to position a vessel. Various members and arrays of anchors may, of course, be utilized under various circumstances.

To illustrate the utility of the present invention, an iceberg 14 is shown moving toward the vessel 10 in its working location. Other reasons such as hurricanes, typhoons or other severe storms at sea can require that an anchored vessel be quickly removed from its working location to seek sanctuary in a port or move away until the hazard has passed. Additionally, the apparatus of the present invention is useful for moving from and returning to the location under other than emergency conditions, and then relocate and reanchor in the working location.

The apparatus of the present invention in its presently preferred embodiment includes a reel, or winch, containing a length of buoyant line. The line, for example, can be nylon or plastic material, the requirements being that it is buoyant and has sufficient strength to recover the anchor cable or chain as described hereinafter. Additionally, the material used must be resistant to destruction or weakening by sea air or sea water. In

the presently preferred embodiment, commercially available nylon line 15 is used. The length of line 15 employed is substantially greater than the depth of water in which the drilling or working operations are being carried out. The reel 17 or winch is of the type well known to the art and may be manual or motor driven. It is of sufficient size to contain the coiled length of buoyant line 15.

One such reel 17 of buoyant line 15 is affixed to the vessel in proximity to each anchor line. The location and type of reel will vary with the application of the present invention, it being necessary only that the free end of the buoyant line be quickly and easily connectable to the anchor line, as will become more apparent hereinafter. In the drawings, and particularly FIGS. 2 through 5, an anchor line 12 is shown in combination with an anchor line winch 18 and fairlead 19 at the bow 20 of the vessel. Although cables are described in the specification, the present invention is equally applicable to chain, howser or other anchor line. A quick connect-disconnect fitting 23 is affixed in the anchor line a short distance from the fixed end of the anchor line on the winch. The disconnect fitting can be a threaded coupling, dogged fitting, bayonet fitting or any suitable type of fitting or union which can be separated to disconnect the anchor line from the winch 18 and thus from the vessel. The anchor line is reeled on a conventional anchor winch 18 which is driven by a motor assembly 21. A receiver pocket 22 is formed in the winch drum to accommodate the quick-connect union or fitting 23 without interfering with the reeling or unreeling of the anchor line. Thus, as shown particularly in FIGS. 3 and 4, a quick connect-disconnect fitting 23 is affixed in the anchor line at a point along the line close to, but spaced from, the fixed end of the anchor line. This allows the fixed end of the anchor line to remain fixed to the winch, and also allows the quick-disconnect fitting to be released through the fairlead 19, with lessened tension on the anchor line to facilitate handling and to allow the line to be separated at, or just beyond, the fairlead by operation of the disconnect fitting 23. Thus, referring to FIGS. 3 and 4, the pocket 22 in the drum 25 of anchor line winch 18 is shown with all of the anchor line unreeled except for the short length of line which will remain on the winch drum when the anchor line is separated. Thus, the anchor line 12 is separable into a main portion 12a which is of sufficient length to anchor the ship in position, and a fixed portion 12b which remains affixed to the anchor winch 18 as shown in FIGS. 2 and 5.

At the outer end of the buoyant line 15 there is affixed a clamp 24 or other suitable fixture for affixing the outer end of the buoyant line to the anchor line portion 12a near the disconnect fitting 23. The clamp is preferably connected to the anchor line outboard of the fairlead 19 so that it need not pass over the fairlead when the anchor line is disconnected from the vessel.

Other features and advantages of the present invention can be seen in view of a brief description of the operation of the present invention in an illustrative environment. Thus, referring to FIG. 1, the vessel 10 is shown anchored on location and performing drilling operations in a sub-sea well. When it is necessary to discontinue drilling and leave the well site it is difficult both to relocate the site and to re-establish the drilling location. Referring to FIG. 2, during the drilling opera-

tions the vessel is held in position by the anchor lines 12 extending to anchors or pilings (not shown) in the ocean floor. During this normal stage of operations the anchor lines 12 are connected to their respective anchor winches 18. The buoyant line is fully wound on the reel 17, as shown in FIG. 3, with its outer end clamped to the anchor line by means of the clamp outboard of the fairlead 19. If the iceberg 14 progresses such that the vessel must abandon its location, tension is eased off on the anchor lines 12 by means of the winch, and the anchor lines are each disconnected at their respective disconnect fitting 23, as shown in FIG. 5. The heavy anchor lines will then fall into the sea and cause the buoyant line 15 to unreel from the reel 17. The inner end of each of the buoyant lines is not affixed to the reel 17 and will therefore be quickly dragged from the vessel and into the sea. Being substantially longer in length than the depth of the water, a length of each line 15 will float on the ocean surface as shown in FIG. 6. The buoyant lines by their nature are capable of withstanding the onset of the event which causes the vessel to leave the site. That is, the nylon line being buoyant, flexible and strong will be unaffected by a storm. The passage of an iceberg over the site was chosen as illustrative because it would be the most damaging occurrence to any floating object. However, even the passage of the iceberg over the well site will leave the nylon lines unaffected since they can easily give against the force of the iceberg and pass beneath the iceberg.

When the vessel is ready to resume operations at the well site, shown as 26 in FIG. 6, it is necessary only to return to the general vicinity where the floating lines can be readily retrieved from the ocean surface. Although the lines should be easily relocated, a visual, mechanical or electronic aid can be affixed to the buoyant line to aid in the relocation. Thus, for example, a mechanical or electronic pinger can be incorporated in the buoyant line clamp 24.

It may be desirable in some circumstances to make the reel 17 buoyant with the buoyant line attached thereto and allow the reel also to be dragged overboard to aid in retrieval.

After the buoyant lines, only four of which are shown in FIG. 6, are retrieved, they are reeled onto their respective reels until the anchor lines are pulled up to the extent that they also can be retrieved and reaffixed to the anchor winch by reconnection of the fittings 23. The winches are then operated until the anchor lines are tensioned to the operating condition at which point the vessel will be anchored in its original operating position.

What is claimed is:

1. An apparatus for disconnecting and recovering anchor lines for a structure floating on a body of water comprising

a buoyant flexible line:

means for connecting and disconnecting the anchor line from the vessel; and

storage means for releasing and retrieving said buoyant line from said vessel which attached to said anchor line, said buoyant line being stored on said structure by said storage means, while the structure is anchored, said buoyant line being greater in length than the water depth whereby a portion of the buoyant line may float on the water surface

5

after the anchor line has sunk to the sub-sea floor.

2. The apparatus of claim 1 wherein the anchor line is connected on one end thereof to an anchoring means and at the fixed end thereof to an anchor line winch, 5 and further comprising a disconnect fitting attached in said anchor line proximate said fixed end thereof for quick disconnection of the anchor line from said winch.

3. The apparatus of claim 2 wherein said storage 10 means comprises:

6

a buoyant line reel means on the vessel proximate each anchor line winch for rolling up said line to retrieve said anchor line;

said apparatus further comprises a clamping means for connecting the outer end of the buoyant line to the anchor line outboard of the disconnect fitting in the anchor line.

4. The apparatus of claim 1 wherein the flexible buoyant line is formed of nylon.

* * * * *

15

20

25

30

35

40

45

50

55

60

65