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(54) **DISPOSABLE VARIABLE DEPTH ANCHOR CABLE PACK**

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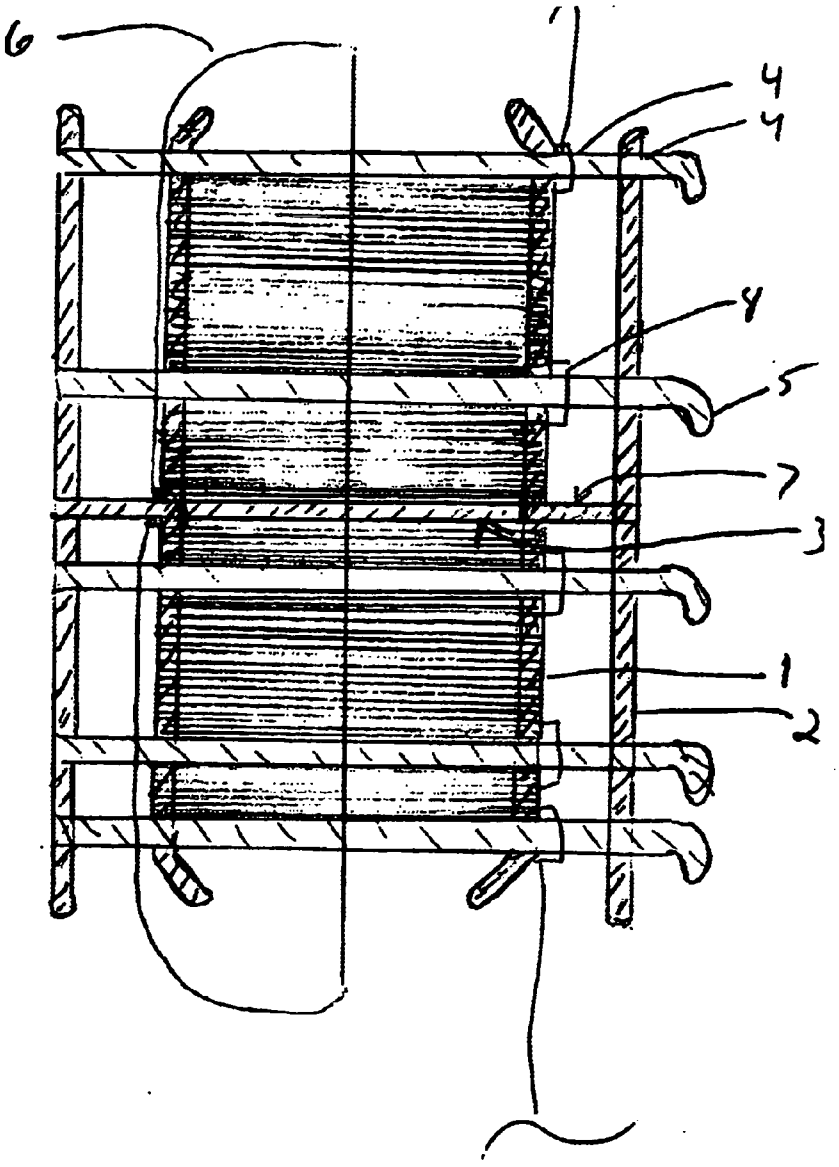
(57) **ABSTRACT**

A low cost, disposable cable pack for small buoy anchors providing a simple, standardized means to mechanically adjust for proper depth. The cable pack is comprised of two concentric hollow cylinders and a perpendicular plate. Depth settings are controlled by inserting or removing retaining pins that release predetermined lengths of anchor cable wound inside the anchor pack that pay out during anchor descent.



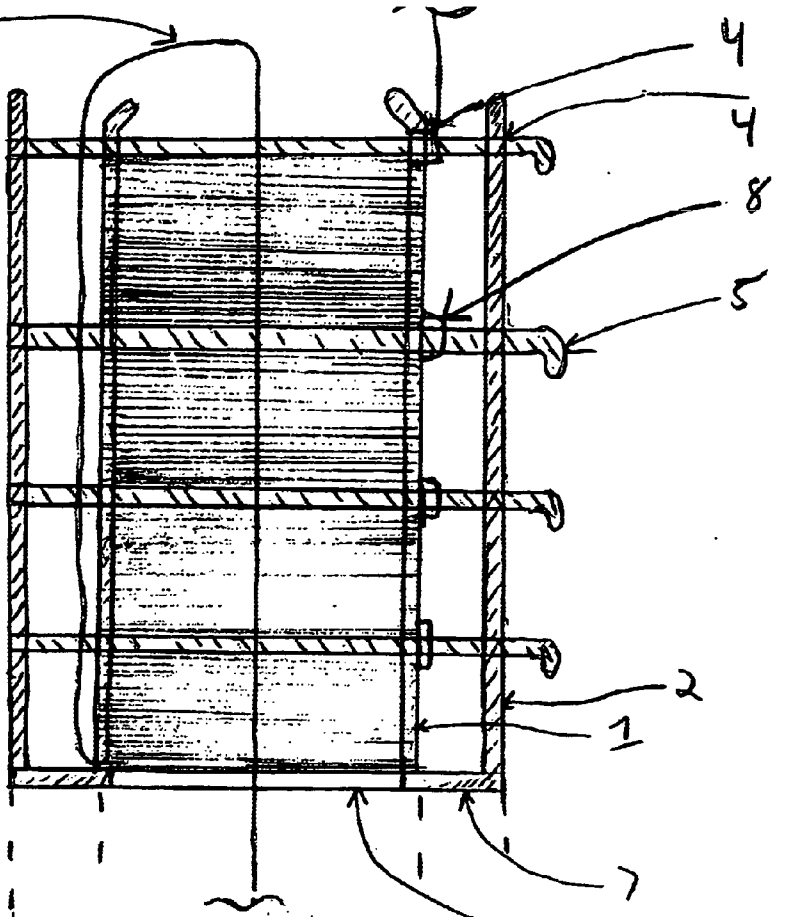


Fig. 1
Side View

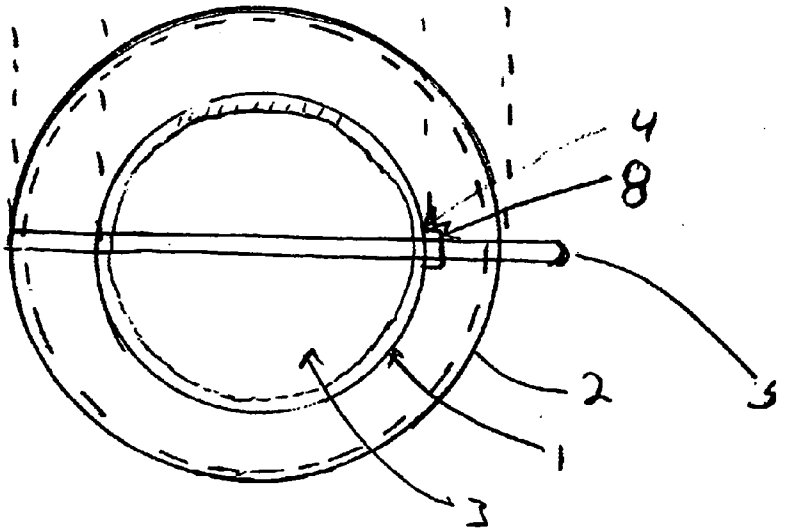


Fig. 2.
Bottom View

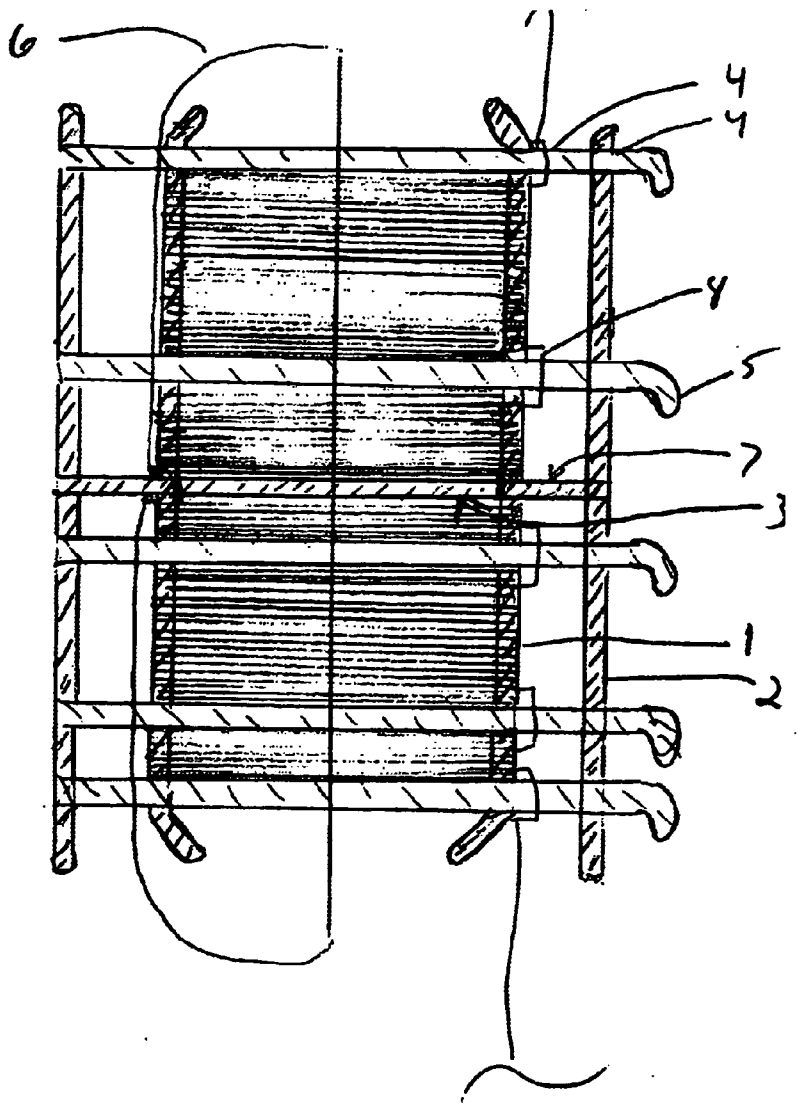
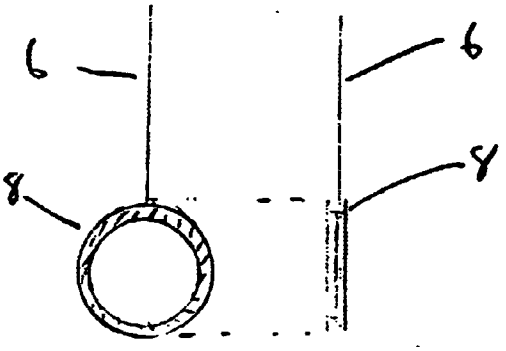


FIG. 3



ATTACHMENT PLATE

FIG. 4

DISPOSABLE VARIABLE DEPTH ANCHOR CABLE PACK

[0001] This invention relates to a standardized cable pack to anchor small buoys at variable shallow water depths. In the military and commercial maritime industries, a need arises requiring the insertion of small marker buoys, sonobuoys and detection devices into the sea. The purpose behind these devices requires that they remain stationary against currents, wind and wave action. Insertion of these buoys is usually done by small boats or by helicopter.

[0002] In a commercial setting, fishermen and divers use various marker buoys, hand made anchors and anchor cables to mark net locations, lobster pots, and dive locations. In the military setting, Mobile Inshore Undersea Warfare, Harbor Defense and other units drop standard sonobuoys close inshore to monitor costal areas for unauthorized vessel intrusion and hostile divers.

[0003] In many instances, the anchors and anchor cables are constructed ashore on a best guess basis and carried to the drop location. Insertion may be conducted at night and in rough seas making the presence of coiled line on deck dangerous and the sizing and attachment clumsy and dangerous as well. Unless these buoys are confidently anchored in place the efficacy of the buoys is quickly degraded.

SUMMARY OF THE INVENTION

[0004] It is therefore an object of the present invention to provide a standardized buoy anchor cable pack capable of being mechanically set at various incremental depths quickly, easily and safely based on real time fathometer readings or navigational chart fixes. The cable pack can be easily attached to the buoy float and the anchor weight without suffering coiled line on deck or in a helicopter. Depth settings are controlled by manually removing or inserting one or more restraining pins securing the cable to the cable pack cylinders.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] **FIG. 1** is a typical side view of a single ended embodiment of the invention also showing the method of winding the cable;

[0006] **FIG. 2** is the bottom view of the perpendicular plate on the single ended embodiment;

[0007] **FIG. 3** is a side view of the double ended embodiment of the invention also showing the method of winding the cable;

[0008] **FIG. 4** is a front and side view of a attachment point comprising a grommet attached to the cable.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0009] The cable pack is simply made up of two concentric hollow cylinders, an inner cylinder **1** and an outer cylinder **2**, perpendicularly connected by a plate **7** located either at the midpoint of the cylinders length (in which case both ends of the cylinders' would be open) or at one end (leaving the opposite end open). The perpendicular plate has a concentric hole **3** to allow free passage of an anchor cable **6**. The open end(s) of the inner cylinder should be slightly tapered and the ends of both cylinders rounded off to prevent abrasion of the cable as it pays out. The size of the cylinders can be any size depending on the diameter and type of cable used and the maximum depth to which it must reach.

[0010] Each cylinder has a line of holes **4** placed down its length and directly opposed to the set of holes in the other cylinder so that a restraining pin or a set of pins **5** can be inserted perpendicularly through the sides of both cylinders. The holes are set at regular intervals down the length of the cylinders, the number of which depends on the nature and size of cable being used, the number of increments making up the maximum depth the cable pack is to be capable of being set to and the ultimate size of the cylinders.

[0011] Each end of the cable **6** is connected to an attachment means allowing the cable to be secured to an anchor weight on one end and a buoy float on the other. The cable passes through the center of the inner cylinder and is wound around the inner cylinder in such a manner to allow free, unfettered pay out given the physical characteristics of the desired cable.

[0012] At each predetermined depth interval, an attachment point **8** is attached to the cable. The attachment point has an internal diameter sufficient to allow a restraining pin to pass through and can comprise any means to secure the cable around the restraining pin. Such means can be a grommet attached such that the grommet does not spin or a simple loop of the cable around said restraining pin as is known in the art.

[0013] In the single ended embodiment, the cable is passed through the center longitudinal axis of the inner cylinder leaving just a single attachment means outside the perpendicular plate. The remaining cable is wound around the inner cylinder beginning at the perpendicular plate **7** and stopping before the first set of holes at the first attachment point **9**. The attachment point lines up with and allows a restraining pin to be inserted trough the outer cylinder through the attachment point and through the inner cylinder.

[0014] The winding continues until the next anchor point and is repeated until the entire cable is wound into the cable pack and the other attachment means is just protruding from the open end of the cylinders. A last set of pins and attachment points or some other means of securing the attachment means can be included to prevent premature run out during shipment and preparation.

[0015] In the double ended embodiment, the cable is passed through the hollow center axis of the inner cylinder **2** leaving half the cable outside one end of the cylinders and the other half outside the opposite end. The remaining cable is wound around the inner cylinder beginning at each side of the perpendicular plate **7** and stopping before the first set of holes on either side of the perpendicular circular at the first attachment point(s) **4** and **8**. The attachment point(s) line up with and allow a restraining pin **5** to be inserted trough the outer cylinder **1** through the attachment point **4** and through the inner cylinder **2**.

[0016] The winding continues until the next anchor point is reached and is repeated until the entire cable is wound into the cable pack and both cable ends are just protruding from the open ends of the cylinders.

[0017] To use the cable pack, the appropriate size pack is selected such that the maximum length of the cable pack is

greater than the maximum depth of water in which it is to be used. One attachment means is attached to an anchor weight and the other is attached to a buoy or float.

[0018] The depth of the water at the insertion sight is determined from a fathometer reading or a chart fix. The restraining pins for all cable depths less that the desired depths are then removed from the pack which disengage the corresponding cable attachment points from the cylinders. Sufficient slack to absorb expected wave and wind forces should be considered in that choice to prevent undue peak stress on the cable.

[0019] The buoy float, cable pack and the anchor weight are then placed into the water in that order or simultaneously. As the anchor weight descends to the bottom, the cable runs free from the cable pack until the anchor reaches the bottom and the cable reaches the remaining attachment points in the cable pack. If all of the pins are removed for maximum depth, all of the cable will run out of the cable pack and the cylinders will eventually slide down the cable and rest on the anchor weight.

[0020] The diameter, length, composition and tensile strength of the cable can be selected by the manufacturer for the particular environment and use intended. That selection will dictate size of the cable pack, materials used and the type of attachment points required. Water soluble or biodegradable materials can be used for short term requirements and civilian usages, durable high tensile strength material may be appropriate for military combat usage.

1. An anchor cable pack comprising:

an outer cylinder said outer cylinder being hollow and having an open top end and an open bottom end;

an inner cylinder placed inside said outer cylinder, said inner cylinder being hollow having an open top end and an open bottom end and having a diameter such as to allow a uniform space to exist between the inner surface of the outer cylinder and the outer surface of the inner cylinder;

a plate, said plate being perpendicular to the axes of said inner cylinder and said outer cylinder, concentrically connecting said inner cylinder and said outer cylinder, said plate further containing a hole in its center;

a cable, said cable running longitudinally through the center of the inner cylinder having a first distal end and a second distal end and wound around the outside surface of said inner cylinder;

an attachment means connected to the first distal end and the second distal end of the said cable;

a set of restraining pins;

a set of holes set into the side of the said outer cylinder and directly opposing set of holes set into the side of said inner cylinder, the said holes accepting and allowing to pass the said set of restraining pins completely through the outer cylinder and inner cylinder.

2. An apparatus as in claim 1 wherein the cable contains a variable number of attachment points of such internal diameter as to accept and pass through said restraining pins.

3. An apparatus as in claim 2 constructed from biodegradable materials.

4. An apparatus as in claim 2 constructed from time delayed, water soluble materials.

5. An apparatus as in claim 2 wherein said plate attaches said inner cylinder and said outer cylinder concentrically at the open bottom ends of said inner and said outer cylinders, the top end remaining open.

6. A method for winding a cable into the cable pack of claim 3 comprising:

running the first distal end and essentially all of said cable out of the open top end of the said inner hollow cylinder leaving just the said attachment means on the second distal end of said cable outside the said perpendicular plate;

winding said cable extending outside the said open top end of the inside cylinder around the outside surface of said inner cylinder beginning at the inside of said perpendicular plate, over itself, moving longitudinally toward the open top end of said inner cylinder;

stopping at the first said attachment point in said cable at the first set of said holes, the said attachment point aligning with and allowing a said restraining pin to be inserted through said outer cylinder, through said attachment point and through said inner cylinder;

repeating the winding and stopping steps until the entire cable is wound around the outer surface of said inner cylinder, such that said attachment means connected to the first distal end is just protruding from the open top end of said outer cylinder;

inserting said restraining pins through said set of holes securing the attachment points to the said inner and outer cylinders.

7. An apparatus as in claim 2 wherein said plate concentrically connects said inner cylinder and said outer cylinder at a point on their longitudinal axis other than the bottom end of said inner and outer cylinders.

8. A method for winding a cable into the cable pack of claim 7 comprising:

running the first distal end and half of said cable out of the open top end of said inner cylinder leaving the second distal end and half the said cable outside the open bottom end of the said inner cylinder;

winding one half end of said cable over itself and around said inner cylinder beginning at the corresponding inside of said perpendicular plate moving longitudinally toward the corresponding open end of said inner cylinder;

stopping at the first said attachment point before the first set of said holes, the said attachment point lining up with and allowing said restraining pin to be inserted through said outer cylinder, said attachment point and through said inner cylinder;

repeating said winding and stopping steps until the entire cable is wound around said inner cylinder and the corresponding said attachment means is just protruding from the open end of said outer cylinder;

repeating the winding, stopping and repeating steps on the opposite end of the said cable and inner cylinder;

inserting said restraining pins through said set of holes securing the attachment points to the said inner and outer cylinders.

9. An attachment point as in claim 2 comprising a circular ring around which said cable is affixed such that said attachment point does not rotate around said retaining pin as the cable pays out due to the torque imparted on the circular ring by the cable.

10. An apparatus as in claim 1 wherein said hole being no larger than the internal diameter of the inner cylinder.

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