FOLDABLE TORPEDO ANCHOR (FOTOAN)

IITM Technology Available for Licensing

Problem Statement

- Develop advanced anchor technology capable of providing reliable mooring for a range of offshore structures, including floating production systems, offshore wind turbines, and other deep-sea installations.
- Design anchors with an extended lifespan to meet the demands of permanent installations in ultra-deep waters (>3000m) and varying environmental conditions.
- The technology address the need for more efficient and reliable anchoring solutions to support the increasing exploration and extraction of underwater hydrocarbons in deep and ultra-deep waters.

Intellectual Property

- IITM IDF Ref. **2000**
- **IN 411169 - Patent Granted**

Technology Category/ Market

Category - Marine and Subsea Anchoring Systems
Applications - Offshore Energy Installations, Maritime Infrastructure, Underwater Exploration
Industry - Maritime Infrastructure and Transportation

Market - Global offshore mooring systems market is projected to grow from USD 2.08 Billion in 2022 to USD 2.96 Billion by 2032, with a forecasted **CAGR of 4%.**

TRL (Technology Readiness Level)

TRL - 3, Proof of concept stage.

Technology

The present invention relates to **a torpedo anchor in combination with movable foldable wings** and fins to provide high pull-out resistance with minimum loss of embedment depth.

Method

1. **The foldable torpedo anchor features movable wings and fins, designed to provide high pull-out resistance while minimizing embedment depth.**
2. **One embodiment includes a separate pulling shaft connected to the wings through a mechanical hinge. This design allows for lateral movement of the fluke while keeping the anchor in place, reducing embedment depth significantly.**
3. **The anchor incorporates a ballast chamber at the bottom, ensuring stability and restricting vertical movement, contributing to its effectiveness in various soil conditions.**
4. **Another embodiment focuses on enhancing geotechnical resistance and pull-out capacity. After embedment, gradual pulling of the mooring line causes the movable wings to rotate, initiating a keying process. This process enables fins attached to the wings to penetrate laterally into the soil, increasing geotechnical resistance.**

Research Lab

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Key Features / Value Proposition

- **Optimized Embedment Depth:**
The foldable torpedo anchor minimizes embedment depth, offering efficient anchoring while reducing the impact on the surrounding environment.

- **Enhanced Stability through Ballast Chamber:**
The inclusion of a ballast chamber at the bottom ensures anchor stability, allowing it to maintain position and resist vertical movement effectively.

- **Tailored Geotechnical Resistance:**
The anchor's innovative keying process increases geotechnical resistance, providing superior holding power in a variety of soil conditions.

- **Flexible Deployment with Foldable Wings:**
Movable wings enable flexible deployment, allowing the anchor to adapt to different terrains and achieve high pull-out resistance.

- **Mechanical Hinge Mechanism for Controlled Movement:**
The separate pulling shaft and mechanical hinge mechanism enable controlled lateral movement of the fluke, enhancing the anchor's performance.

- **Gradual Pulling for Increased Pull-out Capacity:**
The gradual pulling of the mooring line initiates a keying process, enabling lateral penetration of fins into the soil and significantly boosting pull-out capacity.

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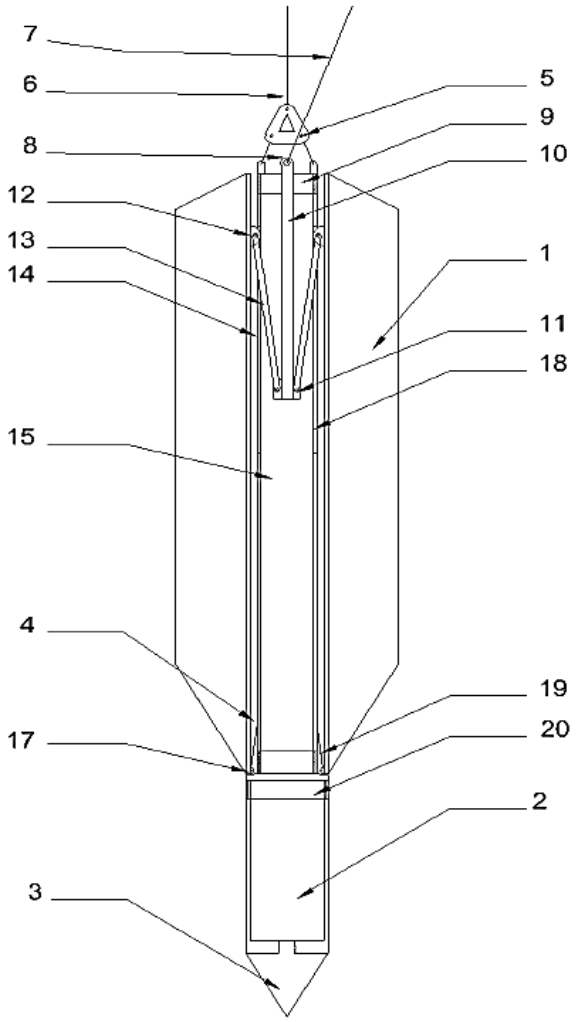

Fig.1. illustrates the sectional view of folding torpedo anchor in launch configuration consisting of fins (1), ballast chamber (2), nose (3), wings (4), quick-release hook (QRH) (5), launching mooring line (6), loading mooring line (7), padeye (8), top cap (9), central pullingshaft (10), pulling shaft – lateral strut hinges (11), lateral strut – wings hinges (12), lateral struts (13), vertical slit in the inner shaft (14), wing – inner shaft hinges (17), inner shaft or core (18), collar (19) and connector (20).

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