United States Patent

Burke

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[54] HYDROSTATICALLY POWERED MESSENGER STYLE WIRE CUTTER

[72] Inventor: **John C. Burke,** North Falmouth, Mass.

[73] Assignee: **The United States of America as represented by the United States Atomic Energy Commission**

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[52] **U.S. Cl.** .....**83/1,** 83/639, 83/925 R, 114/221 A

[51] **Int. Cl.**.....**B26d 5/12**

[58] **Field of Search** .....83/1, 639, 925 R; 114/221 A

[56] **References Cited**

UNITED STATES PATENTS

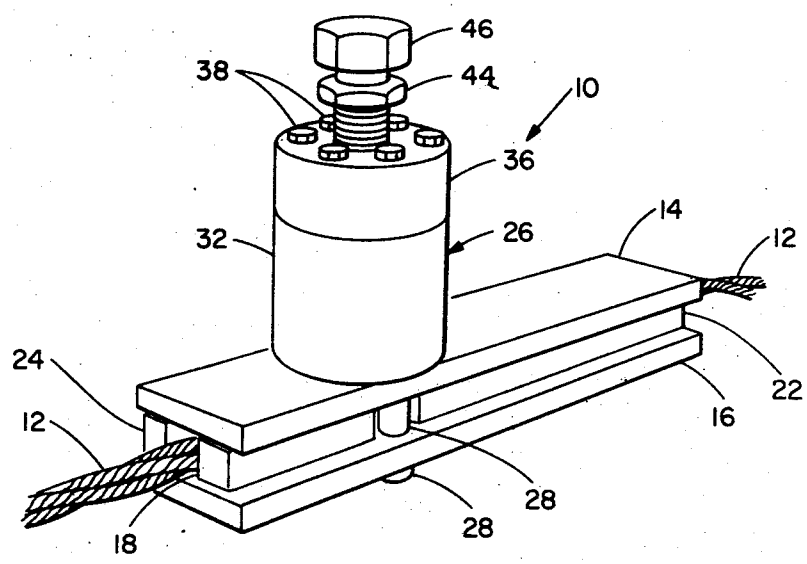
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Primary Examiner—Frank T. Yost
Attorney—Ronald A. Anderson

[57] **ABSTRACT**

A hydrostatically actuated messenger type wire cutter for severing wire below the surface of a body of water consisting of a slide having an assembly for actuating a cutting tool to sever or weaken the wire at a preselected depth. A rupture disk collapses at the preselected depth, permitting water pressure to react against a piston carrying the cutting edge.

4 Claims, 2 Drawing Figures



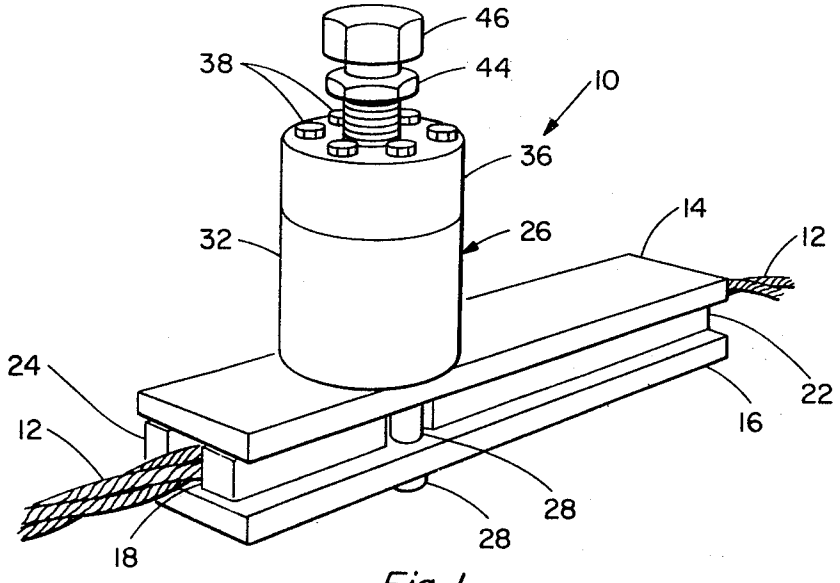


Fig. 1

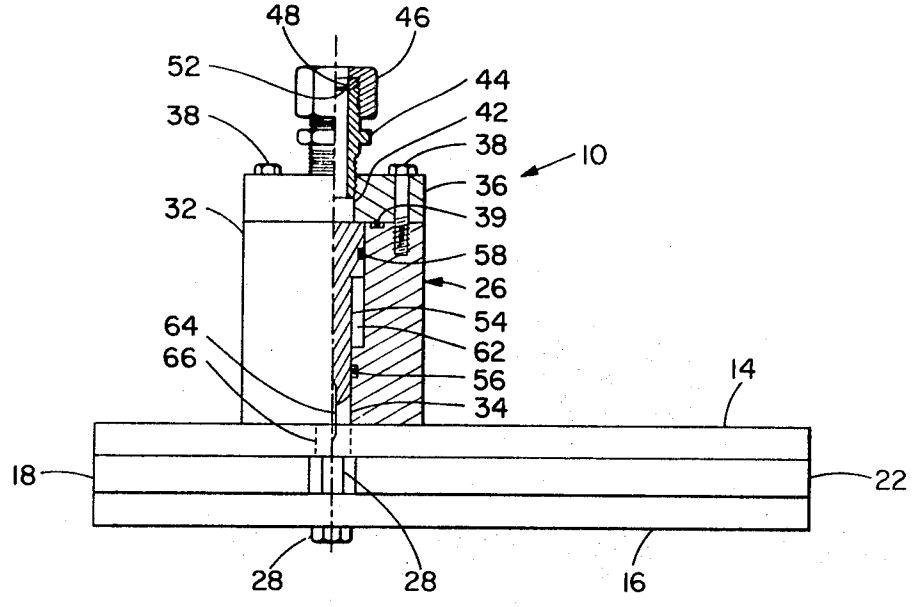


Fig. 2

INVENTOR.
JOHN C. BURKE

Roland A. Anderson
Attorney

HYDROSTATICALLY POWERED MESSENGER STYLE WIRE CUTTER

SOURCE OF THE INVENTION

This invention was made in the course of, or under a contract, with the United States Atomic Energy Commission.

BACKGROUND OF THE INVENTION

In a variety of oceanographic operations there is real danger of exceeding the working strengths of the wire ropes used; this is especially true in operations like coring and dredging. It is usual practice in such operations to use a "weak link" at the end of the wire to connect the gear in bottom-contact. The weak link consists of a shear pin set to fail at tension corresponding to the rated working strength of the wire less the weight (in water) of the wire to be lowered. These weak links are well-calibrated, and their use has usually ensured that only gear is lost when firmly hung-up.

In some cases, however, the wire parts at or near the sheave, and in such cases it is believed that the wire above the weak link had thrown a loop around a bottom projection, such as a ledge or a boulder too large to move. Much ship time is used in maneuvering about the dredges, attempting to pull them free or to disentangle the knots protecting the weak links. Eventually the wire is winched into a zero degree wire angle and tension increased until finally the wire is parted in spite of all these efforts to avoid such a result. Tension meter records show the rated breaking strength of the wire to have been exceeded thereby indicating that the cable was never freed from its projection.

Loss of the wire in such cases is expensive, and can result in curtailed scientific programs when no replacement reel is aboard. Sometimes replacement wire has to be sent in by air, at the cost of some days delay of the ship in port, as well as the considerable freight charges.

SUMMARY OF THE INVENTION

The present invention overcomes the problems mentioned above, in those situations where it is not possible to loosen a fouled wire, and when tension on the wire in excess of that rated for the weak link employed is ineffective to release the wire.

In accordance with a preferred embodiment of this invention, a unique wire-cutter messenger is relied upon to cut or weaken the wire rope at a location close to where fouling has taken place. The wire-cutter relies on hydrostatic pressure both to determine the depth at which it is actuated and also to provide the power to drive a cutting tool to produce the actual cutting.

It is thus a principal object of this invention to provide apparatus for the cutting of a wire close to the point of fouling.

Other objects and advantages of this invention will hereinafter become obvious from the following description of a preferred embodiment of this invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an isometric view of a preferred embodiment of this invention;

FIG. 2 is an elevation view, in partial section, of the embodiment shown in FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, wire-cutter assembly **10** is shown mounted for use on a multi-stranded wire **12**. Cutter assembly **10** would be placed (in a manner to be described later) on wire **12** when the latter becomes fouled, presumably at water bottom, by a rock or other solid object. Wire **12** would extend downwardly, at some shallow angle, from the dredging vessel (not shown) to a point on the sea bottom where the dredging or other gear is attached. Fouling would be at some point close to the dredging gear.

Cutter assembly **10** consists of a pair of spaced plates **14** and **16**, separated by bars **18**, **22**, **24**, and a bar (which is hidden) aligned with bar **24**. Spacing between bars **18**, **22**, and **24** is such as to readily accommodate wire **12**. Bars **18**, **22**, **24**, and the hidden bar would be attached, such as by welding, to lower plate **16**. Upper plate **14** is thus removable.

Cutter mechanism **26**, which is cylindrical in shape, is mounted on plate **14**, clamped in place by a pair of bolts, only one of which, designated **28**, is shown. It will be seen that these bolts, including bolt **28**, maintains the whole assembly together.

Referring to FIG. **2** for the details of cutter mechanism **26**, it will be seen that the latter consists of a solid cylindrical body **32** with a circular axial passageway **34** of narrower diameter in the bottom portion and larger diameter in the upper portion. A cover **36** held in place by a plurality of screws **38** having an opening **42** encloses the upper surface of body **32**. An O-ring **39** in a slot seals the contact between body **32** and cover **36**. Opening **42** is threaded to receive a hollow male member **44** provided with a hollow threaded cap **46**. The latter when in place positions a ring **48** spanned by a rupture disk **52**. Disk **52** is designed to rupture at some particular pressure which corresponds to a particular water depth. By removing cap **46** it is possible to substitute a rupture disk for any selected depth.

Passageway **34** in body **32** functions as a cylinder to accommodate a piston **54** which is stepped to fit snugly in passageway **34** as illustrated. A pair of O-rings **56** and **58** in grooves seal space **62** formed between the wall of passageway **34** and piston **54** when the latter is in its upper, retracted position (as shown). Piston **54** carries at its lower or forward end a cutting element **64** which when retracted with piston **54** as shown is free of contact with wire **12**. An opening **66** in plate **14** accommodates the cutting element **64** when the latter is driven downwardly as will be described later.

In the operation of cutter assembly **10**, cap **46** is removed and ring **48** is replaced with a rupture disk **52** designed to rupture at a depth slightly less than the depth of the water where the drag or other gear is located. Presumably wire **12** is fouled on sea bottom close to the gear. With plate **14** and mechanism **26** removed, assembly **10** is placed on wire **12**, the parts assembled as shown, with bolts **28** holding them together. Cutter assembly **10** is then permitted to slide down wire **12** until the depth is reached where disk **52** will fail. When this occurs, water enters passageway **42** by way of male fixture **44** and urges piston **54** downwardly under great force, causing cutting element **64** to cut or damage wire **12**. In the event the latter is not cut, it will be sufficiently weakened so the continued tugging will cause separation at the point where it has been weakened.

It is thus seen that there has been provided a wire cutting device which is highly useful and, because of simplicity of design, is also reliable and expendable.

What is Claimed is:

1. A hydrostatically actuated messenger type wire cutter comprising:

a. means for being mounted slidably on said wire;

b. cylinder means on the mounting means containing a piston;

c. cutting means extending from said piston in the direction of said wire; and

d. means responsive to water pressure at a preselected depth for driving said piston and cutting means into cutting contact with said wire, to at least weaken the latter.

2. The wire cutter of claim **1** in which the driving means includes a rupture disk which fails at said preselected depth of water.

3. The wire cutter of claim **2** in which said piston is actuated by said water passing through the collapsed rupture disk.

4. The wire cutter of claim **3** in which the driving means includes means for supporting said rupture disk, said supporting means being removable so as to permit use of another rupture disk designed to fail at a different preselected depth of water.

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