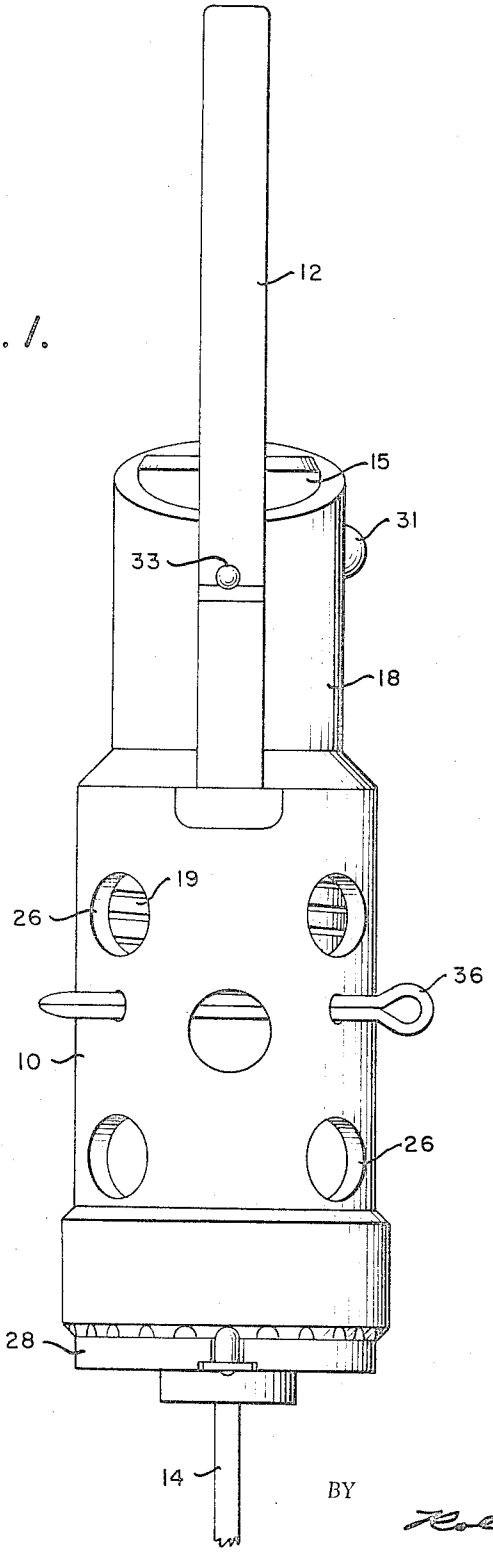
June 20, 1967 L. A. KISH 3,326,172

EXPLOSIVE CUTTER FOR MOORED MINE CABLES

Filed Nov. 14, 1962 2 Sheets-Sheet 1

FIG. 1.



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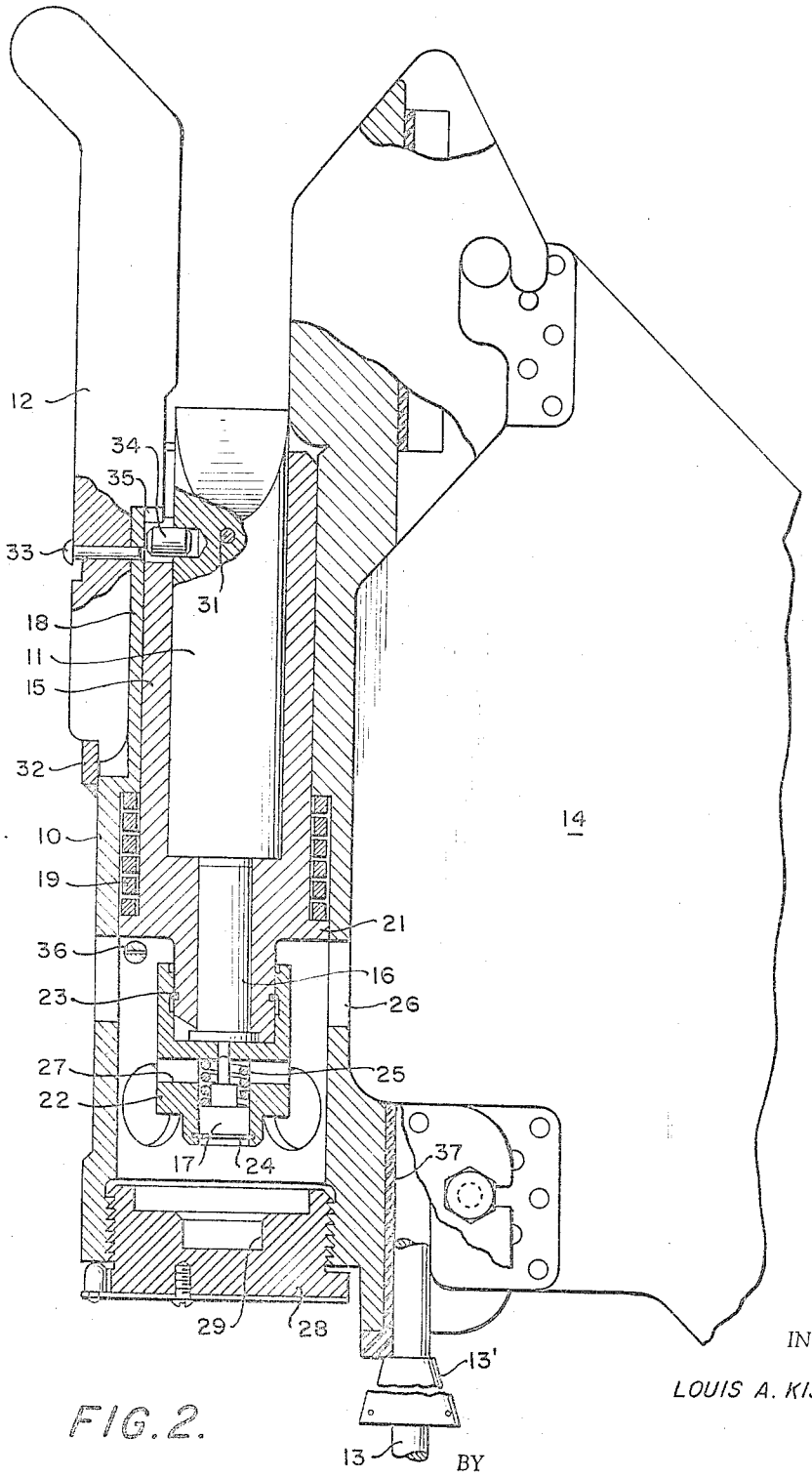


FIG. 2.

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1

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EXPLOSIVE CUTTER FOR MOORED MINE CABLES

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4 Claims. (Cl. 114—221)

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

The present invention relates to improvements in cable cutting devices and more particularly to such devices of the explosive type employed for severing the anchoring cables of moored submarine mines.

In one presently used system the sweeping of moored mines is accomplished by towing at a suitable depth a sweep line or wire to which are secured at spaced intervals devices which when a mooring cable or chain is encountered are triggered to cut the cable. These cutting devices are provided with a member shaped for guiding a mooring cable to cutting position on an anvil, the arrangement being such that as the cable approaches the cutting position it releases a firing pin which detonates an explosive charge for propelling a chisel against the portion of the cable overlying the anvil. The function of the anvil is the usual one of backing up of the cable during the cutting thereof by the chisel, after which the anvil together with its shaped guide must be destroyed, detached, or otherwise removed from its original position so that it can no longer capture a mine mooring cable, it being assumed that a single shot cutting device is being used.

It is an object of the present invention to provide a cable cutting device which does not require the use of an anvil to back up the cutting action of an explosive driven chisel.

Another object of the invention is to provide such an explosive cable cutter which in use positions the chisel-cartridge cutter to face forward so as to bring a mooring cable into direct contact with the cutting edge of the chisel prior to firing.

A further object of the invention is the provision in such a cutter of a cable guide which is separated from the cutter upon the actuation thereof.

Another object of the invention is to provide such a cable cutter which compared to prior art devices is relatively inexpensive and more efficient per unit weight.

Other objects of the invention as well as the invention itself will be understood from the following description when read in connection with the accompanying drawings in which

FIG. 1 is a side view of a cutting device embodying the invention, and

FIG. 2 is a sectional plan view of the cutting device of FIG. 1 attached to a sweep wire.

In accordance with the invention, the cutting device is secured to a sweep wire in such manner that the explosively driven chisel is parallel to the wire and has its cutting edge facing in the direction of tow so that when a mooring cable is encountered, pressure against the chisel shears a trigger pin which initiates a firing operation. When fired, the chisel in moving forward to cut the mooring cable dislodges the guide member utilized for positioning the mooring cable on the edge of the chisel so that the expended cutter offers no obstruction to the next mooring cable encountered. An additional feature of the invention is that the cutter may be provided with a new guide member and be rearmed for future use.

The embodiment shown in FIGS. 1 and 2 comprises a

2

cutter housing 10 having a forwardly facing chisel 11 against which a mine cable is directed by a cable guide 12. The housing 10 has a two-forked notched open end into which extends the cutting end of the chisel 11 and one fork of which constitutes the cable guide 12. The housing 10 is rotatably secured to sweep wire 13 and provided with a stabilizing fin 14. The means securing the fin 14 to the housing 10 forms no part of the present invention. A tapered collar 13' clamped to the wire 13 keeps the housing 10 from sliding outwardly along the wire 13. A barrel 15 having a center bore in which the chisel 11 and a cartridge 16 are axially alined fits with sliding engagement in a forward section 18 of the housing 10 of reduced diameter which provides a rearwardly facing internal shoulder constituting a bearing surface for a firing spring 19 surrounding the barrel 15 and engaging a flange 21 formed on the barrel 15. A firing piston 17 is held in axial alinement with the cartridge 16 by a cylindrical breech block 22 which telescopes over the breech end of the barrel 15 and is held in place thereon by a retaining spring 23. The firing piston 17 is held in the cylinder of the breech block 22 by a retaining ring 24 against which the piston 17 is resiliently held by a compressed spring 25 and thus out of engagement with the cartridge 16. The housing 10 is free flooding through openings 26 provided therein. Radial passageways 27 in the breech block 22 permits fluid displacement when the firing piston moves forward. A base member 28 closing the rear end of the housing 10 is provided with a well 29 dimensioned to mate with the rear end of the breech block 22 so that when the well 29 is filled with a liquid rapid movement of the block 22 into the well 29 will move the piston 17 to firing position. With gas in the well 29 the firing piston 17 will not be actuated.

The barrel 15 normally is held in the cocked position shown, with the spring 19 compressed, by means of a trigger pin 31 extending through the forward section 18 of the housing 10, through the barrel 15 and into the chisel 11. When a mine cable presses against the chisel with a force sufficient to shear the trigger pin 31 between the housing 18 and the barrel 15, the spring 19 forces the rear end of the breech block 22 into the water filled well 29 thereby actuating the firing piston 17. The force of the explosion of the cartridge 16 builds up to cause the chisel 11 to shear the pin 31 between the chisel 11 and the barrel 15 and then move forward to cut the mine cable held taut against the chisel 11 by the drag of the mine and its anchor.

In order that another mine cable will not be hooked after the cutter has fired provision is made for the firing action to bring about a discard of the cable guide 12. One arrangement suitable for this purpose is shown in FIGS. 1 and 2 wherein the proximal end of the guide 12 is inserted between a tab 32 secured to the housing 10 and the outer wall of the smaller diameter forward section 18 and is held against longitudinal movement by a lock pin 33. A lipped shoulder 35 hooks over the end of section 18 to restrain the guide 12 against lateral movement. A lateral projection, such as a pin 34 doweled in the chisel 11, carried by the chisel 11 and extending behind the shoulder 35 formed on the guide 12 acts on the shoulder 35 to break the lock pin 33 when the chisel 11 is shot forward and separates the guide 12 from the housing 10. If the cartridge 16 fails to fire the drag of the uncut mooring cable increases sufficiently to shear the lip 35 and thereafter to force the guide 12 outwardly which results in the pin 33 being withdrawn from the housing 18 and the guide 12 being jettisoned. After such action the particular cable involved is free to ride along the sweep wire to be cut by the next succeeding cutter.

The cutter is cocked by moving the barrel 15 forward against the compression of the firing spring 19 by any

suitable tool (not shown). When in cocked position the trigger pin **31** is inserted through the housing **18**, the barrel **15** and into the chisel **11**. Also, when in cocked position a safety pin **36** is inserted in holes through the housing **10** with the portion of the pin within the housing directly behind the flange **21** on the barrel **15**. The safety pin **36** is not removed until the cutter is about to be lowered into the water. Wear on the sweep wire **13** may be reduced by using nylon inserts **37** at the bearing surfaces between the cutter and the sweep wire **13**.

It will be understood that one manner in which the cutting device of the invention may be utilized in a sweeping operation is to secure the cutters at spaced intervals along a sweep wire adapted to be towed by a mine sweeping vessel as illustrated in FIG. 2 of Patent No. 2,910,034, issued to J. Sullivan Oct. 27, 1959. Also, when the array is under tow, the stabilizing fin **14** trails the sweep wire **13** in a substantially horizontal plane so as to position the cutting device to receive any mooring cable guided into it by the sweep wire.

While for the purpose of disclosing the invention a preferred embodiment thereof has been described in detail it is to be understood that the invention is not limited thereto and that modifications obvious to those skilled in the art are intended to be included within the scope of the appended claims.

What is claimed is:

1. In a device adapted to be employed in sweeping moored mines

a housing having a two-forked notched open end and a closed end,

a spring loaded barrel member movable within the housing against the force of the spring to a cocked position and movable by the force of the spring when released from cocked position to the closed end of the housing,

a chisel member mounted in said barrel and having a cutting end extending into the notched open end of the housing,

explosive means contained in said barrel for driving the chisel member outwardly through the notched open end of said housing,

a trigger pin engaging said barrel to hold it in cocked position and adapted to be sheared by the pressure of a mooring line entering said notched open end and bearing against the cutting end of said chisel, and

means operative upon the movement of said barrel to the closed end of said housing for firing the explosive means.

2. In a device in accordance with claim **1** wherein

one of the forks of said housing is so connected to said housing that it will be released by the force of an uncut mooring line after a misfire of said explosive means.

3. In an underwater mine mooring cable cutter of the explosive type adapted to be moved through a body of water by a sweep wire

a cylindrical housing adapted to be mounted on a sweep wire and having an open end facing forward in the direction of movement through the water,

a spring loaded barrel member slidably mounted in said housing and movable forwardly against the force of the spring to a cocked position and rearwardly to a firing position,

a cutting member mounted in said barrel and having a cutting edge at its forward end,

means holding the barrel in cocked position until a predetermined force has been applied to the cutting edge of the cutting member,

said barrel including a breech adapted to receive an explosive charge in driving relation to the rear of the cutting member,

means holding the cutting member against movement from the barrel until a predetermined driving force has been exceeded, and

means operative to move said barrel rearwardly to the firing position after said predetermined force has been applied to said cutting edge.

4. An underwater cable cutter of the explosive type including

a barrel assembly having a center bore adapted to contain a cutter tool and an explosive charge and terminating in a breech block having a center bore and a rear surface,

a firing piston in the bore of the breech block spring biased away from firing position,

a free flooding housing surrounding the barrel assembly and having a closed end having a surface facing the rear surface of the breech block,

the facing surfaces of the breech block and said closed end being shaped to provide mating male and female parts,

releasable means for holding said facing surfaces spaced apart, and

spring means for moving said facing surfaces together upon the release of said holding means.

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