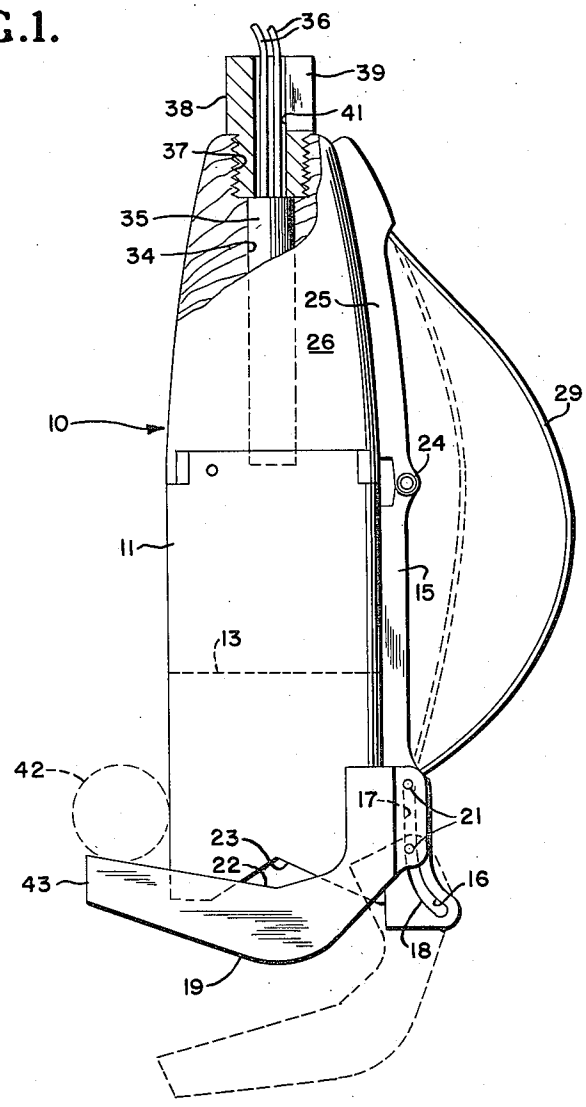
Jan. 12, 1960 D. A. McBRIDE 2,920,532

CABLE CUTTER UTILIZING A HOLLOW CHARGE EXPLOSIVE

Filed May 24, 1957 2 Sheets-Sheet 1

FIG.1.



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FIG.2.

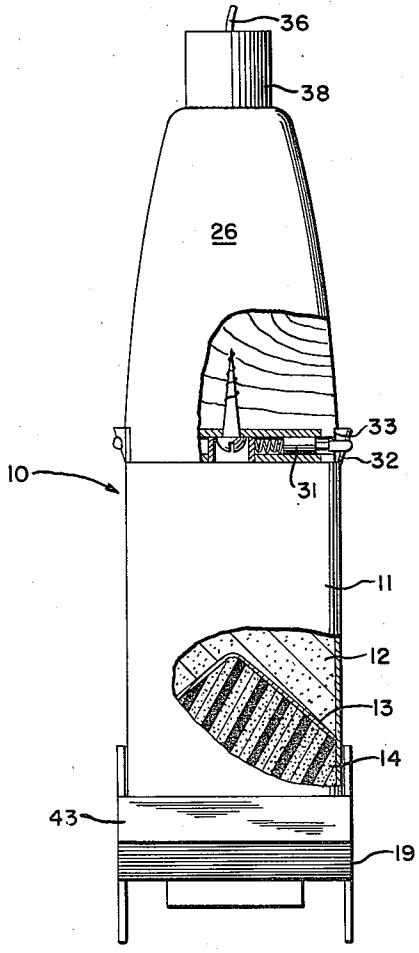


FIG.3.

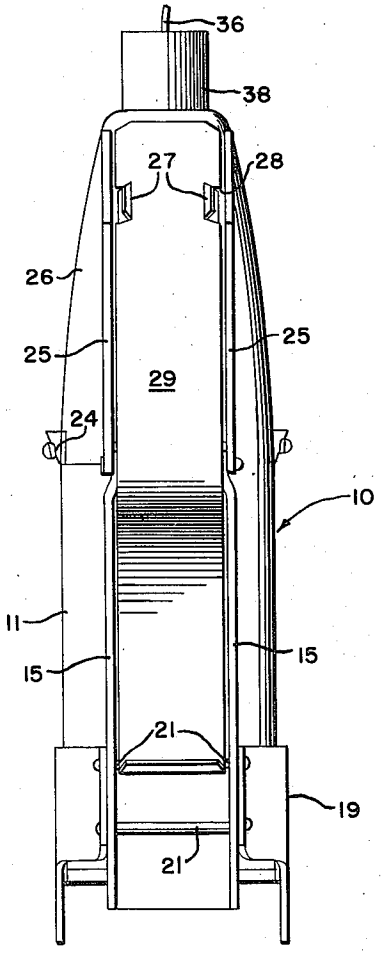


FIG.4.

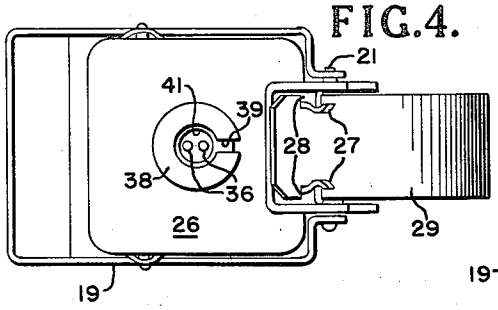
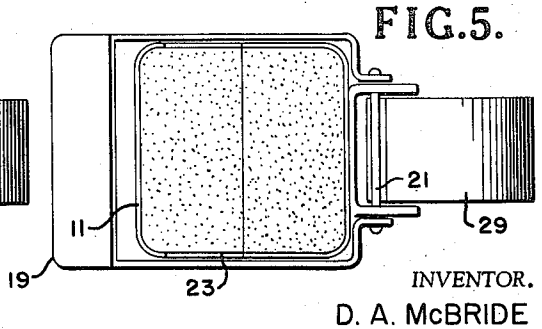


FIG.5.



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CABLE CUTTER UTILIZING A HOLLOW CHARGE EXPLOSIVE

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Application May 24, 1957, Serial No. 661,551

3 Claims. (Cl. 89—1)

This invention relates to cable cutters and more particularly to an explosively actuated cable cutter for severing a cable while the cable is submerged within a body of water in response to the explosion of a shaped charge disposed within the cutter.

In devices of this character heretofore devised it has been the usual practice to provide a hollow sealed container in abutting relation with the exposed face of the shaped charge to provide a watertight air chamber between the charge and the cable to be severed. This air chamber was required by reason of the fact that the force of the explosion of the charge was greatly diminished in effect when employed under water unless an air space was provided adjacent the exposed face of the charge. While a sealed air chamber fittingly engaging the exposed face of the shaped charge has in general been found satisfactory to provide an air cushion sufficient to prevent damping of the shaped charge effect as the charge is detonated, such an arrangement possesses the disadvantage of a substantial increase in the cost of the device and a further disadvantage that the particles of material of which the chamber is composed are disintegrated and interfere to some extent with the effective force of the explosion.

The present invention possesses all of the advantages of this prior art device and none of the foregoing disadvantages. This result is achieved by employing a mass of plastic material such as polystyrene foam or the like between the charge liner and the cable to be cut as will more clearly appear as the description proceeds.

One of the objects of the present invention is the provision of a new and improved cable cutter for use under water.

Another object is to provide new and improved means for excluding water from the outer surface of a shaped charge sufficiently to prevent damping thereof when the charge is fired within the water.

A still further object is the provision of a cable cutting device for use under water and acuated by the explosion of a shaped charge carried therein having new and improved means for preventing damping the explosive effect of the charge by the water as the charge is fired at a distance.

Still other objects, advantages and improvements will be apparent from the following description taken in connection with the accompanying drawings of which:

Fig. 1 is a plan view partially broken away of a cable cutter according to a preferred form of the invention;

Fig. 2 is a side view partially broken away of the device of Fig. 1;

Fig. 3 is another side view of the device of Fig. 1; and Figs. 4 and 5 are end views of the device.

Referring now to the drawings for a more complete understanding of the invention on which like numerals of reference are employed to designate like or similar parts throughout the several views, and more particularly to Fig. 1 thereof there is shown thereon a cable cutter indicated generally by the numeral **10** and comprising

a container **11** of generally rectangular configuration adapted to receive and retain an explosive charge **12** therein of the type known in the art as a shaped charge. A V-shaped liner **13** having two flat surfaces intersecting to form a V is provided within the container **11**, Fig. 2, thereby separating the container into two sections, one section defining a cavity for receiving the shaped charge **12** of generally square cross-sectional configuration which may be a plastic explosive or any other suitable shaped charge explosive while the other section defines a cavity for receiving a filler block **14** composed of suitable filling material such, for example, as a block of polystyrene foam, thereby to eliminate any damping of the explosive force of the shaped charge due to the fact that water might enter the container and thereby interfere with the explosive effect. The filler block disclosed herein effectively seals the liner and the end of the charge in contact therewith to effect a watertight air chamber thereagainst without employing a hermetically sealed metallic container for this purpose as employed heretofore. There is secured exteriorly to one side of container **11** a support **15** having a pair of tracks **16** formed in an end portion thereon, each of the tracks comprising a straight portion **17** substantially parallel to the longitudinal axis of the cutter and a curved portion **18** extending outwardly therefrom.

A clamp member **19** is provided with a pair of bearing pins **21** sildably disposed within the track **16** whereby the clamp member is movable from a closed position as shown on Fig. 1 in solid outline to a moved position shown in dashed outline. The clamp member **19** is provided with a V-shaped clamping surface **22** for engagement with a cable to be cut and for clamping the cable to a complementary V-shaped end surface **23** of the container **11**. Pivotally secured to the other end of support **15** as at **24** is a complementary support **25** to which is secured a cover **26** composed of material suitable for the purpose such, for example, as wood and adapted to be moved from a position engaging in the end of container **11** to an open position by pivotal movement about the pivot **24**. One end of the cover **26** is provided with a pair of clips **27**, Fig. 3, for engagement with a pair of notched portions **28** formed within a spring element **29** of generally flat cross sectional configuration. The other end of the spring is wrapped about one of the bearing pins **21** as best shown on Fig. 3. The spring **29** is preformed in such manner that the clamp member **19** is normally maintained thereby in the position shown on Fig. 1 in a yieldable manner such that the clamp member **19** may be moved at will to an open position shown in dashed outline and thereafter returned to an intermediate position in clamping relation with the cable to be cut by spring **29**.

The cover **26** is provided with a pair of spring pressed detents **31**, Fig. 2, for engagement with clips **32** at apertures **33** respectively provided therein. The clips are secured to container **11** in any suitable manner whereby the cover is locked in a closed position until the detents have been depressed. The cover **26** is also provided with a bore **34** extending axially therethrough adapted to receive an electroresponsive detonator **35** therein, the leads of which are designated by the numeral **36**. The cover is also provided with a threaded bore **37** for receiving a nut **38** threaded therein by means of which the detonator **35** is secured within the cover **26**. The nut **38** is preferably slotted at **39** to permit introducing leads **36** within a bore **41** formed within the nut without the necessity of disconnecting the leads from the detonator. The leads **36**, hereinafter referred to as firing leads, are connected selectively to a source of electrical energy, the connection including a firing switch (not shown) operable at will.

By providing a pair of notched portions **28** in an end portion of spring element **29** in the manner disclosed, an arrangement has been provided in which the spring **29** may be easily detached from support **25** at will to facilitate opening of the cover **26** when the detents **31** thereof have been depressed.

The operation of the device will now be described. Let it be assumed, by way of example, that the device is to be employed by an underwater demolition crew and that the operator of the device is of the type known as a frog man. When the frog man locates the cable to be cut which, in the assumed example, may be the cable **42** shown in dashed outline on Fig. 1, he places the cutter in a position with respect to the cable such that the projecting end **43** of clamp member **19** engages the cable as shown. A pull applied to the body of the cutter withdraws container **11** away from clamp member **19** sufficiently for cable **42** to be moved into engagement with the intersecting V surfaces **22** of the clamp, the clamp member moving somewhat arcuately away from container **11** during this operation by reason of the curved portion **18** of tracks **16** being engaged by pins **21**. Upon release of the pull pressure applied to the cutter, clamp member **19** is moved by spring **29** reversely toward container **11** until the cable **42** is securely clamped thereto by the V-shaped clamping surfaces **22** and **23** of the clamping member and container respectively. Application of a firing impulse to firing leads **36** causes the detonator **35** to operate and fire the shaped charge **12**. When this occurs the cable **42** is severed at a point substantially coincident with the axis of the cutter by the action of the shaped charge, the force of which is applied to the cable most effectively by reason of the provision of filler block **14** of plastic material which excludes water from the space between the surface of the shaped charge and the cable.

Whereas in the foregoing description the clamp member was moved to open position by pressure of the cable thereagainst, it will be understood that this has been done for the purpose of illustration only as, if desired, the clamp member may be opened by merely pressing spring **29** toward the container **11** and thereafter allowing the clamp member to close gently and firmly about the cable.

Preferably though not necessarily the cutter **10** is composed of non-magnetic material thereby rendering it particularly suitable for cutting the cables of magnetic mines without prematurely exploding the mine.

The cutter disclosed herein is adapted for use underwater at great depths, if desired, and therefore is well adapted for use with either a commercial or military demolition team.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. An explosively actuated cutter for a cable disposed within the water, comprising a casing having a V-shaped liner disposed transversely therein, said liner being configured by two flat surfaces intersecting to form a V, a shaped charge defined by said liner disposed within said casing, means on one end of the casing for firing said charge, means operable at will for quickly clamping a cable to be cut to the other end of said casing for severance by the explosive force of said charge, resilient elongated means connected at opposite ends thereof to said casing and clamping means respectively for actuating said clamping means selectively to a cable clamping position, and a quantity of filler material possessing the characteristics of foam polystyrene disposed within and filling that portion of said casing intermediate said liner and the cable for excluding water therebetween.

2. A device of the character disclosed for cutting a mooring cable beneath the water by the explosion of a shaped charge comprising an elongated casing, a V-shaped liner composed of thin metal disposed transversely within said casing and secured thereto to form two sections, a shaped charge disposed within one of said sections and defined by said liner, a polystyrene filler element disposed in the second of said sections in abutting relation with said liner, a cover pivotally secured to one end of said casing for enclosing the first of said sections, means carried by said cover for firing said charge, a clamp member movably carried by said casing for quickly clamping a cable to be cut across the other end of said casing defining the second section, and means including a flat spring pivotally secured to said clamp member and operable at will for holding the clamp member in a clamping position thereby to yieldably maintain the cable against said other end of the casing.

3. A device for cutting a cable beneath the water by the explosion of a shaped charge comprising a casing having a shaped charge therein, a V-shaped liner disposed transversely within said casing and defining said charge, a polystyrene filler disposed within said casing and abutting said liner, movable jaw means carried by said casing at one end thereof for securely clamping a cable to be cut in abutting relation with said filler at a predetermined distance from said charge, a cover pivotally secured to the other end of said casing, means for releasably locking the cover to said casing, resilient manipulative means secured at one end thereof to said cover and at the other end to said jaw for actuating said jaw to a cable clamping position, and a detonator carried by said cover for igniting said charge.

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