March 19, 1946. B. A. WIENER 2,396,732

EXPLOSIVE DEVICE

Filed June 3, 1943

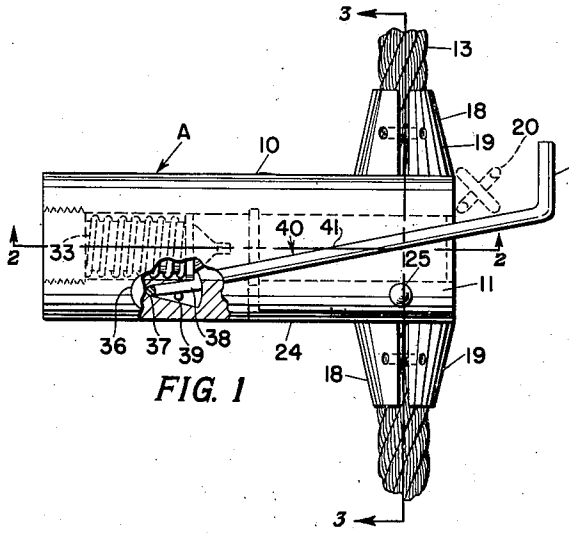


FIG. 1

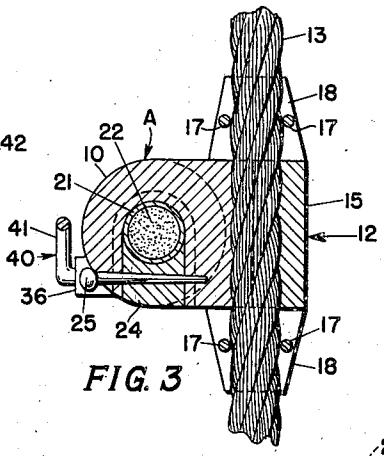


FIG. 3

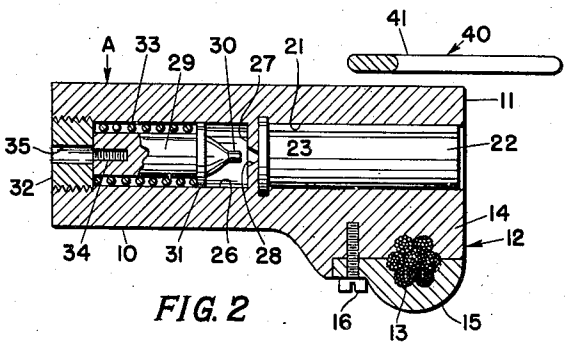


FIG. 2

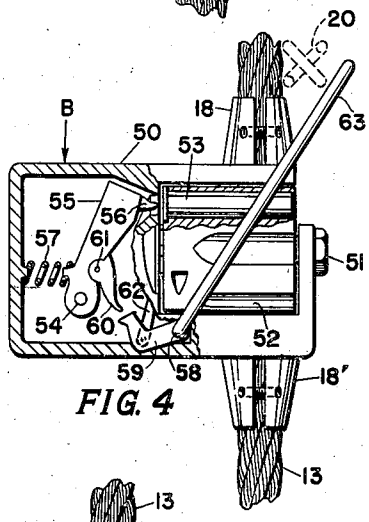


FIG. 4

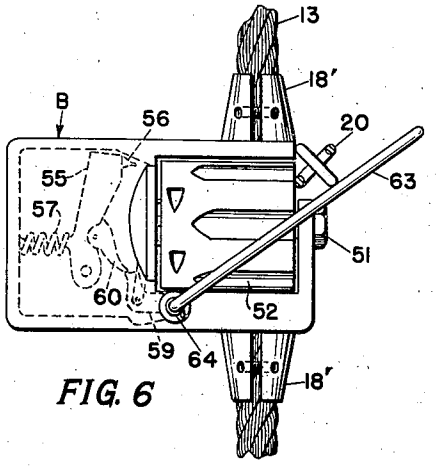


FIG. 6

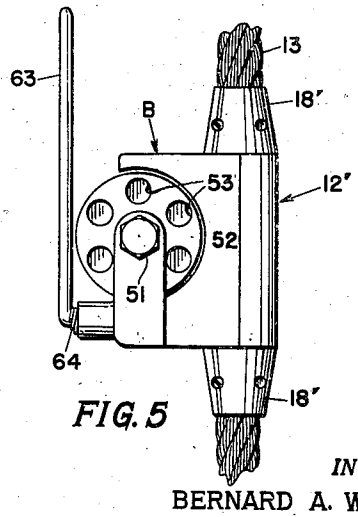


FIG. 5

INVENTOR.
BERNARD A. WIENER
BY
Stone E. Bush
HIS ATTORNEY

Patented Mar. 19, 1946 2,396,732

UNITED STATES PATENT OFFICE

2,396,732

EXPLOSIVE DEVICE

Bernard A. Wiener, Washington, D. C.

Application June 3, 1943, Serial No. 489,459

3 Claims. (Cl. 114—221)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

The invention relates to improvements in cable or chain parting devices and more particularly to an explosive device adapted to be carried by a mine sweeping cable.

The usual procedure in sweeping mines is to drag or tow more or less horizontally through the water, a cable equipped with cutting devices, at such depth that the towed cable will intercept the vertical cables by which explosive mines are commonly anchored below the water surface. The towed cable may be stretched between two towing craft, or one end of the cable may be carried by a paravane or water kite. When the towed cable and a mine mooring cable engage, the latter slides along the towed or sweep cable until a cutting device is reached. When the mooring cable is cut, the freed mine, due to its buoyancy, rises to the surface of the water, where it is destroyed or otherwise disposed of.

At the present time, however, many mines are moored by chains and the existing cutters are not suitable for severing chains. Since the chains are subjected to longitudinal tension due to the buoyancy of the mines and to dynamic forces upon engagement of a sweep cable therewith, a lateral explosive blow which is sudden and concentrated within a restricted area will break the chain.

An important object of the invention is to provide an explosive device for parting a cable or chain and which is adapted to deliver an extremely sudden concentrated blow laterally of the cable or chain.

Another object of the invention resides in the provision of an explosive device which tends to locally heat or burn the cable or chain whereby the same is weakened in the zone where the lateral blow is struck.

A further object of the invention is to provide a device of the character described which is relatively simple, small and light.

A still further object is the provision of an explosive device for attachment to a mine sweep cable which will automatically break a succession of mine mooring cables.

Other objects and advantages of the invention will become apparent during the course of the following detailed description, taken in connection with the accompanying drawing, forming a part of this specification, and in which drawing,

Figure 1 is a plan view of a preferred form of the device, a portion thereof being shown in section.

Figures 2 and 3 are longitudinal and transverse sectional views taken substantially on the lines 2—2 and 3—3 of Figure 1.

Figure 4 is a plan view of a modified form of the device, with portions shown in section.

Figure 5 is an end elevation of the device shown in Figure 4.

Figure 6 is a plan view of the device illustrated in Figure 4, but showing a mooring chain in engagement with the trigger thereof and about to actuate the device.

In the drawing, which for the purpose of illustration shows preferred and modified forms of the invention, and wherein similar reference characters denote corresponding parts throughout the several views, the letter A generally designates a preferred form of the device and B designates a modified form thereof.

The device A includes a cylindrical body 10 provided at its forward end portion 11 with any suitable means 12 for releasably securing a continuous sweep cable 13 transversely of the forward end portion. In the example shown, the cable 13 is clamped between a portion 14 laterally offset from the forward end portion and a jaw 15 removably fastened to the laterally offset portion as by a screw 16. Removably secured to the cable 13 at opposite sides of the device A, as by screws 17, are companion clamp members 18 providing outwardly tapering frusto-conical surfaces 19 for guiding the mine mooring cable or chain 20 from the sweep cable 13 to the forward end of the device.

Formed in the forward end portion of the cylindrical body is a longitudinal chamber 21 for receiving a waterproof blank cartridge 22 provided with a flanged inner end 23. A portion 24 of the cylindrical body may be laterally withdrawn, upon removal of a taper pin 25, to provide for the insertion and removal of the cartridge 22.

Formed in the rear end portion of the cylindrical body is a longitudinal chamber 26 separated from the cartridge chamber 21 by a transverse wall 27 provided with an opening 28. Reciprocable in the chamber 26 is a firing pin 29 provided near its reduced forward end 30 with an annular shoulder 31. The rear end of the firing pin chamber 26 is closed by a removable plug 32. Encircling the firing pin 29 between the shoulder 31 and plug 32 is an expansion coil spring 33 urging the pin into cartridge firing position wherein its reduced end 30 extends through the opening 28. The firing pin 29 may be provided at its rear end with a threaded opening 34 aligning with an access opening 35 in the plug 32. In order to retract the firing pin, a threaded wire (not shown) may be inserted through the access opening 35 for temporary connection with the firing pin at the threaded opening 34.

Pivotally mounted in a boss 36 at the rear end portion of the cylindrical body 10 is a rock shaft 37 provided at inner end with a pawl 38 normally held, as by a frangible pin 39, in latching relation to the retracted firing pin 29, as shown in Figure 1. At its outer end, the rock shaft 37 is provided with a preferably integral trigger arm 40 includ-

ing a forwardly extending portion 41 transversely intersecting the path of travel of the mooring cable or chain 20 and a laterally bent end portion 42 tending to prevent sliding of the mooring chain off the end of the trigger.

The operation of the device A will now be described, assuming that the parts are initially set as shown in Figure 1. Upon engagement of the sweep cable 13 with a mine mooring chain 20, the usual sliding movement of the chain 20 along the sweep cable 13 will bring the chain into engagement with the trigger arm 40. When the mooring chain 20 arrives in front of the cartridge chamber 21, the trigger arm will have retracted the pawl 38 after breaking the frangible pin 39 so as to release the firing pin and fire the cartridge. Since the mooring chain is tensioned by the buoyancy of the mine, the sudden force of the explosion directed laterally against a restricted portion of its length will act to produce a sharp local bend therein, thereby tending to break or snap the chain at a time when it is weakened by the heat of the explosion.

The device B is somewhat similar to the form of device A, except that it is adapted to successively break a plurality of mine mooring cables or chains without reloading. The frame 50 is provided with means 12' and 18', similar to that of the device A, for releasably and adjustably securing the device B to the sweep cable 13. Revolubly mounted in the frame 50, as by a pivot bolt 51 is a cylinder 52 provided with a plurality of cartridge chambers 53, such as illustrated in the Wesson Patent No. 811,807. Secured for swinging movement within the frame between retracted and advanced positions, as by a pivot 54, is a hammer 55 provided with a firing pin 56. Resilient means such as the expansion coil spring 57 urges the hammer 55 toward its advanced position. Pivoted in the frame 50 is a rockshaft 58 provided at its inner end with a cocking arm 59 cooperating in the usual manner with a cocking lever 60 pivoted at 61 to the hammer 55. The cocking arm 59 carries the pawl 62 for successively disposing the cartridge chambers 53 in cooperative relationship with the firing mechanism. At its outer end the rockshaft 58 is provided with a trigger arm 63 which extends forwardly into the path of travel of the mooring chain relative to the sweep cable. Encircling the rockshaft 58 is a helical coil spring 64 having its outer end anchored in the rockshaft and its inner end secured to the frame so as to urge the trigger arm 63 toward the position shown in Figure 4.

The operation of the device B will now be described, assuming the parts to be initially positioned as shown in Figure 4. As the trigger arm 63 is swung in a clock-wise direction, by engagement of the mooring chain 20 therewith, the cocking arm 59 engages the cocking lever 60 to retract the hammer 55 against the resistance of the spring 57. At the same time, the pawl 62 turns the cylinder 52 to dispose one of the cartridge chambers 53 in alignment with the firing pin. Figure 6 shows in broken lines the relationship of parts prior to release of the hammer. Upon further movement of the trigger arm 63, the cocking arm 59 disengages the lever 60 to release the hammer 55 and fire the cartridge, under the influence of the spring 57.

Various changes may be made in the forms of invention herein shown and described without departing from the spirit of the invention or the scope of the following claims.

This invention may be manufactured and/or used by or for the Government of the United States of America for governmental purposes without the payment of any royalty thereon or therefor.

I claim:

1. In an explosive device for parting a succession of mine mooring cables during mine sweeping operations wherein said mooring cables are slidably engaged by a sweep cable, said mine mooring cables being subjected to tension due to the buoyancy of the mines, a cylinder provided with chambers for receiving explosive cartridges, means revolubly mounting the cylinder on the sweep cable so that said cartridges may be successively disposed adjacent and aimed at a point in the path of travel of the mooring cable relative to the sweep cable, means for successively disposing said cartridges adjacent said point and means for firing said cartridges as successive mooring cables reach said point, whereby said mooring cables, under tension, are subjected, in a section of restricted length, to explosive heat and sharp localized bending force tending to blow the mooring cables apart.

2. In an explosive device for parting a mine mooring cable slidably engaged by a sweep cable during mine sweeping operations, said mooring cable being subjected to longitudinal tension due to buoyancy of the mine and to dynamic forces upon engagement of the sweep cable with the mooring cable, a body provided with an explosion chamber having a normally unobstructed discharge opening, an explosive charge occupying said chamber, means securing said body to the sweep cable with said normally unobstructed discharge opening adjacent a point in the path of travel of said mooring cable along said sweep cable whereby said mooring cable, upon reaching said point, obstructs said discharge opening, and means for firing said charge upon the arrival of said mooring cable at said point, whereby the mooring cable, under tension, is subjected, in a section of restricted length, to explosive heat and sharp localized bending force tending to blow the mooring cable apart.

3. In an explosive device for parting a succession of mine mooring cables during mine sweeping operations wherein said mooring cables during mine sweeping operations are slidably engaged by a sweep cable, said mooring cables being subjected to longitudinal tension due to the buoyancy of the mines and to dynamic forces upon engagement of the sweep cable with the mooring cable, a cylinder provided with chambers for receiving explosive cartridges, each of said chambers having a discharge opening, means revolubly mounting the cylinder on the sweep cable so that said discharge openings may be successively disposed adjacent a point in the path of travel of the mooring cable relative to the sweep cable, means for revolving the cylinder to successively dispose said discharge openings adjacent said point, and means for firing said cartridges as successive mooring cables reach said point, said mooring cables upon successive arrival at said point obstructing said openings whereby said mooring cables, under tension, are each successively subjected, in a section of restricted length, to explosive heat and sharp localized bending force tending to blow the mooring cables apart.

BERNARD A. WIENER.