June 20, 1967 M. KURTZ 3,326,173

MULTIPLE UNIT MINE CABLE CUTTER

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FIG. 1

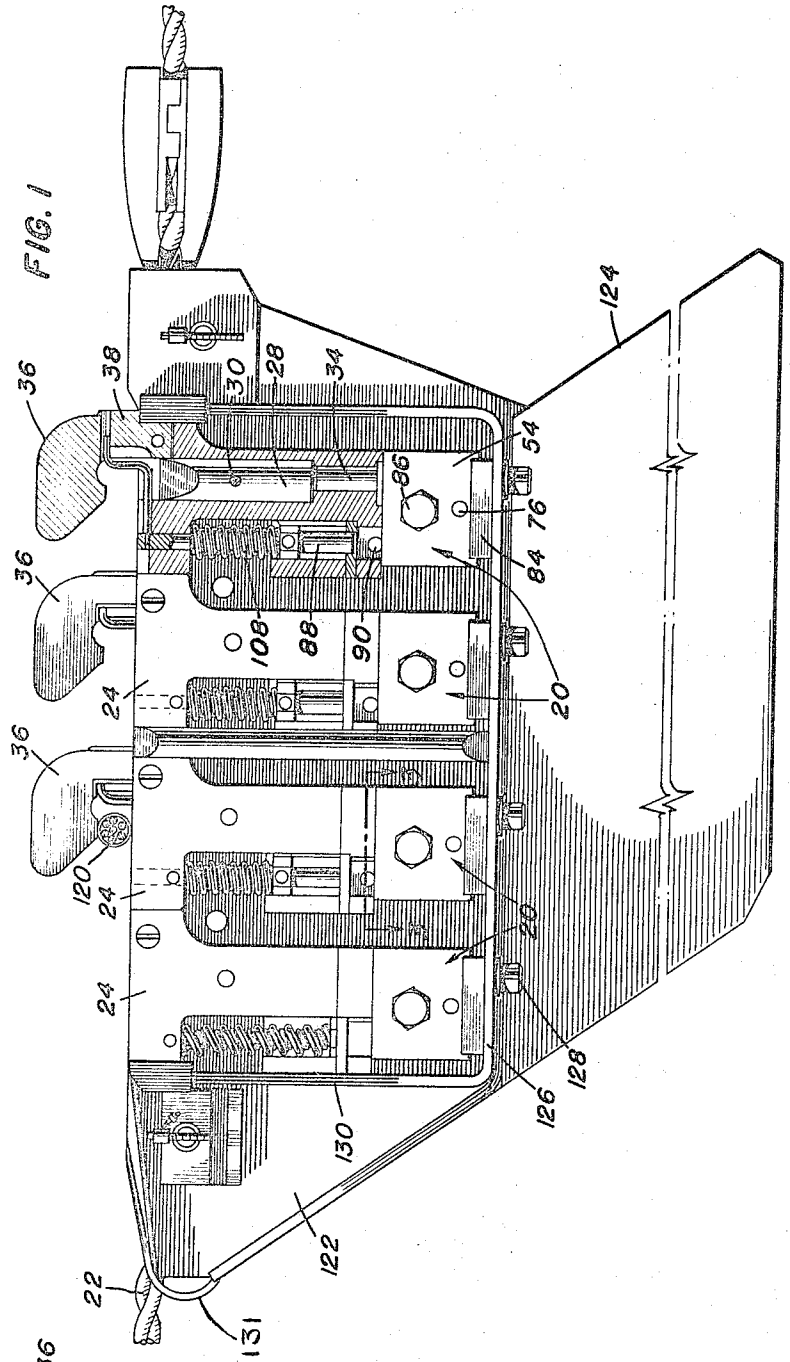


FIG. 3

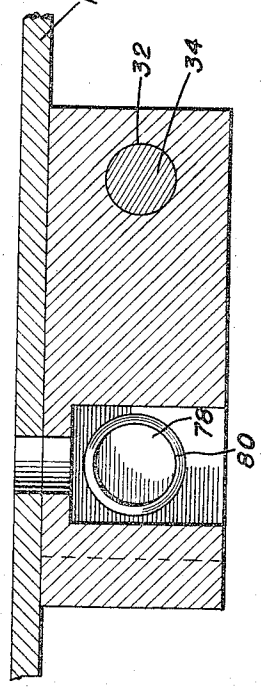
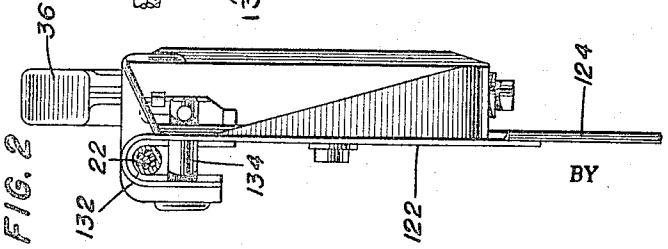


FIG. 2



INVENTOR
MARK KURTZ

BY

B. L. Zangrilli
ATTORNEY

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FIG. 4

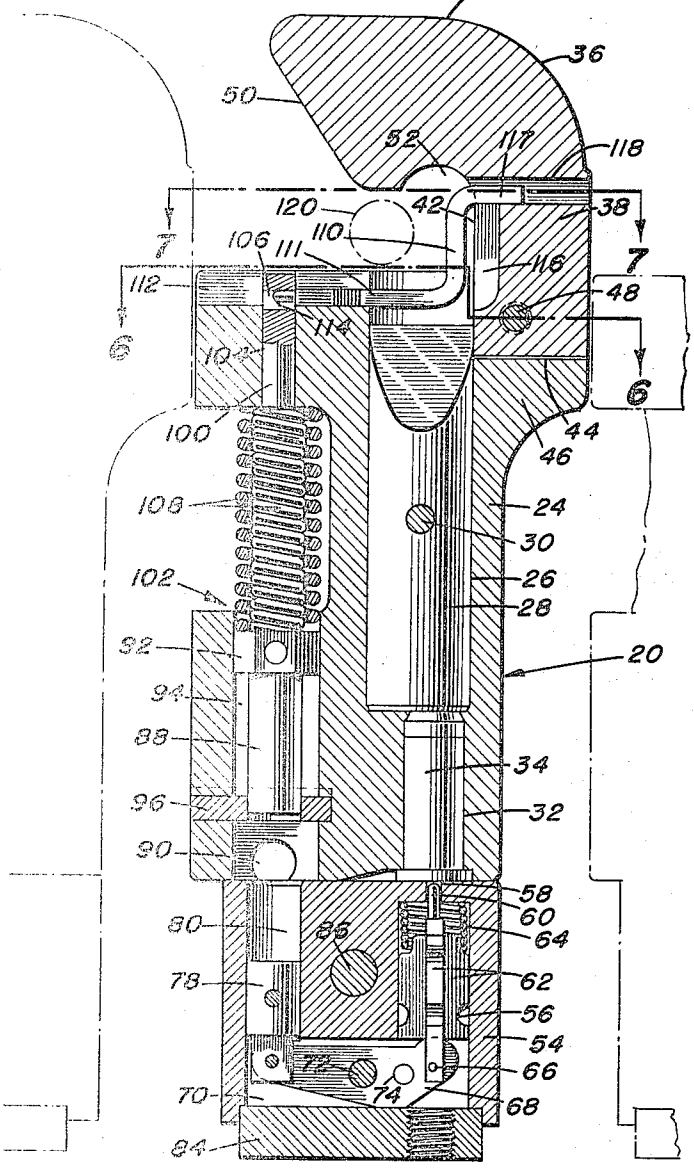


FIG. 5

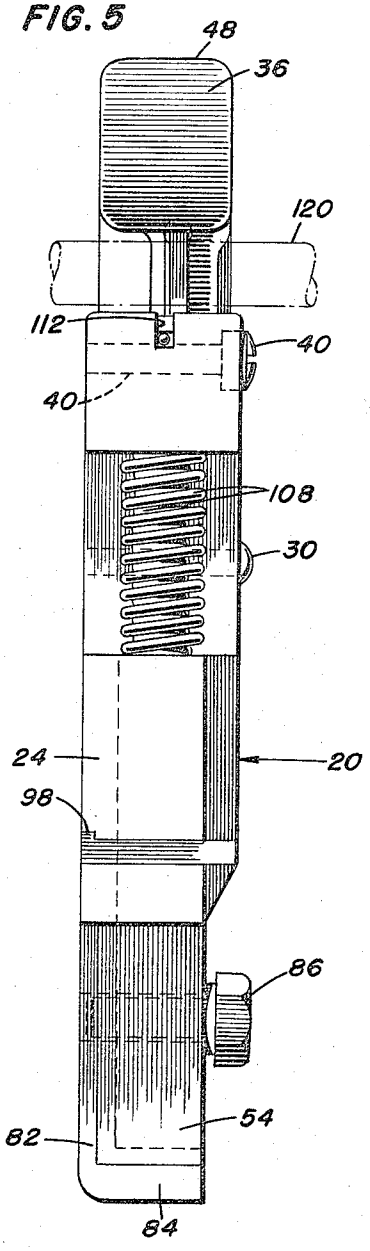
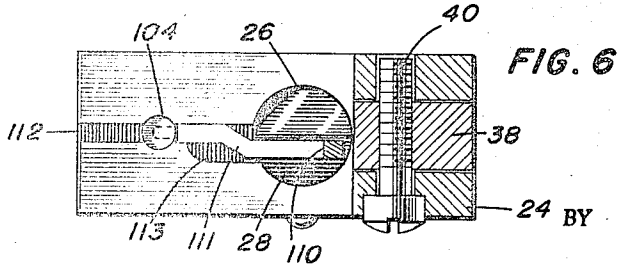


FIG. 6



INVENTOR
MARK KURTZ

BY
B. L. Langwell
ATTORNEY

June 20, 1967 M. KURTZ 3,326,173

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FIG. 7

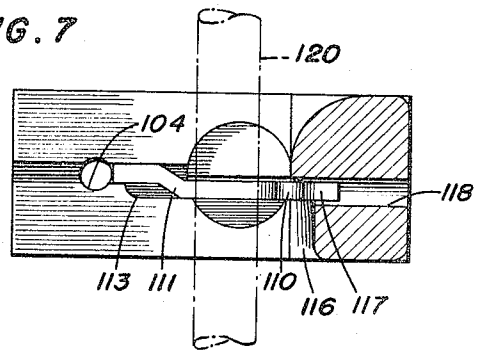
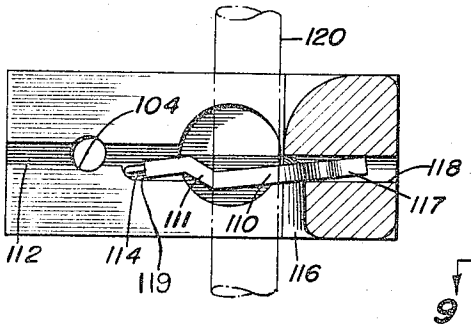


FIG. 9



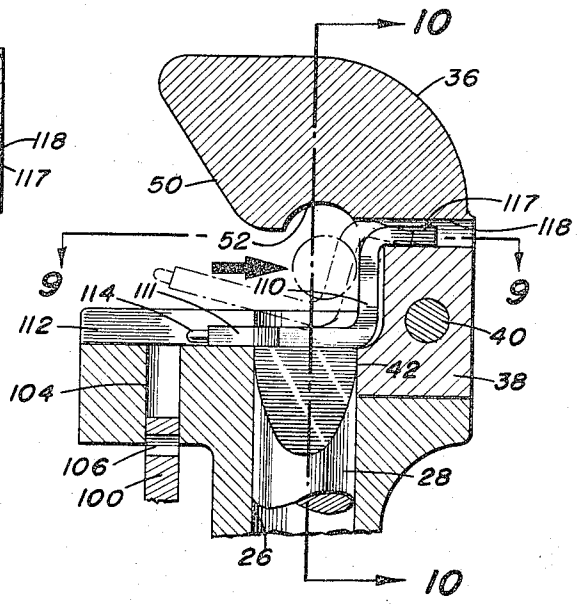
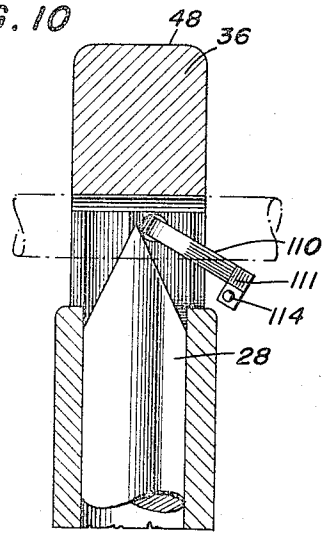


FIG. 8

FIG. 10



INVENTOR

MARK KURTZ

BY

B. L. Zangarill

ATTORNEY

United States Patent Office 3,326,173 Patented June 20, 1967

3,326,173

MULTIPLE UNIT MINE CABLE CUTTER

Mark Kurtz, Washington, D.C., assignor to the United States of America as represented by the Secretary of the Navy

Filed Apr. 30, 1956, Ser. No. 581,811
8 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.

This invention relates to an underwater cable cutter actuated by explosive means, and more particularly relates to a cable cutter pulled through the water by a sweep line carried by mine sweeping vessels, said cutter being adapted to sever the cable by which an explosive mine is anchored in the water.

Mine cable cutter devices are well known and usually are used in conjunction with sweep lines towed by mine-sweeping vessels. However, in the prior art the number of cutters that can be installed on a sweep line per unit length thereof is limited because individual cutters are spaced along the sweep line and each cutter is quite heavy. Consequently the number of mine anchor cables that can be cut per given length of sweep line is similarly limited, necessitating rearming of the cable cutters at frequent intervals, and impeding the rapid sweeping of an area heavily infested with explosive mines. An object of the invention is to overcome the foregoing and other disadvantages of the prior art.

An object of the invention is to provide a mine cable cutter or cutting tool of the explosive type which is light in weight, which is simple in construction, and which is improved in operation.

A further object of this invention is to provide a mine cable cutter design and arrangement which makes it possible to attach a greater number of the cutters to a given length of sweep line.

Still another object is to provide a mine anchor cable cutter with a fool-proof trigger mechanism actuated only upon contact with said cable.

In addition, it is an object of this invention to provide a cable cutter that is less subject to fouling due to underwater debris and the like than the prior art cutters, and which cannot be accidently discharged while the cutter is out of the water.

A still further object is to provide a cable cutter with an anvil member that is not likely to be broken away except upon discharge of the cutter mechanism.

Still another object is to provide a cable cutter mechanism that is simple in construction and that can be used repeatedly at little expense and with a minimum of effort and training.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. 1 is a view showing a plurality of cutters made according to this invention and attached to a mine sweep line;

FIG. 2 is an end view of the assembly shown in FIG. 1 looking from the left;

FIG. 3 is a sectional view taken on line 3—3 of FIG. 1;

FIG. 4 is a longitudinal sectional view of an individual cutter shown in loaded and cocked condition;

FIG. 5 is a side view of the cutter looking from the left in FIG. 4;

FIG. 6 is a sectional view of the cutter taken on line 6—6 of FIG. 4;

FIG. 7 is a sectional view of said cutter taken on line 7—7 of FIG. 4;

FIG. 8 is a vertical sectional view, partially broken away, of the upper portion of the cable cutter mechanism at the beginning of its cutting operation;

FIG. 9 is a horizontal sectional view on line 9—9 of FIG. 8; and

FIG. 10 is a sectional view taken on line 10—10 of FIG. 8, but showing the cutting operation at a stage somewhat more advanced than that of FIG. 8.

Referring now to the drawings, wherein like reference characters designate like or corresponding parts throughout the several views, there is shown in FIG. 1 a view of an assembly of four mine cable cutters or cutting tools 20 on a mine sweep line 22. It is pointed out that all of said cutters or tools are substantially identical.

As shown in FIG. 4, each cutting tool 20 comprises a frame 24. The part of said frame adapted to be located toward the far or trailing end of a sweep line has a cylindrical hole or barrel 26 formed therein; and a cutting chisel 28 is slidably mounted in said barrel. The chisel 28 comprises a cutting mechanism, and is held in fixed position by a shear pin 30 that passes through alignable holes in both the frame and the chisel. Extending from the lower end of the barrel is a chamber 32, said chamber being adapted to receive a cartridge 34 therein. The cartridge 34 therein. The cartridge 34 is utilized to fire the cutting mechanism comprising the chisel 28 forwardly in a manner hereinafter set forth.

An anvil 36 is fastened to the forward part of the frame 24 and has a forward portion thereof spaced from and extending across the forward end of said barrel. The forward portion of the anvil 26 is adapted to confine a mine cable in a position to be struck and cut by the chisel 28 during operation of the cutter. The anvil 36 is provided with a shank member 38 at the rear thereof having a leading face 42 which is in line with one wall of the barrel 26. The shank member is reduced in thickness near its lower end to provide a tenon that fits within a notch provided in the frame 24. The shank 38 is held onto the frame 24 by a screw-type shear pin 40 which passes through both the frame and said tenon as shown in FIG. 6, and is threaded in the shank only. The anvil member 36 is restrained against a tendency to rotate about shear pin 40, by virtue of the abutment of a lower portion of leading face 42 of the shank 38 against a side portion of the chisel 28, as shown in FIG. 4. The abutting surfaces of the anvil 36 and frame 24 have a substantial area of contact and are interlocked by the tenon and notch construction, so that accidental breaking away of said anvil from the frame by snagging or the like is unlikely. A further anti-snagging feature resides in the forward surface 48 of the anvil 36 being substantially flat and smooth so as also to avoid entanglement with an extraneous object.

The anvil 36 is in a sense hook-shaped with a leading face 50 inclined inwardly toward a recess 52 of the anvil 36 that faces the forward end of the frame 24. The inclined face 50 is adapted to guide a mine cable into the space between the recess 52 and the front end of the frame 24 for positioning a snared mine cable so that the cable can be cut by the cutting chisel 28 moving toward the anvil 36; said position being shown in FIG. 10 for example. The curved recess 52 helps to hold the mine cable 120 in cutting position.

The mine cable is cut by the chisel 28 when the chisel is forced toward the anvil 36 by discharge of the cartridge 34 carried at the lower extremity of the frame 24. The cartridge is discharged by firing mechanism located at the lower end of the frame. The firing mechanism comprises a breech block 54 having therein a bore 56 axially aligned with the chamber 32 in which the cartridge 34

is carried. The bore **56** is closed at the end thereof adjacent the cartridge chamber **32**, except for a small hole **58** through which a firing pin **60** is adapted to move and strike the base of the cartridge **34**. The lower portion of the firing pin **60** is provided with four laterally extending webs **62** arranged at right angles. The webs slidably engage the wall of the bore **56** below said small hole **58**. The firing pin **60** is normally held in retracted position, as shown in FIG. 4, by a spring **64** compressed between the respective upper ends of the webs **62** and the forward end wall of the bore **56**. Two oppositely disposed webs **62** extend rearwardly to a pivotal connection **66** with one end of a lever **68** located in a slot **70** in the breech block **54**. Intermediate its ends said lever is pivotally connected to said breech block by a point pin **72**. The lever **68** and breech block are provided with aligned holes **74** through which a safety rod or pin **76** may be passed for latching the lever against pivoting about pivot pin **72** so as to prevent accidental firing of the mechanism by accidental pivoting of said lever **68**. The other end of the lever **68** has a piston **78** pivotally connected thereto which extends forwardly in a cylinder **80** in the breech block **54**, said piston being slidable within said cylinder. The cylinder **80** is located at the side of the breech block opposite the bore **56** and is parallel therewith. Thus it will be seen that a rearward movement of the piston **78** will bring about the firing of the cartridge by rotating the lever **68** about its pivot and forcing the firing pin **60** forwardly against the cartridge **34**.

The breech block **54** is held in contact with the rear end of the main frame **24** of the cutter by being fastened to a side extension **82** of said frame, said extension having a turned rear end portion **84** abutting the rearmost portion of the breech block, as indicated in FIGS. 4 and 5. The breech block is removably attached to the frame by a screw **86** threaded into a hole in the extension **82**.

In axial alignment with but spaced from the piston cylinder **80** the frame **24** of the cutter is further provided with a plunger **88** having a rear end portion adapted to enter the cylinder **80**. The plunger **88**, however, cannot move far enough to contact the piston **78**. When the assembly is submerged in water, water fills the remaining space in the cylinder **80** in which the piston **78** is situated, and thus rapid rearward movement of the plunger **88** into the cylinder **80** forces water against the piston. The force of the moving plunger **88**, acting through the water, forces the piston **78** rearwardly, thereby moving the firing pin **60** forwardly against the cartridge **34**, discharging the latter. The explosion drives the chisel member **28** toward the anvil **36** for cutting action.

In order to precent fouling of the piston cylinder **80** by underwater debris, a hole **90** is provided in the under wall of the frame to insure a free flow of water past the mouth of the cylinder, when the tool is submerged.

The plunger **88** has a sleeve **92** rigidly fixed thereto adjacent its forward end, said sleeve and plunger being slidable in a passage **94** having the same shape as said sleeve, for example, hexagonal. A collar **96** having a central hole is snugly mounted in the plunger passage to properly guide the plunger and insure proper alignment thereof with the piston cylinder **80**. The collar **96** is carried in a slot in the frame **24**, the collar having a shoulder **98** at one end to further limit movement thereof. The rearmost end of the cylindrical plunger **88** slides within the circular opening provided in said collar.

A rod **100** is fastened to the forward face of the sleeve **92** and extends forwardly across a recess **102** in the side of the cutter frame **24**. The rod **100** has a forward end slidably mounted in a hole **104** provided in a protrusion in the forward part of the frame. The forward end of the rod **100** has a hole **106** therein extending transversely of the axis of the rod for a purpose hereinafter set forth. One or more springs **108** surround the rod **100** and are normally under compression between the sleeve **92** and

the under surface of the said protrusion, thereby tending to urge the plunger **88** rearwardly toward the piston.

The plunger **88** is normally held in retracted position against the action of the springs **108** by means of a wire-like, S-shaped trigger pin **110**, FIG. 4. The rearmost leg **111** of the trigger pin normally is partially situated within a transverse groove **112** provided in the forward end of the frame **24**. It is pointed out that the groove **112** has an enlarged portion **113** at that end thereof adjacent to the barrel **26** that carries the chisel **28**. The rearmost leg **111** of the trigger pin **110** that normally lies in the groove **112** has an offset portion situated within the enlarged portion **113** of the groove whereby that part of the rearmost leg portion that crosses the barrel **26** is offset with respect to the axis of the chisel member; as better shown in FIG. 6. The rearmost leg **111** of the trigger pin is provided with a smaller latching element or extension **114** at its free end, said extension being adapted to enter the hole **106** in the forward end of the rod **100**, thereby retaining said rod in retracted position, against the action of spring **108**, in the manner shown in FIG. 4.

The rearmost leg **111** of the trigger pin **110** extends across the opening in which the chisel **28** is carried to a point substantially adjacent the face **42** of the shank portion **38** of the anvil **36**, said shank portion adjacent the trigger pin being provided with a cut-away area **116** that is deeper than the thickness of the trigger pin. At the portion of the trigger pin adjacent the shank member **38**, the trigger pin is provided with a bend at substantially right angles to leg **111**, and thence to provide an intermediate cross portion that extends toward the hook portion of the anvil. The cross portion extends to another right angle bend in the pin **110**; and from this bend the pin has a forwardmost leg **117**. The forwardmost leg **117** of said trigger pin **110** is long enough to extend into a hole **118** extending transversely of the shank member **38**, said hole being of a diameter that is greater than the maximum thickness of the leg **117** of the trigger pin so as to allow some transverse play of the pin in the hole **118**. The trigger pin is prevented from turning in the frame by virtue of the offset portion of the rearmost leg being located in the enlarged portion **113** of the forward portion of the frame.

The narrower extension **114** at one end of the pin **110** provides a shoulder **119** that in cocked position of the cutting tool as shown in FIG. 4 abuts the top part of the rod **104**, so that the movement of the pin **110** will be guided at the start when the cutting tool is submerged in water and a mine cable line such as **120** is snared.

Assuming that the cable line **120** is snared, the face **50** of the tool cams the line toward the recess **52** in the anvil **36**. The line strikes the trigger pin **110** and in the manner shown in FIGS. 8 and 9, pushes the trigger pin toward the shank **38** of the anvil. The extension **114** leaves the hole **106** in the rod member **100**, permitting the coil springs **108** to drive the plunger **88** rearward toward the breech block **54** and towards the cylinder **80** in which the piston **78** is located. The water in said cylinder is pushed by the plunger and being incompressible drives the piston rearwardly, rocking the lever **68** about pin **72**, thereby driving the firing pin **60** forwardly. The forwardly moving pin **60** discharges the cartridge **34** so that the chisel **28** is forcefully driven forwardly toward the anchor line **120** and the anvil **36**. As the chisel moves forwardly, one of its beveled surfaces strikes an edge of the offset portion of the trigger pin in the manner shown in FIG. 9, thereby turning the trigger pin about its forward leg **117** in hole **118**, and also tilting it forwardly as shown in broken lines in FIG. 8. It is ponited out that the rearmost leg **111** of the trigger pin is pushed far enough forward to clear the upper side edges of the groove **112**, as shown in FIG. 8, so that the face of the chisel may rotate the trigger pin completely out of the path of the chisel in the manner shown in FIG. 10. The chisel will not strike the forwardly extending portion of the trigger

pin because the movement of the cable line **120** forces said portion into the recessed area **116** in the shank of the anvil, as shown in FIG. 8. After cutting the cable, the edge of the chisel strikes the anvil **36**. The drive of the chisel is adequate to cut the cable and shear off the screw **40**, and thus break the anvil away from the frame. Thus it can be seen that when a cutter is fired, the anvil is lost, thereby preventing the snagging of another mine cable by a cutter that has already been fired. The lost anvil can readily be replaced with another one for re-arming the cutter when the sweep line is hauled in. It is pointed out that accidental discharge of the cutter tool by underwater debris or the like striking the trigger pin, is prevented by virtue of the fact that the anvil is substantially thicker than the trigger pin and hence acts as a shield therefor, as can be seen in FIG. 5.

In the event that the trigger pin is accidently removed from hole **106** prior to placing the device underwater so that passage **94** is air-filled, the plunger will not strike the piston, as the movement thereof will be stopped when the sleeve **92** strikes the coller **96** contained within the plunger passage **94**. This stopping position is reached before the plunger **88** reaches piston **78**. As a further precaution, the aligned holes provided in the lever **68** within the breech block and in the cover of the breech block are adapted to receive the safety pin **76** that will prevent rotation of said lever. Prior to placing the mechanism within the water, the safety pin is withdrawn.

One advantage of the structure described above is that it results in a compact, light-weight cable cutter, wherein the parts are so arranged as to make possible the use of a greater number of such cutters per given length of mine sweep line. Specifically, the above described cutter has approximately one-fourth the weight of the standard cutter used heretofore, and shown in Patent No. 2,422,506. One arrangement of cutters on a sweep line is shown in FIG. 1 wherein four cable cutters are shown attached to a single conventional carrier member, said carrier member being clamped to a sweep line **22**. The cutter at the extreme left is shown in discharged condition with its anvil lost or spent.

The carrier member consists of a base plate **122** having affixed thereto a stabilizing fin **124** extending laterally therefrom, said fin member being adapted to maintain the combination of cutters in a horizontal plane as they are swept through the water. A U-shaped member having a crosspiece **126** and legs **130** is carried by the base plate. The crosspiece **126** is affixed to, and extends lengthwise of, said base plate **122**, and the rearmost ends of the respective cable cutters abut said crosspiece and are bolted thereto by bolts **128** extending into holes in the end portions **84**. The legs **130** extend outwardly of the base plate **122** adjacent the forward end thereof. The forward leading edge of the base plate **122** is also provided with a flange **131** extending outwardly therefrom and adapted to deflect a mine anchor cable into the path of one of said hooks.

The first cable cutter abuts a leg **130** as well as the longitudinal crosspiece **126**, the various cutters being placed in abutting relation to one another, as shown in FIG. 1. The base plate **122** is adapted to be attached to the sweep line **22** by means of two or more U-shaped clip members **132** in the manner shown in FIG. 2, a toggle bolt **134** extending through the legs of said U-shaped member and the base plate with the cable being located between said bolt and the bite of the U-shaped clamp.

The compact arrangement shown in FIG. 1 is made possible not only by virtue of the compactness of each cutter and its light weight, but also by the fact that each cutter is so oriented on the base plate **122** that when said base plate is attached to the mine sweep line **22** said cutter extends substantially at right angles to said sweep line. As a result of orienting the cutters in the manner described above each anvil **36** is so arranged that its hook portion faces lengthwise of the sweep line instead of longitudinally thereof as has been the case heretofore. Consequently, the cutters successively become active for mine cable cutting operations. It is further pointed out that the shank of one anvil is in abutting relation with the frame of an adjacent unfired cutter and hence when a chisel strikes the anvil, said anvil will be driven forwardly and then away from the cutter frame, thus preventing same from striking any adjacent anvil and thus preventing accidental dislodgement of another anvil. With the last cutter of the group, this precaution is not essential.

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 that as specifically described.

What is claimed is:

1. A mine cable cutter comprising an elongated frame having a hook-shaped member attached to the forward end thereof, said hook-shaped member having a shank portion attached to the frame by means of a shear pin, and an anvil portion extending across the forwardmost end of the frame and spaced from said end thereby forming a mine cable receiving recess, a cutting member slidably mounted in said frame and adapted to slide towards said anvil striking the same, an explosive cartridge mounted behind said cutting member for driving same towards the anvil for cutting a cable received in said recess, means actuated by a mine cable for firing said cartridge, including a slidable rod mounted on said frame, spring means for moving said rod, means for retaining said rod against movement by the spring, said rod retaining means being adapted to be moved out of engagement with said rod upon entry of an anchor line into said recess, said rod retaining means comprising an S-shaped trigger-pin, said trigger-pin comprising a rearmost leg resting within a groove provided in the forward end of the frame, a portion of said rearmost leg being removably engaged within a hole provided in the forwardmost end of the rod, said groove having a widened portion therein adjacent one of its ends and said rearmost leg having an offset portion resting in said widened groove portion, thereby preventing rotation of said trigger-pin about the rearmost leg; said trigger-pin further comprising a forwardly extending portion connected to the rearmost leg and having at its forward end a forwardmost leg extending substantially at right angles to the forwardly extending portion of the pin, said forwardmost leg extending into a hole provided in the shank portion of the hook-shaped member whereby said trigger-pin is retained against rotation about the axis of the rearmost leg of said trigger-pin, said rearmost leg of the trigger-pin being adapted to be withdrawn from the hole provided in said rod by the movement of an anchor line against the forwardly extending portion of the trigger-pin, thereby allowing said rod to move rearwardly on the frame actuating the firing mechanism and discharging the cartridge thereby causing forward movement of the cutting member.

2. A mine cable cutter as set forth in claim **1** wherein the offset portion of the rearmost leg of the trigger-pin extends across the path of movement of the cutting member, said cutting member being provided with beveled surfaces at its forward end adapted to deflect said rearmost leg of the trigger-pin out of its path of movement.

3. A mine cable cutter comprising an elongated frame member, an anvil member attached to said frame at its forwardmost end in spaced relation therefrom thereby forming a mine cable receiving recess, a chisel member slidably mounted in said frame and movable toward said anvil member being adapted to strike the same, an explosive cartridge mounted behind said chisel member, means for firing said cartridge whereby the chisel will be driven forwardly against the anvil, said firing means comprising a breech block snugly mounted against the rear end of the frame, a firing pin slidably mounted in said breech block and having its rearmost end pivotally attached to

one end of a lever that is pivoted intermediate its ends to said breech block, a piston slidably mounted within a cylinder provided in the breech block on the same side of the lever as the firing pin and having its rearmost end pivotally connected to the opposite end of said lever; an opening in said frame at the forward end of said cylinder for admitting water therein when the cutting tool is submerged, a plunger slidably mounted on said frame in axial alignment with said cylinder and piston spring means adapted to drive said plunger into said cylinder pushing water against the forward face of the piston, thereby rocking the lever and pushing the firing pin forwardly against the cartridge, discharging the same, means for preventing the plunger from striking the forward face of the piston, a sleeve member attached to the forward end of the plunger, a rod extending forwardly from said sleeve and having a forward end slidably mounted on said frame, said spring means surrounding said rod and bearing against said sleeve, tending to push the plunger rearwardly toward the piston; means for retaining the plunger in retracted position, comprising a hole in the forward end of said rod, a slot provided in the forward end of said frame and having an enlarged portion therein, an S-shaped trigger-pin having a rearmost leg carried in said slot and having a portion of said leg engaged in a hole in the rod thereby retaining said rod in retracted position, said trigger-pin having an offset portion in its rearmost leg for preventing accidental rotation thereof, said trigger-pin further comprising a forwardly extending portion and a forwardmost leg portion extending at right angles to said portion, said forwardmost leg portion extending into a hole provided in a shank portion on said anvil, the rearmost leg portion of the trigger-pin being situated in the path of movement of the chisel member but offset from the center line thereof, said trigger-pin being adapted to be moved laterally of the frame by the entrance of an anchor line into said recess, thereby removing the rearmost leg of the pin from the hole provided in the rod member, allowing rearward movement of said rod and plunger, thereby actuating the firing mechanism; whereby said chisel member in its forward movement is adapted to contact the rearmost leg of the trigger-pin pushing the same forwardly out of the groove in the forward end of the frame and rotating the trigger-pin about its forwardmost leg thereby preventing said trigger-pin from blocking the forward movement of the chisel member.

4. A mine cable cutter comprising an elongated frame, a barrel provided in said frame adjacent one side thereof and opening at one end of said frame; a hook-shaped member attached to the frame adjacent said end, said hook-shaped member comprising a shank portion attached to a side of said frame and extending forwardly thereof, said hook-shaped member further comprising an anvil portion extending from said shank portion across and spaced from the adjacent end of said frame, thereby forming a mine cable receiving recess between said anvil and said frame, a cutting member slidably mounted in said barrel adjacent the side where the shank portion is attached to the frame, explosive means for forcibly driving said cutting member across said cable receiving recess and against said anvil; actuating means for discharging said explosive means, a trigger-pin releasably engaged with said actuating means for retaining said means in an inoperative position, said trigger-pin comprising an arm extending transversely of said recess and longitudinally of the path of travel of said cutter member, said arm being adapted to be moved by a mine cable as said cable moves through said recess so as to release said trigger-pin from said actuating means, whereby said explosive means is discharged; said trigger pin further comprising an extension affixed to one end of said arm and extending at right angles to said arm and longitudinally of said mine cable receiving recess, an aperture formed in said shank portion for receiving a portion of said extension, said extension and said aperture in said shank portion being relatively proportioned so that said trigger pin is adapted to be withdrawn from the actuating means retaining position upon accidental breaking away of said hook member from said frame.

5. A mine cable cutter comprising an elongated frame having a hook-shaped member attached to the forward end thereof, said hook-shaped member having a shank portion attached to the frame by means of a shear pin, and an anvil portion extending across the forwardmost end of the frame and spaced therefrom thereby forming a mine cable receiving recess, a cutting member slidably mounted in said frame and adapted to slide across said recess and into contact with said anvil striking the same, explosive means mounted behind said cutting member for driving the same towards the anvil for cutting a mine cable received in said recess, means including a firing mechanism actuated by a mine cable for firing said explosive means, including a slidable rod mounted on said frame, spring means for moving said rod, means for retaining said rod against movement by the spring, said rod retaining means being adapted to be moved out of engagement with said rod upon entry of a mine cable into said recess, said rod retaining means comprising a trigger pin, said trigger pin comprising a rear-most leg extending longitudinally of said cable receiving recess, said rearmost leg having a portion thereof removably engaged with a hole provided in the forwardmost end of said rod, said trigger pin further comprising a forwardly extending portion extending at right angles to said rearmost leg and connected to the rearmost leg, said forwardly extending portion being located substantially in a line with the axis of said cutting member and substantially within the path of movement thereof, an extension affixed to the forwardly extending portion of the trigger pin and extending at an angle thereto, an aperture formed in said hook shaped member for receiving an end portion of said extension, whereby resistance to twisting of the trigger pin about the rearmost leg thereof is imparted thereto; the rearmost leg of the trigger pin being adapted to be withdrawn from the hole provided within said rod by the movement of a mine cable against the forwardly extending portion of the trigger pin, thereby allowing said rod to move rearwardly on the frame actuating the explosive means thereby causing forward movement of the cutting member; said cutting member being driven forwardly with a force sufficient to cut a cable, and strike said anvil, breaking said shear pin thereby releasing said hook shaped member from said frame.

6. A mine cable cutter assembly comprising, a base-plate, attaching means on said base-plate adapting the same for attachment to a towed mine sweep line, a plurality of cutter tools attached to said base-plate, said cutter tools being arranged in tandem on said base-plate, one behind the other, and extending at right angles to a mine sweep line when said base-plate is attached thereto, each cutter tool comprising an elongated frame having a hook-shaped member attached to the forward end thereof, said hook-shaped member having a shank portion attached to the frame by means of a shear pin, and an anvil portion extending across the forwardmost end of the frame and spaced therefrom thereby forming a mine cable receiving recess, a cutting member slidably mounted in said frame and adapted to slide across said recess and into contact with said anvil striking the same, explosive means mounted behind said cutting member for driving the same towards the anvil for cutting a mine cable received in said recess, means including a firing mechanism actuated by a mine cable for firing said explosive means, including a slidable rod mounted on said frame, spring means for moving said rod, means for retaining said rod against movement by the spring, said rod retaining means being adapted to be moved out of engagement with said rod upon entry of a mine cable into said recess, said rod retaining means comprising a trigger pin, said trigger

pin comprising a rear-most leg extending longitudinally of said cable receiving recess, said rearmost leg having a portion thereof removably engaged within a hole provided in the forwardmost end of said rod, said trigger pin further comprising a forwardly extending portion extending at right angles to said rearmost leg and connected to the rearmost leg, said forwardly extending portion being located substantially in a line with the axis of said cutting member and substantially within the path of movement thereof, an extension affixed to the forwardly extending portion of the trigger pin and extending at an angle thereto, an aperture formed in said hook-shaped member for receiving an end portion of said extension, whereby resistance to twisting of the trigger pin about the rearmost leg thereof is imparted thereto; the rearmost leg of the trigger pin being adapted to be withdrawn from the hole provided within said rod by the movement of a mine cable against the forwardly extending portion of the trigger pin, thereby allowing said rod to move rearwardly on the frame actuating the explosive means thereby causing forward movement of the cutting member, said cutting member being driven forwardly with a force sufficient to cut a cable, and strike said anvil, breaking said shear pin thereby releasing said hook-shaped member from said frame.

7. A mine cable cutter assembly comprising, a base-plate having means thereon for selective attachment of the assembly to a towed mine-sweep line, a plurality of cutter tools removably attached to said base-plate in tandem relation with one another, each of said cutter tools extending substantially at right angles to said sweep line when said base-plate is attached to the latter, each of said cutter tools comprising an elongated frame member extending transversely of said sweep line, a hook member having a shank portion attached to said frame member with a shear pin, at the end thereof nearest said sweep line and having an anvil portion extending transversely of said frame member in spaced relation from the adjacent end thereof, thereby forming a mine cable receiving recess, each of said hook members being attached to its respective frame by means of a shear pin, a cutter member slidably mounted on said frame adjacent that side of the frame nearest the closed end of said mine cable receiving recess, explosive means mounted in said frame for forcibly driving the cutter member toward said anvil portion with sufficient force to cut a mine cable received in said recess, strike said anvil portion and break the same away from said frame; actuating means for firing said explosive means including a rod, said actuating means slidably mounted and spring biased on said frame adjacent the side thereof nearest the open end of said mine cable receiving recess, a trigger pin having a portion thereof engaged with said rod for restraining the latter against operative movement, said trigger pin being located in said mine cable receiving recess and adapted to be actuated by a mine cable, said trigger pin having a forwardly extending portion situated in the path of movement of said cutter and located adjacent the closed end of said mine cable receiving recess, an extension affixed to the forwardly extending portion of the trigger pin and extending at an angle thereto, an aperture formed in said hook shaped member for receiving an end portion of said extension, whereby resistance to twisting of the trigger pin about the portion thereof engaged with said rod is imparted thereto; said trigger pin being removed from restraining engagement with said actuating means by the movement of a mine cable into said recess against said forwardly extending portion thereby rendering said actuating means operative for discharging said explosive means.

8. A mine cutter cable assembly comprising, a base-plate having means thereon whereby the assembly may be attached to a towed mine sweep line, a plurality of cutter tools removably attached to said base-plate in tandem relation with one another, each of said cutter tools extending substantially at right angles to said sweep line when said base-plate is attached to the latter, each of said cutter tools comprising an elongated frame member, a hook shaped member having a shank portion thereof attached to said frame adjacent one side thereof by means of a shear pin, whereby a mine cable receiving recess is formed at one end of said cutting tool, a cutter member slidably mounted on said frame for movement longitudinally thereof, said cutter member being mounted adjacent that side of the frame nearest the shank portion of said hook shaped member, explosive means for driving said cutter member across said mine cable receiving recess and against an anvil portion of said hook-shaped member; actuating means including a slidable rod, for firing said explosive means, said rod being slidably mounted on said frame for movement longitudinally thereof adjacent that side of the frame nearest the open end of said mine cable receiving recess, a trigger pin removably engaged with said rod and retaining said rod and therefore said actuating means in inoperative position, said trigger pin having a first portion thereof extending toward the closed end of said recess and having a second portion adjacent said closed end of the recess extending at right angles to said first portion and transversely of said recess, an extension affixed to the end of the second portion of the trigger pin and extending at an angle thereto, an aperture formed in said hook shaped member for receiving an end portion of said extension, whereby resistance to twisting of the trigger pin about the first portion thereof is imparted thereto; said second portion being adapted to be engaged by a mine cable upon movement of the latter into said mine cable receiving recess, whereby said trigger pin is disengaged from said actuating means thereby causing said actuating means to discharge said explosive means, driving said cutter member across said mine cable receiving recess and into contact with the anvil portion of the hook shaped member, thereby cutting a mine cable and dislodging said hook shaped member from said frame, whereby an unfired successive one of said tandemly arranged cutter tools is adapted for engagement with a successively encountered mine cable.

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MILTON BUCHLER, *Primary Examiner.*

SAMUEL BOYD, ARTHUR M. HORTON, *Examiners.*

S. W. ENGLE, B. BELKIN, *Assistant Examiners.*