Sept. 13, 1932. J. H. SOLKESZ 1,877,073

DEVICE FOR CUTTING THE CABLES OF SUBMARINE MINES

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FIG: 1

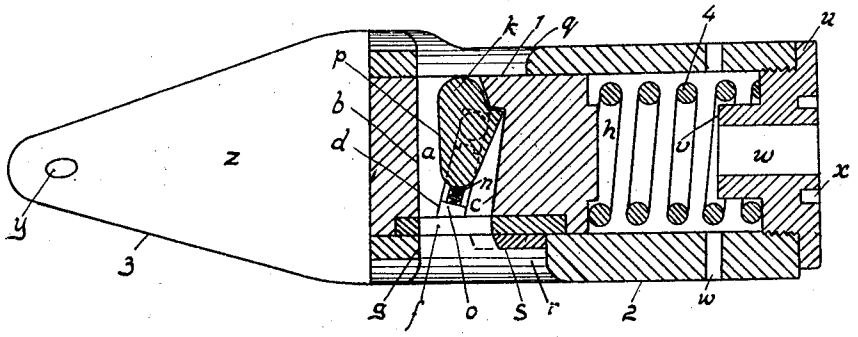


FIG: 2

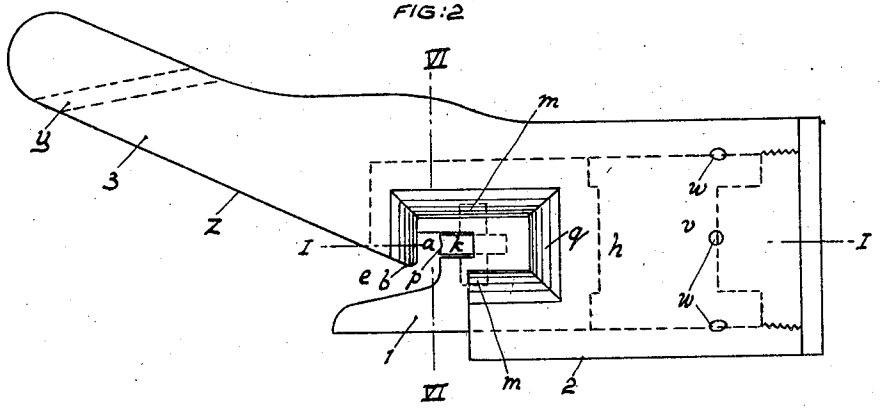
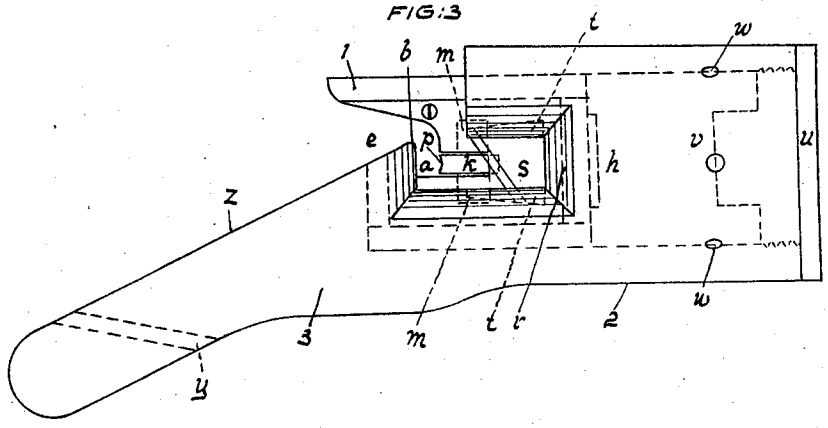


FIG: 3



J. H. Solkesz INVENTOR

By: Marks & Clark Attys.

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FIG: 4

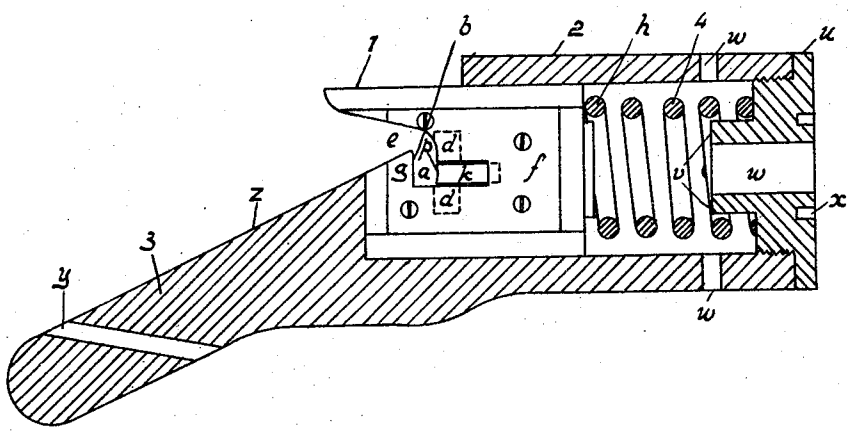


FIG: 5

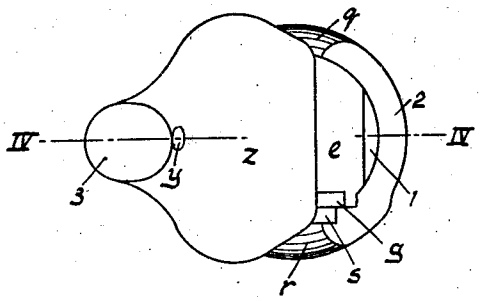


FIG: 6

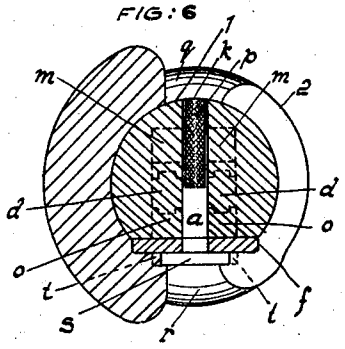


FIG: 7

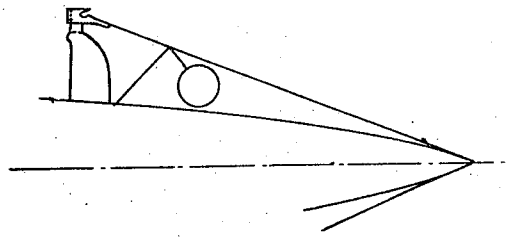
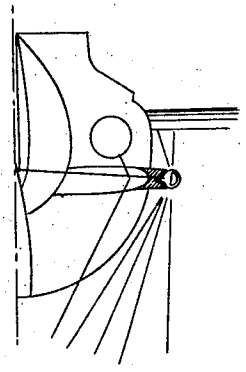


FIG: 8



J. H. Solkesz
INVENTOR

By: Marks & Clark
ATTYS.

Patented Sept. 13, 1932 1,877,073

UNITED STATES PATENT OFFICE

JAN HAJO SOLKESZ, OF SOURABAIA, JAVA, DUTCH EAST INDIES

DEVICE FOR CUTTING THE CABLES OF SUBMARINE MINES

Application filed June 19, 1930, Serial No. 462,348, and in the Netherlands April 11, 1929.

This invention relates to devices for cutting the cables used for anchoring submarine mines. In known cutting devices, the mine cable is caught between cutting jaws, and the pull of the cable causes the jaws to close and thereby cut the cable. As the mine cable is caught only by the jaws, the cable slips between the jaws while the jaws are forced together with the result that the jaws are drawn with great force in a direction substantially parallel to their pivot, and so the device may be damaged.

The cutting device according to the invention is so constructed that the mine cable is engaged and held by distinct parts of the device before the cutting jaw or jaws come into action. The arrangement is such that no force acts on the jaws in the direction of their pivots, so that the mine cable cannot slip along the cutting edges of the jaws and these edges are not damaged.

A form of construction of the invention is shown by way of example in the accompanying drawings, in which

Fig. 1 is a vertical section on the line I—I of Fig. 2.

Fig. 2 is a plan view of a device according to the invention.

Fig. 3 is an inverted plan view of the device shown in Fig. 2.

Fig. 4 is a horizontal section on the line IV—IV of Fig. 5.

Fig. 5 is a front view of the device shown in Fig. 2.

Fig. 6 is a vertical section on the line VI—VI of Fig. 2.

Fig. 7 is a plan view of one half of the front part of a submarine equipped with a device according to the invention, and Fig. 8 is a front view of Fig. 7.

The device shown in the drawings is intended to be arranged at the port-side of a submarine and comprises mainly a piston 1 a cylinder 2 and a guide arm 3. The cylinder 2, which is acted upon by a spring 4, is flattened at the lower side and is provided with a vertical slot a in which a clamp k is arranged, this clamp being formed in one piece with two journals or trunnions m. The front wall b of the slot a has a surface roughened like a file and serves as a gripping surface against which the mine cable is pressed by the clamp k. The rear surface c of the vertical slot a is inclined as shown in Fig. 1, and serves to keep the clamp k under normal circumstances in its inactive position with its front surface p vertical.

In each of the side walls of the slot a, an inclined groove d of rectangular section is formed. The grooves d serve as guides for the journals m of the clamp k. The journals m are appropriately arranged in guide blocks, opposite which, in the lower parts of the slots, similar guide blocks o are arranged. A spring n interposed between the guide blocks in each of the slots a tends to keep the clamp in its highest position.

In the lower portion of the cylinder 2 there is arranged a plate f, which may be attached by screws, as shown in Fig. 4, to the cylinder. The plate f is provided with a slot registering with the slot a and extending to the front side of the device as indicated by Figs. 3 and 4. The cylinder is provided with a similar slot e corresponding to the slot in the plate. The projecting part g of the plate shown in Fig. 4 serves as a counter-jaw and may be also roughened.

At the rear end of the piston 1, a spring 4 is arranged tending to keep the piston in its foremost position.

As shown in Fig. 1, the rear wall of the slot a and the clamp k are specially formed so that the front side p of the clamp is vertical when the clamp occupies its highest position, into which it is brought by the action of the spring n. The front side p may be roughened also.

The clamp k can perform two movements in the slot a. One movement consists of turning about the journals m and the other of moving downwards in an inclined direction guided by the slots d. Both movements bring the front surface of the clamp nearer to the surface d forming the front wall of the slot a.

The piston 1 with its spring 4 are locked in the cylinder by means of a locking piece u screwed in the rear end of the cylinder.

The cylinder 2 is formed in one piece with

the guide arm 3 which constitutes a projection of the cylinder and closes the cylinder for the greater part at the front side. The movement of the piston is limited at the front side by an abutment formed in said guide arm (Fig. 4).

In the upper wall of the cylinder there is provided a slot q, which is formed with bevelled walls so as to allow the mine cable to move freely through said slot when the piston is forced rearwardly in the cylinder. At the lower side of the cylinder a similar slot r is arranged for the same purpose, and at the rear end of the slot r a knife s is arranged in slots t (Fig. 3), in the lower side wall of the piston. These slots are preferably dovetailed in order to prevent the knife from moving forwardly. The upper surface of the knife s lies in the same plane as the lower surface of the cylinder.

The piston 1 is kept under normal circumstances by the spring 4 in its foremost position, in which the front surface of the cylinder abuts against the rear surface of the guide arm 3. The spring 4 may be kept centred by means of a boss h at the rear end of the piston and a boss v on the locking piece u.

In order to prevent the water enclosed in the cylinder behind the piston from forming too high a resistance for the rearward movement of the piston, holes w may be provided in the walls of the cylinder and in the locking piece.

In the front end of the guide arm, a hole y is arranged to serve for connection of the guide cable leading from the stem of the vessel (as shown in Fig. 7) to the cutting device.

The surface z of the guide arm is inclined in such a manner that a mine cable sliding along the above-mentioned guide cable would move along the surface z and enter the opening e whence it enters the slot a until stopped opposite the clamp k.

The working of the cutting device is as follows:—

When a submarine or other vessel equipped with the cutting device approaches a submarine mine, the mine cable will slide along the guide cable to the guide arm of the cutting device and enter the space e as above described. Since the only mines dealt with are those whose cables lie between the cutting devices at opposite sides of the vessel, the part of a mine cable between the cutting device and the anchor will be perpendicular or will incline under the vessel as shown in Fig. 8. The mine cable will, therefore, be drawn without fail into the slot a and will move into a position opposite the clamp k.

Assuming the cable to be so positioned, as the vessel advances, the cable will slide downward, and the two parts of it above and beneath the cutting device will both incline rearwardly. The inclination of the part of the mine cable connected to the anchor will be more inclined than the part connected to the mine itself, because the latter will move through the water. Since now the portion of the clamp k beneath the journals m is longer than the portion above said journals, the clamp will turn around its journals in counterclockwise direction (as viewed in Fig. 1) and the clamp will at the same time move downwardly, sliding along the inclined grooves d. Both movements will cause the clamp to advance towards the surface b of the slot a and to clench the mine cable. The stronger the pull of the cable, the tighter will become the grip of the clamp, so that the cable is gripped firmly and cannot slip down. The roughened surfaces would of course assist to prevent slipping.

The pull which the vessel exerts on the cable is utilized to cut the mine cable. The said pull causes a pressure to be exerted on the piston which compresses the spring v, at the same time causing the water behind the piston to escape through the holes w. The cable is ultimately cut through by the knife s arranged under the piston. The bottom plate f is pressed tightly against the knife s by the pull of the anchor cable which tends to draw the piston downwards.

As soon as the mine cable is cut, the upper part of the cable connected to the mine is drawn upwards by the bouyancy thereof, and the upward pull of the cable will release the cable-end by moving the clamp k upward, the clamp at the same time turning clockwise about its journals, which also aids to release the cable.

The clamp k, under the influence of the springs n and of the rear face c of the slot a will now be brought back in its original position, whilst the spring 4 will bring the piston back to its foremost position ready for cutting another mine cable.

What I claim is:—

1. A device for cutting the cables of submarine mines, comprising a rigid member and a movable member, the latter containing a clenching device cooperative with the rigid member to clamp the mine cable, and a knife on the rigid member to cut the cable beneath the clenching device during rearward movement of said movable member.

2. A cutting device according to claim 1 in which the movable member is provided with a clamp arranged rotatably and shiftably in a forwardly inclined direction in a slot in the movable member, which clamp has such a form that, under the rearward pressure of the mine cable thereon, the clamp is turned, thereby gripping the cable, whilst the pull of the cable downwardly moves the clamp forwardly and downwardly in an inclined direction thereby effecting a tight clutch of the cable by the clamp.

3. A cutting device according to claim 1 in which the movable member carrying the clenching device is displaceable rearwards against the pressure of a spring, and a knife is arranged on the rigid member of the device.

4. A cutting device according to claim 1 in which the movable member is constructed as a piston arranged in a cylinder, and the cylinder having a fluid brake therein arranged behind the piston.

In testimony whereof I affix my signature.

JAN HAJO SOLKESZ.