PUBLISHED
MAY 4, 1943.
BY A. P. C.

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EQUIPMENT FOR SUBAQUEOUS ARMS DESTINED TO BRING ABOUT THE FIRING OF SAME WHEN TRAVERSED BY A GALVANIC CONTACT CURRENT

Filed July 22, 1939

Serial No. 285,850

Fig. 1

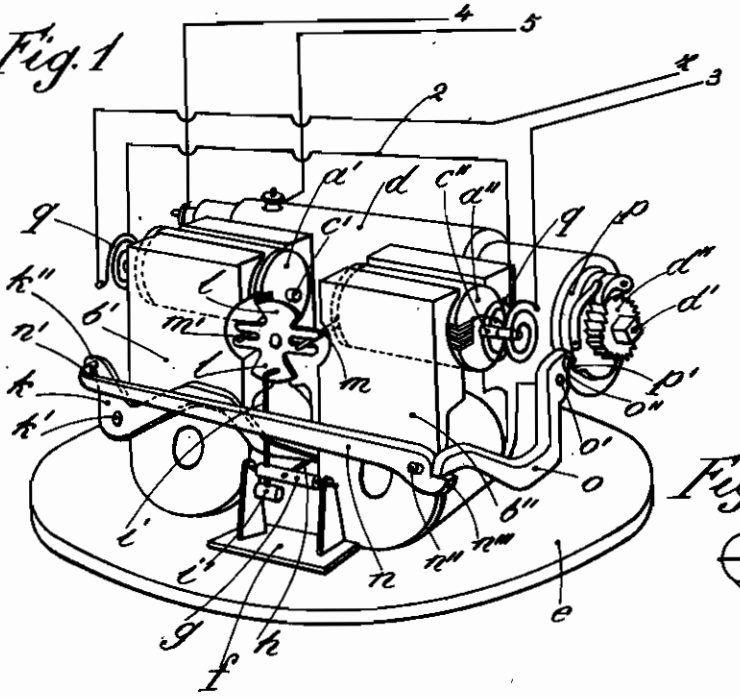


Fig. 2

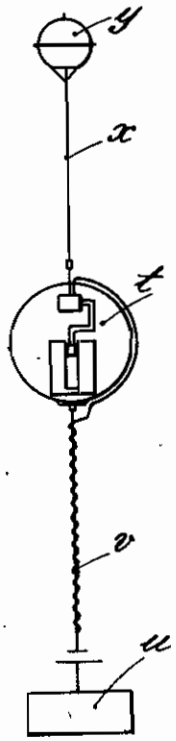


Fig. 3

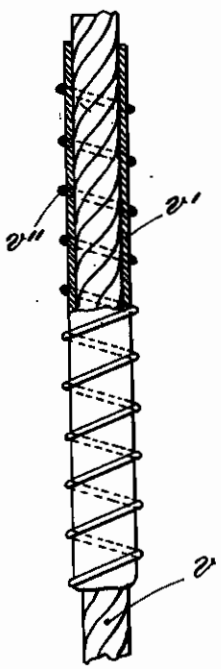
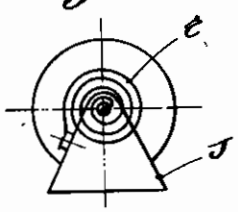


Fig. 4



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INVENTOR

By Otto Munn
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Published May 4, 1943 Serial No. 285,850

ALIEN PROPERTY CUSTODIAN

EQUIPMENT FOR SUBAQUEOUS ARMS DESTINED TO BRING ABOUT THE FIRING OF SAME WHEN TRAVERSED BY A GALVANIC CONTACT CURRENT

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Application filed July 22, 1939

The invention concerns a device which receive galvanic currents obtained in the water by the iron portions of a floating body and by the copper portions connected to a mine or the like. The said device causing, through the action of this galvanic current, the play of a set of levers, the last of which brings about a mechanical action capable of sending out an electric current, disconnecting, for instance, the axis from the armature of a generator provided with a coiled spring, or the like, so that on its being actuated, it shall afford an electric current adapted to fire the arm. The device is such that although highly sensitive to the influence of magnetic currents, it is unaffected by mechanical actions—shocks, vibration, etc.—from the exterior.

The invention will best understood on following the specification and the accompanying drawing which shows, schematically, a practical example of the carrying out of the said invention.

In said drawing

Fig. 1 is a perspective general view of the apparatus;

Fig. 2 shows the said apparatus in operation in one of the modes of application;

Fig. 3 is a detail of the mooring cable which also performs the functions of a lower antenna.

Fig. 4 shows schematically the spring means for imparting a determinate position to the coil.

According to the example delineated, the apparatus is obtained with two coils a'—a'' rotating in the magnetic field of two permanent magnets b'—b''.

The two coils are provided with mutually reversed electric windings, so that under the influence of the galvanic current, the one turns in a direction opposed to that of the other.

The armature of the two coils are perfectly equilibrated relatively to their axes of rotation c'—c''. Beside this coil—according to the example—there is a dynamo d whose armature is connected to a previously coiled, torsional spring, and is destined to supply the current for the firing of the small electric fuze pertaining to the mine; this dynamo is locked to the rotating coils by means of a special system of levers, which we will proceed to describe.

The locking system is constituted as follows: Upon a suitable base e is fixed a small trestle f which carries a small roller g capable of rotation. The said roller carries two shafts integral therewith: the former h disposed horizontally, the latter i disposed vertically. The shaft h is intended to support the extremity of a lever k pivoted at k'.

The shaft i is provided at its lower part with a counter-weight i', and at its upper part it is suitably bent at an angle in order to bear, at the lower extremity thereof, against one of the two sectors l of an organ capable of rotation.

Two appendages m—m' are integral with the two coils a'—a'' and engage with two slots carried by the organ provided with the said two sectors l—l.

The lever k is provided with a projection k'' against which bears the extremity n' of a lever n fulcrumed at n''. The other extremity of the said lever n is likewise provided with a projection n''' upon which rests the free extremity of another lever o fulcrumed at o'. This lever o also carries a tooth o'' against which bears a projection p' carried by the sleeve p, jutting out from the dynamo d. The spring destined to actuate this dynamo is tightened by means of the square d' and the corresponding jack d''.

The levers k—n are perfectly equilibrated relatively to their centre of rotation by means, for instance, of counter-weights, not shown in the drawing; the lever o may also not be equilibrated.

Each coil is provided at the central part thereof, viz. at the parts facing each other, with a small spiral spring. For the sake of clarity in the drawing the small springs are not shown in Fig. 1; one of them, however, is clearly represented in Fig. 4 in which the spring r is seen to be fixed at one end thereof to the axis of the coil, and at the other end to a support s of the said coil. These small springs serve the purpose of holding the coil in a given position until same is without any current, so that the element of sector l may always be in a symmetrical position relatively to the appendix i; precisely until there is no longer any passage of the current. And these small springs are organs which suffice to maintain the determinate position, which is—in short—the position for which the two small pins m—m' retain the sector in the desired symmetrical position, represented in the drawing, and adapted to afford a central support for the appendage i in the solid field of one of the sectors l.

As is apparent from Fig. 2, the apparatus is placed within the torpedo t, which when submerged in the water is moored to the anchor u by means of a cable v, which, as may especially be seen from Fig. 3, is partly wrapt in insulating material v'. Round this insulating material is wound copper wire v'' which constitutes the lower antenna, that is, the lower electrode. The upper electrode, instead, is composed of an uncovered copper cable x, carried by a cable-buoy y also made of copper.

The operation takes place as follows:—on the iron hull of a floating body coming into contact with the two antennae *x v*, or with the buoy *y*, a galvanic pile is fermed, whatever may be the concentration of the sea-water. This improvised galvanic pile causes a weak current to circulate through the next circuit; the current starts, for instance, from the buoy; it flows through the upper antenna *x* connected to the wire *z* (Fig. 1) and proceeds to circulate through the coil *a'* of the apparatus, from whence, passing through the wire 2 it enters the coil *a''*, and issues from same through the wire 3 connected to the lower antenna *v*; the water, which constitutes the pile electrolyte, closes the circuit between the antenna *v* and the hull.

The current circulating through the coils creates a magnetic field, which, under the influence of the magnetic field existing in the two permanent magnets *b'*—*b''*, causes the rotation of the winding spirale and, with same, of the two coils *a'*—*a''*. And as the said windings are, as stated above, turned in mutually reversed directions, the coils turn in a direction being opposed, the one, to that of the other. At the end of each coil drum is located—as has been seen—the respective contact pin *m*—*m'* or the like. These contact pins thus cause the action, viz. the rotation, of the sector element *l*—*l* in one direction or in the other, according as the upper or the lower antenna is struck.

Due to the slight rotation of *l* the shaft appendage *i* springs into one of the gaps of the said element; herethrough the small roller *g* is permitted to perform a slight rotation under the action of the pressure of the lever *k* which bears against the appendage *h* of the said small roller.

This lever, thus, on the raising of its extremity *k''*, liberates the lever *n*, which rotates while lowering the extremity *n'''* thereof. Then, the lever o turns about the pivot o', raising its extremity o'' and freeing the tooth *p'* from the sleeve *p*. Hereby the dynamo armature, which is charged with a spring or other means, is left free to rotate, thus generating the current, which, through the conductors 4—5 is conveyed to the charge-igniting fuze.

Of course, the shifting of the lever o may bring about any other action—the closure of a circuit, activation of a pile or the like, capsule of generating current.

PASQUALE BORRACCI.