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I. KITSEE.

AUTOMATICALLY STEERING MOVING OBJECTS.

APPLICATION FILED FEB. 28, 1903.

Fig. 1.

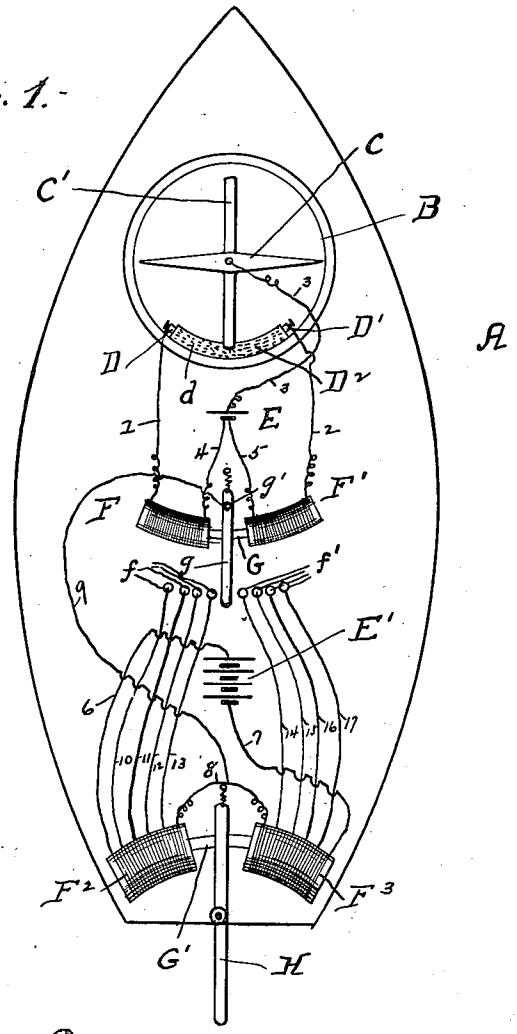
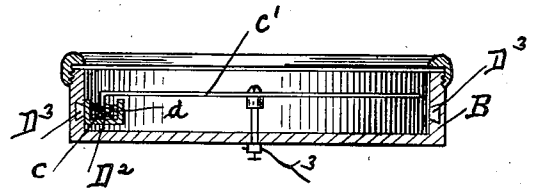


Fig. 2.



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AUTOMATICALLY STEERING MOVING OBJECTS.

No. 800,654. Specification of Letters Patent. Patented Oct. 3, 1905.

Application filed February 28, 1903. Serial No. 145,550.

To all whom it may concern:

Be it known that I, ISIDOR KITSEE, of the city and county of Philadelphia and State of Pennsylvania, have invented a certain new and useful Improvements in the Methods of Automatically Steering Moving Objects, of which the following is a specification.

My invention relates to an improvement in the method of automatically steering moving objects, and has more special reference to the steering of objects such, for instance, as torpedoes.

Torpedoes may be divided into two classes, dirigible torpedoes—that is, torpedoes which are connected with a source of power, generally electric current, to the place from where they are launched (these torpedoes can be steered at the will of the operator) and torpedoes which when launched are entirely independent from the place of launching. Such torpedoes contain generally a mechanism whereby the direction given at the launching is maintained during its travel. With such torpedoes it often happens that through the waves of the ocean the direction is more or less changed, and as the steering mechanism is rigidly attached thereto and no provisions are made to aright its course the torpedo is apt to either miscarry or, as official reports have stated, to turn from its course and return to the place of launching. One of these reports was made by the officials of the United States Government, and were it not that the torpedo was minus its war-head a great accident to its own vessel would have been the result. It is the aim of my invention to obviate this defect and to provide torpedoes, no matter if dirigible or otherwise, with a device whereby the course of the torpedo can be righted if the same should be deflected by the waves or other obstacles.

The underlying principle of this my invention lies therein that through the varying position of the movable part of a compass certain devices are influenced, and with the help of such devices the steering apparatus is deflected in a manner so as to compel the torpedo to assume its original directive course.

Referring to the drawings, Figure 1 is a diagrammatic view of the automatic steering device embodying my invention. Fig. 2 is a sectional view of the compass with its contacting device.

In the figures, A is the moving object—torpedo, if such.

B is a compass of a type such as is generally employed in marine vessels, with the exception that the compass-needle is provided with the contact-bar C′ and the further exception that the compass is provided with the receptacle D^2, containing the conducting fluid or liquid *d*, and also provided with the two terminals or contacts D and D′. This receptacle is secured to the movable part of the compass through the groove D^3, which groove runs around the whole circumference of the compass-case, and with the aid of this groove the receptacle D^2 can be secured to any desired point.

The conducting-bar C′ is provided with a curved end *c*, adapted to dip into the liquid *d*. This liquid may consist of any of the well-known electrolytes; but in my experiments I have found that a solution consisting of equal parts of glycerin and water nearly saturated with a caustic, such as a hydrated sodium or potassium, is best adapted for the purpose, for the reason that this liquid does not readily freeze and for the further reason that this liquid offers sufficient resistance so that the least deflection of the arm will result in a disturbance of the balance between the circuits containing the solenoids F and F′.

The electrical connection between the bar C′, the solenoids F and F′, and the source of current E is as follows: One terminal of the solenoid F is connected through wire 1 to the contact D. One terminal of the solenoid F′ is connected through wire 2 with the contact D′. The other terminals of these solenoids are connected through wires 4 and 5, respectively, to one pole of the source of current E, the other pole of which is, through wire 3, connected with the bar C′. As said above, the receptacle containing the liquid *d* may be adjusted in a manner to suit requirements, and in practice the officer in charge, as in the first case, ascertains in what direction the torpedo should travel and then adjusts the receptacle in a manner so that the bar with its bent end *c* should dip into the liquid *d* at equal distance from the contacts D and D′. The force exerted on the core G by the solenoids F and F′ will then be equal, and the lever *g* attached thereto will be at its zero position. This lever is pivoted at *g*′. The solenoids with their appended lever are not designed to actuate the steering mechanism, but are only designed to actuate a second electric circuit in which are contained the solenoids F^2 and F^3, provided with the core G′, having appended thereto the lever H. One of the terminals of the solen-

oid F^2 is connected through wire 6 to one pole of a source of current E', and one terminal of the solenoid F^3 is connected through wire 7 with the other pole of the source of current E'. The second terminal of the solenoid F^2 is connected through wire 8 with the second terminal of the solenoid F^3.

To different points of the solenoid F^2 are connected the wires 10, 11, 12, and 13, terminating in the contact-points f, and to different points of the solenoid F^3 are connected the wires 14, 15, 16, and 17, terminating in the contact-points f'. The wire 8 is connected through wire 9 with the lever g, attached to the core G of the solenoids F and F'. The action of the lever g as to the wires 10 to 17, inclusive, and therefore as to the magnetizing effect of the solenoids F^2 and F^3, is as follows: As long as the lever g will retain its position as illustrated in the drawings—that is, at zero—the resistance and energizing properties of both of the solenoids F^2 and F^3 are equal. The core G' experiencing a right and left pull of equal force will retain its normal position, and the lever H, attached to said core, will therefore be in a position as illustrated and will not affect any mechanism operatively connected thereto and the steering mechanism; but as soon as the electrical balance between F and F' is disturbed the lower end of the lever g will contact with one or the other of the contacts f or f', thereby shunting part of the coil of the solenoid F^2 or F^3. The solenoid being thus shunted will exert a less energizing effect on the core G' than the solenoid not shunted, and the lever H will therefore be deflected either toward the right or left and will actuate the mechanism connected to the steering apparatus and will deflect this apparatus either toward the right or left, as the case may be. This in broad outlines are the arrangements and connections as embodied in my invention. I have in these figures not taken into consideration the employment of the intermediate source of compressed air; but it is obvious that this source may be employed.

I will state here that it is best to employ as the source of current E, if possible, only one cell, for the reason that the passing of the current through the liquid resistance d will always be attended by an electrolytic action, and it is best to reduce this action to the smallest possible degree.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a device of the class described, a steering apparatus, electromagnetic device operatively connected thereto, a resistance in the circuit of said electromagnetic device, and a compass-needle adapted to vary, through its varying position, the resistance of said circuit.

2. In combination with an automatic steering device, a compass, an electric resistance in said compass, said compass made part of an electric circuit containing an electromagnetic device operatively connected to said steering device and means in said compass to vary the flow of said resistance in accordance with the varying position of the movable part of said compass.

3. An automatic steering device consisting of the following instrumentalities: the steering device proper, electromagnetic means operatively connected to said steering device, a compass, a resistance, an electric circuit connecting operatively said compass to said electromagnetic means through said resistance, and means in said compass to vary said resistance in accordance with the varying position of the movable part of said compass.

4. In an automatic steering device, two solenoids normally balanced, a movable core for each of said solenoids, said cores operatively connected to the steering device, a compass, a resistance in said compass, said compass operatively connected, through an electric circuit, with said solenoids in a manner so that through the varying position of the movable part of said compass the current-flow through said solenoids is varied.

5. An automatic steering device for moving objects consisting of the steering device proper, power means to operate said steering device, electromagnetic means to operate said power means, a compass operatively connected to said electromagnetic means, and means in said compass to vary the resistance of said electric circuit, thereby varying, through said electromagnetic means, the pressure exerted by said power means on said automatic steering device.

6. In an automatic steering device for moving objects, a compass, means in said compass to vary the resistance of an electric circuit containing an electromagnetic device operatively connected to said steering device.

7. In an automatic steering device a compass, a resistance adapted to be altered through the varying position of said compass, a pair of solenoids, each provided with a movable core and means in said compass to energize one or the other of said cores in accordance with the varying position of the movable part of said compass.

In testimony whereof I hereby sign my name, in the presence of two subscribing witnesses, this 26th day of February, A. D. 1903.

ISIDOR KITSEE.

Witnesses:
EDITH R. STILLEY,
CHAS. KRESSENBESCH.