

G. C. DAVISON.  
TORPEDO DIRECTOR.  
APPLICATION FILED JAN. 26, 1909.

970,431.

Patented Sept. 13, 1910.

2 SHEETS—SHEET 1.

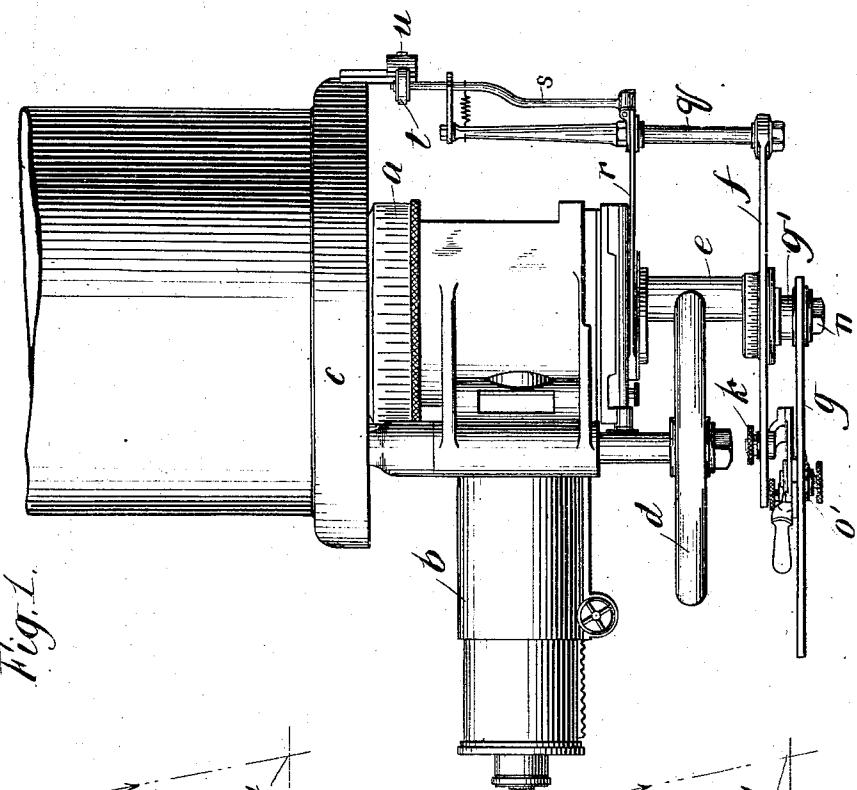


Fig. 1.

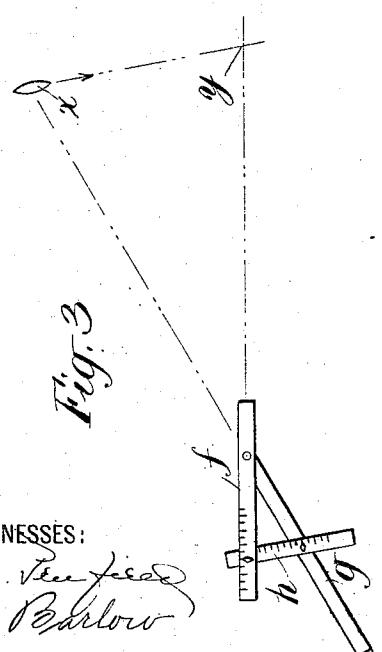


Fig. 3

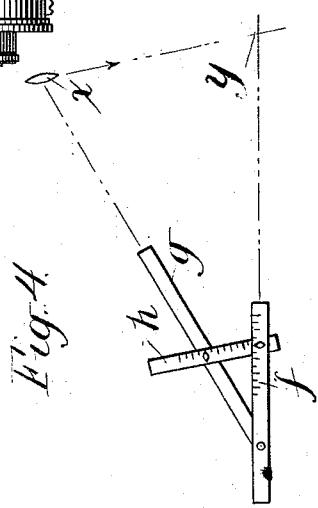


Fig. 4

WITNESSES:  
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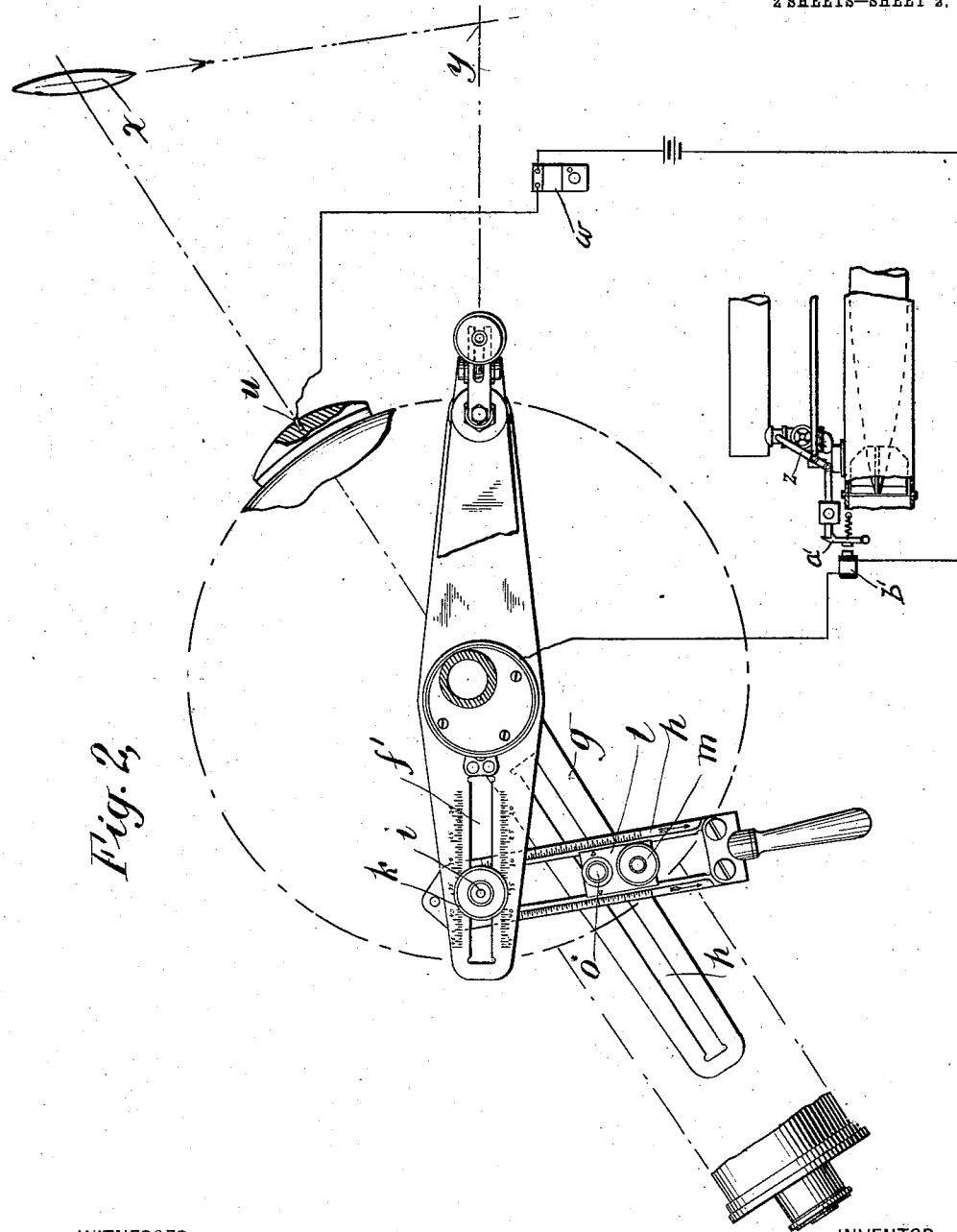


Fig. 2

WITNESSES:

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# UNITED STATES PATENT OFFICE.

GREGORY CALDWELL DAVISON, OF QUINCY, MASSACHUSETTS, ASSIGNOR TO ELECTRIC BOAT COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

## TORPEDO-DIRECTOR.

970,431.

Specification of Letters Patent. Patented Sept. 13, 1910.

Application filed January 26, 1909. Serial No. 474,232.

To all whom it may concern:-

Be it known that I, GREGORY CALDWELL DAVISON, a citizen of the United States, residing at Quincy, county of Norfolk, and 5 State of Massachusetts, have invented certain new and useful Improvements in Torpedo-Directors; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it app- 10 pertains to make and use the same.

The object of the invention is to provide, in connection with the periscope of a submarine boat, a device for directing a torpedo 15 toward a moving target. The manner in which this object is accomplished will best be understood from a consideration of the following description and the accompanying drawings, which set forth a preferred 20 form of the invention.

In the drawings Figure 1 is an elevation of the lower end of a periscope tube and its supporting structure, together with the director constructed in accordance with my 25 invention. Fig. 2 is a plan view of the director, parts of the periscope being indicated in connection therewith, and Figs. 3 and 4 are diagrammatic views illustrating the mode of operation of the director.

The periscope tube, of which the lower end is shown at *a*, with a laterally extending eye-piece *b*, is mounted in a stationary support *c* in the boat, and a hand-wheel *d* is provided for rotating the periscope on its 35 vertical axis to scan the horizon. Depending from the lower end of the rotatable periscope tube is a support *e* for the torpedo director, which director is made up essentially of three arms triangularly arranged and ad- 40 justable in position with respect to one another. These arms are a torpedo-direction-indicator arm *f* swiveled in the support *e*, a target-direction-indicator arm *g* having its point of support on the pin *g'* the axis of 45 which is in line with the vertical axis of the periscope tube, and on which the arm *g* is locked by the nut *n* so that the arm *g* turns with the periscope; and a target-course-indicator arm *h*. The torpedo-direction-indicator arm *f* has a slot *f'* in which the pin *i*, having a binding nut *k* and rigidly fixed in one end of the target-course-indicator arm *h*, moves, so that the pin *i* may be locked in any position along the slot *f'*. 55 The graduated side members of the target-

course-indicator arm *h* form a guideway for the slide *l* having a binding nut *m* by which it may be locked in any desired position in the guide-way. This slide carries a pin *o* moving in a slot *p* in the target-direction-indicator arm *g*, and having a binding nut *o'*. The graduated edges of the slot *f'* and the graduated side members of the arm *h* preferably have their scale divisions marked to indicate knots.

Referring now to Fig. 2 the manner in which the device is used is as follows: The periscope tube is rotated by the hand-wheel *d* until the moving target lies in its line of vision, all of the binding nuts being first 60 loosened. The slide *l* is then locked in position in the target-course-indicator arm *h* at a scale point corresponding to the estimated speed of the target, and the arm *h* is turned until it lies parallel to the course of 65 the target. The pin *i* is then set in the slot *f'* in the torpedo-direction-indicator arm *f* opposite a scale division corresponding to the speed of the torpedo, and by means of the binding nuts the three arms are locked 70 together in these relative positions, thereby forming a rigid triangle which is complementary to the triangle formed by the line of vision of the periscope, the course of the moving target and the course of the torpedo. 75 The torpedo boat is then turned until the torpedo discharge tube lies parallel with the torpedo-direction-indicator arm *f*. In the ordinary practice the torpedo discharge tube is parallel with the longitudinal axis of the 80 vessel and is located in the bow, and in that case the longitudinal axis of the vessel is brought into coincidence with the arm *f*. It will be seen that, by reason of the similarity of the triangles described, if the tor- 85 pedo is discharged with its tube in the indicated position it will travel in such a direction and at such a speed as to meet the target at the point *y* provided the direction and speed of travel of the target has been 90 properly estimated.

In the drawings I have illustrated a frame-work made up of the vertical member *g* and horizontal member *r*, which frame-work moves with the arm *f* and carries a contact arm *s*. The contact roller *t* at the upper end of this arm is adapted to engage the contact point *u*, mounted on a stationary part of the boat at the instant when the axis of the torpedo firing tube coincides in direc- 110

tion with the arm *f*. By this means an alarm device, such as the electric bell *w* illustrated in Fig. 2, may be actuated at this instant to indicate the time when the torpedo should be fired. The electric contact device is shown merely by way of example and it will be understood that any other indicator may be employed either visual or audible, or the parts may be so arranged as to automatically discharge the torpedo at the proper instant. An arrangement for this purpose is indicated in Fig. 2, in which the torpedo discharge valve lever *z* is restrained from opening the valve by a latch *a'* which is retracted by an electromagnet *b'* when the circuit is closed at *u*.

In the specific construction illustrated and described the triangle of the director is complementary to the triangle formed by 20 the line of vision of the periscope, the course of the torpedo, and the course of the target, as shown in Fig. 3, but obviously the same result may be effected by making the triangle of the director coincide with the triangle 25 formed by the line of vision of the periscope the course of the torpedo and the course of the target, as shown in Fig. 4.

What I claim is:

1. The combination with a rotatable periscope of a torpedo director comprising an 30 adjustable triangular frame made up of a target-direction-indicator arm attached to

the periscope to rotate therewith, a torpedo-direction-indicator arm, swiveled about the center of rotation of the target-direction-indicator arm so that the common center of rotation forms an apex of the triangle, and a target-course-indicator arm adjustably connected to the aforesaid arms to complete the triangle.

2. The combination with a rotatable periscope of a torpedo director comprising an adjustable triangular frame made up of a target-direction-indicator arm attached to the periscope to rotate therewith, a torpedo-direction-indicator arm swiveled about the center of rotation of the target-direction-indicator arm so that the common center of rotation forms an apex of the triangle, and a target-course-indicator arm adjustably connected to the aforesaid arms to complete the triangle, and mechanism controlled by the relative movements of the vessel and the torpedo director to indicate when the torpedo-direction-indicator arm coincides in 45 direction with the axis of the torpedo discharge tube.

In testimony whereof I affix my signature, in presence of two witnesses.

GREGORY CALDWELL DAVISON.

Witnesses:

E. L. BRAKE,  
W. D. FESLER.