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(No Model.)

J. ERICSSON.
SUBMARINE PROJECTILE.

No. 298,455.

Patented May 13, 1884.

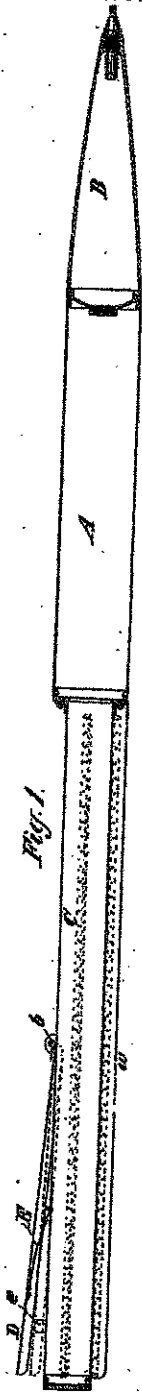


Fig. 1.

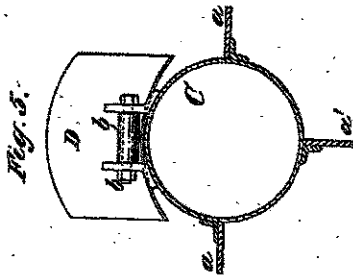


Fig. 5.

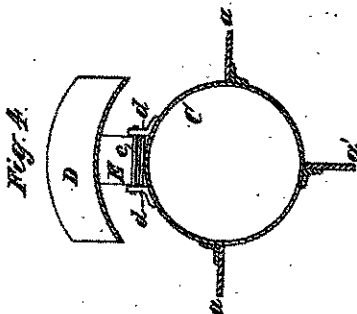


Fig. 4.

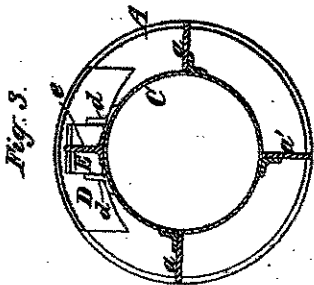


Fig. 3.

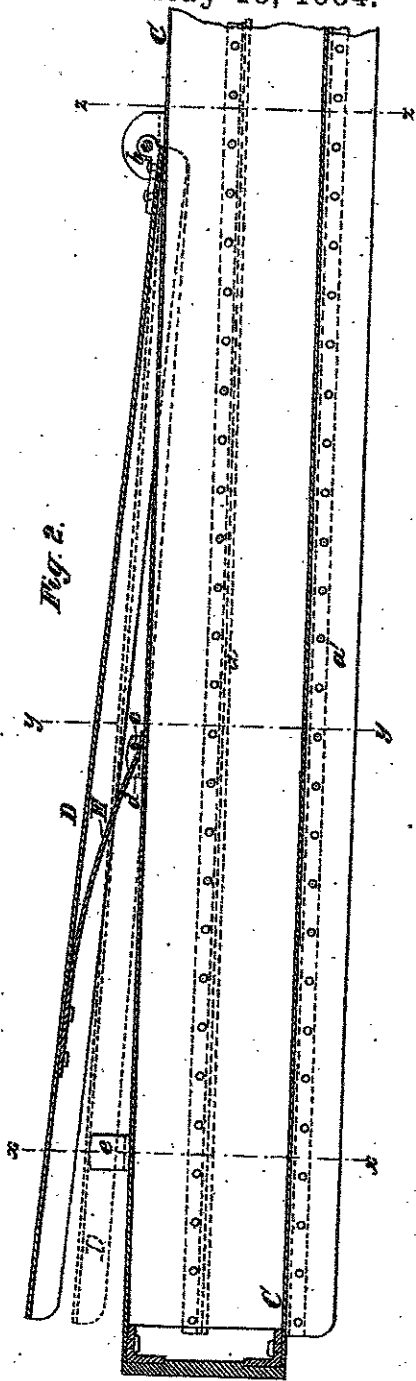


Fig. 2.

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UNITED STATES PATENT OFFICE.

JOHN ERICSSON, OF NEW YORK, N. Y.

SUBMARINE PROJECTILE.

SPECIFICATION forming part of Letters Patent No. 298,455, dated May 13, 1884.

Application filed October 3, 1883. (No model.)

To all whom it may concern:

Be it known that I, JOHN ERICSSON, of the city and county of New York, in the State of New York, have invented a new and useful Improvement in Submarine Projectiles, of which the following is a specification, reference being had to the accompanying drawings.

By extensive experiments in submarine gunnery made under my direction I have discovered that in the discharge of a projectile of considerable length from a gun under water there is always a tendency in the rear end or tail of the projectile to rise immediately on leaving the gun, and consequently the projectile has a tendency to dive or descend. This is invariably the case, no matter how well the projectile may be balanced lengthwise or how nearly its weight may correspond with the weight of the water which it displaces.

The object of this invention is to overcome or counteract these tendencies, and to control in a vertical direction the course of the projectile; and to this end the principal feature of the invention consists in what I call a "steering-plate" attached to and projecting from the upper side of the tail or after part of the projectile, or that side thereof which is to be placed upward in the gun, such plate presenting its face in an outward direction from the axis of the projectile, and serving, by its action against the water and through the resistance of the water to its motion with the projectile, to hold down the tail of the latter. This steering-plate may either have a fixed attachment to the projectile or be attached thereto by a hinge and controlled by a spring between it and the projectile, as will be hereinafter fully described.

Figure 1 in the drawings is a central longitudinal sectional view of a projectile having my invention applied. Fig. 2 is a longitudinal vertical section of the tail portion of the projectile and of the steering-plate thereto attached. Fig. 3 is a transverse section taken in the line xx of Fig. 2. Fig. 4 is a transverse section on the line yy of Fig. 2. Fig. 5 is a transverse section in the line zz of Fig. 2.

Similar letters of reference indicate corresponding parts in the several figures.

A indicates the middle body, B the head,

and C the tail, of the projectile, the middle body being represented of a cylindrical form and of a diameter to fit the bore of the gun, the head of conical form, and the tail cylindrical, but of a diameter considerably smaller than the bore of the gun. The tail is represented with rigid longitudinally arranged straight radial rings or pins $a a'$ on its sides and bottom, to prevent it from turning and to guide it within the bore of the gun. This projectile, as thus far described, does not constitute any part of my present invention, but is represented because it serves as well as one of any other form to illustrate the invention, in the application of which the form of the projectile might be varied, provided always that the tail is of sufficiently reduced diameter to permit the placing of my steering-plate on its exterior and the reception of the so-placed steering-plate within the bore of the gun.

D is the steering-plate, which constitutes the principal feature of my invention, represented as hinged at its forward end by a hinge, b , to the exterior of the tail C of the projectile. This plate may be of a length nearly equal to one-fourth of the entire length of the projectile, and its rear end should nearly reach, but need not project beyond, the rear end or base of the projectile. It has a transverse section of the form of an arc, its exterior conforming to the circle of the body A of the projectile and to the bore of the gun with which it is to be used. Its width may be nearly ninety degrees. It is so hinged or placed on the projectile that its face is presented in a direction conforming, substantially, to the circumference of the projectile; or, in other words, its face is presented directly outward from the axis of the projectile.

E is a spring applied between the steering-plate and the tail of the projectile, and represented as held in place by being riveted or bolted at its forward end to the said plate, and having its rear end inserted between two cheek-pieces, $d d$, fastened on the tail of the projectile and under a pin, c , which is secured in the said cheek-pieces. This spring is strong enough to force outward the steering-plate from the tail of the projectile beyond the circle corresponding with the bore of the gun, 100

as shown in bold outline in Figs. 1 and 2, the plate then having an outward and rearward inclination relatively to the axis of the projectile.

5 *e* is a guard secured to the tail-piece under the steering-plate, and serving to prevent the tail-piece from being pressed further in toward the tail than is sufficient to allow it to pass into and out of the bore of the gun.

10 The projectile is placed in the bore of the gun, with the steering-plate *D* centrally above its axis, the spring *E* yielding to allow the said plate to approach the tail-piece, as shown in Fig. 3 and in dotted outline in Figs. 1 and 15 2, near enough to permit the passage of the steering-plate within the bore. When the projectile has left the bore of the gun in its discharge, the steering-plate may be forced out by the spring *E* beyond the circle of the circumference of the body of the projectile, as shown in bold outline in Figs. 1 and 2 and in Figs. 4 and 5; or may simply be so held out by the said spring, as shown in dotted outline in Figs. 1 and 2, as to counteract its tendency 25 to be forced inward against the tail-piece by the pressure of the said plate against the water; and in either case, the projectile being prevented from turning by the fins *a a'*, the steering-plate will, by the resistance which its outwardly and backwardly inclined face meets from the water, counteract or overcome the 30 tendency of the tail of the projectile to rise and the tendency of the projectile to dive.

The spring may be made of such strength or have its strength so regulated or adjusted 35 that it may so control in a vertical direction the course of the projectile as to cause the latter, after it leaves the gun, to continue moving directly in line with the bore of the gun, or to have a slight ascent or descent, a greater 40 strength of spring having a tendency to produce a depression of the tail and a rise of the projectile, and vice versa.

In some cases the steering-plate, of the form 45 substantially as described, instead of being

hinged to the tail and having a spring applied to it to force it outward from the tail of the projectile, may be rigidly attached to the projectile in a position substantially similar to that in which it is represented in the drawings 50 as hinged thereto, and with such a degree of projection from the tail (not sufficient to prevent its entrance into the gun) as may have been determined by experiment proper to control the course of the projectile to the degree 55 desired in a vertical direction.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with a submarine projectile, of a steering-plate attached to its upper side, and presenting its face in an outward direction from the axis of the projectile, substantially as and for the purpose herein set forth.

2. The combination, with a submarine projectile, of a steering-plate hinged thereto, and a spring between the said plate and the tail of the projectile, substantially as and for the purpose herein described.

3. The combination, with a submarine projectile having a tail provided with straight longitudinal wings or fins to prevent it from turning, of a steering-plate attached to its upper side, and presenting its face in an outward and upward direction from the axis of the projectile, to control its course in a vertical direction, substantially as herein described.

4. The combination, with the projectile having ribs *a a'* on its tail, of the hinged steering-plate *D* and the spring *E*, substantially as 80 and for the purpose herein described.

5. The combination, with the tail of the projectile and the hinged steering-plate *D*, of the guard *e*, substantially as and for the purpose herein described.

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Witnesses:

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