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APPARATUS FOR LAUNCHING TORPEDOES.

APPLICATION FILED APR. 28, 1911. RENEWED MAY 19, 1914.

1,122,700.

Patented Dec. 29, 1914.

2 SHEETS—SHEET 1.

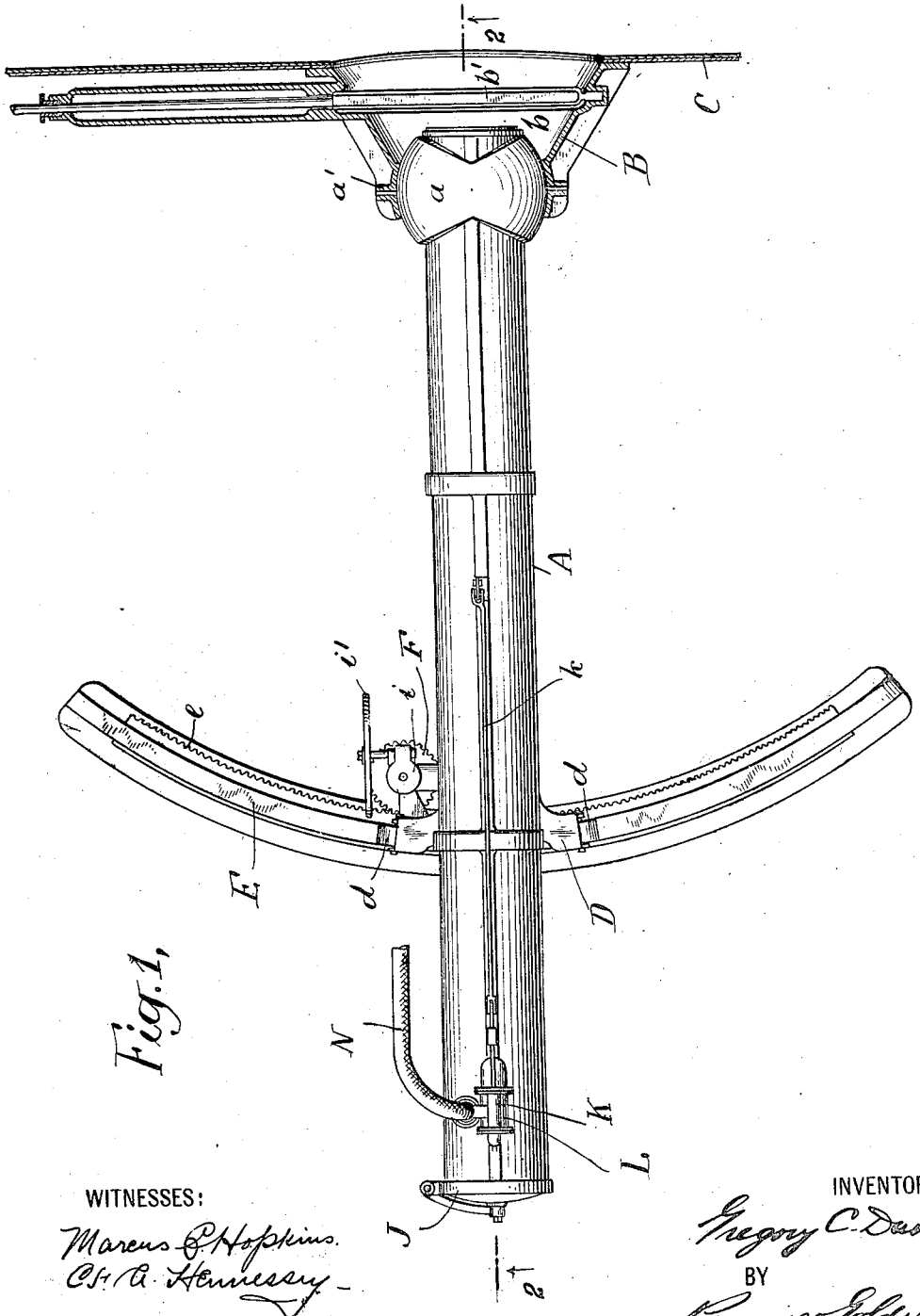


Fig. 1.

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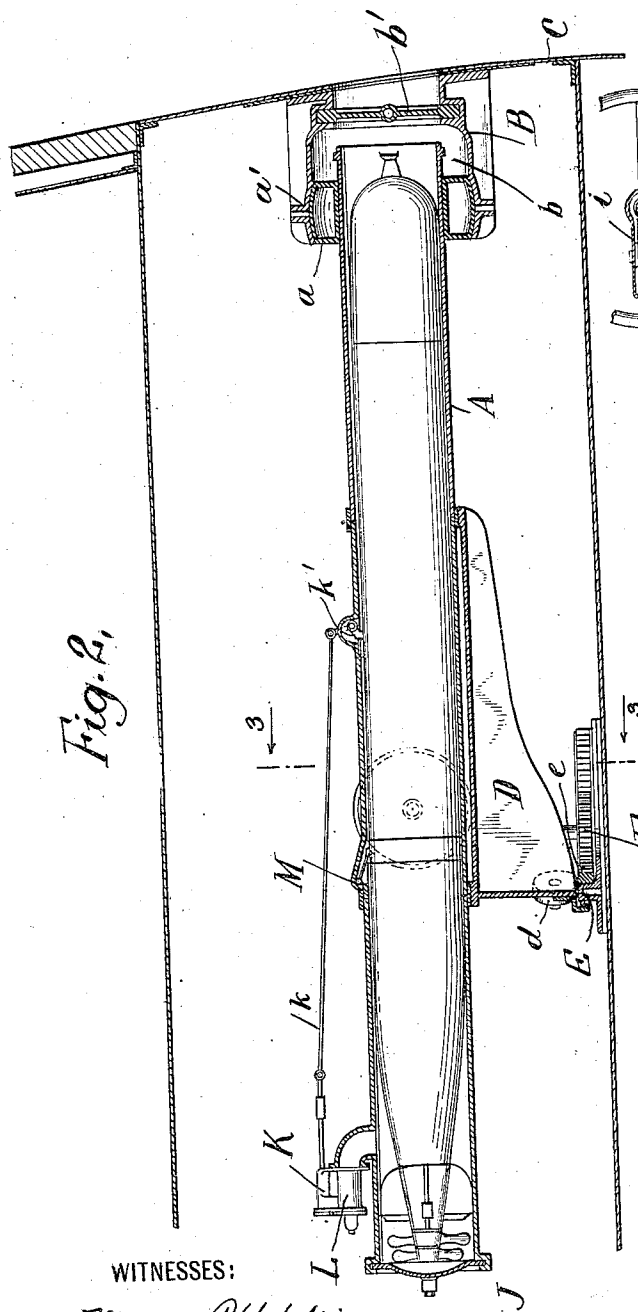
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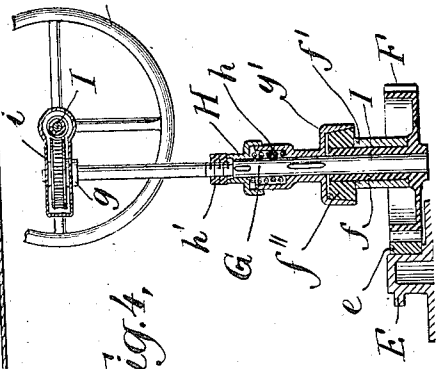
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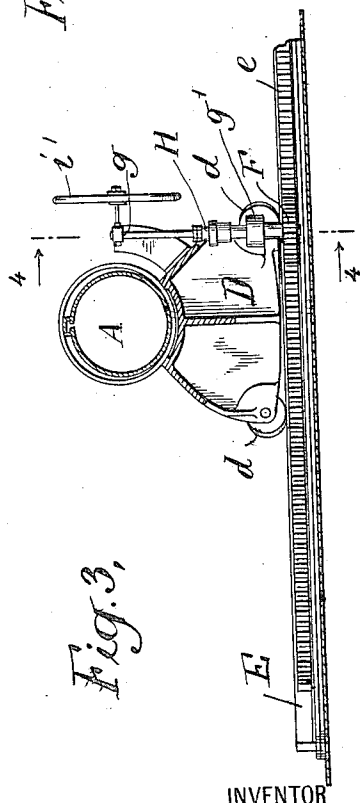
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2 SHEETS—SHEET 2.







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APPARATUS FOR LAUNCHING TORPEDOES.

1,122,700. Specification of Letters Patent. Patented Dec. 29, 1914.

Application filed April 28, 1911, Serial No. 623,979. Renewed May 19, 1914. Serial No. 839,647.

To all whom it may concern:

Be it known that I, GREGORY C. DAVISON, a citizen of the United States, residing at Quincy, county of Norfolk, State of Massachusetts, have invented certain new and useful Improvements in Apparatus for Launching Torpedoes; 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 appertains to make and use the same.

My present invention relates to launching apparatus for marine torpedoes, more particularly pertaining to torpedo tubes located in vessels below the normal water line for broadside firing.

The object of the invention is to provide a practical mounting for torpedo tubes designed to fire from the side of a ship, which will permit of the smooth ejection of a torpedo directly into the water while the vessel is in motion and avoid the binding of the torpedo in the muzzle of the tube occasioned by the lateral resistance of the water on the torpedo during its protrusion from the mouth of the tube in issuing therefrom.

Apparatus embodying my invention is illustrated in the accompanying drawings in which:

Figure 1 is a plan view, showing the muzzle chamber in section; Fig. 2 is a vertical section on line 2—2 of Fig. 1, showing a contained torpedo; Fig. 3 is a vertical section on line 3—3 of Fig. 2, and Fig. 4 is a vertical section on line 4—4 of Fig. 3.

Referring to the drawings the muzzle of a torpedo tube A is encircled with a collar *a* having an outer spherical surface which is mounted in a two-piece socket *a'* in the inner wall of a casting B. The casting B is fixed to the wall C of the hull of the vessel and incloses a chamber *b* in which the muzzle of the tube A is free to swing as the tube is moved in the ball and socket joint *a*, *a'*. The casting B surrounds an aperture in the wall C of the hull affording direct communication between chamber *b* and the sea, and this aperture is of sufficient area to admit of the tube A being trained therethrough at any angle within the limits of its movement. The chamber *b* may be closed to the sea when desired by closing a gate valve *b'* in casting B.

It is preferable to mount the muzzle of the tube A in the universal bearing described above, as a ball and socket joint, to employing a vertical cylindrical joint, though the movement of the tube is only required in a horizontal plane, as slight flexures of the vessel's framework would cause the cylindrical joint to bind were not some movement in a vertical plane allowed. The tube A is supported upon a carriage D provided with rollers *d* which rest upon a rail E in the form of an arc struck from the center of movement of the ball and socket joint *a*, *a'*. The rail E is provided upon its concave side with a stationary concentric rack *e* with which a pinion F carried on and actuated from the carriage D meshes. The pinion F is mounted fast on the lower end of a vertical tubular shaft *f* journaled in a bearing *f'* on the carriage D and a friction cone *f''* is mounted fast on the upper end of the said shaft *f*. A vertical shaft G is journaled in a bearing *g* on the carriage D and in the tubular shaft *f*, and an internal friction cone *g'* is splined on this shaft G to permit of some longitudinal movement thereon, and adapted to frictionally engage and drive the cone *f''* and pinion F when the shaft G is rotated. A spring *h* bears down upon the internal friction cone *g'* and its upper end abuts a collar H splined upon the shaft G to rotate therewith and to be capable of longitudinal adjustment thereon by jam nuts *h'* on shaft G. A horizontal shaft I carries a worm which engages a worm wheel on the shaft G in the housing *i* and is provided with a hand wheel *i'* by which the carriage is manually trained through the mechanism just described. Power driven devices may, however, be used in some cases to train the tube.

The tube A is provided with a hinged breech closure J. Interdependent torpedo releasing and firing valves K and L respectively are mounted upon and suitably connected with the tube A and together with the torpedo contacting plug M mounted in the wall of the tube A are essential features of the mechanism for launching torpedoes described in my co-pending application for patent in the United States, filed of even date herewith, and while the character of torpedo and the firing mechanism proper described in that application are intended to be used in connection with the devices forming the subject matter of this application, it is not deemed necessary to the full understanding of this invention to illus-

trate or describe them herein in their entirety. Fluid under pressure may be conducted to the controlling devices upon the tube A through a flexible tube N or any other suitable conduit which will not interfere with the movements of the tube. The torpedo releasing and firing valve K has the usual piston connected by a rod k to a latch k' pivoted in the wall of the tube A.

The operation is as follows: The gate valve b' being closed and the breech closure J open, a torpedo is placed in the tube through the breech and locked in place by the latch k'. The breech closure J is then applied to the tube and the gate valve b' opened, the sea thereby being admitted to the chamber b and the tube about the torpedo. The ball and socket joint a, a' and the breech closure J are tight and effectually exclude the water from the interior of the ship. One method of firing a torpedo from this apparatus comprehends the employment of a gyroscopically controlled torpedo provided with means for first energizing the gyroscope and then releasing its gimbal ring before the discharge of the torpedo from the tube, and this method involves on the one hand the fixture of the gimbal ring of the gyroscope within, and in fixed relation to the axis of, the torpedo in which case the tube is trained upon the mark and the gimbal ring then released; or, on the other hand the training of the gimbal ring or the valve controlled thereby on the mark followed by the release of the gimbal ring without regard to the position of the tube, which would involve some connection from the outside of the tube to the gimbal ring or valve in the torpedo lying in the tube, which connection would be disconnected just prior to release. In this case the tube would not be trained but would be moved by the issuing torpedo. In any case, the mechanism employed for the purpose constitutes what I term a "course attaining and maintaining steering control." Either of these methods of training the steering control of the torpedo may be employed with this apparatus, it being necessary, however, that the gyroscope be energized and the gimbal ring of the gyroscope in the torpedo be released after training and before the torpedo protrudes from the mouth of the tube during its expulsion therefrom.

Returning to the description of the operation of launching the torpedo the tube A may now be moved to the required direction for firing by the operation of the hand wheel i' which through the medium of the worm gear and friction cones turns the pinion F in engagement with the rack e and moves the carriage D to the desired position for firing, when the energization of the gyroscope is effected, followed by the complete release of its gimbal ring and the release of the torpedo by the latch k' which is in turn followed by the admission to the tube A of the fluid under pressure for the expulsion of the torpedo. The torpedo then moves forward in the tube A and issues from its muzzle directly into the water through which the vessel is moving, but as it protrudes from the muzzle of the tube during issuance it encounters upon its side the resistance of the water through which it is moved, tending to bind it in the muzzle of the tube, and this binding would be a serious obstacle to the complete expulsion of the torpedo and a source of possible injury to the torpedo were the tube held rigidly resisting it, and I have provided that the tube A and carriage D may be deflected with and by the issuing torpedo until its issuance is complete, thereby in a great measure relieving the before mentioned binding strain and permitting the safe expulsion of the torpedo. This is accomplished when the worm hand device is used, by the intervention of the friction cones f'' and g' the grip of which may be regulated by the tension applied to the spring h by the movement of collar H by means of the jam nuts h', which permits the torpedo to deflect the tube A and its carriage and effect the rotation of pinion F when the leverage on the tube is sufficient to overcome the friction at the cones f'' and g'. The friction cones serve to maintain resistive connection between the positive worm hand control and the positive rack and pinion positioning device of the carriage sufficient for training and for the prevention of movement by the pitching of the vessel or the like but is designed to be overcome before the strain on the tube due to the resistance of the water on the torpedo is sufficient to prevent the expulsion of the torpedo or to cause its injury.

What I claim is:

1. The combination with a ship's hull having an aperture therein below the water line, of a torpedo tube mounted wholly within said hull and for angular movement about a point adjacent said aperture and provided with a yieldable retaining device adapted to be overcome and movement of said tube effected by an issuing torpedo diverted from its course.

2. The combination with a ship's hull having an aperture therein below the water line, of a torpedo tube mounted wholly within said hull and adapted to be trained through said aperture and a yieldable training device adapted to be overcome and movement of said tube effected by an issuing torpedo diverted from its course.

3. The combination with a ship's hull having an aperture therein below the water line, of a torpedo tube having its muzzle pivoted in a watertight joint adjacent to and closing said aperture to the interior of said

hull, a carriage supporting said tube, a stationary support upon which said carriage is adapted to be moved, and a frictionally connected training device for moving said carriage on said support; substantially as described.

4. The combination with a ship's hull having an aperture therein below the water line, of a torpedo tube having its muzzle pivoted in a watertight joint adjacent to and closing said aperture to the interior of said hull, a carriage supporting said tube, a stationary rack having the form of an arc struck from the pivot point of the muzzle of said tube, a worm driven training device carried by said carriage and provided with a pinion engaging said rack, and a friction joint in said training device between the worm drive thereof and said pinion; substantially as and for the purposes set forth.

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

GREGORY C. DAVISON.

Witnesses:

WILLIAM H. DAVIS,

MARCUS C. HOPKINS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."