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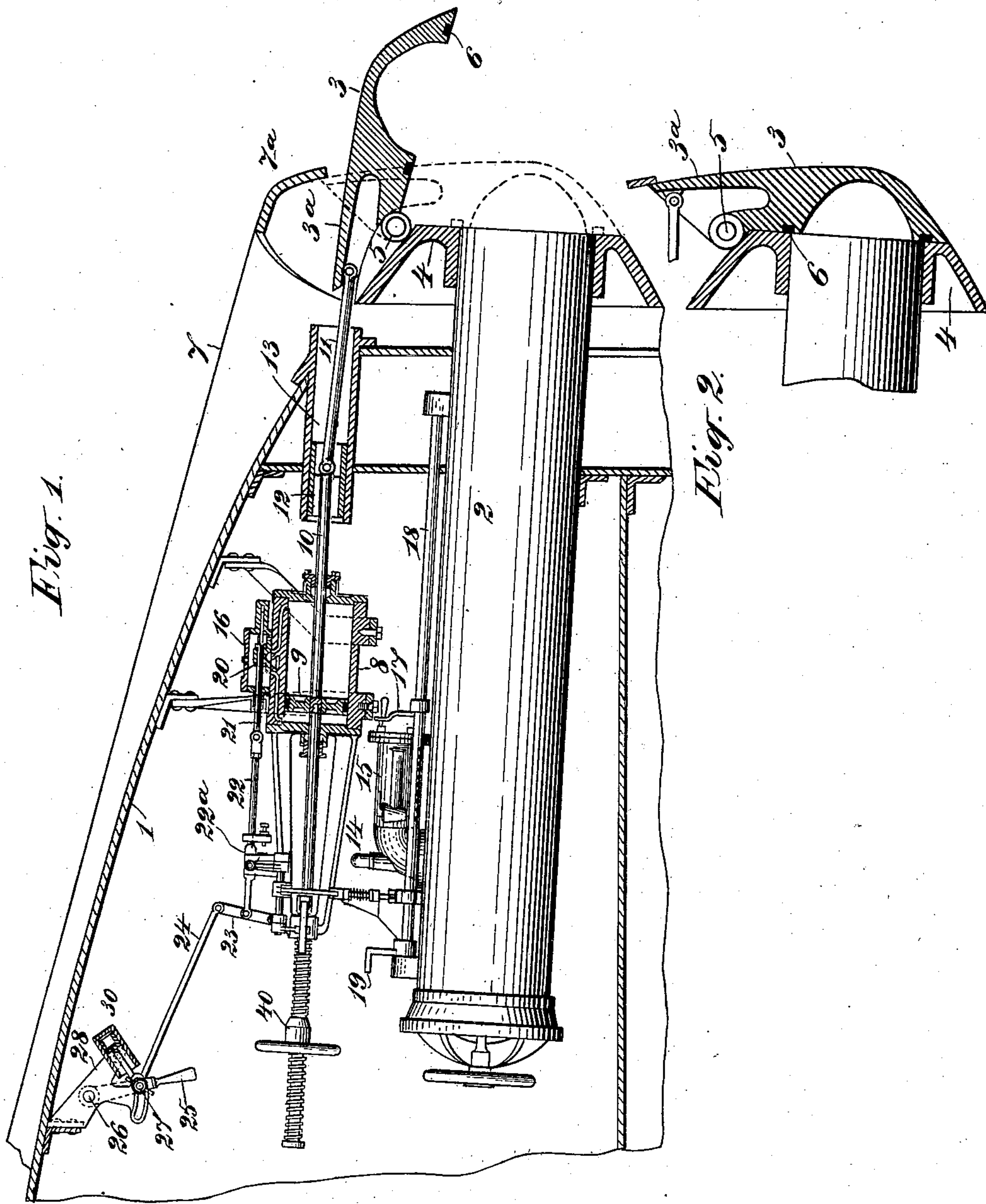
Patented Nov. 11, 1902.

F. W. BRADY.  
TORPEDO BOAT.

(Application filed Feb. 25, 1902.)

(No Model.)

3 Sheets—Sheet 1.



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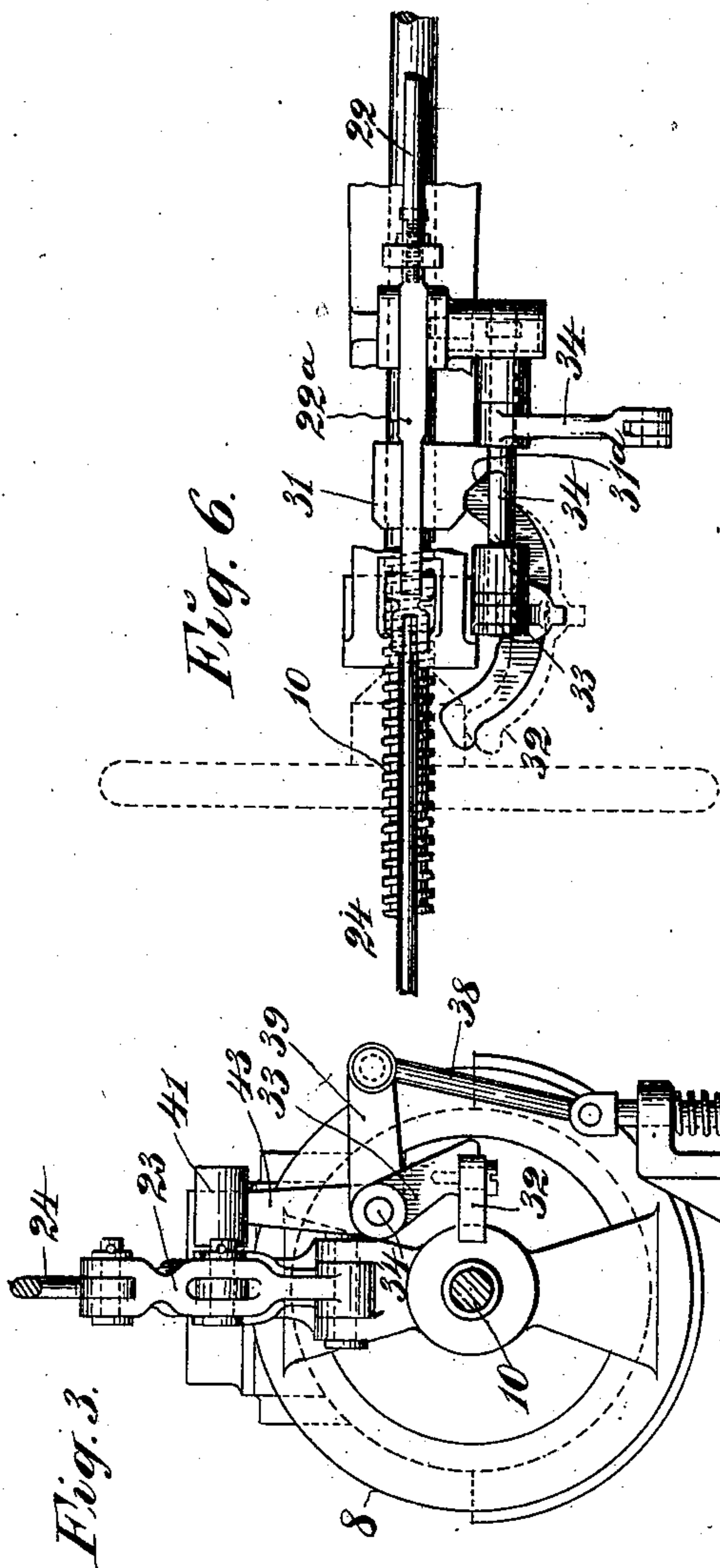
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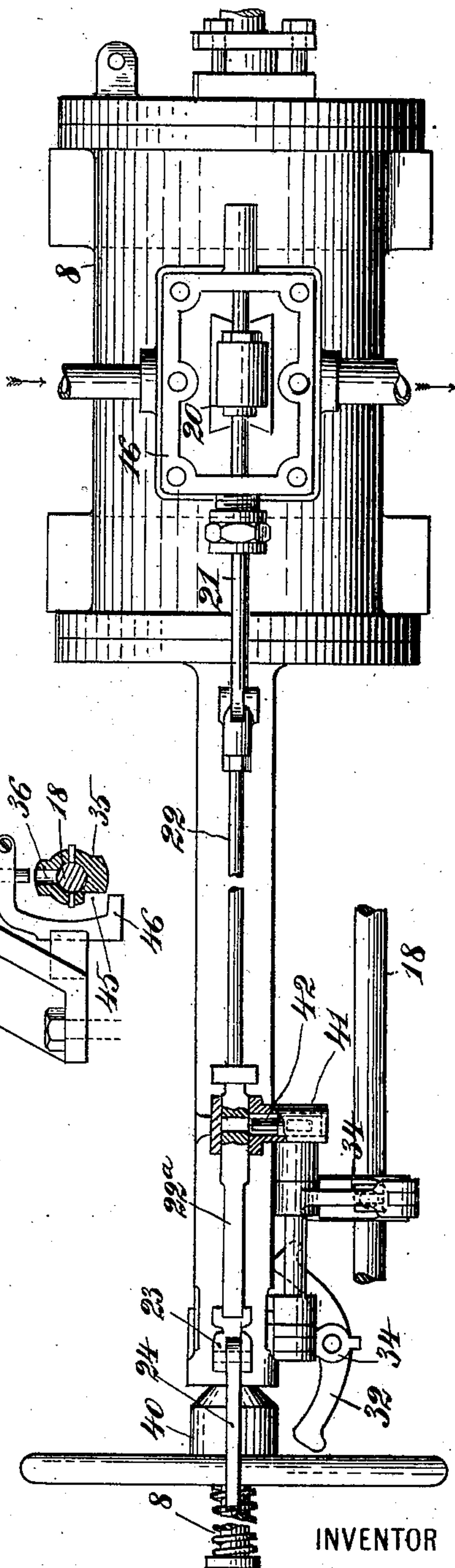
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*Fig. 4.*



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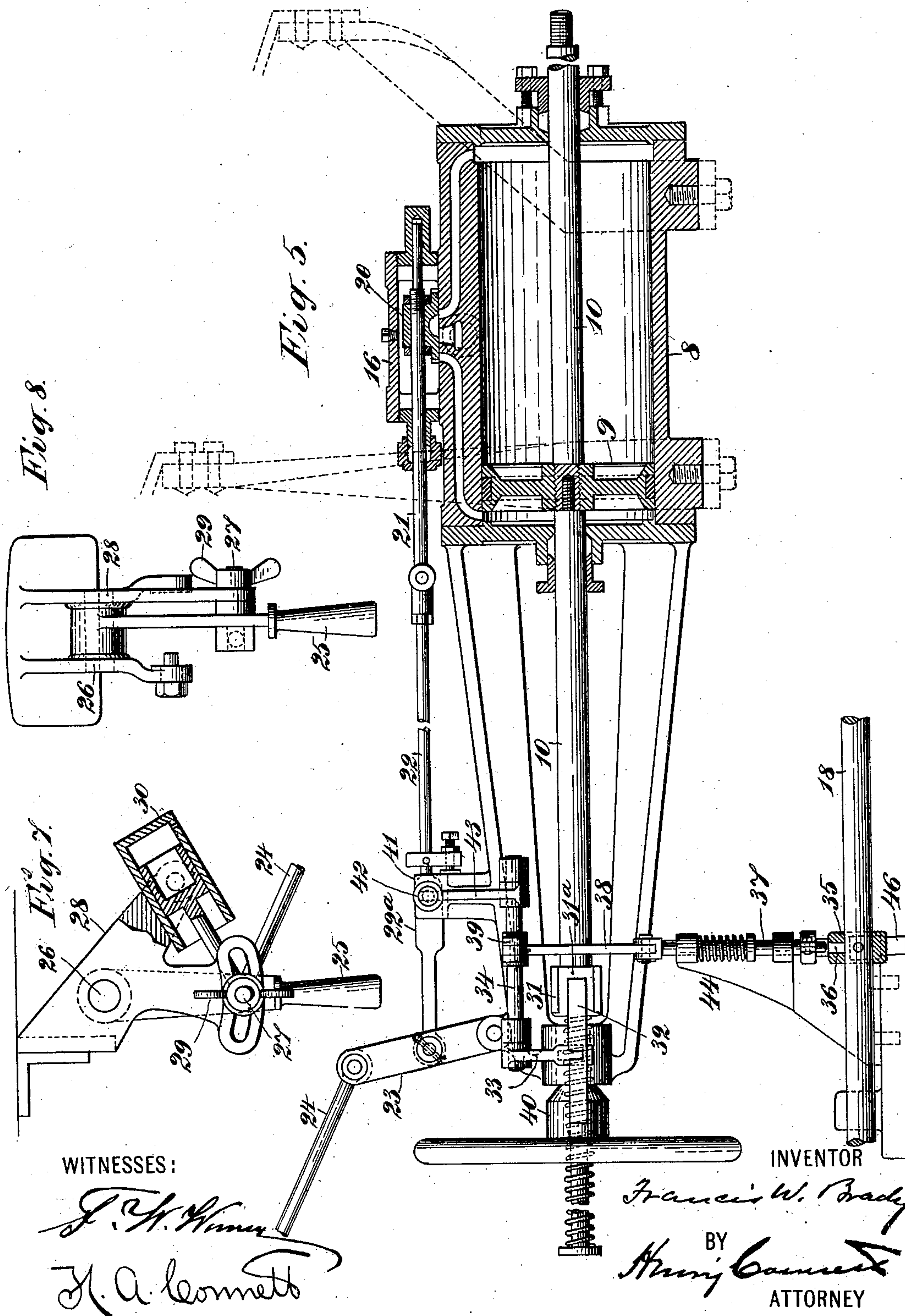
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3 Sheets—Sheet 3.



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# UNITED STATES PATENT OFFICE.

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## TORPEDO-BOAT.

SPECIFICATION forming part of Letters Patent No. 713,198, dated November 11, 1902.

Application filed February 25, 1902. Serial No. 95,627. (No model.)

*To all whom it may concern:*

Be it known that I, FRANCIS W. BRADY, a citizen of the United States, residing at Englewood, in the county of Bergen and State of New Jersey, have invented certain new and useful Improvements in Torpedo Boats or Vessels, of which the following is a specification.

This invention relates to the class of vessels which have torpedo-expulsion tubes that are normally submerged, and particularly to the class of submarine or submergible torpedo-boats; and the object of the invention is to provide a cap to close the outboard end of the expulsion-tube and mechanism for operating said cap from inside the boat or vessel, said mechanism operating in relation to the mechanism controlling the discharge of the torpedo, whereby the former is automatically locked when said cap is closed and whereby the opening of the cap sets the locking mechanism so that the firing mechanism may be unlocked.

In the drawings, which serve to illustrate an embodiment of the invention, Figure 1 is a vertical axial sectional view of the stem and forward part of a submarine boat and of the cap-operating mechanism therein; and Fig. 2 is a similar but fragmentary view, showing the outer cap of the expulsion-tube in full lines closed. Fig. 3 is an end view, Fig. 4 is a plan, and Fig. 5 is a sectional side elevation, on a larger scale than Figs. 1 and 2, of the locking mechanism for the firing-valve. Fig. 6 is a fragmentary plan view of the rocker and adjacent coacting parts. Figs. 7 and 8 are fragmentary detail views, which will be hereinafter described.

1 designates the hull or shell of the boat, and 2 the expulsion-tube mounted therein in a known way. The particular construction of this tube and the manner of mounting it do not concern this invention. The outboard end of the tube 2 is adapted to be closed by a cap 3, hinged to the nose-piece 4 of the boat at 5. This cap fits snugly up to the end of the tube and has a packing-gasket 6. The cap is conical on its outer face to continue the conical form of the nose-piece 4 and has a flange-piece 3<sup>a</sup> at its upper part which takes inside of a lip 7<sup>a</sup> on the open forward end of the superstructure 7 of the boat. The full

lines in Fig. 1 show the cap open and the dotted lines show its position when closed. Fig. 2 also shows the cap closed. The cap is held closed by the pressure of the water from the outside and by the mechanism which operates the cap, and this mechanism will now be described.

8 is the cylinder of the operating-engine, in which is a piston 9 on a piston-rod 10, which plays through both heads of the cylinder. This piston-rod extends forward and is coupled at its front end by a link 11 to the flange 3<sup>a</sup> at the upper part of the cap above the fulcrum or hinge-axis 5. The rod 10 is secured to a piston 12, which plays in a tubular guide 13, opening out through the hull of the boat. Thus the piston 12 prevents the water from entering the boat at the point where the link passes out of the hull. The cap is opened by admitting a fluid under pressure to the front end of the cylinder 8, whereby the piston and its rod are moved inboard, and as the cap must be opened before a torpedo is discharged from the expulsion-tube means have been provided for positively and normally locking the firing mechanism, which controls the discharge of the torpedo until the cap shall have been opened to an extent sufficient to permit the outgoing torpedo to freely clear it.

The torpedo is discharged by a fluid under pressure supplied through a pipe 14, controlled by a valve mechanism 15 of a known kind wherein the admission of fluid to operate the valve is controlled by an arm 17 on a firing-bar 18 in the nature of a rock-shaft. This bar has on it a crank-arm 19, whereby it may be and must be rocked, so as to permit the firing-valve to operate and admit the fluid under pressure behind the torpedo to expel it.

The present invention relates to means for automatically locking the firing-bar 18 against rotation until the cap 3 is opened to a sufficient extent when the locking mechanism is set, so that the firing mechanism may be unlocked by manual means. In the valve-chest 16 of the operating-engine is a valve 20, the stem 21 of which is coupled to a rod 22. This rod is coupled to a rocking lever 23, from the upper end of which a rod 24 ex-



tends to and is connected with an operating-handle 25. It may be said here that this handle, as seen in the detail views Figs. 7 and 8, is fulcrumed at 26, has a stud 27, which plays in a curved slot in a bracket 28, and a clamping-nut 29. The movements of the handle 25 are controlled or retarded by a dash-pot device 30. The dash-pot device is omitted from Fig. 8, which is a view from the left in Fig. 7, and this dash-pot device is seen in section in Fig. 7.

The above devices serve to control the valve of the cap-operating engine. On the movement inboard of the piston-rod 10 for opening the cap 3 a fulcrum-block 31 thereon takes under one arm of a rocker 32, pivotally mounted in or on an arm 33, fixed on a rock-shaft 34.

In order to make clear the operation of the locking and unlocking device, it will be best to explain first that on the firing-bar 18 is a boss or collar 35, which has in it a bolt-socket 36. Mounted in bearings above this socket is a spring-bolt 37, which tends to engage this socket normally and automatically lock the firing-bar against rotation, and it does so lock it while the cap 3 is closed. This bolt 37 is coupled by a link 38 to a lifting or withdrawing arm 39 on the before-mentioned rock-shaft 34. Now when the piston 9 moves inboard for opening the cap 3 an inclined face on the fulcrum-block 31 moves under the outboard arm of the rocker 32 and merely rocks and sets the latter without actuating the bolt 37 to unlock the firing-bar 18. However, on the screw-threaded inboard end of the piston-rod 10 is a coned wheel-nut 40, which when run or driven outward (or toward the cylinder 8) takes under the inboard arm of the set rocker 32 and, acting through the latter as a lever, with its fulcrum on the block 31, rocks the shaft 34 and withdraws the bolt 37 from the socket in the collar 35 on the firing-bar, thus freeing the latter, so that it may be operated; but unless the block 31 is under the outboard arm of the rocker 32 the operation of the wheel-nut will not withdraw the bolt 37.

As a precaution against the shifting of the valve 20 of the operating-engine during the expulsion of the torpedo the rod 22, which operates the valve, has a flat portion 22<sup>a</sup>, which plays through a fixed guide 41 and has in it a socket or aperture. This latter is brought into register with a bolt 42, slidably mounted in the guide 41, when the cap 3 is open, and said bolt is coupled to an arm 43 on the rock-shaft 34. Consequently when this shaft 34 is rocked in a manner to withdraw the bolt 37 and unlock the firing-bar the bolt 42 will be so moved as to lock the valve 20 against movement until the firing-bar is again locked.

After the discharge or expulsion of the torpedo the coned wheel-nut 40 is run back out of the way, as indicated in Fig. 1. Fig. 4 shows the position of the locking and unlocking features when the cap 3 is closed and the piston is at the right-hand or outboard end

of the cylinder 8, and Fig. 6 is a plan view showing the positions of the locking devices before the coned wheel-nut is driven or run in under the inboard end of the rocker so as to withdraw the bolt 37.

Referring to Fig. 3, which shows the feature best, 46 is a sliding dog carried by the spring-bolt 37 and adapted to play in a guide-way in a bracket 44, in which the said bolt is mounted. When this bolt is elevated or withdrawn from the socket 36, as shown in this figure, the jaw of the dog 46 will be moved almost into engagement with a locking-recess 45 in the collar or boss 35 on the firing-bar 18. This is a precautionary device and can only come into play if the piston-rod 10 should break loose or in any way become uncoupled or disconnected from the open cap 3. If this difficulty should occur, the piston 9 would be driven inboard a little beyond its normal limit, and the fulcrum-block 31 would be driven under the outboard end of the rocker 32 far enough for a second and abrupt incline 31<sup>a</sup>, Fig. 6, on the block 31 to take under the arm of the rocker and cause the shaft 34 to rock, the other arm of the rocker bearing on the wheel-nut 40 as a fulcrum. This extra lift of the bolt 37 (which has been already withdrawn by the wheel-nut 40) causes the jaw of the dog 46 to engage the recess 45 in the collar 35, so as to lock the firing-bar, through the medium of said dog, against rotation. It will be seen that this device forms a lock to prevent the expulsion or discharge of the torpedo when an accident or breakage occurs such as would permit the cap 3 to close.

It will be noted that the movement of the fulcrum-block 31 under the outboard arm of the rocker 32 cannot alone effect the withdrawal of the bolt 37 when the cap 3 is opened, as the lever-like rocker will be merely turned on its fulcrum without producing any result. The unlocking must be effected by the wheel-nut 40. On the other hand, unless the cap 3 is open and the fulcrum-block 31 is under the outboard end or arm of the rocker the bolt 37 cannot be withdrawn by the wheel-nut 40 alone, as the driving of the latter under the inboard arm of the rocker will simply rock the latter about its fulcrum without producing any effect on the bolt. When, however, the cap has been opened and the fulcrum-block 31 is moved in under the outboard arm of the rocker and the operator has run the nut 40 under the inboard arm of the rocker, thus withdrawing the bolt 37, if the cap 3 becomes disengaged and closes the piston 9 will be driven inboard a little farther, thus causing the abrupt incline 31<sup>a</sup> to act on the outboard arm of the rocker 32 and by rocking the shaft 34 a little farther thus lift the dog 46 into the locking-recess 45, Fig. 3, to lock the firing-bar against rotation.

I do not, of course, limit myself to the precise construction of the combined cap-operating device and valve-locking mechanism herein shown, as it will be obvious to any one



skilled in the art to which this invention pertains that it may be varied in some respects without departing in any material degree from my invention.

5 Being the first, so far as I am aware, to combine with a cap operating or opening mechanism an automatic locking device for the firing mechanism and means actuated by the cap-opening mechanism for setting the locking mechanism so that it may be unlocked by hand, I wish to claim this combination or feature broadly and without limitation to any specific mechanism for effecting the object. For example, it is convenient to employ the wheel-nut 40 as a means for unlocking the firing-valve when the locking mechanism is set for the purpose by the fulcrum-block 31; but I do not limit myself to this device. The main object is to so set the automatically-locked mechanism that the firing mechanism can be operated by suitable means only when the cap 3 is open.

Having thus described my invention, I claim—

25 1. A means for controlling the expulsion of torpedoes, comprising an expulsion-tube, a cap which closes the outboard end of said tube, means for operating said cap, a firing valve or mechanism for controlling the expulsion of the torpedo, an automatic lock to prevent the operation of said firing mechanism, and means controlled by the cap-opening mechanism which sets the said lock so that it may be operated to unlock the firing mechanism.

35 2. A means for controlling the expulsion of torpedoes, comprising an expulsion-tube, a cap which closes the outboard end of said tube, a firing valve or mechanism for controlling the expulsion of the torpedo from the tube, an automatic locking mechanism for the firing-valve, a cap-operating mechanism, automatic means actuated by the cap-operating mechanism for setting the said locking mechanism so that it may be unlocked by manually-operated means, and the said means for unlocking the firing-valve.

45 3. A means for controlling the expulsion of torpedoes, comprising an expulsion-tube, a cap which closes the outboard end of said tube, means for opening said cap, a firing valve or mechanism for controlling the expulsion of the torpedo, a lock which automatically and normally locks said firing mechanism, means actuated by the cap-opening mechanism for setting the locking mechanism so that it may be actuated to unlock the firing mechanism manually, and means for relock-

ing the firing mechanism automatically should the cap become detached from its operating mechanism.

4. The combination with the hull of the boat or vessel, its nose-piece, the expulsion-tube, and the hinged cap for closing the outboard end of said tube, of the tubular guide 65 13 opening through the hull of the boat, the piston 12 therein, the link coupling this piston with the hinged cap, the cap-operating engine, having its piston-rod coupled to the piston 12, and means for manually controlling the valve of the cap-operating engine.

5. The combination with the expulsion-tube, the cap for closing its outboard end, the firing valve or mechanism controlling the expulsion of the torpedo, and the cap-operating engine, of a rock-shaft 34, a spring-bolt 37, coupled to an arm on said shaft and adapted to normally lock the firing mechanism, a rocker 32 carried by an arm on the shaft 34, a fulcrum-block 31 carried by the piston-rod 80 of the cap-operating engine and adapted to move under one arm of said rocker when the cap is opened, and means for actuating said rocker 32 to withdraw the bolt 37 when the said cap is open, substantially as set forth.

6. The combination with the expulsion-tube, the cap for closing the outboard end of same, the firing valve or mechanism, controlling the expulsion of the torpedo, and the cap-operating engine, of means actuated by said engine for automatically locking its valve against movement when the said cap is open and the firing-valve unlocked, means for automatically locking the firing mechanism when the said cap is closed, and means 95 for setting the last-named locking mechanism so that it may be operated when the said cap is open, the said setting means being automatically actuated by the cap-operating engine.

7. In a device for the purpose specified, the combination with the firing-bar provided with a boss or collar having in it a bolt-socket and a locking-recess, of the double locking device for said bar comprising a bolt to engage said socket and a dog to engage said recess, said dog and bolt being connected and moving together and respectively arranged to operate substantially as set forth.

In witness whereof I have hereunto signed my name, this 20th day of February, 1902, in the presence of two subscribing witnesses.

FRANCIS W. BRADY.

Witnesses:

CHAS. D. STANTON,  
LEWIS E. BURTON.