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TORPEDO.

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1,315,352.

Patented Sept. 9, 1919.

FIG. 1.

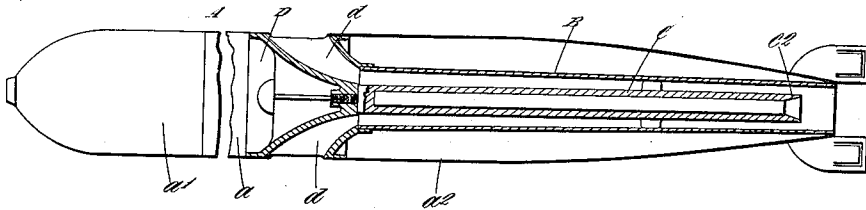


FIG. 3.

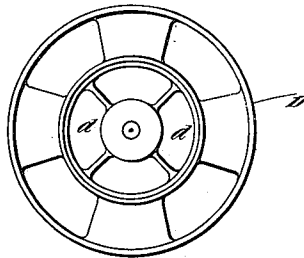
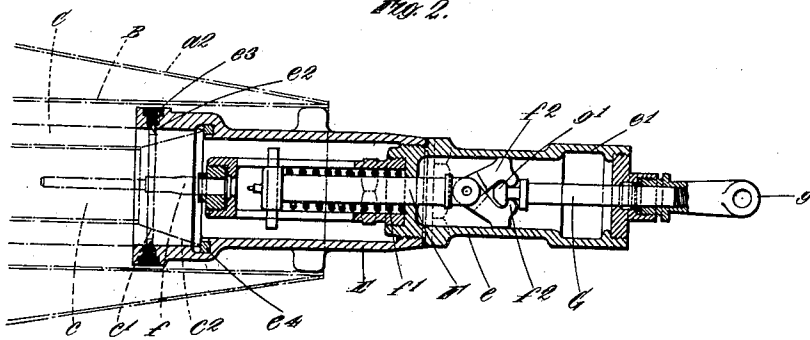


FIG. 2.



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TORPEDO.

1,315,352.

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To all whom it may concern:

Be it known that I, MARIO FRANCESCO TORAZZI, a subject of the King of Great Britain, residing at Broad street, Sandgate, Queensland, Commonwealth of Australia, have invented certain new and useful Improvements in or Relating to Torpedoes, of which the following is a specification.

This invention relates to the propulsion of torpedoes of the jet impelled type.

According to this invention the propulsion is effected by gases generated from a solid self combustible material and continuously escaping at the tail of the torpedo through an ejector into which water is drawn from the surrounding water and ejected along with the gases. In a convenient construction embodying the invention the torpedo is provided with ports opening to the surrounding water and leading to a longitudinal or axial water induction tube passing centrally through the tail chamber of the torpedo and opening at the rear end, toward which the said chamber tapers. Inside this water tube and supported centrally so as to leave an annular water channel is an inner tube containing a self combustible composition that can be ignited at or toward the rear end of the tube, which terminates near the end of the outer water tube and forms with the end of the water tube the aforesaid ejector.

On launching the torpedo, the combustible substance is ignited at the rear and burns steadily at a predetermined rate throughout the tube, the gases as they are ejected drawing with them and ejecting a continuous annular stream of water entering through the water admission ports and flowing through the annular water space in the outer tube. The ejected combined gas and liquid stream possesses considerable mass and at the velocity of discharge produces an efficient propulsive effort, driving the torpedo at high speed through the water. The constant stream of water surrounding the central fire tube keeps the latter cool.

In order that the said invention may be clearly understood and readily carried into effect I will describe the same more fully with reference to the accompanying drawings, in which:—

Figure 1 is a longitudinal section of a torpedo provided with the improved propulsion apparatus;

Fig. 2 is a detail section to a larger scale of an ignition device; and

Fig. 3 is a detail view showing the port member through which the water is introduced into the water induction tube.

A is a torpedo body comprising the usual buoyancy chamber *a*, war head *a'* and tail chamber *a''*, the latter in this case forming also a buoyancy chamber. Depth and steering mechanism can be provided in either or both of the chambers *a* or *a''*. B is the water induction tube extending axially through the tail chamber and slightly tapering toward the tail of the torpedo. C is the combustible charge tube extending through the greater part of the length of the water tube B. D is a central band or port member formed with a series of water admission ports *d* which lead into the annular space within the tube B, four ports being shown in the construction illustrated, curved so as to lead the water smoothly into the forward end of the annular space. E is a firing cap secured on the end of the charge tube C and carrying a striker F and primer *f* to ignite the powder charge *c* in the tube C.

When the torpedo is to be launched, either from above or below the water, the combustible charge within the tube C is fired by the striker mechanism, the striker F being pulled against the pressure of its spring *f'* by means of the operating pin G extending through the outer end of the cap E and provided with the eye *g* to which a firing cord can be attached. The spring *f'* is normally unenergized so that there is no danger of the ignition of the propelling charge until a pull is exerted on the firing cord, which pull may be effected by hand, or automatically if the torpedo is launched from a torpedo tube by compressed air.

The inner end of the pin G is provided with the head *g'* which engages between the jaws *f''* carried on the outer end of the striker F. The cylindrical extension *e* of the cap E is of too small diameter to allow the pin C to be pulled out of the jaws *f''* until the latter, together with the striker, are drawn back sufficiently for the jaws to enter the enlarged portion *e'* of the cap, when the striker is released and springs forward under the pressure of its spring against the primer *f*, which in its turn fires the main propelling charge in the tube C.

It is necessary that the propelling charge

should be properly ignited before the end of the tube C is open to the water and the cap E is therefore arranged to resist a moderate amount of internal pressure due to the combustion of the charge, but when this exceeds a certain amount the cap is blown off and the torpedo is propelled by the gases produced by the combustion of the charge. This action is conveniently arranged for by providing the cap with a pair of small shearing pins e^2 , engaging in a groove c' near the end of the tube C, the pins being pressed into the groove by small springs e^3 . To make a tight joint between the cap and the tube a small rubber ring e^4 is provided. As soon as the pressure due to the combustion of the charge is sufficient, the pins e^2 are sheared and the cap blown off, allowing the gases to escape freely from the end of tube C. The charge tube C has its outer end c^2 chamfered internally so as to form an expanding space in which the gases expand as they pass into the end of the water tube B, so as to reduce the pressure of the gases at this point and to obtain the smoothest possible action upon the water.

When the outer end of the propelling charge is ignited and the gases are steadily generated, they are ejected through the end of the tube C and owing to their high velocity they eject with them from the tail of the torpedo a stream of water drawn (owing to the reduction of pressure caused by the escaping gases) through the water tube B and the water admission ports, which in the arrangement shown are placed about the middle of the torpedo but may be situated at any other convenient position provided a sufficient length of water column is allowed for to enable the necessary acceleration of the water to be readily obtained. The shape and proportion of the various parts should be such that the mixed water and gases are ejected from the tail of the torpedo at a speed which is not unnecessarily high, the object being to produce a maximum impulsive effort with the minimum expenditure of power so that turbulent movement of the water at the tail of the torpedo is avoided as far as possible.

What I claim and desire to secure by Letters Patent of the United States is:

1. In a torpedo of the jet impelled type, a container adapted to hold a solid self-combustible material and provided at the rear with a single central nozzle outlet for the impelling gases and an external ejector nozzle concentric with the said outlet and forming an annular water directing channel through which a column of water is drawn and ejected with the central stream of gases on combustion of the said self-combustible material, and normally unenergized striking mechanism by which the said material is ignited on launching the torpedo.

2. In a torpedo of the jet impelled type, an axial tube open at its rear end and adapted to contain a solid self-combustible material, an external water tube concentric with the first named tube, and surrounding it throughout its length and means for admitting the external water to the annular channel between the two tubes, which form at their rear ends an ejector through which the water and the gases generated from the combustible material escape at the tail of the torpedo, and normally unenergized striking mechanism by which the said material is ignited on launching the torpedo.

3. In a torpedo of the jet impelled type, a chamber adapted to contain a solid self-combustible material, an ejector by which water and gases generated from the combustion of the material can escape at the tail of the torpedo, a cap normally closing the end of the said container and provided with a striker for ignition of the combustible material, and a shearing pin connection for securing the said cap on the container so that it is blown off the end of the container when the internal pressure exceeds a predetermined amount.

4. In a torpedo of the jet impelled type, a container adapted to contain a solid self-combustible material, an ejector associated with the container, by means of which water and gases generated from the combustion of the material may escape at the tail of the torpedo, a cap normally closing the end of the container, a shearing pin device securing the cap on the container and adapted to yield on the internal pressure exceeding a predetermined amount, a spring operated striker carried by the cap, engaging jaws adapted to grip the said striker, a connection from the jaws by which the striker may be drawn back against the force of its spring, and a chamber within which the jaws slide in gripping position until they are drawn back to a predetermined point, the chamber having an enlargement permitting the jaws to open at the end of the predetermined travel.

In testimony whereof I affix my signature.

MARIO FRANCESCO TORAZZI.