

I. N. LEWIS.
GAS PROPELLED TORPEDO.
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933,086.

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Fig. 1

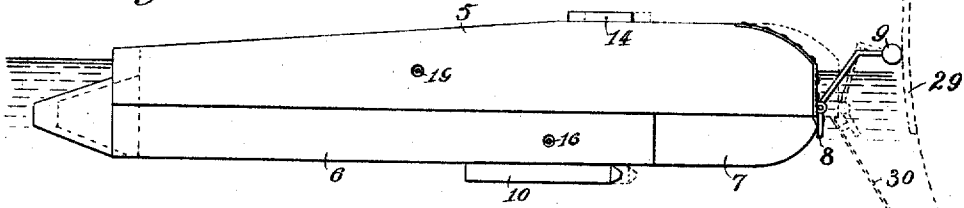


Fig. 2

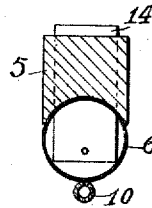


Fig. 3

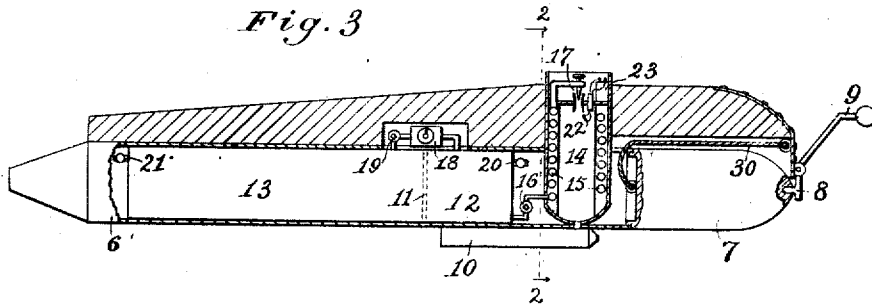
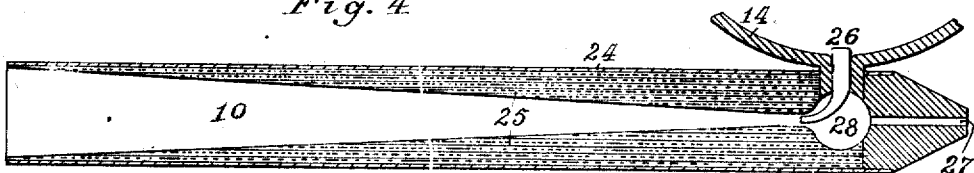


Fig. 4



Witnesses

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GAS-PROPELLED TORPEDO.

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To all whom it may concern:

Be it known that I, ISAAC N. LEWIS, of the United States Army, a citizen of the United States, and stationed at Fortress Monroe, county of Elizabeth City, and State of Virginia, have invented a new and useful Improvement in Gas-Propelled Torpedoes, of which the following is a specification.

This invention relates to the class of torpedoes known as locomotive torpedoes and particularly to the propulsion thereof by gas.

One object of the invention is the formation of the propelling gas in the torpedo itself and the direct application thereof to the motor.

Another object is the adaptation to the torpedo of the apparatus for the production of the motive agent in such a manner, with relation to the cartridge or charge of high explosive, that the latter may be readily and certainly placed in the position where its explosion will be most effective.

Still another object is the propulsion of the torpedo by the jetting action of the gas formed upon the torpedo and consequently the production of a jet nozzle of a construction such as will be best adapted for the purpose.

With these objects in view, the invention consists in the structure of parts and in their combination for the specified purpose substantially as herein set forth and claimed.

In the accompanying drawings, forming a part of this specification, Figure 1 represents in side elevation, the improved torpedo and indicates in dotted lines the manner in which it places its cartridge for explosion against the side of a battleship; Fig. 2 represents a vertical transverse section taken in the plane indicated by the line 2-2 in Fig. 3; Fig. 3 shows a longitudinal medial section of the torpedo; and Fig. 4 is a longitudinal medial section of the jet propeller on an enlarged scale.

The buoyant member of the torpedo may be a float of any sort, but preferably one of wood, as indicated at 5. To the underside of this float a tube as 6 may be attached which shall contain the greater portion of the operating mechanism and which shall receive at its forward end the base of the cartridge illustrated at 7, the nose of the cartridge being held in place by the pivoted catch 8 provided with a trip arm 9. The jet propeller is preferably located under the forward portion of the torpedo and is indicated at 10.

The permanent gas constituting the motive agent for driving the torpedo may be derived from the combustion of any suitable fluid hydrocarbon, the more volatile kinds being best suited for this purpose, such as gasolene, alcohol and denatured alcohol or acetylene gas. The apparatus illustrated is designed for the utilization of the liquid hydrocarbons and consists in part of a cylinder which may be located within the tube 6, which cylinder is divided by a transverse partition 11 into the hydrocarbon tank 12 and compressed air reservoir 13. Entering the tube 6 near its forward end, preferably in a vertical direction, is the combustion chamber 14, within which is located a vaporizing or gasifying coil 15, one end of which is connected to tank 12 through a pipe controlled by key-operating cock 16. At the other end of coil 15 is the injector nozzle forming part of the injector 17 located in the end of the combustion chamber. The coil 15 may be protected by a cylinder of refractory material, as indicated, in order to protect it from the excessive temperatures of the forming gas. A suitable working pressure for the compressed air in reservoir 13 is 150 pounds and from this a constant working pressure of 100 pounds may be maintained in the tank 12 through the employment of any suitable pressure regulating device, indicated at 18, a key-controlled cock 19 being placed in the connection between said tank and reservoir. The tank and reservoir may be filled respectively through the inlets 20 and 21. The initial heating of the vaporizing or gasifying coil may be effected by alcohol entered into the combustion chamber through the air feeding space of the injector, said injector being so constructed and designed that the inrush of hydrocarbon shall lead into the combustion chamber from six to eight times its bulk of atmospheric air. This mixture may be initially lighted by any suitable ignition device, preferably an electric igniter as typified at 22, current for which may be supplied by a dry cell located as indicated at 23.

The permanent gas formed in the combustion chamber may be led to a propeller of any suitable form, but preferably to a jet propeller, which may be of any appropriate design. The form of the jet propeller preferred is that indicated in Fig. 4. It consists of a steel tube 24 lined with a hard refractory substance 25 such as porcelain and

its interior diameter preferably tapers gradually from the inlet to the outlet of the nozzle and in accordance with that curve of expansion, which shall take best advantage of the development of velocity due to decrease in density of the highly heated gas issuing through the nozzle. This nozzle may be connected in any suitable way with the combustion chamber 14, but is preferably so connected through a contracting nipple 26, which delivers the gas into the throat of the nozzle. To take advantage of this highly heated gas to increase the power of the propelling agent, water may be entered at the forward end of the propeller nozzle, as through inlet 27. Water thus entering and passing to the chamber 28 will on its passage from said chamber, through the throat of the nozzle about the tip of the nipple 26, be asperated by the hot gas and the mixture thus formed will issue from the nozzle at high velocity and will strike with great energy against the water in the rear. With an apparatus thus constructed the cartridge may be placed as indicated at the extreme forward end of the torpedo and thereby be in a position for ready delivery and effectual location against the object attacked. Various modes of holding and releasing the cartridge may be devised, but the one illustrated is simple and effective. The cartridge is preferably of the same diameter as the tube 6 and is sufficiently reduced at its base to enter the end of said tube. Its nose is provided with a recess to receive the lug of catch 8, which holds its forward end in position until the trip 9 strikes the object aimed at. If this object be a battle-ship, a portion of whose side is indicated at 29, Fig. 1, the striking of trip 9 against the same will release the catch 8 from the cartridge, allowing the latter to drop from the torpedo, to the nose of which its base is attached by a cable, as indicated at 30, and as the cartridge, through its inertia, advances through the water, it will bring up against the battleship below the armor plate and there explode with great execution. The explosion of the cartridge may be effected in any of the well known ways, as for instance, by means of an automatic, weight operated, percussion primer, which may be set off at the instant the cartridge brings up with a jerk at the end of the cable 30, or by an electric primer.

This torpedo may be handled in the same manner as any locomotive torpedo. It may be directed from a vessel or from a row boat or from shore, or it may be provided with any suitable steering and controlling apparatus, automatic or otherwise, and the gas generated thereon may be utilized in controlling as well as in propelling. To start the torpedo, air from reservoir 13 may be turned on to the hydrocarbon tank by a key

applied to cock 19 and the hydrocarbon turned into coil 15 by a key applied to cock 16. Then by the injection of a little alcohol into chamber 14, and the ignition thereof, the hydrocarbon in the coil may be vaporized and upon opening the nozzle of the injector the vaporized or gasified hydrocarbon from the coil will be injected into the combustion chamber where it and the air led in thereby will be lighted by the igniter 22, and will issue through the nozzle 10 and drive the torpedo forward. Then as the trip 9 strikes the object aimed at the cartridge will be released and exploded as above described. The gases composing the motive fluid being all permanent gases do not condense when mixed with water, while the water itself is atomized rather than vaporized by the action of the high velocity hot gases in the minute time interval required to pass through the propeller nozzle. The resultant action is a reactive thrust of great driving power. The length of cable 30, which may be regulated as desired, determines the depth below the water surface of the cartridge 7 at the moment of explosion or detonation.

The invention claimed is:—

1. In a torpedo, the combination with a suitable float or buoyant body, of a jet propeller therefor, a reservoir of fluid hydrocarbon fuel carried by the float, an injecting device connected to said reservoir and constructed to lead the fuel into the combustion chamber and to supply from the atmosphere at normal pressure the air needed for combustion, means for gasifying or vaporizing the fuel before reaching the injecting device, a device within the combustion chamber for initially igniting the admixture of air and fuel, and means for continuously supplying the highly heated products of combustion directly to said propeller.

2. In a torpedo, the combination with a suitable float or buoyant body, of a jet propulsion device therefor adapted for operation by a permanent gas, of a combustion chamber carried by said float, a reservoir of fluid hydrocarbon fuel under pressure, an injector with free communication to atmospheric air, means for vaporizing or gasifying said fuel and heating it to a high temperature, means for delivering said fuel without other admixture of air directly to the injector, and a device for initially igniting the mixture of air and fuel in the combustion chamber.

3. In a torpedo, the combination with means for supplying a motive agent at a high temperature, of a jet propulsion nozzle gradually increasing in interior diameter and prolonged to take full advantage of the increase in velocity due to the expansion of the motive agent in its traverse of the nozzle, said nozzle having a lining of refractory

material of considerable thickness at the inlet of the nozzle and gradually decreasing toward the outlet, for the purpose set forth.

4. In a torpedo, the combination with means for supplying a motive agent at a high temperature, of a jet propulsion nozzle located beneath the body of the torpedo and having its forward end pointed and having a chamber in that end and gradually increasing in interior diameter from said chamber toward its outlet and having an inlet for water through said pointed end whereby the water may be asperated by the heated gas and add striking force to the mixture as it leaves the nozzle.

5. In a torpedo, the combination with a float, of a casing secured to the underside thereof, a propeller attached to said casing, means within the casing for supplying to the propeller the motive agent, the cartridge located in advance of the casing, and means for automatically releasing the cartridge when the torpedo has reached its destination.

6. In a torpedo, the combination with a float, of a casing secured to the underside thereof and containing the motive means, a cartridge held at its rear end by the casing and at its forward end by a releasing device, and a trip for said releasing device projecting forward of the float for engagement with the object against which the torpedo is directed.

7. A torpedo consisting of a float, a tube

secured to the underside thereof for containing the motive means, and a cartridge of conoid form having its base supported in the forward end of the tube and its nose held by a releasing device at the forward end of the float.

8. In a torpedo, the combination with a float, of a casing secured to the underside thereof, a propeller attached to said casing, means within the casing for supplying to the propeller the motive agent, said means consisting of a reservoir for hydrocarbon fluid, a compressed air reservoir, means for subjecting the hydrocarbon in said reservoir to the pressure of said air, a combustion chamber, and means for leading the hydrocarbon into it and for simultaneously leading in air at ordinary pressure, the cartridge located in advance of the casing, and means for automatically releasing the cartridge when the torpedo has reached its destination.

9. The combination with the float, of the air reservoir and hydrocarbon tank carried along its underside, the combustion chamber extending vertically up through the float, and the propulsion nozzle below the combustion chamber and directly connected thereto.

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Witnesses:

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