G. E. ELIA.

DEVICE FOR USE IN CONNECTION WITH NAVAL WARFARE.

APPLICATION FILED MAY 4, 1909.

984,515. **Patented Feb. 14, 1911.**

Fig. 1

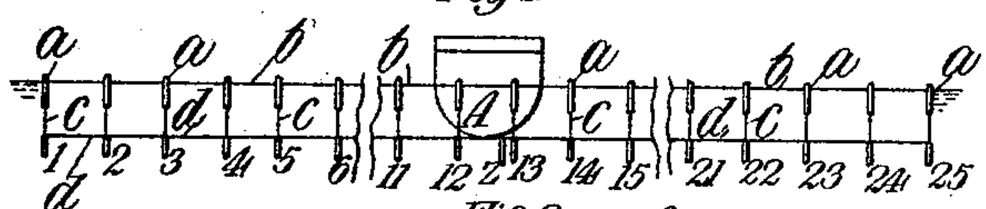


Fig. 2.

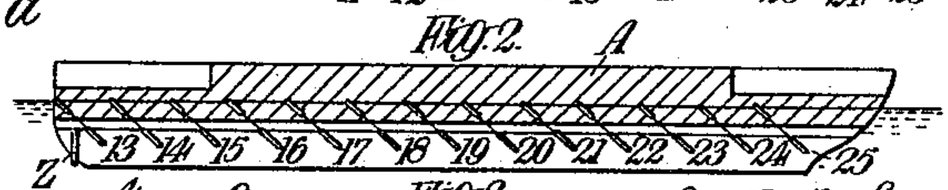


Fig. 3.

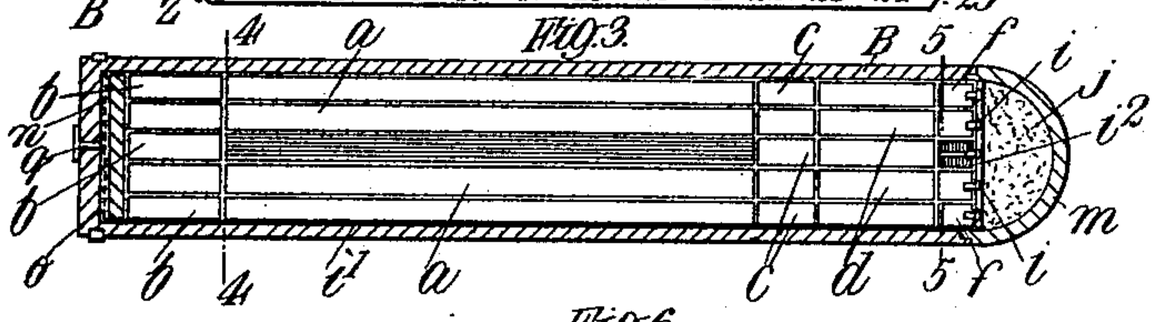


Fig. 4.

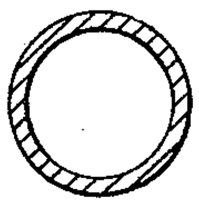


Fig. 5.

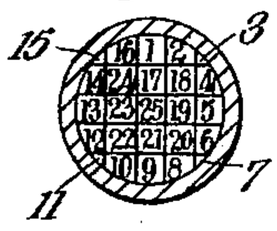


Fig. 6.

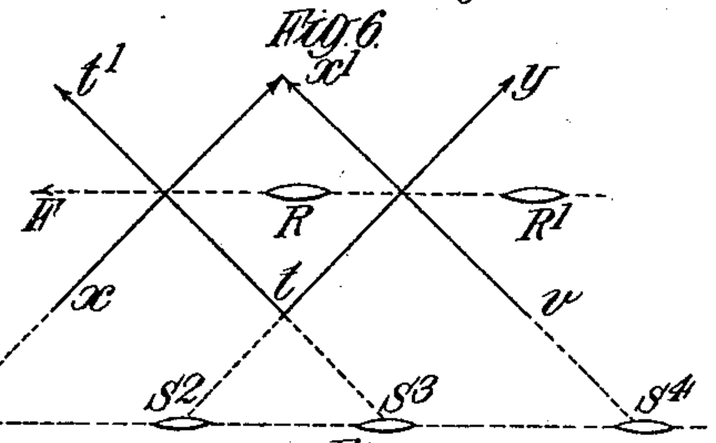


Fig. 7.

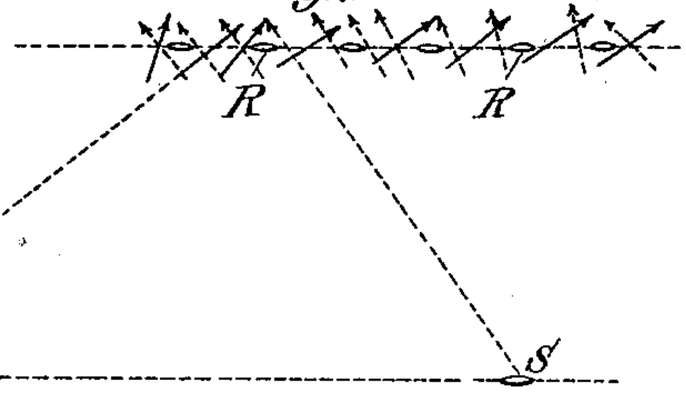
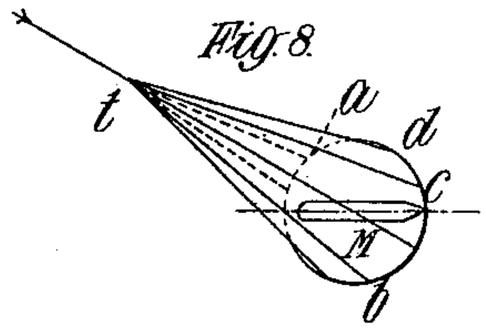


Fig. 8.



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F. Blake.

Inventor:
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by his attorney,
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UNITED STATES PATENT OFFICE.

GIOVANNI EMANUELE ELIA, OF LONDON, ENGLAND.

DEVICE FOR USE IN CONNECTION WITH NAVAL WARFARE.

984,515. Specification of Letters Patent. **Patented Feb. 14, 1911.**

Original application filed March 10, 1908, Serial No. 420,162. Divided and this application filed May 4, 1909. Serial No. 493,794.

To all whom it may concern:

Be it known that I, GIOVANNI EMANUELE ELIA, a subject of the King of Italy, late of 3 St. James Square, Holland Park Avenue, in the county of London, England, at present residing at Bailey's Hotel, Kensington, in the county of London, England, have invented certain new and useful Improvements in or Relating to Devices for Use in Connection with Naval Warfare, of which the following is a specification.

This invention relates to submarine explosive devices for use in connection with naval warfare.

At the present time there are two principal methods employed in naval warfare for attacking the vessels of an enemy; first, by means of shells fired from guns, and secondly, by means of various kinds of torpedoes. A projectile can only damage a part of the ship above the water line, and an automobile torpedo can only attack the ship at a single point below water. Certain ships like the "*Dreadnought*" have armor plate of such thickness that they are invulnerable to the shock of existing projectiles, and the submerged portion of these vessels is divided into large watertight compartments, in such a manner that the explosion of an automobile torpedo has relatively little effect upon the ship, this action being limited to a small number of water-tight compartments, so that the ship retains its power of flotation even with the compartments thus affected fill with water. A third method of destroying the enemy's ships consists in laying explosive mines, but these also are only able to injure small isolated portions of the vessels. Another method or system of destroying ships is described in the specification of my application for patent Serial No. 420,162 filed March 10th 1908; it consists in subjecting the ships to the action of a long floating charge of explosive which is laid in the path of the ships to be destroyed; in the case of a ship in motion, the cable after being struck by the ship is dragged along by it and becomes applied to its front and sides; in the case of a stationary ship, the cable or cables may be placed so that the ship cannot move in any direction without encountering a length of cable. The said charge of explosive is adapted when dragged along by the ship to extend a considerable distance along its sides and beneath its belt of armor plating, under conditions which are such that when the said charge is caused to explode by hand or automatically, it exerts a powerful action upon a large number of the ship's watertight compartments, thereby insuring the destruction of the floatability and stability of the ship whatever its size, whether it is a powerful cruiser, a submarine, a torpedo boat, or a ship of any other type.

It is well known with what care the commanders of ships avoid booms of submarine mines by means of which the existence of the stoutest ships would be compromised. When the mines are fixed the enemy avoids them, and when automobile torpedoes of the Whitehead or other type are used, they can only be launched from a comparatively short distance and with great difficulty of attacking on the part of the torpedo boats intended to carry them.

The chief object of the present invention is to enable a device such as above described to be projected over the water like an ordinary projectile with comparatively small risk and to spread itself into the required position in the water. For this purpose one form of the device comprises a shell or casing containing a line of buoyant explosive charges, an explosive charge for expelling the aforesaid charges from the shell, and time fuses for igniting the said charges, whereby the device can be fired from a gun as a projectile, separated from its shell during its flight, and developed so as to fall into the water and lie therein in the form of a horizontal straight or curved line of explosive across the course of the enemy's ship, which latter encounters it before the time fuses ignite the explosive charges.

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

Figure 1 is a diagrammatic elevation of one modified form of the cable in its expanded or extended condition after having been projected from a gun. Fig. 2 is a side elevation of the cable showing how it becomes applied to the hull of a ship. Fig. 3 is a longitudinal section of the device showing the shell with the explosive cable shown in Figs. 1 and 2 inclosed within it. Fig. 4 is a cross section on the line 4—4 and Fig. 5 a

similar section on the line 5—5 of Fig. 3. Figs. 6 and 7 are diagrammatic plans of ships being attacked by means of the projectile cables illustrated in Fig. 3. Fig. 8 is a diagrammatic plan of a modified method of attacking a ship.

The cable when in its fully extended position in the water, after having been launched, is supported in the water by floats *a a . . . a* which are composed of wood or other material lighter than water connected together by a light cable *b b . . . b*.

1, 2, 3 . . . 25 are the explosive charges which are suspended from the floats *a a . . . a* by means of depending cables *c c . . . c* and are connected by the cable *d d . . . d*. When the ship A collides with the cable it tows the system of connected charges so that these, under the influence of the velocity of the ship, will become applied to the hull as indicated in Fig. 2, that is to say the floats *a*, *a* will be distributed on both sides of the hull on the line of flotation of the ship and the charges 1, 2 . . . 25 will be similarly distributed beneath the water line.

A weight in the form of a vertically suspended cable *z* (Figs. 1 and 2) is provided midway on the cable *d d . . . d* so as to keep the latter submerged, and thus also the charges 1, 2 . . . 25 thereby preventing them when being towed through the water from rising to the line of flotation of the ship or above its armored zone. It is obvious that the cable *z* is unnecessary for attacking unarmored ships because the explosion of a series of charges against an unarmored line of flotation is sufficient to sink the vessel.

In Fig. 1 the ship A is supposed to strike the cable near the middle. It will however be readily understood that the system will act even if the ship should strike it near one of its extremities. As hereinbefore described, a few minutes after the system has become applied to the hull the time fuses, with which each charge is provided, will explode the charges, and a portion of the ship being torn away in proximity to each charge the ship will soon sink. The time fuses become ignited as hereinafter described when the system is launched into the sea, this launching being effected in the manner which will now be explained.

The cable or network hereinbefore described and shown in its extended position in Fig. 1, is shown in Fig. 3 carefully arranged within the shell or casing B adapted to be fired from a gun like an ordinary projectile. The charges 1 to 16 are arranged around the inner circumference of the casing and are given different shapes to enable them to be stowed neatly, while the remaining charges namely 17 to 25, are all of the same shape. The shell or casing is formed of a single piece of steel, except the head *m* which is detachable and is affixed to the part B after the cable or network has been arranged within it. Within the shell or casing there are arranged the cables *b*, *b*, the floats *a a*, the cables *c c* and *d d*, and the charges 1 to 25, each of the latter being inclosed in a steel box *f* and provided with a time fuse *i*. i^2 is a disk of explosive material packed in close contact with the time fuses *i*. The base of the shell or casing also carries the time fuse *q*, which is ignited when the said shell or casing is fired from the gun, and the explosion charge *o*, which is fired by the time fuse *q* by the time that the shell or casing has arrived in proximity to the enemy. i^1 is an instantaneous fuse extending lengthwise in the shell and connecting the charge *o* to the disk i^2 of explosive material. The explosion of the charge *o* expels all the elements of which the explosive cable is composed from the shell or casing, and also causes the ignition of the instantaneous fuse i^1 which instantly ignites the disk of explosive material i^2, thereby causing the ignition of the time fuses *i i*, with each of which the aforesaid disk is in contact. Each element of the explosive cable has its corresponding length of cable *b* upon a plug *n* of non-inflammable material situated between the explosive charge *o* and the cable for enabling the latter to be expelled from the shell or casing, when the charge *o* is exploded, without becoming burned.

In order to maintain the whole cable thoroughly rigid the head *m* is forced by pressure on the steel casing B; it is embedded upon a pad or body portion *j* composed of a suitable kind of india rubber. This device which presents the external form of an ordinary projectile may be placed in a gun charged in the ordinary manner.

Referring now to Fig. 6, S^1, S^2, S^3, S^4 represent ships which are attacking the ships R R^1. The ship S^3 for example, by means of a gun fires a projectile such as that shown in Fig. 3, in the direction S^3, *t*, t^1, in front of the ship R which is traveling in the direction indicated by the arrow F. The fuse *q* of the device is so adjusted as to explode the charge *o* when the said device nearly reaches the point *t*. The explosion causes all the elements to issue from the shell or casing in a single assemblage under the action of three forces, namely those due to the speed of translation and of rotation of the device itself, together with that due to the explosion of the charge *o*. Experiments will elements, 1, 2, 3 . . . 25 to be arrived at in enable the weight and form of each of the such a manner that they will become developed almost in a straight line as shown in Fig. 1 and this at the moment at which they reach the surface of the sea. The whole arrangement is such that it becomes arranged in the form of a horizontally extending vertical wall or network, as shown in

Fig. 1. At the moment when the cable or network is fired from the shell or casing the time fuses *i i* are ignited as hereinbefore described; when therefore the ship R has carried the cable or network along with it, all the time fuses *i i* of the charges are acting, and, after a few minutes, when the charges have become applied to the ship as aforesaid, their explosion will take place. If the ships S^1 S^2 S^3 and S^4 direct their fire against the ships R R^1 as indicated in Fig. 6 it is obvious that the ship R for example, will be completely surrounded by the lines *t* t^1, *x* x^1, *t y* and V x^1 and the ship R even by reversing its engines could not leave the cable or network by which it has been surrounded.

Obviously Fig. 6 illustrates theoretical conditions and in actual naval warfare the cables would be arranged less mathematically but still quite efficaciously and might for example be launched as shown diagrammatically in Fig. 7.

When it is remembered that the guns of large caliber of a single ship could fire two hundred of these cables per hour, that is to say a total length of cable boom of eighty kilometers, it will be readily understood that a hostile fleet can be quickly destroyed. If in addition the quick firing guns are brought into play, thousands of explosions will be produced against the outer bottom plating of the ship beneath the water, and it will be absolutely impossible for the enemy to escape.

The length of the cable or network and the weight of the explosive charges depend upon the caliber of the ordnance employed. As in the case of shells, there will be different sizes of cable projectiles according as large cruisers, torpedo boats, or submarines are to be attacked.

This system is applicable to submarines because they can be reached with these explosive cables whereas they cannot be reached by ordinary shells. It may therefore be said that the advantages of ordnance and of automobile torpedoes have been combined in the present invention.

In places where there are submarine mines the entire zone may be countermined by launching these cables. The fuses *i* are constructed in such a manner as to burn under water. It is also obvious that any desired number of charges may enter into the composition of a cable, only one or two being used if desired.

According to a modified arrangement the cable is endless, and arranged within the shell or casing in such a manner that when the said shell explodes as at *t* in Fig 8, the cable will develop itself in the form of a ring *a b a d* and on striking the water entirely envelop the ship M. Owing to the high speed of rotation of the shell or casing due to the usual rifling of the bore of the gun, the explosive cable or network will naturally develop into a circular shape owing to centrifugal force.

Each bundle or set of elements of the cable may be encircled by a rubber band, which is however easily broken when the cable is expelled from the shell or casing and the spreading effect of the centrifugal force becomes operative. Assuming the shell or casing to be traveling in a horizontal direction when the cable or network is discharged, the latter if packed as shown in Fig. 3 will quickly assume a circular form in a plane perpendicular to the direction in which it is traveling, and it will at the same time descend owing to the action of gravity. As soon as the lowermost portion, as at *a* in Fig. 8, of this circular shaped cable touches the water, the said portion will be checked in its horizontal flight and will then drag adjacent parts downward. In this way the cable will be caused to move about its lowermost point from a vertical plane into a horizontal plane and in the latter position will be in the water and surround the ship M.

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

1. A submarine explosive device for use in naval warfare, comprising a shell adapted to be fired from a gun like an ordinary projectile, explosive charges connected in line and packed in said shell, means for expelling the aforesaid charges from the shell during the flight of the latter from the gun, means for supporting the line of explosive charges when submerged in water, and means for causing the charges to become ignited.

2. A submarine explosive device for use in naval warfare, comprising a shell adapted to be fired from a gun like an ordinary projectile, explosive charges connected in line and packed in said shell, floats connected to said charges for supporting them and also packed in said shell, means for expelling the aforesaid charges and floats from the shell during the flight of the latter from the gun, and means for causing the said charges to become ignited.

3. A submarine explosive device for use in naval warfare, comprising a shell adapted to be fired from a gun like an ordinary projectile, explosive charges connected in line and packed in said shell, means for supporting the explosive charges when submerged in water, means for expelling the aforesaid charges from the shell during the flight of the latter from the gun, a time fuse connected to each of the said charges, and means for igniting the time fuses.

4. A submarine explosive device for use in naval warfare, comprising a shell adapted to be fired from a gun like an ordinary projectile, explosive charges connected in line and packed in said shell, floats connected to

said charges for supporting them and also packed in said shell, means for expelling the aforesaid charges and floats from the shell during the flight of the latter, means for keeping the charges submerged while being dragged through the water by a ship, and means for igniting the aforesaid charges.

5. A submarine explosive device for use in naval warfare, comprising a shell adapted to be fired from a gun like an ordinary projectile, explosive charges connected in line and packed in said shell, means for supporting the explosive charges when submerged in water, an explosive charge for expelling the aforesaid charges from the shell during the flight of the latter from the gun, a time fuse fired when the shell leaves the gun and connected to the aforesaid expelling charge, a time fuse connected to each of the aforesaid explosive charges connected in line, and an instantaneous fuse fired from the said expelling charge for igniting the last mentioned time fuses which are connected to the explosive charges.

6. A submarine explosive device for use in naval warfare, comprising a shell adapted to be fired from a gun like an ordinary projectile, and a plurality of explosive charges, a plurality of floats, means for connecting said charges to each other, means for connecting said floats to each other, means for connecting said charges to said floats, means for expelling the charges, floats, and their connecting means from the shell during its flight, and means for causing the aforesaid charges to become ignited, all packed within said shell.

7. A submarine explosive device for use in naval warfare, comprising a shell adapted to be fired from a gun like an ordinary projectile, explosive charges connected in an endless line and packed in said shell, means for supporting the explosive charges when submerged in water, means for expelling the aforesaid charges from the shell during the flight of the latter from the gun, and means for causing the charges to become ignited.

8. A submarine explosive device for use in naval warfare, comprising a shell adapted to be fired from a gun like an ordinary projectile, explosive charges connected in an endless line and packed in said shell, floats connected to said charges for supporting them and also packed in said shell, means for expelling the aforesaid charges and floats from the shell, during the flight of the latter from the gun, and means for causing the said charges to become ignited.

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

GIOVANNI EMANUELE ELIA.

Witnesses:

HENRY HASPER,

WOLDEMAR HAUPT.