L. P. BARLOW.

AERIAL TORPEDO.

APPLICATION FILED MAY 20, 1916.

1,322,083.

Patented Nov. 18, 1919.

2 SHEETS—SHEET 1.

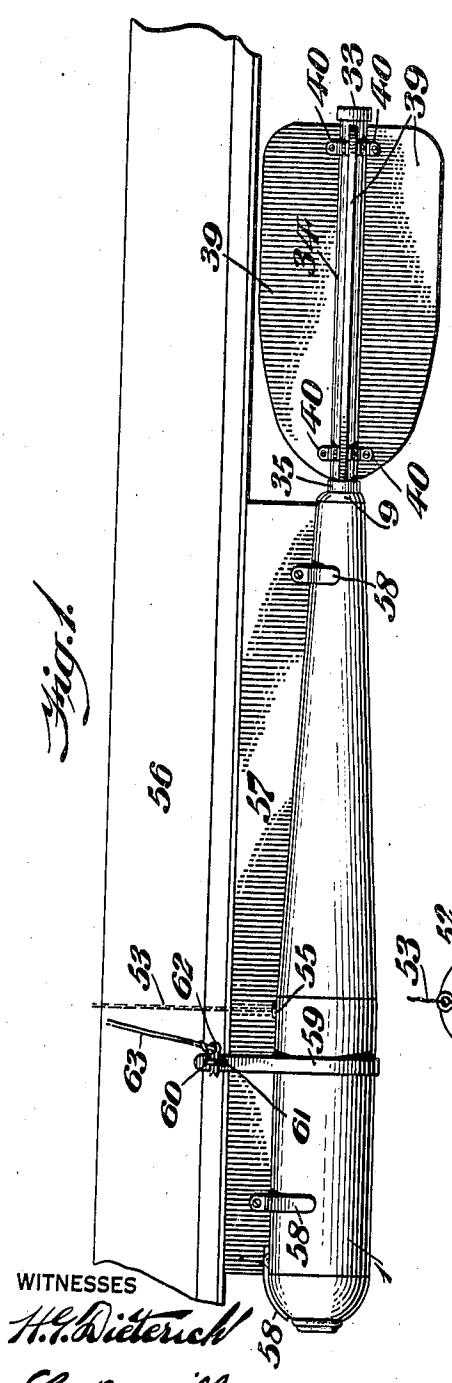


Fig. 1.

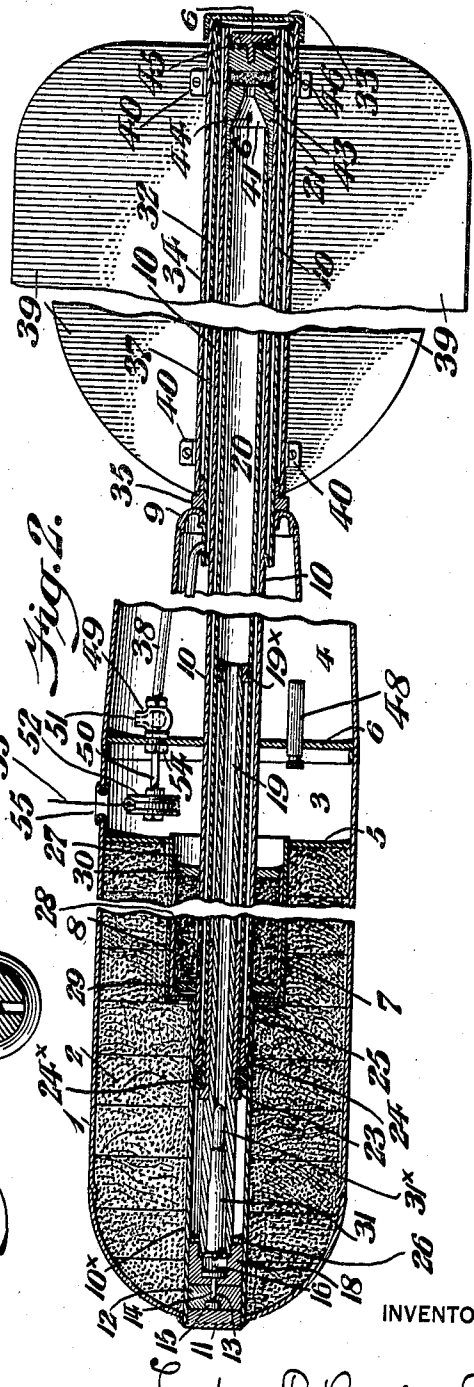


Fig. 2.



Fig. 3.

WITNESSES

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2 SHEETS—SHEET 2.

Fig. 4.

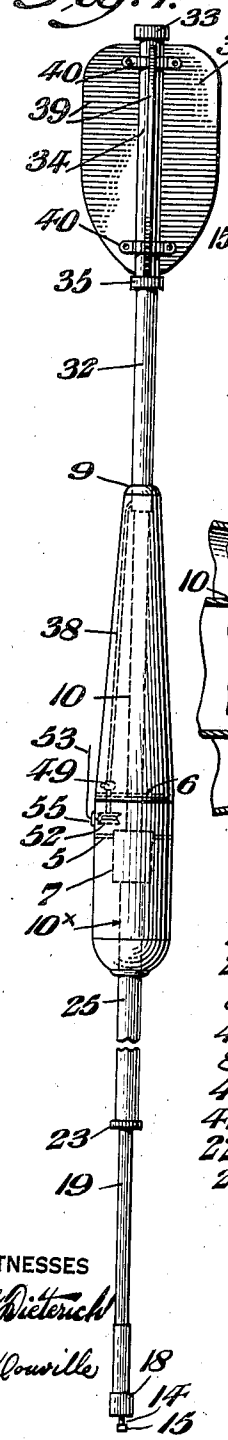


Fig. 5.

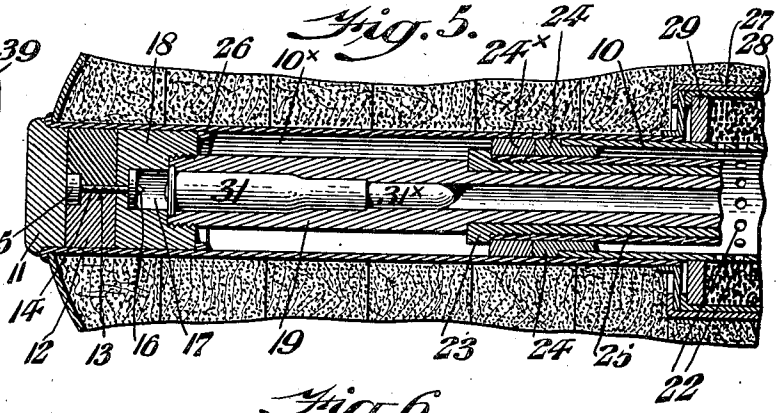


Fig. 6.

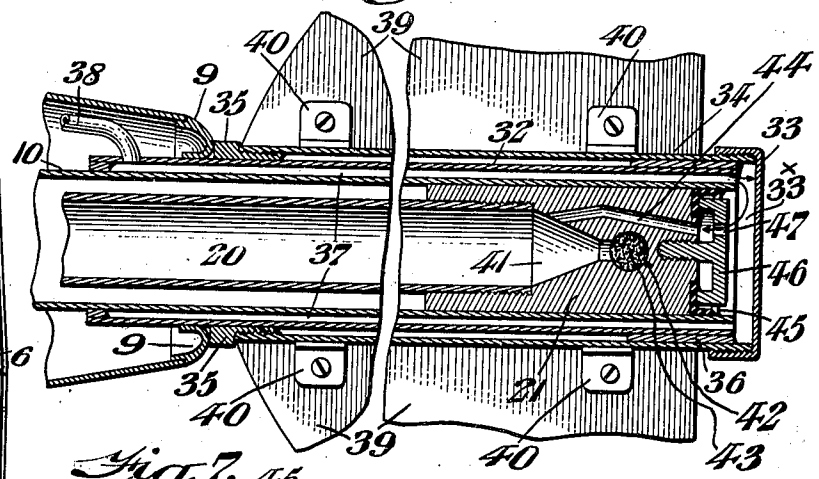


Fig. 7.

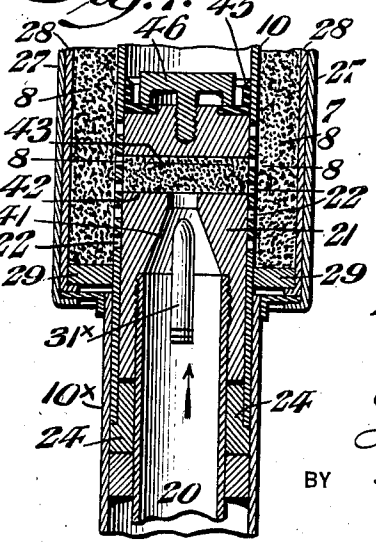
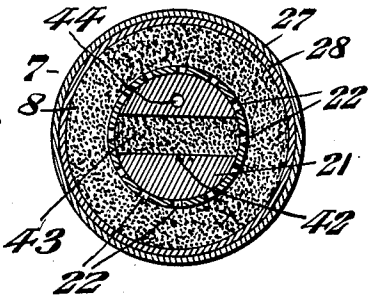


Fig. 8.



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UNITED STATES PATENT OFFICE.

LESTER P. BARLOW, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO MARLIN-ROCKWELL CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

AERIAL TORPEDO.

1,322,083. Specification of Letters Patent. Patented Nov. 18, 1919.

Application filed May 20, 1916. Serial No. 98,737.

To all whom it may concern:

Be it known that I, LESTER P. BARLOW, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Aerial Torpedo, of which the following is a specification.

My invention relates to the general art of the manufacture of torpedoes and torpedo shells of the character adapted to be dropped from aeroplanes or flying machines of any type; and its primary object is the construction of a torpedo or explosive device which will be exploded with certainty at a predetermined distance above the ground or other target. This is accomplished by the provision of a device which assumes or has a position in advance of the explosive head, after the torpedo has been launched, and is operated by contact with the ground or target to fire or propel a bullet or the like rearwardly, into violent contact with the detonator, to explode the latter and thereby the high explosive carried by the torpedo. Preferably this device takes the form of a gun-barrel carrying a firing or gun hammer mechanism, and a cartridge, which is exploded by the firing mechanism to discharge its bullet upwardly into contact with the detonator, the gun-barrel being slidably mounted in the torpedo, and caused to assume a position in alinement with the detonator and in advance of the explosive head, after the torpedo has been launched or dropped. In the preferred construction the torpedo does not arm itself until it has dropped some distance from the aeroplane, when a stabilizer is extended rearwardly from the torpedo, and thereafter the cartridge carrying gun device is extruded forwardly. The detonator also moves into its operative position. These movements are accomplished by positive means, preferably compressed air, which may be released by the opening of a normally-closed valve, controlled from the aeroplane, to cause the movements described.

Other objects of my invention relate to constructional features, whereby the instantaneous and certain operation of the device is insured, and accidental discharge of the same, as by gun-fire directed against the aeroplane, is prevented.

Both the stabilizer as an entirety and the gun devices are normally contained within the torpedo by being relatively assembled within extrudible telescopic members which are oppositely extruded from opposite ends of the torpedo by the expansion of the gases.

In the arrangement described the pilot device or forward extrudement, including the gun-barrel or tube carrying the cartridge, does not fire the detonator, but acts merely as a positioning device. It insures the operation of the firing mechanism on contact with the ground, when the explosive charge is a desired distance above the same, and the alinement of the cartridge and bullet with the detonator. Thus I do away with the necessity of having an extruded or forwardly extending member move relatively to the torpedo body, as by a sliding connection, to fire the detonator, upon impact with the earth. Such operating members are open to various objections. Thus the pilot tube may buckle on impact, or may penetrate the earth so rapidly, on impact, as not to move back relatively to the bomb or torpedo, to fire the same. The means described by me, together with positive means for forcing the "pilot" member forwardly from the torpedo, permit the use of a stream line, vertically dropping torpedo, without the necessity of employing parachutes or other retarding means for the torpedo and without the necessity of a pilot device of greater specific gravity than the torpedo or bomb body, while at the same time instantaneous explosion of the detonator is assured.

The rearward extrusion of the stabilizer increases the stability of the torpedo after it has left the aeroplane. This operation also provides a time interval, after the torpedo has been launched, before gas pressure is available to cause the torpedo to arm itself, thus increasing the safety of an occupant of the aeroplane.

To the foregoing and other ends, my invention comprehends a torpedo of the character hereinafter described, a typical embodiment of which is represented in the accompanying drawings.

For the purpose of illustrating my invention, I have shown in the accompanying drawings, a certain type and embodiment of it which is at present preferred by me,

because in practice it gives satisfactory and reliable results.

It is to be understood, however, that the various instrumentalities in which my invention is shown as embodied can be variously arranged and organized and that my invention is not, therefore, limited to the precise arrangement and organization of these instrumentalities typified in the constructions depicted in the accompanying drawings and hereinafter described.

In the drawings—

Figure 1 represents in side elevation, a torpedo embodying my invention, shown as applied to a carrying aeroplane and in the position which the parts occupy before the torpedo is freed from the plane.

Fig. 2 represents a central, longitudinal, vertical, enlarged elevation through the torpedo represented in Fig. 1, showing it freed from the plane, and illustrating the internal construction.

Fig. 3 represents a transverse section through the normally closed gas valve contained in the valve chamber illustrated in Fig. 2.

Fig. 4 represents in side elevation, the torpedo of Fig. 1 when freed from the plane and in the vertical position in which it drops with the extrudible elements extruded.

Fig. 5 represents a fragmentary, longitudinal, central, sectional side elevation through the forward end of the explosive chamber or war head of the torpedo.

Fig. 6 represents a view similar to Fig. 5 of the aft end of the torpedo, representing parts of the stabilizer vanes, the stabilizer, detonator-carrying plunger and its sliding tube.

Fig. 7 represents a fragmentary, vertical, sectional, elevational detail of the position which the illustrated parts occupy when the detonator-carrying plunger has been entered within the "booster" chamber and when the bullet is assumed to be moving in the direction of the arrow to explode the detonative charge,—and in reading this figure, it is to be assumed that the gun breech and hammer have encountered the ground, the cartridge been exploded and the bullet fired from the gun barrel.

Fig. 8 represents a transverse sectional view on the line 8—8 of Fig. 7.

Similar numerals of reference indicate corresponding parts.

Referring to the drawings:—

The torpedo proper consists of a shell composed, essentially, of a forward chamber termed a war head 1 for containing, for instance, such high explosive material 2 as is known in the trade as "T. N. T.,"—and of a valve chamber 3 between the explosive chamber and a gas chamber 4.

The torpedo contains an axially disposed forwardly-extrudible telescopic organization hereinafter termed the gun-telescope, which contains within it a gun,—and also contains a stabilizer mechanism extrudible rearwardly and axially of the torpedo and hereinafter termed the stabilizer-telescope.

The torpedo-proper.

The body of the torpedo comprises, as explained, a forward explosive chamber 1, a valve chamber 3, a gas chamber 4, and partitions 5 and 6, respectively separating the explosive chamber and the valve chamber and the valve chamber and gas chamber.

Within the rear of the explosive chamber 1 is contained in central, axial, concentric disposition, what I term a "booster" chamber 7, which contains the "booster" or prime fulminate or explosive charge 8.

Throughout the length of the entire torpedo and to some distance beyond its rear end cap 9, extends an axially disposed, fixed, hollow or tubular, casing 10, 10^{x}, within the forward portion 10^{x} of which is contained the gun-telescope as an entirety, and with reference to the rear portion 10 of which are assembled the outer sliding tube 34 of the stabilizer and its inner sliding and detonator carrying plunger 21 and sliding tube 20.

The gun-telescope and gun.

The forward open end of the casing 10 is normally closed by a plug which I term the casing plug 11, against which within the casing is seated a split ring 12, having a central bore 13 for the hammer stem 14 of the hammer head 15 and hammer point 16,—all of a gun hammer mechanism,—of which the hammer point 16 normally and conveniently fits within a hammer socket 17 formed within a breech block 18 of a gun barrel 19, screwed to said breech block.

The gun barrel travels within the inner sliding tube 20, which extends throughout the length of the torpedo casing and terminates in the detonator-carrying block, head, or plunger, 21 as shown in Figs. 2 and 6.

The casing 10, as shown in Fig. 5, is, as explained, conveniently made in two parts, an outer part 10^{x} which is imperforate, that is, is a solid tube, and a continuing rear part already spoken of as 10, which as to such part of its length as is within the booster chamber is provided with perforations 22, within the region of which the detonator when pressed forwardly as hereinafter described, comes to rest, so that upon the explosion of the detonator charge, the perforations aid to permit the explosion of the "booster" charge.

The gun barrel 19 at its inner end extends to and normally stands within the gas chamber 4; is encircled by a stop or packing ring 19^{x} secured thereto, which in the

forward expulsion of the gun barrel by the expansion of the gas is caused to encounter a fixed bushing stop 25, which is secured to the tube 20 within the casing.

Between this bushing stop 25 and the outer end 10ˣ of the casing and forwardly beyond the "booster" chamber, a headed bushing sleeve 24 secured to casing 10ˣ makes tight the sliding tube 20 on the casing so as to prevent the escape of gas, and bears against a sliding packing ring 24ˣ within the casing.

Within the casing to the rear of the normal position of the gun breech is also a stop ring 26, which serves in the introduction of the gun within the casing to confine it to proper inward position.

The "booster" chamber 7 is conveniently composed of two concentric and close-fitting cylinders, the outer of which is 27 and the inner 28,—the two being inclosed by heads 29 and 30, as shown in Fig. 2.

It will now be understood that the gun barrel 19 and its breech 18, which contain the cartridge 31 and bullet 31ˣ, of any ordinary character and construction, and the sliding tube 20 which carries the detonator, are both susceptible of outward and forward sliding movement, that is of being blown forwardly out of the torpedo by the released gas,—the gun barrel with the cartridge against which the gas makes contact and is stopped, and, more slowly the inner sliding tube 20 with the detonator, until the barrel is extruded to, for instance, the distance disclosed in Fig. 4, and the tube to a lesser distance,—the expulsion of the gun barrel and breech necessarily first expelling the casing plug 11 and the split ring 12.

The stabilizer-telescope.

Referring to Figs. 1, 2, 6, 7 and 8,—32 designates a fixed outer tube of the stabilizer which is mounted upon the extended rear end of the casing 10 and itself is open-ended.

Upon this fixed tube 32 is mounted a sliding stabilizer tube 34, the outer end of which is closed by a cover-cap 33, and which has packing rings 35 and 36 to make it slide properly upon the outer fixed tube 32, without permitting the escape of gas, ring 35 being secured to tube 34, and ring 36 being secured to fixed tube 32.

The outer fixed tube 32 is of larger internal diameter than the external diameter of the casing 10, so that between it and the casing there exists a cylindric gas passage 37 into which gas when released from the gas chamber 4 flows through the gas inlet tube 38.

Upon the outer tube 34 of the stabilizer, the vanes 39, which in a sense constitute the stabilizer proper and any desired plurality of which may be employed, are located and connected conveniently by clips 40 or other fastening devices.

Fitted for longitudinal movement within the casing 10 is a sliding inner detonator tube 20, which, as explained, extends forwardly to near the outer end of the casing, and at its rear end terminates in and is connected conveniently by being screwed into what I have termed a detonator-carrying head or plunger 21, which is in effect a plug which closes the rear end of the tube 20, is internally cylindrically bored a certain distance to receive said end, and beyond the termination of the cylindric bore is preferably formed with a conical bore 41, the open apex of which enters a transverse bore 42, which is filled with the detonating material 43, so packed within it as completely to fill it at each end against the inner smooth walls of the casing 10.

In the operation of the torpedo, this detonator head in its forward movement stops within the region of the perforations 22 in the casing, within the "booster" chamber 7, the lower end of the detonator head abutting against stop bushing 24, which is secured to casing 10, as shown in Fig. 7.

A gas inlet 44 extends longitudinally through the detonator head and opens internally within the sliding tube 20 and externally through the outer end of the head.

The outer end of the detonator head is conveniently made tight within the casing by a packing 45, which is held in place by a hollow-headed screw cap 46 having an inlet aperture 47 into its hollow head, through which gas coming through the gas passage 37 and entering the chamber 33ˣ of the cover cap 33, enters and passes through the gas inlet 44 into the sliding tube 20.

The gas chamber and control of the compressed gas.

The gas chamber designated as 4, is, as stated, a chamber extending from the partition 6 to the end cap 9 of the torpedo shell, and it is provided with the gas inlet valve 48, through which before the assembling of the device as an entirety, the compressed gas is introduced to fill the chamber.

The gas inlet tube or conduit 38 which at the rear leads into the gas passage 37, at the front has applied to it the gas discharge valve 49 of any preferred type, but conveniently of the puppet type, the threaded valve stem 50 of which controls the valve and, when opened, permits of the inflow of the compressed gas through the valve inlet 51 into the gas chamber.

The valve stem 50 extends through a packing box 54 in the partition 6 into the valve chamber 3, and is provided with a pulley 52 around which is wrapped a cord

53, preferably fibrous, which passes upwardly through an outlet eye 55 in the wall of the valve chamber, to and into the aeroplane with which it is either fixed or manually operated, in order that when the torpedo is released, it will automatically and with certainty occasion the rotation of the pulley and the opening of the gas valve, so as, without fail and at once upon the dropping of the torpedo from the plane, to let out the gas from the gas chamber into both the stabilizer-telescope and the gun telescope.

As already explained, when the gas is let out, its operation is first upon the stabilizer-telescope and thereafter upon the gun-telescope.

The connection of the torpedo to the plane.

The torpedo as an entirety is, as shown in Fig. 1, suspended in parallelism from beneath an assumedly horizontally disposed aeroplane 56, or other typical flying machine, to which it is conveniently attached by being longitudinally centered up against a depending fin 57 connected with the aeroplane and provided with steadying clips 58.

In this position, the torpedo is best retained by a flexible strap 59, fast to one side of the aeroplane or fin, and loosely connected at the other side conveniently by means of a staple 60 which passes through a slot 61 in the strap 59 and is conveniently retained by a cotter pin 62 with the head of which a link or rod 63 extending to within the aeroplane and operative from said plane, is connected.

Such being a description of an operative embodiment of my invention, its operation in so far as it has not already been explained as the component parts have been described, can be readily summarized:

At once when the torpedo is released from the plane, the cord 53 occasions the rotation of the pulley 52 and the opening of the gas valve to release the compressed gas from the gas chamber into both of the telescopes.

The extrusion of the gun-telescope under the pressure of the gas being temporarily retarded by the frictional resistance of the friction plug 11 and the split steel ring 12, it results that the stabilizer-telescope will first be extended until bushing 35 thereon contacts with stop member 36, and the torpedo thrown into a vertical position. Thereafter the compressed gas, flowing forward through the detonator head, filling the interior of the sliding stabilizer tube 20, and the interior of the gun barrel, and encountering the cartridge, will be stopped by it, until sufficient pressure has been developed, after the stoppage of the stabilizer tube 34. When there is sufficient pressure, the gas will force outward the gun barrel and breech and the contained cartridge,—at the same time, and necessarily expelling the plug 11 and the split steel ring 12,—the hammer head, hammer-stem and hammer-point remaining extended as shown in Fig. 1,—until the gun as an entirety is extruded from the war head up to the limit which its end-for-end travel permits, that is until stop member 19^x contacts against bushing 25 on tube 20. At the same time, but more slowly, the sliding tube 20 and the detonator will travel forward as far as their end-for-end travel will permit and until the plunger and detonator are located within the area of the "booster" chamber, this travel being stopped, as stated above, when member 21 contacts against bushing 24. Tube 20 travels more slowly than the gun barrel, as stated, because the gas in chamber 33^x, pressing on the upper end of the detonator head and at the same time passing through passage 44 and pressing on bullet 31^x, moves the detonator and tube 20, after plug 11 has been forced out, and moves the gun barrel through, that is relative to tube 20, so that the gun barrel advances more rapidly than the detonator. If desired, however, the friction of detonator head 21 in casing 10 could be adjusted so that the detonator and tube 20 would not begin to move until after the gun barrel had completed its movement.

Such being the position of the parts when the torpedo has been dropped a given distance,—and being the position indicated in Fig. 4,—it is obvious that when the hammer head 15 encounters an extraneous object such as the ground, it will drive upwardly the hammer stem 14 and cause the hammer point 16 to strike the percussion cap of the cartridge, explode the latter and occasion the driving of the bullet into the mass of the detonative material which, as explained, will then be within the "booster" chamber and in the position represented in Fig. 7.

The consequent explosion of the detonative material through the perforations in the casing and into the fulminate in the "booster" chamber, will naturally occasion the explosion of the explosive contents of the war head, and bring to pass the results desired and explained.

It may also be remarked that ring 24^x, which is slidable between tubes 10 and 20, slides down with tube 20, when the latter is extended, until it contacts against stop 26, which is fast to casing 10^x. Ring 24^x, in that position, helps support tube 20 against lateral stress, by giving it a lower bearing when tube 20 is fully extended. The enlargement 23, at the lower end of ring 25, holds sliding ring 24^x in place.

It will be observed that the action described prevents the torpedo from arming itself until it has dropped a distance, (a number of hundred feet) from the aeroplane,

the extension of the stabilizer rearwardly providing a time interval before the gun barrel and detonator move into position. It should also be noted that the sliding fit of gun barrel 19 in tube 20, when both are extended, permits the gun barrel to telescope in tube 20 when hammer head 15 and breech block 18 strike the ground. This telescoping action prevents any possibility of tube 20 buckling after the impact of the hammer head, and thus insures bullet 31× reaching the detonator before any shock imparted to tube 20 could move the detonator out of position.

It should also be noted that the arrangement described, in which valve 49 is placed inside the gas chamber, makes it certain that hostile gun-fire will not possibly cause the extrudement of the pilot device and the movement of the detonator into operative position. The same is true in the case of collision of the aeroplane carrying the torpedo, and other accidents. Safety of the occupant of the aeroplane is thereby enhanced. In the case of a tensioned device, such as a spring held by a detent, adapted to move the pilot device and detonator, the shooting away or breakage of such detent permits the undesired movement of the detonator and other moving parts. In my invention, the only result can be that the moving parts will remain in their inoperative positions. If, for example, valve 49 is opened by well-directed gun-fire, the bullet necessarily makes a hole in the outer wall of the gas chamber large enough to permit the escape of gas or air therefrom, so that the moving parts will not have any gas pressure, or sufficient to move them. Also, no breakage of any other part will cause the operation of the compressed gas. I believe that I am the first in the art to conceive and devise a means for positively forcing the detonator and pilot or extrudement into operative position, so arranged and constructed that accidents and hostile acts cannot operate the same. In the invention particularly described above, the air-valve is a detaining means for preventing the operation of the compressed gas, which performs its function only when released from the gas chamber into pipe 38, by the actuating means, namely the slender cord 53 which must be pulled to open valve 49.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In an aerial torpedo, the combination of a body containing an explosive chamber, a tube normally contained within said body, means for forcing said tube forwardly, from the forward end of said body, when the same has been launched, a firing mechanism at the forward end of said tube, a light missile to the rear of said firing mechanism arranged to be projected rearwardly at high velocity through said tube when said mechanism strikes the ground or other target, and means contacted by said missile within the vicinity of the explosive chamber, to cause the explosion of the charge in said chamber.

2. In an aerial torpedo, the combination of a body containing an explosive chamber, a tube adapted to extend forwardly from said body when the same has been launched, a firing mechanism at the forward end of said tube, a cartridge in said tube, adapted to be exploded by said firing mechanism when the latter strikes the ground or other target, said cartridge having a pellet projected rearwardly through said tube into the proximity of said explosive chamber, when the cartridge is exploded, and means contacted by said cartridge to cause the explosion of the explosive charge in said chamber.

3. In an aerial torpedo, the combination of a body containing an explosive chamber, a pilot device carrying a firing mechanism adapted to contact the ground or other target when said chamber is a predetermined distance above said target, a cartridge to the rear of said firing mechanism, said cartridge having a pellet at the rear of the explosive charge thereof, said firing mechanism being adapted to explode said cartridge when said mechanism strikes an object, said pilot device comprising positioning means for said cartridge and pellet, and a detonator adapted to be violently contacted and exploded by said pellet thus positioned, to explode the charge in said explosive chamber.

4. In an aerial torpedo, the combination of a body containing a charge of high explosive, a detonator for the same, a gun mechanism slidably mounted in said body, and arranged to assume a position in alinement with said detonator and in advance of said body after the latter has been launched, and a cartridge and bullet therefor carried by said gun mechanism; said mechanism being arranged to explode said cartridge when it strikes an object, to discharge said bullet into violent contact with the detonator, to explode said high explosive.

5. In an aerial torpedo, the combination of a body containing an explosive charge, a pilot device normally contained within said body, releasable means for forcing said pilot device forwardly from the body, detaining means for said releasable means, actuating means for releasing said detaining means when desired, said releasable means and detaining means being of a construction and so arranged as to be rendered ineffective by gun-fire penetrating the same.

6. In an aerial torpedo, the combination of a body containing an explosive charge, a detonator movably mounted in said body and normally held at a distance from said charge, a chamber containing compressed

gas, a normally closed valve within said chamber, said body having a passageway leading from said valve to the rear of said detonator, said valve being adapted when opened to permit said gas to flow through said passageway into operative relation to said detonator to force the latter into proximity to said charge.

7. In an aerial torpedo, the combination of a body containing an explosive charge, a detonator movably mounted in said body and normally held at a safe distance from said charge, means adapted, when released, to force said detonator into proximity to said charge, detaining means for the same, and actuating means for releasing said detaining means when desired, said releasable means, detaining means and actuating means being of a construction and so arranged that gun-fire will not cause said releasable means to be rendered effective to move said detonator, in case of penetration by such gun-fire of any of said parts.

8. In an aerial torpedo, the combination of a body containing an explosive charge, a pilot device normally contained within said body, a chamber containing compressed gas, and means for releasing the gas from said chamber and causing it to force said pilot device forwardly from the body after the torpedo has been launched.

9. In an aerial torpedo, the combination of a body containing an explosive charge, a pilot device normally contained within said body, a chamber containing compressed gas, a normally-closed valve governing the release of gas therefrom, means operable from an aeroplane upon the release of the torpedo therefrom for opening said valve, and means for causing the released gas to force said pilot device forwardly from the body.

10. In an aerial torpedo, the combination of a body containing an explosive charge, a pilot device normally contained within said body, a detonator movably mounted in said body, a chamber containing compressed gas, and means operable after the torpedo has been launched for releasing the gas from said chamber and causing it to force the pilot device forwardly from the body and the detonator into proximity to said charge.

11. In an aerial torpedo, the combination of a body containing an explosive charge, a pilot device normally contained within said body, a rearwardly extrudible stabilizer-carrying tube, and positive means for first forcing said tube rearwardly and then forcing said pilot device forwardly.

12. In an aerial torpedo, the combination of a body containing an explosive charge, a detonator therefor, a forwardly extrudible tube, a gun barrel telescoping in said tube, carrying a firing mechanism at its forward end, and a light missile arranged to be fired rearwardly when said mechanism strikes the ground or other target, into violent contact with said detonator.

13. In an aerial torpedo, the combination of a body containing an explosive charge, a tubular casing extending into said charge, a friction plug closing the opening of said casing at the lower end of the body, a pilot device carried in said casing to the rear of said plug, a detonator, means acting after the torpedo has been launched for forcing out said plug and extruding said pilot device, and means carried by said pilot device for exploding said detonator, on impact.

14. In an aerial torpedo, the combination of a body containing an explosive charge, a pilot device normally contained within said body, a detonator movably mounted in said body, a stabilizer mounted in said body and rearwardly extrudible therefrom, and means, operable after the torpedo has been launched, for forcing said stabilizer rearwardly to its full extent, and thereafter forcing said pilot device forwardly from the body, and said detonator into proximity to said charge.

15. An aerial torpedo, which comprises in combination a high explosive charge, a forwardly-extrudible gun-member, a rearwardly-extrudible stabilizer member, a detonator slidable relatively to the stabilizer member, and means for extruding the forwardly-extrudible gun-member, for advancing the detonator toward the charge, and for rearwardly extruding the stabilizer member.

16. An aerial torpedo, which comprises in combination:—a chamber for containing explosive,—a chamber for containing compressed gas,—a forwardly-extrudible gun-tube,—a rearwardly-extrudible stabilizer tube,—a detonator-carrying tube slidable inside the stabilizer tube,—and means for releasing the compressed gas so as to free it to extrude the forwardly-extrudible gun-tube, to advance the detonator to within the explosive chamber, and to rearwardly extrude the stabilizer tube.

17. An aerial torpedo, which comprises in combination:—a chamber for containing explosive,—a "booster" or primary fulminate chamber within the chamber for containing explosive,—a chamber for containing compressed gas,—a forwardly-extrudible gun-telescope,—including a gun,—a rearwardly-extrudible stabilizer tube,—a detonator slidable through the stabilizer tube,—and means for releasing the compressed gas so as to free it to extrude the forwardly-extrudible gun-telescope, to advance the detonator to within the "booster" chamber, and to rearwardly extrude the stabilizer tube.

18. An aerial torpedo, which comprises in combination;—a forwardly-extrudible gun-barrel, a firing mechanism and loaded cartridge carried thereby,—a rearwardly extrudible stabilizer tube,—a detonator slid-

able through the stabilizer tube,—means for extruding the forwardly-extrudible gun-barrel, for advancing the detonator to within the explosive chamber, and for rearwardly extruding the stabilizer tube, and means operated from an aeroplane for operating the said extruding and detonator-advancing means.

19. An aerial torpedo, which comprises in combination:—a torpedo shell,—a chamber within said shell for containing explosive,—a chamber within said shell for containing compressed gas,—a forwardly-extrudible gun-telescope normally within the chamber containing the explosive,—including a gun within the forward or breech end of which is a rearwardly-extending hammer which in the extrusion of the gun-telescope and upon contact with an extraneous object, fires a cartridge,—a rearwardly extending stabilizer telescope provided with a gas passage,—a sliding tube within said stabilizer telescope, the rear end of which tube is provided with a detonating charge and channeled to admit gas from the gas passage of the stabilizer telescope to the interior of the sliding tube,—and means for releasing gas from the gas chamber to occasion the forward propulsion of the sliding detonator-carrying tube to bring the detonator within the confining area of the explosive within the explosive chamber, and to occasion the forward propulsion of the gun-telescope so that when the gun hammer strikes an extraneous object, the cartridge will be discharged directly into the detonator to occasion its explosion and that of the explosive compound then surrounding it.

In testimony whereof I have hereunto signed my name this 11th day of May, 1916.

LESTER P. BARLOW.

In the presence of—
J. BRISON TAYLOR,
C. D. MCVAY.