

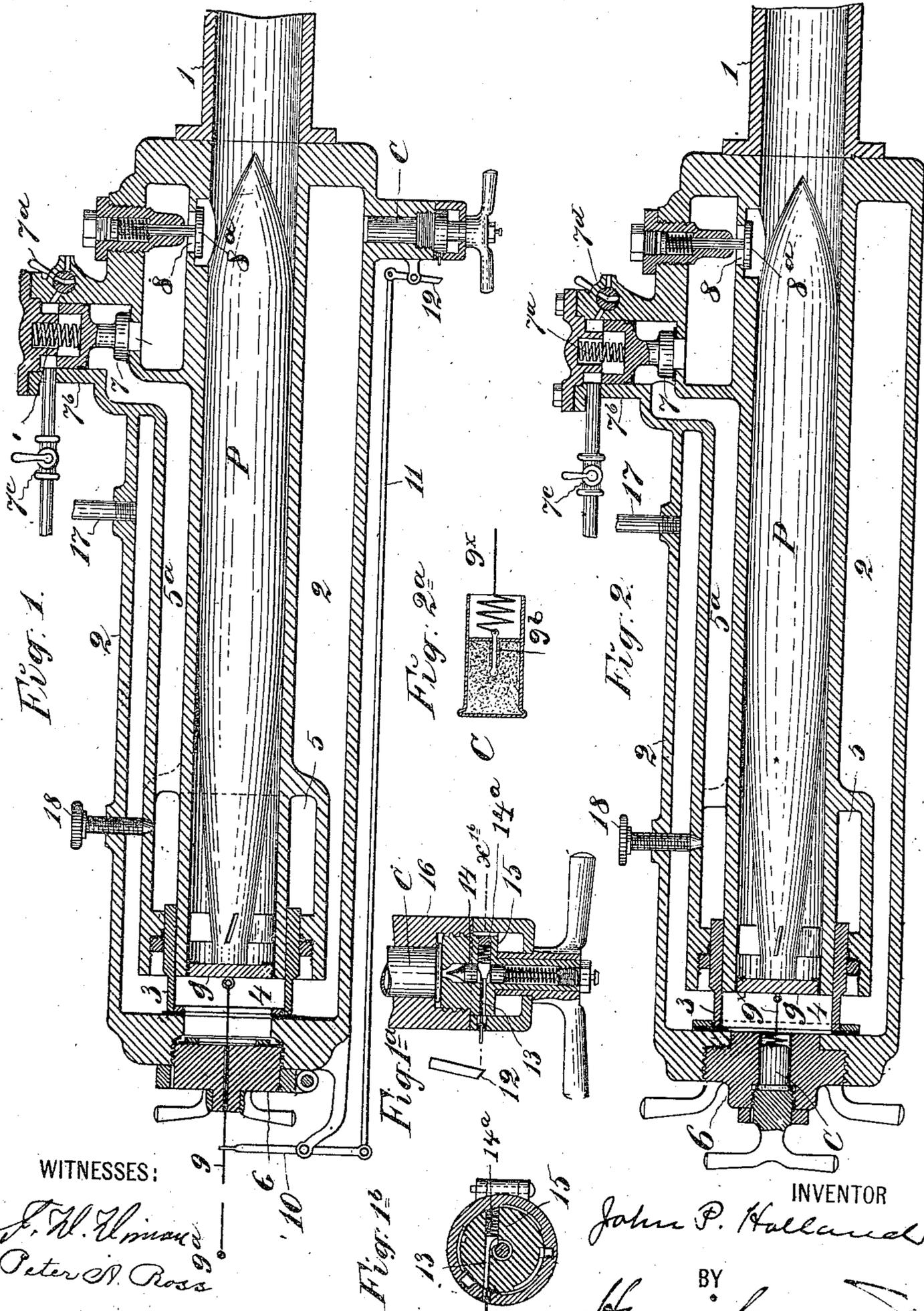
No. 708,552.

Patented Sept. 9, 1902.

J. P. HOLLAND.  
SUBMARINE OR OTHER GUN.

(Application filed Sept. 13, 1898. Renewed Feb. 10, 1902.)

(No Model.)



WITNESSES:  
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# UNITED STATES PATENT OFFICE.

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## SUBMARINE OR OTHER GUN.

SPECIFICATION forming part of Letters Patent No. 708,552, dated September 9, 1902.

Application filed September 13, 1898. Renewed February 10, 1902. Serial No. 93,451. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN P. HOLLAND, a citizen of the United States, residing at Newark, Essex county, New Jersey, have invented certain new and useful Improvements in Submarine or other Guns, of which the following is a specification.

This invention relates to devices for throwing projectiles, and particularly shells and torpedoes containing high explosives; and it relates more particularly, though not necessarily, to the class of guns which are to be fired or discharged when submerged or when the bore beyond the projectile is filled with water at the time of the discharge. In this class of guns it is desirable that the inertia of the projectile shall be gradually overcome by a moderate propulsive force and a stronger propulsive force then applied, and the attainment of this end is one of the important objects of the present invention.

Another object is to effect the expulsion of water from the bore of the gun in advance of the projectile; and the invention consists in means for effecting these objects and others, all of which will be hereinafter fully described.

In the accompanying drawings, which illustrate embodiments of the invention, Figure 1 is a longitudinal axial section of the breech portion of the gun in its preferred form. Fig. 1<sup>a</sup> is an enlarged sectional view of the device for exploding the cartridge used therein, and Fig. 1<sup>b</sup> is a cross-section at line *x<sup>b</sup>* in Fig. 1<sup>a</sup>. Fig. 2 is a view similar to Fig. 1, showing a somewhat-different arrangement of the parts; and Fig. 2<sup>a</sup> is an enlarged sectional view showing the device for exploding the cartridge used therein.

Referring primarily to Figs. 1 and 1<sup>a</sup>, 1 is the barrel of the gun. 2 is an air reservoir or jacket about the barrel to receive and hold a charge of compressed air. 3 is a tubular slide-valve adapted to interpose between the breech-chamber 4 and the air-reservoir. 5 is an air-chamber behind the valve 3, the air in which acts to hold the valve 3 closed normally. P is a projectile in the gun, and g is a gas-check behind it. 6 is the breech-block, which closes the breech of the gun and which may be constructed in the usual manner, and

7 is the discharging-valve, which controls an air-passage 5<sup>a</sup>, leading from the chamber 5 to a port 8, opening into the barrel of the gun just in front of the projectile P. The valve 7 is held down to its seat by a spring 7<sup>a</sup> at its back in the valve-chamber 7<sup>b</sup>, the pressure of the air which tends to open the valve being overcome or counterbalanced by air of like tension admitted to the chamber 7<sup>b</sup> at its back. A cock 7<sup>c</sup> serves to open the chamber 7<sup>b</sup> to the air-supply, and a cock 7<sup>d</sup> opens it to the atmosphere. This latter is a firing cock or valve.

So far as described the operation is as follows: Suppose the bore of the gun in front of the projectile to be full of water, as it may be under some conditions, and the chamber 2 contains a charge of air under moderate tension—say seven atmospheres. If the cock 7<sup>d</sup> be manipulated and the air released from behind the valve 7, the pressure of the air from the chamber 5 flowing through the passage 5<sup>a</sup> will first raise the valve 7 and then expend its force in expelling the water from the gun-barrel; but when the pressure is relieved from the back of the valve 3 by the exhaustion of air from chamber 5 the pressure of air in the chamber 2 raises said valve and admits the charge of air in the latter chamber behind the projectile P. The pressure exerted by this charge of air suffices to overcome the inertia of the projectile and set it in motion.

To the projectile or to the gas-check g, which is expelled with it, is attached a wire 9 of any desired length, which passes out through a small hole in the breech-block and through a hole in one arm of a lever 10, through which hole the wire plays; but on the end of the wire 9 is a button 9<sup>a</sup> or the like, which cannot pass through the hole in the lever, and consequently when the projectile shall have advanced in the barrel to a predetermined distance the button 9<sup>a</sup> engages the lever-arm and rocks the lever 9 on its fulcrum. To the other arm of the lever 9 is coupled a connecting rod or wire 11, which extends forward and is coupled at the other end to an arm of a lever 12, the free end of which pushes back a spring-detent 13, Fig. 1<sup>a</sup>, and thus releases a spring firing-

pin 14, mounted in the breech-block 15 of a cartridge-chamber 16, thus exploding a cartridge C in said chamber. The cartridge-chamber 16 opens into the air chamber or holder 2 and preferably near its front end or that part farthest from the valve 3, and when the cartridge is exploded its force is applied to the throwing of the projectile, the cushion of air between it and the projectile being also greatly expanded by the heat from the explosive.

It will not be necessary to describe the firing device seen in Fig. 1<sup>a</sup> more minutely than to say that the transversely-arranged spring-detent 13 takes in front of a shoulder on the axially-arranged firing-pin 14 and holds it back with its spring 14<sup>a</sup> compressed. The stem of the detent 13 projects into the path of the lever 12, so that the latter pushes the detent from in front of the shoulder on the firing-pin when the lever 10 is actuated. The invention is not, however, limited to any specific device for effecting the automatic explosion of the cartridge through the movement of the projectile.

Figs. 2 and 2<sup>a</sup> illustrate an embodiment of the invention which differs from that last described only in the formation of the cartridge-chamber in the breech-block 6, whereby the discharge of the cartridge C is effected directly behind the projectile, and in the means for exploding the cartridge. In this construction a wire 9<sup>x</sup> connects the gas-check *g* with the friction-pull 9<sup>b</sup> of a friction-primer set in the cartridge C, the surplus of the wire 9<sup>x</sup> being coiled in the front end of the cartridge-shell. When the surplus of wire is drawn out straight, the pull 9<sup>b</sup> will be drawn out and the charge in the cartridge exploded.

The air under tension may be supplied to the chamber 2 in any manner desired, as at the inlet 17, for example, and it may also be supplied to the chamber 5 in the same way; but preferably the air from chamber 2 will be admitted to the chamber 5 at an inlet, closed by a screw-valve 18. The sudden relief to the valve 3 at its back by the sudden lifting of the valve 7 will provide sufficient difference in the pressures on the valve 3 to allow the air-pressure in the chamber 2 to raise it instantly. Where the gun is not for submarine use, the air from the chamber 5 may be discharged into the atmosphere.

In order to enable a check-valve 8<sup>a</sup> to be provided at the port 8 to prevent the water entering the gun-bore from penetrating to the air-chambers of the gun, the valve 7 is so arranged as to control the passage 5<sup>a</sup>, leading to the port 8, and not to close the said port directly.

It will be noted that one of the important features of this gun is the regulable control of the explosive charge. By mechanical connection of the igniter with the projectile the moment of ignition of the explosive charge can be changed at every shot, and it is not necessary to employ a compressed gaseous

explosive charge for imparting the initial movement to the projectile, compressed air serving for this purpose perfectly.

Having thus described my invention, I claim—

1. A gun for discharging a torpedo or other projectile, having means for first setting the projectile in motion with compressed air, having regulable, mechanical connecting means between the projectile and an igniter for afterward igniting an explosive charge when the projectile shall have traveled far enough to act forcibly on the igniter through said connecting means, and having a special, stationary chamber for the explosive charge independent of the projectile, substantially as set forth.

2. A gun for discharging a torpedo or other projectile, having a barrel to guide the projectile, a breech-chamber behind the projectile-chamber, means for admitting a charge of compressed air to said breech-chamber for setting the projectile in motion, a cartridge-chamber independent of the projectile and open to said breech-chamber and adapted to receive a cartridge containing an explosive charge, an igniting device for said cartridge, and regulable connecting means between said igniting device and the projectile whereby the latter, when it shall have moved a predetermined distance, will effect the ignition of the cartridge, substantially as set forth.

3. A gun having an air-reservoir about its barrel in the form of a jacket, a breech-chamber behind the projectile-chamber, a valve controlling communication between said reservoir and breech-chamber, a cartridge-chamber communicating with the breech-chamber and adapted to receive a cartridge containing an explosive, said cartridge-chamber being independent of the projectile and forming a part of the gun, and means for igniting said explosive when the projectile shall have moved a predetermined distance, substantially as set forth.

4. A gun having an air-reservoir about its barrel in the form of a jacket, a breech-chamber behind the projectile-chamber, a valve controlling communication between said reservoir and breech-chamber, a cartridge-chamber communicating with the breech-chamber and adapted to receive a cartridge containing an explosive, said cartridge-chamber forming a part of the gun, and means for igniting the said explosive while the charge of compressed air is between the said cartridge-chamber and the projectile, whereby the force of the explosive acts on the projectile through the intermediate cushion of air, substantially as set forth.

5. A gun for submarine use, having a valve-controlled inlet for admitting gas under tension to the bore of the gun in front of the projectile, whereby the water may be forced out of the said bore in advance of the projectile, substantially as set forth.

6. A gun for submarine use, having a valve

to admit compressed air behind the projectile,  
a chamber to contain compressed air behind  
the said valve to hold said valve down to its  
seat, a port opening into the bore of the gun  
5 in front of the projectile, a passage connect-  
ing said port with the chamber behind said  
valve, and a firing-valve, controlling said pas-  
sage, whereby when said firing-valve is  
opened the air from said chamber expels the  
10 water from the bore of the gun, substantially  
as set forth.

7. A gun for submarine use having a firing-  
valve for admitting a gas under tension be-

hind the projectile, and a valve, automat-  
ically controlled by said firing-valve, which 15  
admits a gas under tension in front of the  
projectile substantially at the same time as  
the firing, whereby the water is expelled from  
the bore ahead of the advancing projectile.

In witness whereof I have hereunto signed 20  
my name, this 1st day of September, 1898, in  
the presence of two subscribing witnesses.

JOHN P. HOLLAND.

Witnesses:

PETER A. ROSS,  
HENRY CONNETT.