C. G. ABBOT.

ORDNANCE.

APPLICATION FILED JAN. 11, 1919.

1,380,171.

Patented May 31, 1921.

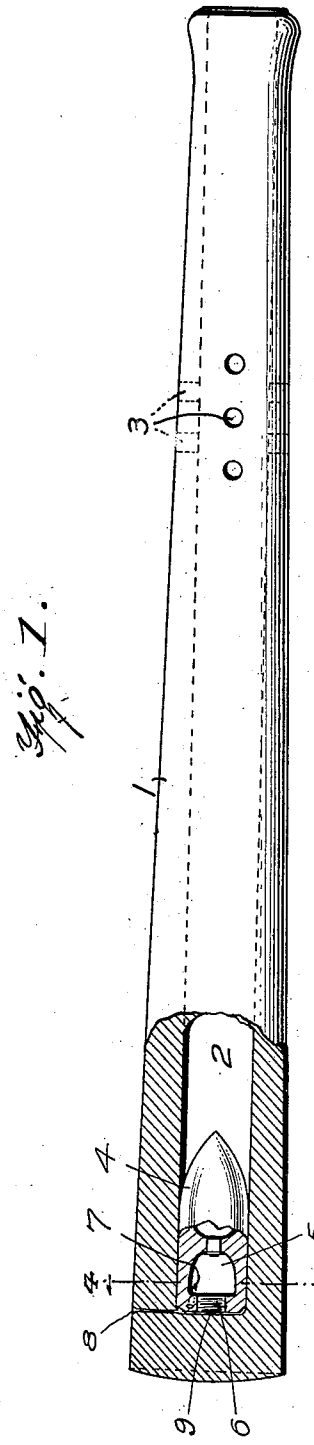


Fig. 1.

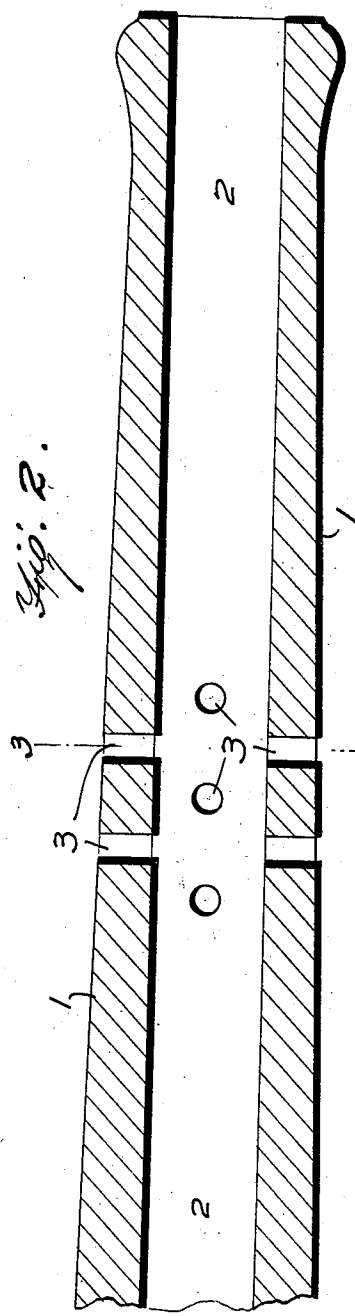


Fig. 2.

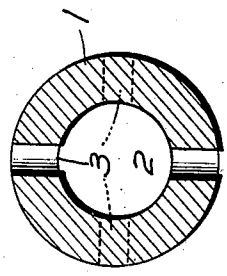


Fig. 3.

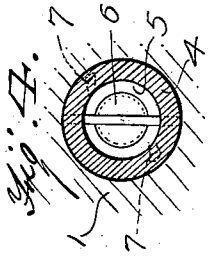


Fig. 4.

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UNITED STATES PATENT OFFICE.

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ORDNANCE.

1,380,171. Specification of Letters Patent. Patented May 31, 1921.

Application filed January 11, 1919. Serial No. 270,686.

To all whom it may concern:

Be it known that I, CHARLES G. ABBOT, a citizen of the United States of America, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Ordnance, of which the following is a specification.

My invention relates to improvements in ordnance, and it consists in the combinations, constructions and arrangements herein described and claimed.

An object of my invention is to provide a novel type of ordnance including a self-propelled projectile which does not require the use of rifled guns, but which may be used with guns of smooth bore, thereby rendering such use economical, due to the lower cost of smooth bore guns and their greater life.

A further object of my invention is to provide ordnance including a self-propelled projectile in which means is provided for rotating the projectile around its longitudinal axis while it is within the gun, thereby insuring the true course of the projectile after leaving the gun, and at the same time, providing means for terminating the rotative force prior to the actual discharge of the projectile from the muzzle of the gun, so that the rotation of the projectile thereafter is accomplished merely by its momentum, that is to say, by the momentum of rotation acquired within the gun.

A further object of my invention is to provide a novel form of gun for use with projectiles of the type mentioned.

Other objects and advantages will appear in the following specification, and the novel features of the invention will be particularly pointed out in the appended claims.

A number of attempts to produce the rotation of projectiles for use with smooth bore guns have been made. In each instance, as far as I am aware, these attempts have failed where such projectiles have been used as ordnance, due to the fact that the rotative force has been applied unsuccessfully during the flight of the projectile, and has not been applied entirely within the gun, as in the present invention. In certain instances, attempts have been made to obtain the rotative effect by air resistance. In other devices, the kinetic energy of the discharging gases has been used to produce a turbin effect. In such devices it has been necessary to construct spiral grooves, and the difficulties of proportioning these grooves, as well as the cost of manufacturing projectiles of this type, have rendered these devices impractical.

In the present invention, I have provided a projectile which is self-propelled and which, as stated before, receives its rotative force entirely within the gun. My invention is illustrated in the accompanying drawings, forming part of this application, in which—

Figure 1 is a side view of a gun, a portion of the gun and the projectile being shown in section;

Fig. 2 is an enlarged section through the forward part of the gun;

Fig. 3 is a section along the line 3—3 of Fig. 2, and

Fig. 4 is an enlarged section on the line 4—4 of Fig. 1.

In carrying out my invention, I provide a gun 1 of any suitable shape, having a smooth bore 2. In Fig. 1 I have shown such a gun, this figure being designed to illustrate a gun of the simplest form. Toward the forward end of the gun I provide a series of openings 3. These openings are arranged radially with respect to the longitudinal axis of the gun, but they may be arranged otherwise without departing from the spirit of the invention.

In Fig. 1 the projectile is shown at 4. The specific form of the projectile is immaterial as far as the present invention is concerned. In a co-pending application Serial No. 270,687, filed Jan. 11, 1919, I have disclosed and claimed a projectile which may be used very effectively with a smooth bore gun. It is essential for the purposes of this invention, however, that the projectile be provided with means for self-propulsion and for self-rotation within the gun, and in so far as these features are concerned, the gun and the projectile act mutually to carry out the purposes of the invention.

In the form of the projectile shown in Fig. 1, and in Fig. 4, the body portion 4 is provided with a chamber 5, which may be closed in any suitable manner, such as by a screw plug 6, and which is provided with passages 7 leading from the chamber to the rear of the projectile and being tangent to the chamber wall, *i. e.*, tangent to a circle having its center in the longitudinal axis of the projectile. The charge within the chamber 5 may be exploded in any suitable way,

such as by pouring a priming charge through the priming passage 8, and igniting the priming charge, the combustion being communicated to the chamber 5 through the passages 7, which are in the form of bell-mouthed bores and which may contain some of the propellant, if desired. Instead of using a priming charge, the propellant in the projectile may be ignited by a firing pin and a percussion cap, such as that shown at 9, when the cap strikes the rear inner end of the gun as, for instance, when the projectile is dropped into the gun from the muzzle.

The ignition of the charge 5 causes a rush of gas through the passages 7. This pressure drives the projectile forwardly and at the same time, gives it a rotative movement while it is passing through the gun. When the projectile reaches the openings 3, the major portion of the propelling and rotating force is removed, since the compressed gases tend to escape through these openings. The openings are so disposed with respect to the muzzle of the gun, as to insure the reduction of the propeling force and the rotative force practically to zero at the time the projectile leaves the gun. This constitutes one of the main features of the present invention, because it has been found in practice that where the propelling and the rotative forces are continued after the projectile leaves the gun, the projectile will be deflected, because of the impossibility of proportioning the parts and the charge so as to get the pressure applied symmetrically with respect to the axis of the rotating projectile. Furthermore, the gases which would be ejected from the muzzle of the gun if the openings 3 were not present, do not exert pressures, the resultant of which is in alinement with the axis of the gun, but rather to one side thereof. As long as the projectile is guided by the gun, this skew pressure has no deleterious effect, but after the projectile leaves the gun it has. The provision of the openings 3, therefore, insures the true course of the projectile. It is essential, for the purposes of the invention, that all of the propelling and the rotative forces be applied while the projectile is still within the gun, and to this end the charge in the chamber 5 is proportioned so that by the time the projectile leaves the gun there is no further ejection of the gases through the passages 7. In other words, the charge has been entirely consumed.

It is, of course, necessary that the passages 7 leading from the chamber 5, extend to the rear of the projectile. Tangential passages extending to the side of the projectile would, of course, be useless as far as this invention is concerned, since such a construction would not give the propelling effect and the rotative effect which is essential for carrying out the objects herein set forth. It is obvious that if greater penetration is desired a small portion of the propelling charge might be placed in the gun itself, since even then the self-propelling property of the projectile would be merely augmented but not otherwise changed.

One of the advantages of having the propellant in the projectile itself is that the propelling force which drives the projectile from the gun is applied more slowly than where the propellant is entirely outside of the projectile, as is ordinary. In the latter case, a very high pressure is developed immediately, thus necessitating a heavy gun construction to stand the pressure. In the present invention the pressure is developed gradually and does not fall as rapidly. A lighter gun may be used without sacrificing its effectiveness.

While I have mentioned powder as being one form of propellant, it is obvious that any propellant capable of causing a rush of gases through the bores or passages 7 when the propellant is actuated, as for instance, a compressed gas, may be used without departing from the spirit and the scope of the invention.

I claim:

1. The combination, with a smooth-bore gun having pressure relieving vents near the muzzle, of a projectile having a chamber containing a propellant, and being provided with tangential bores symmetrically disposed with respect to the axis of the projectile and terminating at the rear thereof, whereby the projectile is propelled forwardly and rotated around its axis when the propellant is actuated, the charge being so proportioned that the rotative force is terminated through the exhaustion of the propellant before the projectile leaves the gun.

2. The combination, with a smooth-bore gun having pressure relieving vents near the muzzle, of a projectile having a chamber containing a propellant, and being provided with discharge passages, whereby the projectile is propelled forwardly and rotated around its axis when the propellant is actuated, the charge being so proportioned that the rotative force is terminated through the exhaustion of the propellant before the projectile leaves the gun.

In testimony whereof I affix my signature.

CHARLES G. ABBOT.