

Jan. 12, 1926.

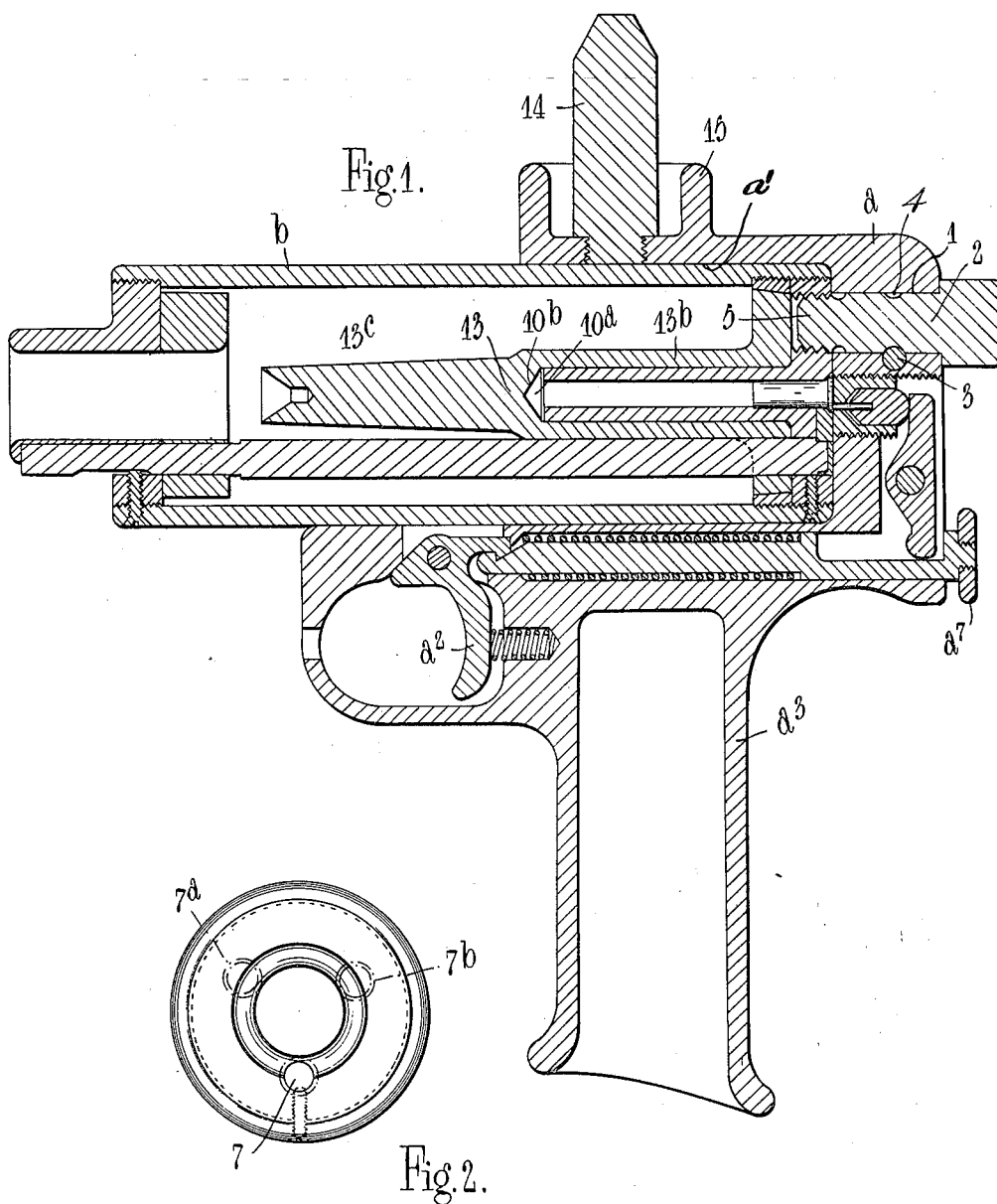
1,569,153

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CAPTIVE BOLT OR LIKE PROJECTILE DEVICE

Filed Feb. 20, 1925

2 Sheets-Sheet 1



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1925

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2 Sheets-Sheet 2

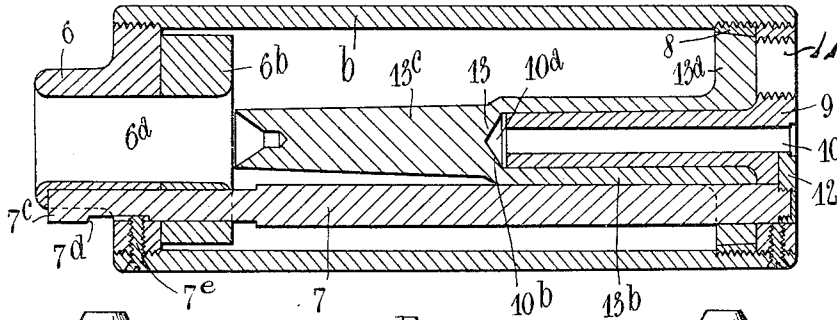


Fig. 3.

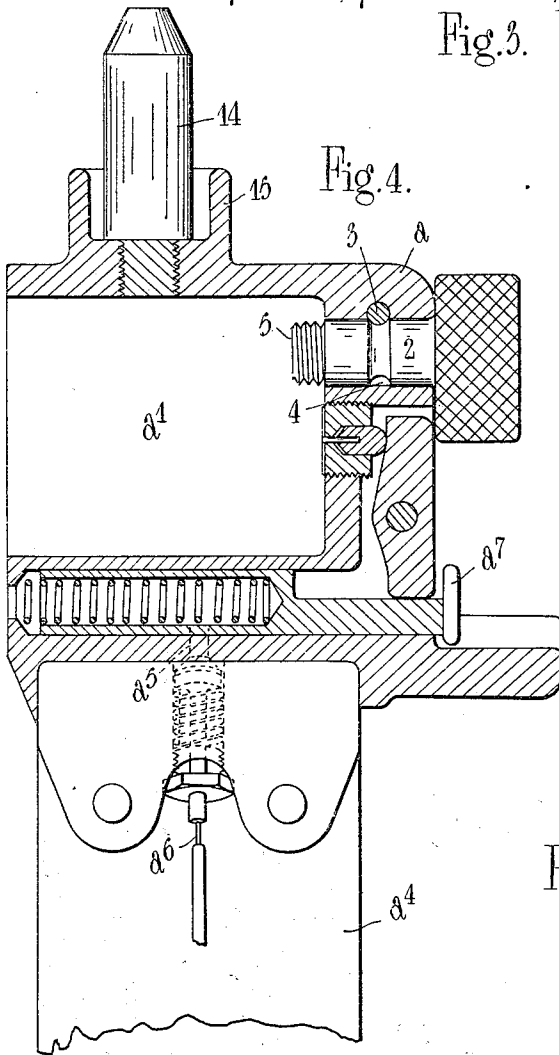


Fig. 4.

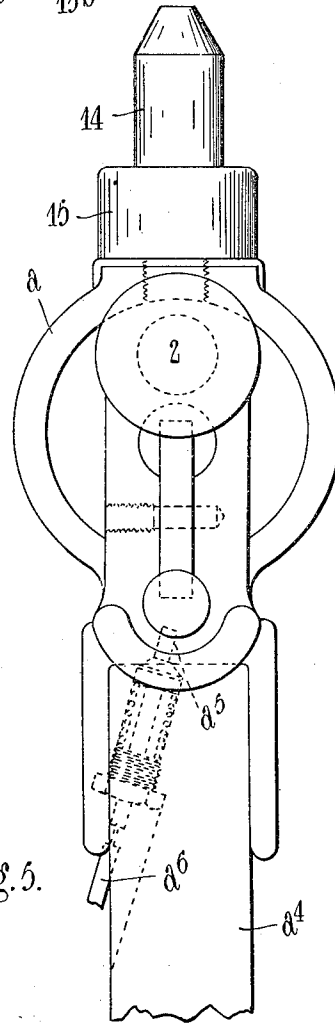


Fig. 5.

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FEB 25 1926

UNITED STATES PATENT OFFICE.

ROBERT TEMPLE, OF BROMLEY, ENGLAND.

CAPTIVE BOLT OR LIKE PROJECTILE DEVICE.

Application filed February 20, 1925. Serial No. 10,649.

To all whom it may concern:

Be it known that I, ROBERT TEMPLE, a British subject, and residing at 38 London Road, Bromley, in the county of Kent, England, have invented certain new and useful Improvements in and Relating to Captive Bolt or like Projectile Devices (for which I have filed an application in England, Dec. 14, 1923, Number 31,459), of which the following is a specification.

This invention relates to captive bolt or like projectile devices of the type in which the projectile is adapted to be propelled by the combustion of an explosive charge and has a muzzle opening of less diameter than the barrel part.

This invention may be applied to a variety of purposes where it is desired to impart or give a powerful blow or deeply to penetrate an object and the invention may be employed with advantage for stunning and killing cattle and other livestock.

The object of the invention is to provide a device in which the projectile may be caused to give a blow of the requisite power or penetrate an object to the desired extent at a low cost per charge and which is safe in use both as regards the operator and other persons, being more or less fool-proof in handling, firing and preparing for re-use.

The invention consists in a device of the type described wherein the projectile during its movement is supported and directed independently of or out of contact with the barrel member, by a guideway arranged within the barrel member.

The invention further consists in a device of the character described in the preceding paragraph wherein the projectile is adapted to be repeatedly used and non-resilient means are provided so that the projectile is engaged and restrained from commencing its movement until a maximum or a predetermined pressure has been established due to the combustion of an explosive charge.

According to the invention a projectile may be employed which has a tapered forward portion or a portion of decreasing diameter towards its outer end, with attendant advantages in the extraction thereof after penetration.

It is preferred to make the cartridge chamber of the device of a form which is elongated considerably beyond the extremity of the cartridge, and to provide the projectile

with a re-entrant part adapted to be passed over the portion containing the elongated chamber which may be conveniently referred to as a "primary combustion chamber". The arrangement should be such that a secondary combustion chamber of increased but small cross-sectional area is provided at the end of the primary combustion chamber remote from the cartridge.

In the accompanying drawings:—

Figure 1 is a cross-sectional elevation of a device according to the invention, more particularly adapted or intended for the purpose of slaughtering cattle or other livestock and provided with a handhold in the nature of a pistol-grip;

Figure 2 is an end elevation of the barrel part shown in Figure 1;

Figure 3 is a sectional side elevation of the barrel part shown in Figure 1;

Figures 4 and 5 are respectively a sectional side elevation and a rear end elevation of an alternative form of breech suitable for connecting to a stock or haft so that the device may be held and fired by the operator at a distance from the breech.

In carrying the invention into effect according to one convenient mode, as applied to a device suitable for the stunning and killing of cattle or other livestock, a breech part *a* is provided and formed with a cavity or seating *a'* which is adapted to receive a barrel part *b*.

The breech part may comprise any suitable mechanism for firing a cartridge by the operation of a trigger, *a²*, such as illustrated in Figure 1 in connection with a pistol-grip *a³* or as shown in Figure 4 in connection with the type adapted to be mounted upon a stock *a⁴*. In the latter form the sear *a⁵* restraining the striker mechanism may be operated by means of a wire or other suitable device *a⁶* extending towards the end of the stock remote from the breech.

In both forms (Figures 1 and 4) the firing mechanism is cocked by pressing the cocking knob or head *a⁷* inwardly into the position illustrated.

Means are provided for engaging and retaining the barrel part so that it may be secured in position in the breech. For example, in an aperture 1 in the breech *a* a set or locking screw 2 may be located and prevented from axial movement therein by means of a key 3 engaging a groove 4. The

screw-threaded part 5 is adapted to project into that part or cavity a' of the breech a adapted to receive the barrel part b .

The barrel part b comprises a cylinder 5 which may be internally screw-threaded at each end to receive parts to be described. In the forward portion of the barrel a muzzle piece 6, having a muzzle opening or aperture 6^a , is screwed into position and is 10 adapted to constitute the mounting at the forward end for a plurality of guide rods, preferably three, 7, 7^a and 7^b , one of the rods, 7, being slidably mounted in the piece.

Adjoining the muzzle part 6 is provided a 15 washer 6^b of more or less resilient material. For example, this washer may be formed of rubber, fibre or composition and is adapted to take the shock of the arrestment of the projectile. This washer may be positioned by 20 the rods 7, 7^a and 7^b which may pass through the material of the washer.

The rear end of the barrel is provided with an inset annulus or bezel 8 which is screwed into position from the breech end. This 25 bezel is formed with an internally coned surface of corresponding form to a coned face provided upon the projectile.

In the rear of the bezel 8 another piece or chamber part 9 is adapted to be screwed into 30 position. This part comprises a cartridge chamber 10 which is elongated in a forward direction to an extent such that it is of considerably greater length than the length of the cartridge. A screw-threaded hole 11 is 35 provided for the reception of the part 5 of the locking screw 2 to enable the barrel to be secured to the breech.

An ejector 12 is provided adjacent the 40 chamber 10 for causing the ejection of the spent cartridge and is connected to or mounted upon the guide rod 7 which is slidably mounted in the part 9.

The projectile 13 comprises a bolt-like element formed towards its rear end with a 45 circular flange part 13^a formed with a conical peripheral surface to engage the corresponding conical surface upon the bezel 8. The body of the projectile is formed with a cylindrical part 13^b and a tapered forward 50 portion 13^c . The part 13^b should be of such a length that when the projectile is about to leave the portion containing the extended chamber 10 it will be engaged and guided at the outer end by the muzzle opening 6^a . 55 The cylindrical part 13^b is formed with a re-entrant opening or cylindrical cavity corresponding in diameter with that of the outside of the chamber (primary combustion chamber) 10. The length of the cavity is 60 preferably such that a chamber (secondary or explosion chamber) 10^a is formed which is of a cross-sectional area greater than the area of the bore 10. The explosion wall or base 10^b may be of conical form.

65 The coned or tapered part 13^c of the pro-

jectile is adapted to strike and penetrate the object to be operated upon. By making this portion coned the extraction of the projectile from the object after use is facilitated and 70 in many cases is automatically effected by the recoil effect or vibration attendant upon firing the charge.

It will be observed that as the projectile is free of the cylindrical wall of the barrel and without support except when in engage- 75 ment with the bezel 8, it is necessary that the travel of the projectile should be accurately guided and for this purpose the guide rods 7, 7^a , 7^b are employed and adapted to pass through holes in the flange 13^a of the projectile so that the latter is slidably supported 80 thereon. These guide rods are disposed upon a circle such that their circumference is slidably engaged by the cylindrical portion 13^b of the projectile and is aligned with the 85 muzzle opening 6^a . By these means, after the projectile has started upon its outward movement under the impulse of the explosive charge, it is accurately guided and main- 90 tained in position to pass through the muzzle opening 6^a of the device.

The rod 7 is slidably mounted within the parts 6 and 9 and its end 7^c projects beyond the barrel of the device and preferably lies 95 within a groove formed in the outer portion of the muzzle part 6. In order to limit the axial movement of this rod, it may be formed with a groove 7^d adapted to be engaged by a set screw 7^e .

For the purpose of resetting the projectile 100 and causing it to be reeased upon the bezel 8 in frictional engagement therewith, the breech part a may be formed with a projection 14 of suitable diameter to enter into the muzzle opening 6^a . The end of the projection 105 or pin 14 is adapted to engage the outer extremity of the projectile. Means are provided adjacent the projection 14 for engaging the extremity 7^c of the rod 7 for causing the ejection of the cartridge. For example, 110 the part 14 may be formed with an annular flange or wall 15 around it which extends sufficiently away from the breech part to permit the required movement to be imparted to the rod 7. 115

In operation, assuming the parts to be in the situation shown in Figure 1 and the device loaded and cocked as illustrated, the device is presented at the head of the animal to be slaughtered, preferably so that the muzzle part 6 touches the skull at the appropriate point. The trigger a^2 is then 120 pressed and the cartridge fired.

Upon ignition, the charge acquires velocity in the chamber 10 and burning particles and gases are projected from the point of ignition along the chamber 10^a against the explosion wall 10^b of the projectile. The particles upon meeting this wall are arrested 125 and their velocity converted into heat and 130

pressure. This sudden increase in heat and pressure causes very rapid combustion to take place in this chamber and produces what may be likened to the characteristic localized effect of high explosive detonation.

The sudden creation of explosive pressure in this chamber overcomes the restraint of the engaged conical parts 8 and 13^a and causes the projectile to be released and propelled along the guiding rods to strike the head of the animal. The force exercised by the explosion causes the part 13^c deeply to penetrate the skull and thereby stuns the animal.

While the secondary combustion chamber is of increased cross-sectional area or becomes of increased area upon movement, the arrangement and proportions should be such that the area of expansion for the gases is limited in accordance with the quantity of the explosive charge so as to keep down or diminish the dissipation of heat to a minimum.

By reason of the differential areas of the chamber 10^a and the chamber 10 and owing to the back pressure effect in the explosion being met and counteracted by the velocity of burning particles and gases still proceeding from the ignition point, the cartridge, it will be found, acquires very little of the usual effects of an explosion and is still only comparatively loosely engaged with that part of the chamber surrounding it, rendering ejection easier.

After firing, the locking screw 2 is operated to release the barrel part which is then removed from the breech.

To reset the projectile to its initial firing position and cause the ejection of the cartridge, the barrel part is placed over the projection 14 so that the latter is in contact with the end of the projectile. The barrel is then moved sharply downwards so that the projection 14 enters the muzzle opening in the part 6 and forces the conical surfaces on the parts 8 and 13^a into re-engagement. The latter part of this movement concurrently causes the ejection of the cartridge by reason of the projecting part 7^c of the rod 7 engaging the wall 15, causing the setting back of the rod 7 and unseating of the ejector 12.

A new cartridge may be now inserted and the barrel re-introduced into the cavity of the breech. If an attempt is made to push the barrel home without operating the screw it will be found that this movement is obstructed by said screw. Thus, it is impossible to cause the accidental firing of the new cartridge by pushing the barrel part home against the striker which may have remained or be in the forward position.

The barrel is gradually returned to its initial position by rotating the set screw 2 into engagement with the screwed hole 11.

When the barrel is back in position the device may be cocked or cocking may be effected at an earlier time if desired. A safety catch may be employed to lock the trigger mechanism, if desired.

The barrel part may be employed alternatively in the breech of pistol-grip form (Figure 1) or in the stock breech (Figure 2).

The advantage residing in the possibility of detaching the barrel portion from the breech after each shot, consists in that the user is enabled to reseat the projectile by the aid of the projection 14 carried by the breech part. It is clearly evident from the foregoing that some force is required to reseat the projectile frictionally in its annular seating 8 and that this could not be properly effected by aid of a ram rod or any device of this character. It is further evident that it is necessary that the end of the projectile should be forced well beyond the muzzle opening and consequently the projectile cannot be resealed by pressing it against a wall surface. Another advantage in providing a detachable breech barrel part for resetting consists in that the possible danger of the projectile being resealed while a cartridge is in the breech and while the striker is in operative position is avoided because if the projectile were resealed under such conditions there would be a liability for the firing of the projectile under conditions which might give rise to an accident.

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

1. A device of the type described comprising a captive projectile having a piston-like member at its rear end, a tapered forward end of substantial length and an intermediate portion adapted to be guided, together with a barrel member having internally arranged longitudinal rod-like guiding means for guiding the intermediate part of the projectile.

2. A device of the type described comprising a barrel member, a captive projectile having a piston-like member at its rear end of less diameter than the barrel and a tapered forward end of substantial length, means for guiding the piston during the travel of the projectile and means for engaging the piston member in its rearward position so as to restrain the commencement of the movement of the projectile until a predetermined pressure has been established due to the combustion of an explosive charge when the projectile is suddenly released and projected.

3. A device of the type described comprising a barrel member, a captive projectile having a piston-like member at its rear end of less diameter than the barrel member, means for guiding the projectile so that the piston travels free from contact with the

barrel and means for engaging the piston member in its rearward position so as to restrain the commencement of the movement of the projectile until a predetermined pressure has been established due to the combustion of an explosive charge when the projectile is suddenly released and projected.

4. A device of the type described comprising a barrel member, a captive projectile having a piston-like member at its rear end of less diameter than the barrel and holes parallel with the axis of the projectile, rod-like guiding means within the barrel adapted to pass through the holes in the piston member and means for engaging the piston member in its rearward position so as to restrain the commencement of the movement of the projectile until a predetermined pressure has been established due to the combustion of an explosive charge, when the projectile is suddenly released and projected.

5. A device having the feature claimed in claim 4 wherein the means for restraining the projectile comprise a bevelled ring secured in the rear end of the barrel and the formation on the piston element of a correspondingly bevelled periphery so that the piston member and the ring may be frictionally engaged.

6. A device of the type described comprising a barrel member, a captive projectile having a piston-like member at its rear end of less diameter than the barrel and a tapered forward end of substantial length, means for guiding the piston during the travel of the projectile, means for engaging the piston member in its rearward position so as to restrain the commencement of the movement of the projectile until a predetermined pressure has been established due to the combustion of an explosive charge when the projectile is suddenly released and projected, a breech adapted to receive and support said barrel member, means for detachably securing the barrel to the breech and a projection carried by the breech against which the projectile is forced back within the detached barrel into its engaged rearward position.

7. A device of the type described comprising a barrel member, a captive projectile having a piston-like member at its rear end of less diameter than the barrel member, means for guiding the projectile so that the piston travels free from contact with the barrel, means for engaging the piston member in its rearward position so as to restrain the commencement of the movement of the projectile until a predetermined pressure has been established due to the combustion of an explosive charge when the projectile is suddenly released and projected, a breech adapted to receive and support said barrel member, means for detachably securing the barrel to the breech and a projection carried by the breech against which the projectile is

forced back within the detached barrel into its engaged rearward position.

8. A device of the type described comprising a captive projectile having a piston-like member at its rear end and an elongated re-entrant cavity, a tapered forward end of substantial length and an intermediate portion adapted to be guided while the projectile is in transit, a barrel member and an elongated combustion chamber part adapted to enter and fit the re-entrant cavity in the projectile.

9. A device of the type described comprising a barrel member, a captive projectile having a piston-like member at its rear end of less diameter than the barrel member, means for guiding the projectile so that the piston travels free from contact with the barrel, means for engaging the piston member in its rearward position so as to restrain the commencement of the movement of the projectile until a predetermined pressure has been established due to the combustion of an explosive charge when the projectile is suddenly released and projected, a captive projectile having a piston-like member at its rear end and an elongated re-entrant cavity, a tapered forward end of substantial length and an intermediate portion adapted to be guided while the projectile is in transit, a barrel member and an elongated combustion chamber part adapted to enter and fit the re-entrant cavity in the projectile.

10. A device of the type described comprising a barrel member, a captive projectile having a piston-like member at its rear end of less diameter than the barrel, formed with an elongated re-entrant cavity, means for guiding the projectile, means for engaging the piston member in its rearward position so as to restrain the commencement of the movement of the projectile until a predetermined pressure has been established due to the combustion of an explosive charge when the projectile is suddenly released and projected, a breech part adapted to receive and support said barrel member, means for detachably securing the barrel to the breech and an elongated combustion chamber part adapted to enter and fit the re-entrant cavity in the projectile and carried by the barrel member and detachable with it from the breech part.

11. A device of the type described comprising a cartridge chamber elongated considerably beyond the length of the cartridge, and a projectile provided with a deep re-entrant part adapted to be passed over the elongated cartridge chamber, the arrangement being such that the elongated chamber provides a primary combustion chamber and that a secondary combustion chamber is provided at the end (remote from the cartridge) of the primary chamber which is of in-

creased but relatively small cross-sectional area and is such that the area of expansion for the gases is initially designed and limited in order to keep down dissipation of heat to a minimum for the purposes described.

12. A device of the type described comprising a barrel member, a captive projectile, a plurality or rod-like elements within the barrel member for guiding the captive projectile, one of which rod elements is axially displaceable, a cartridge chamber mounted in the rear end of said barrel and having an ejector piece operatively connected to the displaceable rod element so that the movement rearward of the latter causes the ejection of a cartridge case.

13. A device having the features claimed in claim 12 and comprising a breech part in which the barrel member is detachably mounted and having a projection mounted

therein for aiding in returning the projectile after the device has been fired, to its initial position, and an annular wall surrounding the projection adapted to engage the displaceable rod element for effecting the ejection of the cartridge.

14. A device of the type described comprising a captive projectile, a barrel part and a breech part one of the parts being formed with a cartridge chamber and seating, an elongated preliminary combustion chamber extending well beyond the cartridge and a secondary combustion chamber of greater cross-sectional area than the preliminary combustion chamber bounded on one side by the projectile, for the purpose described.

In testimony whereof I have signed my name to this specification.

ROBERT TEMPLE.