May 2, 1939. G. W. L. PRETTYMAN 2,156,605

NONRECOIL GUN

Original Filed Sept. 17, 1934

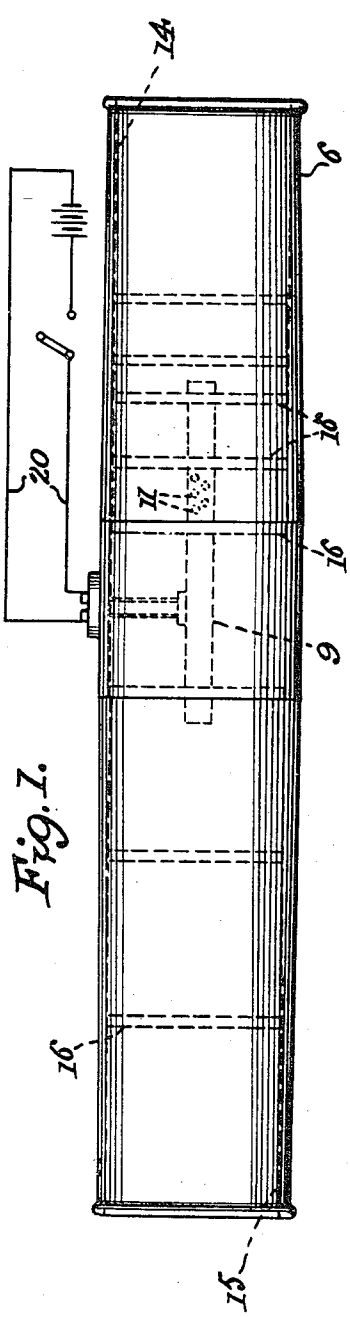


Fig. 1.

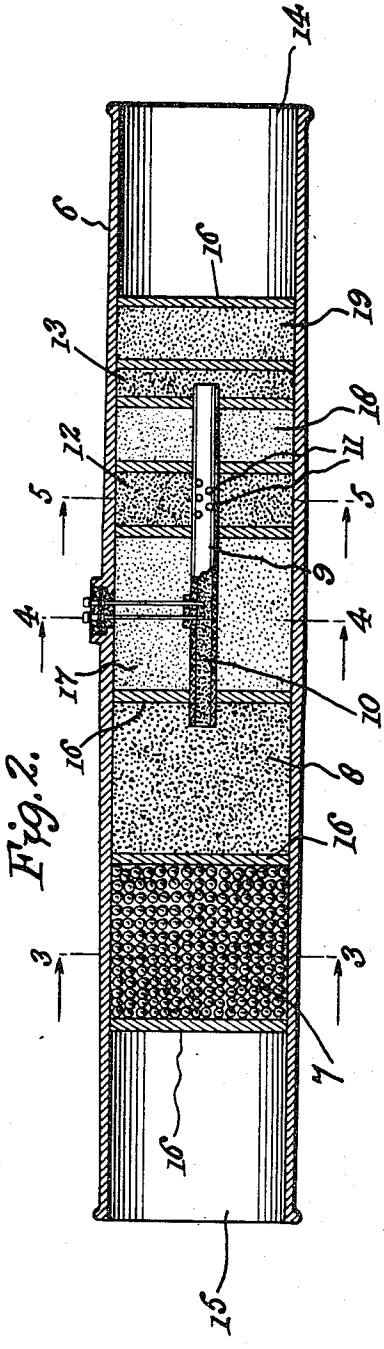


Fig. 2.

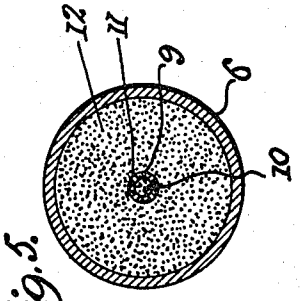


Fig. 5.

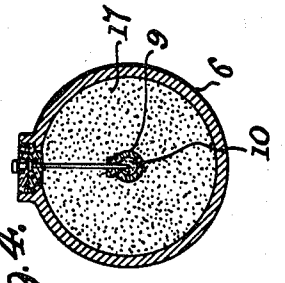


Fig. 4.

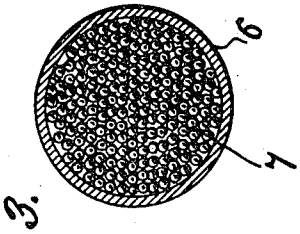


Fig. 3.

Inventor

George W. L. Prettyman

By Wilkinson & Mawhinney

Attorneys.

Patented May 2, 1939 2,156,605

UNITED STATES PATENT OFFICE

2,156,605

NONRECOIL GUN

George William Lyman Prettyman,
Arlington, Va.

Application September 17, 1934, Serial No. 744,443
Renewed September 24, 1938

1 Claim. (Cl. 89—1)

The present invention relates to improvements in the non-recoil gun so as to greatly enlarge its usefulness. The non-recoil gun has been heretofore restricted in its use by the necessity for having a large zone to the rear wherein the rearward products of the explosion may be safely dissipated.

A further object of the invention is to secure the same result as above stated by the use of divided counter-charges and counter-masses, such counter-charges being fired simultaneously or successively for the purpose of neutralizing the recoil of the gun whereby it will not disturb the balance of the aircraft on which it is mounted.

It is a further object of the invention to provide a gun of this character in which the rear blast is light enough to permit of the use of the gun by troops on the ground with but little danger.

With the foregoing and other objects in view, the invention will be more fully described hereinafter, and will be more particularly pointed out in the claim appended hereto.

In the drawing, wherein like symbols refer to like or corresponding parts throughout the several views,

Figure 1 is a side elevation of an improved firing tube constructed according to the present invention.

Figure 2 is a longitudinal section taken through the same.

Figure 3 is a cross section taken on the line 3—3 in Figure 2.

Figure 4 is a similar view taken on the line 4—4, also in Figure 2, and

Figure 5 is a transverse section taken on the line 5—5 in Figure 2.

Referring more particularly to the drawing, 6 represents the firing tube preferably made of as thin a wall as practicable to sustain the explosive shocks to which a gun of this character may be subjected. The tube will also be of a length shorter than those found necessary owing to the improved counter-charge and counter-mass construction and arrangement. The projectile is indicated at 7 and the main propelling charge of powder at 8. A primer tube 9 filled with black powder 10 extends at its front portion into the main propelling charge 8. An intermediate perforated portion 11 of the tube 9 communicates with a second powder charge 12, while the rear end of the tube connects with a third powder charge 13. Two or more such powder charges may be provided. In the case of one additional powder charge over the propelling charge 8, the tube 9 may be a plain tube devoid of the perforations 11, its rear end simply communicating with the second powder charge. In the case of four powder charges, there will be two perforated portions 11 to communicate with the two intermediate powder charges. These various powder charges may be in any quantity or volume desired. As shown in the drawing, the main propelling charge 8 greatly exceeds that of the two charges 11 and 13 which diminish in volume toward the breech muzzle 14 which is open in the same manner as the forward muzzle 15.

Suitable wadding or spacing partitions 16 may be provided at opposite sides of the projectile and the powder charges and between the powder charges and the various counter-weights or masses which are made up, for instance, of the masses of sand indicated at 17, 18 and 19. The ignition circuit to the primer is indicated at 20.

In the use of the device by closing the circuit 20 the primer is set off firing the main propelling charge 8 which drives the projectile 7 out of the forward muzzle 15 of the tube. At the same time this propelling charge 8 reacts against the various counter-masses of sand 17, 18 and 19 and drives the latter out toward the breech muzzle 14. In other words the main explosion pushes the projectile 7 forward and the adjacent sand 17 rearward. The secondary explosion, created by the firing of the charge 12, either simultaneously with the firing of the main explosive charge 8 or previously thereto, resists the rearward motion of the sand 17. Thus the main explosion, being restricted to the rear, develops a higher pressure which results in higher muzzle velocity for the projectile. The total effect to the rear is diminished in intensity because of the slowing up of the main section 17 of sand. The other explosions, such as that provided by the charge 13, act similarly with less effect. By providing progressive explosions a rocket effect is secured but simultaneous or nearly simultaneous explosions have been found in practice to give good results.

By the use of the invention the non-recoil features are preserved, while the blast to the rear is materially reduced without sacrificing the forward muzzle velocity of the projectile, and in fact with the use of the invention a higher muzzle velocity may be secured.

By the use of the proper amount of sand for the amount of powder and weight and type of the lead pellets, the effect of the explosion resulting in tube motion may readily be so balanced

that the tube remains motionless even when mounted on a camera tripod.

It is well-known that by balancing equal weights one to go forward and the other backward on explosion, such balancing will result in no motion of the tube containing the explosion. The relatively small amount of sand used successfully as a counter-recoil is due to the flowing of the sand like a liquid under the explosion pressure so as to expand against the walls of the tube and momentarily prevent the egress of gases past the sand; and so hold up the internal pressure until it has performed its useful work in imparting the necessary velocity to the lead pellets. The load used in the tube for the friction counter-balance is two and one-half pounds. If the load used is based on the counter-weight balance, the weight is four pounds two ounces, an increase of sixty percent in each shot.

The sand of course might all be contained in one continuous mass, rather than being separated as indicated. Sand is preferable as it has a high coefficient of friction. Also the sand is a finely divided mass and by reason of its form is calculated to exert great frictional counter-effect in the tube. The sand comes in contact with the walls of the tube and exerts a counter-frictional effect in obtaining non-recoil of the tube. Its value is very great as by its use the harmful rear effect is much reduced and the total weight of the ammunition is reduced nearly one-half. The counter-friction type weighs only sixty per cent of the counter-weight type ammunition. When the charge is fired without any counter-weight or counter-friction mass the tube kicks forward with good speed and the frictional effect of the sand will avoid the same.

In some cases it may be advisable to make the tube thin and light in which case the tube may be wrapped with wire externally to reinforce and strengthen the same.

It will be obvious that various changes in the construction, combination and arrangement of parts could be made which could be used without departing from the spirit of my invention, and I do not mean to limit the invention to such details except as particularly pointed out in the claim.

Having thus described my invention what I claim and desire to secure by Letters Patent of the United States is:

A projecting device comprising a cylindrical container open from end to end and having a bore and a counter bore, a projectile in the bore of the container, a friction mass of comminuted material in said counter bore spaced from the projectile, a propellant powder charge between said projectile and counter mass, a second counter mass of comminuted friction material in the counter bore spaced from the first mentioned counter mass and being of smaller volume than the first mentioned counter mass, a second propellant powder charge between the two counter masses and being of smaller volume than the first mentioned powder charge, a third counter mass of comminuted friction material in the counter bore spaced from the second counter mass, a third powder charge between said second and third counter masses, a primer tube extending through the counter bore and through the first and second counter masses and through the second propellant powder charge with its open ends communicating with the first and third propellant powder charge, said tube having openings communicating with the second propellant powder charge, a primer powder in said tube, and means for igniting said primer powder, the combined volume of the three counter masses being of less weight than the projectile, said counter mass material having a higher coefficient of friction with the walls of the container than the coefficient of friction of the projectile with the walls of the container.

GEORGE WILLIAM LYMAN PRETTYMAN.