(No Model.)

G. R. ELLIOTT.

RIFLED ORDNANCE.

No. 452,601. Patented May 19, 1891.

Fig. 1

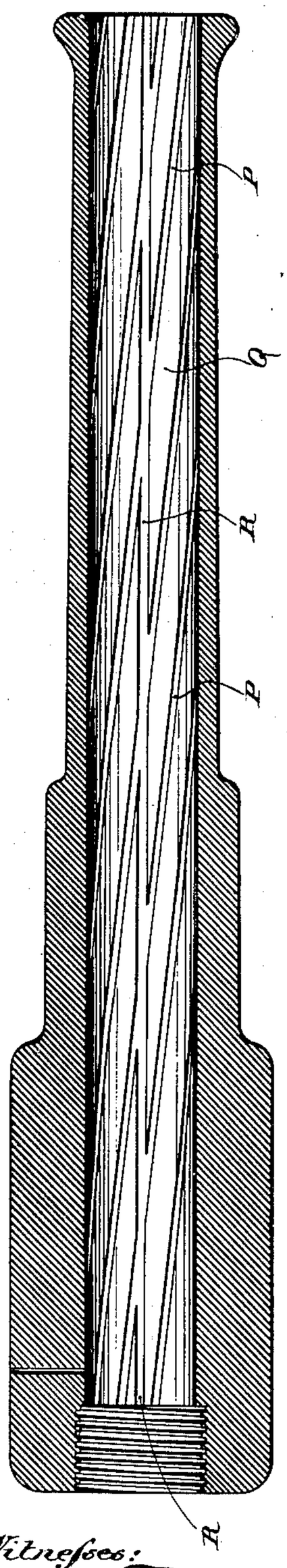


Fig. 4

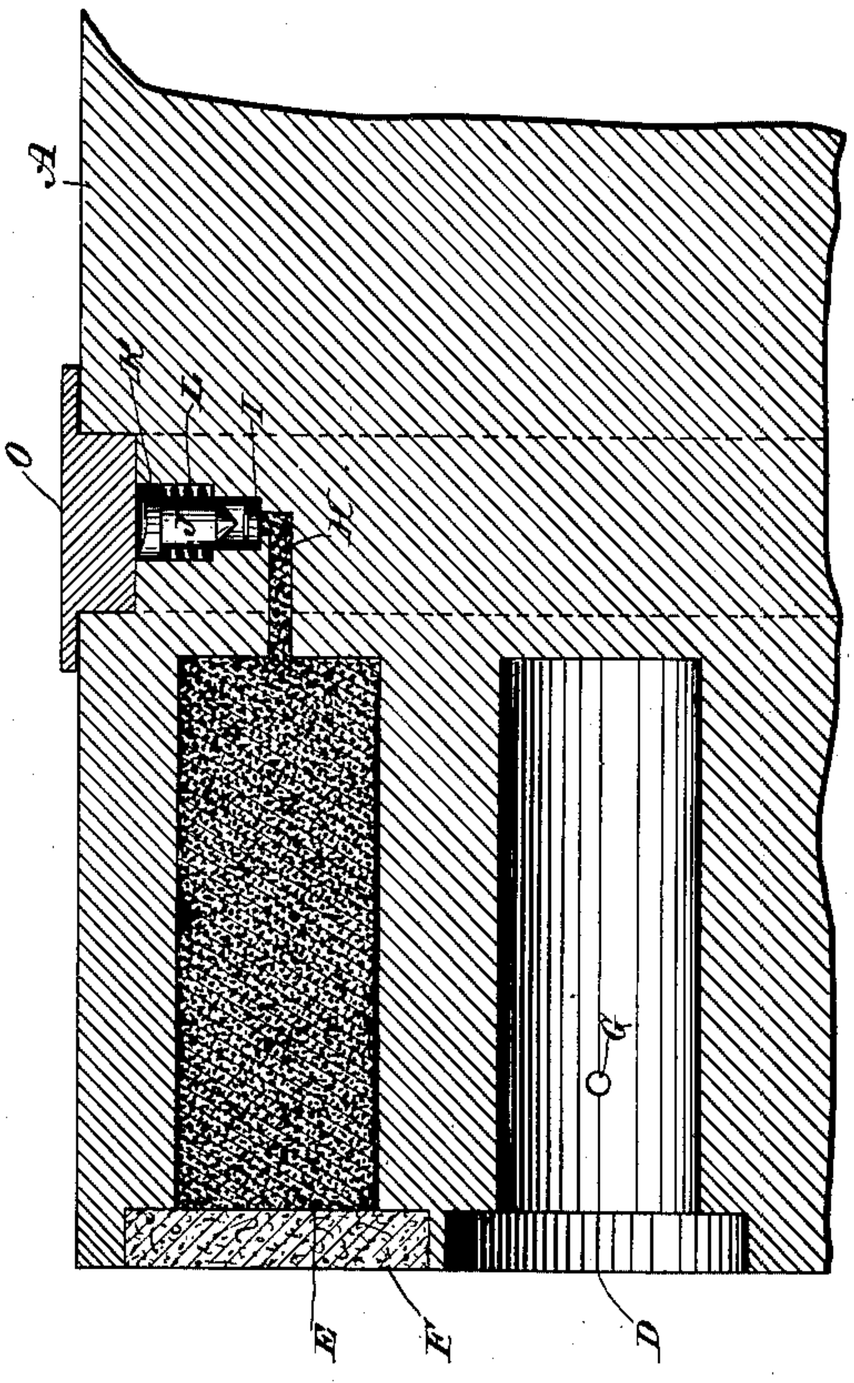


Fig. 2

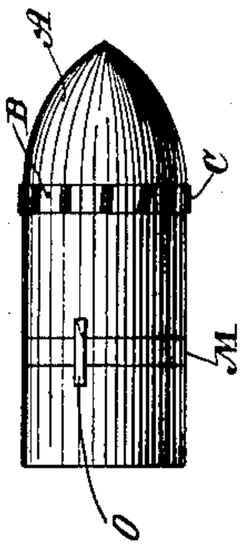


Fig. 3

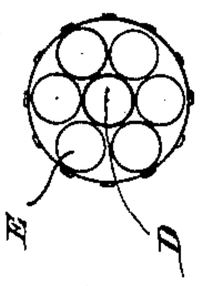
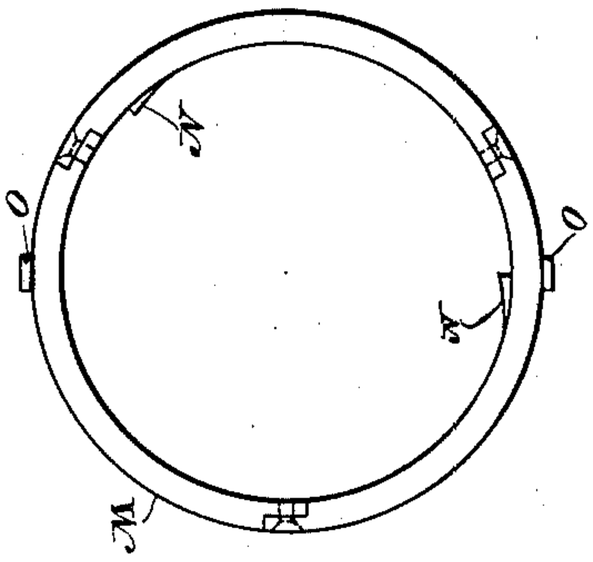


Fig. 5



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UNITED STATES PATENT OFFICE.

GILBERT R. ELLIOTT, OF NEW YORK, N. Y.

RIFLED ORDNANCE.

SPECIFICATION forming part of Letters Patent No. 452,601, dated May 19, 1891.

Application filed August 28, 1890. Serial No. 363,252. (No model.)

To all whom it may concern:

Be it known that I, GILBERT R. ELLIOTT, a subject of the Queen of Great Britain, residing in the city, county, and State of New York, have made certain new and useful Improvements in Rifled Ordnance, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

The present invention relates, primarily, to the manner of discharging a projectile from a gun—that is to say, it is the object of the invention to arrange the charge or charges of a gun upon the accelerating plan, or so that the projectile will not receive the full effect of the whole powder-charge upon ignition thereof, but will at intervals, while passing up the barrel of the gun, receive the impulses of various separate and successively-ignited charges arranged to add their gases to the column of gas already behind and then propelling the projectile. By this arrangement of the propelling-charges it is designed to overcome the momentum of the projectile at a low pressure and with comparatively light strain upon the gun and to maintain a low maximum pressure upon the projectile during the time it is in the gun, whereby a high velocity of the projectile will be secured without severe strain upon the gun.

The special object of the invention is to separate the various charges, so that they cannot ignite from one another, and to successively ignite them by mechanical means caused to operate by a special form of grooving in the gun.

The invention therefore consists of a rifled gun provided with one or more grooves crossing the rifling, which grooves are designed to receive a projection or projections on a movable part of the projectile, and thereby to hold such part against revolving with the projectile as it is turned by the rifling and to cause explosive charges in the projectile to be successively ignited as it passes up the bore of the gun.

Referring to the drawings, Figure 1 is a longitudinal section of a gun rifled on the plan of the invention. Fig. 2 is a plan view of the projectile embodying the invention. Fig. 3 is an elevation view of the rear end of the same. Fig. 4 is a section on an enlarged scale of a portion of the rear end of the projectile, the section being taken through one of the circumferential chambers and through the center chamber. Fig. 5 shows a detail enlarged view of what I term the "firing-ring" of the projectile.

Referring to the views more fully, A represents the projectile, which in general form is of the usual construction of projectiles for rifled guns.

B is the sabot-ring, designed to take the rifling of the gun. This ring may be of any desired form or may be substituted by studs. In the present case I have shown a sabot-ring having studs or projections C, corresponding in position to the grooves on the inner surface of the barrel of the gun.

In the rear end of the projectile is a central chamber D, which is surrounded by other like chambers E. These chambers are designed to receive charges of powder or other explosive material and are then closed by the disks F, which disks may be made of wood, paper, packing, or other like material, such material being preferred to metal. The central chamber D is provided with a firing-hole G, which is located so as to register with the vent-hole of the gun when the projectile is in position for firing.

Each of the other chambers has at its rear end a firing-hole H, which communicates with the anvil of the detonating cap I. Just above this anvil and in a circular radial hole is arranged a firing-pin J, having a cam-head K.

L is a spring on the firing-pin, arranged between its head K and a shoulder just above the anvil of the detonator I, and is of sufficient strength to hold the firing-pin off the explosive cap.

M is the firing-ring. This ring lies in a circular groove in the outer surface of the projectile and flush therewith. The inner face of this firing-ring is provided with two or more cams N, which are of the same width as the thickness of the heads of the firing-pins, and which project into a shallow groove at the bottom of the groove of the ring M, into which shallow groove the heads K also project. The firing-ring is free to move circularly in its groove, and by such movement its cams N are brought into contact with the firing-pins and force their points upon the detonating

caps to explode them. Upon the outer face of the firing-ring are one or more projections or lugs O, which are of the width of the grooves of the gun, (to be hereinafter described,) and of a height corresponding to the depth of such grooves. These lugs are preferably longer than the width of the firing-ring, so that they may have an extended bearing in the grooves of the gun to prevent their leaving such grooves when the projectile is fired.

Referring now to Fig. 1, P represents the ordinary grooves of the rifling, and Q the lands. This rifling may be of any suitable pitch and of any desired number, width, and depth of grooves.

R represents one of two straight grooves which are parallel to and in the plane of the axis of the gun. These straight grooves are preferably of the same width and depth as the inclined rifling which they cross. The projectile, having its chambers charged with powder or other explosive material, is to be placed in the breech of the gun, with its studs O in the grooves R, in which position its studs C will of course be in the grooves P, and this will bring the firing-hole G of the central chamber of the projectile opposite the vent of the gun. Now, upon applying an igniting-flame to the vent of the gun, the explosive in the central chamber of the projectile will be ignited and its confining wad or disk will be blown out, and the rear end of the gun will be filled with the gases of explosion and the projectile started forward along the barrel of the gun. As the projectile moves up the barrel the rifling will cause it to turn upon its axis; but the straight grooves will hold the firing-ring from turning with the projectile, so that very soon after the projectile has commenced to move forward one of the cams of the firing-ring will be forced against a firing-pin and another loaded chamber in the projectile will be exploded, and this action will be repeated until all the loaded chambers have been exploded. In this way successive impulses will be given to the projectile, so that an increasing volume of gas behind the projectile will be preserved and the pressure of the same kept up during the passage of the projectile to the muzzle of the gun. By these means it will be seen that a practically constant pressure may be preserved upon the projectile during its passage up the barrel, and hence that a higher velocity may be given to it with less strain upon the gun than is possible where the whole powder-charge is exploded at once. By these means the various charges may be positively exploded at times best suited to accomplish the desired results—that is, they may be timed so as to add their gases to the column of gas behind the projectile at just the instant of time when such addition is required to maintain the proper pressure upon the projectile.

I have explained the invention as applied to a projectile designed to carry its primary charge—that is, the charge that first starts it up the barrel of the gun; but it is obvious that the charges succeeding the primary charge may be as readily exploded and all their effects realized if the projectile be started in the usual way by a charge placed in the breech of the gun behind the projectile. I have also shown the grooves in the gun that hold the firing-ring against rotation as straight and of practically the same form as the rifling; but this is not essential. It may be preferred in some cases to use but a single groove or to make such groove or grooves deeper or of different form than the rifling. So, too, this groove may be inclined to a plane of the axis of the gun—that is to say, so long as this groove crosses and is not of the same pitch as the rifling it will accomplish its purpose, and, as in the case of a very flat rifling, it may be essential to give the groove an inclination or opposite pitch in order to properly time the ignition of the various charges; and therefore I do not confine myself to any special form of groove, further than that it must cross the rifling and be inclined thereto.

What is claimed as new is—

1. A rifled gun or cannon provided with a groove crossing the lands and grooves of the rifling, substantially as and for the purposes set forth.

2. In a gun or cannon, the combination, with the lands and grooves of the rifling of the barrel, one or more grooves extending across the rifling and in a direction inclined thereto, substantially as and for the purpose set forth.

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