

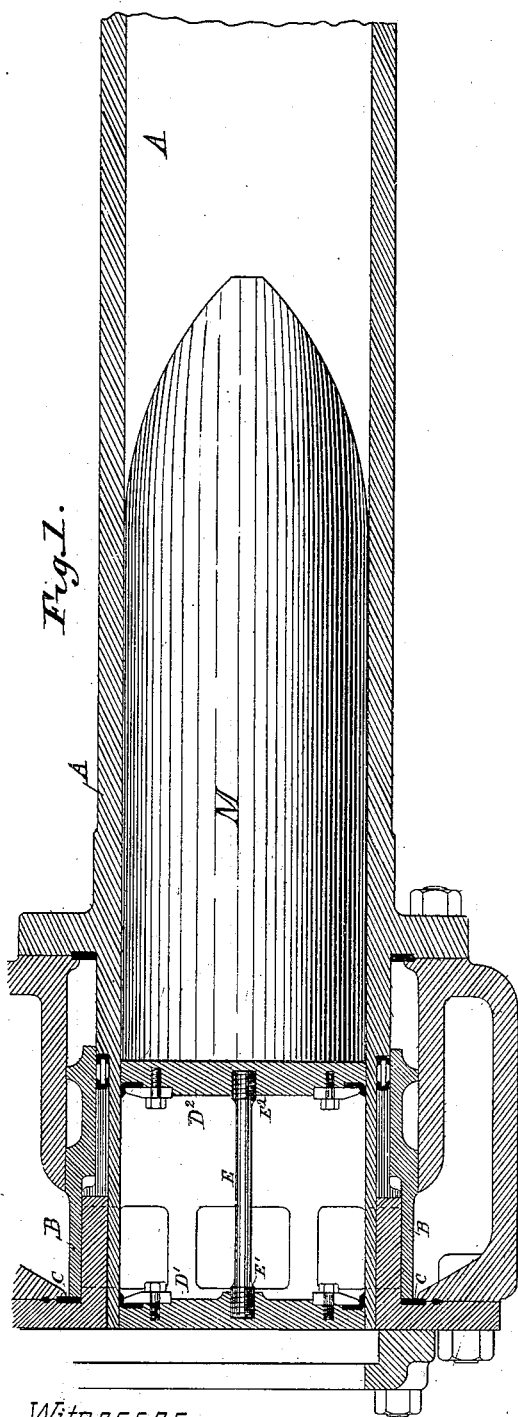
(No Model.)

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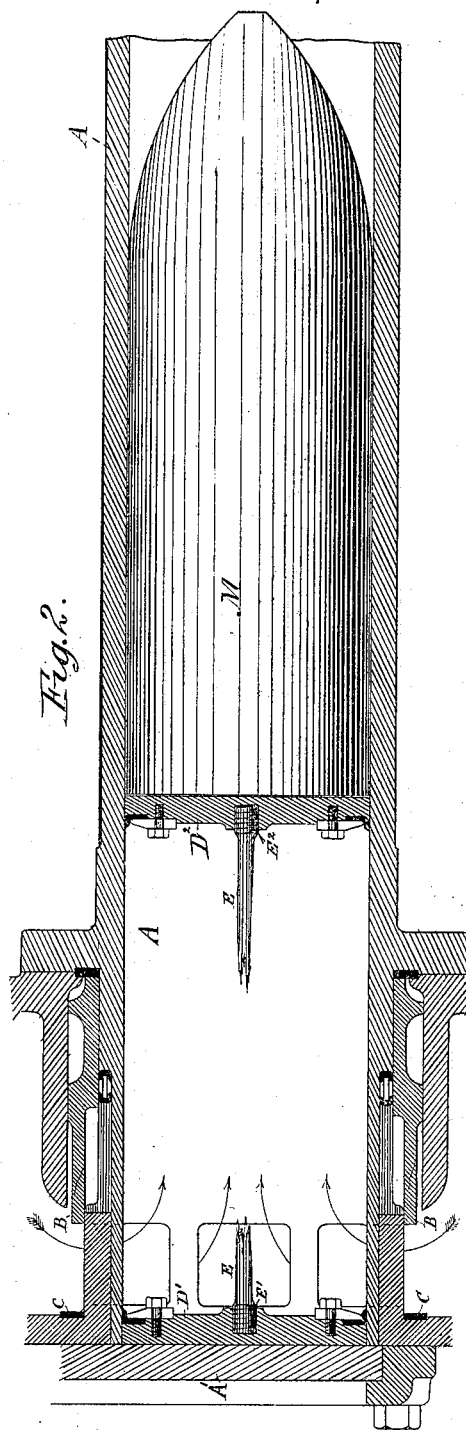
G. H. REYNOLDS.
PNEUMATIC GUN.

No. 421,307.

Patented Feb. 11, 1890.



WITNESSES
Henry C. Blackburn
John R. Bowne Jones



INVENTOR
G. H. Reynolds

(No Model.)

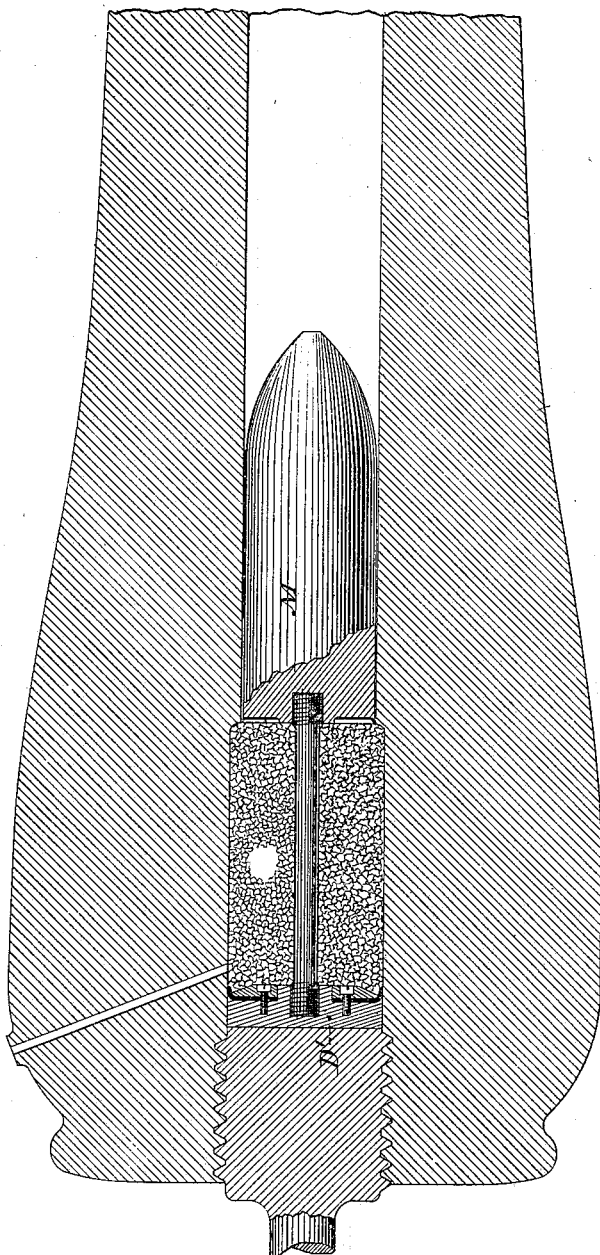
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Fig. 3.



Witnesses

Henry Cribb
Frank Brown Jones

Inventor

G. H. Reynolds

UNITED STATES PATENT OFFICE.

GEORGE H. REYNOLDS, OF NEW YORK, N. Y.

PNEUMATIC GUN.

SPECIFICATION forming part of Letters Patent No. 421,307, dated February 11, 1890.

Application filed March 14, 1889. Serial No. 303,219. (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. REYNOLDS, of the city and county of New York, in the State of New York, have invented a certain new and useful retarding device for delaying the start of projectiles in pneumatic and other guns and liberating them when the propelling force has attained a sufficient tension, of which the following is a specification.

The combustion of powder or the admission of air or other impelling-gas at high tension, although very rapid, is not absolutely instantaneous. It commences with a relatively gentle force and acts more forcibly at a later period.

The object of my invention is to prevent the projectile from being puffed partly or entirely out of the gun before the propelling force is sufficiently developed in the barrel or chamber behind the projectile to be fully effective.

To this end the invention consists, primarily, of a weak tie-bar, which, being attached either to the projectile or to a gas-check behind the same, is connected at the rear end either to the breech of the gun or to a gas-check behind the powder or other propelling force, which tie-bar is of sufficient strength to allow of the accumulation of a high pressure behind the projectile, but will break and leave the projectile entirely free when the desired force has been developed.

The accompanying drawings form a part of this specification and represent what I consider the best means of carrying out the invention. All are central longitudinal sections.

Figure 1 shows the gun with the tie-rod and its connections introduced behind a projectile, the breech being still open; and Fig. 2 shows the breech closed and the firing-valve open. In this figure the gun is in the act of being discharged, the air having been admitted by the sudden opening of the passages into the breech and the pressure having risen sufficiently to break the tie-rod and start the projectile in its movement through the barrel. Fig. 3 shows the invention applied to a breech-loading cannon using gunpowder. In this view the breech is closed ready for firing.

Similar letters of reference indicate like parts in all the figures where they occur.

I will first describe the application of the invention to guns in which the force of compressed air or other gases is used to propel the projectile.

Referring to Figs. 1 and 2, A is the barrel of the gun; B, the valve, which in Fig. 1 is closed upon its seat C against the admission of air to the barrel from a belt of compressed air contained in the valve-casing, which is in open connection with one or more reservoirs of compressed air, (not shown,) and in Fig. 2 is shown open for the admission of air, as shown by the arrows.

D' is a gas-check lying against the breech-plug A', or the equivalent rear boundary of the firing-chamber. It is formed of a strong disk of steel or other material provided with suitable packing to prevent the gas from passing it under the strong pressure to which it is subjected at the moment of the discharge of the gun.

D² is another gas-check with packing arranged in a reverse position against the rear of the projectile M.

E is a tie-bar of low steel or other strong and ductile material, and having enlarged ends E' E², screw-threaded and strongly engaged in corresponding threaded holes in the gas-checks D' and D², so as to tie them together. The strength of the tie is sufficient to restrain the starting of the projectile and prevent its being puffed out of the gun by a slight pressure behind it; but as the pressure of the air rapidly admitted behind it rises the tie-bar stretches and breaks when the impelling force has risen to about the desired point. The thickness and strength of the tie-bar for a given caliber of gun may be varied. The enlargement of the ends E' E² is sufficient to make the screw-threaded parts stronger than the main body of the bar. These gas-checks D' D² are joined together by the tie-bar E E' E² before their introduction into the gun.

In Fig. 3 the gun is marked as before, but modified to adapt the structure to the use of powder. As shown, only a single gas-check D' is employed, the other being that usually forming part of rifled projectiles. The tie-bar is tapped at one end into the projectile M and at the other end into the gas-check D'

Around this tie-bar, between the gas-check and the projectile, is the charge of powder, which may be inclosed in any suitable case.

In guns as ordinarily charged, in which the projectile simply lies against the charge of powder, the first ignition of the powder produces pressure enough to start the mass, and the projectile leaves the gun before the powder is all burned. This is notably the case when slow-burning powder is used; but by the use of my invention the pressure following the first ignition of the powder is not sufficient to break the tie and allow the projectile to start, but the projectile is compelled to remain in place until ignition is fairly set up, and only when the pressure generated is sufficient to overcome the strength of the tie and first stretch and finally break this bar does the projectile commence its movement. The same end is attained in the gun using air, and possibly in a greater degree. The firing-valve necessarily requires time for opening of the air-passage, and the air requires time to flow in and fill the space behind the projectile to an efficient working-pressure. For use in either style of gun the tie-bar can be made of any strength to produce the effect desired, and should be forged or otherwise formed of some material—such as mild steel or copper—capable of considerable elongation before the breaking strain is reached. By this means the projectile, though soon set entirely at liberty, is compelled to start gradually, and time is allowed for the entrance of the air to accumulate a high pressure in an air-gun, or for the full ignition of the charge in a powder-gun. By the use of my invention the projectile may be under a greatly-enhanced pressure during the whole time it is passing through the barrel, with the result of attaining a greatly-increased range.

Modifications may be made without departing from the principle or sacrificing the advantages of the invention. I can use the two gas-checks in reversed positions in a powder-gun, or can attach the tie-rod directly to the projectile and dispense with the forward gas-check in an air-gun. I can use two or more tie-rods instead of one. I can vary the form and strength of the tie rod or rods within wide limits.

I do not in this patent claim the air-gun, or any part thereof, the novel features therein being made the subject of a separate specification.

I claim as my invention—

1. A tie-rod in combination with a gun and projectile arranged longitudinally in the charge-chamber, as shown, and connecting the surface against which the impelling force acts in the rear of the projectile with a gas-check in the breech of the gun, so as to retard the movement of the projectile and allow a fuller application of the impelling force, as herein specified.

2. Two portable gas-checks D' and D², arranged in reversed positions, in combination with a tie-rod holding them together and adapted to break with the discharge of the gun in which they are introduced, as herein specified.

In testimony whereof I have hereunto set my hand, at New York city, New York, this 13th day of March, 1889, in the presence of two subscribing witnesses.

GEO. H. REYNOLDS.

Witnesses:

CHARLES R. SEARLE,
CHAS. F. BARTER.