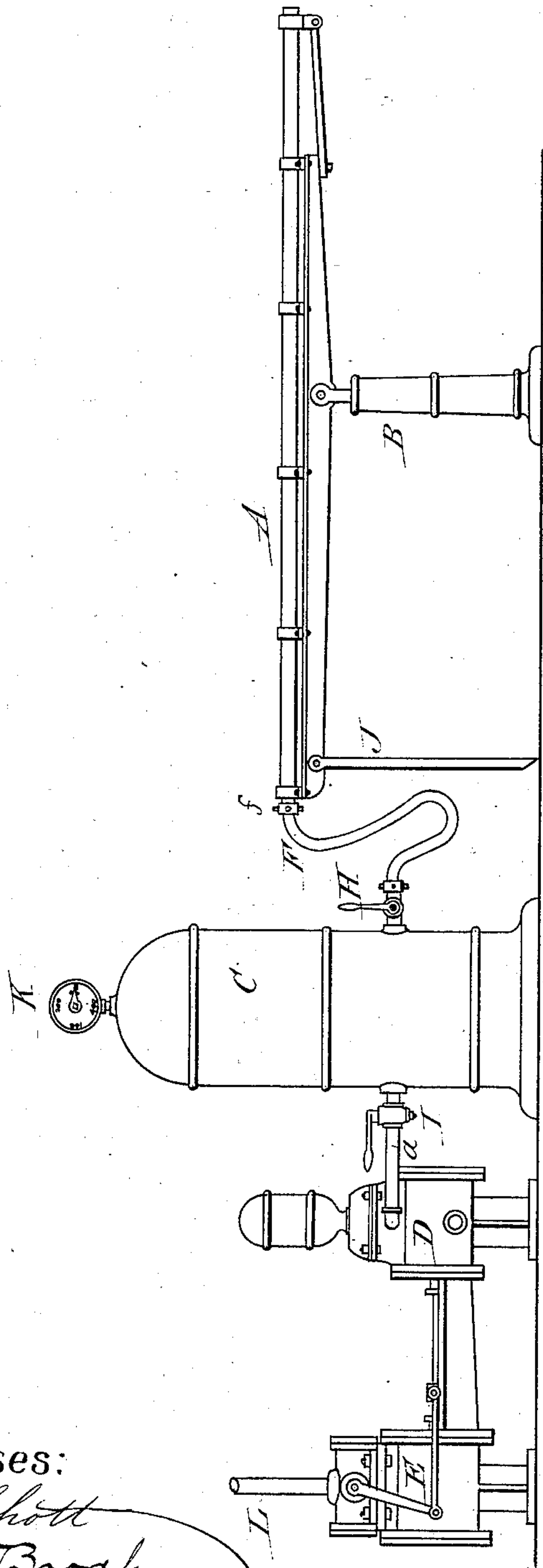


(No Model.)

D. M. MEFFORD.
PNEUMATIC CANNON.

No. 279,965.

Patented June 26, 1883.



Witnesses:
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UNITED STATES PATENT OFFICE.

DAVID M. MEFFORD, OF TOLEDO, OHIO.

PNEUMATIC CANNON.

SPECIFICATION forming part of Letters Patent No. 279,965, dated June 26, 1883.

Application filed November 29, 1882. (No model.)

To all whom it may concern:

Be it known that I, DAVID M. MEFFORD, a citizen of the United States, residing at Toledo, in the county of Lucas and State of Ohio, have
5 invented certain new and useful Improvements in Pneumatic Cannon; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to
10 make and use the same, reference being had to the accompanying drawing, and to the letters and figures of reference marked thereon, which form a part of this specification.

The nature of my invention relates to certain constructions or combinations of parts, hereinafter described, whereby a pneumatic cannon may be made operative and practicable for throwing or shooting shells or projectiles charged with dynamite or other powerful
20 detonating powder without endangering the cannon or the lives of those operating it. The means whereby I accomplish this object are fully hereinafter described, and illustrated by the accompanying drawing, in which an entire
25 side view of the gun and its accompanying parts is given, in which—

A represents a cannon, which consists of a tube of a length corresponding to the size of the caliber, and should be made very much
30 longer in proportion to the size of the bore than a common gunpowder-cannon as now made, for the reason that the velocity of the projectile discharged through the bore of the gun is dependent upon accelerated motion, being continually acted upon by the force of the
35 compressed air from the time it leaves the breech until it reaches the muzzle. In the construction of a cannon upon this plan, when the caliber is as much as twelve inches in diameter, the barrel should be fifty feet long, and if the caliber is fifteen inches in diameter the gun should be still longer, if great length of range be desired. The walls of the cannon or the shell surrounding the bore may be made,
40 however, comparatively thin, not thicker than the walls of the magazine containing the compressed air, but should be perfectly straight and smooth inside, and have a strong stiff support along the under side of the barrel or
45 tube to prevent the warping of the gun by its own weight. As there is no sensible recoil to

the gun when it is discharged, it does not need a carriage such as gunpowder-cannon require, but may be pivoted on top of a pivot-post properly secured at its base, as seen at B. The
55 pivot will be so constructed as to permit the gun to be swung around so that its muzzle will describe the plane of a semicircle, and also allow of elevation or depression of the muzzle. The gun is to be breech-loading, the hose connecting the gun with the magazine being furnished with any suitable mechanism for attaching or detaching it from the gun for loading
60 purposes.

The magazine C is made of boiler-iron, of a
65 thickness governed by its capacity, shape, and pressure to which it is to be subjected; and in construction, as to capacity or size, regard should be had to the size and length of the bore of the gun intended to be used in connection
70 therewith. It should have a compressed-air gage, K, connected with it, so as to correctly designate the amount of pressure of the air it contains, as this is important in securing uniformity of range with the projectiles, for if
75 the projectiles are of uniform weight, the pressure and elevation of the gun the same, the range of the projectiles will be the same.

D is an air-compressing pump, operated by means of steam-cylinder E, to which a steam-
80 boiler is connected by means of the steam-pipe L. The pump D is connected to the magazine by means of pipe I, which may have a valve or not, as this is unimportant. The magazine C is connected with the cannon by means of the
85 flexible hose or pipe F, with any suitable coupling, *f*, at the breech, so that it can be readily attached or detached for loading purposes, while at its other end it is permanently secured to the magazine. The hose or pipe F may be
90 of any desired length, so as to admit of traversing the gun on its pivot, or to admit of the magazine being placed in the hold of a vessel, while the gun is upon the deck. The inside diameter of the flexible hose F should be as
95 large as the diameter of the bore of the gun to which it is attached, so as to allow a free passage through it into the gun, in order that the full power of the compressed air may act on the butt of the projectile while it is passing
100 through the caliber and out of the muzzle.

The stop-cock or valve H is situated near

the magazine, or it may be situated at any desired point in the hose F by suitable connections therewith, but should always be sufficiently distant from the breech-connection to
 5 allow a space in the bore of the hose between the stop-cock H and the breech of the gun, to act and operate as an air-chamber containing common atmospheric air, the purposes of which are to ameliorate the severity of the shock to
 10 the projectile from the full force of the highly-compressed air when liberated by opening the throttle of the valve H, which would otherwise detonate or explode the dynamite contained in the shell or projectile. The air in
 15 the chamber intermediate between the stop-cock H and the breech of the gun, acting as a spring-cushion, when acted upon by the compressed air rushing through the valve or stop-cock H, puts the projectile in motion without
 20 any endangering jar that might explode the dynamite, and when this motion is once so gently produced it can be accelerated to the highest velocity known to projectiles, even when fired from gunpowder-cannon, without
 25 endangering explosion in the gun.

The length of the space intermediate between the stop-cock H and the butt of the projectile may be greater or less according to the kind of dynamite to be used in the shell or projectile—that is, the more sensitive the dynamite
 30 the more air-space for a cushion should be allowed.

The breech-support J may be as seen in the drawing, by which the elevation or depression
 35 of the gun is obtained; but when great accuracy of aim is required the base should be broad enough to prevent lateral sway or swing, and an adjusting-screw so applied that the nicest elevation and adjustment are obtained.

40 In operating the gun and the means for giving velocity to the projectile, without detonating it, as above described, the hose F is disconnected from the gun by means of the coupling *f*, the projectile is placed into the bore at
 45 the breech, and the hose-coupling reconnected to the breech. The compressed air in magazine C being up to the desired pressure, as ascertained by the gage K, the gun elevated and aimed, the stop-cock H is quickly turned,

opening a free passage for the compressed air 50 to pass through from the interior of the magazine C into the breech of the gun, thus driving and compressing the air in the bore of the hose between the stop-cock H and the breech of the gun, as a pliant air-cushion in advance, to start 55 the projectile in motion, thereby preventing any shock, although its motion is immediately and powerfully accelerated by the full force of the compressed air which so quickly follows, and continues acting on the projectile until it 60 reaches and passes out of the muzzle. The valve H, being closed almost as rapidly as it is opened, economizes the compressed air in magazine C, so that by the time another projectile is placed in the breech the continuous 65 working of the air-pump D will have caused the index-hand of the gage K to mark the degree at which the last discharge was made and all ready for throwing open the throttle of the valve H for the second charge. 70

The degree of air-compression in magazine C in order to get the initial velocity ordinarily obtained by cannon to projectiles when gunpowder is used should be from seventy to one hundred pounds to the square inch; but 75 when very much higher velocities are required much greater pressure, even up to three thousand pounds to the square inch, can be obtained and safely used.

Having thus described my invention, what I 80 claim, and desire to secure by Letters Patent, is—

1. In a pneumatic breech-loading gun such as above described, the combination of the pump D, the compressed-air magazine C, the 85 flexible hose-pipe F, having stop-cock H, with the gun A, substantially as and for the purposes described.

2. The combination of the magazine C, the flexible hose F, having stop-cock H, and connecting-coupling *f*, with the gun A, substantially as and for the purpose described. 90

In testimony whereof I affix my signature in presence of two witnesses.

DAVID M. MEFFORD.

Witnesses:

NEWTON CRAWFORD,
 J. W. HAMILTON JOHNSON.