

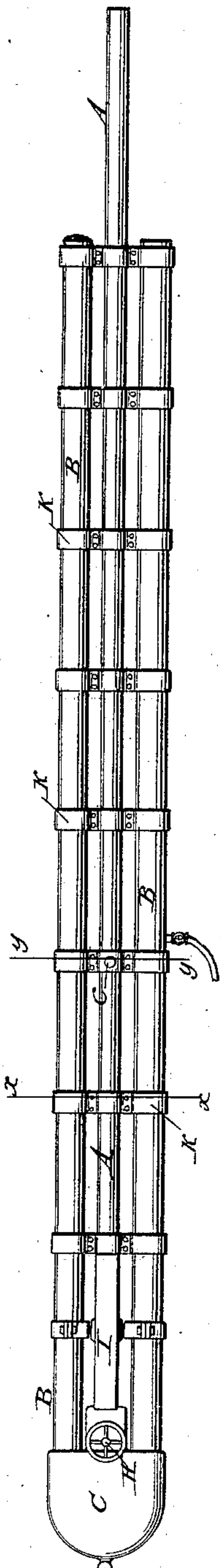
(No Model.)

D. M. MEFFORD.
PNEUMATIC CANNON.

No. 314,298.

Patented Mar. 24, 1885.

Fig. 1.



WITNESSES

Samuel P. Hallingworth
Wm. H. Shipley

Fig. 2.

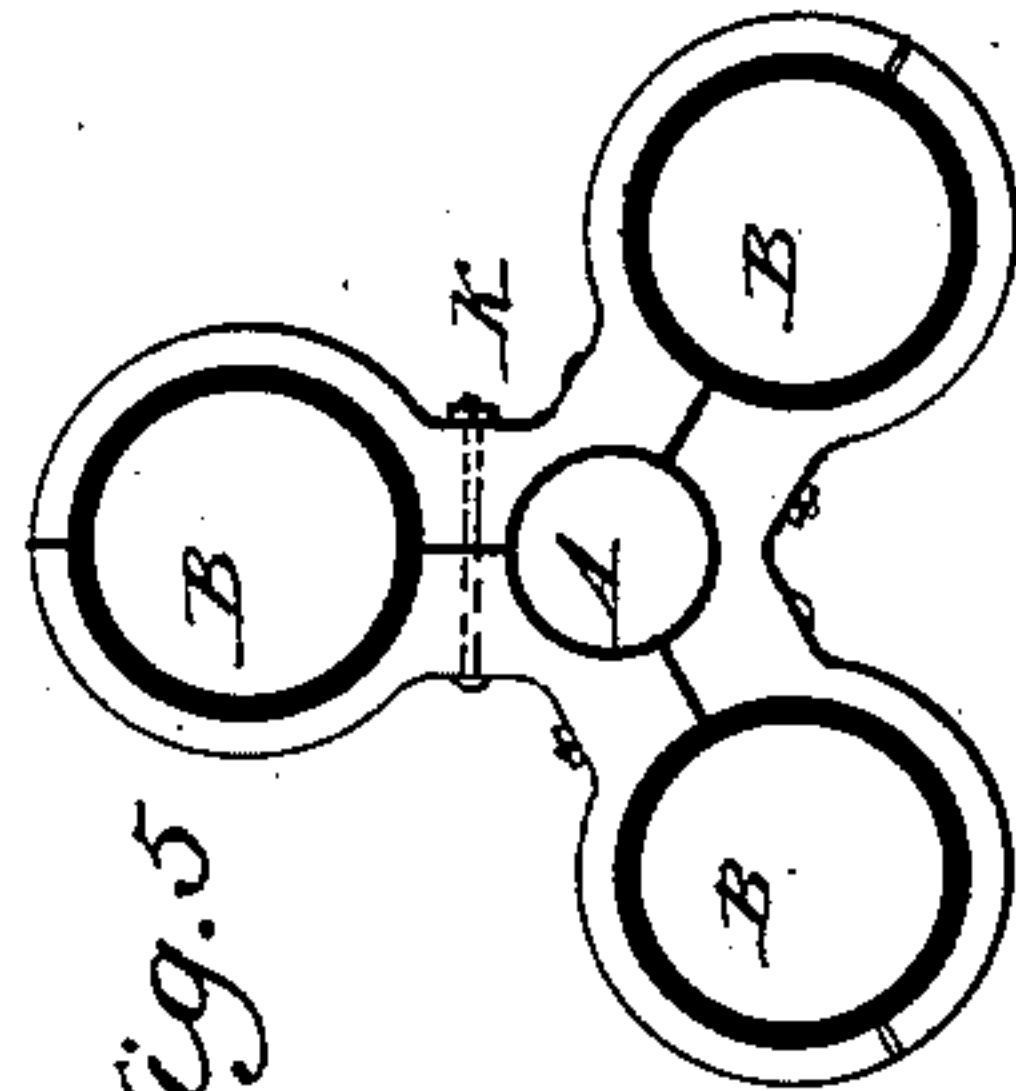
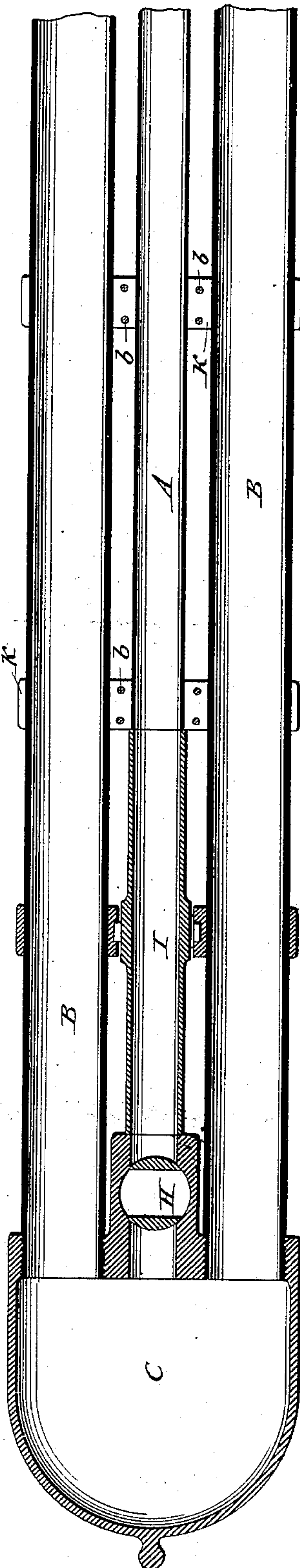


Fig. 5.

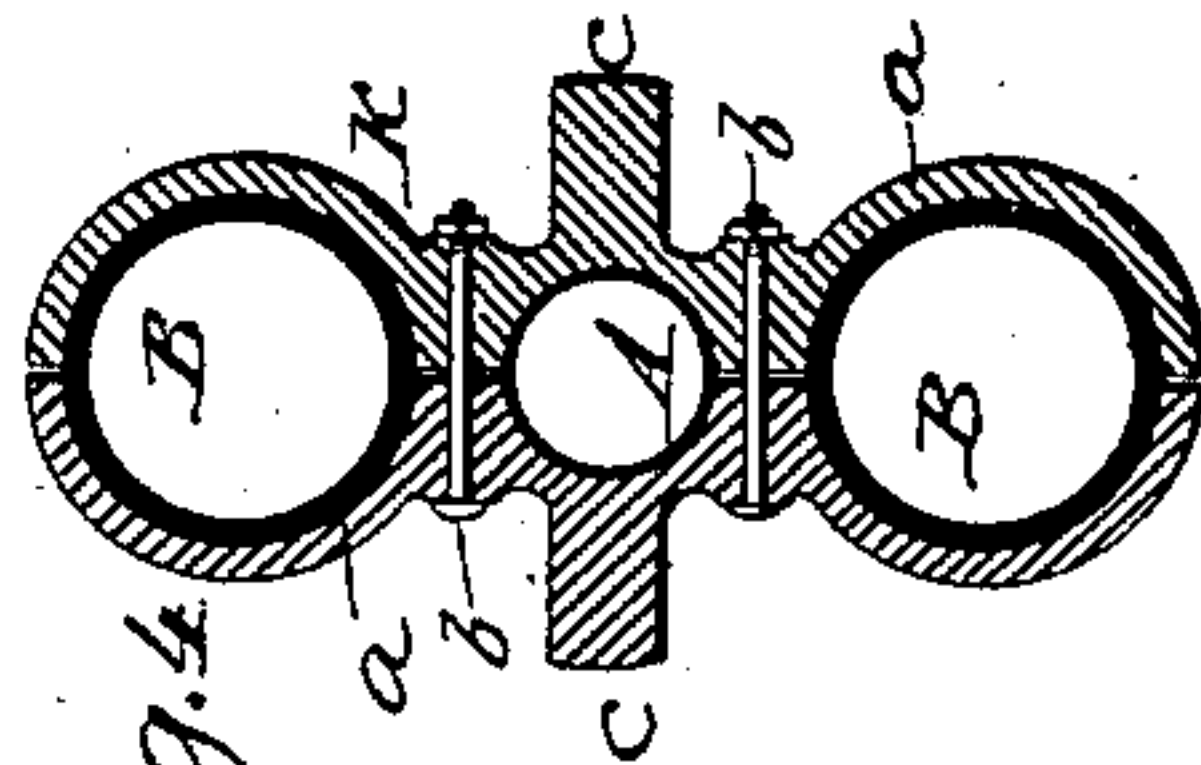


Fig. 4.

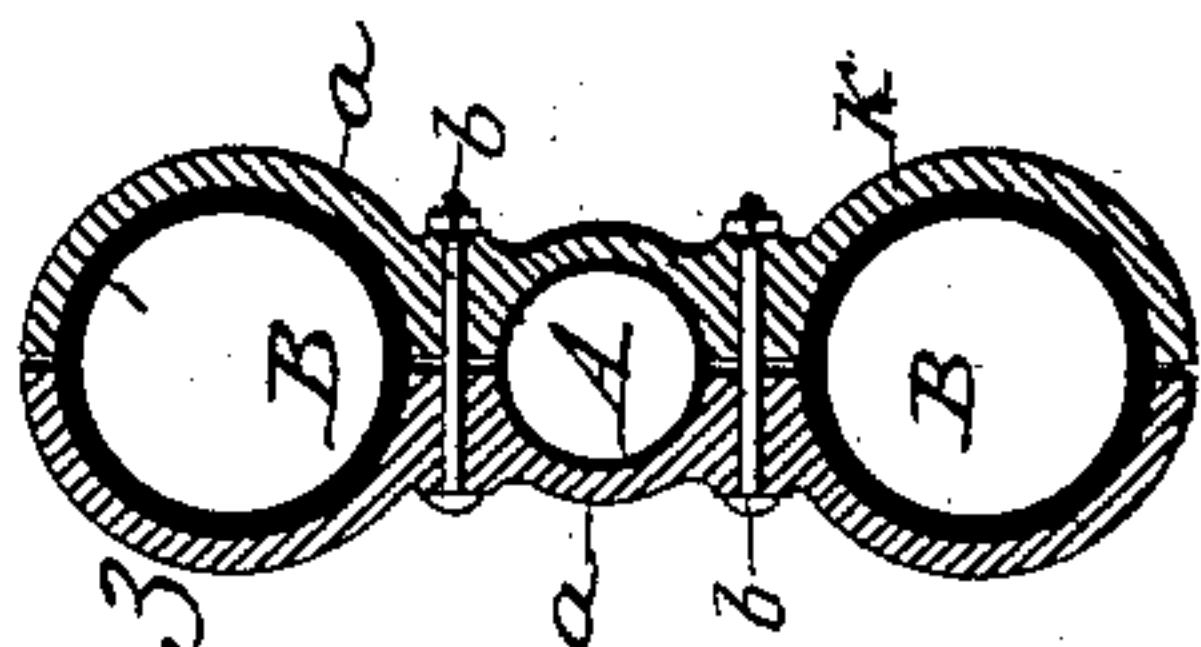


Fig. 3.

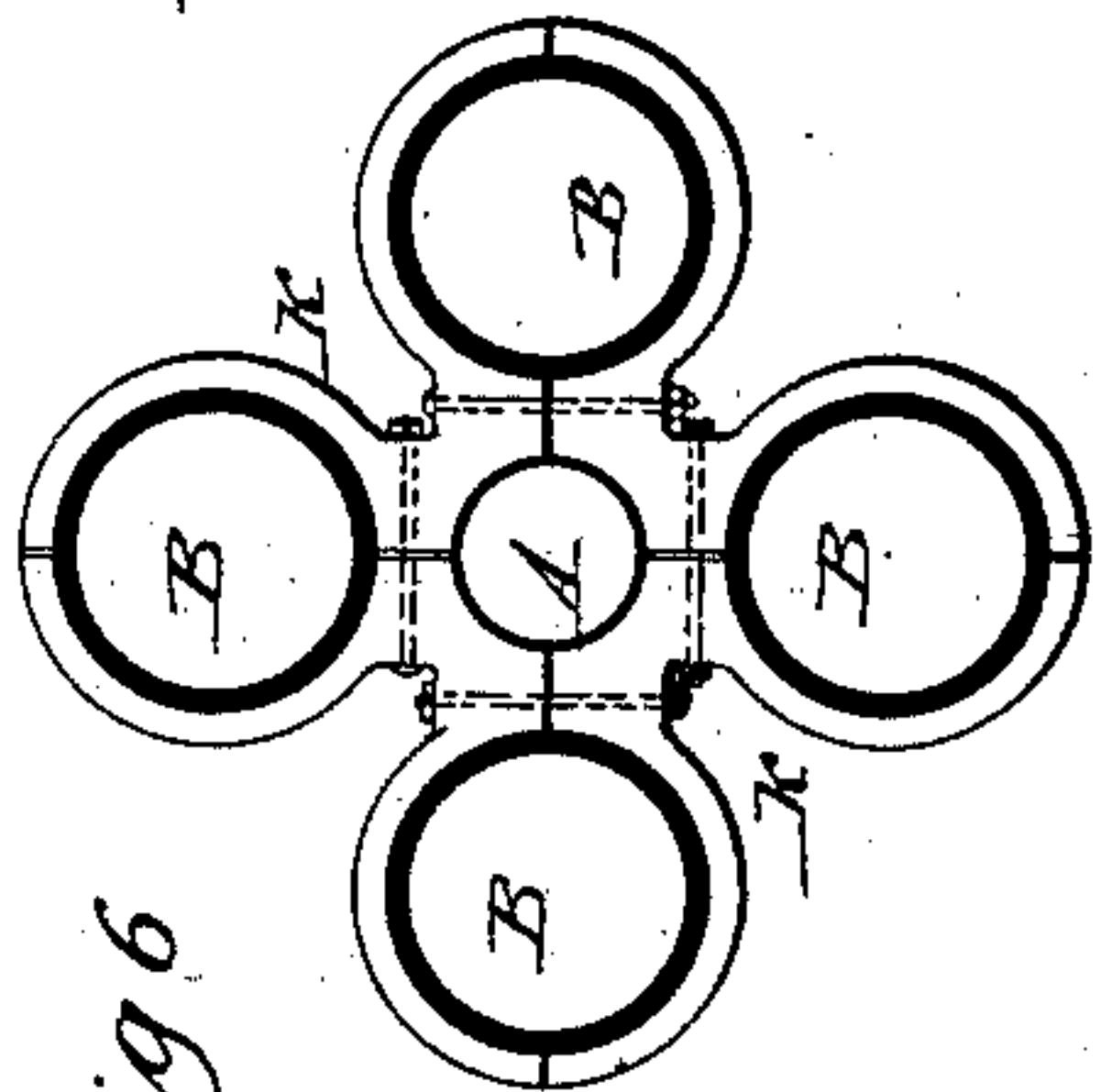


Fig. 6.

INVENTOR

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DAVID M. MEFFORD, OF TOLEDO, OHIO.

PNEUMATIC CANNON.

SPECIFICATION forming part of Letters Patent No. 314,298, dated March 24, 1885.

Application filed March 17, 1884. (No model.)

To all whom it may concern:

Be it known that I, DAVID M. MEFFORD, of Toledo, in the county of Lucas and State of Ohio, have invented certain Improvements in
5 Pneumatic Cannon, of which the following is a specification.

Pneumatic guns, in order to possess the highest degree of efficiency, are necessarily made with barrels of great length, commonly of forty
10 feet or more, the barrels being of relatively small diameter and usually of thin material. In consequence of these facts difficulty is experienced in sustaining the barrels and maintaining them in a straight and true condition,
15 and also in preventing their vibration when in use.

My invention consists in various details of construction, hereinafter described and claimed, designed to impart stiffness to the
20 structure, and to deliver the air with maximum effect against the projectile.

Referring to the accompanying drawings, Figure 1 represents a side elevation of my improved gun; Fig. 2, a longitudinal vertical
25 section of the same; Fig. 3, a transverse section of the same on the line $x x$, showing in their preferred form the clamps by which the barrel and magazines are united. Fig. 4 is a
30 cross-section on the line $y y$, showing the clamps provided with trunnions. Figs. 5 and 6 are views illustrating the combination of the barrel with three and with four reservoir-tubes, respectively.

Referring to the drawings, A represents the
35 barrel of the gun, which may consist under ordinary circumstances simply of a straight tube of uniform diameter.

B B represent the two reservoir or magazine tubes, which are commonly made of a cylindrical form and of a diameter considerably
40 greater than that of the barrel. These magazines, which are arranged one above the other beneath the barrel and parallel thereto, are preferably composed of seamless wrought-iron
45 tubing adapted to withstand heavy pressures. They may be closed at the forward ends by means of caps secured thereto, as represented in the drawings, or by other suitable means; and to prevent the possibility of the leakage
50 of air through the pores of the metal when

working under high pressures the inner surfaces of the tubes may be coated with zinc, tin, or resinous or other matters adapted for the purpose. At the rear end the barrel is
connected with the two magazines by means
55 of a breech-section, C, which may be given any external form or configuration desired, which is provided in the forward side with openings to receive the ends of the barrel and
magazines, as shown. 60

The connection between the parts may be effected in any of the various modes practiced by mechanics in similar cases. It is preferred, however, to thread the barrel and magazines externally and screw them firmly into
65 corresponding openings in the breech-piece, as shown. It is to be noted that the breech-piece is made of large size in relation to the other parts, and adapted to retain a large
70 quantity of air directly in rear of the barrel, which has its bore continued through the breech end directly into the breech-section, as shown. This construction is advantageous in
that it permits a large volume of air to pass
75 directly into the barrel without changing its direction or course of movement, whereby the pressure is rendered more fully available against the projectile during the exceedingly
short time which is required for the delivery
80 of the projectile from the muzzle.

In practice it is found that the time required for the expulsion of the projectile is so brief that if the air is compelled to change its course of direction while entering the barrel, or before acting upon the projectile, the
85 pressure in the barrel and reservoir is not entirely equalized, and that consequently the full pressure of the air is not expended against the projectile; hence the importance of the construction herein represented. The barrel
90 is provided near its lower end with a valve, H, for controlling the admission of air thereto from the magazine. This may be a rotary or a sliding valve of any suitable construction, the present invention having no special reference thereto. In advance of this valve the
95 barrel is provided with a movable breech-section or breech-block, I, arranged to swing upon trunnions, or otherwise movable in such
manner that it may be opened laterally, so as 100

to expose its ends and admit of the projectile being introduced.

In order that the magazines may properly stiffen and strengthen the barrel, and also prevent or counteract its strong tendency to vibrate, I connect the magazines and barrel firmly to each other at various points in their length by means of clamps K. The magazines being of tubular form possess great stiffness or rigidity in proportion to their weight, and being of considerable diameter they serve through the clamps to impart great stiffness to the barrel. Inasmuch as the magazines are ordinarily shorter than the barrel, and inasmuch as bodies of different lengths vibrate under ordinary circumstances in different times, it follows that the tendency of the barrel to vibrate will be counteracted by the vibrations which may occur on the part of the magazines.

The clamps K, which may be variously constructed, are preferably composed each of two castings, *a*, adapted to span the magazines and the intermediate barrel, and especially on their inner surfaces to conform closely thereto, and the two parts thus applied will be united by means of bolts *b* or other fastening devices, by which they may be drawn tightly into position upon the intermediate parts. The clamp at the inner or middle portion of the gun, or at the center of weight, may be cast with trunnions *c* thereon, to give support to the gun and admit of its being mounted in a carriage of ordinary construction.

When the gun is to be worked at very high pressure, or when for special reasons a very large quantity of air is to be accumulated, I propose to employ three magazines grouped about the barrel, as represented in Fig. 3, or four arranged in the positions represented in Fig. 4.

I am aware that two short reservoir-tubes have been arranged at the sides of a gun-barrel, and connected there with the two extremities; and this arrangement I do not claim, inasmuch as the union of the parts at their extremities only was not designed to and will not in practice prevent that tremulous motion or vibration which is established by the handling and firing of the gun when made of the great lengths which recent experiments have demonstrated to be necessary.

It is manifest that when the barrel and magazine are connected at two points only they are perfectly free to vibrate independently, whereas the use of three or more connections renders the independent vibration impossible. The vibration of the three members in unison, particularly when the parts are of different lengths, and therefore adapted to vibrate in different times, is practically impossible.

The arrangement of the magazines above and below the barrel, instead of at its sides, is highly advantageous in that it reduces the width of the gun, and permits the same to be

placed on a narrower carriage, and to be operated with greater convenience, and also in that it permits the employment of the breech-block opening in a lateral direction, which is in practice desirable on account of the convenience of access thereto. It is further advantageous in that the resistance of the upper magazine to tensile strain, and the resistance of the lower magazine to longitudinal compression, are rendered available to assist in supporting the barrel, which would not be the case were the magazines arranged at the sides of the barrel.

Having thus described my invention, what I claim is—

1. In a pneumatic gun, a barrel having its bore continued directly through the rear end, two magazines located on opposite sides of the barrel, and a breech-section connecting the rear ends of the two reservoirs with the open breech of the barrel.

2. In combination with the air-reservoirs and the intermediate gun-barrel, the metallic clamp connecting both reservoirs with the barrel, and provided with trunnions or bearings.

3. In a pneumatic gun, a plurality of parallel elongated reservoirs, in combination with an intermediate barrel, a valve through which the barrel communicates with the reservoirs, and a movable breech-block in advance of the valve, to permit the introduction of the projectile.

4. In a pneumatic gun, a reservoir to hold compressed air or gas, a barrel fixed in relation thereto, a valve for opening and closing communication between the barrel and reservoir, and a breech block or section opening laterally from the barrel in advance of the valve, to permit the insertion of the projectile.

5. In combination with the parallel reservoir, tubes B, and the intermediate barrel, A, the clamps K, each composed of two parts united by bolts, as described and shown.

6. In combination with the breech section or reservoir, the two cylindrical reservoirs, and the intermediate barrel, all screwed thereto, the bore of the barrel being continued through its rear end and opening directly into the interior of the breech-section, as shown.

7. In a pneumatic gun, a barrel having its bore continued through the breech end, in combination with an air-retaining chamber of relatively great diameter arranged directly in rear of the barrel, and a plurality of reservoir-chambers connected at their rear ends to the air-retaining chamber, and extended thence forward along the sides of the barrel, substantially as and for the purpose described.

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Witnesses:

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