

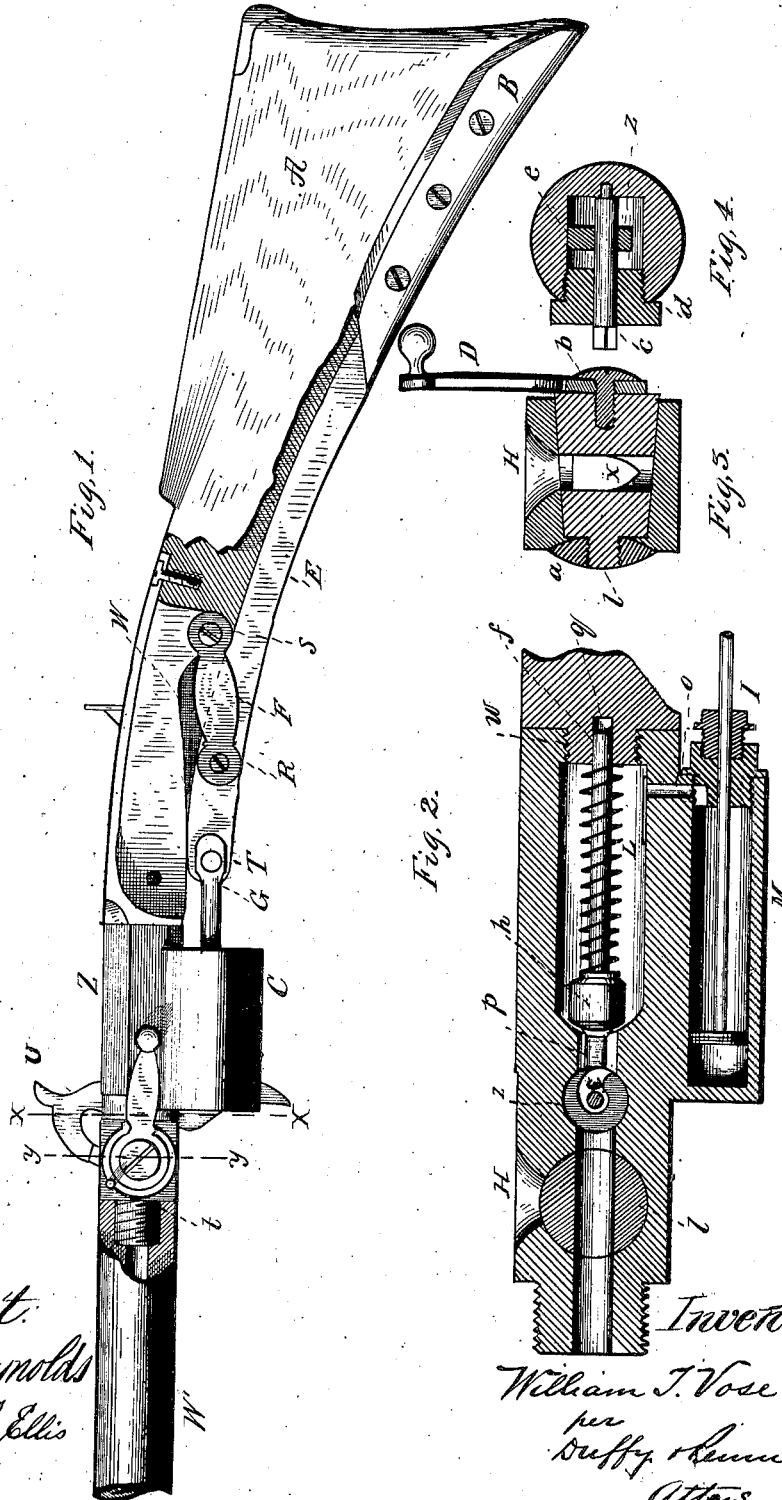
(No Model.)

2 Sheets—Sheet 1.

W. T. VOSE.
PNEUMATIC GUN.

No. 306,563.

Patented Oct. 14, 1884.



Attest:
J. W. Reynolds
Edward C. Ellis

Inventor
William T. Vose
 per
Duffy & Kenne
 Attys.

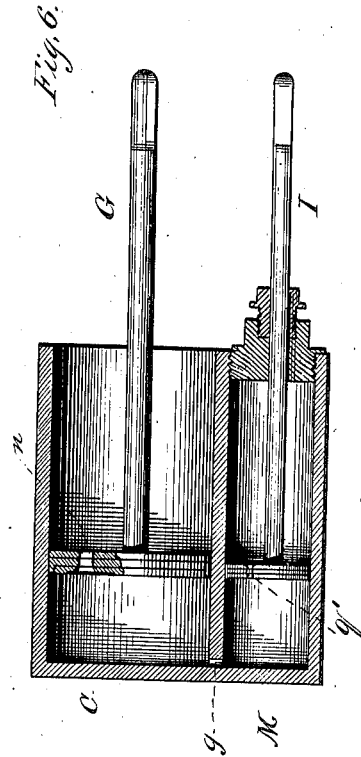
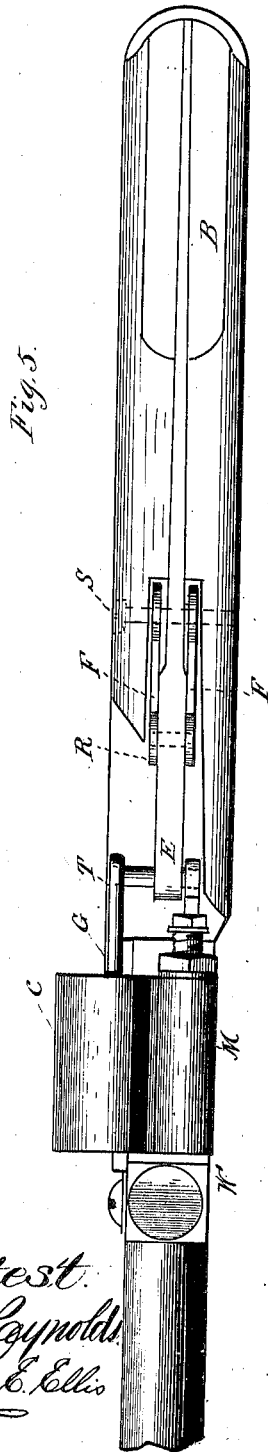
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2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

WILLIAM T. VOSE, OF NEWTONVILLE, MASSACHUSETTS.

PNEUMATIC GUN.

SPECIFICATION forming part of Letters Patent No. 306,563, dated October 14, 1884.

Application filed January 26, 1884. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM T. VOSE, of Newtonville, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Pneumatic Guns; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

My invention relates to that class of devices known as "pneumatic guns," in which the expansive properties of compressed air are utilized for the expulsion of a projectile from the gun-chamber, thus avoiding the disagreeable odor, smoke, and other objectionable features attendant upon the use of gunpowder.

By reason of the simplicity, strength, and compact disposition of the parts of which my improved gun is composed and the high degree of compression to which I am enabled to subject the air in the storage-receptacle my embodied invention, while cheap, durable, and easily kept in repair, also performs its necessary functions with precision and full utilization of the power employed.

Reference being had to the accompanying drawings, in which like letters indicate like parts, Figure 1, Sheet 1, represents my invention in side elevation, portions being shown as broken away to disclose more fully the disposition of parts. Fig. 2, Sheet 1, is a central longitudinal section through the compression or storage chamber and the smaller charging-cylinder. Figs. 3 and 4, Sheet 1, are respectively cross-sections on the lines $y y$ and $x x$, Fig. 1. Fig. 5, Sheet 2, is a plan view of the under side; and Fig. 6, Sheet 2, is a central longitudinal section through the two charging-cylinders.

My improved pneumatic gun consists, in the form represented in the drawings, of three principal sections—the stock A, barrel W, and intermediate charging-piece, Z, all of which are united by screw-threaded extensions t and w , or otherwise, so as to constitute a strong, well-jointed structure. The middle section is provided with an internal chamber, L, in which is centered the spring-seated stem f , carrying

the valve h . This stem plays in a step, g , at the rear end of the chamber, and has a forward extension, p , projecting beyond the outlet-opening and adapted to be operated by the cam e . The spring is of sufficient strength to hold the valve against its seat while the chamber is being charged with air, as hereinafter explained. It is, however, comparatively light, so as to oppose no greater resistance to the working of the valve than can be avoided. The cam is fixed upon a shaft, c , loosely journaled in the chamber z , and squared at its outer end for the reception of the ordinary spring hammer and trigger, U. The cam and hammer are relatively so disposed upon the shaft that when the latter is at half or full cock the cam is out of contact with the valve-stem extension p , but when at the position of discharge, as shown in Figs. 1 and 2, it bears against such extension, forcing the valve from its seat.

In front of the cam-chamber z is situated a two-way charging-cock, l , having a central aperture in axial alignment with the bore of the gun when ready to discharge. The cock is slightly tapering, and is held in position by the washer a . At the larger end is attached, by means of a screw, b , the operating-handle D, which is slightly sprung at its center, so that it will in its horizontal position bear with friction against the exterior surface of Z, and be held firmly in place. By means of the handle the cock can be revolved to the position shown in Fig. 3. The central passage then comes in line with a charging-aperture, H, and the bullet X, or shot, can be inserted. The return of the handle to its horizontal position closes the opening, as shown in Fig. 2, and places the bullet or shot in the line of discharge. The storage-chamber L is filled with compressed air by means of the subjacent air-condensing differential cylinders C and M. The cylinders are fitted with separate pistons G I, whose heads are provided with valves opening in opposite directions. The cylinder C is open at one end to the atmosphere, but M is closed by a stuffing-box fitting, through which passes the piston-rod. The cylinder M communicates with the storage-chamber L by means of the passage o , provided with an inwardly-opening flap, puppet, check, or other valve. The outer ends of the piston-rods are

joined by a transverse pin, T, which supports also the inner end of the operating-lever E. The latter is furnished with a pivot, R, carrying the opposite links F F, which play loosely upon the stationary screw-pin S, firmly secured in the stock, the whole leverage system constituting a toggle-joint. The stock is channeled out for the reception of lever E and its hand-grasp B, and is also provided with grooved guides W, in which the inner end of the lever plays during the operation of the air-pump.

The parts being disposed as described, the operation of my invention is as follows: The hammer being placed at half-cock, the cam-piece *e* either does not engage with or merely rests upon the extension *p* of the valve-stem. Consequently the spring forces the valve *h* firmly upon the outlet of the storage-chamber L. The piston-heads, which in the position shown in Fig. 1 are at the heads of their respective cylinders, are then caused to move outwardly by depressing the handle B of the lever E. During this movement the valve *q'* closes, and the air contained in the cylinder M passes by the passage *o* into the chamber L. In the meantime air enters by the valve *u* from the external atmosphere and fills both cylinders. The air now contained in the chamber L is partly compressed, inasmuch as that chamber holds, in addition to its original volume, the additional amount formerly in cylinder M. My greatest power, however, I obtain by the return of the lever E to its former position. During this movement the valve *u* closes and *q'* opens, and the whole volume of air contained in the cylinder C is forced through the passage *g* and valve *q'* by way of the cylinder M and passage *o* into the storage-chamber. The valve at the termination of the passage *o* prevents a return of the compressed air from the storage-chamber. The reciprocation of the lever may be repeated a number of times until the desired degree of compression is secured in the chamber L. The gun being then charged by means of the two-way cock, as hereinbefore explained, the hammer may be placed at full-cock and the piece discharged by pulling the trigger, the cam forcing the valve *h* from its seat and releasing the compressed air back of the bullet or shot.

It is evident that by my toggle-jointed lever I am enabled to exert an extraordinary force upon the piston, the ratio of power being dependent upon the length of the lever-arm and the distance of the rod-connection from the fulcrum. The arrangement of both rods upon the same pivot also enables me, at a single operation, to take air from the external atmosphere and force it into the storage-receptacle, thus effecting a notable economy in the time necessary for charging the chamber. It is evident, however, that without departing from the spirit of my invention it may be modified in various ways and still preserve its essential features. Thus it may be found convenient to use more than one open

cylinder C in connection with the closed cylinder M; or the cylinder C may be located in line with and slightly in advance of the cylinder M, and its piston-rod pivoted to the lever E at a proportionate distance from the fulcrum. In place, also, of the spring-seated stem *f* playing in the step *p*, I may make the stem stationary and the valve and its extension spring-seated and movable upon it. In such construction, however, there would be danger of leakage, and I prefer the one shown in my drawings.

The charging-opening for the bullets might be made at the side instead of the top of the gun, and the position of the handle appropriately changed.

All of these and other modifications embodying the substitution of mechanical equivalents for the separate elements shown I contemplate using, according to the particular exigencies of the case.

I regard as a very essential part of my invention the fact that it enables me to secure at once the full effective force of the compressed air, the entire volume being discharged instantly at the rear of the projectile.

Having thus described my invention, what I claim is—

1. In a pneumatic gun, the combination, with the storage-receptacle L, of the air-condensing chamber M, communicating therewith by an inwardly-opening valve, the air-supply chamber C, valved pistons within M and C, and means for operating said pistons simultaneously, substantially as described.

2. In a pneumatic gun, the combination, with the intercommunicating chambers M C, provided with pistons G I, of the toggle-jointed lever E B and stock A, the latter being recessed for the reception of the arm of the lever when in its closed position, substantially as described.

3. In a pneumatic gun, the combination of the stock A, having guide-grooves W, the toggle-jointed lever pivoted to said stock and working in said guide-grooves, the pistons to which the forward arms of the lever are attached, and the compound compressing-cylinders, substantially as described.

4. In a pneumatic gun, the combination, with the storage-receptacle L, of the air-condensing chamber M, air-supply chamber C therefor, (the chamber C being larger than chamber M,) valved pistons G I, and means for operating the latter, substantially as described.

5. In a pneumatic gun, the combination, with the storage-receptacle L, of the outlet-valve *h*, the hammer-shaft *c*, provided with cam *e*, and the barrel W', said hammer-shaft and cam being located in such position with respect to the valve as to operate the latter when the shaft is revolved in the act of firing, substantially as described.

6. In a pneumatic gun, the combination, with the storage-receptacle L, of the outlet-valve *h*, spring-seated, the hammer-shaft *c*, pro-

vided with cam *e*, to actuate the rod of valve *h*, and the barrel *W'*, substantially as described.

7. In a pneumatic gun, the combination, with the breech-frame, of the revolving two-way loading-plug and its hand-lever, centrally sprung, and having in its closed position frictional contact against the side of the barrel, substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

WILLIAM T. VOSE.

Witnesses:

C. A. NEALE,
EDWARD E. ELLIS.