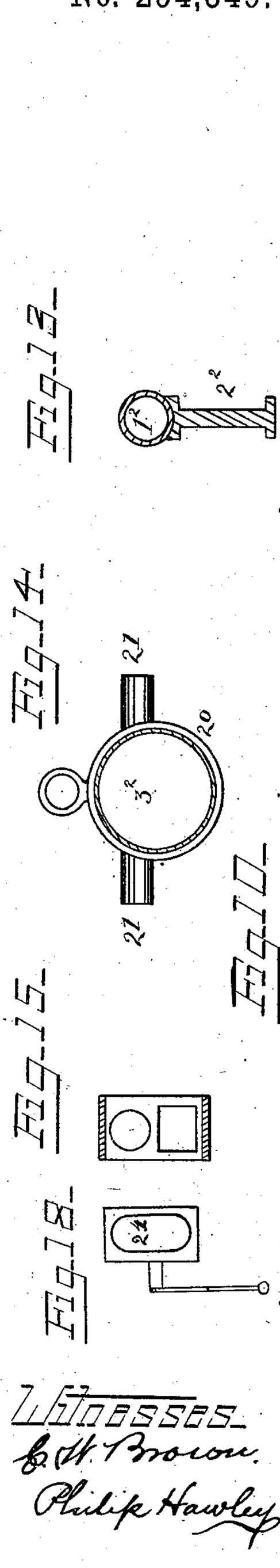
(No Model.) 2 Sheets—Sheet 1.

W. A. BARTLETT.

PNEUMATIC CANNON.

No. 294,349. Patented Mar. 4, 1884.



(No Model.)

2 Sheets—Sheet 2.

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Fig. 21.

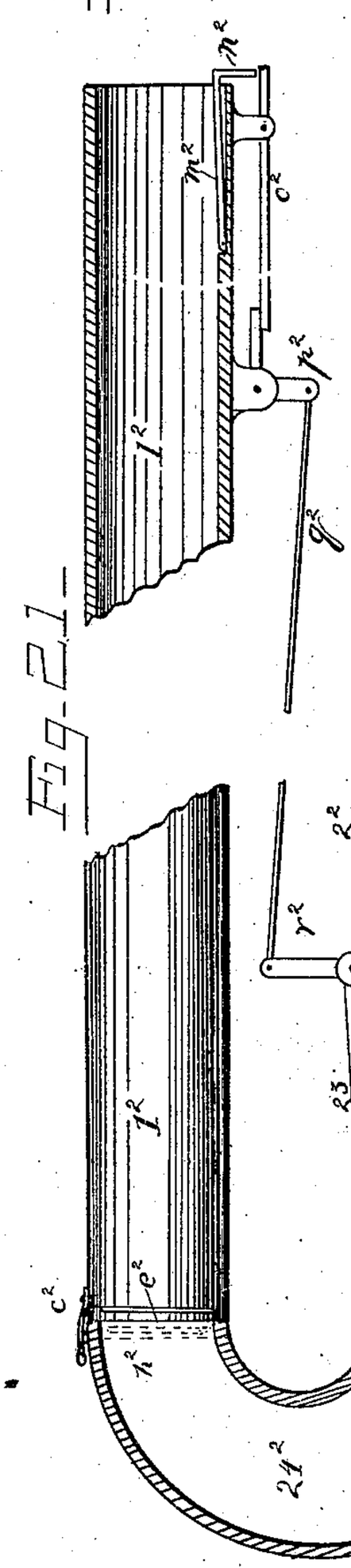


Fig. 22.

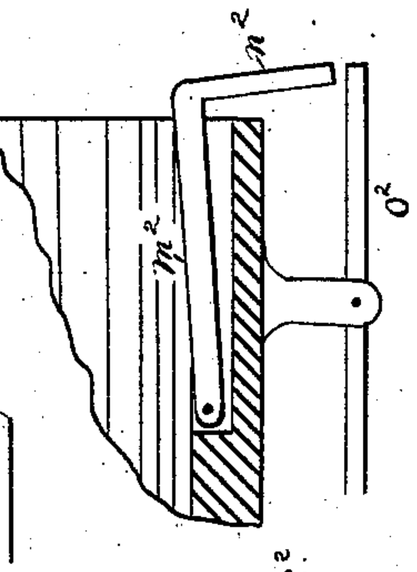


Fig. 23.

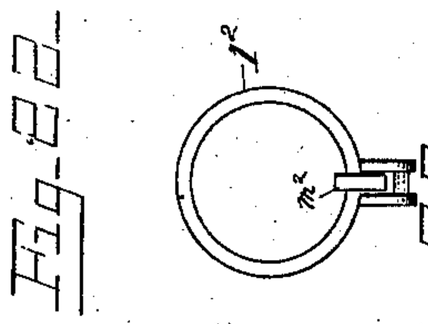


Fig. 24.

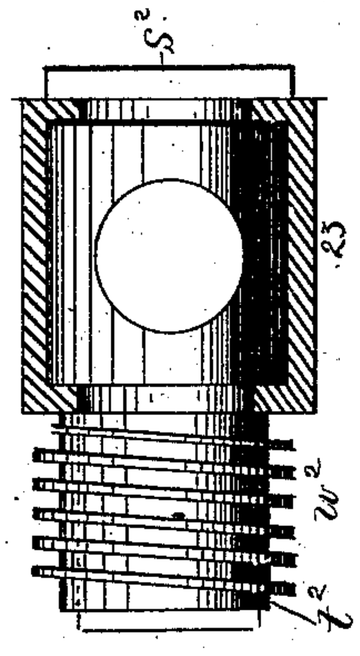


Fig. 25.

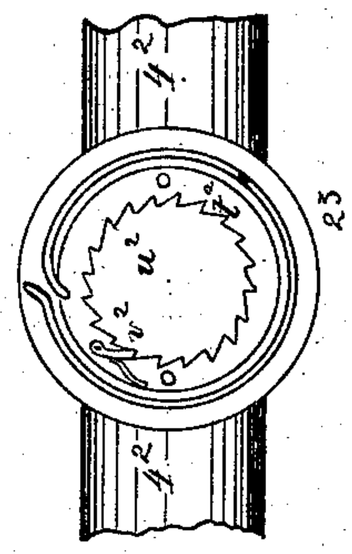


Fig. 20.

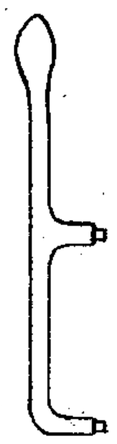


Fig. 19.

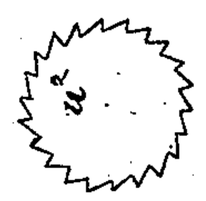
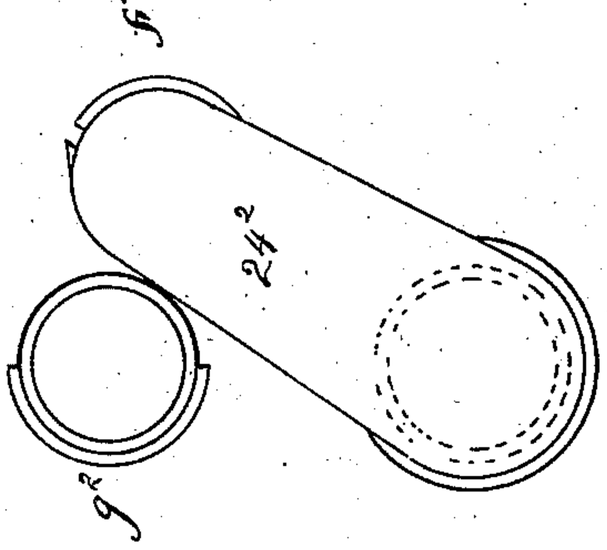


Fig. 26.



Witnesses

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UNITED STATES PATENT OFFICE.

WALLACE A. BARTLETT, OF WASHINGTON, DISTRICT OF COLUMBIA.

PNEUMATIC CANNON.

SPECIFICATION forming part of Letters Patent No. 294,349, dated March 4, 1884.

Application filed January 8, 1884. (No model.)

To all whom it may concern:

Be it known that I, WALLACE A. BARTLETT, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Pneumatic Cannon, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to pneumatic cannon, or guns operated by air or gas pressure, in which the gas is generated or confined in a flask or receptacle other than the bore of the gun prior to the discharge.

The invention consists in certain methods, combinations, and details of construction, as hereinafter pointed out and claimed.

The object of the invention is to produce a gun which will project shells loaded with dynamite or similar high explosives without danger of bursting in the gun.

In the drawings, Figure 10 is a longitudinal section of the gun and attachments, the valves and breech-block being omitted. Fig. 11 is a side elevation of the same form of gun. Fig. 12 is a transverse section of Fig. 11 on line *x x*, looking toward the breech. Fig. 13 is a similar section on line *y y*, looking toward the muzzle. Fig. 14 is a section of the flask and trunnion-band at *z z*, looking toward the muzzle. Fig. 15 is a section through the breech-frame at *z' z'*. Figs. 16 and 17 are details showing parts of the bracing-web. Fig. 18 is a face view of one form of breech-block. Figs. 19 and 20 are details. Fig. 21 is a broken section, showing automatic cut-off which operates mechanically to close valve, parts not essential being omitted. Fig. 22 is a muzzle view of same. Fig. 23 is an enlarged section of the lower portion of the muzzle. Fig. 24 is a rear view of the valve, and Fig. 25 an end view of same. Fig. 26 is a rear view of the form of breech-closing apparatus shown in Fig. 21.

The gun-tube, which may be considered the equivalent of or substitute for the gun-barrel of a powder-gun, is represented by the numeral 1^2. This tube may be in sections of such length as may be convenient, the ends of the sections joined by sleeves or screwed together, as found convenient. As the gun-tube need not be of great thickness to resist any pressure likely to be employed, the tube may be strengthened and kept from sagging by a strengthening brace or web, 2^2. This bracing is of light angle iron or steel, preferably struck up, but may be cast. The web may be made of any desired length by bolting on sections, as shown in dotted lines, Fig. 11, and in the detail, Fig. 17.

The air or gas flask is indicated by 3^2. This is preferably a cylinder, the ends of which are bulged to give increased capacity and strength. The flask is surrounded by a band, 20, which bears the trunnions 21. The band 20 may be shrunk onto the flask, or may be in sections bolted on, or may be keyed or riveted to the flask. A supply-pipe, 4^2, leads from the air-flask to the breech-frame. This supply-pipe is preferably a little larger than the gun-tube, and is provided with a valve or valves at 22 and 23. One of these valves must be capable of exceedingly rapid movement. The other is a relief-valve to shut off the air-supply with certainty when the quick-moving or "firing" valve may not be in position to do this with certainty. The gun-tube 1^2 is placed above the flask 3^2, and supported thereon by saddles, and bound to the flask in any suitable manner, as by bands passing round the tube and flask. The web 2^2, bolted or otherwise firmly secured to the flask, furnishes a support for the front end of the gun-tube. The supply-pipe 4^2 communicates with the interior of the flask, and also with the breech of the gun-tube, either by a passage-way through the breech-block, as shown in Figs. 21, 26, or in dotted lines, Fig. 11, or by a direct passage-way into the side of the gun-tube just forward of the breech-block. A sliding breech such as is common in breech-loading ordnance, as shown in Fig. 10, which moves in the breech-frame either horizontally or vertically, may be used; but I have desired a swinging breech, as shown in Fig. 21. The trunnion should be so placed as to give a slight breech preponderance. In adding muzzle-sections to increase the length of the gun the trunnion-band may be shifted to preserve the equipoise. The web 2^2 may be cut away, as at 26, to receive the sleeves 25, which unite the gun-tube sections. The upper surface of the web 2^2 is hollowed out to form a cradle for the gun-tube. The automatic cut-off connections may pass through or alongside of this

web. The front of the web may be supported by tie-rods leading back to the trunnion-band or to a suitable bridge. The trunnions may be replaced by a yoke or pivot to permit the training of the gun; but in this invention the flask and gun-tube must be moved together when the gun is trained. The supply-pipe is preferably parallel with the gun-tube, and the two are secured together, thus bracing each other. A further support for both may be provided in a strengthening web or brace, 27, which is secured to the rear end of the air-flask, and forms the counterpart of the web 2^2. Both these webs may be bolted to the ends of the shell of the flask 3^2, where they are made to project beyond the heads of said flask, like the chine of a barrel.

It is obvious that the gas-flask may be as long as the gun-tube, or, if not as long, may be near the breech and communicate directly with the breech of the gun-tube. I prefer, however, that the flask be shorter than the gun-tube, as less weight of metal is required with such construction. The air-flask will be supplied with compressed air, preferably through an aperture through one of the trunnions; or gas may be generated in the flask by chemicals or by combustion.

The automatic cut-off mechanism by which the passage of the projectile from the muzzle of the gun actuates or permits the closing of the valve is as follows: A lever, m^2, is pivoted in a groove in the interior of the bore of the gun, so as to project very slightly into the bore and present a gradual incline to a projectile in passing. This lever has an arm, n^2, which bears on the short arm of lever o^2. The other arm of o^2 engages a bell-crank, p^2, which, by a rod, q^2, leads to the trigger r^2. By such a train of mechanism the passage of a projectile over m^2 will cause the trigger r^2 to be rocked and disengaged from its bearing on the ratchet-tooth of the valve 23. (See Fig. 21.)

The valve 23 (see Fig. 24) is a rotary valve, which opens or closes the passage in pipe 4^2 by turning constantly in one direction. One end of the valve-stem outside the casing bears a wheel, s^2, with four ratchet-teeth thereon. One of these ratchet-teeth is engaged by the trigger in the open and another in the closed position of the valve. The other stem or spindle, n^2, of the valve projects some distance outside the casing, and has a ratchet-wheel at its extremity. Surrounding the spindle is a collar or sleeve, t^2, which may revolve in one direction on the spindle, but is held from turning in the other direction by its spring-pawl v^2 engaging with the ratchet-teeth on spindle n^2. The sleeve t^2 is surrounded by a strong spiral spring, w^2, one end of which is secured to the sleeve, the other to the valve-casing. The constant tendency of this spring when under tension is to rotate the collar in the direction of the arrow. The collar in turn, by means of its pawl engaging the ratchet, tends to turn the valve, and will do so when the valve is not held against rotation by the trigger r^2. The sleeve t^2 may be turned in a reverse direction by means of the wrench, Fig. 20, which has two prongs to enter holes in the end of the sleeve. The collar will then rotate on the spindle without moving the valve, and will thus wind up the spring. If necessary, the valve may be held against rotation by a wrench engaging its other spindle while the spring is being wound up. Supposing, now, the spring to be wound up and the valve in closed position, a quick pull on the trigger r^2 will release the ratchet-tooth on s^2, and the valve will be turned by its spring to the open position, the trigger being thrown quickly back by a spring or other mechanism, so as to serve as a stop for the next tooth on wheel s^2. The passage of air through the breech into the gun (supposed to contain a projectile) drives the projectile before it, and its passage over the lever m^2 again trips the trigger r^2 through its connecting mechanism, and allows the spring w^2 to turn the valve another quarter of a turn to its closed position.

I do not herein limit myself to the mechanism shown and described for actuating the valve, nor for connecting from the muzzle to the valve. Other mechanisms are shown in other applications filed by me of even date herewith. In this application I have shown a series of connections which I call "mechanical," to distinguish from electric or pneumatic connections described in other application referred to.

The form of breech-closing mechanism shown in Figs. 21 and 26 is one of several breech-closers devised by me for guns of this class. The breech-piece 24^2 is merely a curved pipe, which is swiveled on the end of the supply-pipe 4^2. A flange, k^2, on the end of 4^2 finds a bearing in the seat i^2, which is screwed or otherwise fastened to the piece 24^2. The curved breech-closer may be swung to one side, as in Fig. 26, but is prevented from further rotation by a stop of any kind. When the breech-piece 24^2 is swung to closed position, it has a projecting side lip, which engages a groove, h^2, in the half collar or flange g^2 on the gun-tube 1^2, and a half-flange, f^2, which closes over a rib, c^2, on the side of the gun-tube, thus locking the breech-piece against backward thrust. The breech is held from turning, when closed, by a catch, as at c^2, which may be a spring or pivoted catch and engage with a notch in the top of breech-piece. The gun is loaded by placing a projectile in the bore. The firing-charge is contained in the flask, and the opening of the valve permits enough gas to enter the gun to drive the projectile out. If the valve were closed too soon, the full pressure of the gas on the projectile throughout the length of the gun would not be maintained. If too late, a waste of compressed air or gas would take place.

I claim—

1. The combination, in a cannon of the char-

acter described, of the gas-flask and the gun-tube arranged outside above the flask, so as to be supported and rigidly held thereby, said flask provided with trunnions or equivalent supporting mechanism, whereby the gun and flask may be trained together, as set forth.

2. The combination, with a cylindrical gas-flask, of a gun-tube placed above and rigidly supported by said flask, and supporting-trunnions for the same, substantially as described.

3. The combination, with an air-flask and a gun-tube composed of longitudinal sections secured to and supported by said flask, of movable trunnions, whereby the preponderance of the gun may be changed, as set forth.

4. The combination, with an air-flask, of a gun-tube attached thereto and supported thereby, and a movable band surrounding the flask, said band having trunnions attached thereto, substantially as described.

5. The combination, with a gas-flask and a gun-tube arranged upon and supported by said flask, of a supporting-brace, as 2^2, projecting from the flask to support the gun-tube.

6. The combination, with an air-flask and gun-tube, arranged substantially as described, of a supporting brace or web, as 2^2, made in sections and secured to the flask, so as to support the tube, substantially as described.

7. The combination, with the air-flask and gun-tube, having projections, as 25, arranged relatively to each other, substantially as described, of a brace-web, as 2^2, provided with notches to receive the projections on the gun-tube, as set forth.

8. The combination, with a gun-tube and air-supply pipe, arranged with open rear ends side by side, of a breech-block having a passage-way leading from one tube to the other, substantially as set forth.

9. The combination, with a cylindrical gas-flask, of a gun-tube arranged on top of and parallel therewith, a supply-pipe arranged alongside the gun-tube and communicating with the flask, a breech-frame in which both tubes terminate, and a breech-block arranged to slide in said frame, and form a communication from the supply-pipe to the gun-tube, substantially as set forth.

10. The cylindrical flask, the gun-tube mounted thereon and projecting at each end thereof, the supply-pipe communicating with the flask and with the breech of the gun-tube, the supporting-brace in front of the flask and under the gun-tube, and the supporting-brace behind the flask and under the supply-pipe, all in combination, as set forth.

11. A gun-tube and supply-pipe, a valve controlling the supply-pipe, mechanism, substantially as described, for actuating said valve, and mechanical connections leading from the muzzle of the gun to a valve-detent, whereby the valve may be closed automatically as the projectile leaves the muzzle, all in combination, substantially as described.

12. The combination, with the supply-pipe, of a valve and a trigger for retaining the same in open or closed position, a sleeve on the valve, spindle adapted to engage therewith, as described, and a spring which tends to rotate said sleeve and through it the valve, substantially as stated.

13. The combination, with a rotary valve, its detent or trigger, and propelling mechanism, of a train of mechanical connections, substantially as described, leading from the muzzle to the detent or trigger, whereby the detent is actuated to permit the closing of the valve by the projectile in its passage from the gun, as set forth.

14. The combination, with an air-flask and supply-pipe, of a breech-closing piece, as 24^2, swiveled on the supply-pipe and forming a passage-way from said supply-pipe to the gun-tube, as set forth.

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

WALLACE A. BARTLETT.

Witnesses:
PHILIP HAWLEY,
C. W. BROWN.