(No Model.) 2 Sheets—Sheet 1.

W. A. BARTLETT.

PNEUMATIC CANNON.

No. 294,348. Patented Mar. 4, 1884.

Fig. 1.

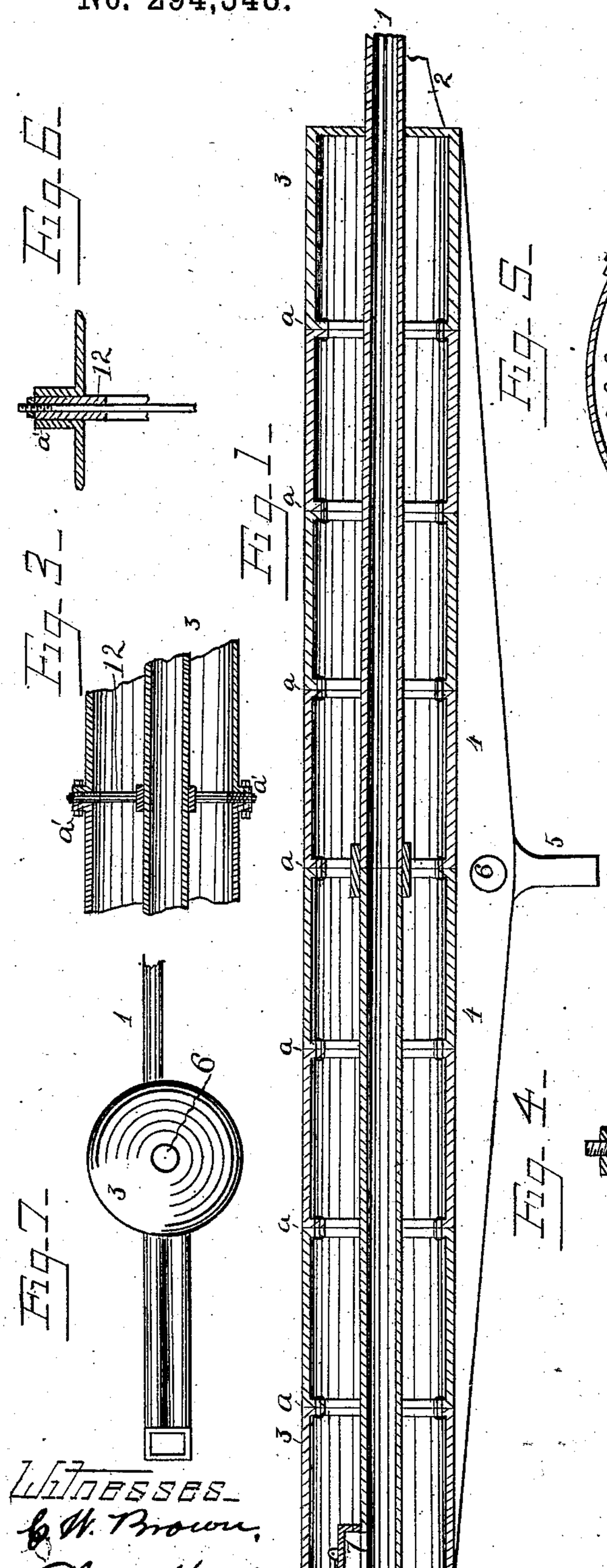

Fig. 2.

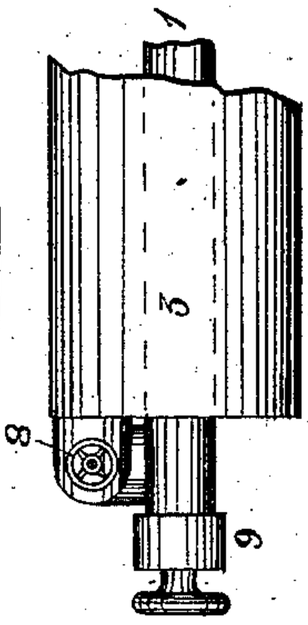

Fig. 3.

Fig. 4.

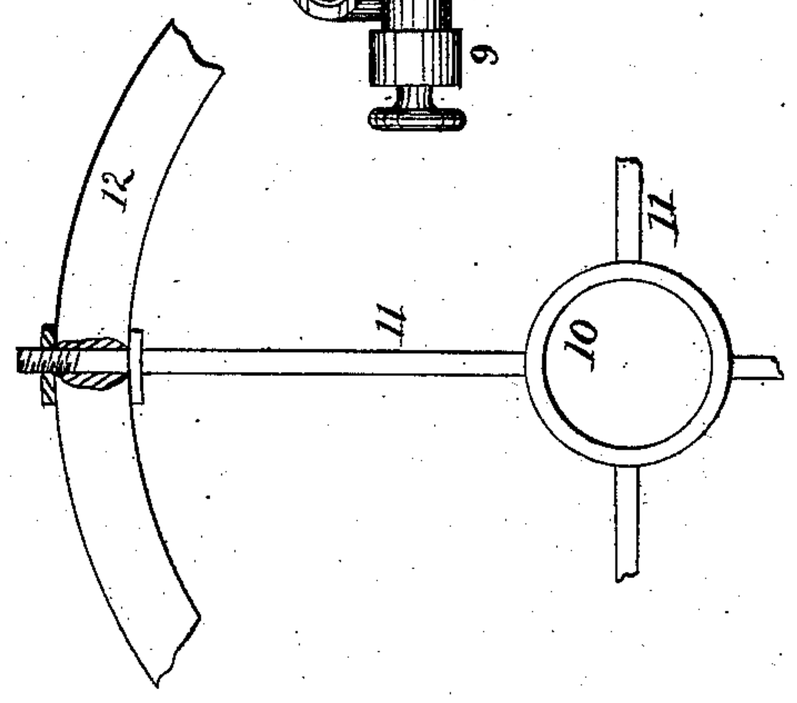

Fig. 5.

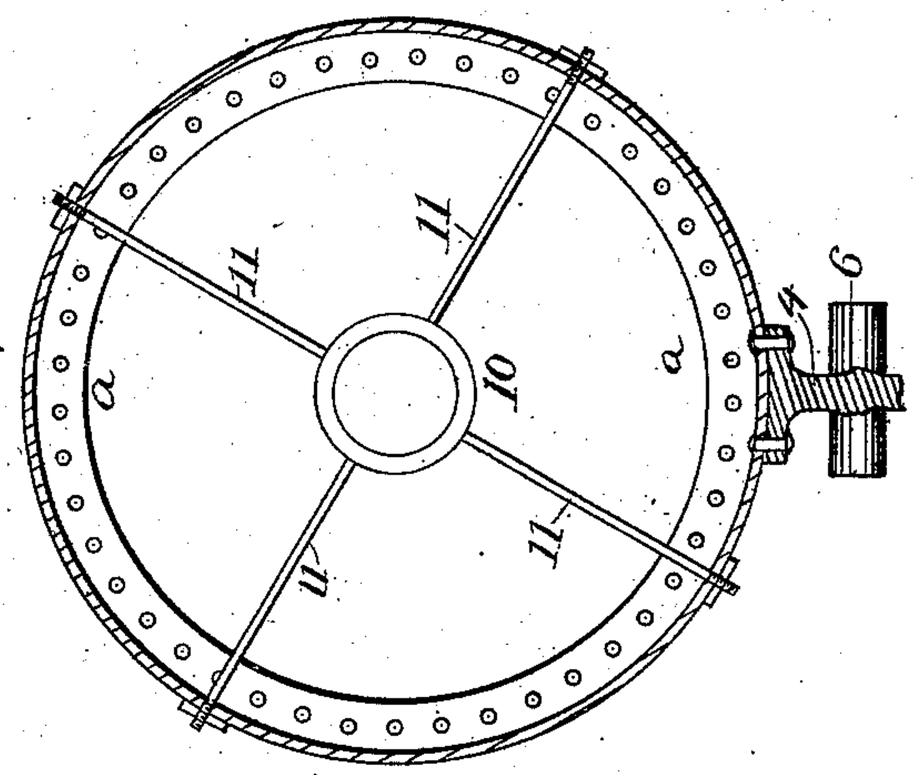

Fig. 6.

Fig. 7.

Witnesses.
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(No Model.) 2 Sheets—Sheet 2.

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PNEUMATIC CANNON.

No. 294,348. Patented Mar. 4, 1884.

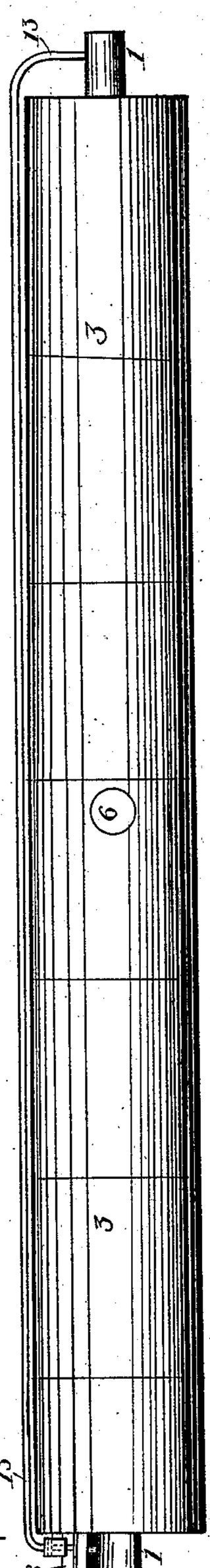

Fig. 8.

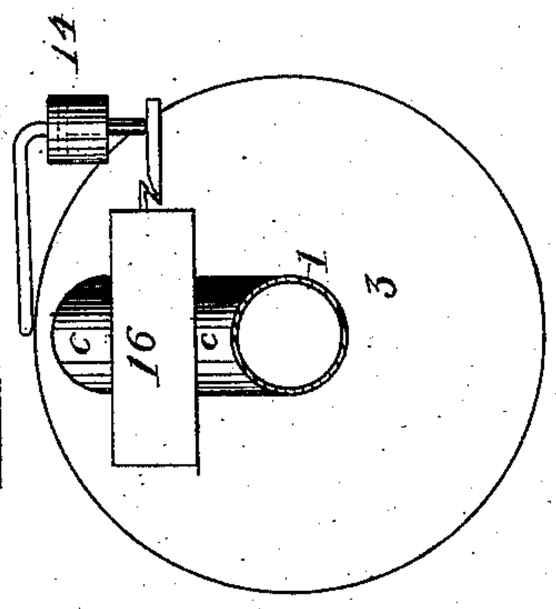

Fig. 9.

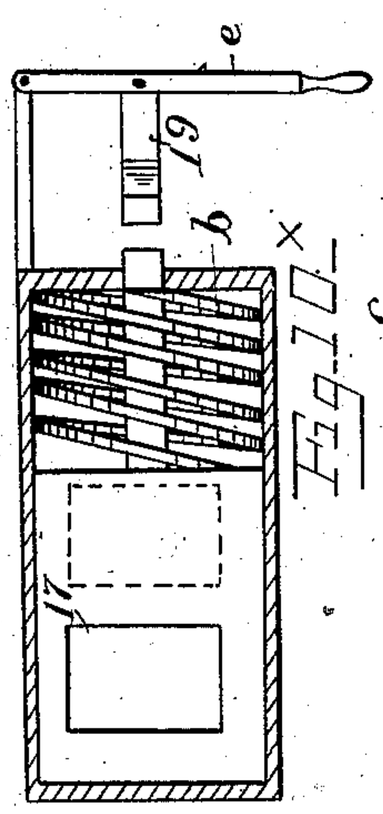

Fig. 10.

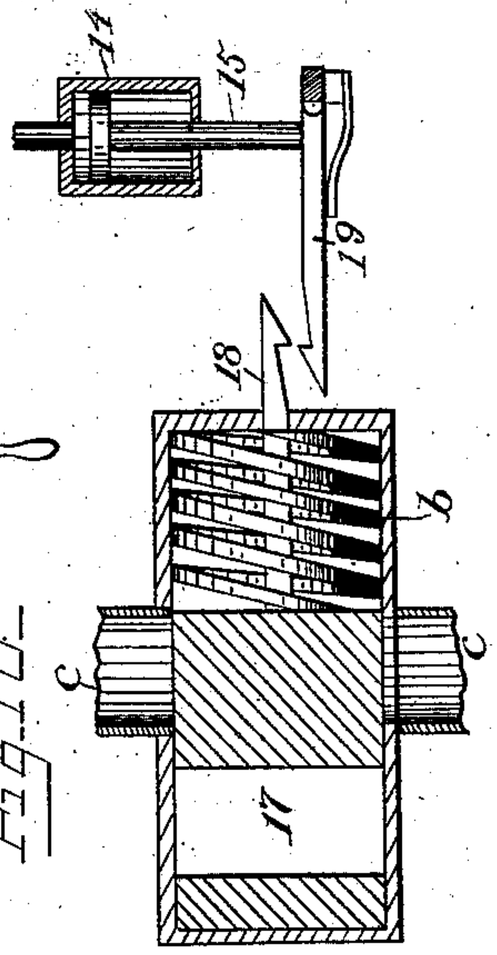

Fig. 10.

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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. 294,348, 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 cannon to be operated by steam or gas pressure; and it consists in the arrangement of the gun-tube with reference to the air or gas flask, so that the latter may serve as a support and protection for the former; also, in mechanism by which the gun-tube may be centered or adjusted in the air-flask; also, in an air-flask made in sections, so that it may be increased in capacity as found desirable; also, in a method of and mechanism for automatically closing the operating-valve; also, in details of construction, as hereinafter pointed out and claimed.

The object of the invention is to produce a gun which will throw projectiles loaded with dynamite, nitro-gelatine, or similar high explosives without danger of bursting in the gun.

In the drawings, Figure 1 is a longitudinal section of a gun-tube and air-flask. Fig. 2 is an elevation of the breech, showing another mode of connection between the flask and tube. Fig. 3 is a section through one of the joints, with packing-ring in position. Fig. 4 is a detail, showing part of packing-ring and adjusting-rods and collar. Fig. 5 is a transverse section, showing adjusting-rods and collar without packing-ring. Fig. 6 is a detail of Fig. 3, enlarged. Fig. 7 is an elevation of a modified form of flask, with gun-tube passing through it; Fig. 8, an elevation of the gun, showing a pneumatic connection for automatically closing the operating-valve; Fig. 9, a rear elevation of the gun and valve mechanism; Fig. 10, a sectional plan of the valve mechanism, and Fig. 10× a longitudinal section of same.

The flask or reservoir for compressed air, gas, or steam is designated by the numeral 3 in the drawings. Through this flask the gun-tube 1 extends, projecting at the muzzle as far as is found necessary or convenient, and at the breech far enough to receive the breech-closing apparatus, which, as shown, is a common screw or slide breech, but may be any well-known form of breech-closing apparatus. I have designated tube 1 as the "gun-tube," instead of "gun-barrel," for the reason that its function differs somewhat from that of a gun-barrel in which powder or other explosive agent is employed. In such a gun the entire charge is inclosed in the gun-barrel, and the barrel receives the shock of explosion. My tube receives only the projectile, the propelling charge being contained in a separate receptacle until the instant of discharge. Moreover, as the pressure throughout the length of my gun-tube is nearly uniform, I may generally use "parallel tubing," well known in the market under that name, instead of specially-constructed gun-barrels for my guns.

The gun-tube 1 may be made in as many sections as found advisable, the sections coming together in such manner as to form a smooth joint. The ends which project from the flask may be supported by a strengthening web or brace, as at 2, Fig. 1. As the gun-tube is exposed to external pressure within the flask as great as any internal pressure which can come upon it, it need be only so heavy as is necessary to resist collapse.

The flask is preferably made up of sections, which may be either riveted or bolted together. The sections are preferably cylindrical, and may have their edges turned in, as at *a a* in Figs. 1 and 5, or turned outward, as in Fig. 3 at *a' a'*. By adding sections the flask may be made as long as found necessary or desirable. Fig. 7 shows a spherical flask with trunnions attached and the gun-tube passing through it. The entire flask may be mounted on a longitudinal support, 4, such as a light metallic web or string-piece, to which the pivot 5 or trunnions 6, or both, are attached; or, if the shell of the flask be sufficiently strong, trunnions may be attached to the sides thereof, as shown in Fig. 8. The trunnion or pivot rests in a gun-carriage of suitable or usual construction. The gas-supply may be conducted to the flask through the pivot or trunnion, or at any other convenient point.

The valve-box, through which air or gas passes to the gun-tube, may be inside the flask, as shown at 7 in Fig. 1; but preferably the

valve is outside the flask, as at 8, so that it may be reached for repairs and adjustment without inconvenience. The gas-supply pipe enters the gun-tube at as little distance forward of the breech-block 9 as may be, and in certain constructions may communicate to the gun-tube through or in the breech-block, as shown in another application filed by me of even date herewith.

As the gun-tube 1 is very light, and as the flask may not be absolutely straight, (in fact it is not essential that it should be so,) the gun-tube is adjustable relatively thereto, so that this tube may be always straightened should it ever become bent. For this purpose the gun-tube passes through rings 10, which have rods 11 connected therewith and passing through the shell. Preferably there are four rods 11 passing through the shell at right angles to each other. (It is obvious that these rods and rings may be replaced by long set-screws, which pass through the shell of the flask and bear upon the gun-tube.) To avoid perforating the plates, which mainly make up the shell of the flask, however, I prefer the modification shown in Figs. 3 and 4, in which an annular plate, 12, is interposed between two sections of the flask. The sides of this plate will be packed with elastic washers, to prevent gas-escape. The plates or rings 12 are perforated for the passage of rods 11, and these rods, when adjusted, bear entirely on the rings 12, so that no strain from these rods comes on the plates of which the main section of the shell of the flask is composed.

The flask should be as many times greater in dimensions than the gun tube as deemed necessary. From three to four times the diameter, where the flask is nearly as long as the gun-tube, will generally be sufficient, although, if the flask be much shorter than the gun-tube, it must be of proportionately greater diameter. Both the flask and the tube may be increased or diminished in length, either absolutely or relatively, by adding or removing sections. This increase of the flask relatively to the gun-tube is of advantage where the supply of air or gas to the flask is meager, as where a small compressor must be used, since the larger the flask the greater the number of shots which may be fired without great diminution of pressure in the flask. It is advisable that the air-flask shall have at least ten times the capacity of the bore of the gun.

The projectile is to be loaded into the breech of the gun as usual in breech-loading ordnance, and is discharged by suddenly opening the communication between the air-flask and the bore of the gun in rear of the projectile.

To prevent waste of the stored-up air or gas in the flask, after the projectile has left the muzzle of the gun, it is desirable that the valve which controls the passage from the flask to the gun should be closed instantly as the projectile leaves the muzzle. To accomplish this I have devised several instrumentalities, some of which are shown in other applications filed of even date herewith. The one herein presented is as follows: I connect a small pipe, 13, with the gun-tube just a little back of the muzzle of the gun. This pipe communicates with the bore of the gun, and leads back to a small cylinder near the breech, (or the cylinder may be near the muzzle of the gun, and the tube leading back be filled with oil, which will act as a piston to communicate power.)

The valve, represented as a slide-valve, 17, is arranged in a valve-chamber, 16, and is held normally closed by a spring, *b*. The passage-way *c c* leads through the valve-chamber to the breech of the gun. A draw-rod, 18, extends through the casing and has a hook at the end. This hook may be engaged by a similar hook on rod 19, which is pivoted to lever *e*.

The piston-rod 15 on the piston is made to bear on rod 19, so that when the piston is forced down it will throw the two hooks out of engagement. When handle or lever *e* is moved toward the valve-box, the hooks on rods 18 and 19 will be brought into engagement. Then by a pull to the right on the lever *e* the valve will be drawn to the right, so as to open the passage through *c c* and valve 17, and permit a rush of air to the gun-tube behind the projectile. As the projectile passes the muzzle, it serves to close the gun-tube for an instant, and the compressed gas rushing into pipe 13 drives down the piston in cylinder 14, and the rod 15, bearing on draw-bar 19, uncouples the hooks and permits the spring *b* to slide the valve 17 and close the passage through *c c*.

It is obvious that many other modes of controlling the valve by the passage of the projectile may be devised. Instead of the pneumatic device herein described, I may use an electrical apparatus, as described in one of the applications hereinbefore referred to, or a positively-operating mechanical connection. The valve need not be a slide-valve, but may be a rotary valve. The lever *e* need not be worked by hand, but by power. In fact, the device illustrated may be considered diagrammatic, and is intended to show the principles of operation rather than the specific construction of the device I shall use to control the valve automatically. This branch of the invention consists rather in the method of closing the valve by means of the passage of the projectile than the stated mechanism by which such result is attained.

The matter above referred to of my invention which is not herein claimed is claimed in other applications of even date hereinbefore referred to.

I claim—

1. A pneumatic cannon in which the gun-tube is inclosed within the air-flask.

2. A pneumatic cannon in which the gun-tube is inclosed within the air-flask for a portion of its length.

3. A pneumatic cannon having the gun-tube within the air-flask and adjustable relatively thereto.

4. A pneumatic cannon consisting, essen-

tially, of a gun-tube and an air-flask surrounding and inclosing the same, the whole supported by suitable mechanism, substantially as described, so as to be trained together.

5. The air-flask of a pneumatic cannon and the gun-tube thereof, made in readily-detachable sections, so that the proportions of each may be increased or diminished relatively to the other.

6. The combination, with a cylindrical air-flask, of a gun-tube passing longitudinally through the same, and breech-closing mechanism outside the flask.

7. The combination, with an air-flask, of a gun-tube passing longitudinally through the same and projecting at the muzzle, and a brace for supporting said gun-tube at the muzzle end.

8. The combination, with a gun-tube and an air-flask surrounding the same, as described, of a longitudinal support, as 4, substantially as described.

9. The combination of a gun-tube, an air-flask surrounding and inclosing the same, and trunnions on the flask, by which the air-flask and tube may be trained, as described.

10. The combination of a gun-tube, an air-flask surrounding the same, and screw-bolts passing through the shell of the air-flask, by which the position of the tube within the flask may be adjusted.

11. The combination of a gun-tube, a cylindrical air-flask made up of sections surrounding the same, a ring interposed between two of said sections, and screw-rods passing from the gun-tube through the ring.

12. The combination of a cylindrical air-flask, a gun-tube passing through the same longitudinally, and a passage-way and valve leading from the flask to the tube outside the shell of the flask, substantially as described.

13. The combination of a cylindrical air-flask in sections, the ends of the sections forming turned-out flanges, as a' a', a gun-tube passing through said flask from end to end, a ring, 12, interposed between two of the sections, a collar surrounding the gun-tube, and screw-rods passing from said collar through the ring, all substantially as described.

14. The method of cutting off the gas-supply from the bore of a gun, which consists in closing the valve governing said supply by the passage of the projectile along the bore of the gun, substantially as described.

15. The combination, with a pneumatic gun-tube, an air-flask, and a valve governing the passage from the flask to the tube, of mechanism, substantially as described, whereby the passage of the projectile past a given point in the tube is made to close the valve, substantially as described.

16. The combination, with an air-flask, a gun-tube, and a valve which controls the passage from the flask to the tube, of pneumatic connections leading from the bore of the gun, and mechanism, substantially as described, controlled thereby, whereby the valve is closed when the projectile reaches a given point.

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

WALLACE A. BARTLETT.

Witnesses:
PHILIP HAWLEY,
C. W. BROWN.