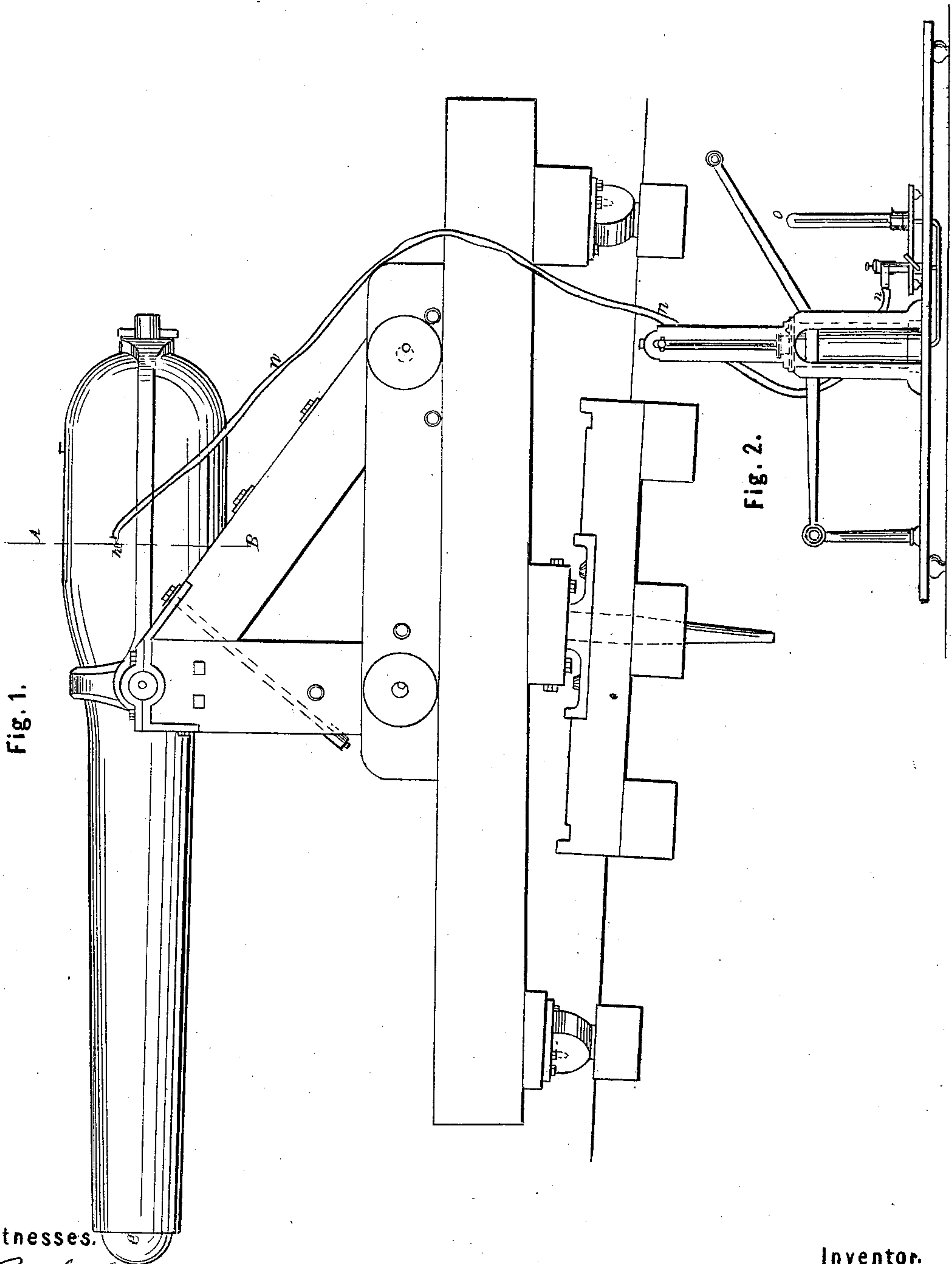


R. GIBBONS.

Ordnance.

No. 43,680.

Patented Aug. 2, 1864.



Witnesses.

Robt L. Harvey.
Wm. Macdonald.

Inventor.

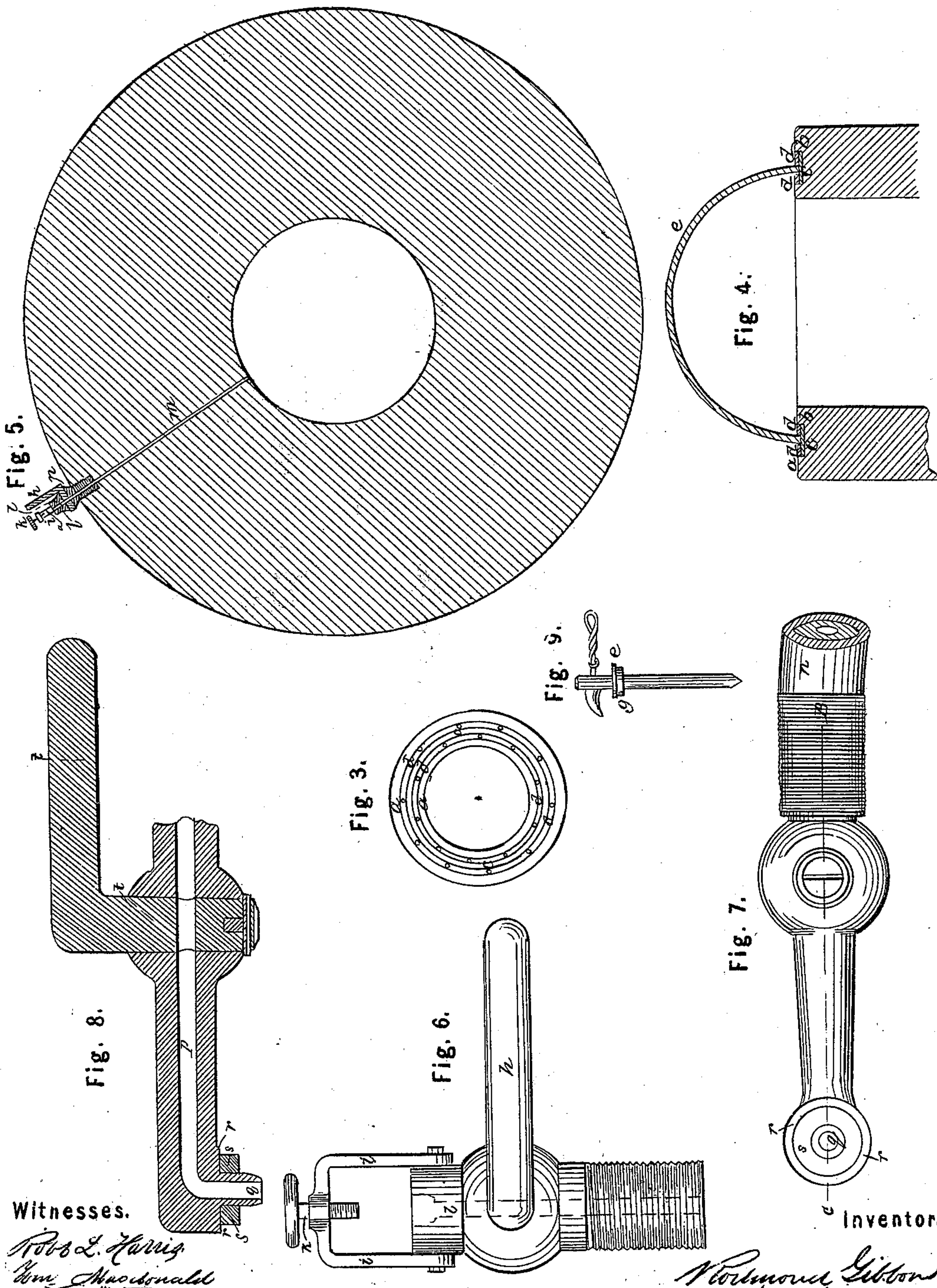
Richard Gibbons

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2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

RODMOND GIBBONS, OF OAKLAND, CALIFORNIA.

IMPROVED MUZZLE-CAP FOR GUNS EXHAUSTED OF AIR.

Specification forming part of Letters Patent No. 43,680, dated August 2, 1864.

To all whom it may concern:

Be it known that I, RODMOND GIBBONS, of the city of Oakland, county of Alameda, and State of California, have invented certain new and useful Improvements in Ordnance and Gunnery; and I do hereby declare that the following specification, taken in connection with the accompanying drawings, hereinafter referred to, forms a full and complete description of the same, together with such parts as I claim and desire to have secured to me by Letters Patent of the United States.

My invention consists in the combined use of a packed recess and a muzzle-cap for closing the bore of a gun preparatory to removing the atmospheric resistance to the exit of projectiles from guns when propelled by accumulative and elastic forces, or by fulminating agents.

Of the drawings, Figure 1, Plate 1, represents a side elevation of a gun, to which my invention is applied. Fig. 2, Plate 1, represents a side elevation of an air-pump used therewith. Fig. 3, Plate 2, is a front elevation of the muzzle. Fig. 4, Plate 2, is a longitudinal section of the same with muzzle-cap in position. Fig. 5, Plate 2, is a transverse vertical section of the gun at the line A B, Fig. 1, Plate 1, showing the exhaust-vent. Fig. 6, Plate 2, represents the stop-cock pin for the exhaust-vent. Fig. 7, Plate 2, is an elevation of the attachment for the gun end of the flexible pipe communicating between the gun and air-pump. Fig. 8, Plate 2, is a section of the same taken in the line C D, Fig. 7. Fig. 9, Plate 2, represents a friction-tube.

In the face of the muzzle of the gun *a* Figs. 3 and 4, is turned a circular groove, *b*, into which is fitted a washer of india-rubber, *c*, of less thickness than the depth of the groove, which washer of india-rubber is secured in its place by metal rings *d d*, which themselves are attached to the gun by screws or other fastenings. The outer edge of the inner ring and the inner edge of the outer ring are beveled to the face of the india-rubber *c*, as shown in Fig. 4, Plate 2.

The muzzle-cap *e*, Fig. 1, Plate 1, and Fig. 4, Plate 2, shown in the drawings as hemispherical, is made of glass, porcelain, stone-ware, or other brittle material. Its base is made to fit a flat surface, the edges being slightly

rounded to avoid cutting the circle of rubber *c*, on which it is designed to rest. The thickness of its base is graduated for the same reason according to the contemplated pressure of the cap on the rubber, and the thickness of its sides and apex must be regulated according to the strength and density of its material. These caps must be strong enough to resist the pressure of the atmosphere over a vacuum, and be impervious to air under the same pressure. After these requisites are attained they should be as brittle as possible, so as to offer no appreciable obstruction to the flight of the projectile from the gun.

On the friction-tube, Fig. 9, Plate 2, is a flange, *f*, near its top, with a washer of india-rubber, *g*, slipped over from the lower end and resting against the bottom of said flange.

Fig. 6, Plate 2, represents a perforated pin of fine metal not liable to rust, with a stop-cock, *h*, and a swinging stirrup, *i*, having a clamp-screw, *k*, to receive and hold the attachment, Figs. 7 and 8, on the gun end of the flexible pipe *n n*, Figs. 1 and 2, Plate 1. This pin is screwed into the gun in advance of the space occupied by the charge (see Fig. 1, Plate 1) in such manner as to preclude the possibility of air leakage about the screw. A washer of annealed copper in the screw-socket will assist to make that point reliable. The perforation *l* through the center of the pin meets one of equal size, *m*, in the gun, that extends into the bore, (see Fig. 5, Plate 2,) and this perforation through the gun I term the "exhaust-vent." The stirrup attachment is made to swing, so that a searcher may be readily used to keep the exhaust-vent free.

n n, Figs. 1 and 2, Plate 1, is a flexible pipe communicating between the air-pump, Fig. 2, Plate 1, and the gun, Fig. 1, Plate 1. This pipe must be perfectly air-tight, (a point that may be attained by covering it with good india-rubber tubing and securing the same with copper wire around the metal attachment at each end of said pipe.)

The attachment at the gun end of the flexible pipe is shown in Figs. 7 and 8, Plate 2, and is made of material similar to that of the exhaust-vent pin. The hole *p* through this attachment terminates in a short pipe, *q*, standing perpendicularly from the flat surface *r*, and around this short pipe is a washer of

india-rubber, *s.* The stop-cock *t* is to prevent, when necessary, a sudden pressure of atmosphere on the vacuum-gage *o* of the air-pump. The attachment at the pump end of the flexible pipe is similar to the one above described, save that it has no stop-cock.

The operation of working the gun will now be readily understood. After the gun has been loaded, the friction-tube, Fig. 9, Plate 2, is placed in the vent. The connection is then made between the air-pump and the gun by means of the flexible pipe *n n* and the attachments, as hereinbefore described. The muzzle-cap *e* is placed in position (see Fig. 1, Plate 1, and Fig. 4, Plate 2) and held until a few plunges of the pump-piston cause it to be retained in its place by atmospheric pressure. The gun may then be sighted while the vacuum is being created. When the vacuum-gage *o* on the air-pump indicates the desired degree of rarification, the stop-cock *h* of the exhaust-vent may be closed, and the gun is ready to be fired. The stop-cock *t* on the flexible pipe *n n*, as shown in Fig. 7, Plate 2, may be shut off at the same moment and the pipe be detached, if desirable.

The use of a sabot in loading the gun, or some other device to decrease or prevent windage, is indispensable to the attainment of the maximum beneficial results, and the better the sabot the better the result.

It is well known that the atmospheric resistance to the exit of shot from guns limits the initial velocity of the shot to a very small percentage of the estimated velocity of powder-gas, and that it has also limited the effective length of guns. The favorite expedient, whereby the length of guns may be somewhat increased, consists in the coarser granulation of gun-powder with the view of diminishing the velocity of the shot at the start and allowing time for the air in the bore to be set in motion toward the muzzle before the shot attains its maximum velocity. The atmospheric resistance to the exit of shot has thus been partially overcome in guns of a certain length; but it

is evident that that resistance in a gun—say, thirty (30) feet in length—would almost counterbalance the force of the powder-gas; whereas in a gun of that length, with the application of my invention, the velocity of the shot would be accelerative from breech to muzzle. In other words, this invention will remove the difficulty in the way of increasing the length of guns and producing more perfect results from the use of accumulative and elastic forces in propelling shot. Supposing a sabot is used between the powder and the shot that would prevent any windage, then it is evident that the drawing force of the vacuum (to use a crude expression) in a fifteen (15) inch gun—which would be, say, twenty-five hundred (2,500) pounds—would be actively exerted at the instant the density of the gas generated by the combustion equalled the density of common atmosphere. It is therefore evident that by the application of my invention to guns not only may the initial velocity of the shot be increased, but guns may be safely fired at any elevation.

My invention will also avoid the production of the heat evolved by the friction of the shot with the bore, and from the concentration of the air in the bore in advance of the shot. The heat imparted to the gun from the combustion of the powder will also be diminished as the initial velocity of the shot is increased.

Having thus described my improvements in ordnance and gunnery, I shall state what I claim as my invention, and desire to have secured to me by Letters Patent, as follows:

The application of an annular or other recess packed with a suitably-elastic material at the muzzle and around the bore of the gun, in combination with a muzzle-cap for closing said bore, so that the air may be exhausted therefrom and a vacuum produced, substantially as and for the purpose described.

RODMOND GIBBONS.

Witnesses:

ROBT. L. HARRIS,
WM. MACDONALD.