(No Model.) 3 Sheets—Sheet 1.

J. ERICSSON, Dec'd.

G. H. ROBINSON & C. S. BUSHNELL, Executors, G. H. ROBINSON Sole Surviving Executor.

MEANS FOR THROWING PROJECTILES.

No. 561,954. Patented June 9, 1896.

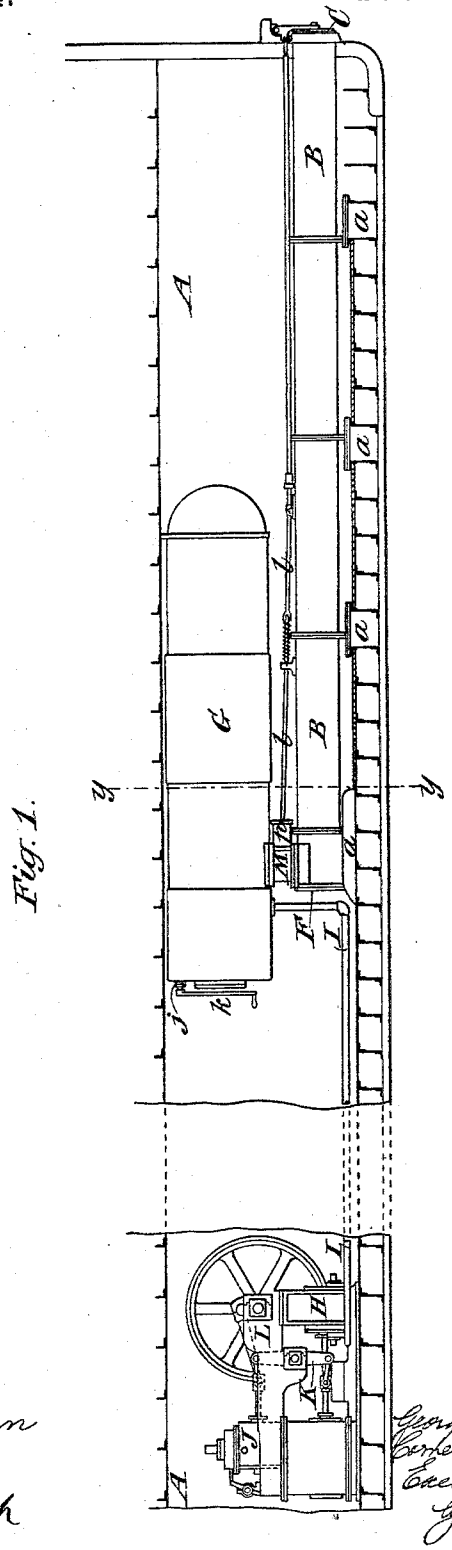

Fig. 1.

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(No Model.) 3 Sheets—Sheet 2.

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Fig. 2.

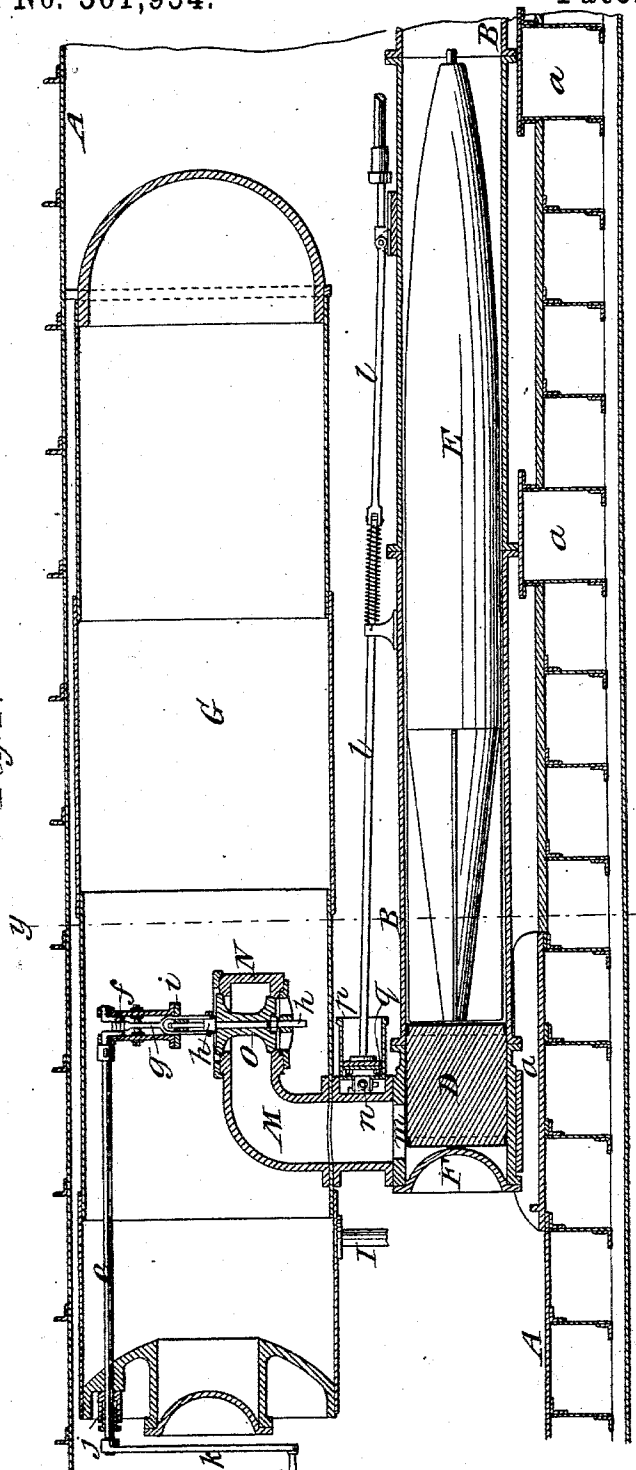
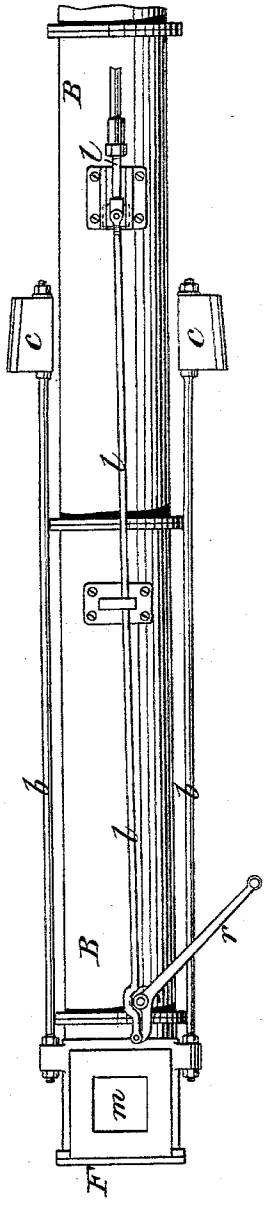


Fig. 3.



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(No Model.) 3 Sheets—Sheet 3.

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MEANS FOR THROWING PROJECTILES.

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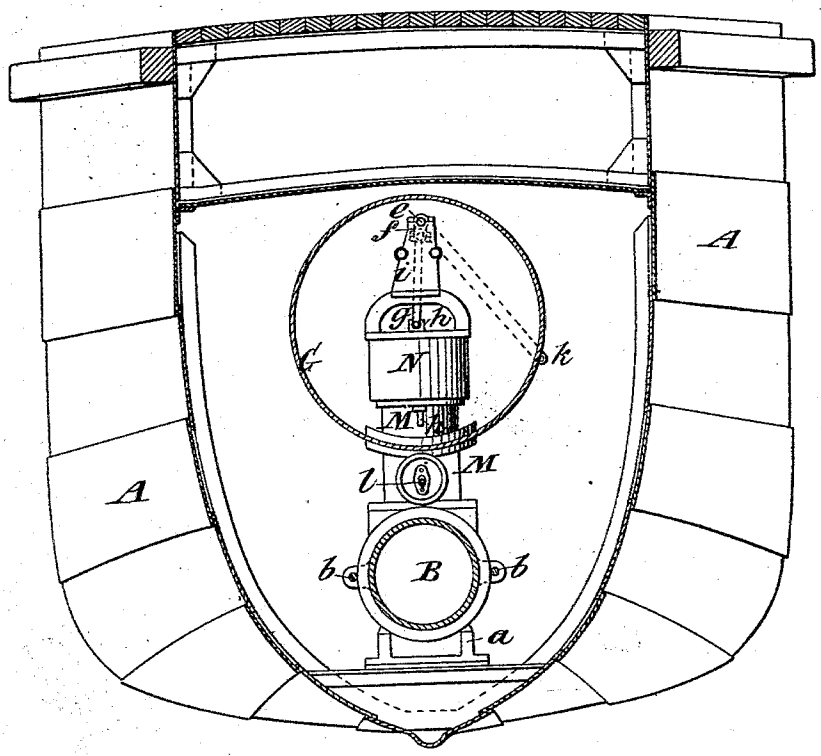
Fig. 4.



Witnesses:

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UNITED STATES PATENT OFFICE.

GEORGE H. ROBINSON AND CORNELIUS S. BUSHNELL, OF NEW YORK, N. Y., EXECUTORS OF JOHN ERICSSON, DECEASED; SAID GEORGE H. ROBINSON SOLE SURVIVING EXECUTOR.

MEANS FOR THROWING PROJECTILES.

SPECIFICATION forming part of Letters Patent No. 561,954, dated June 9, 1896.

Application filed October 3, 1889. Serial No. 325,937. (No model.)

To all whom it may concern:

Be it known that JOHN ERICSSON, deceased, late of the city, county, and State of New York, invented a new and useful Improvement in Means for Throwing Projectiles Charged with Explosives which Ignite by Concussion, of which the following is a specification, reference being had to the accompanying drawings.

This improvement is intended for the throwing of projectiles which contain a bursting charge consisting of an explosive, such as dynamite, which is easily ignited or exploded by concussion without requiring to receive a spark from any other source or to be subject to the percussion of another body striking it or to percussion by the striking of the projectile against another body.

Prior to this invention all attempts to discharge or project such explosive projectiles from guns with force sufficient to impel them to and against an object of attack at any considerable distance have been unsuccessful owing to the liability of their bursting charges to be exploded before the projectile left the gun by the concussion of the particles of said charge between themselves and against the walls of the cavity which contain them within the projectile. The object of this improvement is to overcome and prevent such liability to premature explosion.

In carrying out the said improvement there is employed as the discharging agent in the gun, barrel, or tube from which the explosive projectile is discharged or projected an aeriform body, as common air, mechanically compressed to a degree sufficient to give the desired impulse without at the same time producing in the explosive charge sufficient concussion to cause its explosion.

The invention consists in the means hereinafter described and claimed for the employment of a compressed aeriform body for throwing explosive projectiles.

Figure 1 in the drawings represents a central longitudinal sectional view of a portion of a navigable vessel, in which is an apparatus for carrying out the invention, with a gun arranged below the water-line. Fig. 2 represents a central vertical longitudinal section of a portion of the vessel and of certain of the appliances for carrying out the invention on a larger scale than Fig. 1. Fig. 3 is a plan of the gun or discharging tube or barrel and some of its appurtenances. Fig. 4 represents a vertical section of the vessel and certain of the appliances for carrying out the invention, taken in the plane indicated by the line *y y* of Figs. 1 and 2.

Similar letters of reference designate corresponding parts in all the figures.

A designates a portion of the hull of a navigable vessel. B designates a gun or discharging barrel or tube placed within the said vessel. This gun, barrel, or tube is represented below the water-line, not because it is necessarily so arranged, but because in the inventor's actual test of the invention it has been so arranged. It is shown as supported at *a a* on the keelson, and is held by recoil-rods *b* (see Fig. 3) to plates *c c*, which are fastened to the hull. This gun, barrel, or tube is represented as having its muzzle, which projects from the vessel, fitted with a valve C to exclude water; but this valve forms no part of the present invention. The rear portion of the gun, barrel, or tube B is fitted with a plunger or piston D, in front of which the projectile E is to be placed, and its breech is represented as fitted with a separate breech-piece F, which is removable for the purpose of introducing the projectile and the plunger D through the breech.

G designates a reservoir arranged within the vessel A near the gun or barrel B.

H designates an air-compressor within the vessel A, having its discharge-pipe I connected with said reservoir.

J K L designate a motor, represented as a steam-engine, within the vessel for driving the said compressor for the compression of air to be delivered into the reservoir G through the pipe I.

M designates a passage or communication between the reservoir G and an opening *m*, provided in the gun or barrel near the breech thereof. This passage terminates within the reservoir in the valve-box N, in which are the

seats of a double-headed balanced puppet-valve O, by the opening of which compressed air is allowed to pass from the reservoir G into the gun or barrel B in rear of the plunger or piston D. This valve may be opened and closed by any suitable means; but a hand-gear is represented for effecting the said opening and closing, the said hand-gear consisting of a shaft *e*, furnished with a crank *f*, and a forked rod *g*, which connects the said crank with the stem *h* of the valve. The said shaft *e* is supported at one end in a standard *i*, erected upon the valve-box N and supported near its other end, which passes through the end of the reservoir G, in a stuffing-box *j*, outside of which it is furnished with a hand-lever *k*, by which it is manipulated.

In Fig. 2 the train of rods *l l* for operating the valve C is shown as intended to be actuated by compressed air from the reservoir G, admitted by a valve *n* to a cylinder *p*, which contains a piston *q*, connected with the said train of rods. In Fig. 3 a hand-lever *r* is shown for operating the said rods *l*.

The gun having had the projectile inserted into it through the open breech followed by the plunger D, and the breech having been closed up tightly by the breech-piece F, the valve O is opened just long enough to allow a sufficient quantity of compressed air from the reservoir G to enter the gun behind the plunger and is quickly closed. The expansion of the compressed air in the gun behind the projectile then discharges the latter with sufficient force yet so gradually as to avoid dangerous concussion of the explosive charge which it contains.

The method of throwing projectiles herein described is the subject of application for United States Patent, Serial No. 312,864, filed June 1, 1889.

What we claim as the invention of JOHN ERICSSON, and desire to secure by Letters Patent, is—

1. The combination with a gun and a projectile charged with an explosive which is ignitible by concussion, of a reservoir for containing an aeriform body at a high pressure, a compressor, a motor for working said compressor, a passage between the reservoir and gun, and a balanced valve arranged in the reservoir controlling said passage, substantially as and for the purpose herein set forth.

2. The combination with a gun and a projectile charged with an explosive which is ignitible by concussion, of a reservoir for containing an aeriform body at a high pressure, a passage connecting the reservoir with the gun and extending into the reservoir, a balanced valve arranged in the reservoir controlling said passage, and means for operating the valve from outside the reservoir, substantially as described.

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CORNELIUS S. BUSHNELL,
Executors of John Ericsson, deceased.

Witnesses:
FREDK. HAYNES,
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