(No Model.)

L. D. SHAW.

AIR GUN.

No. 267,027. Patented Nov. 7, 1882.

Fig 1

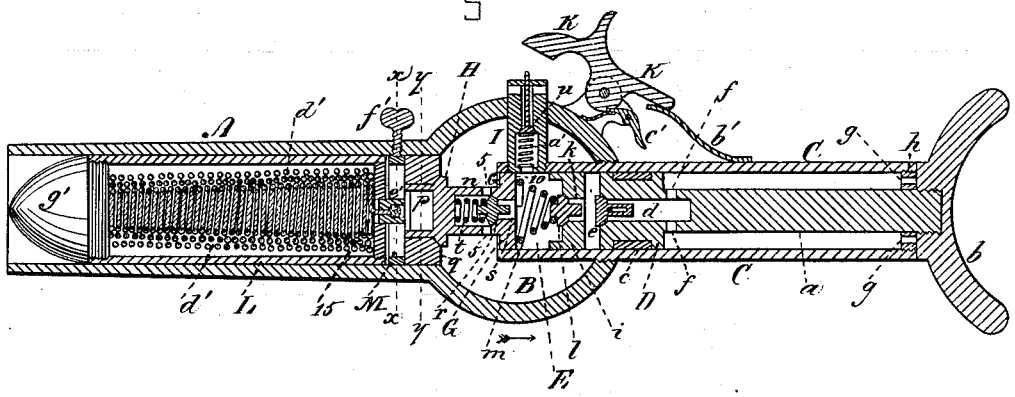


Fig 2

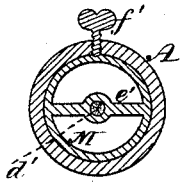
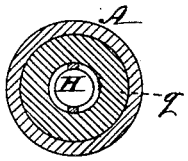


Fig 3



WITNESSES

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UNITED STATES PATENT OFFICE.

LORING D. SHAW, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO HIMSELF, ALONZO WARREN, AND J. CULLEN AYER, OF SAME PLACE.

AIR-GUN.

SPECIFICATION forming part of Letters Patent No. 267,027, dated November 7, 1882.

Application filed March 15, 1882. (No model.)

To all whom it may concern:

Be it known that I, LORING D. SHAW, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Air-Guns, especially designed for projecting life-saving lines onto burning buildings or to vessels in distress, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a longitudinal section through the center of an air-gun constructed in accordance with my invention, and adapted for projecting life-saving lines. Fig. 2 is a vertical section on the line *x x* of Fig. 1. Fig. 3 is a vertical section on the line *y y* of Fig. 1.

My invention relates to an air-gun which is especially designed for projecting life-saving lines onto burning buildings, or to vessels in distress, and has for its object to enable me to increase the size of the valve which admits the compressed air to the projectile, and to open it with a comparatively light pressure of the trigger, thus allowing of a greatly-augmented pressure of air and a corresponding increase in the distance to which the projectile can be thrown.

In air-guns as heretofore constructed a very small valve is necessarily used for liberating the compressed air on account of the difficulty of opening it with a trigger against the pressure of air to which it is subjected, and consequently a small quantity of air only is admitted at first to the projectile, which is thus started gradually with only a small portion of the entire force of the air.

My invention consists in the combination, with the air-chamber and device for compressing the air, of a novel construction and arrangement of valves and air-passages, whereby the force of the compressed air in the air-chamber is made to operate and instantly throw the main valve wide open, which can thus be made of such large size as to cause the air to act with its full force upon the projectile at the start, while a very light pressure of the trigger will cause the valve to be liberated, thus enabling me to compress the air to any desired extent and render the gun effective for throwing projectiles to a much greater distance than has heretofore been practicable.

My invention also consists in certain details of construction, as hereinafter set forth and specifically claimed.

In the said drawings, A represents the barrel of the gun; B, the chamber or reservoir for containing the compressed air; and C, the cylinder of the air-pump, within which is fitted the piston D, which is operated by the rod *a*, provided at its rear end with a handle, *b*, which is preferably curved, as shown, to fit the shoulder. The piston D is provided with a packing, *c*, and has at its inner end a longitudinal recess, *d*, to the open end of which is fitted a valve, *e*, the recess *d* communicating through apertures *f* with the interior of the cylinder C, to which the external air has free access through openings *g* in the piston-rod guide *h*. As the piston D is withdrawn the valve *e* opens, and the air fills the space between the piston and a plug, *i*, securely fixed within the cylinder C, this plug having a central aperture, *k*, closed by a valve, *l*, which is kept upon its seat by a spiral spring, *m*, placed within a chamber, E, formed between the plug *i* and a piston, G, adapted to move within the front end of the cylinder C. This piston G has projecting from its front face a hollow stem, *n*, provided with apertures 5, leading from its interior into the chamber B, and to the opposite end of this stem *n* is secured the large main valve H through which the compressed air is admitted from the chamber B to the barrel A, this valve H being fitted to and adapted to close an aperture, *p*, in the center of a plug, *q*, at the rear end of the barrel.

Within the hollow stem *n* is fitted a valve, *r*, which closes a central opening, *s*, in the piston G, the surface-area of which is made greater than that of the valve H, for a purpose to be hereinafter described. As the piston D is forced in by pressure upon the handle *b*, the valve *e* is instantly closed, and the air in front of the piston forced through the aperture *k* into the chamber E, opening the valve *l* against the resistance of the spring *m*, and from this chamber the air is forced through the aperture *s* into the hollow stem *n*, and thence through the apertures 5 into the air

chamber B, the valve *r* being opened against the resistance of a spring, *t*, by the action of the air entering the aperture *s*; and thus by operating the piston D the air within the chamber B can be compressed to any desired degree; and it will be seen that as the air is forced into the chamber B from the rear of the piston G the pressure of the air in the chamber E is the same as that in the chamber B, which is essential in order that the valve H may be kept firmly on its seat.

I will now describe the manner in which the valve H is opened when the gun is to be discharged,

I is a small branch tube, extending from the chamber E out through the shell of the air-chamber B, this tube being provided with an inwardly-opening valve, *u*, held up to its seat by a spiral spring, *a'*. The stem of this valve *u* extends slightly above the outer end of the tube I, and is adapted to be depressed to open the valve by the blow of a hammer, K, actuated by a spring, *b'*, and released by pulling a trigger, *c'*. On the descent of the hammer the valve *u* is opened, when the compressed air in the chamber E is allowed to escape into the atmosphere through the exit-tube I, which instantly relieves the pressure upon the surface 10 of the piston D, when the difference between the surface areas of the piston D and valve H will cause the former to be forced by the pressure of the air in the chamber B into the chamber E in the direction of the arrow, Fig. 1, this movement of the piston D producing an instantaneous opening of the valve H to its full extent, thus admitting the air at full pressure to the projectile L at the start and causing it to be discharged with much greater force than would be the case if a small gradually-opening valve were used; and it will be seen that by thus employing the force of the air itself to open the valve H by constructing the latter with a smaller area than that of the piston G, as described, the valve can be made as large as may be found necessary, and yet liberated with as light a pressure upon the trigger as may be desired, as the force required to operate the trigger has no reference to that exerted to open the valve H, and consequently the air may be compressed within the air reservoir or chamber B to a much greater extent than has heretofore been found practicable, thus greatly increasing the efficiency of the gun and adapting it for many purposes to which an air-gun has heretofore been inapplicable.

The construction of the hammer for opening the valve *u* may be varied as desired; and although I prefer to employ a hammer, as shown, some other device may be used, if desired, for opening the valve *u*.

The projectile L consists of a tubular casing, within which is placed the life-saving line *d'* to be thrown over a burning building or to a vessel ashore or in distress. This cord or line *d'* is first wound upon a tapering mandrel, and both are then introduced within the casing L, after which the mandrel is withdrawn and the end 15 of the cord drawn out and secured to the center bar, *e'*, of a ring, M, which is then introduced, with the casing L, into the barrel A, the ring M being afterward secured in place by means of a set-screw, *f'*, and thus, as the inner end of the cord is held fast within the barrel A, when the case L is discharged from the gun the line will be delivered or unwound from the center of the coil, this method of winding being the best known for preventing the cord or line from becoming foul. The head *g'* of the projectile is of conical form, and is composed of india-rubber for the purpose of lessening the force of the blow in case it should strike a person in its flight, thus rendering the projectile less dangerous than would be the case if the head was composed of metal or other hard or inelastic substance.

Although I have described my air-gun as particularly applicable for throwing life-lines, it is evident that it may be used for discharging bullets or other projectiles without departing from the spirit of my invention.

For casting life-lines onto burning buildings the gun is preferably adapted to be used from the shoulder; but if designed for throwing life-lines to vessels in distress, it would be best to construct it of larger size and mount it upon a suitable carriage, to facilitate its transportation from place to place.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In an air-gun, the combination, with the barrel A, air chamber or reservoir B, and an air-compressing pump or device, of the valve H, for admitting compressed air to the barrel, connected with and operated by a piston, G, having a greater surface area than the valve, and sliding within a chamber, E, from which the compressed air is allowed to escape by the opening of a valve when the gun is to be discharged, substantially as and for the purpose described.

2. In an air-gun, the combination, with the air chamber or reservoir B and the air-compressing pump, with its valve *e* and air-passages *d f*, of the air-chamber E, with its valve *l*, the piston G, carrying the valve H, having a smaller surface area than the piston, and provided with a valve, *r*, through which the air is admitted to the chamber B from the chamber E, and the exit-tube I, with its valve *u*, for liberating the compressed air in the chamber E when the gun is to be discharged, all constructed to operate substantially as and for the purpose described.

3. In an air-gun, the combination of the two chambers B and E, adapted to contain air at an equal pressure, the piston G and valve H, connected together and having different surface areas, and the exit-tube I, with its valve *u*, for liberating the compressed air in the chamber E when the gun is to be discharged, substantially as and for the purpose set forth.

4. In an air-gun, the combination, with the air-chamber B and piston G, connected with the valve H, for admitting compressed air to

the barrel, of the air-chamber E, containing said piston and interposed between the air-compressing pump or device and the chamber B, whereby the air which enters the latter is forced therein from the rear side of the piston G and caused to maintain its full pressure thereon to keep the valve H upon its seat until the gun is to be discharged, substantially as set forth.

5. In an air-gun, the combination, with the air-chambers B and E, valve H, and piston G, connected together and having different surface areas, and the exit-tube I, with its valve *u*, of the hammer K, adapted, when released, to open the valve *u* and liberate the compressed air in the chamber E, to produce the discharge of the gun, substantially as described.

Witness my hand this 9th day of March, A. D. 1882.

LORING D. SHAW.

In presence of—
P. E. TESCHEMACHER,
W. J. CAMBRIDGE.