(No Model.) 2 Sheets—Sheet 1.

E. E. BAILEY.

REPEATING AIR GUN.

No. 507,470. Patented Oct. 24, 1893.

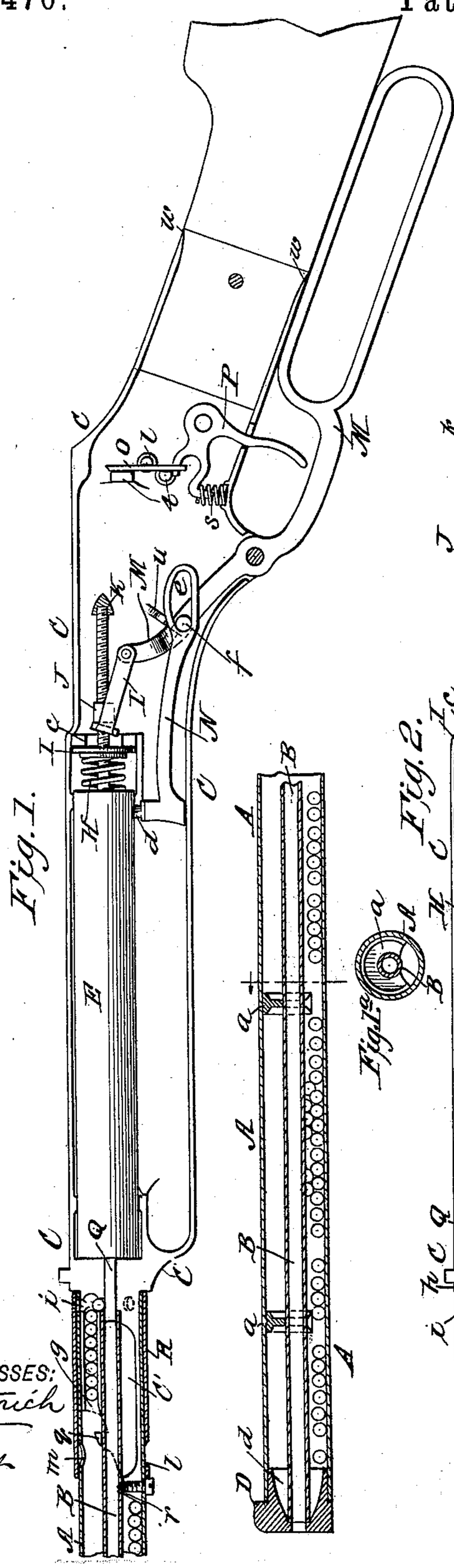

Fig. 1.

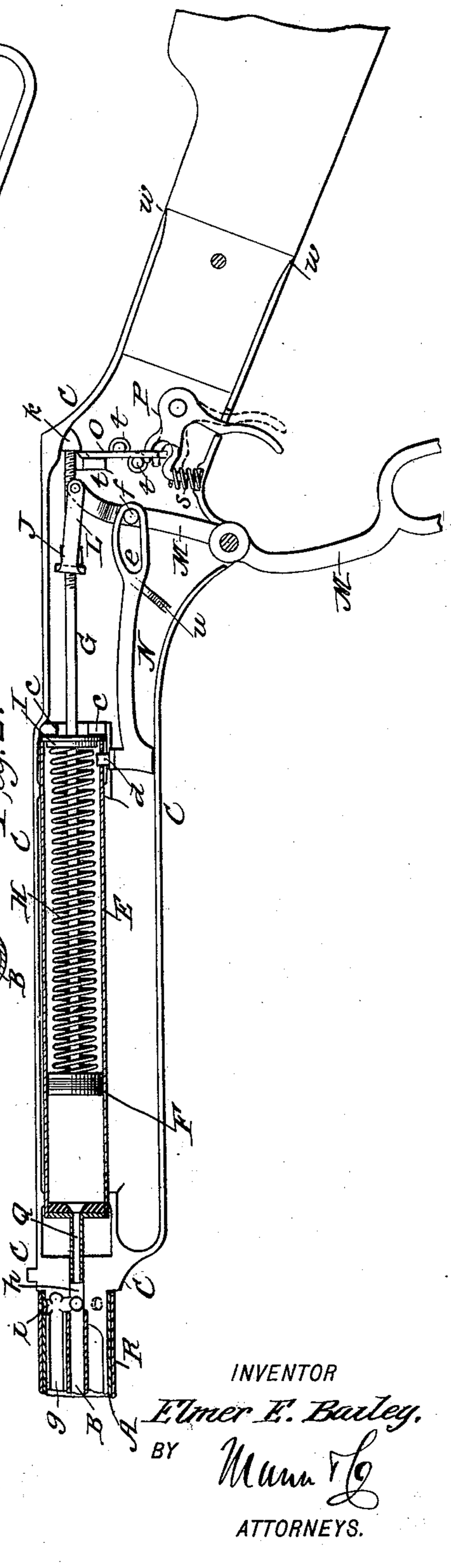

Fig. 2.

Fig. 1a.

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(No Model.) 2 Sheets—Sheet 2.

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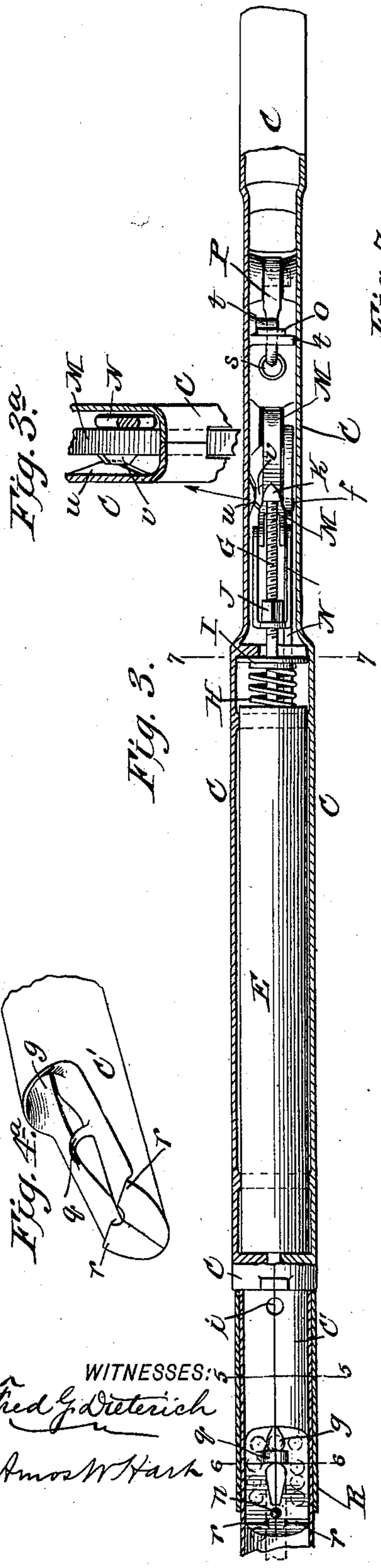

Fig. 3.

Fig. 3a.

Fig. 4a.

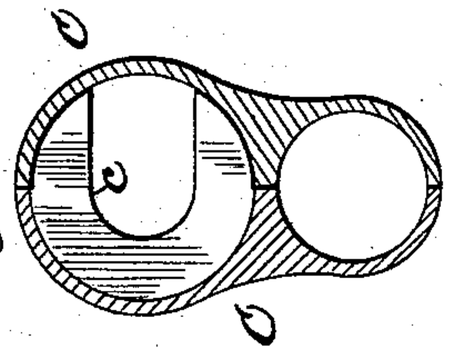

Fig. 7.

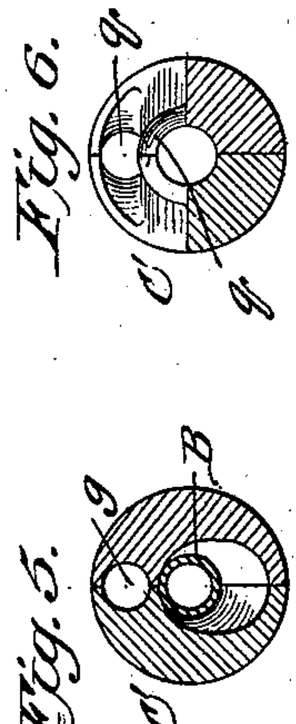

Fig. 6.

Fig. 5.

Fig. 4.

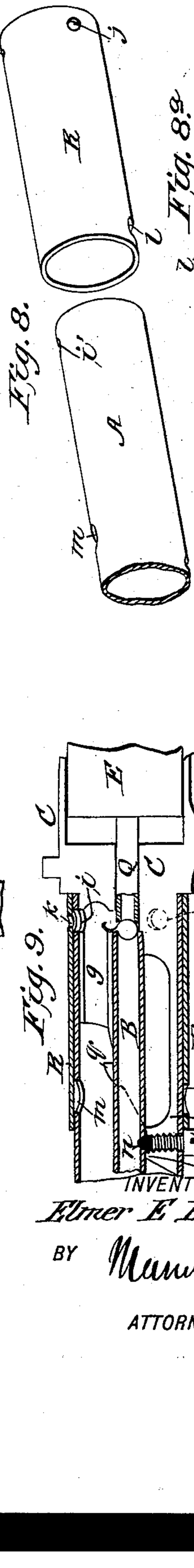

Fig. 8.

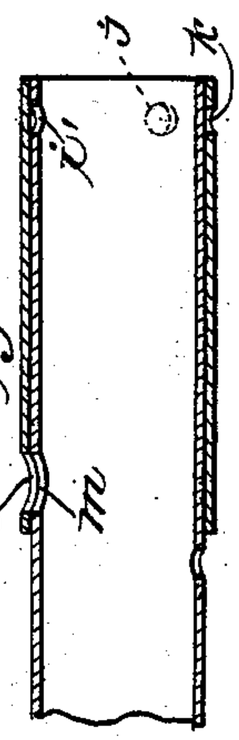

Fig. 8a.

Fig. 9.

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UNITED STATES PATENT OFFICE.

ELMER ELLSWORTH BAILEY, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO WILLIAM G. SMITH, OF SAME PLACE.

REPEATING AIR-GUN.

SPECIFICATION forming part of Letters Patent No. 507,470, dated October 24, 1893.

Application filed April 21, 1893. Serial No. 471,329. (No model.)

To all whom it may concern:

Be it known that I, ELMER ELLSWORTH BAILEY, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Repeating Air-Guns, of which the following is a specification.

My invention is an improvement in that class of repeating air-guns whose magazine tube is traversed by a small firing-tube or barrel proper, through which large shot or small bullets are projected by an air jet or blast emitted from a chamber wherein air is compressed to the requisite degree by means of a spring-actuated reciprocating piston. A distinguishing feature of certain air-guns of this class is the feeding of the shot one at a time from the magazine into a carrier block adapted to reciprocate transversely and which is operated by a lever mechanism connected with an exterior guard-lever such as has long been employed on repeating rifles of the Winchester and allied types. In my invention I have dispensed with such sliding shot-carrier and the lever required to work it, and devised and practically perfected a novel mechanism whose leading feature is the adaptation of the air-compression cylinder to reciprocate, in order to alternately open and close the passage into which the shot are delivered from the magazine, and also to force the shot into the firing tube preliminary to their ejection therefrom by the air blast.

My invention is distinguished by various other novel features as will be hereinafter specified.

In the accompanying drawings — two sheets—Figure 1 is a central longitudinal section of my air-gun showing the movable parts in the position they assume when the gun has been discharged. Fig. 1ª is a cross section of the magazine. Fig. 2 is a section similar to Fig. 1, but showing the movable parts in position for discharge of the gun. Fig. 3 is a horizontal section. Fig. 3ª is a detail section. Fig. 4 is an inner side view of the front end of one of the halves of the lock-frame. Fig. 4ª is a perspective view of the front end of the lock-frame. Figs. 5 and 6 are cross sections, on lines 5—5 and 6—6, respectively, of Fig. 3—omitting the magazine and rotatable sleeve. Fig. 7 is an enlarged cross section, on line 7—7 of Fig. 3. Fig. 8 is a perspective view of the rear end of the magazine and of the rotatable sleeve which is adapted to fit thereon. Fig. 8ª is a longitudinal section of magazine and sleeve. Fig. 9 is an enlarged, longitudinal, central section of the front end of the lock-frame and connected parts, illustrating the charging operation.

The magazine, A, is traversed by the small firing-tube, or barrel proper, B, and secured to the lock-frame, C, in a manner to be presently described. The capacity of the magazine is intended to be such, that it will contain one thousand B—B shot in the space surrounding the firing-tube, B. The latter is supported intermediately of its ends, by means of rigid transverse bridge-pieces, *a*, Figs. 1 and 1ª. Its forward end enters a tapered socket, *b*, in a metal plug, D, Fig. 1, which has a reduced portion that fits in the end of the magazine, A. The socket, *b*, is enlarged at its inner end to facilitate introduction of the firing-tube, B, whose end abuts a circular flange, or shoulder, as shown. The rear end of the tube, B, enters a socket formed in the reduced portion of the lock-frame, which itself enters the magazine, A. That is to say, the lock-frame is formed in two longitudinal parts which are practically duplicates, and the front end of the same is reduced, as shown, to adapt it to enter and fit snugly in the magazine, A. Thus the latter holds the said parts of the lock-frame together, so that the use of screws for this purpose is unnecessary and dispensed with. Furthermore, the firing-tube is held or clamped between the two parts of the lock-frame as shown. The latter is also chambered and otherwise suitably constructed to adapt it to receive and confine the air-compression cylinder, E, and other parts constituting the charging and discharge mechanism. The socket for the said cylinder, E, is made about one-half inch longer than the latter, in order to allow endwise movement of the cylinder to that extent.

The piston, F, (Fig. 2,) is composed of a series of metal disks, and attached to a rod, G, encircled by a coiled spring, H, whose rear end bears against a forked stop, *c*, cast integrally with one part of the lock-frame, C, (see Fig. 7). The rear portion of the piston-

rod, G, is screw-threaded, and two nuts, J, and, K, are applied to it as shown. One nut, J, is screwed against a stirrup-shaped link, L, which is adapted to slide on the rod G, and to whose free end the guard-lever, M, is pivoted, and the other nut, K, which is conical in form is screwed on the extremity of the piston-rod. The nut, J, serves to adjust the link as required to regulate the tension of the spring. The guard-lever, M, (Figs. 1 and 2,) is of a well-known type, and pivoted and operated in the usual manner. Its free or upper end is forked to adapt it for attachment to the stirrup link, L, and to avoid contact with the nut, J, and piston-rod, G, in the required movement of such parts hereinafter described.

The cylinder, E, is reciprocated by means of its connection with the guard-lever, M. Such connection is effected by a bar, N, having a lug, or prong, *d*, at its forward end which enters a hole in the cylinder, and a slot, *e*, at its rear end that receives a stud, *f*, projecting laterally from the upper arm of the guard-lever. The forward end of said bar, N, has a heel or enlargement that slides on the frame and thus prevents accidental disengagement of the prong, *d*, from the cylinder. It will be seen that if the guard-lever, M, be thrown forward, as shown in Fig. 2, three results will ensue, namely; the piston will first be drawn back against the resistance of the spring, H, and before the piston reaches the limit of such movement, the cylinder, E, will also be drawn backward, and, third, the conical nut, K, on the end of the piston-rod will engage the upper end of a reciprocating trip plate, O, which is operated, *i. e.*, reciprocated, by the pivoted, spring-actuated trigger, P. (These parts O, P, will be further described hereinafter.) The guard-lever, M, is then brought back to its normal position, (Fig. 1,) and in such movement, its lateral stud, *f*, strikes in the forward end of the slot, *e*, in the connecting bar, N, and thereby pushes the cylinder, E, back to its normal position. During this operation, the firing-tube, B, is charged as hereinafter described, and the gun is then ready to be fired, which is obviously effected by pulling the trigger, P, thus retracting the trip plate, O, and disengaging it from the nut, K, so that the piston, F, can be forced forward by the spring, H, whereby air is compressed in the cylinder and a jet or blast is forced into the firing-tube, B, thus ejecting the shot with which it had been previously charged.

The charging is effected in this manner—When the guard lever, M, is being operated as above described, the gun should be held vertical, or at least, in an upwardly-inclined position, in order to cause the shot to feed, by gravity, from the magazine, A, into the short, longitudinal passage, *g*, (Figs. 1, 2, 4,) formed in the reduced cylindrical front end portion, C′, of the lock frame, C, which portion enters and fits snugly in the rear end of the magazine, A. From this preliminary-receiving passage, *g*, the shot drop—Fig. 2—one at a time, into a second passage, or cylindrical space, *h*, (Figs. 1, 4,) just in rear of and aligned with the firing-tube, B. Thus the shot are delivered from the magazine at the point where they can be acted upon by a supplemental device to force them into the firing-tube preparatory to discharge by the air blast, without the aid of the reciprocating carrier usually employed for the purpose in guns of this type. The means for forcing the shot into the firing-tube and thus charging the latter, is a device, Q, attached to the reciprocating cylinder, E, the same being the air-jet tube which projects from the forward end of said cylinder in line with its axis, and slides in a passage in the lock frame, C, serving as the front support or bearing of said cylinder. It will be seen that the length of the tube, Q, is such that when retracted along with the cylinder (Fig. 2), it uncovers the opening between the passages *g*, *h*, and thus allows a shot to descend from *g* into *h*, and that, on its return movement, it cuts off or closes the said opening and simultaneously forces the shot which lies in front of it into the firing-tube, B.

Double-B shot often vary slightly in size and hence fit the firing-tube, B, inaccurately, which necessarily results in corresponding inequalities in the velocity of ejection and inaccuracy of fire. To overcome this defect, I propose to reduce the shot which are above a certain size to a uniform diameter at the moment they are being charged into the firing-tube. In other words, I reduce the shot which are too large and would hence have undue friction with the firing-tube, but without any supplementary device. To effect this result, I simply contract the charging end of the firing-tube slightly—as shown in an exaggerated manner in Fig. 9—so that any shot which passes into the rear end of the tube, B, will fit somewhat loosely and hence slide freely in the remaining portion of the tube. When a too large shot is forced in by the tube, Q, the sharp angle or edge of the firing-tube, B, shears or pairs off the superfluous metal (lead), (Fig. 9,) so that the said shot is reduced to a shape approximately that form of projectile known as a slug. The accumulated parings of enlarged shot may be discharged from the passage, *h*, through an opening, *i*, (Figs. 3 and 4) in part, C, which is coincident with a similar opening in the magazine, A, (Figs. 8 and 9.) This opening, *i*, registers with one, *j*, in the rotatable sleeve, R, (that is fitted on the rear end of the magazine A) when said sleeve is turned into proper position. It is obvious the gun must be inverted to allow the parings to drop out through the openings *i*, *j*, when coincident. The sleeve, R, has another and smaller opening, *k*, which will also register with the opening, *i*, in part C′, as shown best in Fig. 9, and this serves as a peep-hole for inspection for

the purpose of noting if shot are in the passages *g* or *h*. The sleeve, R, has a larger opening, *l*, which may be brought at will into coincidence with a like opening, *m*, in the magazine A, and through which shot are fed into the latter when required. Thus, when the sleeve, R, is in position (Fig. 8ª) to permit the magazine to be replenished, the discharge opening *m* is open, and vice versa. Of course the feed opening *m* is normally kept closed by the sleeve as shown in several figures.

In some instances the shot fit the tube, B, too loosely, and hence some sort of retarding device is needed. For this purpose I employ that shown in Figs. 1 and 9. It consists of a conical plug, *n*, of rubber which is held slightly projected into an opening in the firing-tube, B, by means of a screw, *o*, which passes through the magazine, A, and part, C′, of the lock-frame at a point just in front of the sleeve, R. It is obvious the plug, *n*, may be caused to project into the tube B, more or less, by adjusting the screw, *o*, as required. The head of the screw is parallel-sided and projects sufficiently to abut the front end of the sleeve, R, and thus hold the latter in place on the magazine, A.

It has been heretofore stated, that the shot pass from the magazine, A, into the small passage, *g*, preparatory to being delivered, one by one, into the lower passage, or space, *h*, in front of the firing-tube, B. The said passage, *g*, requires, however, to be kept full of shot—as shown in Fig. 1—in order to insure their certain and prompt delivery into such space, *h*. To this end, I provide two stops, or abutments, *q* and *r*, (see Figs 3 and 4,) which hinder the shot escaping or passing backward from such passage *g*, without, however, materially hindering their entrance into it. As shown in Figs. 4 and 5, the rear stop which is nearer the passage, *g*, is formed by two lugs cast integrally with the lock-frame C, and standing in line with the passage *g*, so that the shot must pass around it to enter the latter, but cannot pass over it. From such stop, *q*, the part, C′, slopes down to the front stop *r*, which consists of two transverse lugs, each integral with one of the parts of the lock-frame. The shot must pass over these lugs *r*, on the way to the passage, *g*, and, in practice, such as pass over will ordinarily lie in two rows on opposite sides of the rear stop *r*, as shown by dotted lines in Fig. 3. I prefer to bevel the end of the part, C′, to facilitate the passage of the shot over the aligned stops, *r*. Thus, by a simple construction which involves no additional expense in the manufacture of the gun, I produce a stop, or stops, which effectually prevent the return of shot from the preliminary charges, or passage, *g*, to the magazine.

The trigger, P, is approximately elbow-shaped, and has two horizontal arms, one being bent and bearing on a coiled spring, *s*, and the other working loosely in a hole in the trip-plate, O. The latter is held in place and guided in its reciprocation by means of lugs *t* (Figs. 1 and 2) cast integrally with the lock-frame.

It has been usual in guns having a guard-lever of the kind I employ, to provide a fastening device attached to the stock, exteriorly, for securing the lever in closed position. I dispense with such devices, and provide a means which is within the lock-frame and operates automatically. The said means consist of two lugs *u*, *v*, (Figs. 3, 3ª,) one, *u*, being cast on the side of the lock frame, and the other, *v*, on the side of the guard-lever, and working in contact. That is to say, when the lever, M, is worked, the lug, *v*, sweeps over the fixed one, *u*, lengthwise of the latter, such action being permitted by reason of the upper lever arm yielding slightly laterally, and the lug, *u*, being beveled at each end as shown. When the lever, M, closes, its lug, *v*, passes below the fixed lug, *u*, and the lever is then held closed by abutment or engagement of the two lugs, as will be readily understood. The production of this automatic lever-fastening device adds nothing to the cost of the gun, yet it is not only concealed but effective, durable, and cannot become injured or get out of order.

The shoulder, *w*, of the stock (Figs. 1, 2) where it abuts the rear end of the lock-frame, C, is beveled or inclined instead of being square or angular, which construction avoids weakening the stock and enables it to be turned on a machine, which is not practicable in the case of a stock having the ordinary angular shoulder.

Having thus described my invention, what I claim is—

1. In an air-gun, the combination, with a firing tube, or barrel, and preliminary charging passage, of a slidable, air-compression cylinder, and a charging device attached to said cylinder, and working in alignment with the firing-tube, substantially as shown and described.

2. In an air-gun, the combination, with a lock-frame and firing-tube, or barrel, of a slidable air-compression cylinder and the tube projecting from its forward end and forming the front bearing of the cylinder, the spring-actuated piston having a rod, and working in said cylinder, a lever connected with the piston-rod for retracting the piston, and means connecting the cylinder and lever, whereby the cylinder is reciprocated during the time the piston is being retracted, as and for the purpose specified.

3. In an air-gun, the combination, with a lock-frame and firing-tube, or barrel, of a slidable, air-compression cylinder, having an air-jet tube attached to its forward end, a piston and rod, a lever having a lateral stud on its upper arm, and a slotted bar connected with both the lever and cylinder, whereby oscillation of the lever reciprocates the cylinder, as shown and described.

4. In an air-gun, the combination of the

magazine, or tube A, having the lateral opening *h*, and the lock frame having a space in rear of the firing-tube which registers with such opening, the firing-tube having its rear extremity contracted and provided interiorly with a sharp cutting edge, and the reciprocating charger, as shown and described for the purpose specified.

5. In an air-gun, the lock-frame having its front end provided with a preliminary-charging passage arranged longitudinally, and two projections arranged in front of the latter, but spaced apart, one being the wider and set lower than the other, whereby the shot pass over the lower projection and around the upper one, in passing into the charging passage, substantially as shown and described.

6. In an air-gun, the combination, with the magazine having a shot-charging opening and an opening in rear thereof, of a rotatable sleeve applied to such portion of the magazine, and having openings adapted to register with those of the latter, substantially as shown and described.

7. In an air-gun, the combination, with the lock-frame, air-compression cylinder, piston and piston-rod having a conical end portion, of the slidable trip plate, guides therefor, and the spring-actuated trigger connected with said plate, as shown and described, to operate as specified.

8. In an air-gun, the combination, with the lock-frame, air-compression cylinder, piston and screw-threaded piston-rod of the guard-lever a link loosely connecting said rod and lever, and a nut applied to the threaded portion of the rod, for holding the link in position, yet permitting adjustment as shown and described.

9. In an air gun, the combination, with the magazine, A, and a plug inserted in its forward end, and having a socket and interior flange as described, of the firing tube, or barrel, adapted to be inserted in such socket and abut the flange, and the lock-frame having a socket in its front end which the rear end of the firing-tube enters and abuts, as shown and described.

10. In an air gun, the combination, with a lock-frame, having a lug on its inner side, of a guard-lever having a lateral projection on its upper arm, which coacts with said projection for locking the lever in closed position, and a barrel-charging device connected with the lever, substantially as shown and described.

11. In an air gun, the combination, with the magazine and firing-tube, of the lock-frame divided lengthwise into two parts, and having the front end reduced and adapted to fit in the said magazine, and provided with a socket to receive and clamp the firing-tube, as shown and described.

12. In an air gun, the combination, with the magazine and a firing-tube, of the lock-frame formed in halves longitudinally, and reduced at its front end to fit in the magazine, such reduced portion being beveled or inclined on the upper side and provided with a rear shot passage, *g*, as and for the purpose specified.

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