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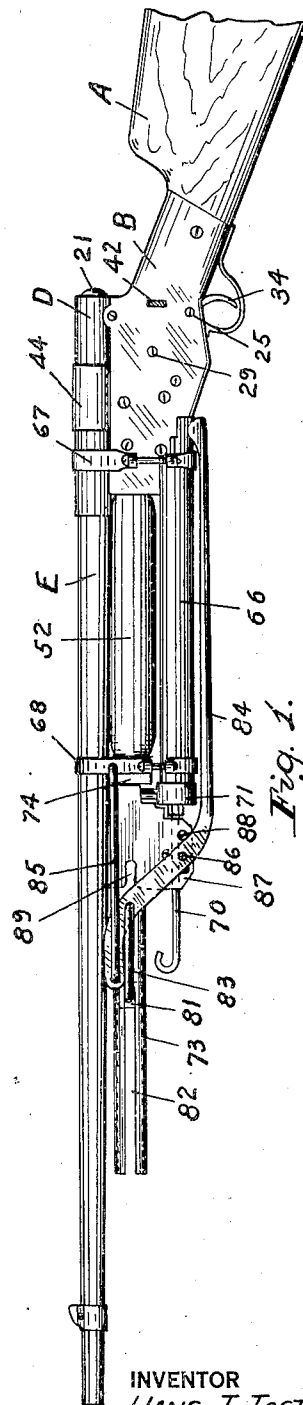
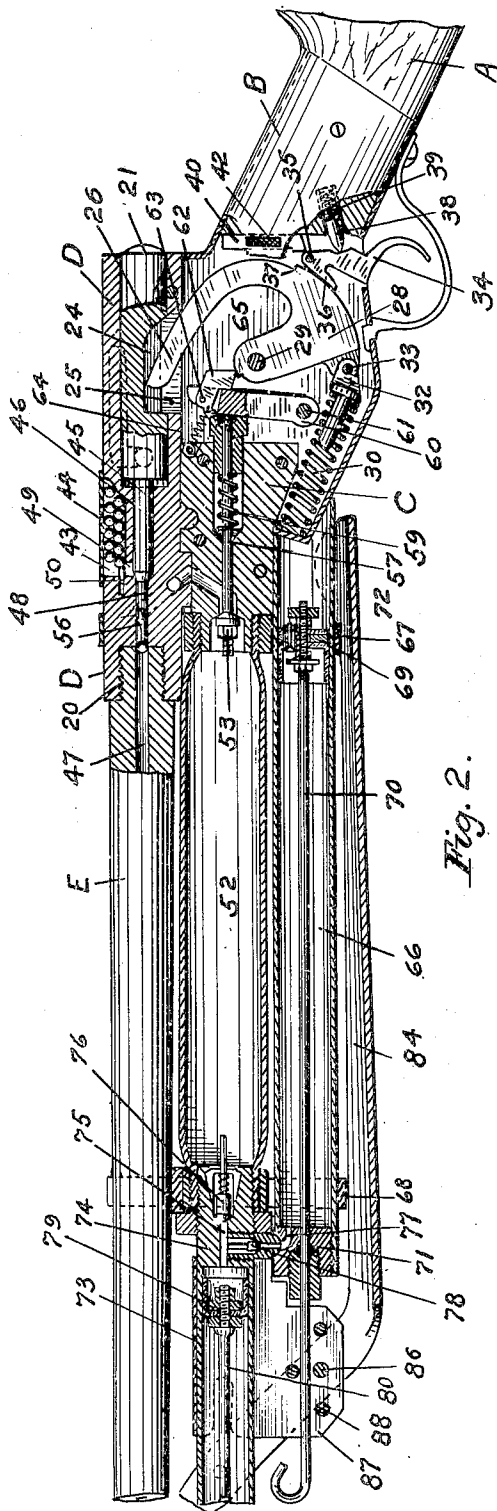
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1,825,489

REPEATING AIR GUN

Filed March 10, 1930

5 Sheets-Sheet 1



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5 Sheets-Sheet 2

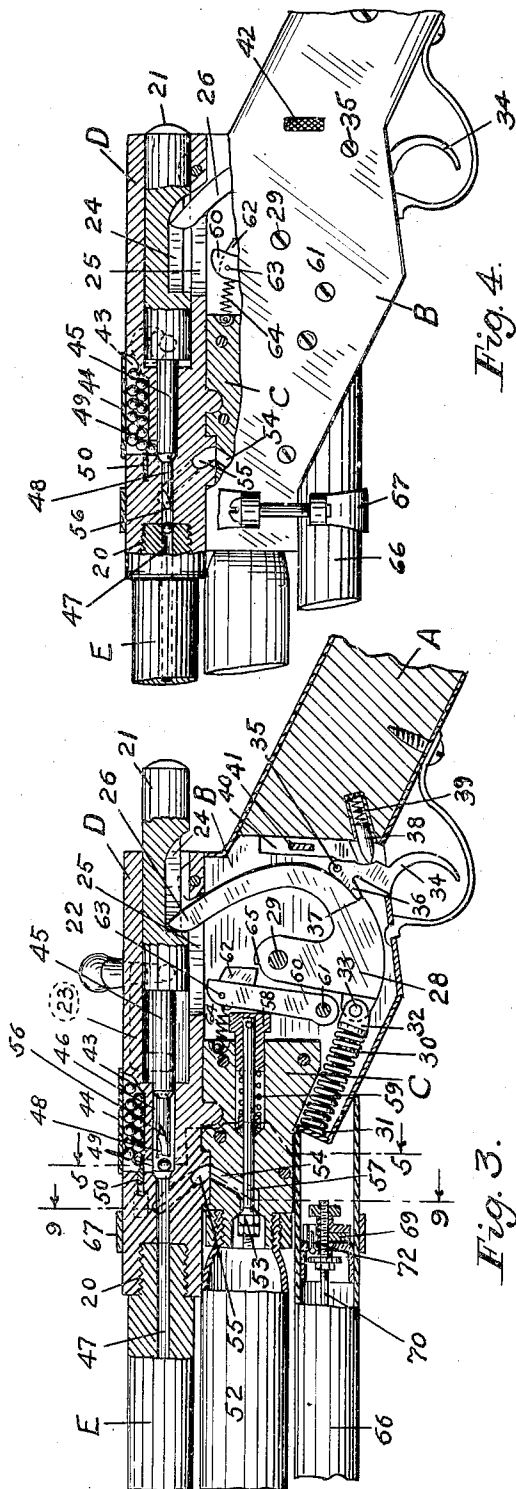
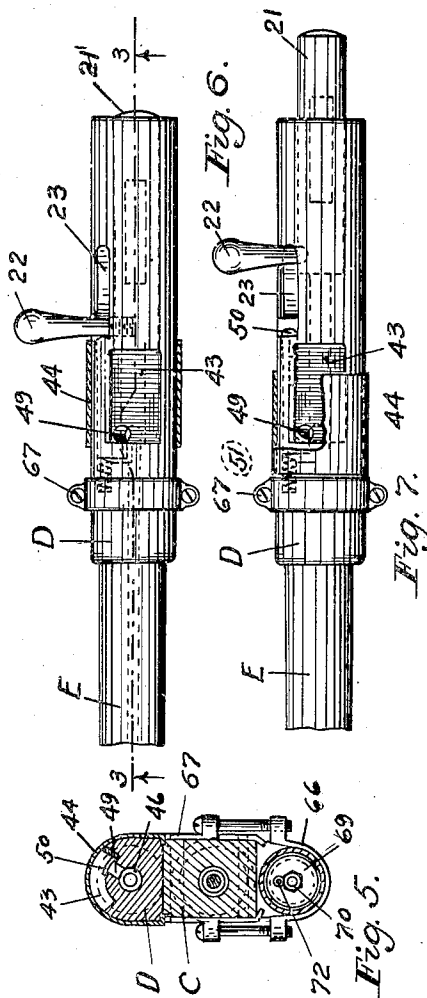


Fig. 4.

Fig. 3.



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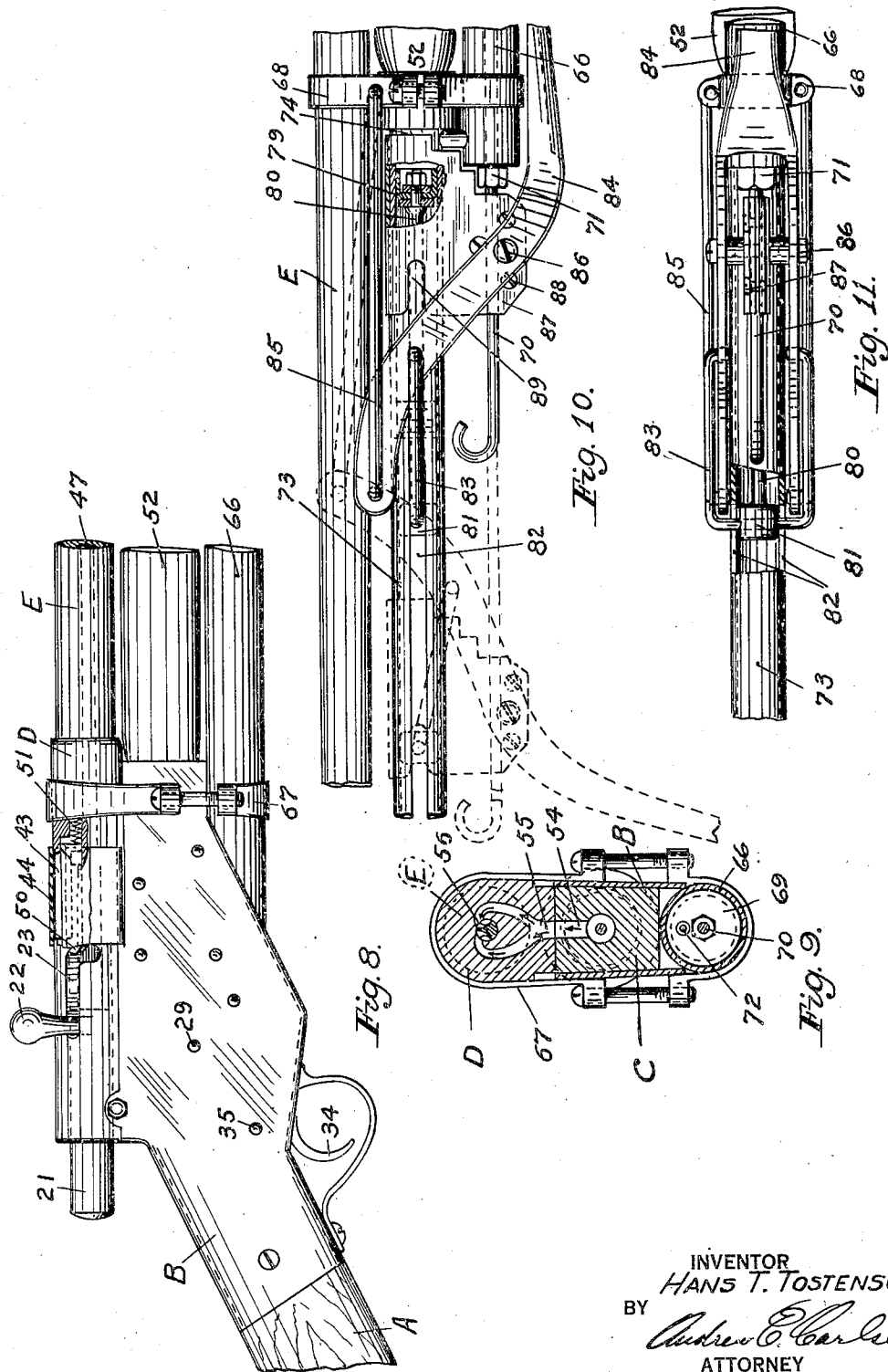
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REPEATING AIR GUN

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5 Sheets-Sheet 3



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REPEATING AIR GUN

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5 Sheets-Sheet 5

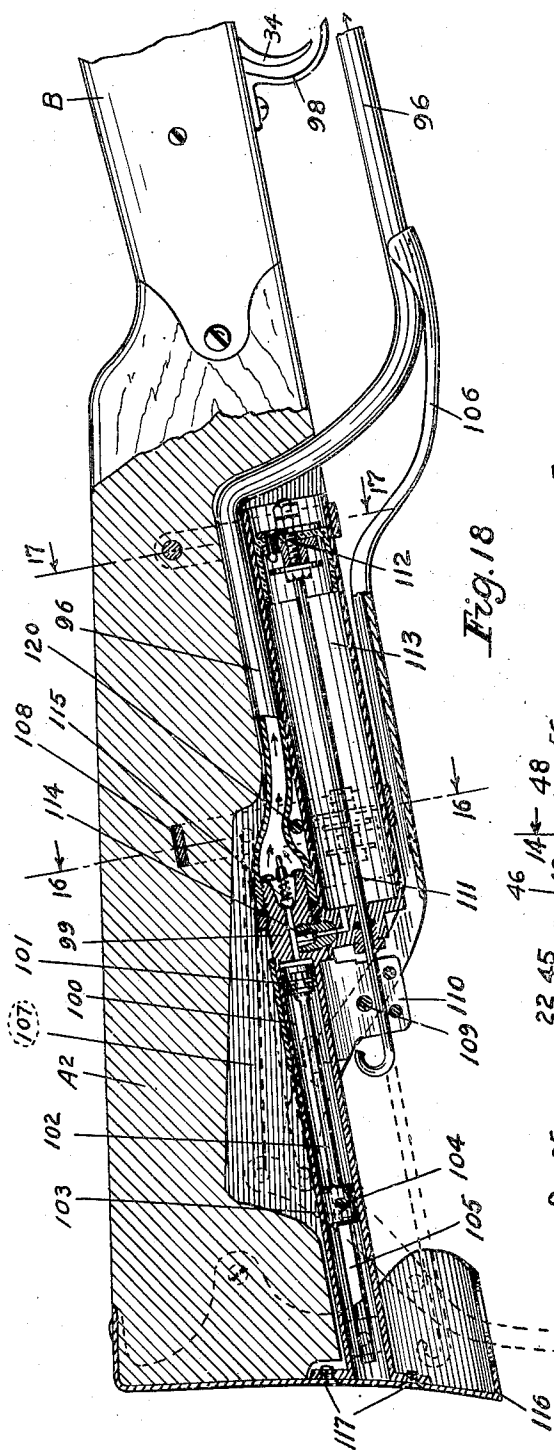


Fig. 18

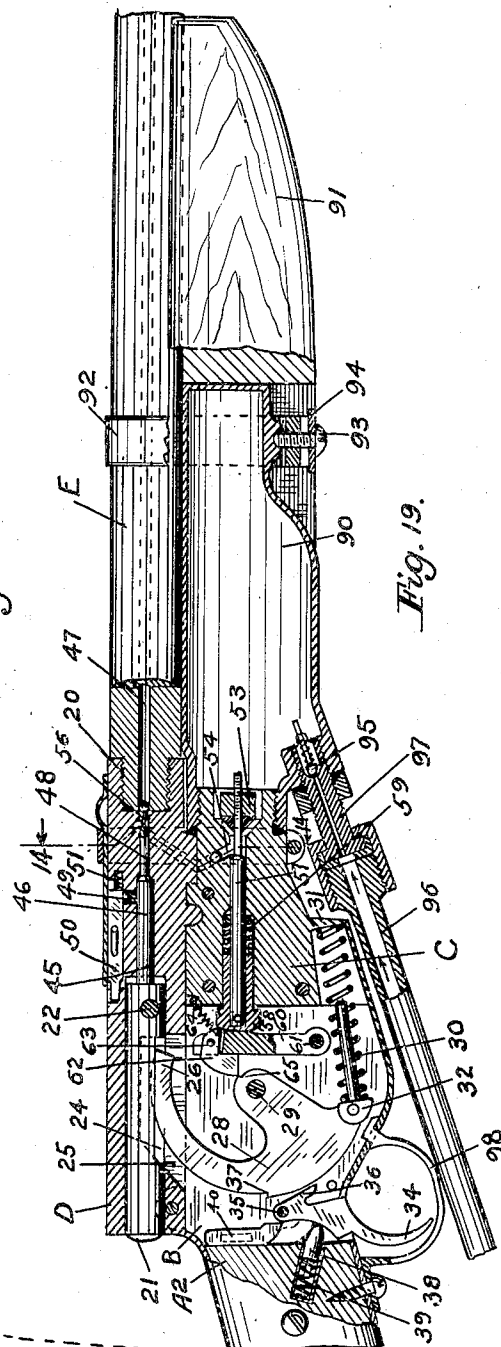


Fig. 19

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REPEATING AIR GUN

Application filed March 10, 1930. Serial No. 434,585.

This invention relates to air guns and the primary object is to provide a repeating air gun or rifle in which a magazine of small pellets such as BB shot are successively supplied to the barrel of the gun, and from which they are successively discharged under the action of the elastic force of highly condensed or compressed air. A further object is to provide a repeating air rifle with a pressure supply chamber and a pumping mechanism for manually and periodically charging the same so that several shots may be fired from the gun in rapid succession and without in each instance actuating the pump mechanism, as would be required if no pressure supply chamber were provided. A further object is to provide a simple, efficient, and practical air pressure pumping mechanism, including a primary pump piston having a relatively long stroke for initially compressing the air introduced, and a secondary pump piston, having a relatively short but more powerful stroke for forcing the previously compressed air into the pressure supply chamber. A further object is to provide novel means for transmitting the pellet, to be shot, from the shot magazine to the barrel bore, in conjunction with the mechanism, which upon being released by the gun trigger, will admit a charge of the highly compressed air back of the placed pellet to eject it under substantial velocity from the gun and to the object at which it is aimed. These and other more detailed and specific objects will be disclosed in the course of the following specifications, reference being had to the accompanying drawings, which drawings while not necessarily perfect in dimensional proportions and all details of construction as might be embodied in a perfected gun, are illustrative of the broad conception of the invention as such and demonstrate a practical or general method of illustrating the various combinations which will be set forth in the appended claims.

In the drawings:

Fig. 1 is a side elevation of a preferred embodiment of the invention, as seen from the left, and with a portion of the stock broken away in order that a comparatively large scale may be utilized.

Fig. 2 is an enlarged detail section taken centrally through the working mechanism of the gun.

Fig. 3 is a sectional detail elevation similar to the right hand portion of Fig. 2, but showing the hammer in the cocked position, as set by the bolt or cocking piece. This view also shows the position of a pellet as it is being introduced into the bore of the barrel.

Fig. 4 is an elevation, partly in section, as in Fig. 3, but showing the cocking piece advanced to a position where the pellet is in readiness to be ejected.

Fig. 5 is a cross-sectional view on the irregular line 5—5 in Fig. 3.

Fig. 6 is a top or plan view of a portion of the gun, with the cocking bolt in its forward position, and showing the cover slide for the shot chamber in section.

Fig. 7 is a plan view similar to Fig. 6, but showing the bolt in its rearward position, and showing the pellet chamber cover partly broken away and in its forward position, to expose a portion of the pellet chamber.

Fig. 8 is a side view of a portion of the gun, as seen from the right, and with a fractional portion broken away for purpose of illustration.

Fig. 9 is a sectional detail elevation on the line 9—9 in Fig. 3.

Fig. 10 is an elevation, partly in section, of a portion of the gun, particularly including the pumping lever mechanism.

Fig. 11 is a plan view of the structure shown in Fig. 10, as seen when looking upward.

Fig. 12 is a side elevation of a modified form of the gun, in this instance the pumping mechanism being associated with the stock of the gun.

Fig. 13 is a detail elevation of a portion of the gun, as seen from the left, and illustrating the position of the safety latch.

Fig. 14 is a sectional elevation on the irregular line 14—14 in Fig. 19.

Fig. 15 is an enlarged sectional elevation on the line 15—15 in Fig. 12.

Fig. 16 is a sectional elevation on the line 16—16 in Fig. 18.

Fig. 17 is a sectional elevation on the line 17—17 in Fig. 18.

Fig. 18 is an enlarged longitudinal sectional elevation through the stock and pumping mechanism, as shown in Fig. 12.

Fig. 19 is a sectional elevation through the pressure chamber and operating mechanism of the gun, illustrated in Fig. 12.

Referring particularly to Figs. 1 to 11, inclusive, of the drawings, A designates the stock of the gun to which is secured a housing B. Between the opposite walls of this housing is secured a metal block C, and a second block D, into the front end of which the barrel E of the gun is screwed, as at 20. The cocking piece 21 is slidably and rotatably secured in the block D, and it is manually operated by a bolt or handle 22 which is secured in 21, and projects out through a bayonet slot 23 in one side of the block D. The under side of the piece 21 has an open slot or groove 24 which is open to the interior of the housing B through a slot 25 in the bottom portion of the block D. It may here be stated that the slot or groove 24 is sufficiently wide to permit the piece 21 to be oscillated while still engaged, by an arm 26 of a hammer 28, which arm projects up through the opening 25 and into engagement with the cocking piece. The hammer 28 is pivotally secured to the housing B, as at 29, and is always under the tension of a main spring 30, which is a compression spring which operates under the block C and between a flange 31 of the housing B and a lug 32 that is pivoted to the hammer, as at 33. A trigger 34 is pivoted, as at 35, and has a dog or sear 36 adapted to engage a notch 37 of the trigger. A small plunger 38 is slidably mounted in the front end of the stock A, and has a spring 39 tending to press the trigger forward and to keep the sear 36 in contact with the hammer.

A safety catch is operated in connection with the trigger 34, and consists of a small latch 40 which is vertically movable immediately back of the upper part of the trigger, and has a short shank 41 which projects through a vertical slot in the housing B to a button 42 on the outside of the housing. When the button is pressed upwardly, as in Figs. 2 and 19, then the latch 40 is raised from engagement with the trigger, and the latter is free to be pulled for the purpose of releasing the hammer 28, but when the button 42 is pressed into its lowermost position, as shown in Figs. 3 and 13, then the latch 40 engages the trigger to prevent it from being accidentally released from the hammer. From the foregoing it will be seen that when the handle 22 is raised and pulled back in the slot 23 the cocking piece 21 will engage the arm 26 of the hammer 28, and move it back against the tension of the spring 30, until the dog 36 of the trigger will engage

the notch 37, under the action of the spring 39.

The shot magazine consists of a chamber 43 hollowed out of the block D. This chamber is normally closed by a U-shaped plate 44 which is slidably secured upon the block D. When this plate is moved to a forward position, as indicated in Fig. 7, the rear end of the chamber is exposed and may be filled with the shot, after which it is pulled back to entirely cover the chamber, as shown in Figs. 2, 3, 4, 5, and 8.

The forward end of the cocking piece 21 has a reduced plunger portion 45 which operates in a hole 46, which is in axial alignment with the bore 47 of the barrel E and the block D, and the plunger 45 is in turn provided with a pin-like extension 48 of a size to fit the gun bore, and of such a length that when the piece 21 is pulled to its rearmost position the pin 48 will permit a shot pellet to drop from the chamber 43 into the forward end of the hole 46, as shown in Fig. 3, so that when the cocking piece is again moved to its foremost position the pin 48 will engage the pellet and move it into the gun bore 47, as shown in Figs. 2, 4, and 19.

In order that only one shot will be discharged from the chamber 43 at a time, I provide means for regulating the port 49 at the front end of the chamber 43, in the form of a small L-shaped guide plate 50, the short projecting end of which normally partly covers the port 49, as shown in Figs. 2, 3, and 7. This plate 50 is slidably secured in the block D, and is normally held in the port closing position by a small spring 51. The rear end of the plate 50 projects slightly into the slot 23, as indicated in Figs. 7, 8, and 12, and when the bolt handle 22 is moved upwardly and back in the slot 23 it will cause the plate 50 to move forwardly for an instant, during which time the pellet in place above the port 49 will drop into the port, and will there remain until the portions 45 and 48 of the piece 21 are moved to their rearmost position, as shown in Fig. 3, at which time the pellet will drop into the forward end of the hole 46. When the cocking piece is now again moved forward by the manipulation of the bolt handle 22 it will be seen that the pin 48 will move the pellet into firing position in the barrel bore 47. If the bolt 22, in its forward movement, again actuates the plate 50, no harm will be done, as the plunger portion 45 then closes the bottom end of the port 49.

The compressed air for ejecting the shot through the bore 47 of the barrel E is supplied from a pressure chamber 52, the forward end of which is rigidly secured to the block C. Air is conducted from the chamber 52 to the bore 47 through a valve 53, and duct 54 in the block C, and a duct 55 in the block D. This duct or passageway 55, as shown particularly in Figs. 9 and 14, has two

branches, each of which terminates in the bore 47 immediately above the pin 48. This pin 48 is in turn provided with a pair of downwardly and forwardly extending grooves 56, so that the air will be discharged against the rear and at the opposite sides of the pellet to be discharged. The valve head 53 which controls the passage of compressed air from the chamber 52 to the bore 47, through the passageways just described, is mounted on the forward end of a small rod 57, the forward end of which has a head-piece 58 which is slidable in the rear end of the block C. A spring 59 operates against the head member 58, and this spring supplements the action of the compressed air in the chamber 52, which tends at all times to keep the valve 53 closed.

Disposed between the head member 58 of the valve 53 and the hammer 28 is a lever 60, which is fulcrumed as at 61, and its upper end is provided with a pawl 62 which is pivoted to the lever 60, as at 63, and is connected by a spring 64 to the block C. The action of the spring 64 is such that it not only holds the lever 60 in contact with the head 58, but also holds the rear end of the pawl 62 in engagement with the hammer 28. The hub portion of the hammer 28 is provided with a tooth 65, which operates in conjunction with the rear end of the pawl 62 in the following manner: When the hammer 28 is cocked, as shown in Fig. 3, the tooth 65 is slightly spaced immediately rearward of the lower end of the pawl 62. When the trigger 34 is now pulled to release the member 36 from the notch 37, the hammer, operating under the action of the spring 30, swings upwardly and forwardly, and the tooth 65, acting upon the pawl 62, causes the lever 60 to press upon the head 58 to open the valve 53. This opening action of the valve is very brief, however, because after the hammer has travelled a very short distance the tooth 65 slips under the pawl 62, as shown in Fig. 19, whereupon the pawl 62 will move rearwardly on the hammer hub, under the action of the spring 59, and the compressed air. When the gun is to be reset the pawl 62 will not, of course, interfere with the return movement of the hammer, because of the yielding action imparted to the pawl by the spring 64.

The two types of mechanisms for pumping air into the compression chambers will now be described, reference being first had to the structure shown in Figs. 1, 2, 3, 4, 5, 8, 9, 10, and 11. In this form of the mechanism a primary pumping cylinder 66 is disposed under the compression chamber 52, and is secured in assembled relation with respect to the chamber and the barrel E by a pair of clamps 67 and 68 which pass under the cylinder 66 and over the barrel E and the block D. A piston 69 is reciprocally mounted in the cylinder 66, and has a rod 70 that ex-

tends out through a packing box 71, closing the forward end of the cylinder 66. The rear end of the cylinder is held up against the forward end of the housing B by the clamp 67, and there is sufficient opening between the housing and the cylinder to permit air under atmospheric pressure to pass into the rear end of the cylinder to the piston 69. A small check valve 72 is carried by the piston 69 and is so arranged that it will permit air to pass forward through the piston, but will prevent it from escaping rearwardly because of the closing action of the valve under the pressure effected in the cylinder 66 when the piston moves forwardly.

A secondary pumping cylinder 73 has a head 74 which screws into the forward end of the compression chamber 52. The head 74 has a central passageway 75 connecting the cylinder 73 with the chamber 52. This passage 75 has a check valve 76 which permits air to be forced into the chamber 52, but will prevent it from escaping in that direction. The passage 75 communicates with the pump cylinder 66 through a port 77 having a check valve 78, which permits air to be forced up through the port 77 from the cylinder 66 to prevent a return flow to the cylinder 66. The cylinder 73 has a piston head 79 attached to one end of a rod 80. The forward end of this rod 80 terminates in a head member 81, which is slidably disposed in the forward end of the member 73. This forward end of the member 73 is bifurcated so that it presents a longitudinal slot 82, in which operates a link 83, the forward end of which is secured in the head 81 while the rearward end is pivotally secured to a pumping lever 84. The forward extremity of this lever 84 is pivotally connected to the clamp 68 by a link member 85. The forward portion of the lever 84 has a third pivotal connection, namely at 86, where it is connected to a carrier 87 which is slidably mounted upon the cylinder 73. The rear portion of the lever, when in its inactive position, swings up under the cylinder 66. The carrier 87 is securely clamped upon the forward end of the piston rod 70 by suitable means such as bolts or rivets 88, and the upper side portions of the carrier 87 are provided with notches 89 which will permit the carrier to advance to the foremost position indicated by the dotted lines in Fig. 10, without having any interference with the forward end of the connecting link 83.

From the arrangement of parts just described it will be seen that the lever 84, which is manually operated by being swung forwardly and rearwardly, has an oscillating fulcrum at the forward end of the link 85, and that one complete forward stroke of the lever will move the pivot 86 substantially twice as far as the movement imparted to the head member 81 by the link 83, and consequently the piston 69 of the primary pump-

ing cylinder 66 will have a considerably longer pumping stroke than does the piston 79 in the cylinder 73. It will also be noted that a complete forward stroke of the hand lever 84 will impart a compression stroke to the piston 69, while the same movement with pull the piston 79 forwardly in the cylinder 73, at which time said piston 79 is not doing any compression work. This forward movement of the piston 69, however, as previously noted, is substantially longer than the stroke of the piston 79, with a result that the air compressed by the piston 69 in the cylinder 66 is forced upward through the port 77 and the valve 78 to the passage 75. In the event that no air has previously been compressed into the chamber 52 the valve 76 will of course open to permit the air compressed in the cylinder 66 to pass into the chamber 52. As soon as the pressure in the chamber 52 reaches a predetermined degree, however, the air forced up through the valve 78 by each stroke of the piston 69 will be forced into the rear end of the cylinder 73, and even though the piston 79 is moving forwardly the space between it and the head 74 will always be smaller than the space between the piston 69 and the stuffing box 71, with a result that when the piston 79 starts to move rearwardly it will initially act upon previously compressed air, and as the stroke of the piston 79 is relatively short the backward movement of the hand lever 84 will have a considerably greater leverage when forcing the air from the cylinder 73 into the chamber 52. There is of course nothing to retard the rearward motion of the piston 69, as the valve 72 will immediately open to permit air under atmospheric pressure to pass into the cylinder 66.

In the gun structure and mechanism illustrated in Figs. 12 to 19, inclusive, the gun stock A2 has a considerable portion of its under side cut away to accommodate the pumping mechanism. In this instance a compression chamber 90 is disposed immediately in advance of the block C, and terminates in its front end in a hand piece 91 which, together with the chamber 90, is firmly secured to the barrel E of the gun by a loop strap 92 and a screw 93, which screws into the strap, and bears, with its inner end, against the forward end of the chamber 90, while the head end of the screw bears against a bearing plate 94 on the hand piece 91. At its rear end the chamber 90 has a check valve 95, through which air is forced to the chamber 90 from a tube or pipe 96 connected to the chamber as by a coupling unit 97. The pipe 96 extends rearwardly under the trigger guard 98, and thence upwardly into the stock A2 where it connects to the head 99 of a secondary pump cylinder 100. The pump cylinder 100 has a piston 101, connected by a piston rod 102 to a head member 103, which is movable in the rear end of the cylinder 100, and is operated by

a link 104 passing through a slot 105, and attached at its forward end to the hand lever 106. This lever is in turn connected by a link 107 to a securing strap 108, and also has a pivotal connection 109 with a carrier 110 which is secured to the piston rod 111, which operates a valve controlled piston 112 in the primary pumping cylinder 113. The cylinder 113 communicates with the cylinder 100 through a valve controlled port 114, and the cylinder 100 in turn communicates with the pipe 96 through a valve controlled port 115.

The operation of the pump mechanism, as embodied in the structure shown in Fig. 18, is substantially identical with the pump mechanism shown in Figs. 1, 2, 3, 10, and 11. There is the difference, however, that the hand lever 106 is operated by being pulled backward on the initial stroke, while in the previously described mechanism the initial pumping stroke is effected by a forward motion of the hand lever. It may also be noted that the cylinder 103, while relatively shorter than the previously described cylinder 66, has a relatively larger diameter, with a result that the pumping capacity is substantially the same. By placing the pumping mechanism in the stock of the gun, a further advantage accrues, in that a portion of the working mechanism is shifted rearwardly, and in so doing will give better balance to the completed rifle. For some people it might also be more convenient to operate the lever 106 while the rifle is in a shooting position, while for other people it might be found more advantageous to use the forwardly moving lever 84, as shown in the first described form of the invention.

As shown in Figs. 12 and 18, a considerable portion of the stock A2 has been cut away, and in order that the rear end of the stock may have the proper size and shape to fit the shoulder it is provided with a butt plate 116, which also serves as a support for the rear end of the cylinder 100, the latter being secured thereto by short screws 117. The pumping cylinder 113 is held in place by a strap 118 which passes under the cylinder and is firmly secured to the stock A2 as by a bolt 119 passing therethrough. The strap 108 is sectionally formed, one section passing under the rear end of the cylinder 113 and the other section passing through the stock A2, and these two sections are firmly secured together as by a bolt 120, as shown in Figs. 12 and 16.

It is understood that suitable modifications may be made in the structure as disclosed, provided such modifications come within the spirit and scope of the appended claims. Having now therefore fully illustrated and described my invention what I claim to be new and desire to protect by Letters Patent is:

1. The combination with an air gun, of a

compressed air chamber communicating with the gun bore, a primary pump and a secondary pump, having oppositely acting pistons, for supplying the air chamber, a lever, having a link connection with the gun and separate pivot connections with the two pump pistons, for actuating the latter.

slidable in the block with an end pin for engagement in the bore, said block having a forked duct for admitting air to opposite sides of the bore, and said pin of the cocking piece having a pair of surface grooves for conducting air from said duct openings in the bore to the end of the pin when the latter is in a forward position.

2. The combination with an air gun, of a compressed air chamber communicating with the gun bore, a primary pump and a secondary pump, having oppositely acting pistons, for supplying the air chamber, a reciprocating lever operative upon a complete forth and back movement to effect complete movements to the two pistons, said lever being connected to the pistons by means which will cause the piston of the primary pump to travel a substantially longer stroke than that of the piston of the secondary pump for each complete movement of the lever.

8. An air gun comprising a barrel having a bore through which missiles are to be projected, a cocking piece slidably associated with the barrel and adapted upon being actuated to successively feed missiles to the bore, a compressed air chamber having an outlet communicating with the bore, a valve head normally closing the outlet, a rod for actuating the head, a spring acting on the rod to close the valve, a hammer associated with the cocking piece, and a lever member disposed between the hammer and the rear end of said valve rod.

3. The combination with an air gun, of a compressed air chamber communicating with the gun bore, a primary pump and a secondary pump, having oppositely acting pistons, for supplying the air chamber, a reciprocating lever operative upon a complete forth and back movement to effect complete movements to the two pistons, a lever having an oscillating fulcrum connection with the gun and separate pivot connections with the two pistons.

9. An air gun having a compressed air chamber communicating with the bore of the gun, a normally closed valve member for controlling the air to the bore, a trigger releasable hammer, a lever disposed between the valve member and said hammer, and a pawl carried by the lever for engagement by the hammer.

4. The combination with an air gun having a chamber for compressed air to discharge missiles from the gun, a pair of pumps, having reciprocating pistons, for supplying the chamber, a lever connected to the pistons for actuating the same, and a link pivoted at one end to the gun and pivoted at its other end to the lever so that said other end will form an oscillatable fulcrum for the lever.

10. An air gun having a compressed air chamber communicating with the bore of the gun, a normally closed valve member for controlling the air to the bore, a trigger releasable hammer, a lever disposed between the valve member and said hammer, a pawl carried by the lever for engagement by the hammer, and spring means for holding the lever and pawl in predetermined positions.

5. The combination with an air gun having a chamber for compressed air to discharge missiles from the gun, a pair of pumps, having reciprocating pistons, for supplying the chamber, a lever connected to the pistons for actuating the same, and a link pivoted at one end to the gun and pivoted at its other end to the lever so that said other end will form an oscillatable fulcrum for the lever, said lever being disposed under the gun and swingable in the longitudinal vertical plane thereof with its outer end forming a manipulating handle.

11. An air gun having a compressed air chamber communicating with the bore of the gun, a normally closed valve member for controlling the air to the bore, a trigger releasable hammer, a lever disposed between the valve member and said hammer, a pawl carried by the lever for engagement by the hammer, and a spring acting upon the pawl to hold it in operative position with respect to the hammer, said spring being operative to maintain the lever in contact with the valve member.

6. An air rifle having a breech block at the rear end of the barrel and a cocking piece slidable in the block with an end pin for engagement in the bore, said block having a duct for admitting air to the bore, and said end pin of the cocking piece having a surface groove for conducting air under pressure from the said duct to the end of the pin when the latter is in its foremost position in the bore.

12. An air gun having a compressed air chamber communicating with the bore of the gun, a normally closed valve member for controlling the air to the bore, a trigger releasable hammer, a lever disposed between the valve member and said hammer, and a pawl carried by the lever for engagement by the hammer, said hammer having a tooth portion for actuating contact with the pawl.

7. An air rifle having a breech block at the rear end of the barrel and a cocking piece

13. In an air gun the combination of a cocking piece slidable in a breech block, and operative, upon a full movement, to load the gun, a hammer pivotally secured under the cocking piece and having an arm extending up for engagement with the piece, a hammer

actuated valve for controlling an air passage to the gun bore, and a trigger for holding and releasing the hammer to effect an opening of the valve.

⁵ Signed at Nicollet, Minnesota, this 4th day of March, 1930.

HANS T. TOSTENSON.

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