B. L. BLAIR.

AIR GUN.

APPLICATION FILED APR. 13, 1917.

1,299,901.

Patented Apr. 8, 1919.

2 SHEETS—SHEET 1.

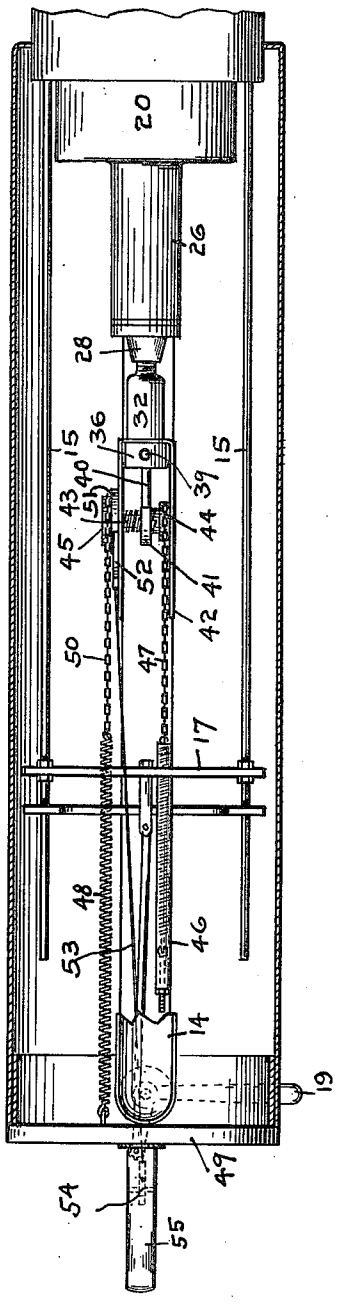


Fig. 1.

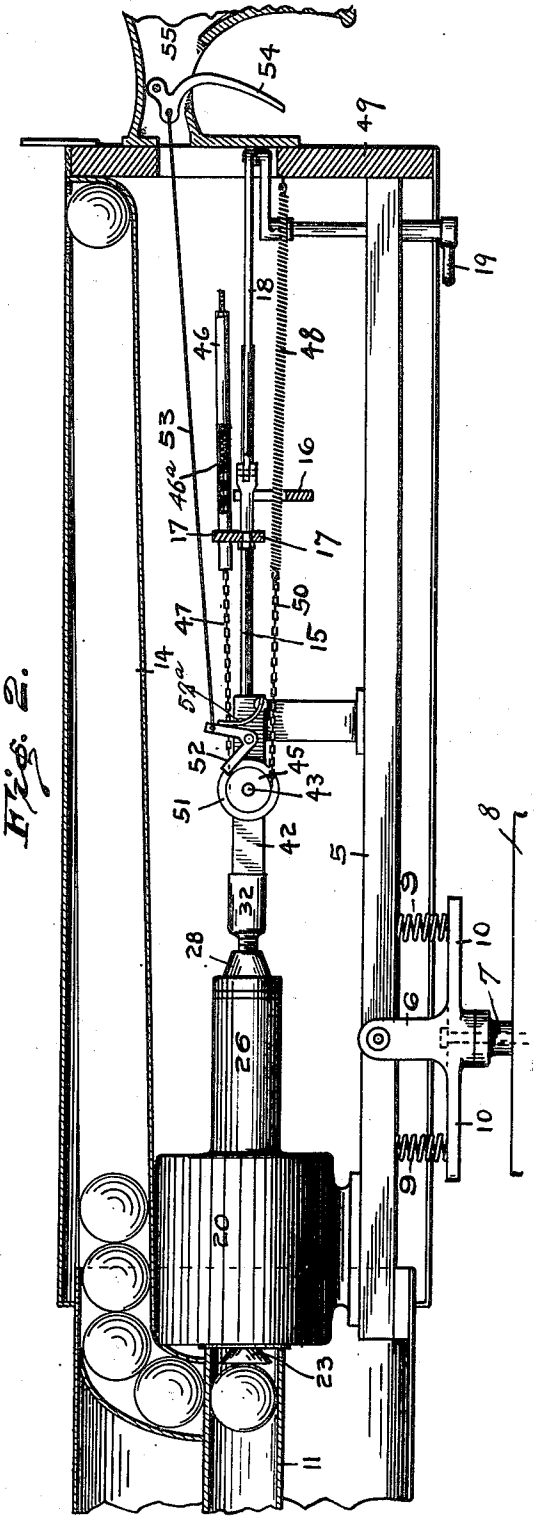


Fig. 2.

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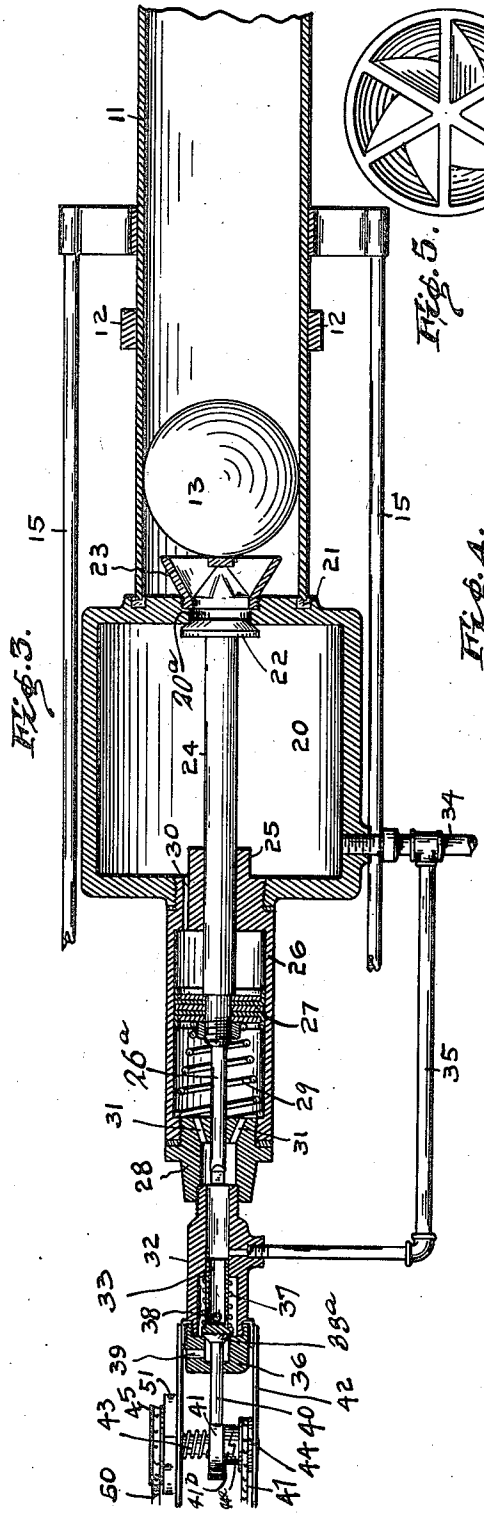


Fig. 3.

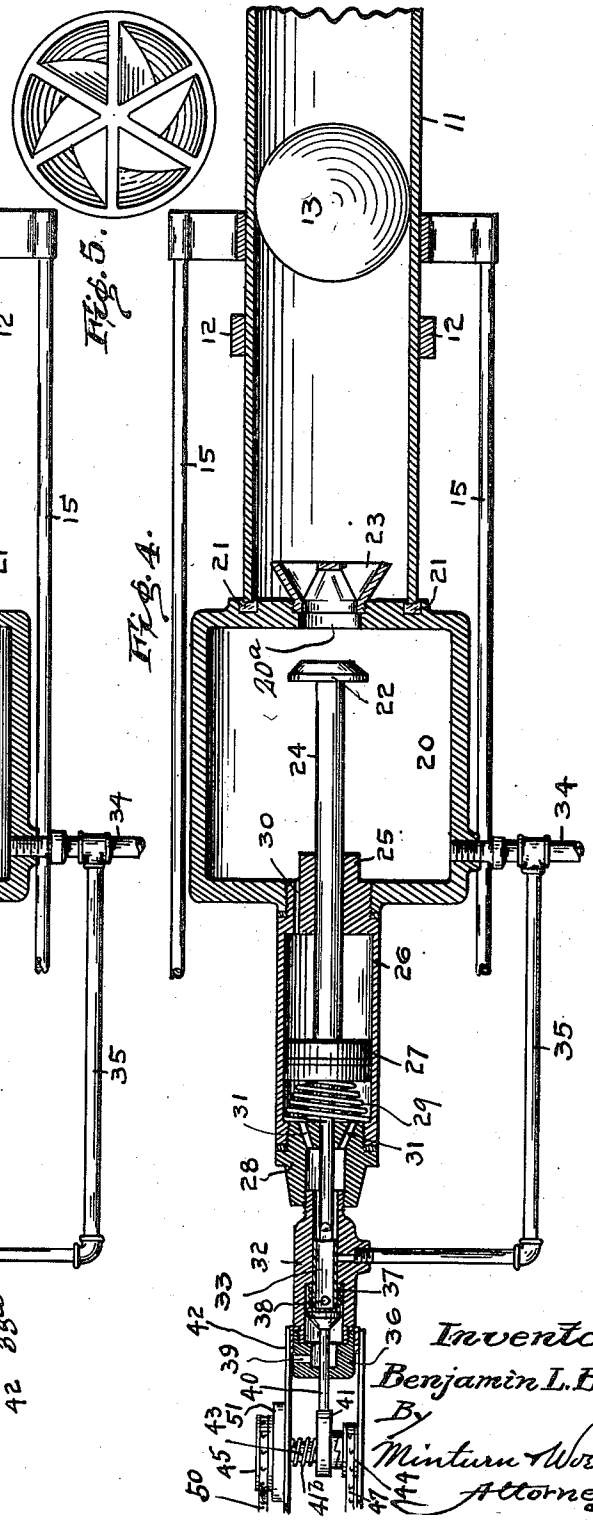


Fig. 4.

Fig. 5.

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UNITED STATES PATENT OFFICE.

BENJAMIN L. BLAIR, OF INDIANAPOLIS, INDIANA.

AIR-GUN.

1,299,901. Specification of Letters Patent. Patented Apr. 8, 1919.

Application filed April 13, 1917. Serial No. 161,790.

To all whom it may concern:

Be it known that I, BENJAMIN L. BLAIR, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements in Air-Guns, of which the following is a specification.

This invention relates to guns for throwing projectiles by the expansive force of compressed air, and the object is to provide quick, simple, durable and reliable means for supplying compressed air to eject the projectile and for cutting off the air supply while the gun is being loaded and aimed.

A further object of the invention is to provide an air gun which can be fired rapidly, with great force and accuracy.

I accomplish the above, and other objects which will hereinafter appear, by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a top plan view of the breech of my improved gun showing the air-control mechanism in position to shoot. Fig. 2 is a vertical section of the breech end of the projectile barrel and breech housing, on a somewhat larger scale than Fig. 1, showing the air-control mechanism in side elevation, cocked ready to shoot. Fig. 3 is a longitudinal horizontal central section of the air-control mechanism of Fig. 1, showing the projectile ready to be expelled, and the air-control mechanism ready to be moved to admit compressed air for the expulsion of said projectile, and Fig. 4 is a like section showing the mechanism at the instant of the ejection of the projectile. Fig. 5 is a front view of the nozzle.

Like characters of reference indicate like parts throughout the several views of the drawings.

The various parts of my gun are mounted on a base 5, which is pivoted in a yoke 6 insuring vertical adjustment of the gun, and the yoke is attached by a vertical pivot to a standard 7 held by a sub-base 8. Universal adjustment of the gun is thus provided for. Resilience in its yoke is afforded by springs 9 between the base 5 and lateral arm-extensions 10. A projectile-receiving and directing barrel 11 has longitudinal adjustment in guides 12, in which it is moved for the breech-insertion of a projectile 13, preliminary to the expulsion of the latter. The projectiles are placed in a magazine 14 which discharges by gravity into the breech of barrel 11 when the latter is moved forward to load. This movement to the barrel is imparted through the parallel bars 15, 15, with which it is connected as shown in Figs. 3 and 4, the rods passing through a guide 16, at the rear, being fastened to a cross-bar 17 which is connected by a rod 18, with a crank operated by a swinging hand lever 19.

The barrel 11 in closed position is in contact with an air cylinder 20, a tight joint being assured by a gasket 21, and a port 20^a through the cylinder-wall into the end of the barrel, for the admission of compressed air into the barrel to eject the projectile by its expansion back of the latter, is normally closed by a valve 22, which is seated by the pressure of the air in cylinder 20. When the port 20^a is momentarily opened by means which we will hereinafter describe, the inrushing air is given a whirling motion to twist the movement of the projectile and cause it to shoot straight, by the nozzle 23, having the series of curved blades as shown in Fig. 5.

The valve 22 is mounted on a rod 24, which passes from the cylinder 20 at the opposite side from the port 20^a which it controls, through a comparatively long plug 25, to give the rod a good bearing, into a cylinder 26. At a suitable distance in the latter the rod is reduced in diameter to form a shoulder against which, on the rod, a piston 27, is mounted, and is locked against the shoulder by a nut on a threaded portion of the rod, as shown in Fig. 3. This piston, as is shown in Fig. 3, is formed of a pair of leathers separated by a metal disk, with the edges of the leathers bent in opposite directions from each other over metal disks against their outer sides of suitably less diameter than the bore of cylinder 26. The diameter of the rod 24 is further reduced toward its extension from the piston, and this last reduced part 26^a is held in the bore of a plug 28 which forms the outer head of the cylinder 26. The plug 28 helps to guide the rod 24 and seat the valve 22, and quick action for the latter operation is aided by the introduction of a helically coiled spring 29, introduced around the rod between the piston and plug 28. The spring helps to lock the nut holding the piston members together, and the spring is preferably helical so it will nest when compressed. The plug 25, between the cylinders

20 and 26 has an air port 30, of small dimensions which is always open, and the plug 28 at the other end of the cylinder 26 has several ports 31, allowing more air to pass than through port 30. The bore of plug 28 is enlarged in its major outer length to form a chamber for the ports 31 to lead from, and in the extreme outer end of the bore of this plug, which is there threaded a third plug 32 is screwed. This plug has a longitudinal bore in which the hollow stem 33 of a valve 33^a makes a sliding air tight fit.

A pipe 34, from a suitable source of compressed air, (not shown) discharges into the cylinder 20, and a branch 35, from said pipe discharges compressed air into the bore of the plug 32. On the outer end of the plug 32, is a cap 36, having a recess which is normally closed by the valve 33^a on the hollow stem 33, through the action of a spring 37, wrapped around the stem 33, and bearing between the valve 33^a and a shoulder formed in the plug 32 by enlarging the outer end of its bore, as shown. This enlargement affords ample air passage around the valve 33^a when it is in open position with spring 37 compressed, and the escape of air from the bore of the stem 33, and parts in communication therewith through the hollow plug 32, is afforded through hole 38, in the walls of the hollow stem 33, and escape of air to atmosphere is had after passing the valve 33^a, through the recess in the cap 36, and thence to atmosphere through a hole 39.

On the other side of the valve from the hollow stem 33, is a smaller solid stem 40, which passes out through an opening in the cap 36, and terminates in the path of a rotating cam 41. The cam is rotated by a spring 41^a which is strained in cocking the gun, and is released by manipulating the trigger by the gunner, and rotated against the end of stem 40, pushing valve 33^a and hollow stem 33 in longitudinally. This movement unseats valve 33^a and causes hollow sleeve 33 to cut off the air pressure through branch 35, and enables the air coming against the piston 27 from cylinder 20, to move the piston and open the port 20^a into barrel 11. The lowering of pressure in cylinder 20 causes the valve 22 to be instantly closed by the spring 29, and the passing of the cam 41 releasing the stem 40, causes its valve 33^a to be closed by spring 37. This establishes communication with pipe 35, admitting compressed air against the piston 27, which assists spring 29 in closing the valve 22.

Mounted in a fixed frame extension 42, from the plug 32, is a shaft 43, on which are two fixed sheaves 44 and 45. Mounted on the shaft 43 loosely is the cam 41 having a half-clutch 41^b on one side which engages with a half clutch 44^a on the sheave 44, fastened at one end to the sheave 44, and passing over it to a spring 46^a incased in a tube 46, carried by the moveable bar 17, is a chain 47, and fastened to the sheave 45 and passing under it to a spring 48, which is fastened to the stationary head 49, is a chain 50. Integrally with the sheave 45 is a wheel 51, having a notch which engages a dog 52, pivoted to the frame 42, and pressed into engagement with the wheel 51 by a spring 52^a shown in Fig. 2.

An arm of the dog 52 is connected by a wire 53 with a trigger 54, in a hollow handle 55, at the head 49. The mechanism is set by the action of the two springs 48 and 46^a in tube 46, when the bar 17 is moved forward by the hand lever 19 in loading the barrel 11. The stronger spring 46^a, in tube 46, rotates the shaft 43 and cam 41 when the dog 52 is released from its notch by the manipulation of the trigger 54.

While I have described my invention with more or less minuteness as regards details of construction and arrangement, and as being embodied in certain precise forms, I do not desire to be limited thereto unduly or any more than is pointed out in the claims. On the contrary, I contemplate all proper changes in form, construction and arrangement, the omission of immaterial elements and the substitution of equivalents as circumstances may suggest or as necessity may render expedient.

I claim—

1. In an air gun, the combination of a projectile barrel having a port for the introduction of compressed air, a valve opening and closing the port, a piston operatively connected with the valve, means for supplying compressed air to both sides of the piston to hold its connected valve closed, the means on the side remote from the valve having a port to atmosphere, and means to open and close said last port and simultaneously close and open the compressed air supply against the rear side of the piston comprising a manually rotated cam and a stem projecting into the path of the cam.

2. In an air gun, the combination of a projectile barrel having a port for the introduction of compressed air, a valve opening and closing the port, a piston operatively connected with the valve, means for supplying compressed air to both sides of the piston to hold its connected valve closed, the means on the side remote from the valve having a port to atmosphere, and means to open and close said last port and simultaneously close and open the compressed air supply against the rear side of the piston comprising a spring actuated cam manually operated means to load the projectile into the barrel and to set the spring to operate the cam, manually operated

means to release the spring, and a stem projecting into the path of the cam.

3. In an air gun, the combination of a projectile barrel having a port for the introduction of compressed air, a valve opening and closing the port, a piston operatively connected with the valve, means for supplying compressed air to both sides of the piston to hold its connected valve closed, the means on the side remote from the valve having a port to atmosphere, a valve to close and open said port having a hollow stem which closes the compressed air supply against the rear side of the piston when said port is open to atmosphere, said hollow stem having an opening back of the last valve into said port to atmosphere when the valve is open.

4. In an air gun, the combination of a projectile barrel having a port for the introduction of compressed air, a valve opening and closing the port, a piston operatively connected with the valve, means for supplying compressed air to both sides of the piston to hold its connected valve closed, the means on the side remote from the valve having a port to atmosphere, a valve to close and open said port having a hollow stem which closes the compressed air supply against the rear side of the piston when said port is open to atmosphere, said hollow stem having an opening back of the valve to said port to atmosphere when the valve is open, and a spring to initially seat the last valve.

5. In an air gun, the combination of a projectile barrel having a port for the introduction of compressed air, a valve opening and closing the port, a piston operatively connected with the valve, means for supplying compressed air to both sides of the piston to hold its connected valve closed, the means on the side remote from the valve having a port to atmosphere, a valve to close and open said port having a hollow stem which closes the compressed air supply against the rear side of the piston when said port is open to atmosphere, said hollow stem having an opening back of the valve to said port to atmosphere when the valve is open, and a spring to initially seat the valve and manually operated means to unseat it.

6. In an air gun, the combination of a projectile barrel having a port for the introduction of compressed air, a valve opening and closing the port, a piston operatively connected with the valve, means for supplying compressed air to both sides of the piston to hold its connected valve closed, the means on the side remote from the valve having a port to atmosphere, a valve to close and open said port having a hollow stem which closes the compressed air supply against the rear side of the piston when said port is open to atmosphere, said hollow stem having an opening back of the valve to said port to atmosphere when the valve is open, a manually actuated cam, and a stem on the other side of said last valve from the hollow stem terminating in the path of the cam.

In witness whereof I have hereunto set my hand and seal at Indianapolis, Indiana, this 22nd day of March, A. D. one thousand nine hundred and seventeen.

BENJAMIN L. BLAIR. [L. S.]