

UNITED STATES PATENT OFFICE

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AIR RIFLE

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My invention relates to air guns and consists in a novel construction of the bullet feeding, retaining and discharge mechanism.

The present structure incorporates the means shown in my copending application, Serial Number 292,699, filed July 14, 1928, for regulating the amount of air admitted into the discharge chamber including the valve adjusting mechanism and the means for automatically closing the valve after its momentary opening, irrespective of the manual operation of the trigger, and also includes some automatic loading mechanism elements similar to those disclosed in my copending application.

The general objects of my present structure, like those of my copending application, include the provision of an automatic repeating air gun requiring no other manual operation but the repeated movement of the trigger for the discharge of a series of bullets, having a novel means for retaining the bullet in firing position, and having a novel means for adjusting the charge of air for each bullet.

The bullet retaining means in my copending application, provided by the force of the magazine spring transmitted through the column of bullets in the magazine to the bullet in firing position, has the disadvantage of reducing the firing power of the rifle by the amount of force expended in causing the bullet to push back the column of bullets in the magazine when the rifle is discharged before the bullet can enter the discharge barrel proper. A particular object of my present application is to overcome this waste of force by placing the bullet in a firing position completely free from the pressure of the bullets in the magazine and providing a spring retaining means just strong enough to keep the bullet from rolling out of the barrel if the barrel is inclined downwardly.

Another object of my invention is to utilize all of the compressed air, admitted to the discharge barrel, to propel the bullet and to avoid the loss of a portion of this air through the magazine tube as occurred in the gun of my copending application.

Another object is to insure the delivery

of all the bullets in the magazine to the discharge barrel before reloading is necessary.

Another object is to provide an air gun of the class described with a trigger lock or safety catch.

The foregoing and additional detail objects which will appear in the specification are attained in the structure illustrated in the accompanying drawing in which—

Figure 1 is a vertical section of a portion of my gun.

Figure 2 is a longitudinal section and a top view taken on the line 2—2 of Figure 1.

Figure 3 is a similar section showing the parts in a different position and is drawn on an enlarged scale.

Figure 4 is a detail horizontal section taken substantially on line 4—4 of Figure 1 but showing the trigger in locked position.

The gun stock 1 mounts the gun body 2 which is of tubular shape and the forward portion 3 of which forms a cylinder in which the air compressing piston 4 operates. The rear portion of the body constitutes a chamber 5, for compressed air, and a housing 6 for the breech block and trigger mechanism. Adjacent to the body 2 are the magazine and discharge barrels 7 and 8 respectively. The magazine barrel 7 is provided with an opening 9 through which bullets may be supplied to the barrel and has an inclined passage 19 leading to the discharge barrel. A plunger 10 is slidably mounted in barrel 7 and a coil spring 11 moves plunger 10 to the inner end of the barrel. The end of plunger 10 is provided with a flexible shaft 12 comprising a double coil of light spring wire and having a bead end 13, being substantially the size of the bullets used in the gun and being for the purpose of engaging the rear bullet 14. A handle 15 on stem 10 slides in a groove 16 in the side of barrel 7 and the end of groove 16 nearest the front end of the barrel has a lateral offset 18 into which the handle 15 may be turned (and in which it is turned in Figure 1) to hold the plunger 10 in retracted position while the magazine barrel is being filled with bullets. A projection 68 on the gun body forms a stop for limiting the rearward movement of handle 15 and con-

sequently limits the movement of bead 13 through passage 19. The length of member 10 and the position of stop 68 are so correlated that bead 13 will feed the last bullet into the discharge barrel but the bead itself can not enter the barrel. This feeding of the last bullet is a safety feature which functions irrespective of the position in which the gun is held and is novel in air guns.

10 The discharge barrel is provided with a slidable sleeve member 20 having a forward hollow portion 20a which slides into a position posterior to the passage 19 (see Figure 3) when a bullet is being admitted from the magazine to the discharge barrel, and slides past the passage 19 forwardly to the position shown in Figures 1 and 2 to restrain the entrance of other bullets from the magazine and to push the first bullet B into the firing position against the yielding holding element 49. In this position, an opening 37 in the side of portion 20a is alined with a passage 36 leading from the air chamber 5.

25 The rear part of member 20 forms a hollow portion 20b. A shoulder 21 abuts the end of discharge barrel 8 to limit forward movement of the sleeve in the barrel.

At the rear of member 20, is a collar 23 and between the collar 23 and the rear of the discharge barrel 8 a spring 24 is compressed and tends to thrust the member rearwardly to the position shown in Figure 3, thus permitting the magazine spring 11 to push a bullet into the discharge barrel 8.

35 Slidably fitting into the rear portion of 20b of the sleeve member is a plunger 25 having an enlarged rear end 26. Compressed between end 26 of the plunger 25 and the solid portion of the member 20 is a spring 27 which is stronger than spring 24. Any pressure brought to bear on the exterior of end 26 moves the plunger and sleeve member as a unit until the shoulder 21 of member 20 engages the end of the discharge barrel 8, after which the plunger and sleeve member are telescoped. Attached to the barrel 8 is a guide 29 in which rides a screw 28 extending from the collar 23 to limit the rearward movement of sleeve member 20.

50 The bullet feeding and firing mechanism is controlled by a trigger member 50 pivoted to the breech block 69 at 51 and having an upstanding arm 52 projecting through the slotted flange 53 on end 26 of the plunger 25 and engaging the end of the plunger to move the same forwardly when the trigger is retracted. Normally, springs 24 and 27 thrust sleeve member 20, plunger 25 and trigger arm 52 rearwardly into the normal position shown in Figure 3.

During the initial movement of the trigger, arm 52 moves forwardly to move plunger 25 and member 20 as a unit from the position shown in Figure 3 to the position shown in Figure 2. During the move-

ment, the front end of sleeve 20 seats bullet B and moves it against the holding element 49. Further movement of the trigger is accompanied by telescoping of members 25 and 20, member 20 remaining stationary with its opening 37 alined with the passageway 36 leading from the air chamber and with its forward portion seating bullet B against pin 49.

The entrance of air to the discharge barrel is controlled by a valve 53 and a cam 54. The valve slides in guides 55 and is thrust against its seat 56 by spring 57. The cam has a pin and slot mounting 58 on the breech block 69 in housing 6 and a knob 59 on the end of a spring 60 thrusts the cam downwardly into the normal position shown in Figure 1. Further retraction of the trigger from the position shown in Figure 1 will cause the trigger finger 61 to move forwardly and downwardly and raise the cam with its cam surface 62 engaging pin 63 and move valve 55 forwardly to permit the passage of air through the valve opening and passage 36. The engagement of trigger finger 61 on the cam is only momentary in duration, however, and the finger immediately slips off of the cam to permit its return and the seating of valve 53.

Upon release of the finger engaging portion of the trigger 50, springs 24 and 27 thrust the trigger arm 52 back, as explained above, and the finger 61 moves upwardly and the cam 54 moves rearwardly due to its pin and slot mounting until finger 61 passes beyond the end of the cam when spring 60 will move the latter down to its original normal position clearing pin 63 but ready to engage the latter after the trigger has again been operated far enough to telescope the sleeve member and plunger.

The breech block 69 has a lateral recess receiving a sliding pin 70, and a spring pressed locking element 71 bears against a groove in pin 70 to frictionally retain the pin in retracted or advanced position. In the advanced position shown in Figure 4, the inner end of the pin projects in front of the trigger arm 52 and prevents the operation of the gun. By pulling pin 70 outwardly, the trigger is free to move.

From the above description, it will be seen that I have produced an automatic repeating air rifle in which the repeated pulling of the trigger will discharge successive bullets one after the other as long as any bullets remain in the magazine barrel and any air under compression remains in the chamber. Also I have reduced the resistance that a bullet must overcome in being discharged from the firing position, and have eliminated a source of loss of power due to leakage of compressed air through the side of the discharge barrel into the magazine barrel. Also I have pro-

vided safety feeding and locking features which are novel in the air gun field.

While I have shown my invention embodied in an air rifle, it may be utilized in a pistol or cannon or machine gun structure and details of the device may be varied otherwise without departing from the spirit of my invention and I contemplate the exclusive use of all modifications as come within the scope of my claims.

I claim:

1. In an air gun, a magazine barrel, a discharge barrel, a passageway between said barrels, a member movable in said discharge barrel, and a spring engaging said discharge barrel and said member and tending to move said member rearwardly in said discharge barrel to open said passageway to admit a bullet from said magazine barrel into said discharge barrel.

2. In an air gun, a magazine barrel, a discharge barrel, a passageway between said barrels, a sleeve member slidably fitting in said discharge barrel and adapted to close or open said passageway, opposing elements on said barrel and sleeve member, a spring compressed between said elements and tending to move said sleeve member rearwardly in said discharge barrel to open said passageway to permit a bullet to enter said discharge barrel.

3. In an air gun, a magazine barrel, a discharge barrel, a passageway between said barrels, a sleeve slidably fitting in said discharge barrel and adapted to close or open said passageway, said sleeve projecting from the rear of said discharge barrel, a collar on the rear end of said sleeve, and a spring on said sleeve between said collar and the rear end of said discharge barrel tending to move said sleeve rearwardly in said discharge barrel to open said passageway between said barrels to permit a bullet to enter said discharge barrel.

4. In an air gun, a magazine barrel, a discharge barrel, a passageway between said barrels, a sleeve member slidably fitting in said discharge barrel and adapted to close or open said passageway, said sleeve member projecting from the rear of said discharge barrel and having a shoulder limiting the movement thereof into said discharge barrel, a collar on the rear end of said sleeve member, and a spring on said sleeve member between said collar and the rear end of said discharge barrel tending to move said sleeve member rearwardly in said discharge barrel to open said passageway to permit a bullet to enter said discharge barrel.

5. In an air gun, an air chamber, a discharge barrel, a passageway between said air chamber and said discharge barrel, a sleeve slidably fitting in said barrel, means limiting the forward movement of said sleeve, a plunger slidably fitting into the rear end of said sleeve, a spring compressed between said

sleeve and said discharge barrel, a second spring stronger than said first spring and compressed between said sleeve and plunger, a valve controlling said passageway between said air chamber and said discharge barrel, and a trigger mechanism, said trigger mechanism being adapted to move said plunger and sleeve as a unit forwardly to the limit of said sleeve's movement to push a bullet into firing position, and thereafter to telescope said plunger and sleeve and actuate said valve to open said passageway to discharge said bullet.

6. In an air gun, an air chamber, a discharge barrel, a valve between said air chamber and said discharge barrel, a trigger mechanism, an operative connection between said trigger mechanism and said valve, a sleeve slidably fitting in said discharge barrel and adapted to move a bullet into firing position, means on said sleeve limiting the forward movement thereof, a plunger slidably fitting into the rear portion of said sleeve, means adapting said sleeve and plunger to be moved as a unit within the range of the movement of said sleeve, said trigger mechanism engaging the rear of said plunger to move said plunger and sleeve as a unit until a bullet is moved into firing position and then to telescope said plunger and sleeve until said valve is opened and the bullet is discharged.

7. In an air gun, an air chamber, a discharge barrel, a valve between said air chamber and said discharge barrel, a trigger mechanism, an operative connection between said trigger mechanism and said valve, means in said barrel for preventing a bullet from rolling out of the barrel before the firing of the gun, a sleeve slidably fitting in said discharge barrel and adapted to move a bullet into firing position, means on said sleeve limiting the forward movement thereof, a plunger slidably fitting into the rear portion of said sleeve, a spring engaging said sleeve and said discharge barrel to thrust said sleeve rearwardly, a second spring stronger than said first spring and thrusting said sleeve and plunger apart, said trigger mechanism engaging the rear of said plunger, said plunger and sleeve being movable as a unit by said trigger mechanism until a bullet is moved into firing position and then being adapted to be telescoped by said trigger mechanism until said valve is opened and the bullet discharged.

8. In an air gun, an air chamber, a discharge barrel, a passageway between said air chamber and said discharge barrel, a valve in said passageway, a trigger mechanism, means associated with said trigger mechanism to momentarily open said valve, a sleeve slidably fitting in said discharge barrel and adapted to move a bullet into firing position, a plunger slidably fitting into the rear portion of said sleeve, said trigger mechanism engag-

ing the rear of said plunger, and means adapting said sleeve and plunger to be moved as a unit by said trigger mechanism until a bullet is moved into firing position, said trigger mechanism and associated means being adapted thereafter to move further to open said valve.

9. In an automatic repeating air rifle, a magazine barrel, a discharge barrel, a passageway between said barrels, a chamber for compressed air, a spring pressed plunger in said magazine barrel for ejecting bullets into said discharge barrel, a movable sleeve in said discharge barrel for alternately admitting a bullet through said passageway to said barrel and for sealing said passageway against the escape of air therethrough, a spring seated valve in said chamber controlling the passage of air to said discharge barrel, a trigger, mechanism directly operated by said trigger for moving said sleeve and at the same time momentarily opening said valve, and means for automatically returning said mechanism to normal position upon release of manual control of said trigger.

10. In an automatic repeating air gun, an air reservoir, a discharge barrel, a magazine barrel arranged to discharge bullets to said discharge barrel, a passage between said barrels, a member for closing said passage, a trigger, and means operated thereby for admitting a charge of compressed air from said reservoir to said discharge barrel to discharge a bullet, and means connected to said trigger for automatically moving said member to open said passage and feed another bullet to said discharge barrel immediately upon the release of said trigger.

11. In an air gun, a magazine barrel, a discharge barrel, a passageway between said barrels, a member normally spaced rearwardly from said passageway, and a trigger element connected to said member and adapted during the firing movement of said trigger to move said member forwardly to a position to restrain the entrance of bullets from said magazine through said passageway into said discharge barrel.

12. In an air gun, an air reservoir, a magazine barrel, a discharge barrel, a passageway between said barrels, a second passageway between said air reservoir and said discharge barrel, a closure member movable to and from said first mentioned passageway, and a trigger element adapted to open and close said second passageway and having an operative connection with said member for moving the same to close said first mentioned passageway to prevent the escape of air there-through.

13. In an air gun, an air reservoir, a magazine barrel, a discharge barrel, a passageway between said barrels, an air valve between said air reservoir and said discharge barrel, a sleeve in said discharge barrel, and a trigger

arm adapted to open said valve and at the same time to move said sleeve to close said magazine passageway.

14. In an air gun, a magazine barrel, a discharge barrel, a passageway between said barrels, a sleeve member slidably fitting in said discharge barrel and adapted to close or open said passageway, means on said sleeve and discharge barrel limiting the reciprocation of said sleeve in said discharge barrel, and a spring engaging said sleeve member and tending to move said sleeve member rearwardly in said discharge barrel to open said passageway to permit a bullet to enter said discharge barrel.

15. In an air gun, a breech block having spaced walls, firing mechanism including a trigger located between said walls and having an arm rigid therewith, bullet repelling elements, an operative connection between said trigger and said elements, and a pin slidable in one of said walls to and from a position in which it engages said trigger arm to prevent movement thereof and to lock said arm against accidental discharge, the movement of said connection being unrestricted by said pin.

16. In an air gun, a breech block having spaced walls, firing mechanism including a trigger located between said walls and having an arm rigid therewith, bullet repelling elements, and an operative connection between said trigger and said elements, and safety means including a lateral recess in one of said walls only, a pin slidable in said recess, a groove in said pin, and a locking element bearing against said groove to frictionally retain said pin in retracted or advanced position, the inner end of said pin in advanced position engaging said trigger arm to prevent movement thereof, and said pin being spaced a substantial distance from said operative connection in both the advanced and retracted positions of said pin.

17. In an air gun, a magazine barrel, a discharge barrel, a passageway between said barrels, a sleeve in said discharge barrel having an internal diameter less than the diameter of the proper sized bullet for the gun, the forward end of said sleeve being normally positioned rearwardly of said passageway, and a trigger element engaging said sleeve and adapted during the firing movement of said trigger to move said sleeve forwardly to engage a bullet within said barrel and place the same in firing position.

In testimony whereof I hereunto affix my signature this 14th day of April, 1930.

FRANK MIHALYI.