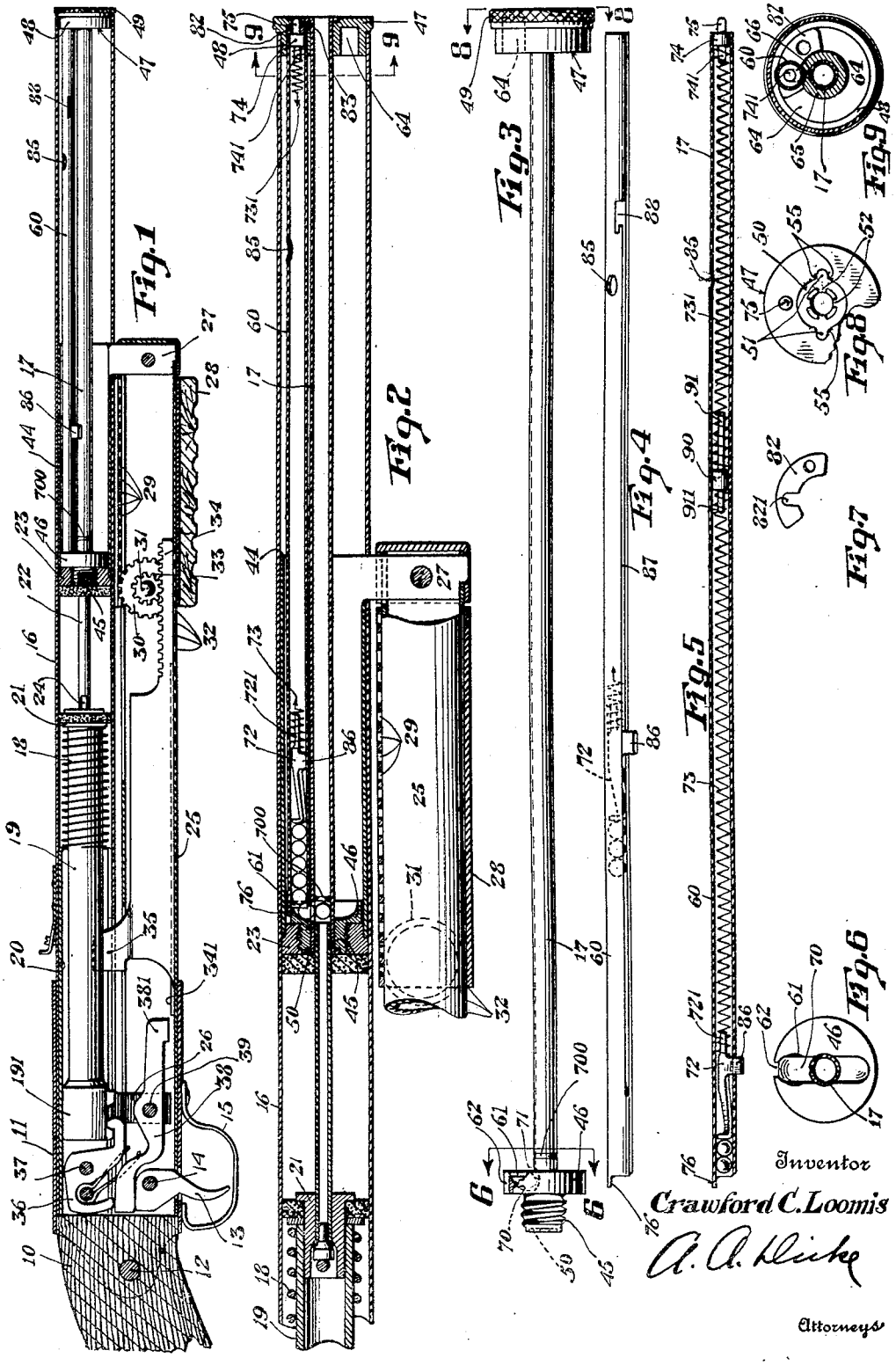
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AIR GUN

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AIR GUN

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This invention relates to spring operated air guns, and among other improvements contemplates an improved combination magazine and shooting barrel of simple and readily demountable construction.

One object of the present invention is to provide a magazine assembly which will be quickly detachable from the shooting barrel at any time for purposes of cleaning or repair.

A further object of the invention is to provide an improved barrel construction consisting of a hard drawn heavy metal tube which can be attached to the ordinary barrel ends without brazing, soldering or applying heat thereto.

A further object of the invention is to provide a novel magazine and barrel assembly which has a high torque resistance when mounting or dismounting the barrel from the gun, consequently preserving the barrel alignment.

A further object of the invention is to provide a spring for the magazine follower having joined sections of a different resistance to eliminate the possibility of the coils entering the loading entrance as well as to improve the feeding of the shots from the magazine to the barrel.

With these and other objects in view the invention consists in the novel combinations and arrangements of parts, a representative embodiment of which is shown in the drawings and will be hereinafter described. The drawings illustrate the present invention as applied to a spring operated air gun of the type shown and described in my prior copending application Serial No. 224,888, filed October 8, 1927, but it will be understood that in many respects they are of general applicability, and not limited to guns of this particular type.

In the drawings:

Fig. 1 is a fragmentary longitudinal section thru a gun of the type described in my prior application above identified, having one embodiment of the present invention applied thereto.

Fig. 2 is an enlarged longitudinal sectional elevation of a part of the mechanism shown in Fig. 1.

Fig. 3 is a view of the improved barrel and mounting devices.

Fig. 4 is a view showing the magazine assembly before it is attached to the barrel.

Fig. 5 is a longitudinal section of the magazine showing the novel construction of the magazine spring and follower.

Fig. 6 is a section line 6—6 of Fig. 3 to show the inlet port for the feeding of the shots in the shooting barrel.

Fig. 7 is a detail of a magazine securing member.

Fig. 8 is a view on line 8—8 of Fig. 3, showing the shooting barrel securing devices.

Fig. 9 is a section on line 9—9 of Fig. 2 showing the devices which lock the magazine to the barrel.

The gun comprises a stock and receiver assembly, a barrel assembly and a power applying assembly. The stock assembly includes the stock 10 and the receiver housing 11 which embraces the forward end of the stock and is secured thereto by suitable means, such as a rivet or screw 12. The receiver housing carries the trigger 13 pivoted on the pin 14, and the trigger guard 15.

The barrel assembly comprises the cylindrical housing tube or false barrel 16, which contains the true or shooting barrel 17, and a power mechanism comprising a power spring 18 which encircles the plunger 19 and is compressed between the flanged end of a fixed reinforcing sleeve 20 and a piston head 21 secured to plunger 19. A driving or piston tube 22 extends forwardly from the piston and enters an aperture in a fixed plug or bushing 23, to be hereinafter more fully described. The bushing 23 and the piston 21 are faced with leather or other material adapted to make an air tight joint with the wall of the tube 16, and thus together define an air chamber which thru the aperture 24 in the piston tube 22 communicates with the rear end of barrel 17.

The power applying unit is chiefly housed in a tubular member 25, secured below the barrel assembly tube 16 by any suitable means, such as the arms 26 and 27 depending from

the tube 16. Power is applied to cock the spring 18 by manipulation of the sliding forearm or handle 28, which encircles the tube 25 and is provided at the top with apertures 29 forming a rack engaged by a gear 30 which rotates about the floating pivot 31. Gear 30, which also engages rack teeth formed by the row of apertures 32 in the bottom of tube 25 has rigidly connected thereto a double gear 33 which is in engagement with a double rack bar 34 having near its rear end an upwardly projecting head 35 which engages the plunger 19. Upon movement of the forearm 28 a lesser movement is thus transmitted to plunger 19, the ratio of reduction of movement depending upon the ratios of the diameters of gears 30 and 33.

A sear 36 pivoted in the barrel tube at 37 is adapted to engage a suitable notch in the head 191 of plunger 19 and to be withdrawn therefrom upon the firing movement of trigger 13 by the movement of a locking lever 38, interposed between the trigger and sear. Lever 38 is pivoted at 39 and its forward end 381 is moved by the firing movement of the trigger into the path of movement of the end 341 of the rack bar 34. Thus the trigger is locked when the forearm 28 and rack 34 are displaced, and the rack and forearm are locked when the trigger is depressed.

The mechanism thus far described is substantially similar to that shown in my prior application above identified. The present invention contemplates certain variations and refinements on the construction previously disclosed, one of which comprises the novel construction of the magazine and shooting barrel assembly. The mechanism employed in this portion of the gun will now be described.

The invention contemplates a barrel assembly which is so constructed and joined that it may be screwed in place in the frame without the danger of barrel distortion which has characterized previous air guns. To this end the barrel and magazine are separate members, the barrel is a tube of relatively heavy hard drawn metal, and is articulated with the barrel assembly as follows:

The aforementioned bushing 23 is secured in or to the end of another reinforcing tube 44 which fits closely within the tube 16, and has rigid or integral therewith the power unit supporting projection 27, previously mentioned. The bushing 23 is interiorly threaded to receive a threaded nipple 45 which projects from an enlarged head or abutting piece 46 to which is secured the barrel 17. A barrel aligning end piece or cap 47 is provided at the forward end of the barrel 17 and comprises a flange 48 adapted for peripheral engagement with the housing tube 16 and a slightly projecting knurled edge 49 facilitates the removal of the barrel by turning the knurled cap 47 to unscrew nipple 45 from bushing 23. This method of mounting the barrel constitutes a distinct advance in the art. Heretofore in guns of this type the end pieces such as 46 and 47 were attached to the barrel by welding or soldering, with the disadvantages of heat distortion and permanent fastening. In the present invention these parts are mechanically and detachably secured together as follows: The end pieces 46 and 47 are countersunk (Fig. 2) to receive a locking washer, such as the washer 50, shown in Fig. 8. This washer besides its stop wings 51 is provided with a series of inwardly projecting teeth 52 which are adapted to engage with end slots made in the barrel tube 17. Substantially the length of the teeth 52 are that of the thickness of the tube. To attach the barrel to the end pieces the tube 17 is entered in the apertured end pieces 46 and 47 and the washers are located in the countersunk portions with the projections on the end of the barrel extending into the slots in the washers the washers then being secured in the countersinks by "peening" or "staking" as shown at 55 (Fig. 8).

The invention contemplates a novel construction and attachment of the magazine tube to the barrel assembly above described, the construction being characterized by added strength as well as ready accessibility and detachability.

The magazine tube 60 is adapted to lie parallel to the barrel tube 17 and is supported by the same end caps 46 and 47, the magazine tube and barrel tube 17 with the end caps forming a sub-assembly unit which can be readily secured in and removed from the gun frame. In addition to removing this unit it sometimes is desirable to detach the magazine tube from the shooting barrel. To this end the mounting of magazine tube 60 to the supporting end pieces comprises an aperture 61 (Figs. 3 and 6) made in the rear cap 46 to receive the rear end of the tube, and a slot 62 just above the aperture to receive a tongue 76 projecting rearwardly from the top of the tube. The forward end of the tube is received by a space 64 formed by the aforementioned flange 48 and a second flange 65 which encircles the barrel 17. The width of the magazine tube 60 is slightly greater than the width of space 64, and a locating recess 66 is provided in the flange or hub 65.

Into the forward end of the magazine tube is inserted a tube closing member 74 provided upon the rearward side with a spring pilot 741 and upon its front side with a locating pilot 75 adapted to enter an aperture 83 in the end piece 47. The magazine tube is positioned upon the barrel by inserting the forward end thereof into the space 64 and locating recess 66 until the end of the tube engages the inner face of the end piece 47. The rear end of the tube will then be flush with the face

of the rearward end piece 46. The tube is then drawn rearwardly, its rear end entering the recess 61 in end piece 46 and the tongue 76 entering the recess 62. A locking piece 82 (Fig. 7) is then placed between the forward end of the magazine tube and the inner face of the forward end piece 47, said locking piece being provided with a notch 821 to receive the pilot 75, which pilot is moved inward by inserting a suitable implement through the aperture 83 to permit the proper placing of locking piece 82.

The shot in the magazine tube pass one at a time through the rearward end of the tube, the dished face 70 of the end piece 46 and an aperture 71 in the barrel into firing position in the rear end of the barrel. A slight ridge 700 on the barrel wall serves to prevent the shot in the barrel rolling forward. The column of shot in the magazine tube is pressed rearwardly by the spring follower 72 provided with a finger piece 86 which projects through a slot 87 in the magazine tube. In order to load the magazine the spring follower 72 is drawn forward by means of the finger piece 86 until said finger piece reaches the bayonet slot 88 by which the spring and its follower are retained while the shot are introduced through a loading port 85.

It has been found that in magazines of the type above described having a follower urged by a single long light spring difficulties often arise due to the buckling or protruding of the spring through the loading port 85 (Figs. 4 and 5). During the retracting of the spring follower a coil of such a spring may engage with the edge of the loading port with the result that the whole spring would buckle through the said port. To overcome this defect the present invention contemplates a spring comprising a plurality of sections of progressively increasing strength and stiffness. Two such sections 73 and 731 are shown in the drawings (Fig. 5). The two spring sections are joined by a connector 90, provided with forwardly and rearwardly extending pilots 91 and 911. The spring 731 is more stiff and resistant to distortion than spring 73. The action of the novel spring unit is as follows:

When the follower 72 is moved forward toward loading position, the rearward light spring 73 is first compressed. Toward the end of its compression the heavier spring 731 begins to be displaced, the long forward pilot 91 moving below the loading port 85 and positively preventing the buckling of the spring through the loading port. When the forward section 731 is fully compressed the pilot 911 abuts a pilot 721 on the follower 72, and buckling of the light spring 73 is positively prevented. Similarly pilot 91 abuts pilot 741, properly aligning spring 731.

While the form of mechanism herein described is admirably adapted to fulfill the objects stated, it is to be understood that it is not intended to confine the invention to the one form of embodiment herein shown, since it may be embodied in various forms, all coming within the scope of the claims which follow.

What is claimed is:

1. In an air gun, a detachable barrel assembly unit comprising a shooting barrel, end pieces rigidly secured to said barrel, a magazine tube detachably secured between said end pieces, a recess in the rear end piece and an aperture in the barrel communicating therewith, for the passage of projectiles from said magazine to said barrel.

2. In an air gun, a removable barrel assembly unit comprising a shooting barrel, apertured end pieces adapted to receive the ends of said barrel, washers adapted to be secured to the ends of said barrel, and recesses in said end pieces adapted to receive said washers.

3. In an air gun, a barrel assembly unit comprising a shooting barrel, apertured end pieces adapted to receive the ends of said barrel, washers adapted to receive the ends of the barrel and recesses in the end pieces adapted to receive the washers, the arrangement being such that when in assembled relation the barrel, end pieces and washers are secured against relative rotation.

4. In an air gun, a barrel assembly comprising a shooting barrel, apertured end pieces adapted to receive the ends of said barrel, washers adapted to be placed on the ends of said barrel, cooperating tongues and grooves on said barrel ends and said washers, outwardly extending projections on said washers and recesses in said end pieces adapted to receive said washers and said projections thereby securing the barrel, the end pieces and the washers against relative rotation.

5. In an air gun, a barrel assembly unit comprising a shooting barrel and end pieces adapted to be secured thereon, a magazine tube, a recess in the front end piece adapted to receive one end of said magazine tube, said tube being of such a length as to clear the rearward end piece when fully inserted in said recess, a recess in the rearward end piece adapted to receive the rear end of said tube and a locking piece adapted to be interposed between the front end of said tube and the bottom of its recess thereby locking the magazine tube in place.

6. In an air gun, a barrel assembly unit comprising a shooting barrel and end pieces secured thereto, a magazine tube adapted to be secured between said end pieces and parallel with said barrel, a spring in said magazine tube, a movable spring abutment in the forward end of said tube, a pilot projecting outwardly from said abutment and an aperture in the forward end piece adapted to receive said pilot.

7. In an air gun a barrel assembly unit

comprising a shooting barrel and end pieces rigidly secured thereto, recesses in said end pieces adapted to receive the ends of a magazine tube, a magazine tube adapted to be assembled in said unit by first being inserted in the forward recess, moved into alignment with the rearward recess and then retracted into the rearward recess, a floating spring abutment in the forward end of said magazine tube provided with an outwardly extending pilot, an aperture in the forward end piece adapted to receive said pilot and a locking piece adapted to be inserted between the forward end of the magazine tube and the bottom of its recess when said tube is retracted into the rearward recess, said locking piece being provided with a notch to receive the projecting pilot and permit its entry into the end piece aperture.

8. In an air gun, a barrel assembly unit comprising a shooting barrel, a magazine tube in communication with the rear end of said barrel and adapted to contain a column of projectiles, a spring follower in said magazine tube comprising a plurality of spring sections of progressively increasing resistance to deformation, said spring sections being joined to each other by floating abutments provided with forwardly and rearwardly extending spring pilots.

9. In an air gun magazine adapted to contain a column of projectiles, a spring device for moving said projectiles toward one end of said magazine comprising a plurality of spring sections of progressively increasing resistance to deformation, said spring sections being joined by floating abutments provided with extending spring pilots, a projectile follower provided with a spring pilot interposed between the rearward spring and the column of projectiles, an operating finger piece extending from said follower, a slot in the magazine tube adapted to receive said finger piece and permit the retraction of said spring device, the arrangement being such that when said device is fully retracted the spring pilots associated with each spring section are in abutment with each other within the coils of their respective springs.

10. In an air gun magazine adapted to contain a column of projectiles, a spring device for urging said projectiles toward one end of said magazine, a loading port in the side wall of said magazine, an operating finger piece for retracting said spring device past said port, and a floating spring abutment provided with spring pilots extending internally of said spring device and effective to prevent the buckling of said spring device through said loading port.

11. In a gun, in combination, a magazine tube adapted to hold a column of projectiles and provided with a loading port in the side wall thereof, a follower in said tube comprising a coil spring consisting of a plurality of sections of progressively increasing resistance, and means operable on compression of said spring to prevent buckling of said spring through said port.

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