Jan. 18, 1955 B. MANGOLINI 2,699,767

SEMIAUTOMATIC AIR GUN

Filed June 17, 1953

2 Sheets-Sheet 1

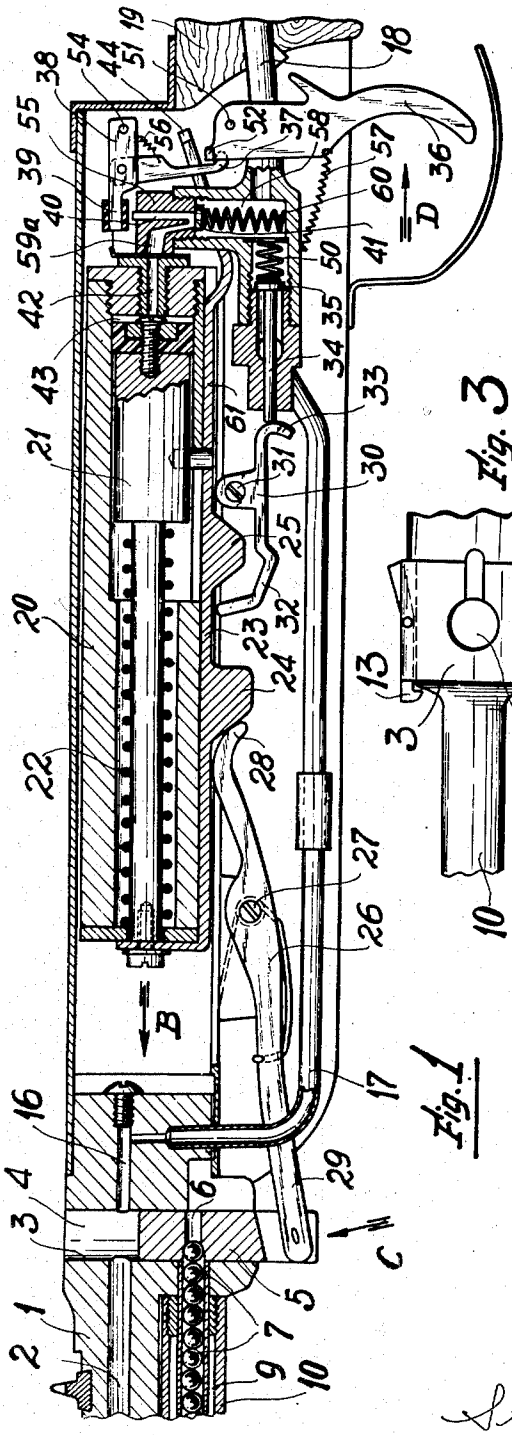


Fig. 1

Fig. 3

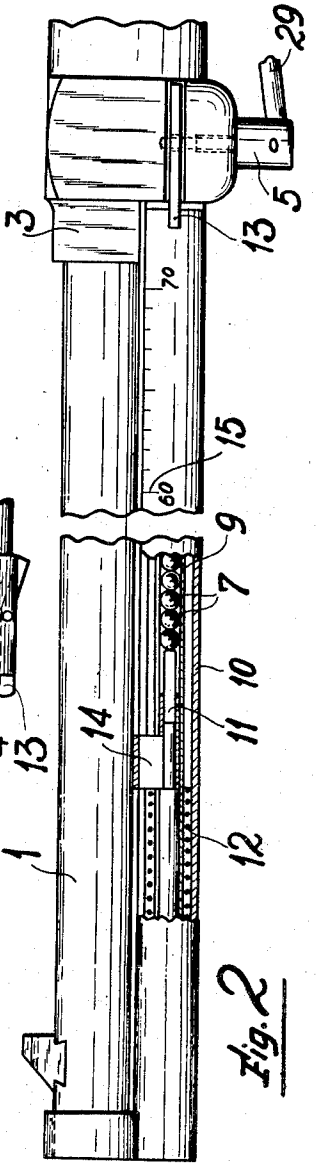


Fig. 2

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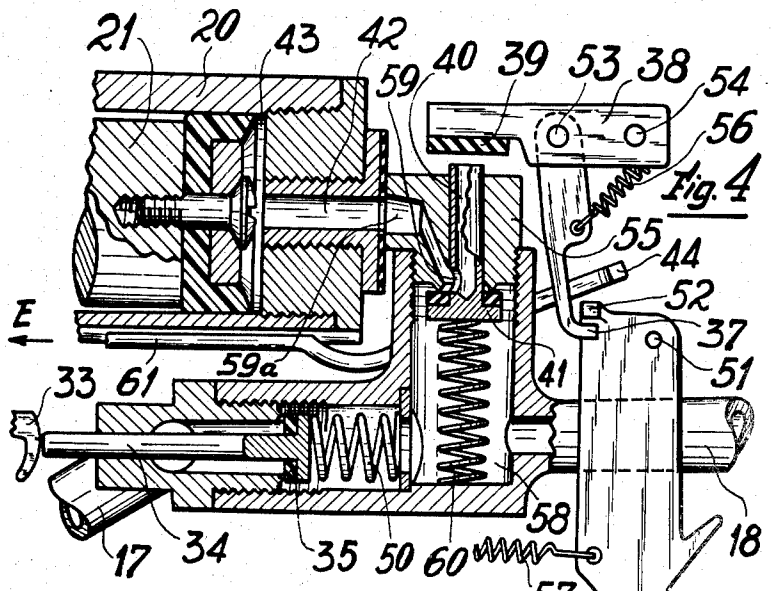


Fig. 4

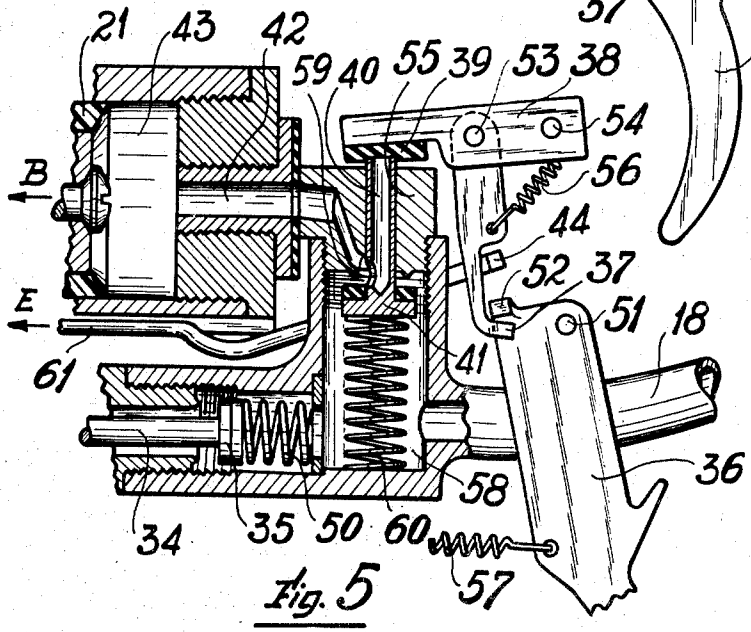


Fig. 5

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United States Patent Office

2,699,767

Patented Jan. 18, 1955

2,699,767

SEMIAUTOMATIC AIR GUN

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Application June 17, 1953, Serial No. 362,300

6 Claims. (Cl. 124—11)

The present invention relates to carbines or shooting rifles of the type that utilizes, for propelling the missiles, the elastic expansion of previously compressed air; in particular, the present invention relates to a carbine which is destined to be employed for target shooting practice, in public entertainment resorts or elsewhere.

More specifically, the present invention has for an object to provide an air gun of the kind and for the purpose stated above, adapted to be supplied continuously with compressed air from a suitable source (e. g. by separate compression means, for instance, a power compressor of the type employed for inflation of vehicle tires or for similar purposes) and comprising means serving to permit the firing of a succession of shots by simple successive actuations of the trigger with automatic reloading and re-cocking.

A further object of the invention is to provide an air gun of the above mentioned kind, having in combination with means as last mentioned, means serving to prevent the automatic actions from being altered, thus inhibiting any irregular succession thereof and affording absolute dependability in operation and use.

The invention has for yet another object to provide an air gun having the above mentioned advantageous features of operation and dependability, which is adapted for comparatively simple and economic production and comprises parts capable of withstanding long use, without appreciable reduction of efficiency.

The invention accordingly provides an air gun having a magazine for a plurality of missiles, plunger means for carrying one missile at a time from said magazine into the breech, valve means adapted to put a propulsion chamber in communication with a compressed air source, a pneumatically controlled mechanism acting in succession, upon said plunger means and said valve means and upon a device which will temporarily disengage the trigger, and a trigger-actuated lever system adapted to operate further valve means serving to put the pneumatic control in communication with the compressed air source and cause said mechanism to operate the plunger means and the valve means, said mechanism further comprising an element adapted to disengage said lever system from the trigger for re-cocking so as to effect a complete operating cycle at every pressure upon the trigger.

The foregoing and other features of the air gun according to the present invention will be more clearly understood from the following description by way of example of a preferred embodiment with reference to the attached diagrammatic drawing, wherein:

Figure 1 shows the stock portion of the air gun with the mechanism therein in section on the axis of the barrel;

Figure 2 shows the barrel portion of the gun in side view and partly in section;

Figure 3 shows a detail, seen in the direction of the arrow A in Figure 2;

Figure 4 is an enlarged detail vertical sectional view of the trigger actuated pneumatically controlled mechanism shown in a rest position, and

Figure 5 is a view similar to Figure 4 and showing the parts in an operating position, i. e., shooting a missile.

The gun as shown in the drawings comprises a barrel 1, the bore 2 of which at the breech 3 opens into a vertical cylindrical aperture 4 in which is slidable with a tight fit a plunger 5 having a diametral passage 6, the front part of which is shaped in such manner as to receive one at a time of a series of small balls 7 constituting spherical missiles to be propelled.

Below said barrel is arranged a magazine comprising two tubes, namely, an inner tube 9 and an outer concentric tube 10. Within the tube 9 there is slidable a feed member 11 which is urged rearwards by a spring 12 enclosed between said tubes. The magazine is readily detachable, being engaged with the lower portion of the breech 3 by means of resilient lever hooks 13 (Figures 2 and 3).

In view of the small diameter of the balls 7 and the considerable length of the magazine, the latter can contain balls in a sufficient number for the execution in succession of some dozens of shots. The gun is also adequately provided with means for indicating the number of missiles remaining in the magazine, which comprises a radial projection 14 from the feed member 11 projecting through both tubes 9 and 10 which for this purpose have lengthwise slots. The position of the projection 14 referred to a scale 15 marked upon the outside surface of the magazine establishes the length of the space occupied by the remaining missiles 7 and, therefore, with a good approximation, their number.

Behind the aperture 4 in the breech, a passage 16 is arranged coaxially with the bore 2, in communication through a pipe 17 and a valve system which will later be described, with a duct 18 that extends through the butt 19 of the gun and is adapted to be connected by means of a flexible conduit with a power compressor or other suitable compressed air source.

The plunger 5 is displaceable within the aperture so as to take up the position shown in Figure 1 where passage 6 is coaxial with inner tube 9 of the magazine and therefore can receive a missile 7 pushed thereinto by the feed member 11 through any other missiles remaining in the magazine and alternatively a higher position wherein said passage 6 is coaxial with and connects compressed air feed passage 16 and the bore 2.

The carbine includes also a control assembly, comprising a cylinder 20 wherein a slidable an air-tight piston 21 which is urged rearwardly by a spring 22 and is firmly connected with a slide piece 23 having two cam shaped projections 24 and 25. The assembly also comprises a loading lever 26 turnable on a pivot 27, the rear end 28 of which is subjected to the action of the cam 24 and the front end 29 of which is firmly articulated to the lower end of the plunger 5, and an air valve lever 30 turnable on a pivot 31, its front end 32 being subjected to the action of the cam 25, while its rear down-turned end 33 acts upon the stem 34 of a valve 35. The latter is normally closed by a spring 50 to interrupt communication between the pipe 17 and duct 18. As will be seen in Figure 1, the cams 24 and 25 are arranged and shaped, relative to ends 28 and 32 respectively of levers 26 and 30, so that, when piston 21 and therefore slide pieces 23 move forward in the direction of arrow B, the cam 24 acts to displace in the direction of arrow C the arm 29 of lever 26 to such extent as to bring the passage 6 from the position shown in Figure 1 to the alternative position coaxial with bore 2, before the cam 25 starts to act upon the end 32 of lever 30 for opening the valve 35.

As shown particularly in Figures 4 and 5, the actuating mechanism of the gun comprises a trigger 36 which is pivoted at 51 and is provided with a hook 52 that is laterally offset from the upper end thereof. The hook 52 engages the lower hook end of a lever 37 which is pivotally attached at its upper end, as at 53, to a second lever 38. The lever 38 is pivoted on a fixed pivot 54 and has a front end which supports a plug packing 39. The plug packing 39 is adapted to close off the upper end of a small tube 40 which is slidingly disposed in a block member 55. The hook lever 37 is moved toward the hook 52 by a spring 56 which also holds the packing 39 away from the tube 40 and the trigger 36 is retained in its normal position by a spring 57.

The tube 40 has an integral, diametrically enlarged solid head member 41 at its lower end which head member forms a plug designed to close off communication between a chamber 58, in which the conduit 18 ends, and a passage 42, which terminates in the chamber 43 of the cylinder 20, located behind the piston 21. The tube 40 is also formed with a radial opening 59, adjacent the head member 41, which opening 59 communicates with

the passage 42 and the chamber 43 through a diagonal passage 59a in the block member. The valve 41 and the valve 35 are normally retained closed by springs 60 and 50, respectively. The actuating mechanism further includes a hook 44, which is formed by the rear end of an extension 61 of the slidable piece 23. The hook 44 is arranged so that as the piece 23 is shifted in the direction, indicated by the arrow E (Fig. 5) and in accordance with the movement in the direction B of the piston 21, it shifts the hook lever 37 and disengages it from the hook 52 of the trigger.

The gun as described operates as follows: its different parts, when at rest, are in the position shown in Figure 1 and flow of compressed air supplied to conduit 18 is stopped by valves 35 and 41 which prevent its passage into pipe 17 and passage 42. By pressure as usual in the direction of arrow D, upon trigger 36, the latter is caused to lower, by means of small lever 37, the small lever 38, the plug 39 of which will come into contact with the upper end of small tube 40, closing it and causing it to move downwards. This movement opens the small valve 41, which permits the compressed air to flow into chamber 43 of the cylinder and to displace piston 21 forwardly in the direction of arrow B by the means above described. Such forward movement brings about, firstly, lifting of the plunger 5 until a missile 7 is brought to shooting position, secondly, opening of valve 35 to permit flow of compressed air into passage 16 and therefore the projection of the same missile, and, thirdly, disengagement of small lever 37 from the trigger, due to the action of the hook 44. The latter movement, by permitting the lever 38 to rise again, closes the small valve 41 and opens communication, through the passage 42 and small tube 40, between chamber 43 and the atmosphere so that piston 21 is moved backwards by spring 22, bringing all the other parts to the starting position. All these operations take place in very quick succession, so that practically the propulsion of the ball is not subject to any delay, relative to the trigger action. In order to fire a further shot, it is necessary only to release the trigger for effecting its re-engagement with small lever 37 and, therefore, each pressure upon the trigger effects one shot only.

The gun according to the present invention has been described with reference to the accompanying drawings only as an exemplary embodiment and without limitation. It will be understood that constructional modifications and variations may be made without exceeding the scope of the invention as defined in the appended claims.

What I claim is:

1. An air gun comprising a gun barrel having a breech at the rear end of the bore thereof, a magazine attached to the barrel and adapted to house a plurality of missiles, plunger means for carrying one missile at a time from said magazine into the breech, valve means adapted to place the rear end of the gun barrel in communication with a source of compressed air, a pneumatically controlled mechanism actuating the plunger means and the valve means in succession, a trigger, a lever system actuated by the trigger, a second valve means actuated by the lever system for placing the pneumatically controlled mechanism in communication with the source of compressed air and causing said mechanism to be operated for actuating the plunger means and first valve means, and means actuated by the pneumatically controlled mechanism, after the actuation thereby of the plunger means and the first valve means, for disengaging the lever system from the trigger.

2. An air gun as claimed in claim 1, wherein said mechanism comprises a cylinder, a piston workingly disposed therein, a slide piece carried by the piston, cam shaped projections on the slide piece and means actuated by said projections and connected to the plunger means and first valve means for actuating the plunger means and the first valve means.

3. An air gun as claimed in claim 1, wherein said lever system includes a swinging lever engageable with and actuated by the trigger, a second lever actuated by said swinging lever to operate said second valve means whereby upon movement of the trigger compressed air is supplied to the pneumatically controlled mechanism, said swinging lever being disengaged from the trigger by the means actuated by the pneumatically controlled mechanism, and means responsive to the disengagement of the swinging lever from the trigger for disconnecting the pneumatically controlled mechanism from the source of compressed air and venting it to the atmosphere.

4. An air gun as claimed in claim 1, wherein said magazine is disposed below the barrel and includes a spring urged feed means, said feed means including an externally visible indicator for visibly indicating the length of the magazine occupied by the remaining missiles.

5. An air gun as claimed in claim 1, wherein the magazine is detachably secured at its ends to the barrel.

6. An air gun comprising a gun barrel having a breech at the rear end of the bore thereof, a magazine attached to the barrel and adapted to house a plurality of missiles, plunger means operating between the magazine and the breech for carrying one missile at a time from the magazine to the breech, valve means for placing the rear end of the barrel bore in communication with a source of compressed air, a pneumatically controlled mechanism successively actuating the plunger means and the valve means, a trigger, a lever system actuated by the trigger, a second valve means actuated by the lever system for placing the pneumatically controlled mechanism in communication with the source of compressed air, an element carried by the pneumatically controlled mechanism for temporarily disengaging the lever system from the trigger after actuation of the plunger means and the first valve means, and means responsive to such disengagement for interrupting the communication of the pneumatically controlled mechanism with the source of compressed air and for venting such mechanism to the atmosphere.

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