

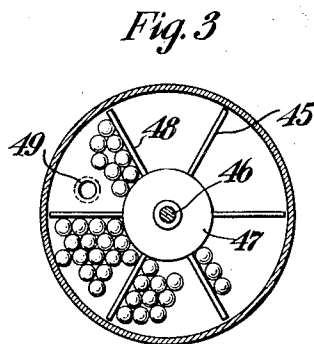
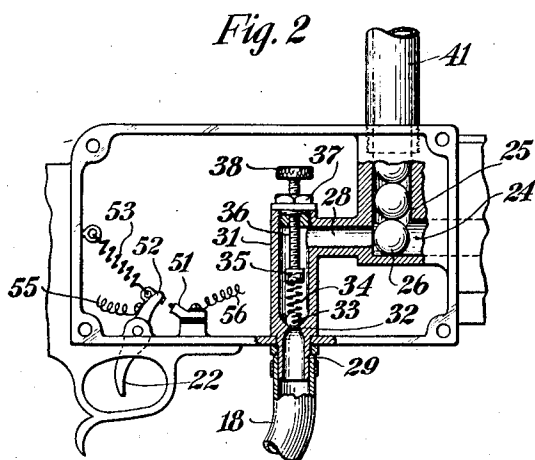
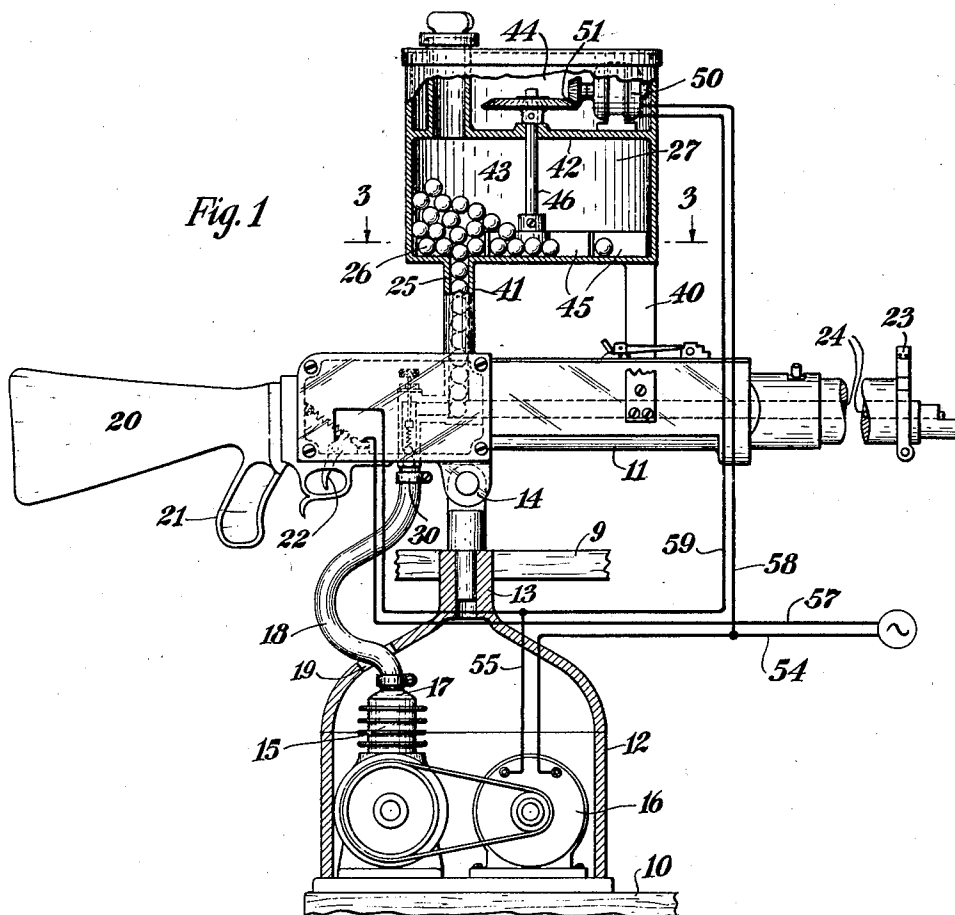
Jan. 14, 1930.

R. B. SMITH

1,743,576

PNEUMATICALLY ACTUATED MACHINE GUN

Filed July 14, 1927



INVENTOR
Robert Bigham Smith,
BY
Warren S. Ostou.
ATTORNEY

UNITED STATES PATENT OFFICE

ROBERT BIGHAM SMITH, OF ATLANTA, GEORGIA

PNEUMATICALLY-ACTUATED MACHINE GUN

Application filed July 14, 1927. Serial No. 205,832.

The invention relates in general to a machine gun of the pneumatically actuated type, and the invention specifically relates to such a form of gun particularly designed as a military training device and as an amusement device for use in shooting galleries and the like.

It has been known to feed projectiles, sometimes in the form of spherical balls, to the gun barrel and project the same by means of air or gas under pressure sometimes by means of an air pump but more often by means of an exploded charge of gas. These known devices have the disadvantage in that the gases so discharged are obnoxious especially in close quarters and otherwise such devices are not designed for indoor use. Such devices which depend upon an air pump for supplying the projectile propelling air are not particularly designed nor adapted for economic operation should an attempt be made to utilize them as amusement devices or in a shooting gallery. Should the small air pump of the known art be enlarged to generate air under compression as would discharge the projectile for any material distance, the size of such an air pump and the cost of operating it would be prohibitive as a shooting gallery equipment.

Accordingly, the primary object of the invention is to provide an extremely simplified form of pneumatically actuated gun and actuating mechanism which can be marketed as a complete, compact and inexpensive unit and installed for use within doors; which can be operated economically and continuously and which will simulate the action of a rapid fire machine gun of conventional form.

Broadly, this invention is attained by providing a condenser of relatively small volumetric capacity and a motor for driving the same forming an air pressure generator—capable of instantly generating sufficient pressure to discharge the projectiles to the requisite distance. The compressor is in direct fluid connection with the gun barrel and interposing therebetween is a normally closed spring resisted valve which will permit the accumulation of pressure in rear of the same and delay the discharge until such pressure

has reached a pre-determined point at which it is automatically released into the gun barrel to act on the projectile therein.

Another object of the invention and also featuring economy in operation is to provide a form of control to simulate the usual trigger operation so that pressure on the trigger finger will cause the compressor to function and the gun to discharge simulating the action of conventional forms of guns.

Still another object of the invention is to provide a projectile feeding magazine which will insure a constant feeding of the projectiles to the gun barrel irrespective of the rate at which they are discharged from the barrel.

Broadly, this phase of the invention is attained by agitating the projectiles in the magazine during the time the gun is in operation and preferably by controlling the agitation by the firing control, in this instant by actuating the trigger, which also controls the functioning of the air compressor.

Various other objects and advantages of the invention will be in part obvious from an inspection of the accompanying drawings and in part will be more fully set forth in the following particular description of one form of mechanism embodying my invention, and the invention also consists in certain new and novel features of construction and combination of parts hereinafter set forth and claimed.

In the accompanying drawing:

Fig. 1 is a view partly in side elevation and partly in vertical section of a construction illustrating a preferred embodiment of the invention;

Fig. 2 is an enlarged detail view taken in vertical section showing the receiving or breach end of the gun barrel and the associated trigger control for the compressor and agitator; and

Fig. 3 is a horizontal sectional view of the magazine and agitator taken on the line 3—3 of Fig. 1.

It is understood that the construction as shown in Fig. 1 is intended to be a complete marketable unit designed to be installed in position with a part extending below a counter 9 with the bottom of the unit rest-

ing on a support 10 and with the gun proper 11 extending above the counter 9. The unit includes a mechanism containing casing 12 with its upper portion reduced to form an upstanding socket 13 designed to receive one
 5 element of a swivel joint 14 forming part of the replaceable gun. Contained within the casing 12 is a relatively small air compressor 15 of the reciprocating single piston type
 10 operatively connected to be driven conventionally from a small electric motor 16. To the upper, discharge end 17 of the compressor extends a flexible tubing 18 intruded through an opening 19 in the casing 12 and
 15 leading to the gun which is pivotally mounted by means of swivel joint 14 so as to permit universal aiming of the gun as is usual in such constructions. The gun is designed to simulate a conventional form of machine
 20 gun and includes stock 20, handle 21, trigger 22, sight 23 and other usual parts. The gun barrel 24 is provided adjacent its rear or stock end with a projectile feeding conduit 25 opening through the top of the casing and
 25 adapted to receive projectiles 26 fed thereto one by one from the magazine 27 hereinafter more fully described. The rear end of the gun barrel is defined beyond the conduit 25 by an L-shaped air conduit 28, the lower end
 30 of which is formed into a nipple 29 projecting downwardly through the casing and to which is affixed the upper, free end of the conduit 18, demountably secured in position by a strap 30. The upstanding portion 31
 35 of the conduit 28 has its bore constricted to provide a valve seat 32 on which is normally seated a spherically shaped valve 33 maintained on its seat by a compression spring 34. The upper or opposite end of the spring 34 is
 40 set in adjustable position by means of a stop 35 in turn adjusted by a set screw 36 which is threaded through a nut 37 screwed into the upper end of the arm 31 and rotated by means of a knurled head 38.

45 From this construction it is seen that the valve 33 will be held in spring pressed engagement with its seat until the air pressure in the conduit 18 is sufficient to move the valve
 50 off its seat into open position and thus permit the accumulated charge of compressed air to act upon the projectile which is in position in the gun barrel as shown in Fig. 2 to discharge the projectile from the gun barrel.

55 The magazine 27 is in the form of a cylindrical drum supported from the gun 11 by means of brackets 40 so as to move with the gun and maintain a projectile chute or conduit 41 in communication with the conduit
 60 25 so as to supply projectiles in a continuous stream and one after the other to the gun barrel. The projectiles may be permitted to flow conventionally to the gun barrel by gravity but where the gun is intended to discharge
 65 the projectiles in rapid sequence it is

suggested that some suitable means be positioned in the magazine in order to maintain the mass of projectiles or at least the layer thereon on the bottom of the reservoir in a state of agitation and thus insure the rapid
 70 filling of the conduit 41.

In the illustrated case the magazine is divided by means of a partition 42 into a lower projectile containing compartment 43 and into an upper agitator mechanism contain-
 75 ing compartment 44. The agitator 45 positioned in the compartment 43 includes an upstanding centrally positioned driving shaft 46 journaled in the partition and to the lower end of which is secured a hub 47 and
 80 agitating blades 48 extend regularly from the hub. As these blades rotate under the turning action of the shaft, they will tend to sweep the projectiles across and into the intake end of the conduit 41. Positioned in
 85 the compartment 44 is an agitator motor 50 connected by a gear drive 51 with the shaft 46.

It is intended that the device thus disclosed is to be connected to an electric light circuit or other suitable force of electric energy for
 90 driving the motors 16 and 50 and so that the opening and closing of the circuit may be governed by the trigger action of the gun. For this purpose the motors 16 and 50 are connected in parallel and controlled by a
 95 circuit closer 51. The movable element 52 of the circuit closer forms a continuation of the trigger finger 22 of the gun as particularly shown in Fig. 2. The movable element 52 is normally maintained in circuit open
 100 position by means of a retractile spring 53.

Describing the electric wiring it is noted that a main lead 54 from the socket or other source of current leads to the motor 16, from
 105 the motor 16 conductor 55 leads to the movable element of the circuit closer 51. Conductor 56 leads from the fixed element 52 of the circuit closer and constitutes the return to the main line 57. Shunt leads 58 and 59
 110 extend from the main leads on opposite sides of the motor 16 and include the agitator motor 50.

In operation, the gun is aimed conventionally and by pressing on the trigger finger 22 the circuit is closed through both motors
 115 which simultaneously starts both the compressor and the agitator. At the beginning of the upward or compression stroke of the compressor the pressure is not intended to be sufficient to overcome the closing resistance
 120 of the spring 34. The tension of this spring has previously been adjusted so that the valve will open, preferably at the instant maximum pressure is attained in the conduit 18. It is obviously possible, however, by adjusting the
 125 screw 36 to regulate the opening movement of the valve even to the extent of requiring several strokes of the compressor piston to accumulate the required pressure to open the valve. In this case, of course, the compressor
 130

would have to be provided with a conventional form of non-return valve at its outlet, but the preferable structure is to provide an extremely simplified and thus cheap form of compressor without valves and to have a direct fluid connection between the compressor and gun and thus eliminate any necessity of a reservoir of compressed air usually used in such constructions.

By means of the device of the class disclosed, there has been avoided any necessity of providing air pressure tanks and the sealing means for defeating leakage in such tanks and connections therewith. The pressure is not generated until about to be used. A continual supply of projectile ejecting air is being generated only while the gun is in active operation and the generation of compressed air is interrupted automatically and promptly simply by releasing the trigger. It is this interruption of air pressure generation which causes the cessation of the firing operation. The entire operation is automatic. It is simply required of the operator that he press on the trigger finger as is usual in the firing of machine guns and the firing operation will continue as long as there are projectiles in the magazine. Should it be desired to change range or the rate per unit of time at which the projectiles are ejected, it is simply necessary to adjust the tension of spring 34 by rotating head 38 of its set screw. Should it be desired to actuate the gun to discharge one projectile at each actuation of the piston, the tension of the screw is adjusted so that the valve will open at a pressure equal to or less than the maximum pressure generated by the compressor at each actuation of its piston and if it is desired to shorten the range, tension of the spring is further released so that the gun barrel is in open communication with the compressor at any desired pressure less than the maximum.

I claim:

1. In a pneumatic gun for use in shooting galleries and the like, the combination of a mechanism containing casing, an air compressor and a motor for driving the same contained in said casing, a gun including barrel, stock, trigger and sights mounted on said casing, a swivel joint connection between the casing and gun, a projectile magazine carried by the gun barrel and movable therewith, an agitator and a motor for driving the same both contained in said magazine, said magazine operatively connected to the gun barrel, for supplying projectiles to the gun barrel, a flexible conduit leading from the compressor extending through the casing and discharging into the bore of the barrel to supply projectile ejecting air thereto and a control actuated by the trigger for causing both motors to function.

2. In a pneumatic gun of a non-explosive type, the combination of a gun barrel, means

for feeding projectiles automatically to said barrel, an air compressor of the reciprocating piston type constituting the sole source of compressed air for discharging the projectiles, said compressor having its discharge end in fluid communication with said barrel for intermittently delivering a charge of projectile propelling air to the barrel, whereby at each compressor stroke of the compressor piston a projectile is discharged from the gun, and the gun will fire with the rapidity of the actuation of the compressor and means for automatically shutting off communication between the compressor and gun barrel on each air intake stroke of the compressor.

3. In a pneumatic gun of a non-explosive type, the combination of a gun barrel, means for feeding projectiles automatically to said barrel, an air compressor of the reciprocating piston type capable of generating a charge of compressed air under pressure sufficient to discharge the projectiles from the gun barrel, said compressor having its discharge end in fluid communication with said barrel for intermittently delivering a charge of compressed projectile propelling air to the barrel, whereby at each compressor stroke of the compressor piston a projectile is discharged from the gun, and the gun will fire with the rapidity of the actuation of the compressor.

4. In a pneumatic gun, the combination with a gun barrel mounted for aiming and provided with a trigger, of an air compressor for supplying projectile propelling air to the gun barrel, an electric motor for driving the compressor, and means forming an electric circuit including said motor and a circuit closer controlled by said trigger whereby the supply of air to the gun barrel is controlled by the actuation of the trigger of the gun.

5. In a pneumatic gun, the combination with a gun barrel, of means for supplying to the gun barrel air under pressure, a magazine for supplying projectiles to the gun barrel and rotary means including an electric motor for driving the same housed within the magazine for agitating the projectiles therein.

6. In a pneumatic gun, the combination with a gun barrel, of means including an electric motor for supplying projectile propelling air to the gun barrel, a magazine for supplying projectiles to the gun barrel, means including an electric motor for agitating the projectiles in the magazine, and means forming an electric circuit and including both of said motors and a single manually actuated control.

7. In a pneumatic gun, the combination of a gun barrel, means for feeding projectiles thereto, an air compressor, a valve normally closing communication between the compressor and barrel, a spring tending to maintain the valve closed, said valve movable into open position when the air pressure from the compressor and acting on the valve is sufficient

cient to overcome the closing effect of said spring.

8. In a pneumatic gun, the combination of a gun barrel, means for feeding projectiles thereto, an air compressor, a valve normally closing communication between the compressor and barrel, a spring tending to maintain the valve closed, said valve movable into open position when the air pressure from the compressor and acting on the valve is sufficient to overcome the closing effect of said spring, and means for adjusting the tension of said spring thereby to regulate the pressure of the air admitted to the gun barrel.

9. In a pneumatic gun, the combination of a gun barrel, means for feeding projectiles to said barrel, a source of compressed air leading to said barrel for expelling the projectiles therefrom and spring regulated control means between said source and said projectile feeding means for automatically regulating the projecting force of the air admitted to the barrel.

10. In a pneumatic gun, the combination of a gun barrel, a compressor for supplying air to the barrel to propel projectiles therefrom, a valve normally closing communication between the compressor and barrel and responsive to a definite pressure generated by the compressor and acting on the valve to move the same into an open position, and thus permit the air at such definite pressure to act on the projectile at the time being in the barrel.

11. In a pneumatic gun, the combination of a gun barrel, an air compressor, a short length of conduit providing a direct fluid connection between the compressor and barrel to supply projectile forcing air thereto, means for supplying a stream of projectiles, one by one to said barrel and means controlled automatically by the pressure of said air for causing said projectiles to be ejected successively from the barrel.

Signed at Atlanta in the county of Muscogee and State of Georgia this 30th day of June A. D. 1927.

ROBERT BIGHAM SMITH.

50

55

60

65