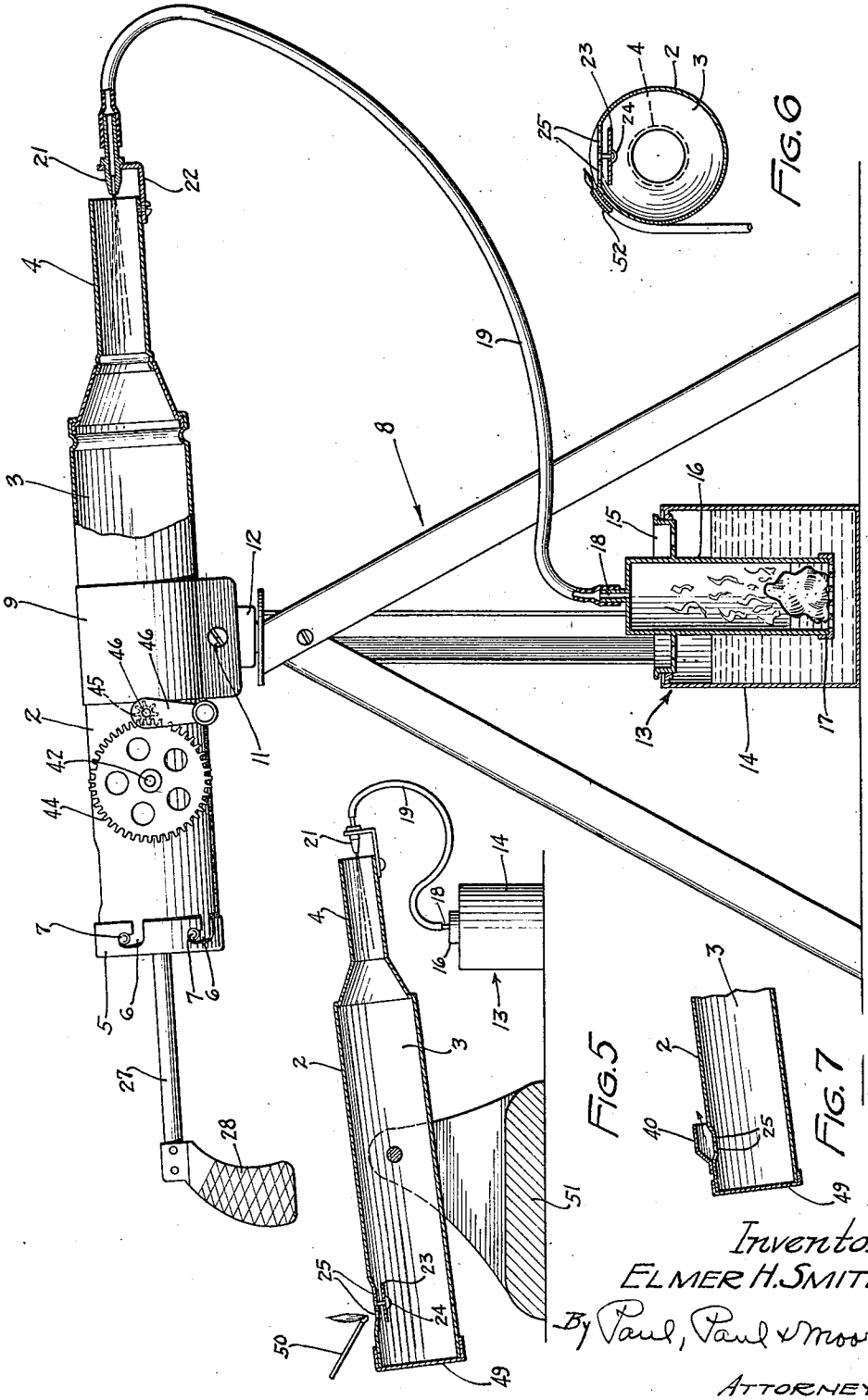
Oct. 18, 1932. E. H. SMITH 1,883,029

TOY MACHINE GUN

Filed Sept. 5, 1931 2 Sheets-Sheet 1



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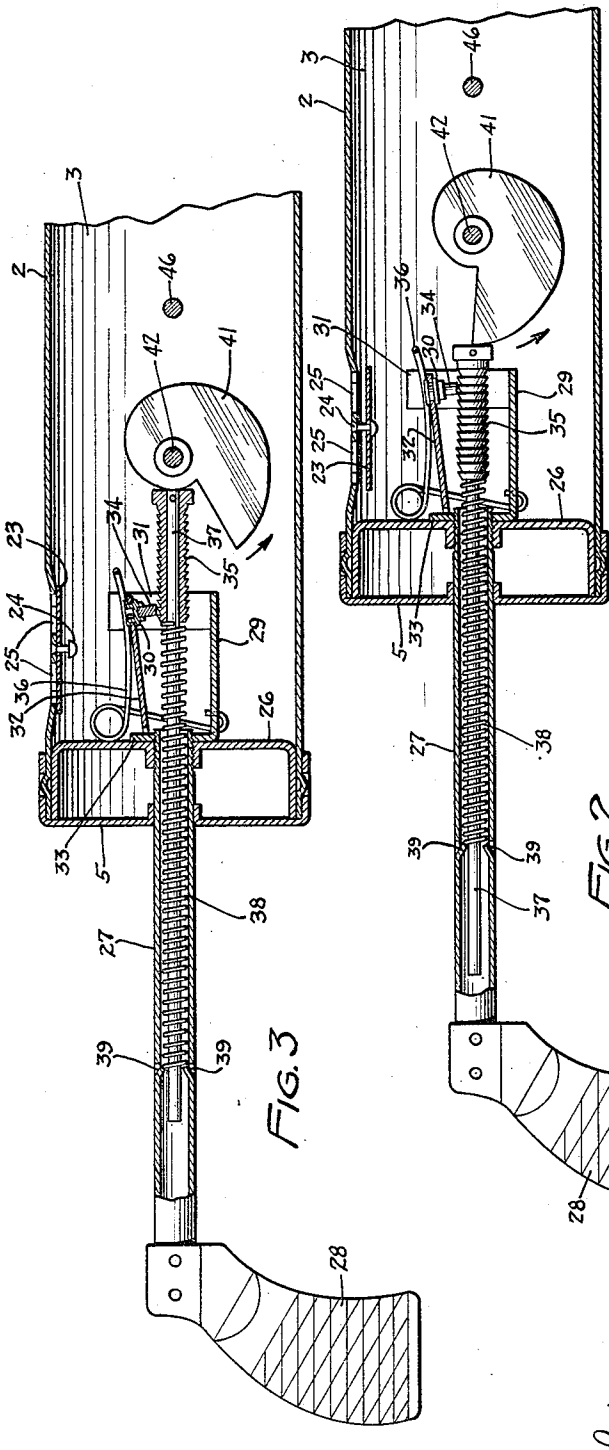


FIG. 3

FIG. 2

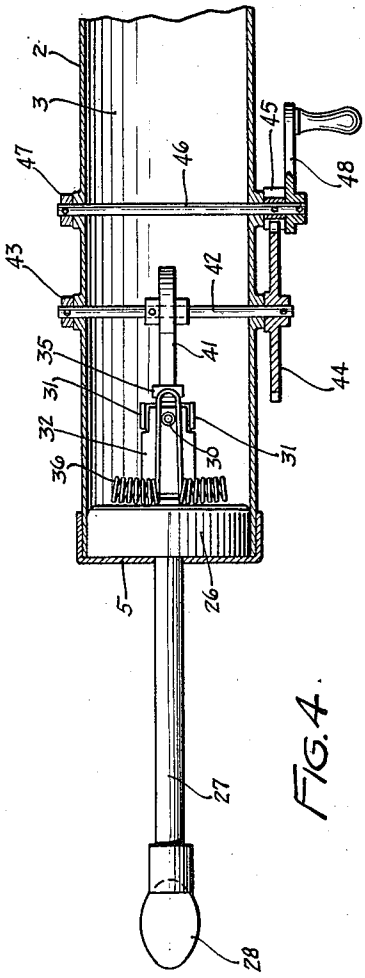


FIG. 4

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UNITED STATES PATENT OFFICE

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TOY MACHINE-GUN

Application filed September 5, 1931. Serial No. 561,420.

This invention relates to an improved toy machine gun adapted to use an explosive gas such as a mixture of acetylene and air for charging or loading it.

An object of the invention is to provide a toy gun comprising a body portion having a chamber therein and provided at one end with a barrel which communicates with said chamber, and means being provided at the discharge end of the barrel for projecting a suitable gas through the barrel and into said chamber whereby air is drawn into the chamber and intermixed with said gas to provide an explosive mixture, and means being provided at the opposite end of said body portion for permitting free circulation of the explosive mixture or gas therethrough, and means also being provided for igniting the gas in said chamber whereby the gun will be discharged with a loud report.

A further object is to provide an acetylene gas gun comprising a body portion having a chamber therein provided with means for supplying an explosive gaseous mixture thereto, and an igniter being provided at the breech of the gun having an operating crank situated exteriorly of the gun whereby it may be conveniently manipulated so as to cause the igniter to function to ignite the explosive mixture within said chamber.

A further object is to provide a gun of the character described comprising a body portion having a chamber therein provided at one end with means for supplying a suitable gaseous mixture thereto, and a normally open valve being provided at the opposite end or breech of the gun whereby free circulation of the gaseous mixture is permitted through the chamber, and an igniter being mounted within said chamber and provided with an operating mechanism adapted to be operated from the exterior of the gun, said mechanism being adapted to actuate the igniter so as to cause it to produce a succession of sparks each resulting in the detonation of a charge of gas delivered into said chamber.

A further object is to provide an acetylene gas gun comprising a body portion having a chamber therein provided at one end with a barrel of relatively smaller diameter than the diameter of said body portion, and a nozzle being mounted at the discharge end of said barrel having a connection with a suitable generator, said nozzle being arranged in such a manner that when the generator is functioning, acetylene gas will be projected into the mouth of the barrel whereby a supply of air will also be drawn into the barrel by the injector action of the gas projected from the nozzle, and a normally open valve being provided adjacent to the breech of the gun whereby the explosive gaseous mixture formed within the chamber by the intermixing of the acetylene gas and air may circulate through the chamber of the gun and if not ignited, will discharge through said open valve, said valve being of such proportions as to prevent the explosive mixture within the chamber from becoming too rich with acetylene gas to prevent said mixture from exploding with a loud report, when ignited, regardless of the time interval between shots, and assuming, of course, that gas is being supplied to the chamber, and means being provided at the breech of the gun for igniting the explosive charge therein, said valve being adapted to automatically close by the pressure in the chamber when the charge is ignited.

A further object is to provide a toy cannon of the character herein described which is very simple and inexpensive in construction and comprises few operating parts.

Other objects of the invention will appear from the following description and accompanying drawings and will be pointed out in the annexed claims.

In the accompanying drawings, there has been disclosed a structure designed to carry out the various objects of the invention, but it is to be understood that the invention is not confined to the exact features shown as various changes may be made within the scope of the claims which follow.

In the drawings:

Figure 1 is a side elevation of my improved gun, partially in section, showing the means for supplying an explosive charge thereto;

Figure 2 is an enlarged detail sectional view of the breech of the gun showing the valve in its normal open position and the

igniter about to be actuated to produce a spark;

Figure 3 is a view similar to Figure 2 showing the positions of the parts when the igniter has been actuated to ignite the explosive charge in the chamber of the gun;

Figure 4 is a sectional plan view of Figure 2, on a smaller scale, showing some of the parts in elevation;

Figure 5 is a view showing the gun arranged as a cannon and the igniter and its operating mechanism omitted;

Figure 6 is a cross-sectional view showing the gun provided with a small pilot light which functions as an igniter for the charge delivered into the chamber thereof; and

Figure 7 is a detail sectional view showing a modified construction wherein the disk at the breech of the gun has been dispensed with.

The novel gas gun featured in this invention is of the same general character as those shown and described in my co-pending applications, Serial No. 512,279, filed January 30, 1931, and Serial No. 554,489, filed August 1, 1931.

The gun herein disclosed comprises a body portion 2 having a chamber 3 therein and provided at its forward end with a barrel 4, the diameter of which is relatively smaller than the diameter of the body portion 2. A breech block or cap 5 is detachably secured to the breech of the gun by such means as bayonet slots 6 and pins or projections 7, provided in the wall of the body portion 2. In Figure 1, the body portion 2 is shown supported upon a suitable support 8 preferably in the form of a tripod and having a clamping member 9 encircling the body portion and pivotally secured to the tripod in a manner to permit the gun to be oscillated upon the pivot 11 which secures the band 9 to the upper portion of the tripod. The upper portion of the tripod consists of a suitable swivel 12 whereby the body portion 2 may be rotated upon a vertical axis on the tripod or support 8.

The means for supplying an explosive charge to the chamber 3 of the gun consists of a suitable generator 13, comprising a casing 14 having an opening at its top normally closed by a suitable closure 15, as shown. A carbide holder 16 is secured to the closure 15 and depends into the casing 14 and is provided at its lower end with a removable perforated cover 17, whereby when the carbide holder is removed from the casing 14, a piece of carbide may be introduced therein. A nipple 18 is provided at the upper end of the carbide holder to which one end of a flexible conduit 19, such as rubber hose, is connected, the opposite end of which is connected to a nozzle 21 which may be supported upon a suitable bracket 22 suitably secured to the wall of the barrel 4. The nozzle 21 is preferably axially alined with the barrel, as shown, so that when the generator is functioning, the pressure created in the carbide holder and conduit 19, by the chemical action resulting from the carbide contacting with the water in the casing 14, will cause the resultant acetylene to be projected from the tip of the nozzle into the open mouth of the barrel, whereby a supply of air will be drawn into the barrel by the injector action of the acetylene being projected thereinto, said acetylene and air intermixing within the chamber 3 of the gun to provide an explosive mixture.

Means are provided at the opposite end or breech of the gun to permit the gaseous mixture delivered into the forward end of the chamber 3 by the nozzle 21 to circulate freely therethrough towards the breech of the gun. Such means is shown consisting of a disk valve 23 supported upon a stud or pin 24 secured to the wall of the body portion 2. Suitable apertures 25 are provided in the body wall directly above the valve 23 so that when the valve is in its normal open position, as shown in Figure 2, the apertures 25 will be open to permit circulation therethrough. The valve openings 25 are of such size as to permit the gaseous mixture introduced into the chamber 3 from the barrel of the gun to discharge freely therethrough in the event that the charge is not ignited, thereby preventing the gaseous mixture within the chamber 3 from becoming too rich with acetylene to prevent it from firing with a loud report when ignited. In other words, the nozzle 21, barrel 4, and valve opening 25 are so designed that when the generator is functioning, the proportions of acetylene gas and air delivered into the chamber 3 are always such as to provide a highly explosive gaseous mixture. As heretofore stated, the openings 25 of the normally open valve 23 are of such size as to permit the gaseous mixture delivered to the chamber 3 to escape therefrom substantially as fast as it is being delivered thereto by the action of the nozzle 21, if the gun is not fired, thereby preventing the mixture from becoming enriched with acetylene to the extent that it will not explode with a loud report.

Means is also provided at the breech of the gun for successively igniting the charge delivered into the chamber 3 through the barrel of the gun whereby a succession of shots may be produced. Such means consists of a pyrophoric igniter mounted upon a cup-shaped member 26 adapted to be demountably fitted into the breech of the gun and having one end of a tubular member 27 suitably secured thereto, the opposite end of which is provided with a suitable grip 28 for the convenience of manipulating the gun upon the tripod 8. The tubular member 27 passes through an aperture provided in the breech block or cap 5.

The igniter comprises a bracket 29 secured to the forward end of the member 27 adjacent to the cup-shaped member 26. This bracket preferably has a pair of upstanding lugs or ears 31 between which one end of a plate 32 is supported, the opposite end of which is pivotally and detachably connected with the upper rear portion 33 of the bracket 29.

A piece of pyrophoric metal 34 is supported in a holder 30 provided at the forward end of the plate 32 and is held in frictional engagement with an abrasive element 35 by means of a suitable spring 36. The abrasive element 35 is secured to one end of a rod 37, the opposite end of which is mounted within the tubular member 27 and has a suitable spring 38 coiled thereabout. One end of this spring is seated against a pair of inwardly bent lugs 39 provided in the wall of the member 27 and the opposite end of the spring is seated against the rear end of the abrasive element 35, whereby the spring constantly urges the element 35 in a forward direction.

The operating mechanism for the igniter comprises a suitable cam 41 against the periphery of which the abrasive element is held by the action of the spring 38. The cam 41 is secured to a shaft 42 mounted in suitable bearings provided in the wall of the body portion 2, as shown in Figure 4. A suitable collar 43 is provided at one end of the shaft and a spur gear 44 is secured to the opposite end thereof. The collar 43 and gear 44 prevent the shaft from moving endwise in its bearings. A pinion 45 meshes with the gear 44 and is secured to a shaft 46 mounted in suitable bearings also provided in the wall of the body portion 2 and having a collar 47 secured to one end thereof. An operating crank 48 is secured to the opposite end of the shaft 46 whereby the shaft may be rotated to impart rotary movement to the shaft 42, as will readily be understood by reference to Figures 1 and 4.

In the operation of the gun, the generator is loaded by placing a piece of carbide in the holder 16 and replacing the holder in the casing 14, after a quantity of water has been introduced in the casing, as shown in Figure 1. When the carbide contacts with the water, acetylene gas will immediately begin to form in the carbide holder 16 and will create a pressure therein, whereby the acetylene gas will be forced into the conduit 19 and will be projected from the nozzle into the open mouth of the barrel 4. Because of the valve 23 at the rear of the gun being open, the acetylene gas projected from the nozzle will circulate freely through the chamber 3, drawing with it into the chamber a suitable quantity of air because of the injector action of the acetylene as it is projected from the nozzle 21. The acetylene gas and air thus introduced into the chamber 3 will be thoroughly intermixed therein to form a highly explosive mixture.

The crank 48 is then rotated, whereupon the cam will be rotated to reciprocate the abrasive element 35. When the head of the element 35 drops from the high point of the cam, as shown in Figure 3, a spark will be generated because of the frictional engagement of the pyrophoric metal 34 with the element 35, as a result of the latter being suddenly thrust forwardly by the action of the spring 38, thereby causing the gas in the chamber 3 to explode. The speed ratio between the shafts 42 and 46 is such that by the time the cam has made one complete revolution and the abrasive element is again thrust forwardly by the action of the spring 38, a fresh charge of gas will have been supplied to the rear portion of the chamber 3 so that the gun is again fired. After firing the gun, a fresh charge is quickly supplied thereto from the open mouth of the barrel as hereinbefore described. Thus, it will be seen that as long as acetylene gas is being supplied to the chamber 3 from the nozzle 21, and the crank 48 is rotated, the gun may be fired in rapid succession without having to stop to reload it, the loading being done automatically by the pressure generated in the generator and by reason of the valve 23 permitting circulation of the gaseous mixture through the chamber 3 of the gun.

The disk valve 23, as hereinbefore stated, functions to close the openings 25 when the gun is fired, primarily for the purpose of precluding the danger of the operator meeting with injury as a result of expanding gases projected through the openings 25, when the gun is fired. If desired, the disk 23 may be dispensed with, and a suitable guard 40 secured to the wall of the body 2 over the openings 25, as shown in Figure 7, whereby the expanding gases escaping through the openings 25 will be directed in a forward direction, away from the operator, who usually is stationed back of the gun.

Figure 5 illustrates another form of the invention wherein the pyrophoric igniter has been omitted and the breech of the gun is provided with a breech block or cap 49. In the construction here shown, the valve openings 25 of the valve 23 have a dual function in that they provide means for permitting circulation through the chamber 3 of the gun, and they also function as a touchhole, whereby the gaseous mixture within the chamber may be ignited by such means as a match 50 in the manner of an ordinary toy cannon. The body portion 2 may be supported upon a suitable base 51 as shown.

Figure 6 illustrates another form wherein the ignition means consists of a small pilot light 52 arranged adjacent to the valve openings 25—25 so that each time the explosive mixture delivered into the chamber 3 reaches

the valve openings 25, then the gun is initially charged and subsequent to each shot fired, the mixture within the chamber will automatically be ignited by the pilot light 52, whereby the chamber is purged and a fresh charge supplied thereto from the barrel of the gun. By this arrangement, it will be noted that the gun will automatically continue to fire in rapid succession as long as acetylene gas is being supplied to the chamber 3 from the nozzle 21. It is to be understood, of course, that the pilot light is so arranged that the gas escaping from the valve openings 25, when the gun is fired, will not extinguish it. The pilot light may be connected with the generator 13, or with some other source of gas supply.

I claim as my invention:

1. A toy gun comprising a body portion having a chamber therein, a barrel at one end of said body portion communicating with said chamber, a nozzle connected with a source of gas under pressure and positioned to project gas and air through said barrel and into said chamber whereby an explosive mixture is provided within the chamber, and means at the breech of the gun for successively igniting the explosive gas delivered to said chamber.

2. A toy gun comprising a body portion having a chamber therein, a nozzle arranged at one end of the chamber and having a connection with a source of gas under pressure, said nozzle being adapted to project gas into the chamber and to cause a quantity of air to be drawn into the chamber therewith, whereby an explosive mixture is provided within the chamber, and means for igniting the charge delivered to said chamber.

3. A toy gun comprising a body portion having a chamber therein, a barrel at one end of said body portion communicating with said chamber, a nozzle having a connection with a source of gas under pressure and adapted to project gas and air through said barrel and into said chamber to charge the gun, a valve at the opposite end of the chamber for permitting circulation of the explosive mixture therethrough, and means for successively igniting the explosive charges delivered to said chamber.

4. A toy gun comprising a body portion having a chamber therein, a barrel at one end of said body portion communicating with said chamber, a nozzle having a connection with a source of gas under pressure and adapted to project gas and air through said barrel and into said chamber to charge the gun, a normally open valve at the opposite end of said body portion for permitting escape of the explosive mixture from said chamber when the gun is not fired and the generator is operating, and means for igniting said explosive mixture.

5. A toy gun comprising a body portion having a chamber therein, a nozzle mounted at the forward end of the chamber and having a connection with an acetylene generator, said nozzle being substantially axially alined with said chamber and adapted to project acetylene gas thereinto and whereby a quantity of air will be drawn into the chamber by the injector action projected from said nozzle, thereby providing an explosive mixture within the chamber, a pyrophoric igniter at the breech of the gun, and an operating mechanism for said igniter comprising an operating crank adapted to be rotated whereby said igniter will be successively actuated to ignite the explosive charges delivered to said chamber.

6. A toy gun comprising a body portion having a chamber therein, a barrel secured to one end of said body portion and communicating with said chamber, a nozzle mounted at the mouth of said barrel and having a connection with an acetylene generator, said nozzle being adapted to project acetylene gas and air through the barrel and into said chamber to provide an explosive gaseous mixture within the chamber, a pyrophoric igniter provided at the breech of the gun and comprising a spring-actuated abrasive element, and an operating mechanism for said igniter comprising a cam engaged with said abrasive element and an operating crank for rotating said cam whereby said igniter will be successively actuated to ignite the explosive charges delivered to said chamber.

7. A gun comprising a body portion having a firing chamber therein, means for introducing a suitable gas into said chamber, means by which air is drawn into said chamber by the action of said gas as the latter is introduced into the chamber, and whereby the air is intermixed with the gas during introduction, to provide an explosive charge, and means by which the firing chamber is purged of spent gases by the inflow of gas and air into said chamber.

8. A gun comprising a body portion having a firing chamber therein, means for introducing a suitable gas into said chamber, means by which air is drawn into said chamber by the action of said gas as the latter is introduced into the chamber, and whereby the air is intermixed with the gas during introduction, to provide an explosive charge, means for igniting the charge within the chamber, and means by which the firing chamber is purged of spent gases by the inflow of gas and air into said chamber.

9. A gun comprising a body portion having a firing chamber therein, means for introducing a suitable gas into said chamber, means by which air is drawn into said chamber by the action of said gas and intermixed therewith during introduction, to provide an explosive charge, means for igniting said charge, and a valved opening by which the

firing chamber is purged of spent gases by the inflow of gas and air into said chamber.

10. A gun comprising a body portion having a firing chamber therein provided with an opening whereby communication is established between said chamber and the atmosphere, means for introducing a gas through said opening and into said chamber and whereby air is simultaneously drawn into said chamber and intermixed with said gas to provide an explosive charge, means by which a purging draft may be created through said firing chamber during the introduction of gas and air thereinto, and means by which the explosive charge in said chamber may be ignited.

11. A gun comprising a body portion having a firing chamber therein provided with an opening whereby communication is established between said chamber and the atmosphere, a nozzle for introducing a gas through said opening and into said chamber and whereby air is simultaneously drawn into said chamber and intermixed with said gas to provide an explosive charge, a valved opening remote from said first mentioned opening by which a circulation may be created through said firing chamber during the introduction of gas and air thereinto, to remove the spent gases therefrom, and means by which the explosive charge in said chamber may be ignited.

12. A gun comprising a body portion having a firing chamber therein and a restricted passage leading from said chamber, a gas supply nozzle mounted at the outer end of said restricted passage and adapted to introduce a suitable gas into said chamber and whereby air will be drawn into said chamber by the injector action of said nozzle, to provide an explosive charge, means for igniting the charge in said chamber, and means permitting the escape of the spent gases from the chamber during the introduction of gas and air thereinto.

In witness whereof, I have hereunto set my hand this 1st day of September, 1931.

ELMER H. SMITH.