

Jan. 1, 1946.

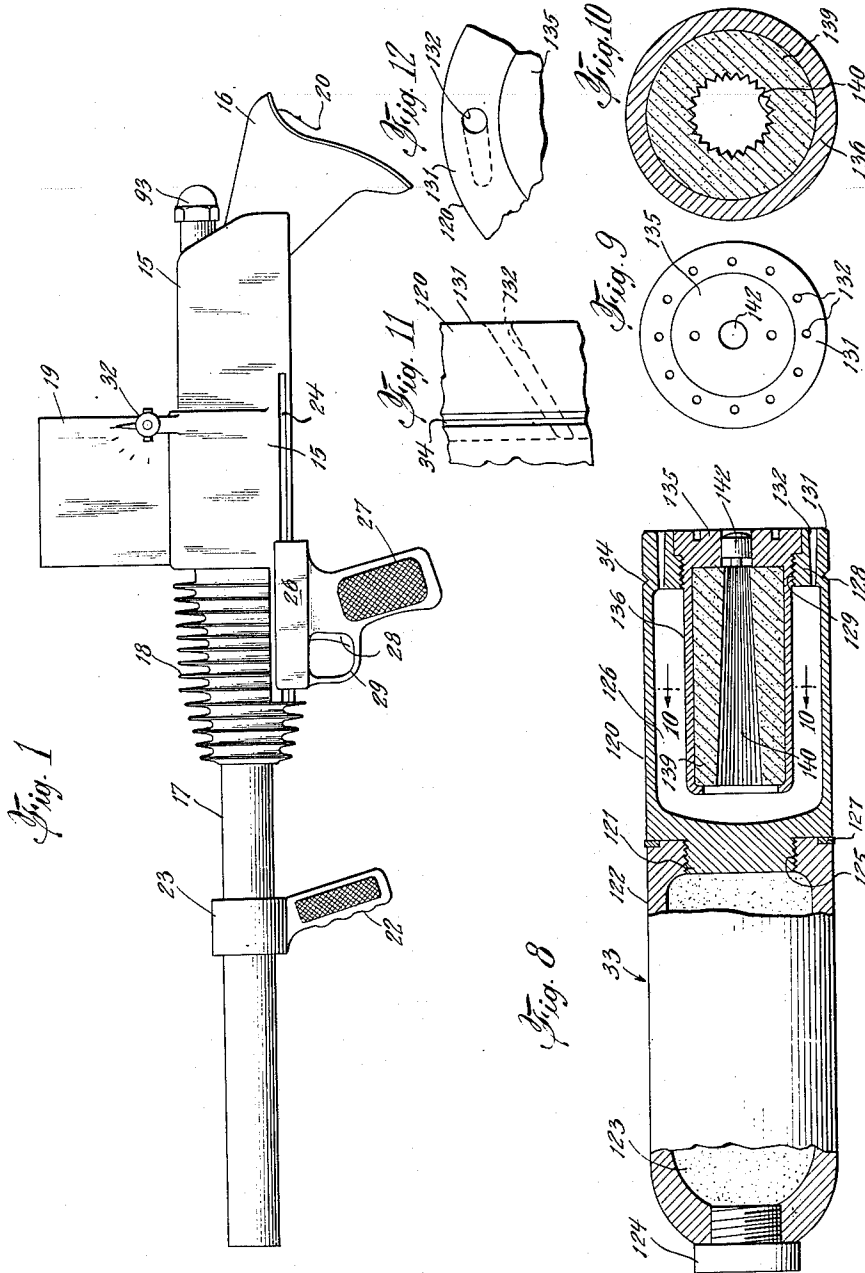
E. F. CHANDLER

2,391,864

REPEATING ROCKET GUN

Filed Aug. 26, 1941

3 Sheets-Sheet 1



INVENTOR.
Edward F. Chandler
BY John P. Chandler
his Attorney

Jan. 1, 1946.

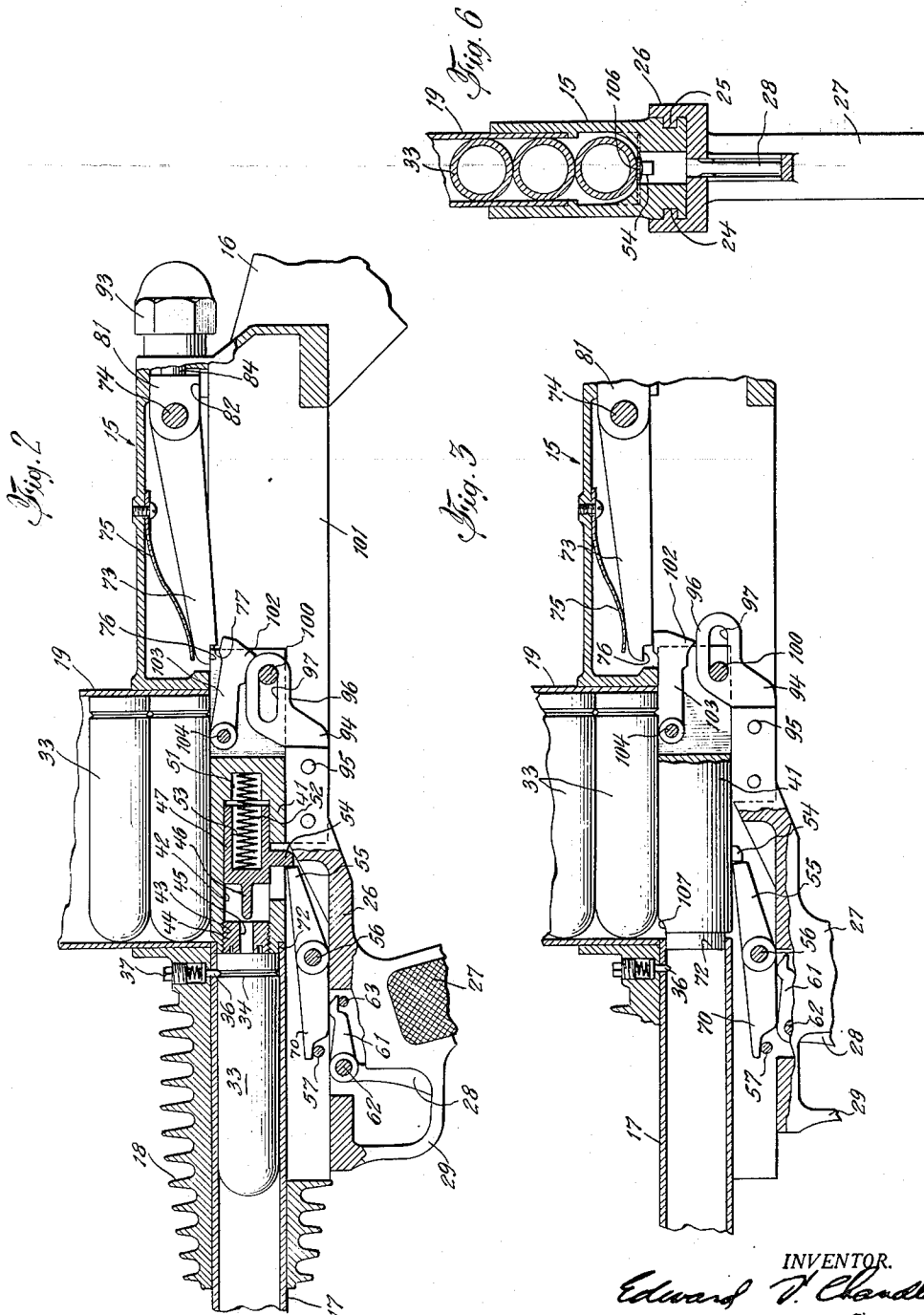
E. F. CHANDLER

2,391,864

REPEATING ROCKET GUN

Filed Aug. 26, 1941

3 Sheets-Sheet 2



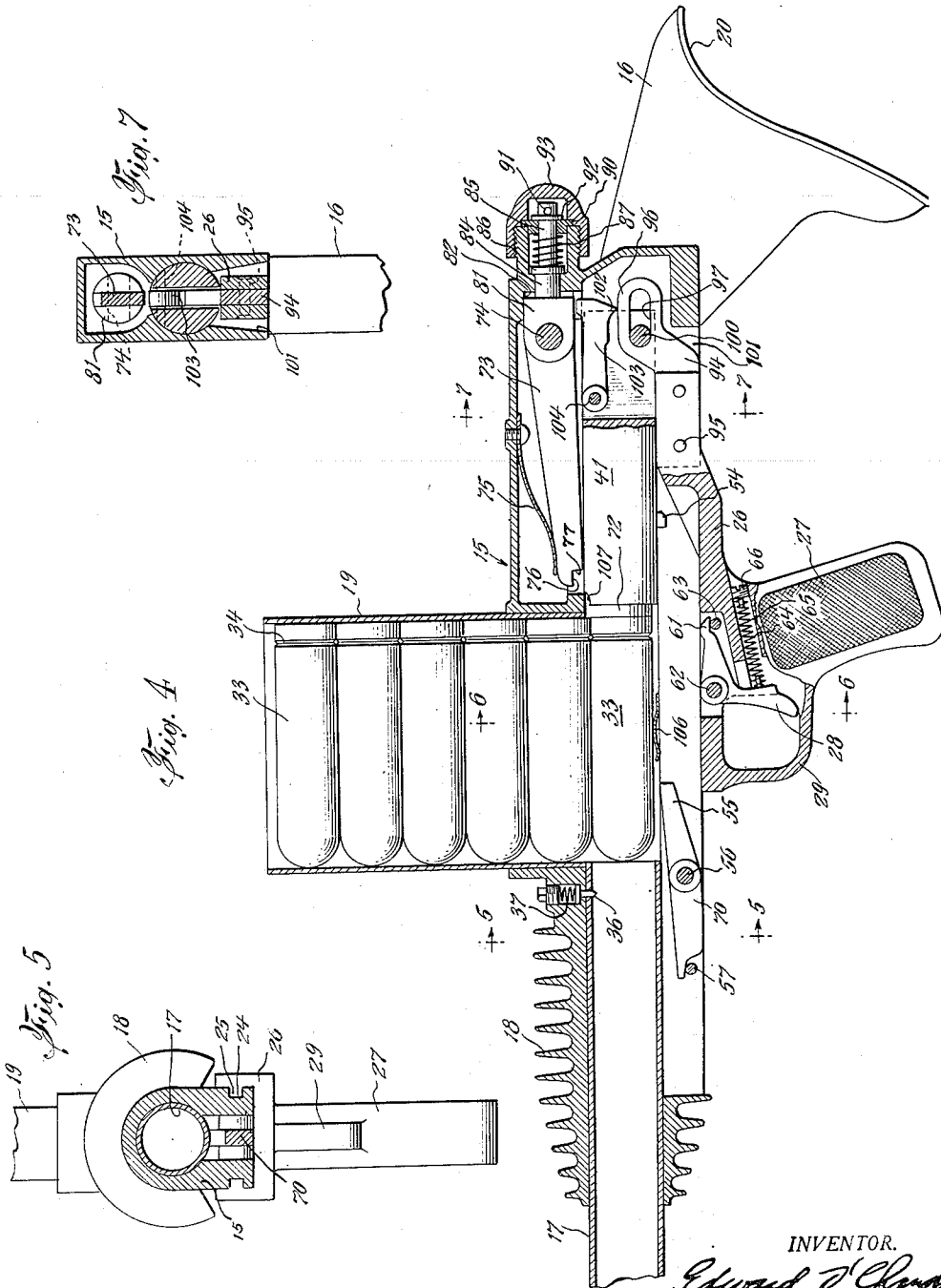
INVENTOR.
Edward F. Chandler
BY John P. Chandler
his attorney

Jan. 1, 1946.

E. F. CHANDLER
REPEATING ROCKET GUN
Filed Aug. 26, 1941

2,391,864

3 Sheets-Sheet 3



UNITED STATES PATENT OFFICE

2,391,864

REPEATING ROCKET GUN

Edward F. Chandler, Brooklyn, N. Y.

Application August 26, 1941, Serial No. 408,284

1 Claim. (Cl. 42—18)

This invention relates to improvements in ordnance and to an improved shell therefor, and also to an improved method of shell propulsion, and relates more particularly to a novel type of portable gun for dispatching shells of the reaction type formed with a self-contained propulsion charge, the present application constituting a continuation-in-part of my co-pending application, Ser. No. 406,944, now Patent No. 2,380,024, July 10, 1945.

One of the principal objects of the present invention is to provide a field piece which can be fired from the shoulder, and which is light in weight, simple in operation, and is capable of dispatching a shell of fair caliber in great destructive power. A further object of the invention is the provision of a novel shoulder-firing gun capable of firing in rapid succession a plurality of reaction-type shells carrying any type of offensive charge in solid, liquid or gaseous form. Yet another object of the present invention is to provide a gun of this type having improved cocking and firing means, and wherein after a shell has been fired, another shell may be quickly brought into position in the barrel, ready for firing.

Although the gun of the present invention is designed primarily as a shoulder-firing field piece for infantry detachments, it may nevertheless be mounted on a tripod or gun carriage and may be fired from a fixed position, or may be fired from mobile units such as motor-driven vehicles, planes, tanks and the like. The firing of the gun from a pursuit plane is particularly important, since it has a minimum of recoil, although dispatching a relatively heavy shell of great destructive possibilities.

The gun of the present invention, when embodied as a shoulder-firing field piece, will have a certain limit of caliber, although when the gun is mounted on a suitable carriage the caliber may be quite large and be capable of handling a shell of tremendous destructive power. In this connection, it is effective for use on small, high-speed water craft, especially for the reason that the recoil for any given caliber is relatively low, and for the further reason that the gun is fairly noiseless.

Another object of the invention is to provide a gun with a smooth bore for firing reaction-type shells, having a low center of gravity, low recoil, and because of its ease in handling and mobility of action, can be ready for firing at a moment's notice and in any direction.

In the drawings:

Fig. 1 is a side elevation of a gun constituting one embodiment of the present invention.

Fig. 2 is a broken vertical section taken through the firing mechanism and a portion of the barrel of the gun shown in Fig. 1, the view showing the position of the parts prior to firing.

Fig. 3 is similar to Fig. 2, but shows the position of certain of the parts after the shell has been detonated and the breech element moved to partly retracted position.

Fig. 4 is similar to Fig. 2, but shows the position of the parts when the breech element is in fully retracted position.

Figs. 5, 6 and 7 are transverse sections taken on lines 5—5, 6—6 and 7—7, respectively, of Fig. 4.

Fig. 8 is a side elevation, partially in section, of the improved shell which is particularly adapted for use in the gun of the present invention.

Fig. 9 is an end elevation thereof.

Fig. 10 is an enlarged section taken on line 10—10 of Fig. 8.

Fig. 11 is an enlarged broken side elevation of the rear portion of the afterbody of the shell.

Fig. 12 is an enlarged broken end elevation of the shell.

A general view of the gun constituting the preferred embodiment of the present invention, in side elevation, is shown in Fig. 1. The gun includes a breech housing or frame 15 supporting a gun stock 16 at one end thereof, and a barrel 17 at its opposite end. At its forward end, breech housing 15 is formed with a plurality of annular heat-diffusing fins 18, and on the upper surface of such housing a vertical shell magazine 19 is secured. Substantially midway between the ends of the barrel 17, a forward hand grip 22, formed with a collar 23 enclosing the barrel, is secured. At its upper end, the shoulder-engaging portion of the gun stock 16 is formed with an extension portion 20 adapted to fit over the shoulder of the user. The angle of the gun stock relative to the barrel is a matter of choice.

Adjacent to the lower surface of housing 15 on each side thereof, a recessed trackway 24 is formed, such opposed trackways receiving internal rib portions 25 of a substantially U shaped slide member 26 which supports a hand grip 27 at its lower extremity. A trigger 28 and trigger guard 29 are associated with slide member 26. An adjustable sight 32 of any suitable type is mounted on the upper surface of housing 15 to one side of magazine 19. A plurality of shells 33 are positioned in magazine 19, which is shown in Fig. 4 as being open at its upper end.

The shells 33 are preferably of the reaction type, the details of one form of such shell being illustrated in Figs. 8 to 12, inclusive. Each shell

is formed adjacent to its butt with an annular recess 36, and for the purpose of retaining the shell in firing position within barrel 17, a detent 36 is provided adjacent to the rear end of barrel 17, such detent being urged downwardly by means of a spring 37. One of such shells is shown in firing position in Fig. 2, which also shows certain details of the breech and firing-pin assembly, which includes a sliding breech block 41 mounted for longitudinal movement within housing 15. This breech block is formed with a longitudinal bore 42 extending inwardly from the forward end thereof, the front portion of such bore being threaded as at 43, and receives a bushing 44 having a central bore 45 through which a firing pin 46 passes.

The firing pin 46 is preferably formed integrally with hammer element 47 slidably mounted within bore 42. At its rear end, bore 42 has a reduced portion 51 which receives the rear terminal of a spring 52. The forward end of spring 52 is positioned within a bore 53 in hammer element 47 and urges such element forwardly. On its lower surface hammer 47 has an integrally formed lug 54, the purpose of such lug being to cock the hammer. When in firing position, as shown in Fig. 2, lug 54 is engaged by the rear end of a lever 55 which is centrally pivoted at 56 and which is carried by the housing 15, and accordingly such lever does not change position during longitudinal movement of the breech block. Counterclockwise rotation of lever 55 beyond the position shown in Fig. 2 is restrained by means of a pin 57 carried by housing 15.

When in the position shown in Fig. 2, energy has been stored in spring 52 preparatory to firing. Hammer 47 is released by trigger 28, which is formed with a bell crank lever portion 61 formed integrally with the trigger 28, which is pivoted at 62 in sliding member 26. A pin 63 limits clockwise rotation of bell crank lever portion 61 beyond the position shown in Fig. 2. The trigger assembly is urged in a clockwise position by a spring 64 positioned within an aperture 65 at the upper end of hand grip 27. The rear end of the spring is retained by means of a set screw 66, and the forward end of the spring receives a pin formed integrally with trigger 28. When the trigger is pulled, the upper surface of bell crank lever 61 engages the lower surface of forward portion 70 of lever 55, thereby lowering the rear portion thereof and releasing lug 54, thereby releasing hammer element 47 and causing firing pin 46 to move forward and detonate shell 33.

In order to seal the breech portion of barrel 17 during firing and thus prevent the rearward escape of combustion gases, the forward end of breech block 41 is formed with an annular reduced portion 72 which is received within the breech portion of the barrel, all as shown in Fig. 2. When the shell 33 is detonated, rearward movement of breech block 41 is prevented by means of a retaining pawl 73 which is pivoted at 74 on a block 81 at the rear of housing 15. Pawl 73 is urged downwardly by means of a flat spring 75, and at its forward end is formed with a square cut-out portion 76 which engages the rear terminal of such breech block.

In order to assure a positive lock for the breech block when the same has been manually moved forward to firing position, a slight clearance is provided between shoulder portion 77 of lever 73 and the rear end of the breech block. Reaction-type shells of the kind disclosed herein set up a

minimum of recoil, and in order to absorb even this slight recoil, the means shown in Fig. 4 are provided. Pawl 73 is mounted on a block 81 which is positioned for slidable movement in a recess 82 in housing 15. Block 81 is formed with an integral rearward extension 84 having a reduced portion 85. A collar 86 rests against the shoulder formed by such reduced portion. A spring 87 at its forward end engages collar 86, and at its rear end spring 87 engages the bushing 90. The portion 85 is retained in position by a guide bushing 90. Forward movement of recoil element 84 is limited by means of a pin 91 which engages washer 92 carried on reduced portion 85. A cap nut 93 encloses the recoil-absorbing means and retains the bushing 90.

After the gun has been fired, a new shell is placed in the barrel, and the gun cocked in the following manner. The breech block 41 is moved rearwardly by manually drawing hand grip 28 carried by slide member 26 rearwardly along the trackways 24. At the start of this movement the breech block is unlocked by the following means. A plate 94 is secured to slide member 26 by means of screws 95, such plate having an offset portion 96 formed with an elongated slot 97. A pin 100 carried by breech block 41 is positioned within such slot, the rear end of the slot engaging the pin when the block is in firing position. Initial rearward movement of member 26 causes plate 94 to move rearwardly in a slot 101 formed in housing 15 without causing any movement of breech block 41 until the forward end of slot 97 engages pin 100, in which position it is shown in Fig. 3.

During the aforesaid movement, the upper surface of extension 96 causes a toe portion 102 formed at the rear end of a lever 103 to be cammed upwardly. Lever 103 is pivotally mounted at 104 on the breech block 41, and as cam lever 103 is moved upwardly from the position shown in Fig. 2 to that shown in Fig. 3, the upper surface thereof raises pawl 73 out of engagement with the breech block, thus freeing same for rearward movement, which is accomplished by continued rearward movement of extension 96 operating against the pin 100. Maximum rearward position of breech block 41 is shown in Fig. 4, and when the block has reached this position, another shell 33 moves downwardly, preferably against some resilient element, as indicated by spring member 106. The lowermost shell now being in alignment with barrel 17, hand grip 27 is moved forwardly, and during initial movement thereof no movement of breech block 41 occurs until pin 100 has moved to the opposite end of slot 97. When this occurs, continued forward movement of hand grip 27 causes the breech block to move forwardly, thus moving shell 33 into the barrel.

In order to prevent the forward end of breech block 41 from engaging the shell positioned above the lowermost shell, a small cut-out portion 107 is provided, as shown in Fig. 4. As shell 33 is moved forwardly by breech block 41, lug 54 eventually engages the rear end of lever 55, and upon the completion of the forward movement, lug 54 being restrained by lever 55, stores up sufficient energy in spring 52 to cock the hammer and retain it in cocked position until the trigger is pulled. When the shell finally reaches the appropriate position for firing, spring-pressed detent 36 snaps into annular recess 34 in the shell.

One type of improved shell constituting the present invention, for use in connection with the gun just described, is illustrated in Figs. 8 to 12,

inclusive. It will be appreciated, of course, that this shell may be used in other types of guns as well. The shell comprises a cylindrical afterbody 120 formed with a reduced, threaded forward extension 121 upon which the forward section 122 is mounted. In the shell shown, the afterbody and the forward section are of substantially the same diameter. The forward section is formed with a chamber 123, which chamber is adapted to carry any type of offensive charge in solid, liquid or gaseous form. The forward end of the chamber is closed by means of a closure member 124 which may contain a fuse of any suitable character, or any other appropriate means of detonation may be employed in connection with this forward section. At its rear end, forward section 122 is formed with a threaded aperture which receives threaded portion 121 of the afterbody.

In a shell of this character, the outer periphery thereof is preferably slightly smaller than the bore of the gun barrel, and in order to effect a relatively close gas seal between the shell and the bore of the gun barrel, a gasket 127 of slightly greater diameter than that of the shell is positioned between the sections adjacent to their outer peripheries. Afterbody 120 is also provided with a hollow chamber or bore 126 extending forwardly from the rear end thereof. Adjacent to its rear end, the bore is provided with a section of reduced diameter, as shown at 128, and is provided with internal threads 129. The rear face 131 of the afterbody has formed therein a plurality of nozzle openings 132 which are disposed at an angle to a line running longitudinally of the shell, all as shown in Figs. 11 and 12.

Within the threaded opening 129 an internal cartridge 135 is positioned, such cartridge having a forward tubular portion 136 containing the combustible charge 139 having a central bore 140 therethrough formed with a longitudinally splined surface to increase the combustible area. The charge is detonated by means of a primer cap 142, and when the charge is set off the combustible gases within chamber 126 pass outwardly through the diagonal nozzle openings 132, propelling the shell forward and also setting up a gyratory effect.

The combustible gases which are generated within the cartridge are first caused to pass forwardly through the internal cartridge 135, and

thence rearwardly through the area between the cartridge and the interior of the shell. By this means, the hot gases within this space tend to pre-heat the combustible charge which, together with the pressure generated in the chamber, accelerates the rate of gas evolution. The nozzle orifices are proportioned to provide a desired accumulation of pressure within chamber 126.

It will be appreciated that, if the gun of the present invention is to be made in a caliber which is obviously too high for a shoulder-firing weapon, any suitable support may be employed for the gun.

The embodiment of the invention illustrated in Figs. 1 to 7, inclusive, shows the shell magazine as being positioned on the upper side of frame member 15, the shells being fed vertically into the breech. It will be appreciated, of course, that any other magazine and shell-feeding arrangement may be employed. It will be further appreciated that the invention is not limited to a repeating gun with appropriate mechanism for successively feeding the shells after each shell is fired, since the embodiments illustrated may be appropriately modified to form a single shot arm.

The embodiment of the present invention herein illustrated and described is illustrative only, and is not to be taken in any limiting sense. In other words, this structure is one of the many possible embodiments of the present invention, and is set forth for purpose of illustration only, the scope of protection being defined by the appended claim.

What I claim is:

In a repeating gun, a barrel, a frame secured to the breech end of said barrel, a breech block longitudinally reciprocable in said frame, resilient means locking the breech block in forward position comprising a block longitudinally reciprocable in said frame, spring means resisting rearward movement of said block, a locking pawl pivotally mounted at its rear end on said block and means urging the forward end of said pawl into blocking engagement with the rear terminal of said breech block, and manually-operable means for moving said pawl out of engagement with the breech block to permit re-loading.

EDWARD F. CHANDLER.