

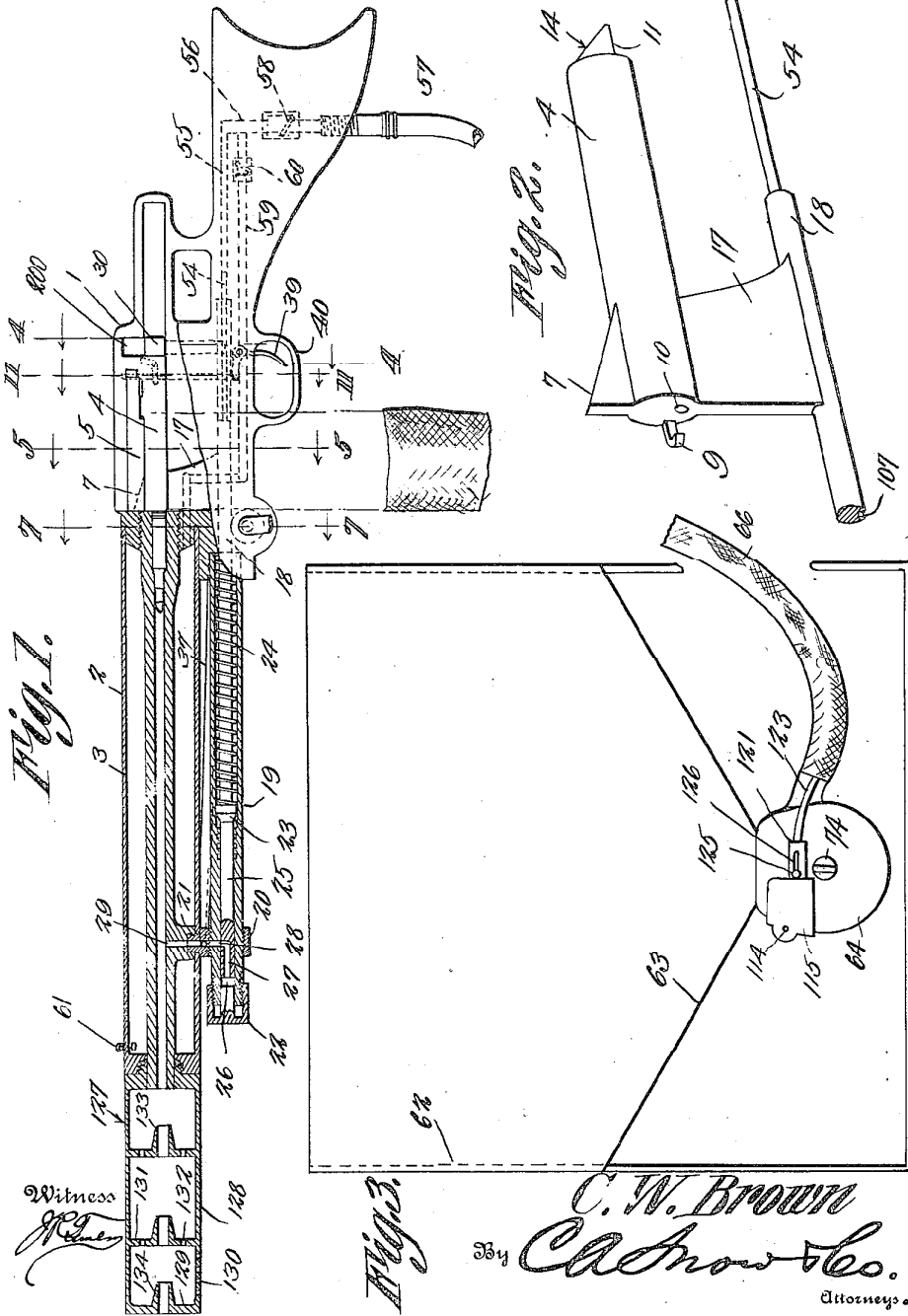
C. W. BROWN.
MACHINE GUN.

APPLICATION FILED AUG. 22, 1918.

Patented Dec. 27, 1921.

5 SHEETS—SHEET 1.

1,401,667.



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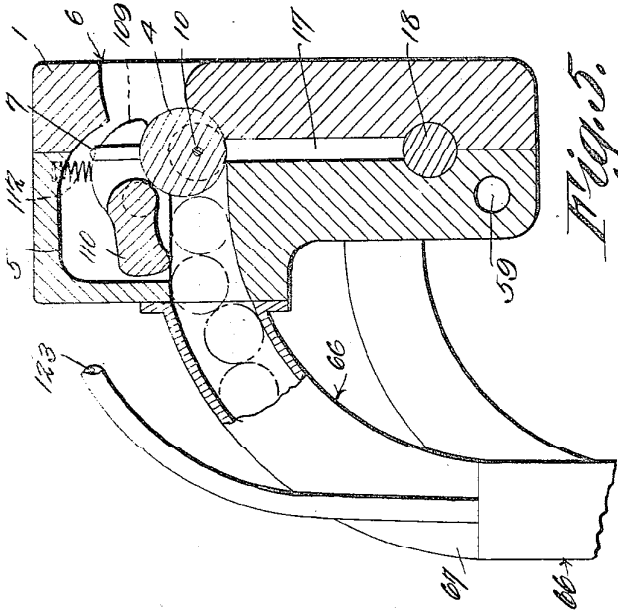


Fig. 5.

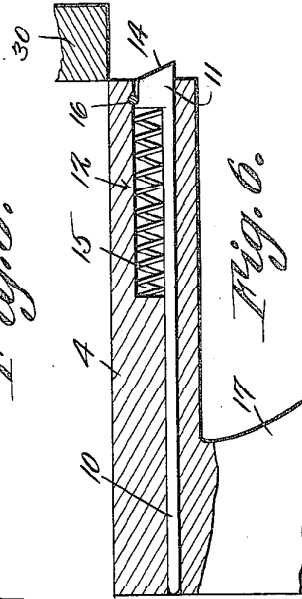


Fig. 6.

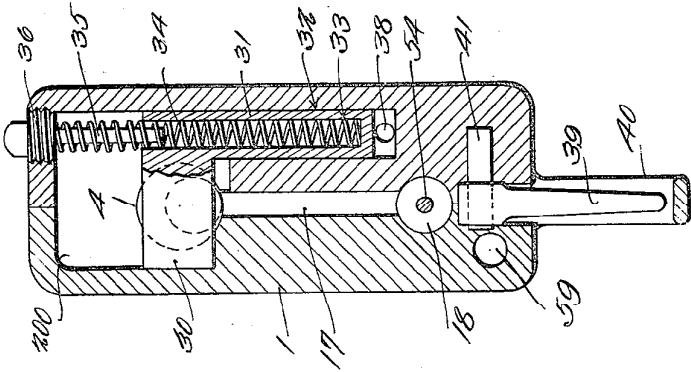


Fig. 7.

Witness

J. R. Gentry

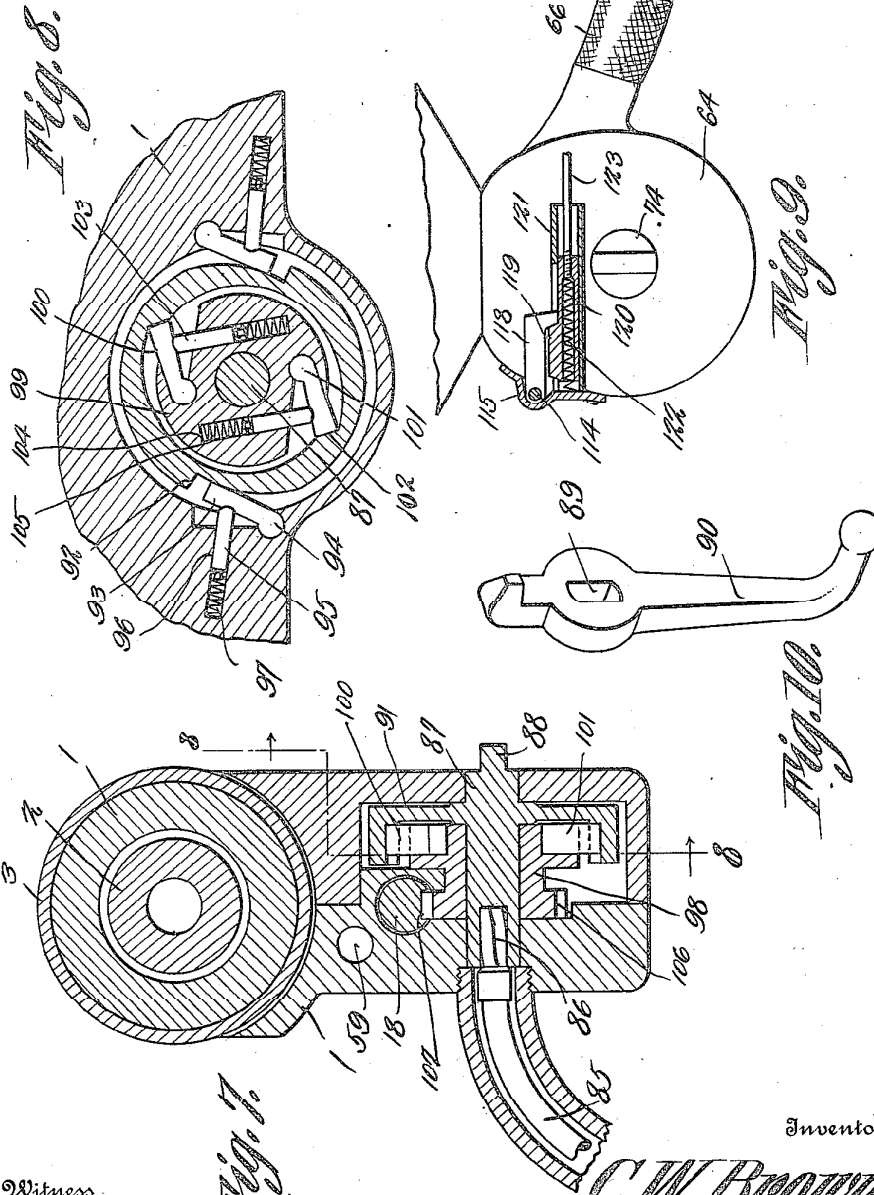
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1,401,667.



Witness
[Signature]

Fig. 7

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By *Chas. H. Brown*
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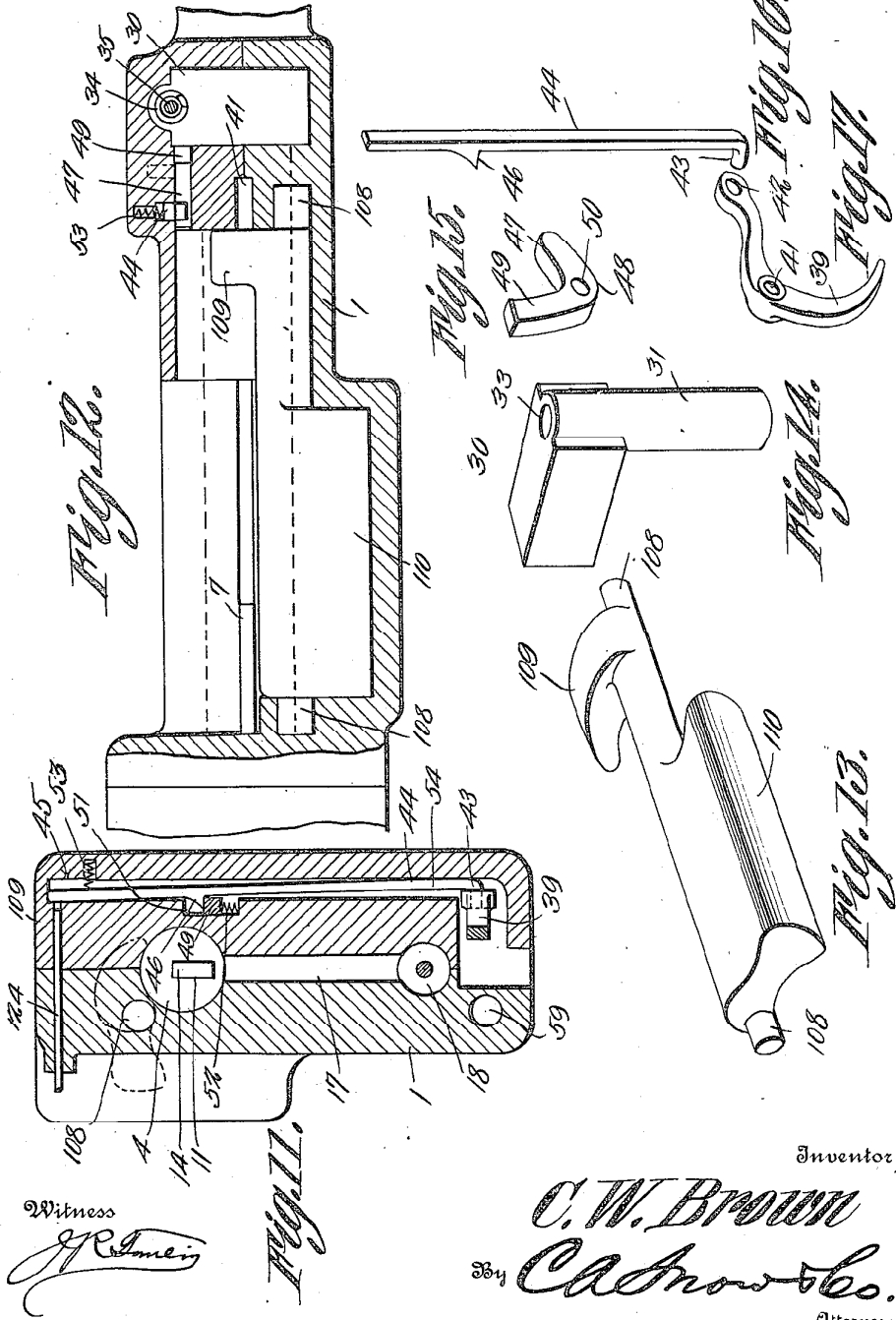
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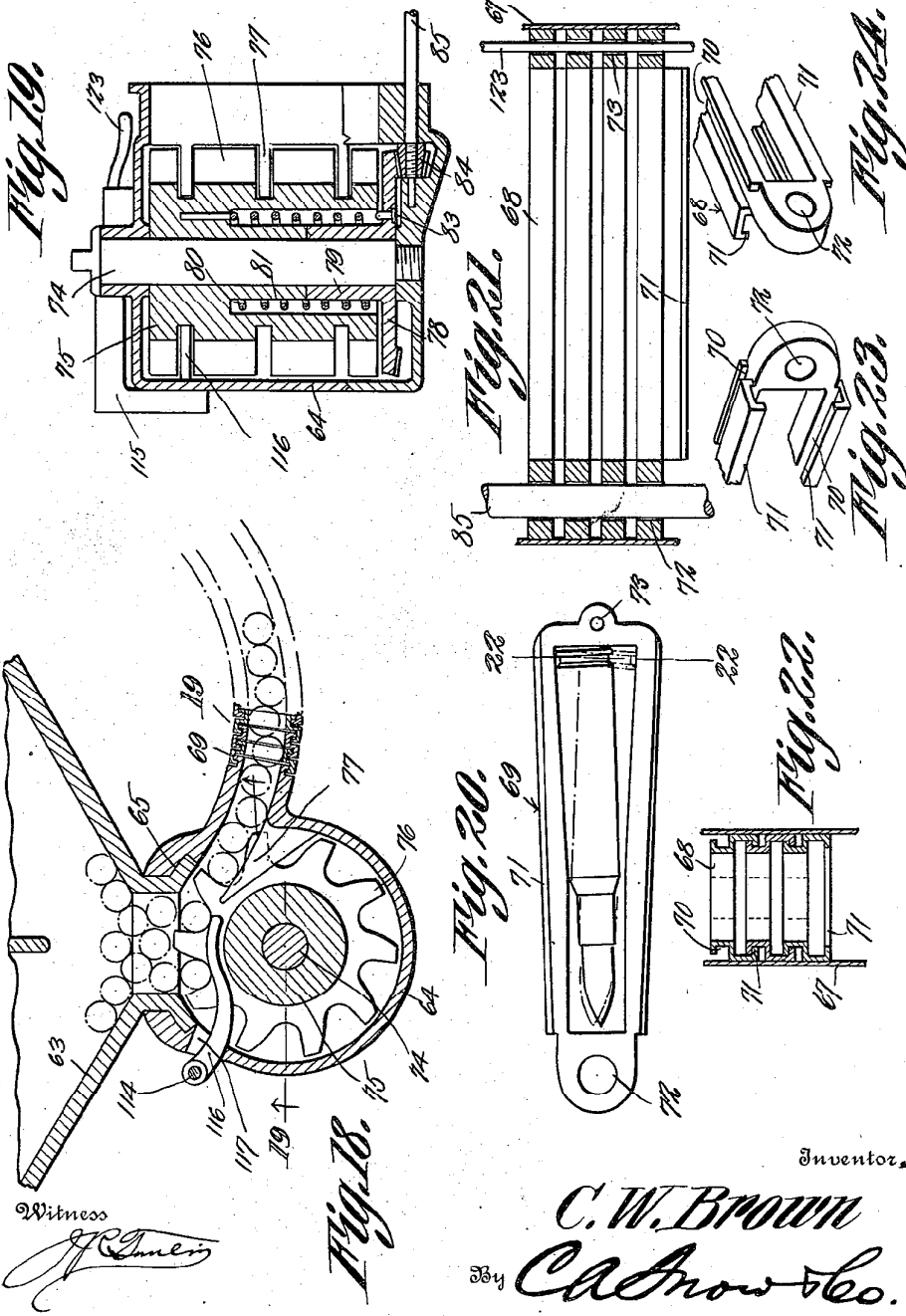
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5 SHEETS—SHEET 5.

1,401,667.



UNITED STATES PATENT OFFICE.

CHARLES W. BROWN, OF INDIANOLA, IOWA.

MACHINE-GUN.

1,401,667.

Specification of Letters Patent. Patented Dec. 27, 1921.

Application filed August 22, 1918. Serial No. 251,000.

To all whom it may concern:

Be it known that I, CHARLES W. BROWN, a citizen of the United States, residing at Indianola, in the county of Warren and State of Iowa, have invented a new and useful Machine-Gun, of which the following is a specification.

The device forming the subject matter of this application is a machine gun comprising five component mechanisms, and an auxiliary cartridge magazine which is used when the gun is not of the portable form. There is provided, first, a firing mechanism controlled by gas pressure derived from the barrel of the piece; second, a means for water-cooling the barrel, including a pump operated by the breech block; third, a means for feeding the cartridges with respect to the breech block, and for ejecting them after they have been fired; fourth, a control for the firing mechanism, responsive to the depletion of the ammunition, and operating to stop the working of the gun when the ammunition is used up; fifth, a novel form of muffler and flame-check; and sixth, the auxiliary cartridge magazine above mentioned.

The invention aims to improve the various instrumentalities above mentioned, and to combine them operatively in a machine gun of unusual efficiency and comparative simplicity.

In a device of this kind, much must be left to the judicious skill of a mechanic, and, therefore, within the scope of what is claimed, a mechanic may work changes without departing from the spirit of the invention.

In the accompanying drawings:—

Figure 1 shows in partial longitudinal section, a machine gun constructed in accordance with the invention;

Fig. 2 is a perspective view showing the breech block;

Fig. 3 is a side elevation disclosing the portable magazine;

Fig. 4 is a cross section on the line 4—4 of Fig. 1;

Fig. 5 is a cross section on the line 5—5 of Fig. 1;

Fig. 6 is a longitudinal section depicting the mounting of the firing pin in the breech block;

Fig. 7 is a cross section on the line 7—7 of Fig. 1;

Fig. 8 is a fragmental section taken longi-

tudinally of the gun on the line 8—8 of Fig. 7;

Fig. 9 is an elevation showing a portion of the means for feeding the cartridges, parts being shown in section;

Fig. 10 is a perspective view of the operating crank;

Fig. 11 is a cross section on the line 11—11 of Fig. 1;

Fig. 12 is a fragmental horizontal section taken through the breech of the piece;

Fig. 13 is a perspective view showing a shaft and parts carried thereby, which regulate the passage of the cartridges to the breech block;

Fig. 14 is a perspective view of the locking or stop member which coacts with the breech block shown in Fig. 2;

Fig. 15 is a perspective view depicting a bell crank lever coacting with the locking member of Fig. 14;

Fig. 16 is a perspective view showing a rod which operates the part disclosed in Fig. 15;

Fig. 17 is a perspective view of the trigger which operates the part delineated in Fig. 16;

Fig. 18 is a vertical section showing the rotary member which advances the cartridges from the magazine toward the gun proper;

Fig. 19 is a horizontal section of the structure disclosed in Fig. 18;

Fig. 20 is an elevation showing one of the members of the flexible conduit through which the cartridges pass to the gun;

Fig. 21 is a sectional detail of the conduit;

Fig. 22 is a section taken longitudinally of the conduit; Figs. 23 and 24 are perspective views showing one of the members of the conduit.

The firing mechanism.—The machine gun forming the subject matter of this application includes a frame, denoted generally by the numeral 1 and carrying a barrel 2 surrounded by a cooling water jacket 3. A breech block 4 is mounted in the frame 1 for right-line reciprocation and coöperates with a compartment 5 fashioned in the frame, the compartment having a lateral outlet 6 through which the empty cartridges ultimately pass. The breech block 4 carries at its forward end, an extractor 9.

As disclosed best in Fig. 6, a firing pin 10

is mounted to slide longitudinally in the breech block 4 and terminates in an enlarged butt 11 received in a correspondingly shaped bore 12 in the breech block 4. The butt 11 of the firing pin 10 has an inclined cam edge 14. A compression spring 15 is located in the bore 12 and serves to retract the firing pin 10, one end of the spring engaging the butt 11 of the firing pin, and the other end of the spring engaging the breech block 4. Rearward movement of the firing pin 10 is limited by a stop 16 in the breech block.

The breech block 4 has a depending web 17 carrying a plunger 18 operating in a tube 19, the rear end of which is engaged with the frame 1, the tube constituting, to all intents and purposes, a removable part of the frame. The tube 19 is received in a ring 20 assembled with a lug 21 on the barrel 2. A cap 22 is adjustably mounted, by threading or otherwise, on the forward end of the tube 19. The plunger has an abutment 23, and a compression spring 24 is interposed between the abutment and the frame 1 at the rear end of the tube 19, the spring being located in the tube and surrounding a part of the plunger.

At its forward end the plunger 18 merges into a piston 25 having a slidable but gas-tight fit in the tube 19. The space between the forward end of the piston 25 and the cap 22 constitutes a chamber 26, and it is to be observed that the capacity of this chamber may be varied by adjusting the cap on the end of the tube 19. In the forward end of the piston 25 there is formed a longitudinal duct 27 having a laterally extended end 28 adapted to communicate with a transverse passage 29 in the ring 20 and the lug 21, the passage opening into the bore of the barrel 2.

A locking member in the form of a block 30, detailed in Fig. 14, is mounted to reciprocate transversely of the line of fire, behind the breech block 4, in a recess 200 formed in the frame 1. The locking member includes a depending piston 31 adapted to reciprocate in a cylinder 32 formed in the frame 1, the piston being supplied with a seat 33 receiving one end of a compression spring 34, the other end of which is received by a sustaining pin 35 carried by an adjustable plug 36 against which the said end of the spring abuts, the plug being threaded or otherwise mounted in the top portion of the frame 1. A tube 37 communicates with the passage 29 between the bore of the barrel 2 and the piston 25, the rear end of the tube opening into the cylinder 32 below the piston 31, as shown at 38 in Fig. 4.

A trigger 39 operates within a guard 40 on the frame 1 and is pivoted to the frame as indicated at 41. The inner end of the trigger 39 is provided with an opening 42 receiving loosely, a side finger 43 on a rod

44 located in a slot 45 in the frame 1. The rod 44 is adapted to move endwise in the slot, and it may also have a slight transverse swinging movement in the slot, attention being directed to Fig. 11. The rod 44 carries a projection 46 cooperating with one arm 47 of a bell crank 48 including an arm 49 adapted at times to engage beneath the locking member 30 and to stop the downward movement thereof. The bell crank 48 forms a detent for the locking member 30 and is located in a recess 51 in the frame 1 and is fulcrumed on the frame as indicated at 50. A compression spring 52 is located beneath the arm 47 of the bell crank 48 and tends to maintain the upper end of the arm 49 of the bell crank yieldingly beneath the locking member 30. A compression spring 53 is interposed between the side of the frame 1 and the upper end of the rod 44, as shown in Fig. 11, and tends to keep the projection 46 on the rod 44 above the arm 47 of the bell crank 48.

Operation of the firing mechanism.—It is to be supposed that a cartridge has been delivered in front of the breech block 4, the latter being retracted along with the plunger 18, and the spring 24 being under compression. The locking member 30 has been raised against the action of the spring 34, and rests on top of the breech block 4. The spring 24 moves the breech block 4 forwardly and seats the cartridge in the breech of the barrel 2, and the locking member 30 moves downwardly, responsive to the spring 34, and engages behind the breech block to hold the cartridge in the barrel. As the locking member 30 moves downwardly, it rides across the cam edge 14 of the firing pin 10 and advances the latter to explode the cartridge, the spring 15 being compressed, so as to retract the firing pin after the member 30 has been raised.

The gas in the bore of the barrel 2, behind the bullet, enters the passage 29 and flows through the tube 37 into the cylinder 32, raising the piston 31 and the locking member 30 as aforesaid, and compressing the spring 34, the locking member thus being moved out of engagement with the rear end of the breech block. As soon as the bullet leaves the barrel 2, and when the gas pressure in the barrel is relieved, the pressure in the cylinder 32, below the piston 31, is relieved, and the locking member 30 moves downwardly on top of the breech block 4, under the action of the spring 34, the breech block having been retracted, in the meantime, in a way now to be described.

The gas, traversing the passage 29, enters the duct 27 in the piston portion 25 of the plunger 18, by way of the lateral end 28 of the duct, and flows into the chamber 26. Here the gas expands and forces the piston 25 and the plunger 18 rearwardly, the

spring 24 being compressed, and the breech block 4 being carried rearwardly. It is to be observed that as soon as the piston 25 starts to move rearwardly, the lateral end 5 28 of the duct 27 in the piston moves out of registration with the passage 29, the chamber 26 being closed to permit the gas to expand therein, and there being no exit for the gas from the chamber 26 until the 10 piston 25 has moved rearwardly far enough so that the front end of the piston 25 is to the rear of the passage 29, whereupon, the gas in the chamber 26 can escape by the passage 29 and the bore of the barrel 2, 15 and permit the piston 25, the plunger 18 and the breech block 4 to move forwardly, responsive to the spring 24. Because the chamber 26 is sealed as soon as the piston 25 starts to move rearwardly, there is no 20 chance for the gas to escape from the chamber 26 through the passage 29 and out of the barrel 2, should pressure in the barrel be relieved by the advancing bullet. A properly timed cooperation between the 25 breech block 4 and the locking member 30 thus is secured.

During the firing of the piece, the trigger 39 is pressed rearwardly, the rod 44 being drawn downwardly. The projection 46 on 30 the rod 44 engages the arm 47 of the bell crank 48 and tilts the bell crank on its fulcrum 50, the upper end of the arm 49 of the bell crank being held out of the way of the stop member 30, so that the latter can 35 reciprocate transversely of the breech block 4, as hereinbefore described. The firing of the arm is continuous, so long as the trigger 39 is pressed, but when the trigger is released, the rod 44 moves upwardly, the 40 projection 46 no longer operates the bell crank 48, and the spring 52, reacting on the arm 47 of the bell crank, disposes the arm 49 of the bell crank in the path of the locking member 30, and prevents a further dis- 45 charge of the gun.

The cooling means.—The rear end of the plunger 18 carries a piston 54 mounted to reciprocate in a cylinder 55 fashioned in the frame 1. From the cylinder 55, a conduit 50 56 leads to a source 57 of water supply. A check valve 58 is mounted in the conduit 56. In the frame 1 there is formed a branch conduit 59, communicating at one end with the conduit 56, and communicating at its 55 opposite end with the interior of the water jacket 3. A check valve 60 is located in the branch conduit 59. A valve 61 is disposed at the forward end of the water jacket 3, and may be set to emit water from the 60 jacket at any desired pressure.

Operation of the cooling means.—When the plunger 18 reciprocates as hereinbefore described, the piston 54 reciprocates in the cylinder 55. When the piston 54 moves for- 65 wardly, water is sucked into the cylinder 55

through the conduit 56 from the source 57 of supply, the check valve 58 in the conduit 56 opening, and the check valve 60 in the branch conduit 59 closing. When the piston 54 moves rearwardly, the check valve 58 closes, 70 the check valve 60 opens, and water is forced from the cylinder 55, through a part of the conduit 56 into the branch conduit 59 and from thence into the water jacket 3, the water finding its way out of the jacket 3 75 slowly, through the valve 61.

The cartridge feed.—The numeral 62 denotes a magazine, which, if the gun is of the portable form shown in Fig. 1, is carried 80 by a member of the gun crew. A hopper 63 is located in the magazine 62, and a tubular casing 64 is detachably assembled with the magazine, as indicated at 65. A flexible conduit 66 leads from the casing 64 to the frame 1 of the gun and communi- 85 cates with the compartment 5. The conduit 66 includes a cover 67 within which are located loop-shaped members 68 which taper from one end to the other as shown at 69, to correspond with the taper of the cartridge. 90 The parts 68 are provided with loosely interengaged flanges 71 and grooves 70. At one end, the parts 68 are supplied with cooperating openings 72, and at the opposite ends of the parts 68 there are openings 73. 95

The cartridges used in the gun ordinarily are of tapered form, being widest adjacent to their butts. It is obvious that if the cartridges are advanced in the same plane, they will not move forward in a 100 straight line, parallel to each other. The flexible conduit 66 is of sufficient size so that the cartridges may be disposed in staggered or crossed relation to each other, as indicated in Fig. 20, the cartridges contacting 105 with each other at a point about midway between their ends. Consequently, the cartridges will move forwardly through the conduit 66, with their axes in parallel planes and at right angles to the line of 110 advance, each cartridge ultimately arriving at the breech block 4, in parallel relation thereto, and not at a more or less acute angle to the breech block.

A shaft 74 is mounted in the casing 64, 115 A rotatable member 75 is journaled on the shaft 74 and has radial feeding fingers 76, the casing carrying deflectors 77, located between the fingers and adapted to receive cartridges from the fingers and to direct the 120 cartridges into the flexible conduit 66. A second rotatable member is located in the casing 64 and includes an end gear wheel 78 and a neck 79 mounted on the shaft 74 to rotate thereon. A helical spring 80 sur- 125 rounds the neck 79 and is received in a recess 81 in the rotatable member 75, one end of the spring being attached at 82 to the member 75, and the other end of the spring being attached at 83 to the gear wheel 78. 130

It will be obvious that when rotation is imparted to the member 78—79, rotation will be transmitted to the member 75 by way of the spring 80, the two members being yieldingly connected for simultaneous rotation.

The gear wheel 78 is driven by a pinion 84 on a flexible shaft 85 extended through the flexible conduit 66 and journaled in the openings 72 of the parts 68 of the conduit. Passing to Fig. 7, it will be seen that one end 86 of the shaft 85 is squared for reception in one end of a shaft 87 journaled in the frame 1 of the gun and having an exposed end 88 adapted to be received in the slot 89 of a crank 90, should it be desired to rotate the shaft 87 by hand. Ordinarily, however, the shaft 87 is rotated by a part of the firing mechanism of the gun, in a way which will now be set forth.

The shaft 87 carries a ratchet wheel 91 provided with external teeth 92 cooperating with back-stop pawls 93 pivoted at 94 to the frame 1 and serving to prevent a retrograde rotation of the wheel 91 and the shaft 87. The pawls 93 are held in operative relation to the teeth 92 by plungers 95 slidable in recesses 96 in the frame 1 and advanced by springs 97. A tubular shaft 98 is journaled on the shaft 87 and carries a disk 99 whereunto pawls 100 are pivoted at 101. The pawls 100 are feed or actuating members for the ratchet wheel 91, the latter element having internal teeth 102 coacting with the pawls. The pawls 100 are held in operative relation to the teeth 102 by plungers 103 slidable in recesses 104 in the disk 99, the plungers being advanced by springs 105. The tubular shaft 98 is provided with a pinion 106 meshing into a rack 107 on the plunger 18 which forms a part of the breech block 4.

A shaft 108 is terminally mounted in the frame 1 and is disposed parallel to the line of reciprocation of the breech block 4, the shaft having arms 109 and 110 which project laterally in opposite directions. The arm 109 overhangs the breech block 4 and is depressed by a spring 112, whereas the arm 110 extends to one side of the breech block, as shown in Fig. 5, and operates in the chamber 5 at the inner end of the flexible cartridge conduit 66. The breech block 4 carries a top cam 7 coacting with the arm 109 on the shaft 108, in a manner to be described hereinafter.

Operation of the cartridge feed.—When the breech block 4 moves forwardly, the arm 109 of the shaft 108 rests on top of the breech block to the rear of the top cam 7, under the action of the spring 112, as shown in Fig. 5, the arm 110 being raised so that the cartridges may be fed one at a time beneath the arm 110 and against the side of the breech block 4. When the breech block 4 moves forwardly, the rack 107 operates the pinion 106, the tubular shaft 98 being ro-

tated, and rotation being imparted to the ratchet wheel 91 and the shaft 87 by the pawls 100. Motion is transmitted from the shaft 87 to the flexible shaft 85 and, passing to Fig. 19, it will be seen that the shaft 85 drives the pinion 84, the pinion 84 operating the gear wheel 78 and consequently the rotatable member 75, since the parts 75 and 78—79 are connected by the spring 80. The purpose of the spring 80 is to prevent an abrupt rotation of the member 75, due to a rapid movement of the breech block 4, in the operation of firing the gun.

When the member 75 is rotated, the feeding fingers 76 receive the cartridges from the hopper 63 and pass them along the deflectors 77, into and through the conduit 66 and advance the cartridges one at a time, against the side of the breech block 4, as shown in Fig. 5. When the breech block 4 moves rearwardly, the top cam 7 engages the arm 109 and swings the same upwardly, the arm 110 swinging downwardly. When the arm 110 swings downwardly, a single cartridge is advanced by the arm into a position in front of the breech block, the empty shell, withdrawn by the extractor 9, being pushed laterally through the outlet 6 in the frame 1 of the gun. When the arm 110 swings downwardly, it not only segregates a single cartridge for loading, and expels an empty shell, but, at the same time, serves as a stop preventing the other cartridges in the conduit 66 from crowding up against the breech block, before its forward movement begins.

The control for the firing mechanism, responsive to the depletion of ammunition.—A shaft 114 is journaled on the casing 64 and is protected by a housing 115. The shaft 114 carries an arm 116 which rests on the periphery of the rotatable member 75 (Figs. 18 and 19) between certain of the feeding fingers 76, the arm operating in an opening 117 in the casing 64. At its outer end, the shaft 114 is provided (Fig. 9) with a dog 118, cooperating with a projection 119 on a slide 120 mounted to reciprocate in a guide 121 on the casing 64, the slide 120 having a pin 125 (Fig. 3) operating in a slot 126 in the guide 121, to prevent the slide 120 from rotating. A spring 122 is located in the slide 120 and abuts against the part 115 and against the slide, to advance the slide under circumstances which will be pointed out hereinafter.

One end of a flexible push rod 123 is assembled with the slide 120, the push rod passing through the flexible conduit 66 and being mounted to reciprocate in the openings 73 of the conduit parts 68. The push rod 123 terminates (Fig. 11) in a plunger 124 mounted to slide in the frame 1 of the gun and alined with the upper end of the rod 44.

Operation of the control for the firing

mechanism.—Let it be supposed that the gun is in operation, the trigger 39 being under pressure, the rod 44 being drawn downwardly, and the projection 46 coacting with the arm 47 of the bell crank 48 to withdraw the arm 49 of the bell crank from beneath the locking member 30, so that the latter can reciprocate as it does while the firing operation is taking place. Suppose that the cartridges in the hopper 63 are used up. Then, there is no pressure exerted by the cartridges upon the arm 116, which extends beneath the cartridges as they are fed from the hopper 63 into the flexible conduit 66. When the cartridges in the hopper 63 no longer exert a pressure on the arm 116, the spring 122 overcomes the engagement between the dog 118 and the projection 119 on the slide 120, the slide and the push rod 123 being advanced by the action of the spring 122. The plunger 124 of Fig. 11 is advanced, the rod 44 is swung outwardly against the action of the spring 53, the projection 46 is disengaged from the arm 47 of the bell crank 48, and the arm 49 of the bell crank engages beneath the locking member 30, responsive to the action of the spring 56. Thus, when there is no more ammunition in the hopper 63, the discharge of the gun is stopped automatically.

The muffler and flame check.—On the forward end of the barrel 2 is mounted a muffler and flame check 127, including a tubular shell 128 having an outer end wall 129. There are openings 130 in the shell 128, immediately in the rear of the end wall 129. Disks 131 extend across the shell 128 and are provided with openings 132. The disks 131 carry conical nipples 133, and there is a similar nipple 134 on the end wall 129.

Operation of the muffler and flame check.—As the gas moves through the muffler 127, some of the gas passes through the nipples 133, and some of the gas passes through the openings 132. The gas which enters any compartment of the muffler through the nipple 133 is deflected by the nipple of the disk at the forward end of the compartment, and eddies backwardly, coming into contact with the gas which has passed through the openings 132 in the disk at the rear end of the compartment, and in this way, the member 127 will exercise the functions indicated by its name. The gas ultimately leaves by way of the openings 130.

Résumé.—The operation of the structure has been explained at length, hereinbefore, in connection with the various component mechanisms, but the functions of certain parts may be alluded to profitably at this point. The breech block 4 is advanced by the spring 24 and is retracted by gas pressure. The locking member 30 is raised by gas pressure and is moved downwardly by

the spring 34. The plunger 18, which moves with the breech block, operates the pump 54—55 to secure a flow of cooling water through the jacket 3. The rack 107 on the plunger 18 forms the initial member of a driving train, which, culminating in the feeding fingers 76, serves to advance the cartridges to the breech block. The breech block 4 and its cam 7 operate the parts 109 and 110, these elements regulating the movement of the cartridges in the immediate vicinity of the breech block 4. When the cartridges in the hopper 63 are used up, a mechanism beginning with the arm 116 of Fig. 18, and terminating with the plunger 124 of Fig. 11, stops the operation of the gun.

Having thus described the invention, what is claimed is:—

1. In a device of the class described, a gun embodying a movable breech block; a remote source of ammunition supply including a rotary feeding means; a conduit leading from said source to the gun; a shaft journaled in the conduit; means for operatively connecting the shaft with the feeding means; and mechanism for operatively connecting the shaft with the block.

2. In a device of the class described, a gun embodying a movable breech block; a remote source of ammunition supply including a feeding means; a conduit leading from said source to the gun; a shaft journaled in the conduit; a pinion and gear connection between the shaft and the feeding means; and a rack and a pinion connection between the breech block and the shaft.

3. In a device of the class described, a gun embodying a movable breech block; a first shaft journaled in the gun; a rack and pinion mechanism actuated by the breech block; a pawl and ratchet connection between the pinion member of said mechanism and the first shaft; a remote source of ammunition supply including a rotary feeding means; a conduit leading from said source to the gun; a flexible shaft journaled in the conduit and connected with the first shaft; and means for operatively connecting the flexible shaft with the feeding means.

4. In a device of the class described, a gun comprising a breech block; a locking member for the breech block; a detent cooperating with the locking member; trigger mechanism coacting with the detent to hold the same out of engagement with the locking member; a source of ammunition supply; a part in said source responsive to a diminution of ammunition in said source; and a connection between said part and the trigger mechanism, operating to release the detent for engagement with the locking member, upon a diminution of ammunition in said source.

5. In a device of the class described, a gun comprising a breech block; a locking member for the breech block; a detent cooperating

ing with the locking member; trigger mechanism coacting with the detent to hold the same out of engagement with the locking member; a source of ammunition supply; a
5 flexible conduit leading from the source to the gun; a part in said source responsive to a diminution of ammunition in said source; a flexible push rod in the conduit and coacting with the trigger mechanism to move the
10 same out of operative relation to the detent and to cause the detent to coact with the locking member; and means for connecting the push rod with said part.

6. In a device of the class described, a casing; a gun; a conduit leading from the casing to the gun; a rotary feeding member
15 journaled in the casing; a shaft journaled on the casing; an arm carried by the shaft and extended transversely of the feeding member, for engagement with the ammunition; a
20 push rod slidable in the conduit; means for operatively connecting the push rod with the

shaft; a firing mechanism in the gun; and means responsive to the action of the push rod for rendering the firing mechanism inactive when the pressure of ammunition on the arm is relieved.

7. In a device of the class described, a gun comprising a reciprocating breech block; a shaft journaled in the gun parallel to the block and comprising arms, one of which extends above the breech block, the other of which operates at the side of the breech block, to form an ammunition feed and an ammunition ejector; and a cam on the breech block cooperating with the first specified arm.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

CHARLES W. BROWN.

Witnesses:

MASON B. LAWTON,
IVY E. SIMPSON.