

**2,091,672**

# RAPID FIRING RIFLE

Filed May 29, 1936

4 Sheets-Sheet 1

FIG. 1

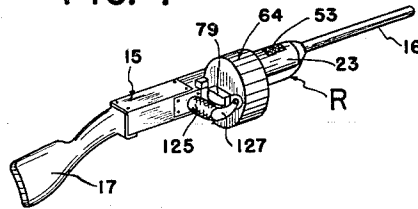
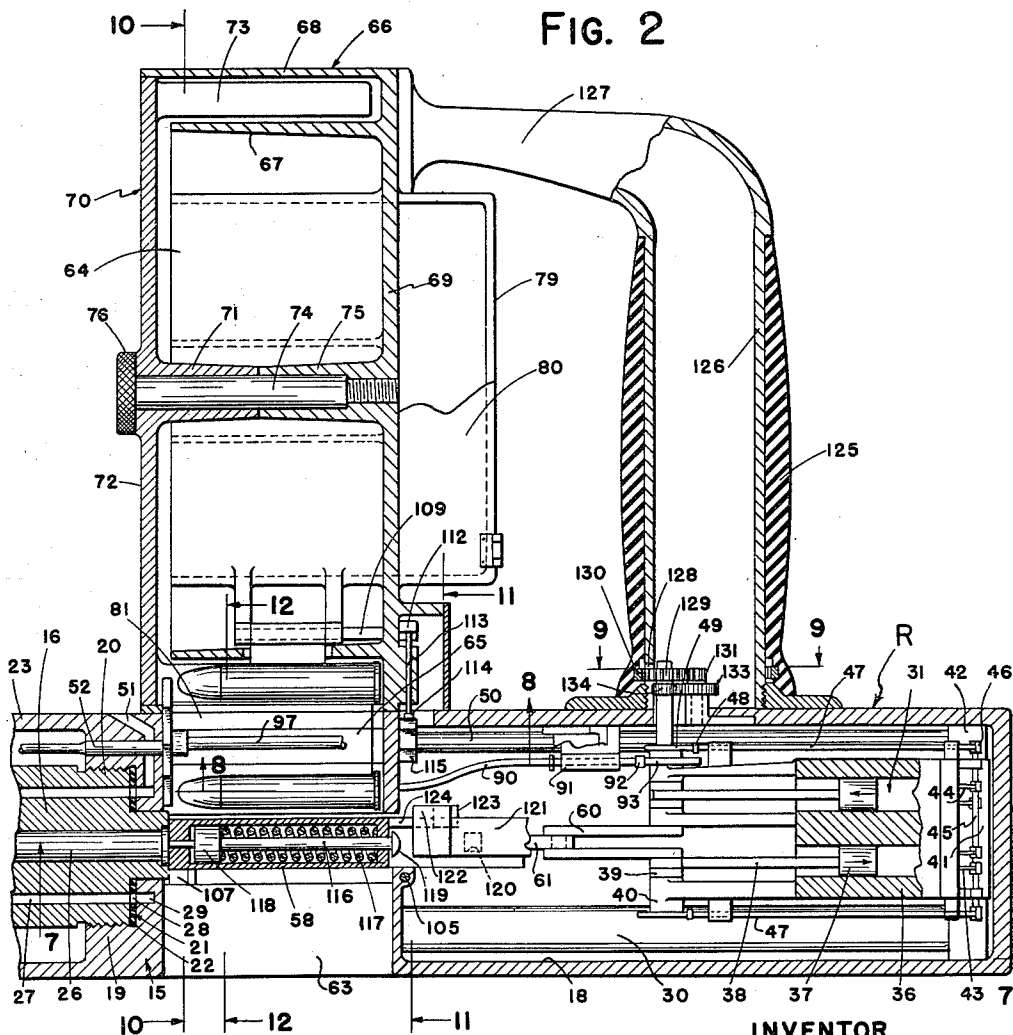


FIG. 2



INVENTOR  
BY *P. J. CLEERMAN*  
*[Signature]*  
ATTORNEYS

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FIG. 6 is a cross-sectional view of a device. It shows a substrate 15 with a layer 53 and a structure 54. A component 23 is shown with a curved surface 16 and a layer 56. A reference numeral R is also present.

INVENTOR  
P. J. CLEERMAN  
BY *[Signature]*  
ATTORNEYS

Aug. 31, 1937.

P. J. CLEEREMAN

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RAPID FIRING RIFLE

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FIG. 7

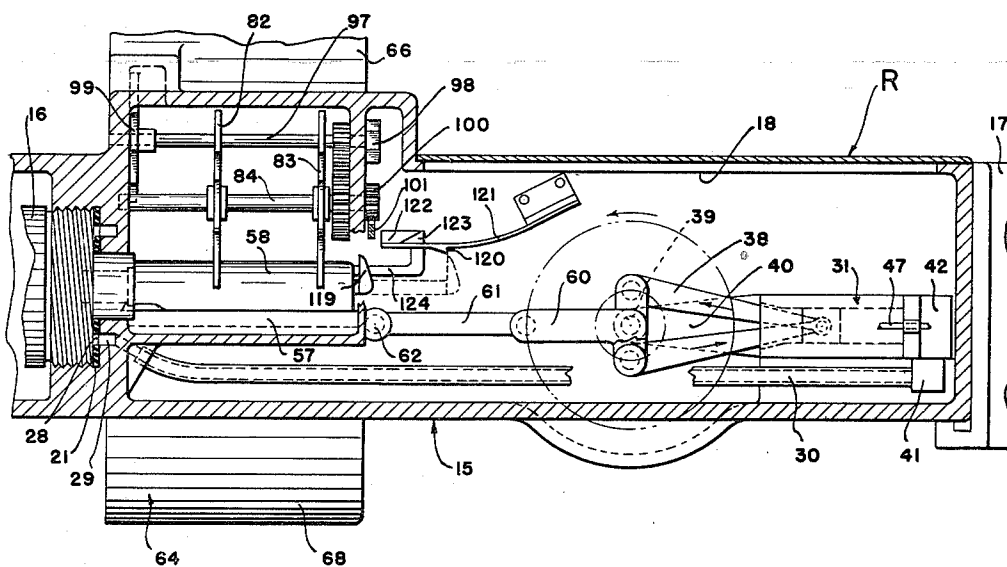


FIG. 8

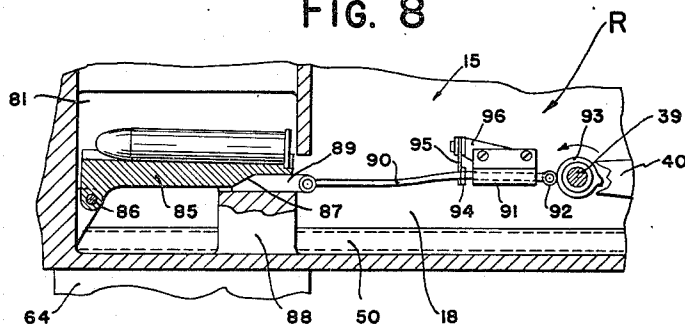


FIG. 9

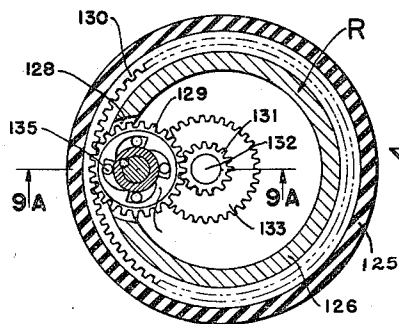
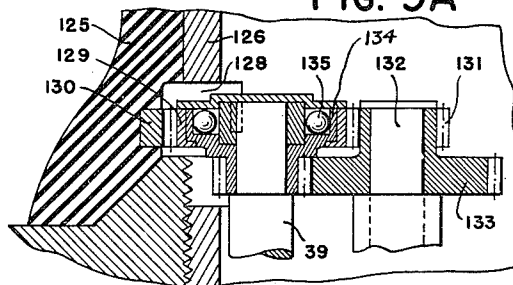


FIG. 9A



INVENTOR  
P. J. CLEEREMAN  
BY *[Signature]*  
ATTORNEYS

Aug. 31, 1937.

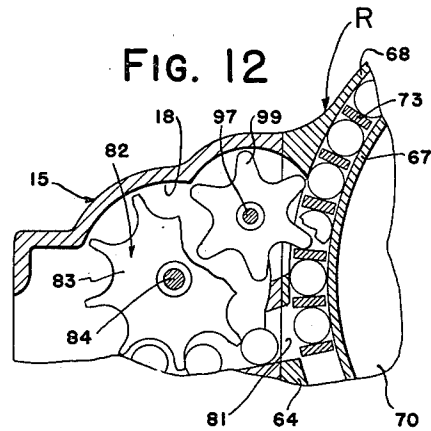
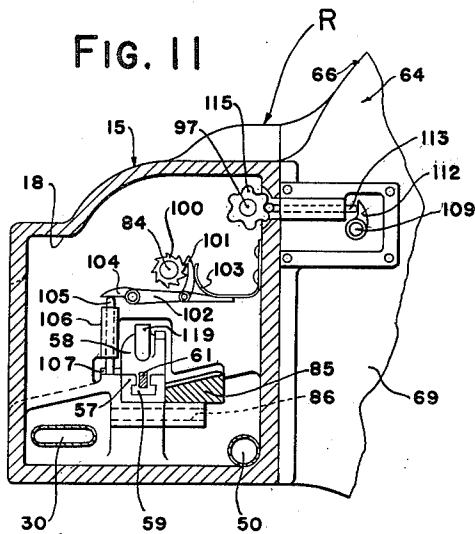
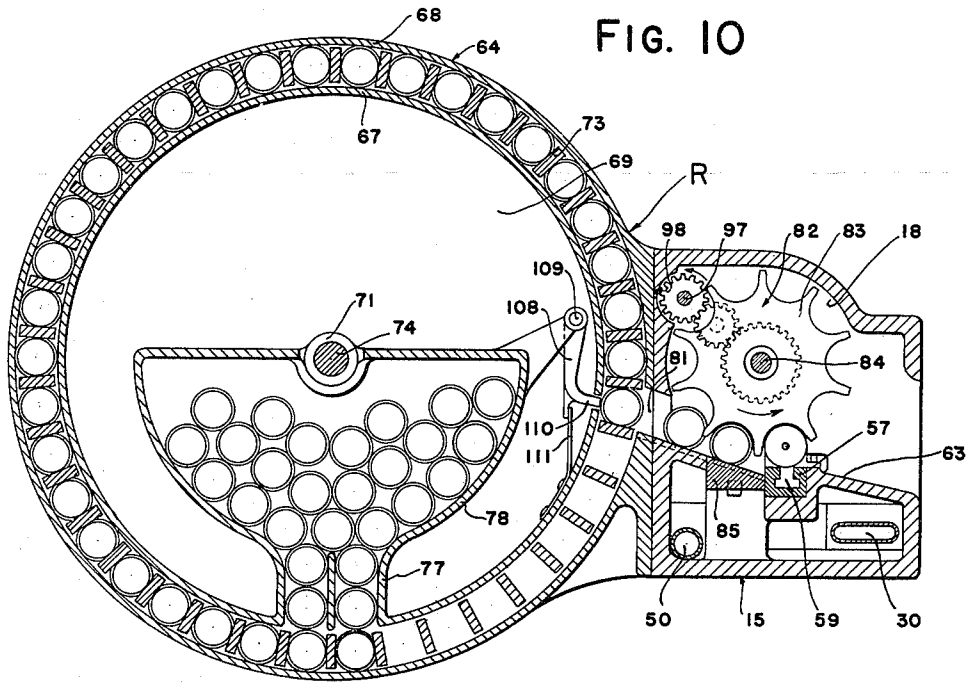
P. J. CLEEREMAN

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RAPID FIRING RIFLE

Filed May 29, 1936

4 Sheets-Sheet 4



INVENTOR  
BY *P. J. CLEERMAN*  
ATTORNEYS

## UNITED STATES PATENT OFFICE

2,091,672

## RAPID FIRING RIFLE

Peter J. Cleereman, Kenosha, Wis.

Application May 29, 1936, Serial No. 82,541

## 11 Claims. (Cl. 42—3)

This invention appertains to firearms, and more particularly to a rapid-firing rifle of the automatic type.

There is a growing demand by peace officers and the military forces for a light portable gun having a great cartridge capacity and capable of firing a maximum number of cartridges in a minimum amount of time, which can be conveniently carried and operated by a single person either at close or long range.

It is, therefore, one of the primary objects of my invention to provide a machine gun which will be of little greater weight or size than an ordinary army rifle, and which will automatically fire, after initial manual operation, a large number of rounds of ammunition with great accuracy in a minimum amount of time, and which can be either shot from the hip or confined quarters, or at the shoulder for long range.

Another object of my invention is to provide a rapid-firing rifle embodying an expanding gas-operated motor actuated from the exploding cartridges for ejecting the fired shells from the gun, and for feeding fresh cartridges into the barrel.

Another salient object of my invention is the provision of novel means under control of the operator for directing the course of the expanding gases either into the motor for operating the gun, or into the atmosphere for stopping the operation of the motor and the gun.

A further object of my invention is the provision of a magazine of great capacity for receiving the cartridges and for feeding the cartridges from the magazine to the motor-actuated breech block, the provision of the magazine and feed entirely eliminating the necessity of utilizing cartridge-carrying belts or discs.

A further important object of my invention is the provision of novel means for actuating the feeding mechanism for the cartridges from the magazine to the breech block from the motor, whereby all parts will be actuated in proper sequence.

A further object of my invention is the provision of a laterally extending hand grip on the side of the gun for facilitating the operation of the gun from both the hip and the shoulder, and novel means actuated from the hand grip, whereby upon the turning of the hand grip the parts will be manually actuated for bringing about the initial firing of the gun.

A further object of my invention is the provision of a hopper forming a part of the magazine for loosely receiving a quantity of cartridges and

for directing the cartridges one at a time to the feeding mechanism.

A further object of my invention is the provision of novel means arranged intermediate the magazine and the breech for positively delivering one cartridge at a time from the feed wheel of the magazine to and in advance of the breech block, with novel means for holding the cartridges against movement as the same are delivered to the breech block incident to the vibration of the gun.

A further object of my invention is the provision of novel means for permitting the quick detaching of the barrel from the body of the gun, whereby when the barrel becomes overheated, the same can be readily removed for permitting a cool barrel to be associated with the gun.

A further object of my invention is the provision of a novel valve arrangement for permitting the flow of the expanding gases from the barrel into a delivery tube for the manifold of the motor, the valve arrangement being such as not to interfere with the substitution of barrels.

A still further object of my invention is to provide a rapid-firing rifle of the above character, which will be durable and efficient in use, one that will be comparatively simple and easy to manufacture, and one which can be placed upon the market at a reasonable cost.

With these and other objects in view, the invention consists in the novel construction, arrangement, and formation of parts, as will be hereinafter more specifically described, claimed, and illustrated in the accompanying drawings, in which drawings:

Figure 1 is a perspective view of my complete rapid-firing rifle.

Figure 2 is an enlarged, fragmentary horizontal section through the body portion of the gun, illustrating the arrangement of the motor, the magazine, the laterally extending hand grip and the means for feeding the cartridges from the magazine to the barrel.

Figure 3 is a longitudinal section through the gun taken in advance of Figure 2 and forming in effect a continuation of Figure 2, and illustrating the novel means employed for permitting the flow of expanding gases from the barrel to the passageways leading to the expanding gas conduit tube for the motor.

Figure 4 is a transverse section through the gun taken substantially on the line 4—4 of Figure 3 looking in the direction of the arrows and illustrating the novel valve arrangement.

Figure 5 is a transverse section through the gun taken substantially on the line 5—5 of Figure 3 looking in the direction of the arrows and illustrating the manual means employed for

stopping the operation of the gun.

Figure 6 is a detail longitudinal section taken substantially on the line 6—6 of Figure 5 looking in the direction of the arrows illustrating the manually actuated thumb-piece for controlling the firing of the gun.

Figure 7 is a longitudinal section through the body of the gun taken substantially at right angles to Figure 2 and on the line 7—7 of Figure 2 looking in the direction of the arrows illustrating the conduit for the expanding gases and the novel cartridge feed and the actuating means for the firing pin.

Figure 8 is a detail longitudinal section taken at one side of Figure 7 and on the line 8—8 of Figure 2 looking in the direction of the arrows, illustrating the means for holding the cartridges against vibration as the same are fed in advance of the breech block.

Figure 9 is a transverse section through the laterally extending handle and its hand grip on an enlarged scale taken on the line 9—9 of Figure 2 looking in the direction of the arrows, illustrating the manual means employed for actuating the gun.

Figure 9a is an enlarged, fragmentary detail section taken on the line 9a—9a of Figure 9 looking in the direction of the arrows.

Figure 10 is a transverse section through the gun taken substantially on the line 10—10 of Figure 2 looking in the direction of the arrows, illustrating the novel arrangement of the magazine with its feed wheel and the means for positively delivering one cartridge at a time in advance of the breech block.

Figure 11 is a transverse section through the body of the gun taken on the line 11—11 of Figure 2 looking in the direction of the arrows, illustrating the arrangement of the breech block and the means for actuating the feed wheel of the magazine and the mechanism for delivering one cartridge at a time to the breech block.

Figure 12 is a fragmentary transverse section through the body of the gun taken substantially on the line 12—12 of Figure 2 looking in the direction of the arrows, showing the star wheels for actuating the feed wheel of the magazine and the wheels for moving the cartridges one at a time to the breech block.

Referring to the drawings in detail, wherein similar reference characters designate corresponding parts throughout the several views, the letter R generally indicates my novel rapid-firing rifle, which comprises the body portion 15, the removable barrel 16, and the stock 17.

The body of the gun is of a hollow construction, so as to form a casing 18 for the various operating parts of the gun, and it is to be noted that the forward end thereof is closed by a wall 19. This front wall 19 has formed therein an offset bore 20 defining an annular shoulder 21. The enlarged portion of the bore is internally threaded for receiving the threaded rear end of the barrel 16, and the extreme rear end of the barrel is reduced and fitted into the smaller portion of the bore. A gasket 22 is placed between the shoulder of the bore and the rear end of the barrel.

Formed on the wall 19 is a forwardly extending sleeve 23, which encompasses a portion of the barrel around the breech end thereof, and the forward

end of this sleeve snugly abuts against a shouldered rabbet 24 formed on an enlargement 25 of the barrel. This forms a hollow space between the barrel and the sleeve 23, which functions as a cooling chamber and as a compartment for housing certain operating parts of the gun.

The barrel 16 is provided with an axially disposed bore 26 which may or may not be rifled. Spaced radially around the bore 26 are longitudinally extending passageways 27, the rear ends of which communicate, through ports 28 formed in the gasket 21, with an annular passageway 29 formed in the body of the gun 15 in advance of the casing 18. Communicating with the annular passageway 29 is a conduit or tube 30 for conveying the gases under pressure from the exploding cartridges to the expansion engine or motor 31, which is located in the casing 18 adjacent to the stock 17.

Connecting the bore 26 at spaced points with the longitudinally extending passageways 27 are radially extending ports 32. The flow of expanding gases through the ports 32 is controlled by valves 33, which are normally held on their valve seats formed in said ports by spaced rings 34. These rings 34 are rigidly secured to the inner face of the sleeve 23 of the body, and each of the rings is formed with an annular outstanding flange which surrounds the barrel. These flanges are slit to provide resilient fingers 35, which are adapted to engage the heads of the valves to hold the valves normally on their seats. By providing the rings 34 with the resilient tongues 35, the barrel 16 can be readily and easily connected with the body of the gun and insure the proper engagement of a resilient tongue 35 with the heads of the valve stems.

As the cartridges are fired, the expanding gases unseat the valves 33 and allow the flow of gases into the longitudinally extending passageways 27, and thence into the conduit 30, and into the motor 31 for causing the automatic actuation of the gun, as will be later described.

The expanding gas motor or engine 31 takes the form of a miniature internal combustion engine and includes a pair of cylinders 36 in which are reciprocally mounted a pair of operating pistons 37. The pistons are operatively connected, through the medium of connecting rods 38, with a crank-shaft 39. This crank-shaft 39 is rotatably supported in suitable bearings 40, which can be connected with the cylinder block.

The heads for the cylinders carry an intake manifold 41 and an exhaust manifold 42. The flow of gases into the cylinders is controlled by intake valves 43, and the exhausting of the expanding gases is controlled by exhaust valves 44. These valves are operated in proper timed relation by means of a cam shaft 45. The cam shaft 45 has formed thereon cranks 46 to which are operatively connected slide rods 47. These rods carry rollers 48, which are adapted to bear against cams 49 secured to the cam shaft 45. Communicating with the exhaust manifold 42 is an exhaust tube 50 which leads into the atmosphere through one side of the gun.

The annular passageway 29 formed in the body of the gun also has communication with the atmosphere through a port 51 at one side of the body. This passageway 51 is normally closed to the atmosphere by means of a valve rod or pin 52, which is reciprocally carried by the body 15 of the gun. When the valve rod or pin is in the passageway 51, the passageway is closed, and when the valve rod 52 is moved out of the passageway,

flow of expanding gases from the chamber 29 directly into the atmosphere is permitted.

In order to actuate the valve rod 52 the sleeve 23 of the body supports a sliding thumb or finger-piece 53. Connected with the finger-piece 53 is a pin 54 which is slidably mounted in a slot 55 formed in the sleeve 23. This pin 54 has in turn connected therewith an arcuate metal strip 56 which carries the valve rod 52. Obviously, by manipulating the thumb-piece 53, the valve rod can be moved into and out of the passageway 51.

When it is desired to operate the motor 31 and the gun, the thumb-piece 53 is moved rearwardly so that the valve rod will close the passageway 51, and when it is desired to stop the operation of the motor 31 and the gun, the thumb-piece 53 is slid forwardly, which will carry the valve rod away from the passageway 51. The direct exhausting of the expanding gases into the atmosphere will effectively prevent the operation of the motor and thus bring about the stopping of the gun.

Formed on or secured to the body 15 of the gun within the casing 18 is a stationary guideway 57 for the breech block 58. The breech block 58 carries a tongue 59 which is slidably received within a groove formed in the guideway 57. The tongue and groove may be dovetailed, if preferred. The breech block is reciprocated back and forth in rear of the barrel directly from the crank-shaft 39 of the motor, and the crank-shaft has formed thereon or secured thereto a crank-arm or throw 60, to which is operatively connected a connecting rod 61. The connecting rod 61 is in turn pivotally connected, as at 62, to the rear end of the guide tongue 59. This forms an efficient means for reciprocating the breech block so as to permit the feeding of fresh cartridges in advance of the same and to permit the exit of the empty shells from the bore of the barrel.

Obviously, when a cartridge is fired, the explosion kicks back the empty shell and the breech block. This movement is timed to operate in synchronism with the motor. As the shell is kicked out of the barrel, means is provided for forcing the shell to one side of the breech block and out of a passageway 63 formed in the body 15, so that the empty shells can be thrown on the ground. Simultaneous with the forcing of an empty shell away from the breech block, a cartridge is fed in front of the breech block, so that as the motor continues its movement, the breech block will be forced forwardly, shoving the cartridge into the bore.

As heretofore intimated, a novel magazine 64 is provided for the cartridges, and novel means 65 is provided for feeding the cartridges from the magazine to and in front of the breech block.

The magazine 64 can take the form of an annular casing 66 carried by one side of the body of the gun. This annular casing 66 includes a pair of spaced concentric inner and outer walls 67 and 68, which can be formed on or secured to the disc-shaped rear wall 69 of the magazine.

Rotatably carried by the magazine 64 is a feed wheel 70. This feed wheel 70 includes a hub 71 and a disc-shaped wall 72 which forms a closure for the front of the magazine. The disc-shaped wall 72 carries equidistantly spaced blades or fingers 73, which move in the space between the concentric annular walls 67 and 68. The space between the blades is just sufficient to receive a single cartridge.

A bearing pin 74 is provided for rotatably supporting the feed wheel, and this bearing pin ex-

tends through the hub 71 and is threaded into a boss 75 formed on the axial center of the rear wall 69 of the magazine. The outer end of the bearing pin 74 has formed thereon a knurled head 76 to facilitate the turning of the pin 74 and to engage and hold the wheel 70 against displacement.

Rigidly connected with the inner concentric wall 67 at its lower end are the feed spouts 77 of the hopper 78 for the cartridges. The spouts 77 are of a sufficient width to permit the downward movement of cartridges therein, and the walls of the hopper are shaped so as to facilitate the directing of the cartridges into the spout.

A feed chute 79 communicates with the hopper, and extends beyond the outer face of the rear wall 69, and forms means for permitting the insertion of loose cartridges into the hopper. A pivoted cover 80 can be provided for closing the chute.

As the wheel 70 rotates, the cartridges are automatically kicked out into an inclined feed slot 81, which leads from the magazine into the body of the gun. The inclined feed slot allows the cartridges to roll into the body of the gun directly in rear of the barrel, and means is provided for accurately timing the delivery of the cartridges in rear of the barrel and in advance of the breech block when the breech block is in its rearmost position. This means is also provided for kicking out the empty shells.

The feeding and timing mechanism is generally indicated by the reference character 82 and embodies a pair of spaced star wheels 83 rigidly connected with a longitudinally extending operating shaft 84, which is mounted in suitable bearings carried by the body. The teeth of the star wheels are so spaced as to receive a cartridge therebetween, and the wheels are so positioned as to carry a cartridge.

The feed and timing wheels 83 carry the cartridges over a friction lift block 84, which is situated in the runway for the cartridges at one side of the bolt or breech block 58. The friction lift block is hinged at its forward end, as at 86, on a suitable bearing bracket or boss carried by the housing 18.

The lower face of the block 85 at its rear end is beveled, as at 87, and normally rests on a guide-piece 88 formed on one wall of the housing. Slidably mounted on the guide-piece 88 is an operating wedge 89, and this wedge is pivotally connected to a cam rod 90 slidably mounted in a guide sleeve 91 arranged within the housing or casing 18. The rear end of the cam rod 90 carries a roller 92 for engaging the periphery of an operating cam 93 secured to the crank-shaft 39 of the motor 31. The wedge 89 is operated in proper timed relation so as to move the lift and friction block 85 upwardly, whereby to hold a cartridge between the teeth of the star wheels 83 as the star wheels carry the cartridge in front of the bolt or breech block.

In order to hold the roller 92 of the cam rod 90 in engagement with the cam wheel 93, the rod 90 is provided with a finger 94 against which bears a leaf spring 95. The leaf spring 93 is firmly connected to a bracket 96 disposed in the housing.

Attention is now directed to the means for actuating the feed wheel 70 of the magazine and the feeding and timing wheels 83. This means includes a shaft 97 disposed in parallelism to the shaft 84 of the timing and feeding star

wheels 83. Suitable bearings are provided for the shaft 97 and this shaft is operatively connected to the shaft 84 by means of a train of gears 98.

5 Rigidly secured to the shaft 97 is a star wheel 99, the teeth of which are adapted to engage the blades 73 of the feed wheel 70 of the magazine. The teeth of the star wheels are so spaced as to turn the feed wheel 70 one space so as to position a pair of the blades 73 in registration with the cartridge-way 81 to allow a cartridge to roll from between the blades down into the way 81 and into engagement with the star wheels 83. Means is also provided for forcibly kicking a 10 cartridge from between a pair of blades and into the way, and this means will be later described.

Rigidly secured to the shaft 84 is a ratchet wheel 100. The teeth of the ratchet wheel are normally engaged by a dog or pawl 101, which is pivotally connected to a rocking lever 102. A spring 103 is utilized for normally holding the pawl 101 into engagement with the ratchet wheel 100. Formed on the lever 102 is a crank-arm 104 normally engaged by a slide rod 105. 15 This slide rod is mounted within a guideway 106, and the lower end of the pin or slide rod 105 rests upon the upper surface of the guide 57 for the breech block. The breech block has formed thereon a laterally extending wedge-shaped finger 107, which is adapted to move under and raise the rod 105 as the breech block is forcibly moved back.

The raising of the rod moves the ratchet wheel 100 one tooth through the medium of the pawl 101, and consequently the shafts 84 and 97 are rotated to cause the feeding of the cartridges.

To force the cartridges out of the magazine feed wheel, an arm 108 is carried by a rock shaft 109 mounted in suitable bearings carried by the magazine. The lower end of the arm 108 has formed thereon a right-angularly extending nose 110, which, when the rock shaft is moved in one direction, is carried into the magazine feed wheel between a pair of the blades and into forcible contact with the cartridge. 20

A spring 111 engages the arm 108 to normally hold the nose away from the magazine feed wheel, so as not to interfere with the normal rotation thereof. One end of the rock shaft 109 has formed thereon or secured thereto a crank-arm 112 which normally bears against a slide rod 113. The spring 111 also functions to hold the crank-arm 112 in engagement with the slide rod 113.

55 The inner end of the slide rod is provided with a head 114, which engages against a cam wheel 115 secured to the shaft 97. Hence, during rotation of the shaft 97, the rock shaft 109 will be operated in proper time with the movements of the magazine feed wheel and the feed and timing star wheels 83.

The breech block 58 carries the firing pin 116 for the cartridges, and a relatively heavy expansion coil spring 117 is disposed within the block and around the firing pin. This spring has one end thereof bearing against the rear end of the breech block, and its forward end against a collar 118 carried by the firing pin. The forward end of the firing pin extends through the breech block for forcible contact with the firing cap of the cartridge, and the rear end of the firing cap has formed thereon a laterally extending foot 119. 60

75 Arranged in the path of the foot 119 is a spring-pressed detent 120. As shown, the tooth of the

detent 120 is formed directly on a leaf spring 121 carried by one wall of the casing 18, and the forward end of the spring has secured thereto or formed thereon a stationary wedge block 122. This wedge block 122 is adapted to be engaged at the proper time by a sliding wedge block 123, so as to move the tooth of the detent from the path of the foot 119. The movable wedge block 123 is carried by an arm 124 rigidly secured to the rear end of the breech block 58.

As the breech block 58 moves rearwardly, the wedge block 123 is carried therewith and away from the stationary wedge block 122, allowing the spring 121 to flex so as to dispose the tooth of the detent in the path of the foot 119. 10

It is to be noted that the outer face of the detent is beveled so that as the foot moves rearwardly the same will spring back the tooth and catch thereunder. When the breech block is returned to its normal position forcing a fresh 15 cartridge in the bore of the barrel, the firing pin is held back against the tension of its spring 116, which places the spring under considerable tension.

Just as the breech block reaches its normal position, the movable wedge block 123 engages the stationary wedge block 122 so as to move the tooth of the detent from engagement with the foot, allowing the spring 116 to forcibly bring the forward point of the firing pin into engagement with the cartridge. 20

Means must be provided for initially operating the gun and for loading the magazine feed wheel with the cartridges from the hopper. This means comprises a rotatable hand grip 125 mounted upon a laterally extending handle 126 secured to the body of the gun in advance of the stock 17. This handle curves forwardly, as at 127, and is rigidly secured to the magazine 54 adjacent to the outer end thereof. Hence, the handle also forms a brace for the magazine. The position of the hand grip facilitates the holding of the gun against the shoulder and also permits the gun to be fired conveniently from the hip at close quarters. 25

Adjacent to the inner end of the handle a short slot 128 is formed, through which extends the teeth of an idle gear wheel 129. This gear wheel 129 meshes with a ring gear 130 secured to the inner face of the hand grip 125. The gear 129 is rotatably mounted upon the hub of a spur gear 134 and constantly meshes with a spur gear 131 secured to a stub shaft 132 rotatably mounted in a suitable bearing carried by the body of the gun. The stub shaft 132 also has secured thereto a spur gear 133, which meshes with the smaller spur gear 134. This smaller spur gear 134 is operatively connected to the crank-shaft 39 through the medium of a clutch hub 135. The provision of the clutch hub is such that the hand grip 125 can be turned in one direction for bringing about the rotation of the crankshaft 39 to cause manual operation thereof to bring about the initial operation of the gun. 30

After the motor 31 starts operation and the crank-shaft 39 is forcibly actuated thereby, the clutch hub 135 prevents retrograde movement of the hand grip. By turning the hand grip the magazine feed wheel will be rotated so that the cartridges can be fed into the compartments carried thereby. If preferred, a clutch mechanism can be provided for preventing actuation of the breech block during the loading of the magazine feed wheel, and this clutch would act in the nature of a safety. 35

It is believed that the reading of the foregoing description will give a clear idea of the operation of the gun, but one cycle of operation will be again briefly described.

5 In operation of the gun, the finger-piece 53 is moved rearwardly so as to close the port 51 leading to the atmosphere, and the hand grip 125 is turned. Considering that the gun is loaded with cartridges, rotation of the hand grip will turn 10 the crank-shaft 39, which will move back the breech block 58, allowing a cartridge to be fed in advance of the same. As the breech block again moves forwardly, the firing pin will be held stationary by the detent 120, and when the breech 15 block reaches its closed position the firing pin will be released by the movable wedge 123, which will bring about the firing of the cartridge.

As the cartridge fires, the breech block will be automatically thrown backward with the empty 20 shell, and the turning movement of the star wheels 83 will carry the empty shell away from the breech block and into the inclined outlet 63, and at the same time carry a fresh cartridge in advance of the breech block. As the breech block 25 returns to its normal position the cartridge is forced into the bore of the barrel, as just described.

The expanding gases from the fired cartridge will unseat the valves 33, and these gases will 30 flow through the passageways 27, into the chamber 29, and then into the conduit 30, through the inlet manifold 41. The turning of the crank-shaft will actuate the inlet valves to permit the gases to empty the cylinders at the proper time 35 to bring about the automatic rotation of the crank-shaft and the consequent automatic operation of the gun.

When it is desired to cease firing, the thumb-piece 153 is moved forwardly, which will open 40 the atmosphere port 51, allowing the escape of the expanding gases into the atmosphere, which will prevent further operation of the motor.

From the foregoing description it can be seen that I have provided an exceptionally light portable 45 machine gun of the rifle type, which can be conveniently handled by a single person and fired either from the shoulder or the hip.

Changes in details may be made without departing from the spirit or the scope of the invention, but what I claim as new is:

50 1. In a rapid-firing rifle, a body portion, a quickly detachable barrel carried by said body portion having a bore and a plurality of longitudinally extending passageways disposed around 55 the bore, ports connecting the bore with the passageways, outwardly opening valves normally closing said ports and adapted to be unseated by expanding gases from fired cartridges, a plurality of resilient springs carried by the body portion 60 for engaging the valves when the barrel is associated with said body portion, an expanding gas-operated motor in the body, means for leading the expanding gases from the passageways to the motor, a breech block, means for operating the 65 breech block from the motor, and cartridge-feeding and ejecting mechanism operated from the breech block and in unison therewith.

2. In a rapid-firing rifle, a body portion, a quickly detachable barrel carried by said body 70 portion having a bore and a plurality of longitudinally extending passageways disposed around the bore, ports connecting the bore with the passageways, outwardly opening valves normally closing said ports and adapted to be unseated by 75 expanding gases from fired cartridges, a plurality

of resilient springs carried by the body portion for engaging said valves when the barrel is associated with said body portion, an expanding gas-operated motor in the body, means for leading the expanding gases from the passageways to the 5 motor, a breech block, means for operating the breech block from the motor, cartridge-feeding and ejecting mechanism operated from the breech block and in unison therewith, said body having a port for venting the passageways to the atmos- 10 phere, a closure valve plug for the passageway, and a thumb-piece operatively connected to the valve plug, whereby the same can be manually actuated.

3. In a rapid-firing rifle, a body portion, a 15 barrel, a magazine communicating with the body portion, a movable breech block, cartridge-feeding means for leading the cartridges from the magazine in advance of the breech block one at a time when the breech block is in its rearmost position, means for operating said feeding mechanism 20 from the breech block, an expanding gas-operated motor, means for leading expanding gases from the bore of the barrel to the motor, means operatively connecting the motor to the breech block, a laterally extending handle carried by the body and connected with the magazine, and a rotatable hand grip on the handle operatively 25 connected to said motor.

4. In a rapid-firing rifle, a body portion, a 30 barrel connected with said body portion, a reciprocating breech block movable toward and away from said barrel, an expanding gas-operated motor, means operatively connecting the motor to the breech block, means for leading expanding 35 gas from the bore of the barrel to the motor, a laterally extending magazine carried by and communicating with the body portion, a feed wheel in said magazine having a plurality of cartridge compartments, means for ejecting one cartridge 40 at a time from the feed wheel into the body portion of the gun, feed and timing wheels for receiving said cartridges and feeding the same one at a time in advance of the breech block when the same is in its rearmost position, means for ejecting 45 fired shells by said feed and timing wheels, and means for operating said feed and timing wheels, the magazine wheel and the cartridge-ejecting means for the wheel from the breech block. 50

5. In a rapid-firing rifle, a body portion, a barrel connected with said body portion, a reciprocating breech block movable toward and away from said barrel, an expanding gas operated motor, means operatively connecting the motor 55 to the breech block, means for leading expanding gas from the bore of the barrel to the motor, a laterally extending magazine carried by and communicating with the body portion, a feed wheel in said magazine having a plurality of cartridge compartments, means for ejecting one cartridge 60 at a time from the feed wheel into the body portion of the gun, feed and timing wheels for receiving said cartridges and feeding the same one at a time in advance of the breech block when the 65 same is in its rearmost position, means for ejecting fired shells by said feed and timing wheels, means for operating said feed and timing wheels, the magazine wheel and the cartridge-ejecting means for the wheel from the breech block, and 70 means operated from said motor for frictionally holding the cartridges in engagement with the feed and timing wheels as the cartridges are carried in advance of the breech block.

6. In a rapid-firing rifle, a body portion, a 75

barrel carried by said body portion, a reciprocating breech block movable toward and away from the barrel, an expanding gas-operated motor, means operatively connecting the breech block to the motor, means for leading expanding gases from the bore of the barrel to the expanding motor, a laterally extending magazine carried by the body portion communicating with said body portion, a rotatable cartridge feeding wheel in said magazine having a plurality of peripheral pockets for receiving the cartridges, a hopper in said magazine for leading cartridges to the pockets of the wheel, means for ejecting one cartridge at a time from the wheel into the body portion, cartridge-timing and feeding wheels for feeding the cartridges one at a time in advance of the breech block when the breech block is in its rearmost position, said last mentioned wheels ejecting fired shells from the body portion in advance of the breech block when the same is in its rearmost position, means for operating the feeding and timing wheels and the magazine cartridge-feeding wheel from the breech block, and means for operating the cartridge-ejecting means for the magazine cartridge feeding wheel from the feeding and timing wheels.

7. In a rapid-firing rifle, a body portion, a barrel, a reciprocating breech block movable toward and away from the barrel, an expanding gas-operated motor, means operatively connecting the breech block to the motor, means for feeding the expanding gases from the bore of the barrel to the motor, a firing pin carried by the breech block, an expansion spring normally urging the firing pin toward the bore of the barrel, a laterally extending foot carried by the rear end of the firing pin having a beveled outer face, a spring-carried detent disposed in the path of said foot for holding the firing pin against the tension of its spring in a rearward position when the breech block moves forwardly, a wedge block on the spring, and a wedge shoe carried by the breech block and movable into engagement with the first mentioned wedge for carrying the detent away from the foot when the breech block reaches its foremost position.

8. A rapid-firing rifle comprising a body portion, a barrel, a reciprocating breech block movable toward and away from the barrel, an expanding gas-operated motor including a crank-shaft, means operatively connecting the breech block with the crank-shaft, means for leading expanding gases from the barrel to the motor, means operated from the breech block for feeding cartridges in advance of the breech block when the breech block is in its rearmost position, a magazine carried by and extending laterally from the body portion, means for feeding cartridges from the magazine into the body portion, a laterally extending handle connecting the body portion and magazine, a rotatable hand grip on the handle having a ring gear, and a train of gearing connecting the ring gear with the crank-shaft, including a ratchet mechanism.

9. In a rapid-firing rifle, a body portion, a barrel carried by said body portion, a reciprocating

breech block movable toward and away from said barrel, an expanding gas-operated motor, means operatively connecting the motor to the breech block, means for leading expanding gases from the bore of the barrel to the motor, rotatable star wheels actuated from the breech block for feeding cartridges one at a time in advance of the breech block when the same is in its rearmost position, a friction lift block disposed at one side of the breech block and hingedly connected to the body portion at its forward end, said friction lift block having a beveled lower face, a reciprocating wedge shoe movable into and out of engagement with said beveled face, and means for operating the shoe from the motor.

10. In a rapid-firing rifle, a body portion, a barrel connected with said body portion, a breech block movable toward and away from the barrel, an expanding gas-operated motor, means operatively connecting the breech block with the motor, means for leading expanding gases from the bore of the barrel to the motor, a laterally extending magazine communicating with the body portion, a rotatable feed wheel in said magazine having a plurality of peripheral pockets for cartridges, a hopper for feeding cartridges to the pockets, a pair of rotatable star wheels for receiving cartridges from the magazine feed wheel and for feeding the same one at a time in advance of the breech block when the breech block is in its rearmost position, a star wheel for operating the magazine wheel, means operatively connecting the last mentioned star wheel with the first mentioned star wheels, a shaft for said first mentioned star wheels, a ratchet wheel on said shaft, and means for operating the ratchet wheel from the breech block.

11. In a rapid-firing rifle, a body portion, a barrel connected with said body portion, a breech block movable toward and away from the barrel, an expanding gas-operated motor, means operatively connecting the breech block with the motor, means for leading expanding gases from the bore of the barrel to the motor, a laterally extending magazine communicating with the body portion, a rotatable feed wheel in said magazine having a plurality of peripheral pockets for cartridges, a hopper for feeding cartridges to the pockets, a pair of rotatable star wheels for receiving cartridges from the magazine feed wheel and for feeding the same one at a time in advance of the breech block when the breech block is in its rearmost position, a star wheel for operating the magazine wheel, means operatively connecting the last mentioned star wheel with the first mentioned star wheels, a shaft for said first mentioned star wheels, a ratchet wheel on said shaft, means for operating the ratchet wheel from the breech block, a rock shaft in the magazine, a wheel carried by the rock shaft for moving cartridges from the magazine wheel toward the first mentioned star wheels, and means for operating the rock shaft from the star wheel for the cartridge wheel of the magazine.

PETER J. CLEEREMAN.