G. C. WATSON.

AUTOMATIC RIFLE.

APPLICATION FILED APR. 26, 1918.

1,377,236.

Patented May 10, 1921.

4 SHEETS—SHEET 1.

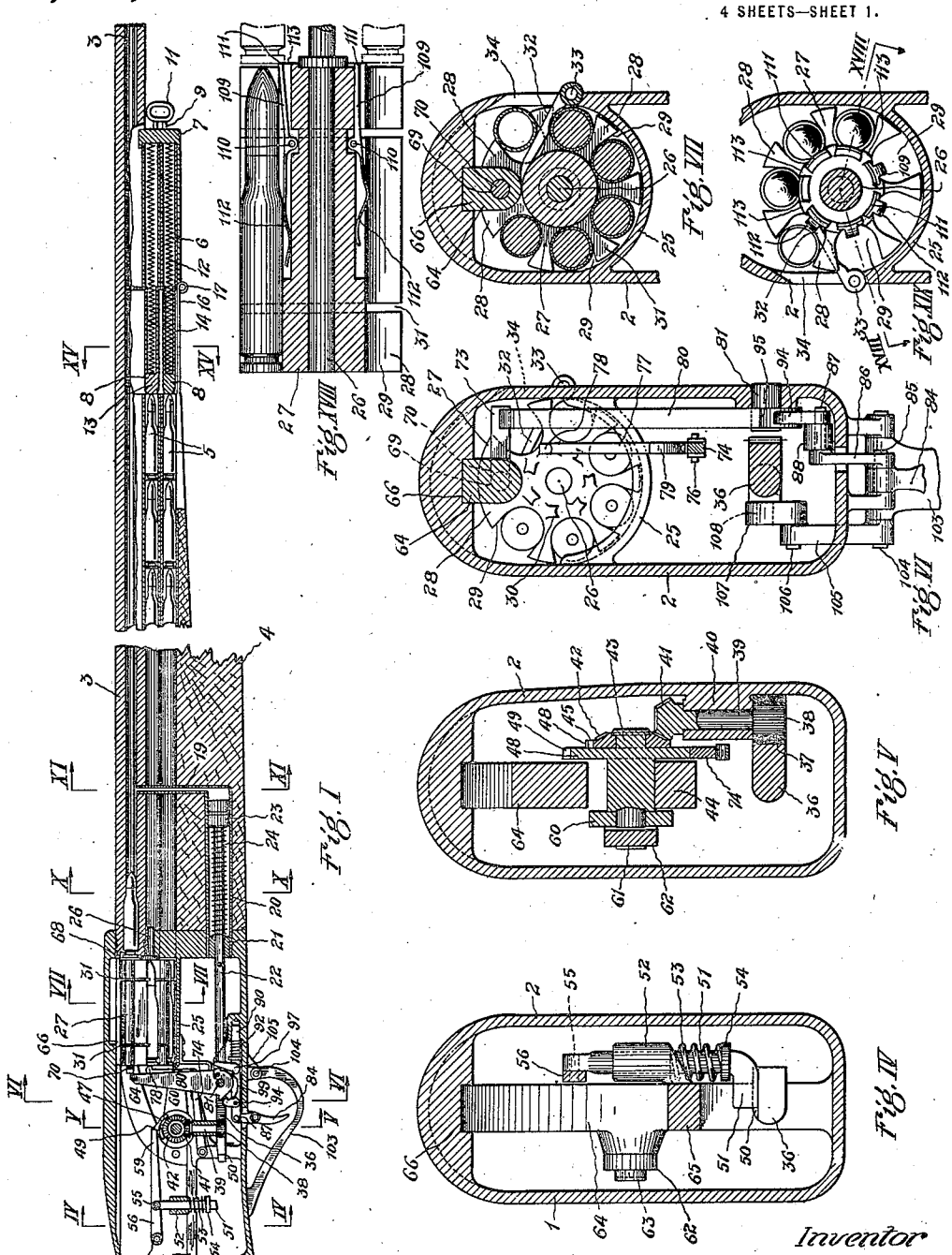


Fig. I

Fig. II

Fig. III

Fig. VIII

Fig. XIII

Fig. XVIII

Fig. VII

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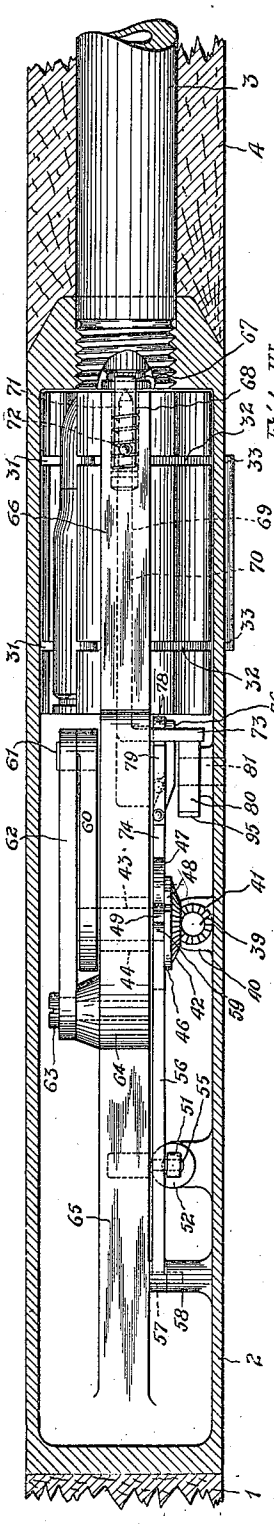


Fig. III

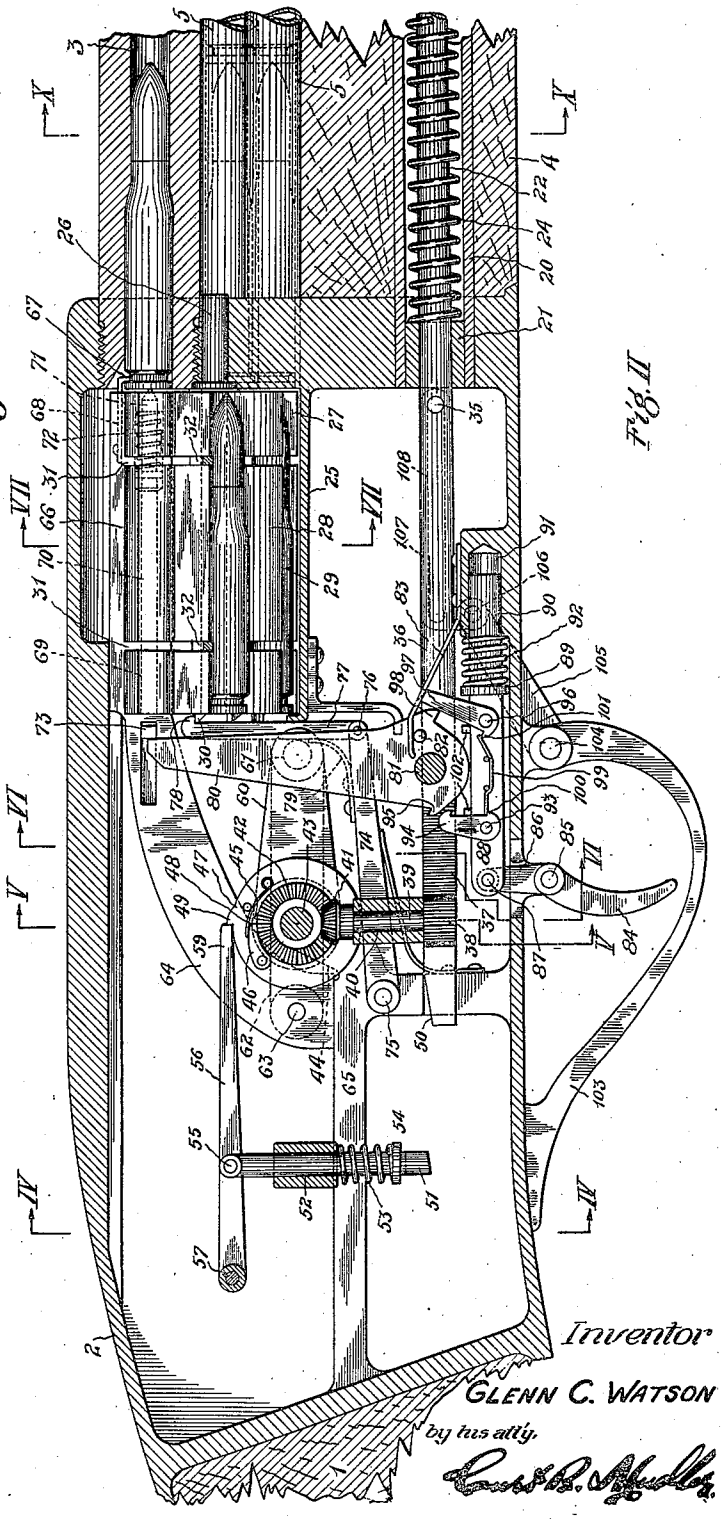


Fig. II

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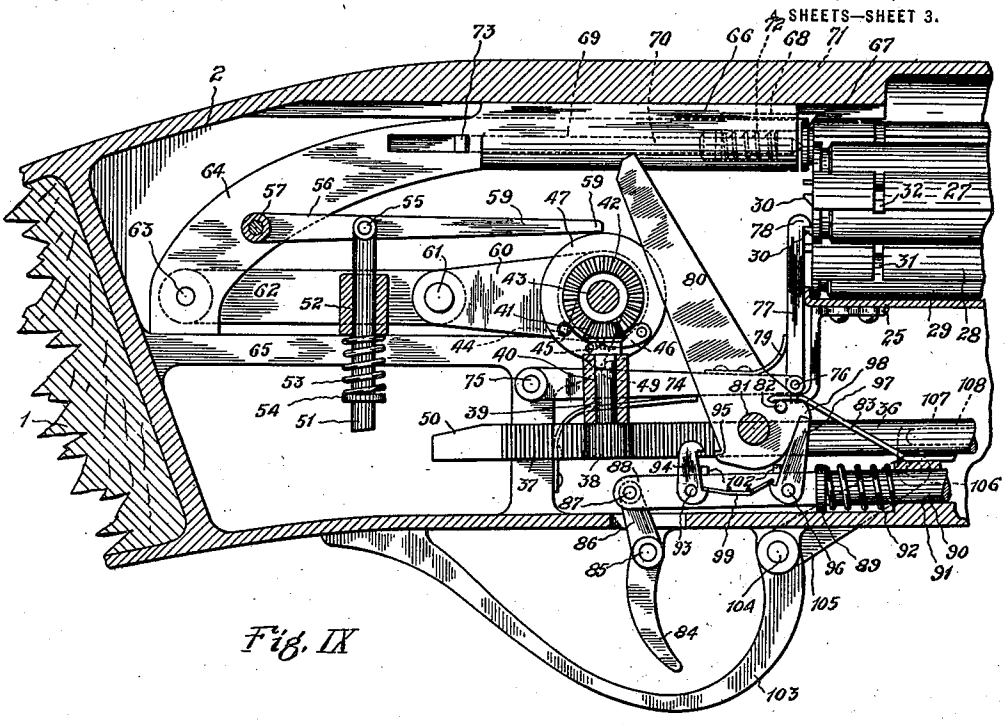


Fig. IX

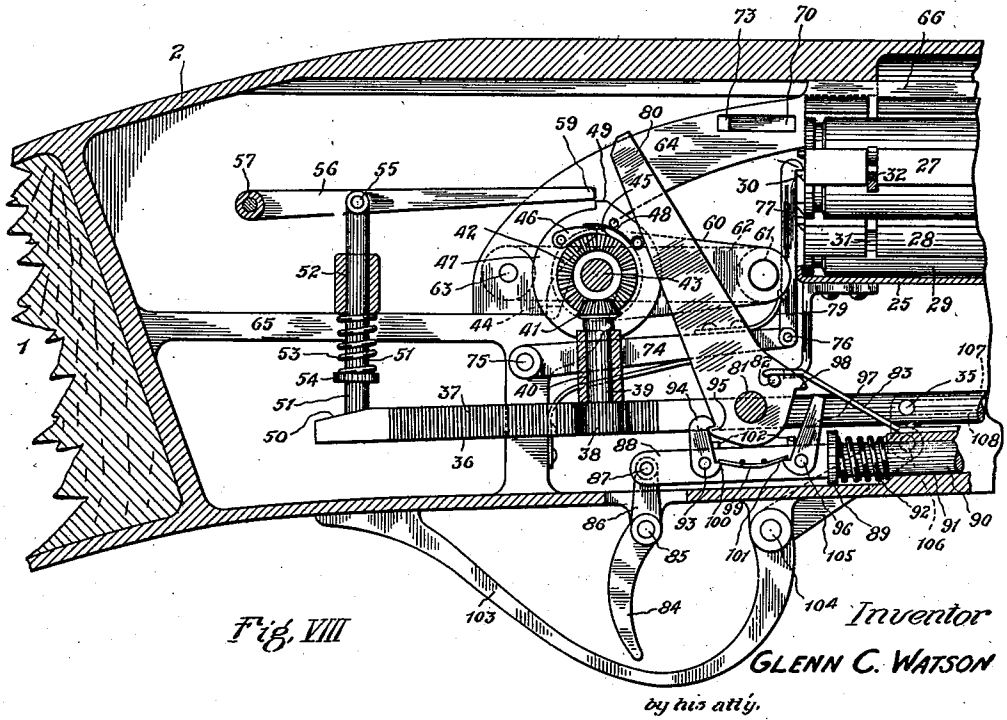


Fig. VIII

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AUTOMATIC RIFLE.

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4 SHEETS—SHEET 4.

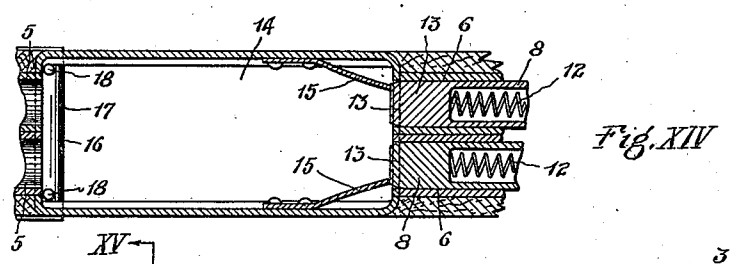


Fig. XIV

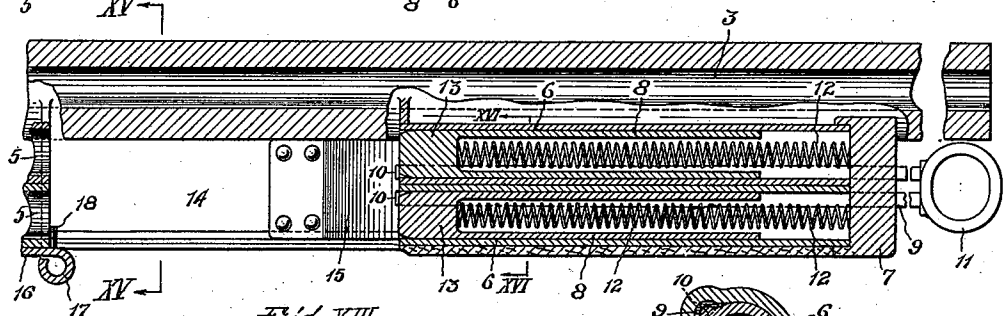


Fig. XIII

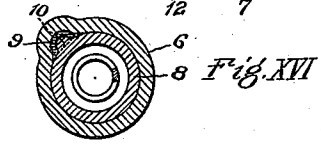


Fig. XVI

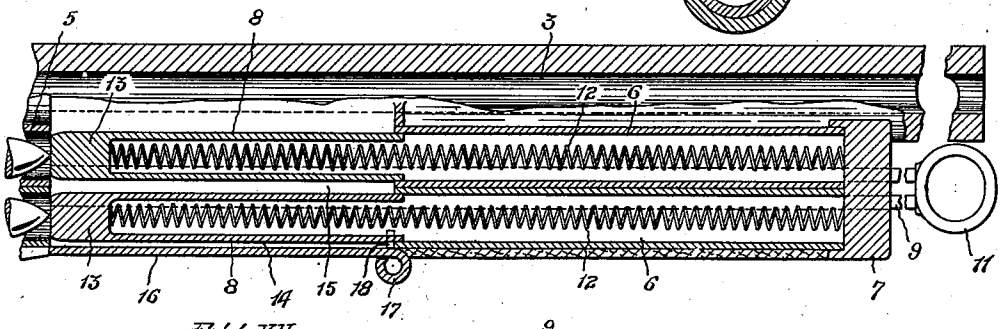


Fig. XII

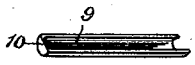


Fig. XVII

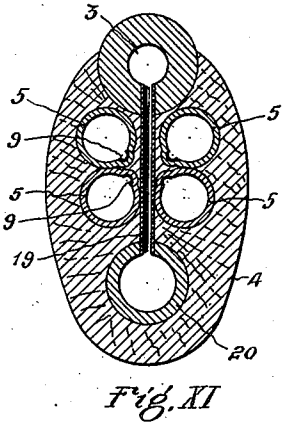


Fig. XI

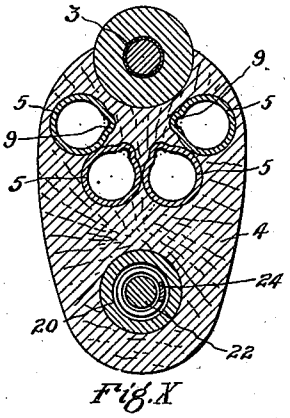


Fig. X

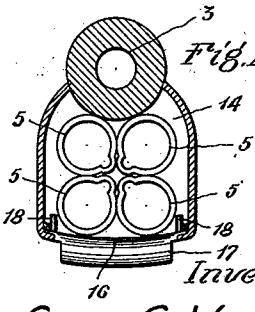


Fig. XV

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UNITED STATES PATENT OFFICE.

GLENN C. WATSON, OF CLEVELAND, OHIO.

AUTOMATIC RIFLE.

1,377,236. Specification of Letters Patent. Patented May 10, 1921.

Application filed April 26, 1918. Serial No. 230,970.

To all whom it may concern:

Be it known that I, GLENN C. WATSON, a citizen of the United States of America, residing at 337 Superior ave. N. W., city of Cleveland, in the county of Cuyahoga and State of Ohio, have invented a new and useful Improvement in Automatic Rifles, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

My invention pertains to an automatic rifle and more particularly to a firearm of this character which may be classed as a small arm in the sense that it is designed to be compact and light enough to be carried by one man. Indeed, compactness, durability and lightness in weight are the particular objects which I have had in mind.

Since a gun of this type is not to be cumbersome in size, shape and weight it cannot well be adapted either to the use in conjuction therewith of a cartridge belt nor of a magazine otherwise constructed to hold a very considerable number of cartridges and involve extreme projections from the stock. In line with this assumption I have resorted to the sporting model type of magazine extending underneath the barrel.

Besides the general purposes already stated to be comprehended by my improvement I now declare the following features:

A plurality of magazine tubes which progressively diverge in a direction from the muzzle toward the breech and so as to gradually approach and eventually assume a circumferential relationship at a point where they are to come in line or register with a corresponding number of chambers in a revolving cylinder, which latter is in turn so positioned that all of its chambers may successively register behind the barrel.

Automatic actuation on the gas operating principle.

While desirable to have the magazine tubes as close together as possible it is necessary to have them other than parallel so that the pointed bullets do not bear against the percussion heads of the following cartridges respectively.

Adverting to the drawings:

Figure I is a vertical section of an automatic rifle embodying my invention showing the butt of the stock broken away and the parts in position just at the time of firing.

Fig. II is an enlarged view corresponding to the breech mechanism portion of Fig. I.

Fig. III is a plan with the top of the receiver removed.

Figs. IV, V, VI and VII are vertical sections on the corresponding section lines as shown in Fig. II and all looking in the direction of the muzzle as directed by the indicating arrows.

Fig. VIII is a view corresponding to a major portion of Fig. II showing the position of the parts at the other limit of their movement.

Fig. IX is a similar view showing an intermediate position of the parts toward the firing position of Figs. I and II.

Fig. X is a vertical section on line X—X of Fig. II, likewise looking toward the muzzle.

Fig. XI is a vertical section on line XI—XI of Fig. I.

Fig. XII is an enlarged broken view mainly in vertical section of the muzzle end of the magazine when filled.

Fig. XIII is a view like Fig. XII showing the altered relation of certain parts when the magazines are empty preparatory to being refilled.

Fig. XIV is a horizontal section of a portion of Fig. XIII.

Fig. XV is a vertical section on line XV—XV of Figs. I and XIII looking toward the breech.

Fig. XVI is a detail section on line XVI—XVI of Fig. XIII.

Fig. XVII is an enlarged perspective view showing one end of a certain detail.

Fig. XVIII is a plan section on lines XVIII—XVIII of Fig. XIX.

Fig. XIX is a vertical section on line XIX—XIX of Fig. II.

The main supporting parts comprise the broken portion of the stock 1, a hollow receiver 2, a barrel 3 and a hand gripping stock extension 4.

Magazine structure.

Fitted in any approved manner between the underside of the barrel 3 and the extension 4 is a magazine casing which, according to the design exemplified by the drawings, consists of four magazine tubes as may be seen in Figs. X, XI and XV. A closer inspection of these three views discloses that the relative arrangement of the tubes progressively varies from one end to the

other and in fact in such a way that nearest the muzzle they are as closely bunched together as possible and that they gradually divaricate in a direction toward the breech to a circumferential arrangement, indeed, to an arrangement whereby they are disposed contiguous to each other on the arc of a circle which would be completed by the addition of three others of like size. In other words, as may be perceived upon an inspection of Fig. X, the four tubes there shown, together with the barrel also seen, are all concentrically arranged though spaces for the accommodation of two additional tubes are provided on each side of the barrel. The purpose in having the four magazine tubes 5 not parallel to each other, and none conforming to a straight line, is to break the alinement of the cartridges which are to be carried therein so that the pointed bullet noses will be unable to center against the heads of the abutting cartridges respectively and therefore to avoid the possibility of a sudden jolt firing one or more thereof. The purpose of the circumferential disposition of the rear ends of the magazine will hereinafter appear. The other ends of the four magazines which are contiguous to each other terminate in open extremities some distance from the muzzle. Spaced a distance from such extremities, somewhat in excess of the length of the cartridges with which the magazines 5 are to be charged, are four similar tubes 6 which are, however, parallel to each other and in axial alinement to the near ends of the tubes 5 respectively. The ends of the tubes 6 which are nearest the muzzle are closed by a cap 7. A corresponding number, namely four hollow plungers 8 are adapted to have telescopic connection with the tubes 6 and also with the tubes 5. The movement of the plungers 8 is controlled by four slide rods 9 of U shaped cross-section as is seen in Fig. XVI. These slide rods are movable through the cap 7 and also in correspondingly shaped slots provided between the plungers 8 and tubes 6 as is clearly shown in Fig. XVI. The ends of the rods 9 which are nearest the breech are provided with webs 10 to limit the movement of the rods through the plungers 8 in a direction toward the muzzle and to also enable the plungers 8 to be drawn toward the muzzle by a suitable handle 11 which is secured to the rods. The plungers 8 and therefore the rods 9 are normally pressed in a direction toward the breech by means of four internal compression springs 12 which bear against the solid ends 13 of the plungers 8. This general principle of exerting pressure against the cartridges in a magazine so as to continually tend to move them toward the breech is, I am aware, not new to the art and may be readily understood. As each magazine is emptied its plunger 8 moves toward the breech end of the tubes 5 whereby individual cartridges may be shoved from the magazines as required. The portion of the magazine structure 14 which is located between the tubes 5 and the tubes 6, preferably exceeds in length that of the cartridge for which the gun is designed, and is provided interiorly on each side with spring fingers 15 which normally extend diagonally toward the muzzle and toward the middle of the structure as may be seen in Fig. XIV. In such position each of the fingers 15 intersects the path of movement of the two plungers 8 which are on the same side and while they are adapted to yield when the plungers are drawn toward the muzzle they will spring inwardly after the extremities of the plungers 8 have passed and thereafter serve to hold them against the action of the springs 12 as is shown in Figs. XIII and XIV. The underside of the structure 14 is provided with a sliding door 16 carrying a knob 17 by means of which it may be slid open to permit the insertion into the tube 5 of the charge of cartridges. Projecting upwardly from the door 16 on each side of the handle end are a pair of pins 18 adapted to ride over and spread apart the fingers 15 when the door again assumes its closed position, whereupon the plungers 8 are released and allowed to bear against the rows of cartridges respectively within the tubes 5. It will be noticed upon inspection of Fig. XV that the ends of the tubes 5, through which they are charged, are as close together as possible and that they also progressively divaricate in a direction toward the breech as may be seen in the sectional views represented by Figs. XI and X in the order stated. By the time they have reached the point at which Fig. X is sectioned the tubes 5 have assumed a circumferential arrangement and occupy the four lowermost positions of a circle which would be completed by seven tubes of equal size.

Gas actuated motor.

Automatic guns have been operated on two successful principles, one of which was to utilize the pressure of the discharged gases, and it is this principle which I have preferred to employ in the exemplification of the drawings in this application. Directing attention to Figs. I and XI it will be seen that a small duct 19 communicates with the bore of the barrel 3 and passing downwardly through the extension 4 and between the tubes 5 terminates in one end of a transversely directed larger duct 20 provided at its other end with a closure 21 through which a piston rod 22 extends. Interiorly of the duct 20 the rod 22 carries a piston 23, while surrounding the piston and interposed between the latter and the closure 21 is a compression spring 24. It will be

clear to those conversant with the art that every time a cartridge is discharged in the barrel gas pressure is established in the duct 19 which acts to suddenly propel the piston 23 in a direction toward the breech in order to prepare for the accomplishment of the actuation of certain mechanism within the receiver to be hereinafter described. After atmospheric conditions have been restored within the barrel 3 and the duct 19 the spring 24 is permitted to expend its energy so as to return the piston 23 to its starting position.

Revolving cylinder.

Interiorly between the sides of the receiver 2 and near the end of the latter which is nearest the tubes 5, a hollow structure 25 is supported. Pivoted upon a pin 26 which is about centrally located with reference to the structure 25 is a revolving cylinder 27 provided with seven radial projections 28 extending therealong so as to provide seven interjacent open chambers 29 each of which is designed to accommodate a single cartridge during revoluble movement of the cylinder 27 within the structure 25. The exposed or rear end of the cylinder 27 is provided with the usual circular ratchet 30 best seen in Figs. II and VI. The sides of the cylinder 27 are provided with a pair of annular grooves 31 which may be seen in Figs. I and II. Projecting diagonally upwardly in each of these grooves as is shown in Fig. VII is an ejector guide 32 secured to the receiver 2 at 33. The purpose of the two guides 32 which are somewhat closer together than the length overall of the cartridge is to direct the lateral expulsion of the cartridges after their discharge in and ejection from the barrel. In Fig. VII it will be seen that the receiver 2 is provided with a suitable discharge opening 34 through which the discharged cartridges are successively thrown after being properly directed toward the same by the guide 32 by being caused to ride on the guides 32 and be lifted each out of its chamber until actually ejected by the tip of the downcoming projection 28. It should be understood that the disposition of the cylinder 27 is such that its four lowermost chambers 29 may correspond in position and register with the proximate ends of the tubes 5 as they appear in Fig. X. By this arrangement each of the tubes 5 is adapted to discharge cartridges one at a time into one or the other of the chambers 29 as it moves into registering position therewith, provided it is empty. It is manifest that one of the magazines 5 will first discharge the cartridges contained therein by forcing one at a time into the seven chambers 29 as they successively come into position and only after that one is discharged will another, next in order, be able to commence to so discharge. It is also to be understood that the revoluble movement of the cylinder 27 is to be effected intermittently in accordance with well known practice so as to successively bring its chambers in registering alinement with the barrel 3 preparatory to the forcing of the cartridges from such chambers into the barrel.

Automatic control mechanism.

The rearward projecting end of the piston rod 22 carries a pin 35, the purpose of which will be hereinafter described and beyond the latter carries a rigid extension bar 36 provided on one side with rack teeth 37 adapted to engage a pinion 38 mounted on the lower end of a vertical shaft 39 which is in turn mounted in a suitable bearing 40 which is formed in a boss projecting interiorly from the receiver side 2 as may be seen in Fig. V. The upper end of the shaft 39 carries a bevel pinion 41 in mesh with a bevel gear 42 which is loosely mounted on a stud shaft 43 extendingly horizontally through a bracket 44. The periphery of the bevel gear 42 is provided with a single tooth 45 adapted to be engaged by a pawl 46 which is pivoted to a ratchet disk 47 integral or fixed to the shaft 43. This disk carries a spring 48 adapted to bear against the pawl 46 so as to insure its engagement with the tooth 45 as may be seen in Figs. II and VIII. The ratchet disk 47 is likewise provided with a single tooth 49 the coöperative function of which will soon appear. It is clear that as the rack 36 moves rearwardly in response to the compression action of the discharge gases against the piston 23 is will act to rotate the bevel gear 42 forwardly, that is so as to move its tooth 45 away from the pawl 46 and consequently without transmitting any rotation to the shaft 43 and such parts as are operatively connected therewith.

The upper surface 50 of the rear end of the rack member 36 is beveled and when it assumes its rearmost position as shown in Fig. VIII it engages and lifts a correspondingly beveled lower end 51 of a vertically reciprocable lifting pin movable in a bearing 52. The elevation of the pin 51 is counter to the action of a spring 53 interposed between the bearing 52 and a suitable collar 54. Articulating at 55 with the upper end of the pin 51 is a releasing lever 56 having a fixed fulcrum 57 in an integral boss 58 projecting from the side of the receiver 2 as is shown in Fig. III. The other end of the releasing lever 59 acts as a stop, for the tooth 49 to hinder the rotary movement of the disk 47, until lifted along with the pin 51 to the position shown in Fig. VIII which is just prior to the commencement of the return of the rack member 37.

Also fixed to the shaft 43 on the opposite side of the bearing support from that on

which the gear 42 is loosely mounted and the ratchet disk is fixed, is a crank 60 the relative position of which may be seen in Fig. V and two diametrically opposite positions of which are shown in Figs. VIII and IX. The end of the crank 60 articulates at 61 with one end of a link 62, the other end of which in turn articulates at 63 with a reciprocable breach bolt structure 64 the under surface of the rear end of which is adapted to reciprocate upon a longitudinal slideway support 65 which is about in the middle of the receiver 2. The forward end of the structure 64 is hollow and carries a hollow breech bolt 66 in line with the barrel 3 so as to be adapted to shove the uppermost of the cartridges in the cylinder 27 out of its chamber and into the barrel in which position such cartridge is engaged by a hook 67 on the forward extremity of a spring extractor 68 secured to the structure 64 so that when the latter is withdrawn the cartridge which has been discharged is likewise removed to re-occupy its position in the cylinder preparatory to being turned toward the opening 34. The bore 69 of the bolt 66 is occupied by a firing rod 70 adapted for axial movement therethrough. The forward end of the rod 70 carries a firing pin 71 adapted to be projected, as will hereinafter be explained, against the head of the cartridge which has been inserted in the barrel in order to discharge the same. Such forward propulsion of the firing pin 71 is against the action of a spring 72 suitably seated therearound in any approved manner well known to the art. The rear end of the rod 70 is fashioned with a lateral extension 73 as may be clearly seen in Fig. III.

In order to effect the intermittent revolution of the cylinder 27 I provide a rather long lever 74 having one end pivoted at 75 and its other end articulating at 76 with an upwardly extending arm 77 having its extremity fashioned with a hook 78 adapted in response to the pressure exerted by a spring 79 to bear against the rear end of the cylinder 27 and spring into position over one of the teeth of the ratchet 30. The arrangement is such that a slight downward actuation of lever 74 serves to pull the arm 77 a distance sufficient to revolve the cylinder 27 through one-seventh of a revolution. Upon a release of the power which actuated the lever 74 the latter is allowed to spring upwardly and cause the hook 78 to ride over the sloping undersurfaces of the next ratchet tooth and to spring into position thereover preparatory to a repetition of the operation just described.

A hammer 80 is pivoted below at 81 so that its upper end may impinge against the lateral extension 73 of the firing rod. The engageable relation of these two parts is well shown in Fig. III. The hammer 80 is provided near its pivot 81 with a pin 82 upon which a spring finger 83 bears so as normally to tend to bring and hold the hammer 80 in its forward position against the extension 73, in which position the hammer appears in Fig. II. The operation of the hammer to the cocked position may be effected either automatically or by hand, but its release according to my invention can only be accomplished by the intermittent application of finger pressure to the trigger. It was early discovered, in the use of automatic fire-arms during warfare, that if such rifles continued to operate automatically as long as pressure was applied to the trigger a great waste of ammunition would result because under the excitement of battle a great number of shots were fired regardless of direction owing to the fact that the important factor of taking proper aim had been entirely forgotten. I understand that till now the equipping of infantrymen with automatic rifles has been condemned by almost all the Governments, not only because of the excessive weight of the automatic guns heretofore produced, but because even waving such objection the probable wastage of ammunition would be enough to condemn its use. By requiring therefore that the trigger must be separately pulled with each discharge of the rifle a sufficient time interval is afforded and mental process required to remind the soldier to aim prior to each shot. The trigger 84 is pivoted intermediately of its ends at 85. Its upper extension 86 articulates interiorly at 87 with a bar 88 carrying a collar 89 and having its other cylindrical end 90 reciprocable in a suitable bore 91 formed in the receiver 2 as appears in Fig. II. Surrounding a portion of the end 90 and interposed between that portion of the receiver 2 which surrounds such bore 91 and the collar 89 is a coil spring 92 adapted to resist the forward actuation of the bar 88 in response to a pull upon the trigger 84. Pivoted at 93 to the bar 88 is a catch 94 adapted to lock with a complementarily surfaced projection 95 on the rear of the hammer 80. Also pivoted to the bar 88 at 96 is another catch 97 adapted to seat underneath a projection 98 on the forward end of the hammer 88. Both of the catches 94 and 97 are adapted to hold the hammer 80 in its cocked position. The normal position of these catches is controlled by a single spring 99, the ends of which engage with suitable projections 100 and 101 on the catches 94 and 97 respectively, whereby to tend to move their upper extremities toward the hammer pivot 81. At proper points upon the bar 88 are a pair of stops 102 which are designed to limit the movement of the catches 94 and 97 toward each other.

To effect the manual operation of all of the breech mechanism a lever 103 shaped

to act as a trigger guard is provided in a manner also common to the art. This lever is pivoted at 104 and has an inward extension 105 articulating at 106 with a link 107 provided with an elongated slot 108 in which the plunger pin 35 is secured. It will be observed from the position of the parts shown in Fig. II that any downward actuation of the lever 103 will raise the link 107 and at the same time draw it rearwardly so as to exert a pull upon the pin 35 and therefore move the bar 36 rearwardly in the same manner in which it is so moved automatically by the pressure of the discharge gases heretofore described. A tipping member 109 is seated in a groove in the bottom of each cartridge chamber 29 in the revolving cylinder 27. This member is pivotally mounted at 110 in the cylinder. The forward part of 109 is rigid and is provided with a smooth surface at its extreme point 111. The rear part of the member 109 consists of a spring member 112 which tends to deflect the nose 111 toward the axis of the cylinder, until a shell is placed into the pocket. When this happens the rear 112 of the tongue 109 is depressed thus tipping the front 111 upward and into the circle in which the rearmost one of the shells in the magazine chambers lie. Thus 111 intersects the path of movement of the feeding cartridges when the chamber 29 is occupied and serves to hold back the foremost cartridge in the reserve magazine. The movement of the front point 111 is suitably limited when it is forced outwardly. This regulates the distance through which the point 111 is moved outwardly and thus insures a smooth circle against which the heads of the cartridges abut. Each pocket is formed with circumferential projections 113 which together with the points 111 make a complete smooth circle without interruptions when the points 111 are thrown outwardly. The two possible relative positions as between the ends of the shells and the points 111, that is, with a pocket empty and occupied is clearly shown in Fig. XVIII.

Operation.

The first step preparatory to the operation may be considered as the loading of the magazines. The sliding door 16 is first opened by moving the handle 17 in a direction toward the breech. This causes the pins 18 to be carried away from the spring fingers 15 so that the latter are released and spring inwardly to their functionating position. Thereafter, the slide rods 9 are pulled out by means of the handle 11 until the webs 10 engage the ends of the plungers 8 whereupon continued withdrawal toward the muzzle carries such plungers in the same direction against the action of the springs 12 until the fingers 15 spring into place ahead of the end of the plungers to fix them during the insertion of cartridges from below. After all four of the magazines have been fully charged the door 16 is shoved to its closed position which automatically spreads the fingers 15 and releases the plungers 8 and allows them to exert pressure against the rows of cartridges in the magazines as shown in Fig. XII. The rods 9 may then be slid in again or if preferred they may reassume such position, as appears in either Fig. X or XI, as soon as the plungers 8 have been carried beyond to be held by the spring fingers 15 and before the door 16 is closed. As the magazines are filled the four lowermost of the chambers 29 in the cylinder 27 are each supplied with one cartridge. Thereafter, prior to any automatic operation of the mechanism, in response to the discharge of a cartridge, it becomes necessary to twice actuate the mechanism by hand through the agency of the lever 103 in order to twice turn the cylinder 27 through one-seventh of a revolution and thus advance the nearest of the four filled chambers, with reference to the direction of movement, to a position in line with the barrel from whence it is shoved into the same. According to the drawings the chamber which is farthest to the left of the four lowermost, as shown in Figs. VI and VII, is moved upwardly and first brought into registry with the barrel. In the meantime the magazine farthest to the right in the arrangement shown in Fig. X will have twice supplied a cartridge to the two chambers in the cylinder which were empty and which successively moved into position therebehind. It will be perceived therefore that each of the four magazines is entirely emptied in advance of any discharge of cartridges from the one next in order. When the lever 103 is drawn downwardly it throws its extension 105 upwardly and in consequence draws the link 107 and therefore the piston rod 22 rearwardly against the action of the compression spring 24. Coincident with this movement the bar 36 is moved rearwardly and its rack teeth act to turn the pinion 38. This rotational movement is transmitted to the shaft 39, to the bevel pinion 41 and thence to the bevel gear 42. Inasmuch as the gear 42 is loose upon its shaft such rotational movement in the direction just indicated is idle. As the bar 36 reaches its rearmost position, however, its upper bevel surface 50 has engaged and lifted the pin 51 and in consequence the tip 59 of the lever 56 from its obstructing position with reference to the single tooth 49 on the ratchet disk 47. As soon as the lever 103 is reverse actuated and the bar 36 starts its return movement the single radially projecting tooth 45 on the gear 42 engages the pawl 46 as may be seen in Fig. VIII. In consequence the reverse rotation carries the ratchet disk 47 in the

same direction and accordingly rotates the shaft 43 likewise. The arrangement of the parts is such that the rotation of the disk 47 commences just a moment prior to the release of the pin 51 so that the tip 59 of the releasing lever 56 thereafter rides idly upon the periphery of the disk. The ratio of the gearing is furthermore such that the gear 42 and disk 47 complete exactly one revolution during the return movement of the bar 36. While the shaft 43 is making its first half revolution the crank 60 is carried from the position shown in Fig. VIII to its diametrically opposite position as shown in Fig. IX and in completing such semi-circular travel it has drawn the breech bolt structure 64 to its rearmost position. At the time that it is just completing the half revolution, it will be noticed upon inspection of Fig. IX, that the tooth 49 impinges after the manner of a cam upon the upper surface of the lever 74 to depress the same. Inasmuch as the point of such engagement is somewhat nearer the pivot 75 the movement of the free extremity of the lever 74 is somewhat multiplied and in fact to such an extent as to pull the arm 77 enough downwardly to turn the cylinder 27 through one-seventh of a revolution. During the other half turn of the shaft 43 and the complemental semi-circular swing of the crank 60 the breech bolt 64 has been returned to its forward position and if there is a cartridge in the chamber which has just been brought into registering position with the barrel such cartridge is shoved out of the chamber into the barrel. The end of such movement has caused the spring hook 67 to spring over the head of the cartridge so as to enable the withdrawal of the latter from the barrel when the breech bolt structure 64 is again moved rearwardly during the next repetition of the operation. It should be understood that when the breech bolt 64 starts its rearward movement the lateral extension 73 on the rod 70 carries the upper end of the hammer 80 back with it sufficient to enable the trigger catch 97 to slip under the projection 98 and thus hold the hammer in its cocked position as shown in Fig. IX.

Assuming now that the lever 103 has been twice manipulated and that a cartridge is in the barrel with the trigger mechanism cocked as shown in Fig. IX, a pull upon the trigger 84 carries the trigger catch 97 free of the projection 98 and so allows the spring 83 to snap the hammer 80 and cause it to strike the extension 73, whereupon the rod 70 and firing pin 71 are suddenly pushed forwardly sufficient to cause the latter to impinge upon the percussion head of the cartridge. Simultaneously with the firing of the explosive charge in the cartridge a measure of the discharge gases exert a pressure within the duct 19 and against the piston 23 which is therefore suddenly projected rearwardly to effect the idle rotation of the rotating mechanism heretofore described and to lift the lever 56. The return movement is accomplished through the medium of the energy stored in the spring 24 whereby the breech bolt 64 and lever 74 are actuated as before explained. At the moment of firing the recoil is communicated to the rod 70 which causes the extension 73 to throw the hammer 80 back far enough to be momentarily engaged by the safety catch 94 as illustrated in Fig. VIII and prior to the release of the pressure upon the trigger 84. When such release of pressure against the trigger 84 occurs the spring 92 returns the bar 88 and in so doing returns the trigger catch 97 to its position under the projection 98 a moment before the safety catch 94 is simultaneously moved clear of the projection 95 as shown in Fig. IX. The discharged cartridge in the meantime has reassumed its position in the uppermost of the cylinder chambers and when next moved to the right through its second one-seventh of a revolution is lifted out of its chamber by the ejector guides 32 and allowed to fall out of the opening 34 as should be readily understood upon inspection of Fig. VII.

I claim:

1. An automatic rifle comprising a barrel, a stock, a hollow receiver, a cylinder having circularly arranged chambers and movably mounted in said receiver so as to be adapted to bring its chambers successively in line with said barrel, gas operated mechanism in said receiver for automatically loading, firing and ejecting and a plurality of magazines extending along the barrel and adapted to supply cartridges to the chambers of said structure, said magazines having one corresponding set of ends registering with a like number of the chambers in said cylinder and converging in a direction toward their opposite ends.

2. An automatic rifle comprising a barrel, a stock, a hollow receiver, a cylinder having circularly arranged chambers and movably mounted in said receiver so as to be adapted to bring its chambers successively in line with said barrel, gas operated mechanism in said block for automatically loading, firing and ejecting and a plurality of magazines extending along the barrel and adapted to supply cartridges to the chambers of said structure, said magazines having one corresponding set of ends registering with a like number of the chambers in said cylinder and converging in a direction toward their opposite ends, and automatically operating means whereby each magazine is completely emptied by successively feeding single cartridges at registering locations of said chambers respectively.

3. An automatic rifle comprising a barrel, a stock, a hollow receiver, automatically op-

erating mechanism within said receiver for loading, firing and ejecting, said mechanism reacting against gas pressure actuation and including a revolving cylinder provided with cartridge chambers adapted successively to register with said barrel, a plurality of bent magazines carried along the barrel and adapted to discharge cartridges into correspondingly assumed positions of a corresponding member of said chambers respectively and means for forcing cartridges from each magazine, the bent formation of said magazines being adapted to break the alinement of the cartridges therein so that the pointed bullet noses will not center against the heads of abutting cartridges.

4. An automatic rifle comprising, a barrel, a stock, a hollow receiver, mechanism within said receiver for loading, firing and ejecting cartridges, said mechanism including; a movable cartridge carrier adapted successively to bring cartridges in line with said barrel, a breech bolt for shoving said alined cartridge into the barrel, a firing pin adapted to impinge against the cartridge in the barrel, a part upon said breech bolt for withdrawing a cartridge from the barrel to said carrier, a slideway in said receiver, a member reciprocable upon said slideway and connected with said bolt, a shaft, a crank upon said shaft and connected with said member, gas-pressure operated means operatively connected with said crank, and an automatically operating device for obstructing the actuation of said shaft during a certain stage of the movement of said operating means.

5. An automatic rifle comprising, a barrel, a stock, a hollow receiver, mechanism within said structure for loading and ejecting cartridges, said mechanism including; a movable cartridge carrier adapted successively to bring cartridges in line with said barrel, a breech bolt for shoving such alined cartridge into the barrel, a part upon said member for withdrawing the cartridge from the barrel unto said carrier, a spring controlled rotatable structure idly actuated in one direction in response to the pressure of the discharged gases and means operatively connecting said bolt and structure during its spring actuated movement in the opposite direction.

6. An automatic rifle comprising, a barrel, a stock, a hollow receiver, mechanism within said structure for loading, firing and ejecting cartridges, said mechanism including; a movable cartridge carrier adapted successively to bring cartridges in line with said barrel, a member for shoving such alined cartridge into the barrel, a firing pin adapted to impinge against the cartridge in the barrel, a part upon said member for withdrawing the cartridge from the barrel unto said carrier, an actuating member, a hammer adapted to move said firing pin, a trigger actuated bar, a pair of catches each pivoted to said bar for successively holding said hammer in cocked position and a common spring acting to hold both of said catches in certain positions.

7. An automatic rifle comprising, a barrel, a stock, a hollow receiver, mechanism within said structure for loading, firing and ejecting cartridges, said mechanism including; a movable cartridge carrier adapted successively to bring cartridges in line with said barrel, a member for shoving such alined cartridge into the barrel, a firing pin adapted to impinge against the cartridge in the barrel, a part upon said member for withdrawing the cartridge from the barrel unto said carrier, an actuating member, a hammer adapted to move said firing pin, a pair of catches for engaging opposite sides of said hammer to hold it in cocked position, and a trigger device including a part movable in opposite directions and adapted to simultaneously move both of said catches.

8. An automatic rifle comprising, a barrel, a stock, a hollow receiver formed with a slideway, a cylinder having cartridge chambers movable into line with said barrel, a device movable upon said slideway and adapted to shove a cartridge into and withdraw the same from said barrel, an appliance for intermittently imparting rotational movement to said cylinder, and mechanism including a shaft and parts simultaneously movable thereabout, said parts being adapted to actuate said device and appliance respectively.

9. An automatic rifle comprising, a barrel, a hollow receiver formed with a horizontal slideway and a horizontal relatively transverse bearing, a cylinder having cartridge chambers movable into line with said barrel, a breech bolt structure reciprocable upon said slideway and adapted to shove a cartridge into and withdraw the same from said barrel, an appliance including a lever for intermittently imparting rotational movement to said cylinder, means including a shaft rotatable in said bearing, a crank on said shaft for actuating said structure, and a cam on said shaft for engaging said lever and actuating said appliance.

10. An automatic rifle comprising a barrel, a stock, a hollow receiver, a magazine opening into the latter, a cylinder revolubly mounted in said structure and having chambers adapted to come into registering alinement with said barrel and magazine, a cylinder actuating device, a rack, a shaft, a projection carried by said shaft and adapted to actuate said device, means including gearing connecting said rack and projection, and a spring for actuating said rack whereby intermittently to revolve said cylinder.

11. An automatic rifle comprising a bar-

rel, a stock, a hollow receiver, a magazine opening into the latter, a cylinder revolubly mounted in said structure and having chambers adapted to come into registering alinement with said barrel and magazine and also having a circular ratchet, an actuating rack, and mechanism including gearing operatively connected with said rack, a hook engaging said ratchet, a lever connected with said hook, a shaft and a cam member thereon for moving said lever whereby to intermittently turn said chambers as described.

12. An automatic rifle comprising a barrel, a stock, a hollow receiver therebetween, mechanism for feeding cartridges into and withdrawing the same from said barrel, said mechanism including; an actuating member, a breech bolt structure adapted to effect such movements of the cartridges and means including an engageable toothed part and pawl operatively connecting said member and breech bolt structure whereby to actuate the latter in only one direction.

13. An automatic rifle comprising a barrel, a stock, a hollow receiver therebetween, mechanism for feeding cartridges into and withdrawing the same from said barrel, said mechanism including; an actuating rack, a reciprocable breech bolt adapted to effect such movements of the cartridges, a crank shaft for reciprocating said bolt, means including gearing operatively connecting said rack and shaft, and a lever normally obstructing the movement of said shaft but adapted to be engaged by said rack and moved to its releasing position.

14. An automatic rifle comprising a barrel, a stock, a hollow receiver therebetween, mechanism for feeding cartridges into and withdrawing the same from said barrel, said mechanism including; a piston chamber in communication with said barrel, a piston therein, an actuating rack connected with said piston and adapted to be moved in one direction by the pressure of the discharged gases against said piston, a spring for moving said rack in the opposite direction, a reciprocable breech bolt adapted to effect such movements of the cartridges, a shaft, a bevel gear provided with a peripheral projection loosely mounted on said shaft and operatively connected with said rack, a disk fixed to said shaft, a pawl on said disk adapted to be engaged by said projection, means connecting said gear and disk during movement of said rack in only one direction, and a crank upon said shaft and connected with said breech bolt.

15. An automatic rifle comprising a barrel, a stock, a hollow receiver therebetween, mechanism including a cylinder for feeding cartridges into and withdrawing the same from said barrel, a magazine tending to force cartridges into said cylinder, and means carried by the latter for obstructing the passage of cartridges thereto from said magazine said mechanism including; an actuating member, a reciprocable breech bolt adapted to effect such passage of the cartridges to the barrel, together with means operatively connecting said member and breech bolt.

16. In an automatic rifle the combination of a stock, a barrel, a hollow receiver connecting the same, mechanism carried by the latter for firing a cartridge in said barrel and including a pivoted hammer, a reciprocable trigger bar, a safety catch and a trigger catch both pivoted to said bar, said hammer being fashioned with sears adapted to coact with said catches respectively whereby successively to hold said trigger in cocked position, a trigger connected with said bar and adapted to release said trigger catch and a spring resisting the action of said trigger.

17. In an automatic rifle the combination of a barrel, a stock formed with a duct in communication with said barrel, a hollow receiver, a cylinder having chambers adapted to register with said barrel, a piston in said duct, a piston rod connected with said piston and extending into said receiver, said rod being adapted to be actuated by the pressure of the explosive gases against said piston, a spring for returning said rod and piston to starting position, a magazine for moving cartridges into said cylinder and disposed at an angle to said barrel, a breech bolt adapted to transfer cartridges between said cylinder and barrel, and mechanism intermittently connecting said rod and breech bolt.

18. In an automatic rifle the combination of a barrel, a stock formed with a duct in communication with said barrel, a hollow receiver therebetween, a cylinder having chambers adapted to register with said barrel, a piston in said duct, a piston rod connected to said piston and extending into said receiver, said rod being adapted to be actuated by the pressure of the explosive gases against said piston, a spring for returning said rod and piston to starting position, a carrier operatively connected with said rod for shoving cartridges from said cylinder into said barrel, manually operable means for also actuating said rod against the action of said spring, a firing rod movable both with and independently of said carrier, and a hammer adapted to engage, and be engaged by, said firing rod.

19. In an automatic rifle the combination of a barrel, a stock formed with a duct in communication with said barrel, a hollow receiver, a cylinder having a chamber adapted to register with said barrel, a piston in said duct, a piston rod connected to said piston and extending into said receiver,

said rod being adapted to be actuated by the pressure of the explosive gases against said piston, a magazine for discharging cartridges into said cylinder, mechanism operatively connecting said rod and carrier and a trigger-guard actuating lever articulating with said rod and adapted to permit action independent of the gas operated actuation thereof.

20. In an automatic rifle the combination of a stock, a barrel, a hollow receiver therebetween, a cylindrical bore in communication with said barrel, a piston fitted in said bore, a piston rod connected to said piston and extending into said receiver, said rod being adapted to be actuated by the pressure of the explosive gases against said piston, a spring for returning said rod and piston to starting position, a cylinder revoluble in said receiver and adapted to move cartridges into line behind said barrel, a breech bolt adapted to transfer cartridges between said cylinder and barrel, and mechanism including a shaft and a pair of parts both revoluble about said shaft and controlled by the movement of said rod for intermittently actuating both cylinder and bolt.

21. In an automatic rifle the combination of a stock, a barrel, a hollow receiver therebetween, a cylindrical bore in communication with said barrel, a piston fitted in said bore, a piston rod connected to said piston and extending into said receiver, said rod being adapted to be actuated by the pressure of the explosive gases against said piston, a spring for returning said rod and piston to starting position, a cylinder revoluble in said breech structure and having cartridge chambers adapted to move in line behind said barrel, a reciprocable breech bolt adapted to transfer cartridges between said barrel and different chambers of said cylinder during its reverse movements, mechanism including a cam operatively connecting said rod and breech bolt; controlled by the movement of said rod for actuating said bolt and a device actuated by said cam for automatically turning said cylinder when said bolt reaches the limit of its withdrawal movement.

22. In an automatic rifle the combination of a hollow receiver, a barrel and a stock each secured thereto, a cylinder revolubly mounted in said receiver and having cartridge chambers movable behind said barrel, a magazine adapted to discharge cartridges into the chambers of said cylinder, a device for turning said cylinder through a predetermined arc, a breech bolt reciprocal behind said cylinder and in line with said barrel, said bolt being adapted to shove cartridges from the chambers of said cylinder into said barrel and to withdraw cartridges from said barrel, said device adapted to be intermittently actuated when said bolt reaches the limit of its withdrawal movement, mechanism including a crank for reciprocating said bolt and including a part for synchronously actuating said device, and means for operating said mechanism and including a piston exposed to the pressure of the discharged gases.

23. In an automatic rifle the combination of a hollow receiver, a barrel and a stock each secured thereto, a cartridge carrier movable behind said barrel, a magazine adapted to discharge cartridges into said carrier, a device for moving said carrier, a breech bolt reciprocable behind said carrier and in line with said barrel, said bolt being adapted to shove cartridges from said carrier into said barrel and to withdraw cartridges from said barrel during its reverse movements respectively, irreversible mechanism including a crank for reciprocating said bolt and a part for synchronously actuating said device, and means for operating said mechanism and including a spring controlled piston exposed to the pressure of the discharged gases said mechanism being adapted to functionate during the movement of said piston in only one direction.

24. In an automatic rifle the combination of a hollow receiver, a barrel and a stock each secured thereto, a cylinder revolubly mounted in said receiver and having cartridge chambers movable behind said barrel, a magazine shaped with a bend and adapted to discharge cartridges into the chambers of said cylinder, a device for turning said cylinder through a predetermined arc, a breech bolt reciprocal behind said cylinder and in line with said barrel, said bolt being adapted to shove cartridges from the chambers of said cylinder into said barrel and to withdraw cartridges from said barrel, mechanism including a crank for reciprocating said bolt and a part rotatable with said crank and adapted to actuate said device at the moment of one of its dead center positions of said crank, and means operating in response to the pressure of the explosive gases for actuating said mechanism.

25. In an automatic rifle the combination of a hollow receiver, a barrel and a stock each secured thereto, a cylinder revolubly mounted in said structure and having cartridge chambers movable behind said barrel, a magazine adapted to discharge cartridges into the chambers of said cylinder, a device for turning said cylinder through a predetermined arc, a breech bolt reciprocal behind said cylinder and in line with said barrel, said bolt being adapted to shove cartridges from the chambers of said cylinder into said barrel and to withdraw cartridges from said barrel during its reverse movements respectively, said device adapted to functionate when said bolt reaches the limit of its withdrawal movement, a piston cham-

ber carried by said barrel and in communication therewith, a piston therein, a rod connected to said piston, a shaft in said receiver, gearing connected with said rod, means for connecting said gearing and shaft and adapted to functionate during one direction of movement of said rod, means including a crank for connecting said shaft and bolt, and a part carried by said shaft for moving said device in timed relation to the movement of said bolt.

26. An automatic rifle comprising a barrel, a stock, a hollow receiver, automatically operating mechanism within said receiver for loading, firing and ejecting, said mechanism including a revolving cylinder provided with chambers adapted successively to register with said barrel, a plurality of magazines adapted completely to discharge successively into correspondingly differently assumed positions by said chambers respectively, means for successively ejecting cartridges from said chambers, the arrangement being such that each in turn discharges all of its cartridges into the emptied chambers of said cylinder as they move into registering position therewith.

27. An automatic rifle comprising a barrel, a stock, a hollow receiver, automatically operating mechanism within said receiver for loading, firing and ejecting, said mechanism including a revolving cylinder provided with chambers adapted successively to register with said barrel a plurality of magazines adapted to discharge into correspondingly assumed positions by said chambers respectively, and automatically operating means including guides for ejecting cartridges from said cylinder chamber which is next beyond said barrel with reference to the direction of revolution of such chamber, and springs in each magazine whereby each in turn may discharge all of its cartridges into the emptied chambers of said cylinder as they move into registering position therewith, and means for limiting the entry to the confines of an empty chamber of more than one cartridge.

28. In an automatic rifle the combination of a stock, a barrel, a hollow receiver connecting the same, mechanism carried by the latter for firing a cartridge in said barrel and including; a reciprocable firing rod provided with a lateral projection, a hammer adapted to engage and to be engaged by said projection, said hammer being fashioned with two sears, a safety catch adapted to engage one sear when said hammer is moved by the recoil of said projection, a trigger catch adapted to engage the other sear, and a trigger device for controlling the position of both of said catches.

29. An automatic rifle comprising, a barrel, a stock, a hollow receiver, mechanism within said structure for loading and ejecting cartridges, said mechanism including; a movable cartridge carrier adapted successively to bring cartridges in line with said barrel, a member for shoving such alined cartridge into the barrel, a part upon said member for withdrawing the cartridge from the barrel into said carrier, an actuating bar adapted to be moved in one direction by the pressure of discharged gases, a spring for effecting the return movement of said bar, a shaft mounted in said receiver, a bevel gear loose upon said shaft and operatively connected with said bar so as to be reversely rotated during the reciprocating movement thereof, said gear being provided with a ratchet tooth, a disk fixed to said shaft, a pawl upon said disk adapted to be engaged by said ratchet tooth during the movement of said bar in one direction, a reciprocable structure for actuating said breech bolt and a crank operatively connecting said structure and shaft.

30. An automatic rifle comprising a barrel, a hollow receiver provided interiorly with a slideway, mechanism within said structure for loading and ejecting cartridges, said mechanism including; a movable cartridge carrier adapted successively to bring cartridges in line with said barrel, a breech bolt reciprocable upon said slideway for shoving such alined cartridge into the barrel, a part upon said member for withdrawing the cartridge from the barrel to said carrier, an actuating rack bar adapted to be moved in one direction by the pressure of discharged gases, a spring for effecting the return movement of said bar, a shaft mounted in said receiver, gearing operatively connecting said bar and shaft, a crank operatively connecting said shaft and bolt, during one direction of movement of said bar.

31. An automatic rifle comprising a barrel, a stock, a hollow receiver therebetween, mechanism including reciprocable and rotatable parts for feeding cartridges into and withdrawing the same from said barrel, means whereby some of said parts are reciprocated intermittently and a device initially obstructing the movement of one of said rotatable parts but adapted presently to be actuated by a reciprocating part and moved to its releasing position.

32. A gun of the character described comprising a barrel, a magazine mechanism including a cylinder having cartridge chambers and adapted to transfer cartridges from said magazine to said barrel, each of said chambers being fashioned with a groove, means for shoving a cartridge from said magazine into one of the chambers of said cylinder, and spring devices occupying said grooves each adapted to be so actuated by the movement of a cartridge from said magazine into its particular chamber as to obstruct the en-

try of a succeeding cartridge into the confines of said chamber.

33. A gun of the character described comprising a barrel, a magazine mechanism including a hollow structure having a cartridge chamber and adapted to transfer a cartridge from said magazine to said barrel, said chamber being fashioned with a groove, means for shoving a cartridge from said magazine into said chambers, and a spring device tiltably mounted in said groove and adapted to have one end tilted by the engagement of a cartridge being shoved from said magazine whereby its other end obstructs the entry of a succeeding cartridge into the confines of said chamber.

34. An automatic rifle comprising a barrel, a stock, mechanism including a cartridge chamber for feeding cartridges into and withdrawing the same from said barrel, a magazine tending to force a cartridge into said chamber, and a device movably carried by a wall of the latter for obstructing the passage of a cartridge thereto from said magazine said device being movable to its obstructing position by the entry of a cartridge into said chamber.

35. An automatic rifle comprising a barrel, a stock, mechanism including a cartridge chamber for feeding cartridges into and withdrawing the same from said barrel, a magazine tending to force a cartridge into said chamber, and a tipping device so carried by the latter as normally to permit of the entry of a cartridge from said magazine into said chamber, one part of said device being adapted to be engaged by a cartridge inserted in said chamber whereby another part of the device obstructs the passage of another cartridge from said magazine said device being movable to its obstructing position.

36. An automatic rifle comprising a barrel, a hollow receiver, automatically operating mechanism within said receiver for loading, firing and ejecting, said mechanism including a structure provided with a chamber adapted to register with said barrel, a magazine adapted to discharge into said chamber, said structure being fashioned with a groove, said receiver being fashioned with an opening and a stationary guide occupying said groove and adapted to be engaged by the exploded cartridge to lift the same from its chamber and cause its gravitational fall through said opening, and means for shoving cartridges from said magazine into the emptied chamber as it reaches a registering position therewith.

37. A gun comprising a barrel, a hollow receiver, mechanism within said receiver for loading, firing and ejecting, said mechanism including a chamber adapted to register with said barrel, a magazine adapted to discharge into said chamber, said structure being fashioned with an annular groove, said receiver being fashioned with an opening and a guide occupying said groove sloping downwardly toward said opening and adapted to be engaged by the exploded cartridge to lift the same from its chamber and cause its gravitational fall through said opening, and means for shoving cartridges from said magazine into the emptied chamber as it reaches a registering position therewith.

38. An automatic rifle comprising a barrel, a hollow receiver, a magazine, a cartridge carrier adapted to receive cartridges from said magazine and move them into position behind the barrel, a reciprocable actuating device, a breech bolt for shoving cartridges from said carrier into said barrel and for returning them from the barrel to said carrier, and mechanism for connecting said bolt and device including two parts one of which is adapted to move alone during the actuating movement in one direction and to be locked with so as to carry the other part along with it during the reciprocal movement in the opposite direction.

39. An automatic rifle comprising a barrel, a hollow receiver, a magazine, a cartridge carrier adapted to receive cartridges from said magazine and move them into position behind the barrel, a reciprocal breech bolt for shoving cartridges from said carrier into said barrel and for returning them from the barrel to said carrier, and mechanism for operating said bolt including two turning parts one of which is adapted to turn alone during the reciprocal movement in one direction and to be locked with so as to turn the other part along with it during the reciprocal movement in the opposite direction.

40. An automatic rifle comprising a barrel, a hollow receiver, a magazine, a cartridge carrier adapted to receive cartridges from said magazine and move them into position behind the barrel, a reciprocable breech bolt for shoving cartridges from said carrier into said barrel and for returning them from the barrel to said carrier, and mechanism for operating said bolt including two parts one of which is adapted one to turn alone during the reciprocal movement in one direction and to be locked with so as to turn the other part along with it during the reciprocal movement in the opposite direction and an automatically operated device for obstructing the turning movement of such other part during a certain stage of the actuation of the mechanism.

41. An automatic rifle comprising a barrel, a hollow receiver, a magazine, a cartridge carrier adapted to receive cartridges from said magazine and move them into

position behind the barrel, a reciprocable breech bolt for shoving cartridges from said carrier into said barrel and for returning them from the barrel to said carrier, a shaft, two rotatable parts loose and fixed to said shaft respectively, the loosely mounted of said parts being adapted to rotate idly upon said shaft during the reciprocal movement in one direction and to be locked with so as to rotate the other working part and said shaft along with it during the reciprocal movement in the opposite direction, an automatically operated device for obstructing the turning movement of such other part during a certain stage of the actuation, a crank connecting said shaft and bolt, and means for rotating said loosely mounted part in reversed directions.

42. An automatic rifle comprising a barrel, a hollow receiver, a magazine, a cylinder adapted to receive cartridges from said magazine and move them into position behind the barrel, a reciprocable breech bolt for shoving cartridges from said cylinder into said barrel and for returning them from the barrel to said cylinder, a shaft, two rotatable parts loose and fixed to said shaft respectively, the loosely mounted of said parts being adapted to move idly upon said shaft during the reciprocal movement in one direction and to be locked with so as to rotate the other working part during the reciprocal movement in the opposite direction, a crank connecting said shaft and bolt, means for rotating said loosely mounted part in reversed direction and mechanism for imparting intermittent rotational movement to said cylinder and including a member adapted to be engaged and moved by said part which is fixed to the shaft.

Signed by me, this 17th day of April, 1918.

GLENN C. WATSON.