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MACHINE GUN.

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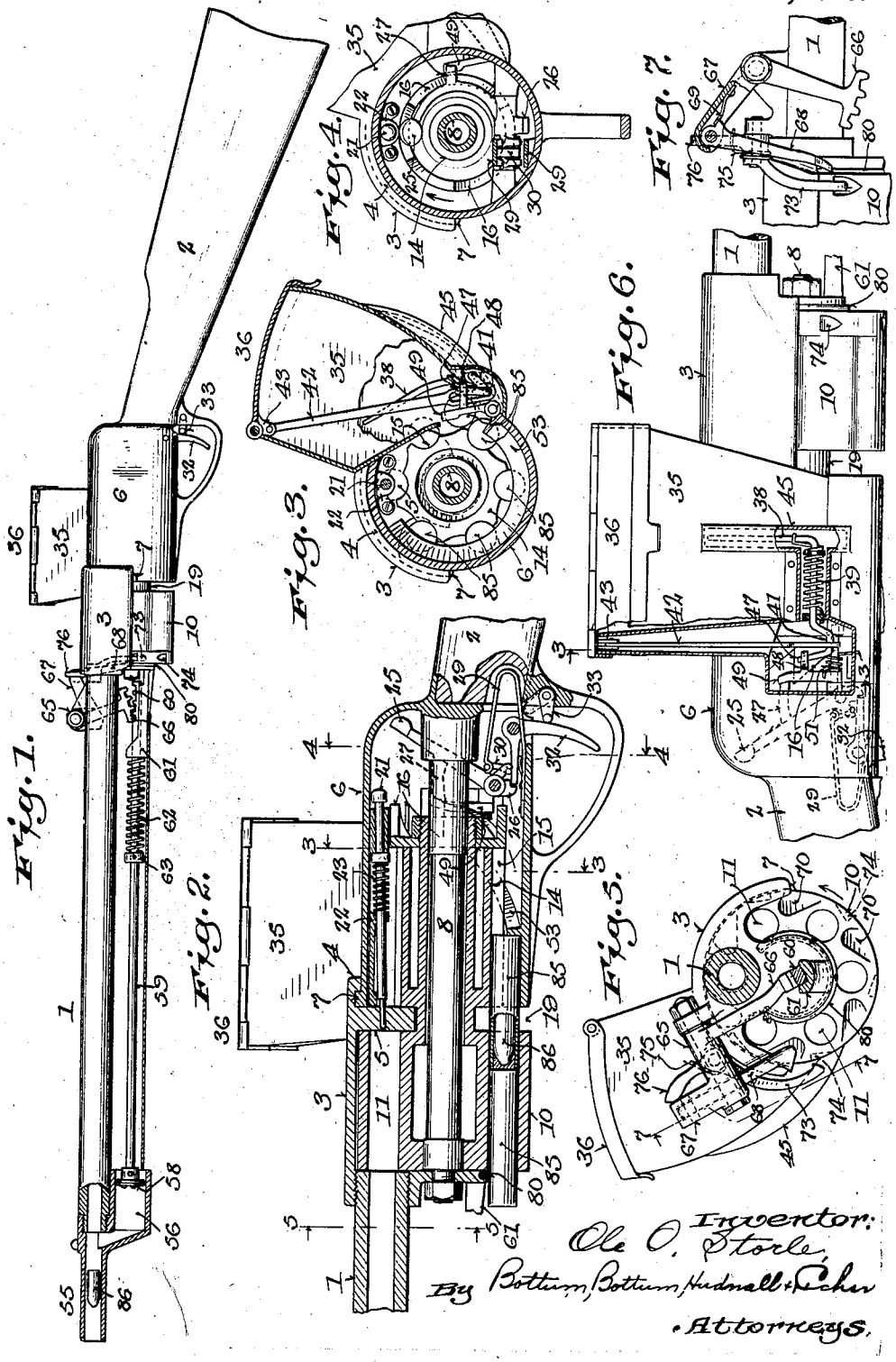


Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

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UNITED STATES PATENT OFFICE.

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MACHINE-GUN.

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To all whom it may concern:

Be it known that I, OLE O. STORLE, a citizen of the United States, residing at Tacoma, in the county of Pierce, and State of Washington, have invented certain new and useful Improvements in Machine-Guns, of which the following is a specification, reference being had to the accompanying drawing, forming a part thereof.

This invention relates to automatic rapid fire rifles or machine guns.

Its main objects are to utilize the pressure of gases produced in the barrel by the discharge of bullets or projectiles therefrom, for repeatedly reloading and firing the gun and ejecting the cartridge shells while the trigger is held retracted, without diminishing the force with which the bullets or projectiles are discharged and without mutilating or weakening the gun barrel; to automatically stop firing the gun whenever the magazine is emptied and while the cylinder is supplied with cartridges, ready for immediate action as soon as the magazine is again filled or supplied with cartridges; to prevent overheating of the gun in action; and generally to improve the construction and operation of this class of guns.

It consists in the construction, arrangement and combination of parts as hereinafter particularly described and pointed out in the claims.

In the accompanying drawing like characters designate the same parts in the several figures.

Figure 1 is a side elevation of a rifle embodying the invention, parts adjacent to the muzzle being broken away and shown in section; Fig. 2 is a vertical longitudinal section on an enlarged scale of the loading and firing mechanism of the gun; Fig. 3 is a cross section on the line 3—3, Figs. 2 and 6; Figs. 4 and 5 are cross sections on the lines 4—4 and 5—5 respectively, Fig. 2; Fig. 6 is an enlarged side elevation and partial section of the magazine and associated parts of the gun as viewed from the reverse side from that shown in Fig. 1; and Fig. 7 is a detail view in a plane indicated by the dotted line 7—7, Fig. 5, of parts of the cylinder actuating mechanism.

As shown in Figs. 1 and 2, the gun comprises a single barrel 1, and a stock 2, which may be of the usual or any suitable construction. The barrel is threaded or otherwise fastened at its rear end in a breech piece 3 of approximately semi-cylindrical shape, open on the under side and formed at its rear end with an internal flange 4 and adjacent to the flange with a depending wall 5. A lock case 6, of approximately cylindrical shape, to which the stock 2 is attached, is formed at its front end on the upper side with an external flange 7, adapted to interlock with the internal flange 4 of the breech piece to rigidly hold the parts in their proper relation to each other when they are assembled as shown. The lock case 6 is formed or provided with a center pin 8, which is secured at its front end in the front wall of the breech piece 3.

A rotary cartridge cylinder 10, formed parallel with its axis with a circular series of equally spaced cylindrical cartridge chambers 11, is fitted to turn on the center pin 8 in the breech piece 3 between the front wall and the wall 5 thereof. The cylinder 10 is formed or provided at its rear end with a co-axial cartridge feeding or loading extension 14, which is formed with semi-cylindrical pockets 15, in axial alinement with the cartridge chambers 11, and at its rear end is provided with a circular series of inclines or cam projections 16, corresponding in number and spacing with the pockets 15 and chambers 11.

The lower part of the wall 5 extends into an annular groove or channel 19, formed or provided between the cylinder 10 and its extension 14, and closes the rear ends of the chambers 11 as they are brought by the rotation of the cylinder into alinement with the barrel 1, besides firmly supporting the cylinder at its rear end.

A firing pin 21 is guided in the upper part of the lock case 6 in a bracket 22, attached to the wall 5, and is provided with a retracting spring 23. At its front end, which is reduced, it is fitted and guided in a hole in the wall 5 in alinement with the bore of the barrel 1. A hammer 25, pivotally mounted in the lower part of the case 6 adjacent to its rear end, is formed or provided below its pivot with a shoulder or cocking notch 26, and at its upper end with a head which is arranged to coöperate with a head on the rear end of the firing pin 21. The shank of the hammer is curved to one side to clear the center pin 8 and is formed or provided between its pivot and head with a forwardly projecting arm 27, with which

the inclines or cam projections 16 on the cylinder extension coöperate to automatically and successively cock and release the hammer when the cylinder extension 14 is rotated with the cylinder 10, as hereinafter explained. A main spring 29 of the usual or any suitable construction, connected by a link 30 with short arms or lugs on the hammer shank, as shown in Figs. 2 and 4, tends to throw the hammer head forward against the firing pin 21.

A spring actuated pivoted trigger 32, of ordinary or any suitable construction, pivoted in the lower rear part of the case 6, and projecting downwardly through an opening therein, is adapted by engagement with the shoulder 26, to normally hold the hammer 25 retracted or cocked, and affords means for releasing it at will. A manually operated dog 33, pivoted in a recess in the trigger guard, is adapted when thrown forward, to lock the trigger 32 in engagement with the shoulder 26, and thus prevent accidental release of the hammer and firing of the gun.

A cartridge magazine 35, provided with a hinged cover 36, is attached to and opens at the bottom into one side of the lock case 6 opposite the cylinder extension 14. The magazine is provided with a follower arm 38, pivotally mounted in the lower part of the magazine and provided with a spring 39, which tends to swing said arm upwardly and inwardly toward the opening from the magazine into the lock case. The pivot piece of the follower arm 38 is formed or provided with a crank 41, which is connected as shown in Figs. 3 and 6, by a link 42 with an arm 43 on the cover 36 adjacent to its hinge. The magazine is formed on the outer and under side with a pocket 45 to receive the follower arm 38 when it is turned back or withdrawn to fill the magazine, and the link 42 is formed with a slot for the crank 41 so as to permit the cover 36 to be closed when the magazine is filled or supplied with cartridges and the follower arm 38 is held thereby within the pocket 45.

The crank 41 is formed or provided with an upwardly projecting arm 47, which engages an outwardly and forwardly bent arm 48 on a detent 49, pivotally mounted as shown in Figs. 3 and 6, in one side of the case so as to be turned at its upper end transversely to the axis of the case into and out of the path of the hammer arm 27. A spring 51 tends to turn the detent inwardly toward the path of the arm 27 into position to lock and hold the hammer cocked or in retracted position, as indicated in Fig. 6.

As long as there are any cartridges in the magazine 35 the follower arm 38 will hold the detent 49 out of the path of the hammer arm 27, but when the last cartridge in the magazine is delivered therefrom into the loading extension 14 of the cylinder, and the arm 38 is turned inwardly to the limit of its movement in that direction, the detent 49 will pass into the path of the hammer arm 27, as shown in Fig. 4, and will lock the hammer cocked or in its retracted position.

When the cover 36 of the magazine 35 is opened, the slotted link 42 connecting the crank 41 of the follower arm 38 with the arm 43 on the cover, turns the follower arm against the tension of the spring 39 back into the pocket 45 for filling the magazine, and at the same time withdraws the detent 49 from engagement with the hammer arm 27, thereby releasing the hammer 25, which is then caught and held in cocked position by engagement of the shoulder 26 with the trigger 32.

The lock case 6 is formed or provided on the inside with a spiral rib or projection 53, extending from a point adjacent to the lower side and rear end of the opening from the magazine into the lock case, around the lower and opposite side of the case to a transverse plane coincident with the rear end of the cylinder 10 or the front face of the wall 5, and adapted by engagement with the rear ends of the cartridges to thrust them forward from the pockets 15 into the alined chambers 11 of the cylinder 10 as the cylinder with its extension 14 is turned in the direction indicated by arrows in Figs. 4 and 5. As the cartridges are advanced from the pockets 15 of the loading extension 14 into the chambers 11 of the cylinder 10, empty cartridge shells or cases will be thrust forward and ejected from said chambers, as shown in Fig. 2, before they are brought into alinement with the barrel 1.

For operating the cartridge loading and firing and the shell ejecting mechanism, the gun is provided as shown in Fig. 1, with a muzzle extension 55, which may be attached to the end of the barrel by a screwthread, as shown, and which has a somewhat larger bore than that of the barrel. The extension 55 is formed with a pressure cylinder or chamber 56, communicating at its outer end with the bore of the extension adjacent to the muzzle of the gun. The cylinder or chamber 56 is provided with a piston, plunger or movable member 58, having a rod or stem 59 extending rearwardly parallel with the barrel and provided at its rear end with a rack 60 supported and guided in an arm or bracket 61, formed on or attached to the front wall of the breech piece 3. A spiral spring 62, surrounding the rod or stem between the front end of the arm or bracket 61 and a collar 63 on the rod or stem, tends to thrust the piston or plunger 58 forward and to hold it at the limit of its forward movement.

A rocker 65, pivotally mounted on the

barrel 1 adjacent to the breech piece 3, is provided with a gear segment 66, meshing with the rack 60, and is also provided as shown in Figs. 5 and 7, with an arm 67, to which is pivoted a pawl 68, held by a spring 69 in engagement with the front end of the cylinder 10, which is formed at intervals with notches 70, corresponding in number and spacing with the chambers 11.

A stop dog 73, pivotally mounted on the breech piece 3, with its axis at the right angles to that of the rocker 65, is adapted by engagement with notches 74 in the periphery of the cylinder 10, to arrest and hold the cylinder with a chamber 11 in exact register with the bore of the barrel, as the cylinder is turned by the pawl 68 to bring the chambers 11 one after another into alinement with the bore of the barrel. A spring 75 tends to swing the dog 73 toward the cylinder and the dog is provided with a tail piece 76 in the path of the arm 67, which by engagement therewith throws and holds the dog out of engagement with the notches 74 when the arm 67 is turned downward with the pawl 68 to advance the cylinder an interval.

A round arc-shaped wire spring 80 fastened at one end to the front wall of the breech piece 3 and projecting normally from a groove in the curved edge of the wall, slightly over the front ends of the chambers 11, as shown in Figs. 2 and 5, prevents the cartridges and shells from accidentally slipping forward and projecting from said chambers when the gun is held with its muzzle downward, but yields inwardly into the groove, as shown in Fig. 2, to permit the ejection of the shells from the cylinder by cartridges as they are thrust forward by the spiral rib 53 into the chambers of the cylinder. Cartridges 85, are specially constructed for the gun. As shown in Fig. 2, they have plain cylindrical shells of uniform diameter from end to end, so that they can be thrust by the spiral rib 53 from the pockets 15 of the feed or loading extension 14 of the cylinder, into the cylinder chambers 11, and ejected from said chambers in the same direction. The shell is extended over the conical or rounded nose of the ball or bullet 86, and the space between the nose of the bullet and the overhanging shell is filled, as shown in Fig. 2, with lubricating material, such as a mixture of graphite and wax, which when the bullet is discharged, is applied to the bore of the barrel and prevents its becoming overheated.

In the operation of the gun the magazine 35 and the pockets 15 in the cylinder extension 14, and the chambers 11 in the cylinder 10 between the opening from the magazine into the lock case 6 and the barrel 1, being supplied with cartridges, and the follower arm 38 being retracted and held in the pocket 45 by the cartridges in the magazine, when the trigger 32 is pulled out of engagement with the shoulder 26, thereby releasing the hammer 25, the firing pin 21 will be thrust forward by the hammer and fire the cartridge in the chamber 11, which registers with the bore of the barrel. As the bullet passes from the barrel 1 into the muzzle extension 55, the gas pressure produced by the discharge thrusts the plunger 58 backward against the tension of the spring 62 and turns the gear segment 66 backward and the arm 67 upward, lifting the pawl 68 and turning the dog 73 out of engagement with the cylinder 10, as shown in Figs. 1 and 5. The recoil of the spring 62 as the bullet leaves the muzzle extension 55 and releases the pressure in the barrel and chamber 56, instantly shifts the rack 60 forward, returning the plunger 58 to its initial position and turning the gear segment 66 forward. Simultaneously with the downward movement of the arm 67 the pawl 68 engaging with a notch 70 in the cylinder 10, turns the cylinder forward, bringing the next loaded chamber 11 therein into alinement with the barrel. As said loaded cylinder chamber is brought into alinement with the barrel, the dog 73 engages with a notch 74 in the barrel, thereby arresting its movement with said chamber in exact register with the barrel bore.

With each partial rotation of the cylinder 10 and its extension 14 by the pawl 68, the hammer 25 is cocked and immediately released by the action of one of the cam projections 16 against the hammer arm 27, and as long as the trigger is held retracted, the hammer will be automatically cocked and released and the gun will be fired in very rapid succession until the supply of cartridges in the magazine 35 is exhausted.

When the last cartridge is discharged therefrom, the follower arm 38 at the limit of its inward movement, allows the detent 49 to be turned by its spring 51 into the path of the hammer arm 27, thereby locking and holding the hammer in its cocked position, as indicated in Fig. 6, and preventing its further operation until the follower arm 38 is withdrawn by opening the cover 36 and the magazine is filled or supplied with cartridges. The operation of the gun is thus stopped while the cylinder 10 and its loading extension 14 are supplied with cartridges for immediate use, whenever the magazine is supplied with cartridges. When the follower arm 38 is turned back by opening the cover 36 and the magazine is supplied with cartridges, thereby turning and holding the detent 49 out of the path of the hammer arm 27, the hammer is held cocked by engagement of the trigger 32 with the shoulder 26.

With each partial rotation of the cylinder

10 and the loading extension 14 by the pawl 68, a cartridge is fed from the magazine 35 into a pocket 15 on the descending side of the loading extension. As the cylinder and its extension are turned, the cartridges are thrust forward by the spiral rib 53 from the pockets 15 into the cylinder chambers 11, thereby ejecting the empty shells therefrom and bringing one chamber after another into firing position.

The ejection of the shells from the cylinder in the same direction that the cartridges are supplied to the cylinder, admits of very rapid firing.

By releasing the trigger 32, the firing of the gun may be stopped at will before the supply of cartridges in the magazine 35 is exhausted, the engagement of the trigger with the shoulder 26 locking and holding the hammer 25 in cocked position.

Various changes in the construction and arrangement of parts of the gun may be made without departure from the principle and scope of the invention as defined in the following claims.

I claim:

1. In a machine gun the combination with the barrel and a rotary cartridge cylinder having cartridge chambers arranged to be turned one after another into alinement with the bore of the barrel and formed in one end and in the periphery with notches corresponding in number and spacing with the cartridge chambers, a rocker provided with a gear segment and with a pawl and a dog coöperating with said notches to turn the cylinder step by step and stop it with a chamber in exact register with the barrel bore, a pressure chamber parallel with the barrel and communicating with the bore thereof, a plunger fitted in said chamber and provided with a rack in engagement with said gear segment, and a retracting spring acting on the plunger in opposition to the discharge pressure.

2. In a machine gun the combination with the barrel, provided with a breech piece and case, of a cartridge cylinder provided with a feed extension housed in said case and having longitudinal pockets in axial alinement with the chambers of said cylinder, a magazine opening at the bottom into one side of said case opposite the cylinder extension, mechanism for rotating said cylinder and extension step by step to bring the cartridge chambers one after another into alinement with the barrel bore, and a spiral projection fixed within said case and adapted by engagement with the rear ends of cartridges to thrust them forward from the pockets in the cylinder extension into the alined cylinder chambers and to eject the cartridge shells from said chambers as the cylinder with its extension is turned and the cartridges are thrust into the chambers before they are brought into alinement with the barrel bore.

3. In a machine gun the combination with the barrel having a breech piece and lock case, of a cartridge cylinder provided with an extension rotatably mounted and housed in the lock case and having outwardly opening longitudinal pockets in alinement with the cartridge chambers of the cylinder, and a circular series of cam projections on its rear end corresponding in number and spacing with the cartridge chambers and pockets, a wall extending from the upper part of the breech piece between the cylinder and cylinder extension and closing the rear end of the cartridge chambers as they are brought into alinement with the barrel bore, a spring retracted firing pin guided in the upper part of the lock case and in said wall, a spring actuated hammer pivotally mounted in the rear end of the lock case and adapted to coöperate with the firing pin and to be cocked by the cam projections on the cylinder extension, a trigger for locking and holding the hammer cocked and for releasing the same, a spiral projection inside of the lock case, adapted to thrust cartridges forward from the pockets in the cylinder extension into the chambers in the cylinder, and mechanism for rotating the cartridge cylinder and its extension, comprising a pressure chamber communicating with the barrel and a spring retracted member operated by the discharge pressure of the gun.

4. In a machine gun the combination with the barrel, the breech piece and lock case, of a cartridge cylinder and extension rotatably mounted and housed in said breech piece and lock case, the cylinder extension having outwardly opening longitudinal pockets in axial alinement with the cartridge chambers of the cylinder, a wall extending downwardly from the breech piece between the cylinder and its extension and closing the rear ends of the cartridge chambers as they are brought into alinement with the barrel bore, a spiral projection inside of the lock case, arranged to thrust cartridges from the pockets in the cylinder extension into the chambers in the cylinder as the cylinder and extension are turned, and a magazine opening at the bottom into one side of the lock case opposite the cylinder extension and provided with a hinged cover, a spring actuated follower arm pivotally mounted in the magazine and provided with a crank which is connected by a link with the cover of the magazine.

5. In a machine gun the combination with the barrel, breech piece and lock case, of a cylinder rotatably mounted in the breech piece and provided with a loading extension having outwardly opening pockets in alinement with the cartridge chambers of the cylinder and having cam projections on its rear

end, a firing pin guided in the upper part of the lock case, a spring actuated hammer pivotally mounted in the rear end of the lock case and adapted to coöperate with the firing pin and to be cocked by the cam projections on the loading extension, a trigger for locking the hammer cocked and for manually releasing the same, a magazine opening into one side of the lock case opposite the loading extension and provided with a spring actuated follower arm pivotally mounted therein and having a crank arm, and a pivoted detent engaged by the crank arm of the follower and adapted to lock and hold the hammer cocked when the magazine is empty.

6. In a machine gun the combination with the barrel, breech piece and lock case, of a cartridge cylinder provided with a loading extension having outwardly opening pockets in axial alinement with the cartridge chambers in the cylinder and having cam projections on its rear end, a spiral projection inside of the lock case adapted to thrust cartridges forward from the pockets in the loading extension into the chambers in the cylinder, a firing pin guided in the upper part of the lock case, a spring actuated hammer adapted to coöperate with the firing pin and to be automatically cocked by the cam projections on the loading extension, a trigger for locking the hammer cocked and for manually releasing the same, a magazine provided with a hinged cover and communicating with the lock case through an opening opposite the descending side of the loading extension, a spring actuated follower arm pivotally mounted in the magazine and provided with a crank and crank arm, a link connecting the crank of the follower with the cover, a pivoted detent, and a spring tending to turn the detent into position to lock and hold the hammer cocked, the detent being arranged to be engaged by the crank arm on the follower and held thereby out of engagement with the hammer when the magazine is supplied with cartridges.

7. In a machine gun the combination with the barrel, breech piece and lock case, of a rotary cartridge cylinder having longitudinal chambers adapted to be brought one after another into alinement with the bore of the barrel, a loading extension on the rear end of the cylinder having pockets in axial alinement with the cylinder chambers, a magazine opening into the lock case opposite the loading extension, and a spiral projection inside of the lock case adapted to thrust cartridges from said pockets into said chambers and to eject cartridge shells from the chambers.

8. In a machine gun the combination with the barrel, breech piece, and lock case, of a rotary cylinder provided at the rear end with a loading extension having pockets in axial alinement with the cylinder chambers and having cam projections, a wall in the breech piece closing the rear ends of the cylinder chambers as they are brought into alinement with the barrel, a firing pin guided in an opening through said wall, a spring actuated hammer adapted when released to coöperate with the firing pin and to be cocked and released by the cam projections on the loading extension when it is rotated with the cylinder, a trigger for holding the hammer cocked and for manually releasing it, a magazine opening into the lock case opposite the loading extension, and a spiral projection in the lock case adapted to thrust cartridges forward from the pockets in the loading extension into the chambers in the cylinder and to eject cartridge shells from said chambers.

9. In a machine gun the combination with the barrel, breech piece, and lock case, of a rotary cylinder and loading extension rotatably mounted in the breech piece and lock case, the loading extension being provided with cam projections and having pockets in axial alinement with the cylinder chambers which are arranged to be brought one after another into alinement with the barrel, a wall in the breech piece closing the rear ends of the cylinder chambers as they are brought into alinement with the barrel, a firing pin guided in an opening through said wall, a spring actuated hammer adapted to coöperate with the firing pin and to be cocked and released by the cam projections on the loading extension as it is rotated, a trigger for holding the hammer cocked and for manually releasing it, a spiral projection in the lock case arranged to thrust cartridges forward from the pockets in the loading extension into the cylinder chambers and thereby eject empty shells from said chambers, a magazine opening into the lock case opposite the loading extension and adapted to feed cartridges into the pockets therein, a spring actuated follower tending to press cartridges in the magazine toward the opening into the lock case, a magazine cover connected with the follower and adapted to retract it when the cover is opened, and a detent controlled by the follower and adapted to lock the hammer cocked when the supply of cartridges in the magazine is exhausted.

In witness whereof I hereto affix my signature.

OLE O. STORLE.