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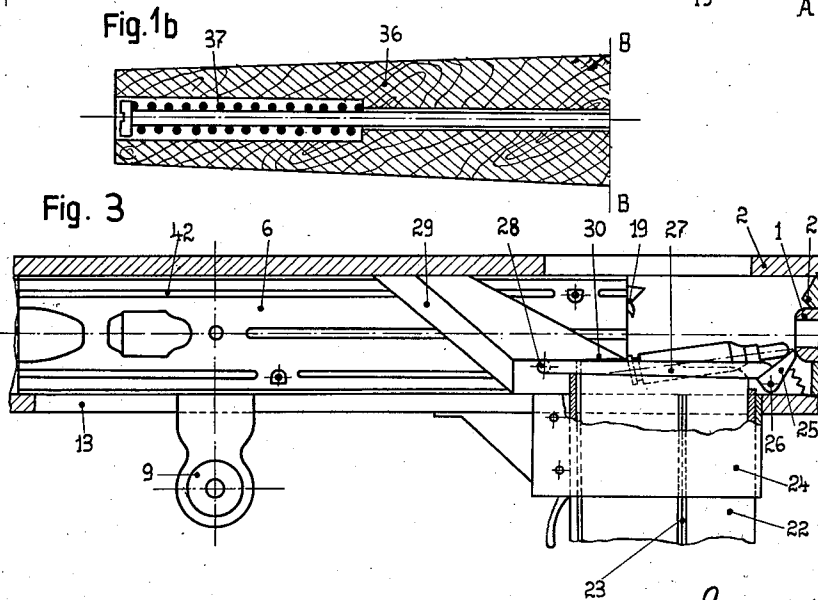
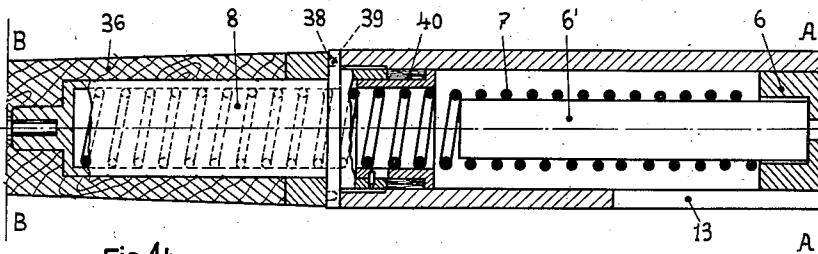
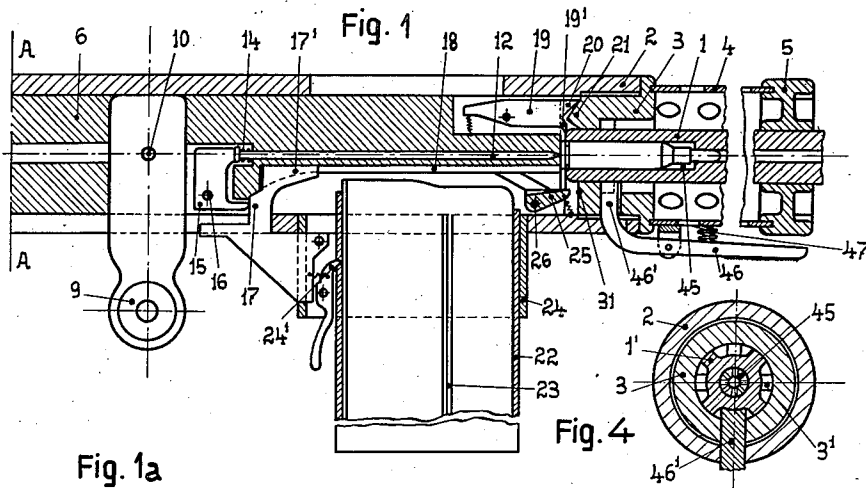
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AUTOMATIC FIREARM

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UNITED STATES PATENT OFFICE

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AUTOMATIC FIREARM

Application filed March 21, 1928, Serial No. 263,288, and in Great Britain August 25, 1927.

This invention relates to improvements in machine guns and like automatic firearms.

One object of the present invention is to provide automatic firearms which are simpler and cheaper to construct than those commonly in use.

A further object is to provide a fire arm of which the weight is less than that of modern machine guns.

The improvements consist principally in that the breech closure is obtained, as in small automatic pistols, by means of the weight of the breech block combined with the action of a spring pressing it forward, thus keeping the breech block of a moderate weight and size even when war cartridges are used.

The invention consists in the combination of means whereby the percussion is effected in advance of, i. e. a little before the complete closure of the breech block so that this latter is still moving forward to close the breech at the moment of discharge with means whereby the pressure of the exploded charge is admitted to a space in the chamber surrounding the neck of the cartridge so as to balance the internal pressure thereon. It is known that it is not broadly new to operate a hammer carried by the breech block by means of a stop on the fixed breech casing at the moment when the breech closes.

The balancing of pressure on the cartridge neck is attained by special arrangements consisting in that the cartridge is fully contained in the barrel chamber so that the base of the cartridge case will not be deformed during recoil and in that in said chamber longitudinal rectilinear or curved grooves are provided in order to create, by means of the gases at the moment of discharge, a counter pressure directed inwardly onto the neck of the cartridge case and preventing the deformation or breakage of this latter during the beginning of the recoil stroke without any escape of gas, and also causing the cartridge to be moved during the recoil slightly out of the barrel to be engaged by an extractor.

All grooves or notches on the edge of the barrel chamber including the notch generally provided to receive the extractor after

the closure, are dispensed with, means being provided for automatically displacing the extractor hook at the end of the forward stroke of the breech block thus obtaining the advantage of avoiding any risk of breaking the extractor end as happens sometimes in known automatic firearms owing to the escape of gas caused by defective cartridge cases breaking when firing.

The accompanying drawing shows by way of example a constructional form of the improved fire arm according to this invention. On the drawing the arm is provided with a butt to enable its use as a rifle. When it is desired to mount it on a support for use as a machine gun, the butt which, however, does not hinder such use of the weapon, will be removed and replaced by a plug provided with a handle.

Figures 1, 1^a and 1^b show a horizontal longitudinal section of the fire arm, the breech block being in the closed position.

Figures 2 and 2^a show a longitudinal vertical section of the fire arm, the breech block being in the cocked position.

Figure 3 is a detailed view of the fire arm as the breech block moves forward and a cartridge is entering the cartridge chamber guided by a special device adapted to facilitate its introduction.

Figure 4 is a cross vertical section showing how the barrel is fitted into the plug and held in this position.

Figure 5 shows a modified method of fastening the striker lever.

Figure 6 shows a further construction in which the lever itself, modified in shape and position, forms the striker.

Figure 7 shows the pivots used for this fire arm and removable without employing any special tools.

Figure 8 shows diagrammatically the action of the gas pressure on the cartridge case on firing.

1 denotes the barrel and 2 denotes the breech formed from a tube (for instance a Mannesmann tube) closed at its front end by a plug 3, to which the barrel is fitted by means of a bayonet joint and safety lock, as hereinafter described. A sleeve 4 surround-

ing the barrel is fixed to the plug 3 and is supported at its front end by a support 5 carried by the barrel.

The bayonet joint (Figure 4) comprises 5 teeth or fins 1' on the barrel and longitudinal grooves 3' on the plug. This latter carries further at the end of the grooves 3' a circular cross groove receiving the teeth 1' when the barrel is rotated. The barrel is locked in 10 position by means of a tooth 46' on a lever 46 pivoted to the sleeve 4 and subjected to the action of a spring 47. The tooth 46' is forced between two teeth 1' on the barrel and locks this latter; in order to release it, the 15 lever 46 is acted upon against the action of the spring 47. The breech block 6 is of cylindrical form and is slidably mounted in the breech and at its rear portion the block is provided with a projection 6' of smaller 20 diameter serving as a guide for a return spring 7 which abuts against a rear plug 8 of the breech. The breech block can be made of suitable weight without enlarging its size by filling a recess thereof with a mass of 25 heavy material, e. g. a wolfram block. Moreover means can be provided for adjusting from the outside the tension of the return spring in accordance with the inclination of the fire arm (more particularly for firing 30 against aircraft).

The breech block is provided with a handle 9 comprising a stem fitting into a corresponding slot on the breech bolt to which it is 35 secured by means of a pin 10 which after the breech block has been mounted in the breech, is passed through a hole 11 (Figure 2) in said breech. The handle 9 slides in a rectilinear slot 13 formed in the breech, which slot, as 40 clearly shown in Figure 1, does not extend to the breech ends. The striker 12 is slidably mounted in the front portion of the breech block and is normally maintained in the inoperative position by a spring 14; the striker is operated by means of a lever 15 pivoted in 45 16 to the breech block and which does not extend beyond the widest circumference of the breech block. One arm of the lever 15 is adapted when the breech block has nearly completed its forward stroke to strike against 50 a lug 17 forming part of an ejector 17' secured to the breech and extending into a corresponding slot 18 formed in the breech block whereby the striker is caused to move forward and effect the striking; the arrangement is such that there is a slight advance 55 in the striking which admits of the firing taking place while the breech block still possesses a certain momentum in the direction of its closing movement, this ensuring the closure without special members and without 60 excessive weight of the breech block.

Figure 5 shows a modified arrangement of the lever 15 which instead of oscillating about the pivot 16 carried by the breech block rocks 65 by its projection 15' in a recess formed in the

handle 9. This simplifies the construction and facilitates removing and controlling the lever 15 that is fitted in and extracted in a single operation by the handle 9.

According to the modified construction 71 shown in Figure 6, the said lever is dispensed with and replaced by a lever 48 pivoted through a pivot 49 to the front end of the breech block and pressed by a spring 50. The striker 12 is also dispensed with, 7 its action being performed by the projection 48' of a lever 48, abutting by a projection 48'', as the breech block reaches the end of its stroke, against the front plug 2 of the breech, whereby the lever is caused to oscillate and striking is effected. 8

The barrel chamber is formed with longitudinal grooves 45 (measuring in depth and width a few tenths of a millimeter) which extend from the point at which the chamber 8 becomes narrower to receive the neck of the cartridge case to about a millimeter beyond the point reached by the neck. The cartridge case which is fully contained in the barrel, as shown in Fig. 1, is subjected on the 1 outer side of the neck to the gas pressure during firing and first part of the recoil so that the cartridge cannot be deformed, the arrangement being such that there is no risk of escape of gas.

As shown in Figure 8, when recoil begins and the gas pressure still acts on the cartridge case, a force C is exerted on the neck of this latter, of which the horizontal component B has a direction opposite to the 2 force A acting on the base. These two forces A and B cause an elongation of the cartridge case which therefore breaks easily where the stresses are greater, namely in proximity to the base. This serious drawback 3 as well as the deformation of the neck is fully eliminated in this fire arm by virtue of the grooves 45 admitting of the gases to produce a pressure on the neck outside the cartridge case, annulling by a force D the 4 force B opposing the force A.

The extractor 19 comprises a tooth 20, which, during the last short part of the forward stroke of the breech block, slides on an inclined surface 21 formed on the barrel and is thereby forced to pivot, thus moving the extractor hook 19' away from the cartridge edge and therefore from the barrel chamber.

The loader 22 is adapted to receive two series of cartridges and is provided with a shoulder 23 on each side to retain the cartridge cases in position and prevent the bullet from striking against the loader wall during vibrations and recoil. The loader is adapted to be inserted in a ring 24 secured to the breech tube and is locked by means of a suitable spring stop 24' operated by a hand lever.

In order to facilitate the feeding of the

cartridges taken in turns from the two series of cartridges in the loader by the breech block during its forward movement, there is provided a guide 25 pivotally mounted in 5 26 on the breech and provided with a hollow cradle-like surface (Figure 2) which directs the cartridges towards the barrel chamber, (Fig. 3). The guide 25 is operated by arms 27 the ends of which carry a pin 28 adapted to engage inclined grooves 29 formed in the breech block the said grooves being so arranged as to rock the guide (after admittance of the cartridge into the barrel chamber) in order that the breech block may reach the barrel. During that part of the stroke in which the breech block takes the cartridge from the loader and commences its forward movement, the guide 25 is maintained in the raised or operative position as shown in Figure 3 by rectilinear guides 30 10 formed on the breech block and in engagement with the pins 28. A cavity 31 into which the guide 25 may enter when lowered is provided under the barrel chamber in the 15 plug 3.

The breech block is provided with longitudinal grooves 42 on its whole periphery so that dust or other foreign matter entering the breech will enter the grooves without creating any resistance to the sliding of the breech block. 20

A case 32 containing the trigger mechanism is soldered or otherwise secured to the breech. The said mechanism comprises a trigger 33 urged upon by a spring 34 and an operating lever 35 which is operated by the said trigger and which, when the trigger is released, retains the breech block in the "cocked" position by engagement with a slot 25 40 formed in the breech block as shown in Figure 2, a single spring acting simultaneously on the trigger and on the trigger lever.

The firearm butt 36 is mounted on the rear breech plug against which it is resiliently pressed by a spring 37; the plug is provided with a flange having two diametrically opposed holes 38 adapted to receive two corresponding pins 39 carried by a metallic flange integral with the butt 36. When it is desired to move the butt from the normal position to the "overturned" position to facilitate firing at a certain elevation when the gunner lies on the ground the butt is pulled rearwardly against the action of the spring 37 and rotated through 180° and is then allowed to snap into locked position by the entering of the pins into the holes formed in the plug. The rear plug is provided with an annular buffer or shock absorber 40 to check the rearward motion of the breech block 6. The front part of the barrel sleeve is provided with a pedestal (non illustrated for simplicity's sake) the legs of which may be overturned or folded over on to the sleeve during transportation of the firearm and in order to 65

effect this the legs are articulated by means of a ball joint provided with stops corresponding to the "use" and "transportation" positions.

The firearm is as usual provided with a handle 41 which in the normal position is behind the trigger. 70

In order to facilitate mounting and removal of some pivots, as the pivots 33' of the trigger and 35' of the trigger lever, these are provided with a special lock device, shown in Figure 7. The pivot, denoted by 51, is provided at its outer end with a groove 51' of a depth corresponding to the diameter of a steel wire forming a resilient split ring 52. 75 This split ring, when free, has a slightly larger diameter than the pivot, but when it is closed it does not exceed the said diameter. 80

For placing the pivot 51 in position, the pivot is placed by its outer end against the opening of its seat, of which the ends are slightly flared, and is pressed upon in order to force the ring 52 against the flared end, causing the ring 52 to close and enter the groove 51'; the pivot is driven through the hole and issues at the other end where the resilient ring again expands preventing the pivot from becoming loose. A pressure in the opposite direction will effect removal of the pivot. The characteristic feature of this lock is that the ring never leaves the pivot and cannot be lost, which is of great importance when using the fire arm on the field. 85 90 95

What I claim is:

1. A machine gun comprising, in combination with a breech bolt of which the closure is obtained by virtue of its weight a striker carried by said bolt, a stop member on the breech, a lever co-operating with said stop member for actuating said striker before the breech bolt has reached the end of its closing stroke, a barrel chamber having longitudinal grooves corresponding with the neck portion of the cartridge case to generate, when the charge explodes, a counter-pressure on said neck portion, the length of said chamber being such that it completely embraces the cartridge, and its edge being free of notches, an ejector, and means for displacing said ejector towards the outside when the breech bolt closes. 100 105 110 115

2. A machine gun comprising, in combination with a breech bolt of which the closure is obtained by virtue of its weight, a striker, a stop member on the breech, a lever co-operating with said stop member for actuating said striker before the breech bolt has reached the end of its closing stroke, a barrel chamber having longitudinal grooves in correspondence with the neck portion of the cartridge case for generating, when the charge explodes, a counter-pressure on said neck portion, the length of said chamber being such that it completely embraces the cartridge case and its edge being free of notches, 120 125 130

an ejector mounted for oscillating on the breech bolt and having a tooth on its front end, an inclined surface on the breech co-operating with said tooth for withdrawing the extractor from the barrel chamber when
5 the breech bolt closes, and a spring for returning the extractor to its working position as soon as the breech bolt begins to recede.

3. A machine gun comprising, in combination with the breech having a slot closed at
10 both its ends and a breech bolt of which the closure is obtained by virtue of its weight, a handle detachably mounted on said breech bolt, the shank of said handle being engaged
15 by said slot, a striker mounted in said breech block, and means for preventing the deformation of the cartridge at the beginning of the recoil movement, said means comprising longitudinal grooves formed on the wall of the
20 front end of the cartridge chamber of the barrel adapted to create when firing a counter-pressure directed inwardly on to the neck of the cartridge case, and means for actuating the striker just before the end of the closing movement of the breech block, which still
25 possesses a certain momentum, in the direction of its closing movement ensuring the closure.

4. A machine gun comprising, in combination with the breech having a slot closed at
30 both its ends and a breech bolt of which the closure is obtained by virtue of its weight, of a handle detachably connected to said breech bolt and having a shank engaged by said slot,
35 a striker lever mounted on the front portion of the breech bolt, one arm of said lever acting as striker, a spring normally holding said striker in its withdrawn position, a stop member on said breech with which the other arm
40 of said striker lever co-operates at the end of the closing stroke of the breech bolt, a barrel chamber having longitudinal grooves in correspondence with the neck portion of the cartridge case for generating, when the
45 charge explodes, a counter-pressure on said neck portion, the length of said chamber being such that it completely embraces the cartridge case and its edge being free of notches, an ejector mounted for oscillating on the
50 breech bolt and having a tooth on its front end, an inclined surface on the breech co-operating with said tooth for withdrawing the extractor from the barrel chamber when the breech bolt closes, and a spring for returning
55 the extractor to its working position as soon as the breech bolt begins to recede.

In testimony that I claim the foregoing as my invention, I have signed my name.

BETHEL-ABIEL REVELLI.

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