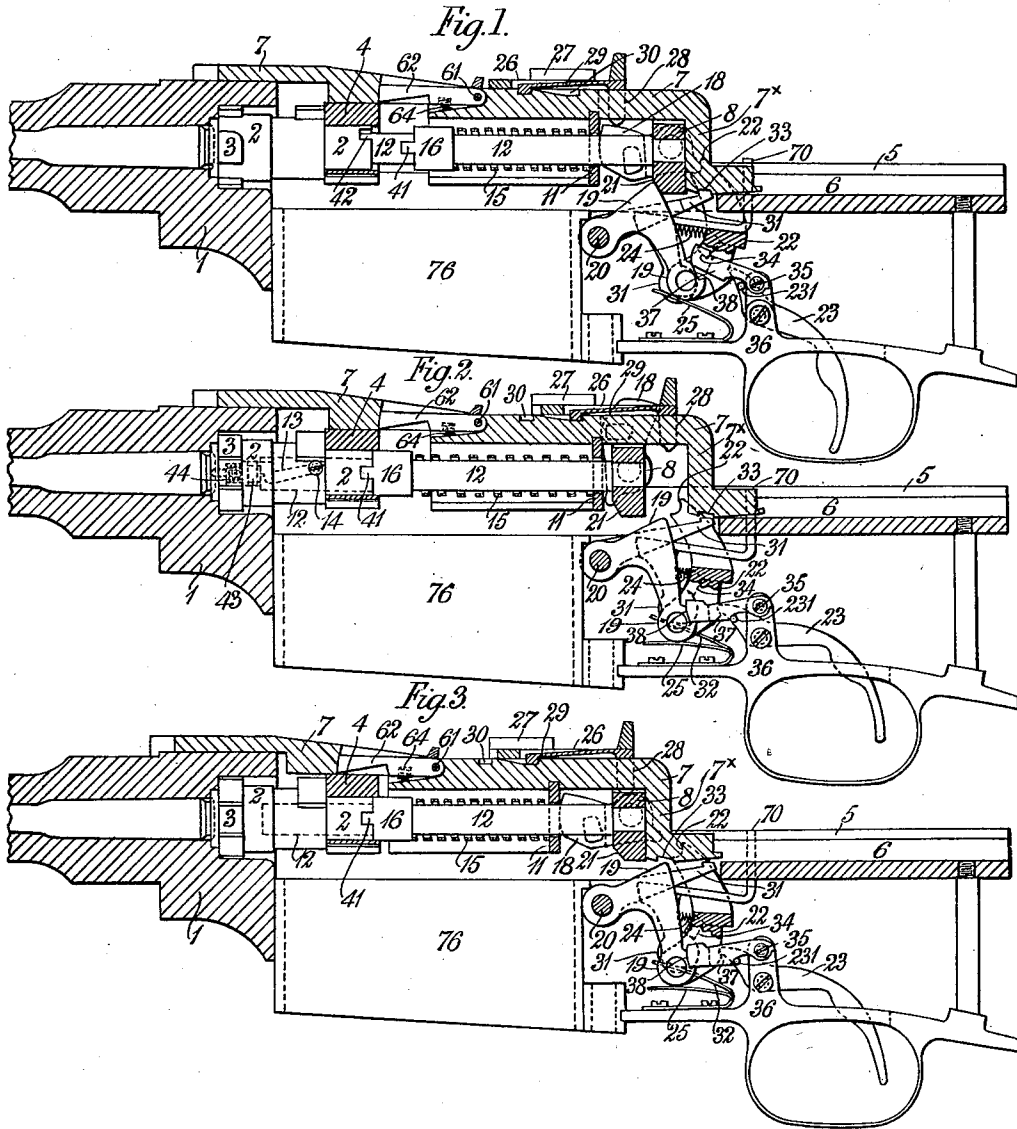


A. L. CHEVALLIER & J. EASTWICK.  
 AUTOMATIC SMALL ARM.  
 APPLICATION FILED MAR. 27, 1911.

1,001,250.

Patented Aug. 22, 1911.

3 SHEETS—SHEET 1.



Witnesses  
 E. B. Franzoni.  
 M. E. Bunnell

Inventors  
 Donald D. Chevallier  
 James Eastwick  
 By their Attorneys,  
 Brewin Night

A. L. CHEVALLIER & J. EASTWICK.

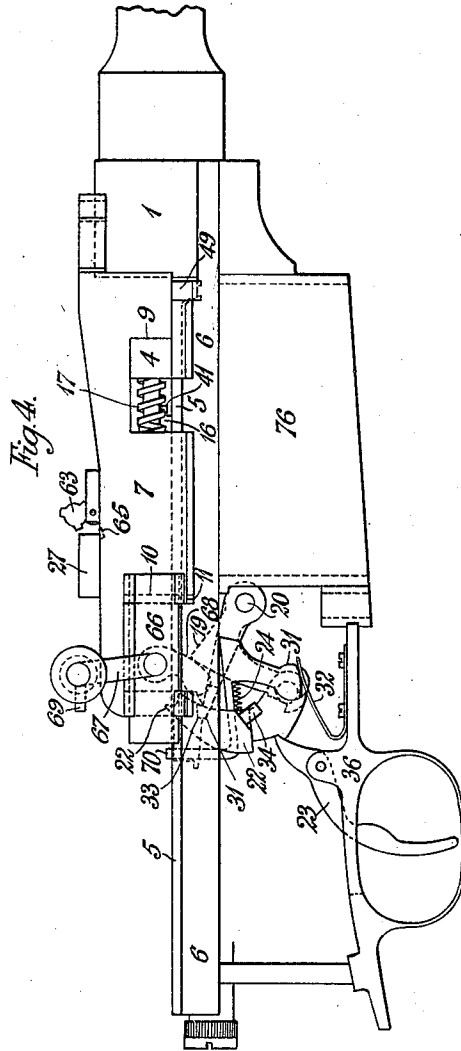
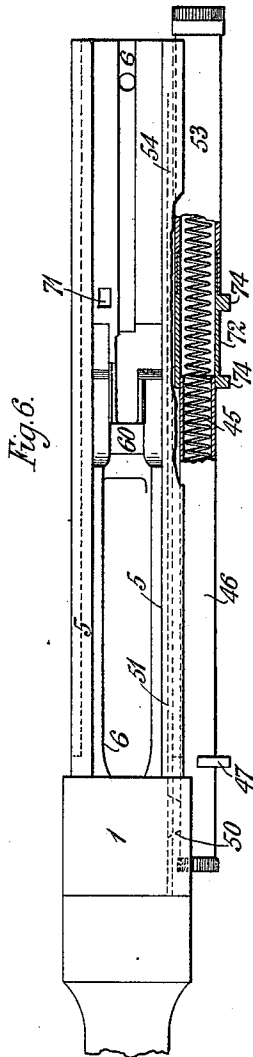
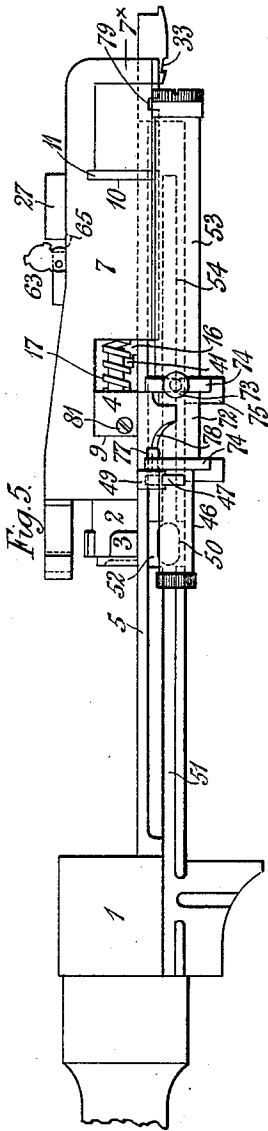
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3 SHEETS—SHEET 2.



Witnesses  
C. B. Frangoni  
M. E. Burkell

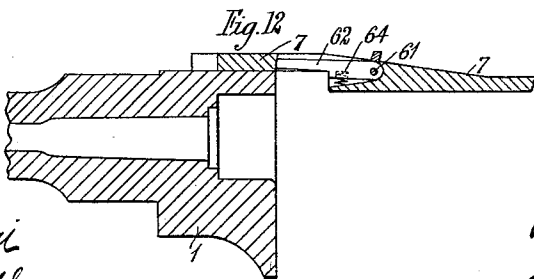
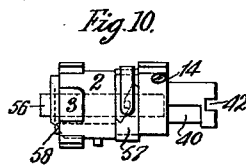
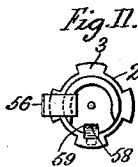
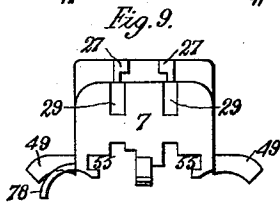
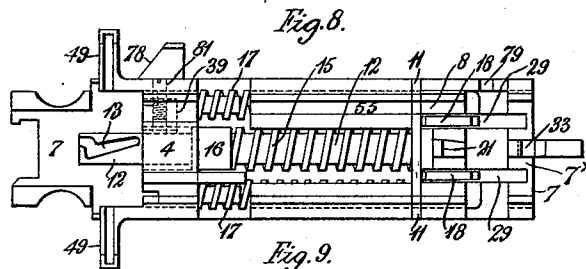
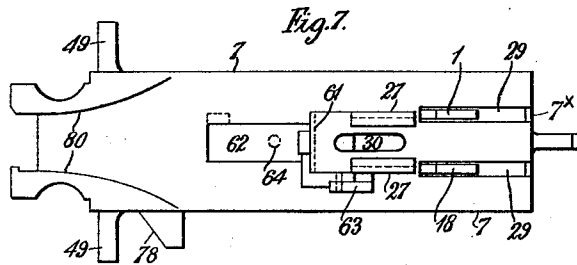
Inventors  
Arnold E. Chevallier  
James Eastwick  
By Otis Attorneys  
Palmer & Nykt

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3 SHEETS—SHEET 3.



Witnesses.  
 C. D. Frangoni  
 M. E. Burrell

Inventors.  
 Arnold S. Chevallier  
 James Eastwick  
 By their Attorneys  
 Pauline Wright

# UNITED STATES PATENT OFFICE.

ARNOLD LOUIS CHEVALLIER, OF ROPLEY, NEAR ALRESFORD, COUNTY OF HANTS, AND  
JAMES EASTWICK, OF FYNING WOOD, PARISH OF ROGATE, COUNTY OF SUSSEX,  
ENGLAND.

## AUTOMATIC SMALL-ARM.

1,001,250.

Specification of Letters Patent. Patented Aug. 22, 1911.

Application filed March 27, 1911. Serial No. 617,306.

*To all whom it may concern:*

Be it known that we, ARNOLD LOUIS CHEVALLIER, residing at Lymington House, Ropley, near Alresford, in the county of Hants, England, and JAMES EASTWICK, residing at Fyning Wood, in the parish of Rogate, in the county of Sussex, England, subjects of the King of Great Britain, have invented new and useful Improvements in Automatic Small-Arms, of which the following is a specification.

The object of this invention is to provide an improved automatic small arm in which the opening and closing of the breech with the attendant operations of extracting and ejecting and inserting a new cartridge shall be effected by the energy of the recoil, this being utilized by means of a heavy cover or inertia block.

In order that the invention may be the more readily understood we will at once describe the drawings accompanying this specification. These drawings illustrate a rifle made in accordance with this invention.

Figures 1, 2 and 3 are longitudinal vertical sections looking from the left. Fig. 1 shows the mechanism ready for firing except that the safety is on: in this figure the bolt is not home but as will be described later the bolt is driven forward and locked by a locking spring when the trigger is pulled and the weapon is immediately fired. The parts are then in the position shown in Fig. 2. Owing to its inertia the heavy cover fails to participate in the recoil of the weapon and the parts therefore assume the positions of Fig. 3. Fig. 4 is a right hand elevation with the parts in the position of Fig. 1. Fig. 5 is a left hand elevation showing the cover, bolt, etc., right back, that is the breech open to its fullest extent. Fig. 6 is a plan of the shoe and Figs. 7 and 8 a plan and underside view and Fig. 9 is a rear view of the cover while Figs. 10 and 11 are side and front views of the bolt and Fig. 12 shows a modification.

1 is the boss of the barrel.

2 is the bolt provided with locking lugs 3 and capable of turning in a carrier 4 which cannot rotate but can move longitudinally on guides 5 formed on the shoe 6.

7 is the inertia cover already referred to; this also is made to fit the guides 5. Its front end overlaps the top of the boss 1 and it is also supported by the bolt carrier 4 and by a crosshead 8 which is attached to the firing pin. The cover is thus supported on either three or four points. The cover is formed with shoulders or stops 9, 10 which in their normal position rest against the front edges of the bolt carrier and crosshead respectively. The cover is thus allowed a backward and forward movement relatively to the bolt while avoiding any tendency to jerk rearward as the bolt closes or is being locked. Further the firing stroke brings the crosshead 8 home against the shoulders 10 of the cover and the abutment 11 carried by it and so aids in steadying the cover against the action of the next recoil. When that recoil takes place the forward lurch of the cover acts in a contrary sense to the pressure on the bolt and so aids in lessening the friction of unlocking.

12 is the firing pin having formed in it grooves 13 in which work studs 14 in the bolt. It is obvious that instead of the grooves on the inside of the bolt may engage studs on the pin.

15 is a locking spring located between the abutment 11 and a collar 16 on the firing pin 12 while 17, 17 are unlocking springs located between the abutment and the bolt carrier 4.

Pivoted on the crosshead 8 are two tumblers 18, 18 adapted to fall behind the abutment 11. These tumblers are preferably linked together so that they move as one.

The trigger gear consists of a sear or lever 19 pivoted on the frame at 20 adapted to engage a bent 21 formed on the crosshead 8. This sear also carries on a pivot at its farther end a bifurcated sear 22 which when the gear is in position before firing engages with and holds the projecting bases of the tumblers 18. The head of the trigger 23 presses against this sear 22. When the trigger is not pressed the sear 22 is kept in its backward position by a spring 24. A sear spring 25 presses against the underside of the sear 19.

In the upper part of the cover we place

a safety device consisting of a plate 26 capable of sliding backward and forward between rabbeted guides 27 and carrying two trippers 28 which project down through slots 29 in the cover. When the safety is on, that is in the position shown in Fig. 1, the trippers are over the tumblers 18 and hold them down and so prevent any action of the gear. In its backward position the trippers leave the tumblers free play; a flat spring 29 carried by the plate holds the latter at either extremity of its travel by engaging with notches 30 cut in the top of the cover.

On the pivot 20 is pivoted a retaining lever 31 urged upward by a spring 32 into engagement with a notch 33 in the underside of the tail of the cover 7 which is thus held immovable in either direction until the trigger is pulled when a lug 34 on the sear 22 presses against the bottom of the retaining lever 31 and pulls it down freeing the cover. This retaining lever not only prevents a rebound of the bolt if it should return while the pressure on the trigger were continued but also prevents accidental discharge due to a jar such for instance as that due to grounding arms.

Pivoted at 35 on the trigger strap 36 is a weighted timing lever 37 adapted when the sear 19 turns down to fall behind and engage a shoulder 38 upon it and hold the sear 19 down until the recoil movement is complete. Such a timing lever may be employed to obviate the results of an involuntary pull. When the trigger is released a lug 231 on it lifts the lever 37.

The action is as follows:—Let us start from the position shown in Fig. 1 in which the locking spring 15 is compressed between the collar 16 and the abutment 11 owing to the fact that the tumblers 18 are down and prevent the crosshead 8 from approaching the abutment, in other words the mechanism is cocked. The safety 26 is drawn backward so that the trippers 28 are no longer above the tumblers and when the trigger 23 is pressed, it first presses forward the sear 22 and so raises the tumblers 18, the sear 22 thus acting as a primary sear. As the tumblers rise above their dead point, this pressure while still acting on the tumblers presses down the sear 19 which is thus free from the bent 21; but until this sear is so freed it holds back the bent and so saves friction on the motion of the tumblers. The lug 34 presses on the bottom of the retaining lever and frees the cover. The spring 15 therefore is now free to extend and as it does so it drives the firing pin forward. The grooves 13 acting on the studs 14 cause the bolt to turn in its carrier 4, such turning movement being also controlled by a segmental clutch 39 in the carrier engaging a groove 40 on the bolt (see Fig. 8). The

bolt is accordingly locked by its lugs 3 engaging corresponding lugs on the interior of the boss 1. The last part of the movement of the firing pin 12 relative to the bolt 2 causes lugs 41 on the collar 16 to enter notches 42 in the bolt and the front of the firing pin impinges on a striker 43 (see Fig. 2) and moves it forward against its spring 44 and so fires. The parts are now in the position shown in Fig. 2. On the recoil the cover 7 remains forward or, looking at it relatively to the rest of the weapon, lurches forward as seen in Fig. 3 compressing the springs 15 and 17, while the rear flange 7<sup>x</sup> of the cover comes against the crosshead and assists in holding the pin 12 forward, that is, assists in obturating. The trippers 28 come against the rear of the tumblers which are thus thrown forward behind the abutment 11, holding it away from the crosshead 8. It may be remarked that the pull of the trigger may be decreased by filing away the rear surface of the abutment where the tumblers engage it. With this arrangement the cover has so long a lurch that the breech is only opened after the pressure in the barrel is at an end. Moreover the cover presses on the bolt carrier and on the firing pin and therefore assists in obturating. The cover 7 and abutment 11 now partake of the recoil movement and are driven backward by the reaction of the unlocking springs 17, and carry the pin 12 back also, the spring 15 remaining compressed between the abutment 11 and the collar 16. This motion of the pin draws the grooves 13 past the studs 14 which are thus rotated and the bolt 2 is turned so as to free the lugs 3, the screw form of these lugs causing a slight backward movement which effects the primary extraction. The bolt being now unlocked travels backward compressing the closing spring 45 and the intermediate operations of extracting, ejecting and inserting a new cartridge are performed. The closing spring is contained in a telescoping case seen in Figs. 5 and 6. The sliding member 46 of the case is attached to the bolt carrier 4 by means of a stud 47 on the case which enters into and engages a slot 48 cut in the underside of a claw 49 formed on or attached to the bolt carrier 4. A second stud 50 on the case 46 slides in an undercut groove 51 milled out of the shoe and prevents the member rotating except at one spot. In ordinary working no rotation can take place in the sliding member and so long as there is no rotation the first stud remains engaged in the slot and the attachment to the bolt carrier is intact. But if it be desired to disperse, the cover is drawn back until the stud 50 reaches the point 52. Then the sliding case 46 is rotated by hand until the stud 47 is clear of the slot 48 and the bolt carrier is freed from the spring.

The bolt and all its gear can then be removed and the sliding member 46 can be drawn out forward. The rear or fixed member 53 of the case is secured to the shoe by a feather or lug 54 which likewise enters the groove 51. The spring 45 drives the bolt and cover forward again but the tumblers 18 remain in their forward position preventing the pin 12 from moving forward relatively to the abutment 11 and keeping the spring 15 compressed. This all takes place practically instantaneously and before the pressure on the trigger has been relaxed. When the pressure on the trigger is removed the springs 24, 25 restore the trigger gear to its normal position. But the spring 24 acting on a point close to the pivot and therefore through a small arc acts first so that when the trigger is released the sear 22 always rises to its normal position with its teeth fully back and thus they are not caught and held down by the underside of the tumblers. The normal function of this sear 22 when at rest is in fact that of a primary retaining lever; its shape is such that if any longitudinal pressure is imparted to the bolt when the tumblers are in the forward position the effect is to press the tumblers downward not upward and so to tend to retain them in their forward position. The ribs 55 on the cover which travel along the guides 5 prevent the sear 22 from rising when the cover is traveling back and forward should the pressure on the trigger be relaxed before the travel of the cover is finished. The parts therefore return to the position shown in Fig. 1.

The extractor 56 is carried by a split ring 57 on the bolt. This is shown in Figs. 10 and 11 but not in other figures. The ejector 58 (also shown in Figs. 10 and 11 only) works in a slot 59 cut in the bottom of the bolt. As the bolt moves back the tail of the ejector comes against a projection 60 on the shoe; the ejector is thus moved sharply forward and throws forward the empty cartridge case which the bolt and extractor are carrying back. The underside of the front of the ejector is beveled so that the topmost part of the rim of the next cartridge as it rises from the magazine pushes the ejector back into the bolt ready to act again.

In order that we may be able to use the weapon as a hand operated arm we pivot to the cover at 61 an arm 62 working vertically in a slot cut in the cover and capable of dropping behind the bolt carrier 4. The arm has pivoted to its rear end a catch 63 (see Figs. 4, 5 and 7) and a spring 64 beneath the arm tends to throw it up into the position in which it is seen in Figs. 1, 2 and 3 and in which it passes backward and forward over the top of the bolt carrier but when the catch 63 is turned down by hand to engage a notch 65 in the cover the

front end of the arm is forced down owing to the shape of the catch and comes behind the rear face of the bolt carrier preventing the forward lurch of the cover and so stopping the automatic working of the piece. This arm might be arranged to engage with the rear face of the boss instead of with the bolt carrier as shown in Fig. 12.

For hand working we pivot in a side plate or slide 66 (see Fig. 5) fast with the cross-head 8 a hand lever 67 which has fast upon it a cam 68 adapted to engage the rear face of the abutment 11. As the soldier pulls the top of this hand lever toward him the cam working against the abutment forces the crosshead rearward, that is to say, withdraws the firing pin and therefore rotates and unlocks the bolt. As seen in Fig. 4 the crosshead is already drawn rearward from the abutment and there is therefore a gap between the cam and the abutment. An arm 69 on the hand lever 67 now comes against a finger 70 which is carried by an extension of the retaining lever 31 which passes rearward through the sear 22, the finger passing up through a slot 71 in the shoe. The arm 69 presses upon this finger and not only disengages the retaining lever 31 from its notch 33 but also depresses the sear 22 so that the cover with all it carries is free to move rearward as the soldier pulls the hand lever toward him.

The rear or fixed member 53 of the case of the closing spring carries on its forward part a rotary sleeve 72 fitted with a handle 73 by which it can be turned on the member 53. Normally this handle is down and two segmental lugs 74 bed in or butt against lugs 75 on the shoe. The object of this sleeve is as follows:—When the magazine 76 is empty the platform (not shown) rises and holds the bolt 2 with its head projecting over the clip space. Then if the handle 73 be raised and the sleeve 72 rotated, a stud 77 upon it engages an incline 78 on the bolt carrier 4 and forces back the bolt and its gear to its rearmost position as shown in Fig. 5 and locks it there. On the handle being replaced the stud 77 is withdrawn and the bolt goes forward again.

We may provide in the rear end of the cover 7 a notch 79 in such a position that when the cover is forward, this notch will align with the forward lug 74 on the sleeve 72, so that by turning up the handle 73, the cover will be locked; the sleeve 72 thus acting as a safety.

On the forward upper surface of the cover 7 we may arrange guiding ribs 80 which in the dark assist the soldier to pass the clip into the clip guide way. These guiding ribs are shown only in Fig. 7.

We have already shown how to free the bolt carrier from the spring 45; when it is desired to remove the bolt from its carrier,

the segmental clutch 39 already referred to is withdrawn from the groove 40 by the screw 81 which may be fitted with a spring if desired; the bolt can then be turned so that its studs 14 move along the straight portions of the grooves 13 and then the bolt can be drawn rearward clear of the firing pin.

What we claim is:—

1. In an automatic small arm, the combination of a bolt, an axial firing pin, a heavy cover free to slide relatively to the bolt and pin, and a flange on the cover adapted to press on the rear end of the firing pin when the cover is in its forward position.

2. In an automatic small arm, the combination of a bolt, an axial firing pin, a heavy cover free to slide relatively to the bolt and pin, a flange on the cover adapted to press on the rear end of the firing pin when the cover is in its forward position and shoulders on the cover adapted to limit the movement of the cover relative to the bolt and pin.

3. In an automatic small arm, the combination of a bolt, an axial firing pin, a heavy cover free to slide relatively to the bolt and pin, a crosshead on the pin, a tumbler pivoted on the crosshead, a pivoted sear adapted to engage the crosshead, a sear pivoted to the first sear and adapted to engage the tumbler, a spring adapted to hold the sears in engagement and means for releasing the sears.

4. In an automatic small arm, a heavy cover free to lurch forward on recoil relatively to the weapon and an arm pivoted to the cover and adapted to butt against some part of the weapon and so to prevent such lurch.

5. In an automatic small arm, the combination of a bolt, an axial firing pin, a heavy cover free to lurch forward relatively to the bolt and pin, and an arm pivoted to the cover and adapted to butt against the bolt carrier and so to prevent such lurch.

6. In an automatic small arm, the combination of a bolt, an axial firing pin, a heavy cover free to slide relatively to the bolt and pin and having a notch in its underside, a sear adapted to engage the firing pin, a trigger adapted to actuate the sear, a retaining lever adapted to engage the notch in the cover and means actuated by the trigger for withdrawing the lever from the notch, a crosshead on the pin, a tumbler pivoted on the crosshead, a pivoted sear adapted to engage the crosshead, a sear pivoted to the first sear and adapted to engage the tumbler, a spring adapted to hold the sears in engagement and means for releasing the sears.

7. In an automatic small arm, the combination of a bolt, an axial firing pin, a

heavy cover free to slide relatively to the bolt and pin and having a notch in its underside, a crosshead on the firing pin, a tumbler pivoted on the cross head, a pivoted sear adapted to engage the crosshead, a second sear pivoted to the first and adapted to engage the tumbler, a trigger adapted to actuate the sears, a retaining lever adapted to engage the notch in the cover and a lug upon the second sear adapted to press upon the lever and withdraw it from the notch.

8. In an automatic small arm, the combination of a bolt, an axial firing pin, a heavy cover free to slide relatively to the bolt and pin, a crosshead on the pin, a tumbler pivoted on the crosshead, a pivoted sear adapted to engage the crosshead, a sear pivoted to the first sear, and adapted to engage the tumbler, a spring adapted to hold the sears in engagement, a second spring tending to keep the two sears apart and a trigger adapted to press upon the second sear.

9. In an automatic small arm, the combination of a cylindrical bolt, an axial firing pin therein, a heavy cover free to slide relatively to the bolt, an unlocking spring between the cover and the bolt, a locking spring between the cover and the pin, a tumbler pivoted on the pin and adapted to engage the cover and retain the locking spring compressed, a trigger for controlling the tumbler and a safety device sliding in the cover and adapted to hold down the tumbler.

10. In an automatic small arm, the combination of a cylindrical bolt, an axial firing pin therein, a heavy cover free to slide relatively to the bolt, an unlocking spring between the cover and the bolt, a locking spring between the cover and the pin, a tumbler pivoted on the pin and adapted to engage the cover and retain the locking spring compressed, a pivoted sear adapted to engage the pin, a second sear pivoted to the first sear and adapted to engage the tumbler, a spring adapted to hold the sears in engagement, a second spring tending to keep the two sears apart and a trigger adapted to press upon the second sear.

11. In an automatic small arm, the combination of a bolt, an axial firing pin, a heavy cover free to slide relatively to the bolt and pin, a crosshead on the pin, a lever pivoted on the crosshead, and a cam fast with the lever and adapted to engage the cover.

12. In an automatic small arm, the combination of a cylindrical bolt, a bolt carrier, a spring adapted to close the bolt, and two cylindrical casings adapted to contain the spring, the rear casing being fixed while the forward casing is secured to the bolt carrier and slidable in the rear casing.

13. In an automatic small arm, the combination of a cylindrical bolt, a bolt carrier, a spring adapted to close the bolt, two cylindrical casings adapted to contain the spring, the rear casing being fixed while the forward casing is secured to the bolt carrier and slidable in the rear casing, a sleeve that can turn on but not move along the rear casing, an incline on the bolt carrier and a lug on the sleeve adapted to engage the incline. 10

ARNOLD LOUIS CHEVALLIER.  
JAMES EASTWICK.

Witnesses:

ROBERT B. RANSFORD,  
JOHN H. WHITEHEAD.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

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