

N^o 25,656



A.D. 1905

Date of Application, 9th Dec., 1905

Complete Specification Left, 3rd July, 1906—Accepted, 27th Sept., 1906

PROVISIONAL SPECIFICATION.

"Improvements relating to the Breech Mechanism of Automatic Fire Arms".

We, the MARS AUTOMATIC PISTOL SYNDICATE LIMITED, of 37 Newhall Street, Birmingham, and CLEMENT BROWN, Engineer, of 154 Trinity Road, Aston, Birmingham, both in the County of Warwick, do hereby declare the nature of this invention to be as follows:—

- 5 This invention has reference to the breech mechanism of automatic fire arms and especially to the breech mechanism of automatic pistols of the kind referred to in the Specification of a prior Patent No. 14777 of the year 1900, granted to Hugh William Gabbett Fairfax, in which the barrel and breech block or bolt recoil together against the resistance of springs and in
10 which said bolt, after becoming unlocked, remains held retracted while the barrel advances towards its firing position and opens the breech, a cartridge having been previously withdrawn rearwardly from the magazine during the recoil of the barrel and bolt and placed upon a lifting device which, as the breech opens, raises the said cartridge into a position to be pushed into the
15 barrel by the bolt when the latter is released and permitted to advance in closing the breech. In the aforesaid prior specification the cartridge lifting device comprised a tray into which the cartridges were placed by lugs on the bolt-sleeve or the barrel as the latter recoiled. This tray was capable of sliding in the forked arms of a lifting lever which was pivoted to the bolt-sleeve and
20 adapted to lie in the path of the hammer-head when the latter was cocked. The hammer was capable of a certain amount of return movement or "back lash" for the purpose of raising the lifting lever and tray, when the breech was opened, and of bringing the cartridge into the path of the breech bolt as it advanced to close the breech.
- 25 According to one part of the present invention, the aforesaid sliding tray is dispensed with and the withdrawal of the cartridge is effected initially by the aforesaid lugs on the bolt-sleeve and subsequently by a hinged device forming part of the bolt and provided with resilient or spring controlled jaws or arms that are opened by means of a wedge-shaped piece or cam, said jaws or arms
30 gripping said cartridge as the device moves rearwardly during the recoil, thus completing the removal of the said cartridge from the magazine. During the return or advance movement of the breech-bolt, the said device operates to bring the said cartridge into the path of the bolt, and, by the latter, it becomes thrust into the barrel, the said device then moving from the path of the bolt
35 by the action of an inclined portion thereon striking the hammer.
- In the aforesaid prior specification, also, the lock mechanism was furnished with a spring controlled detent which, on the recoil of the barrel and bolt after firing, was raised into the path of a sliding plate on the bolt-sleeve. The said detent thus held this sliding plate stationary while the bolt, bolt sleeve and
40 barrel moved forward a short distance, *i.e.* sufficient to unlock the bolt from the barrel so that the latter was able to advance to its firing position without the bolt and thereby open the breech. The detent remained in this stopping position until the trigger was released after firing, whereupon the detent-spring returned the trigger to its original position and in so doing depressed the detent.

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Improvements relating to the Breech Mechanism of Automatic Fire Arms.

from the path of the sliding plate, thus permitting the bolt to advance and close the breech. For thus depressing the detent, the trigger had a pivoted arm which was hooked at its free end to engage with a tail of the detent. This arm had an inclined surface which operated in conjunction with a fixed pin and a spring to trip the sear as it moved rearwardly, thus liberating the hammer when the trigger was pulled to fire the pistol. The sear also had a spring which, as the said arm became disengaged from the sear after tripping it, caused the sear to resume its engaging position relatively to the notch in the hammer.

According to another part of the present invention we use only one spring which will serve the trigger, the detent, and the sear, so as to overcome the liability of said detent giving way under the blow of the forward movement of the bolt and thereby failing to perform its stopping function with respect to said bolt, as sometimes occurred with the previous arrangement in which a separate spring was used for the detent. The necessity of the disengagement of the arm with the sear is also avoided, so that the objectionable clicking noise which arose in the previous arrangement, owing to the re-engagement of said arm with the sear on the release of the trigger, is prevented.

We make the rear part of the said pivoted arm with two inclines one of which operates on an inclined tail of the sear when the trigger is pulled to fire the pistol and the other of which operates upon an inclined or cam piece of the detent. For convenient identification we term these inclines respectively the tail-sear incline and the detent-cam incline. The said pivoted arm also has a lug which lies behind the tail of the said detent. One end of the sear spring rests upon the floor of the lock casing and the other end presses against a nose on the sear. When the trigger is pulled, the detent-cam incline of the pivoted arm is caused to press against the inclined piece of the detent and the tail-sear incline is caused to press against the tail of the sear. As the detent is prevented from moving, by reason of the lateral arms or sides of the bolt-sleeve lying above it, the detent-cam incline simply slides slightly downward upon the inclined piece of the detent; but as the sear is only restrained from moving by the pressure of the sear spring, the latter is overcome and the sear tripped, whereby the hammer is released and flies forward to fire the cartridge. The barrel and breech-bolt then recoil together, and, as they reach the end of their recoil and the sides of the bolt-sleeve move from above the detent, the latter promptly assumes its stopping position in front of the sliding plate, by the pressure exerted on the inclined piece of the detent by the detent-cam incline, the trigger still being pulled. The extent to which the sear can move in becoming disengaged from the hammer is limited by its coming against a rigid part of the pistol-body, so that it cannot give way under the pressure exerted on it by the pull of the trigger transmitted through the aforesaid pivoted arm. When the trigger is released, the inclined tail of the sear (under the action of the sear spring) returns the pivoted arm and the trigger to their normal position, and in so doing brings the projection or lug on said arm, against the tail of the detent and causes the latter to assume its lowered or disengaging position, whereby the sleeve carrying the breech bolt is liberated and permitted to advance towards the barrel and close the breech. The movements of the said detent and sear are so timed relatively to each other, that the sear engages with the hammer prior to the complete disengagement of the detent from the breech bolt.

According to another part of the present invention we provide means to prevent the premature liberation of the breech bolt by the aforesaid detent in the event of the trigger being released before the barrel has fully regained its firing position. For this purpose we provide the trigger with an arm or extension which supports a pin or the like adapted to slide in a direction transverse with respect to the movement of the barrel. The barrel has near its breech end a recess which lies immediately opposite said pin when the barrel reaches its

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fully advanced position, thus permitting said pin to rise and the trigger to assume its normal position, with the consequent liberation of the breech bolt by the detent. If, however, the barrel has not fully regained its firing position, when the trigger is released, the said recess does not lie opposite the pin and therefore the latter cannot move to permit the trigger to assume its normal position until the barrel completes its forward movement.

Dated this 9th day of December, 1905.

HASELTINE, LAKE & Co.,
7 & 8 Southampton Buildings, London, W.C.
Agents for the Applicants.

COMPLETE SPECIFICATION.**"Improvements relating to the Breech Mechanism of Automatic Fire Arms".**

We, the MARS AUTOMATIC PISTOL SYNDICATE LIMITED, of 37, Newhall Street, Birmingham, and CLEMENT BROWN, Engineer, of 154, Trinity Road, Aston, Birmingham, both in the County of Warwick, do hereby declare the nature of this invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement:—

This invention has reference to fire arms and especially to automatic pistols of the kind referred to in the Specification of a prior Patent No. 14777 of the year 1900 granted to Hugh William Gabbett Fairfax, in which the barrel and breech block or bolt recoil together against the resistance of springs and in which said bolt, after becoming unlocked, remains held retracted while the barrel advances towards its firing position and opens the breech, a cartridge having been previously withdrawn rearwardly from the magazine during the recoil of the barrel and bolt and placed upon a lifting device which, as the breech opens, raises the said cartridge into a position to be pushed into the barrel by the bolt when the latter is released and permitted to advance in closing the breech. In the aforesaid prior specification, the cartridge lifting device comprised a tray into which the cartridges were placed by lugs on the bolt-sleeve or the barrel as the latter recoiled. This tray was capable of sliding in the forked arms of a lifting lever which was pivoted to the bolt-sleeve and adapted to lie in the path of the hammer-head when the latter was cocked. The hammer was capable of a certain amount of return movement or "back lash" for the purpose of raising the lifting lever and tray, when the breech was opened, and of bringing the cartridge into the path of the breech bolt as it advanced to close the breech.

According to one part of the present invention, the aforesaid sliding tray is dispensed with and the withdrawal of the cartridge is effected initially by the aforesaid lugs on the bolt-sleeve and subsequently by a hinged device forming part of the bolt and provided with resilient or spring controlled jaws or arms that are opened by means of a wedge-shaped piece or cam, said jaws or arms gripping the cartridge as the device moves rearwardly during the recoil, thus completing the removal of the said cartridge from the magazine. During the return or advance movement of the breech-bolt, the said device operates to bring the said cartridge into the path of the bolt, and, by the latter, it becomes thrust into the barrel, the said device then moving from the path of the bolt by the action of an inclined portion thereon striking the hammer.

Improvements relating to the Breech Mechanism of Automatic Fire Arms.

In the aforesaid prior specification also, the lock mechanism was furnished with a spring controlled detent which, on the recoil of the barrel and bolt after firing, was raised into the path of a sliding plate on the bolt sleeve. The said detent thus held this sliding plate stationary while the bolt, bolt sleeve and barrel moved forward a short distance, *i.e.* sufficient to unlock the bolt from the barrel so that the latter was able to advance to its firing position without the bolt and thereby open the breech. The detent remained in this stopping position until the trigger was released after firing, whereupon the detent-spring returned the trigger to its original position and in so doing depressed the detent from the path of the sliding plate, thus permitting the bolt to advance and close the breech. For thus depressing the detent, the trigger had a pivoted arm which was hooked at its free end to engage with a tail of the detent. This arm had an inclined surface which operated in conjunction with a fixed pin and a spring to trip the sear as it moved rearwardly, thus liberating the hammer when the trigger was pulled to fire the pistol. The sear also had a spring which, as the said arm became disengaged from the sear after tripping it, caused the sear to resume its engaging position relatively to the notch in the hammer.

According to another part of the present invention we use only one spring which will serve the trigger, the detent and the sear, so as to overcome the liability of said detent giving way under the blow of the forward movement of the bolt and thereby failing to perform its stopping function with respect to said bolt, as sometimes occurred with the previous arrangement in which a separate spring was used for the detent. The necessity of the disengagement of the arm with the sear is also avoided, so that the objectionable clicking noise which arose in the previous arrangement, owing to the re-engagement of said arm with the sear on the release of the trigger, is prevented.

Another feature of the present invention is a device for preventing the premature liberation of the bolt by the said detent in the event of the trigger being released before the barrel has fully regained its firing position.

In order that the invention may be clearly understood and readily carried into effect we will proceed to describe the same more fully with reference to the accompanying drawings, in which:—

Figures 1, 2 and 3 are vertical sections of the rear part of an automatic pistol with our improved cartridge elevating device applied thereto. Figure 1 represents the parts in the position they occupy just when the trigger has been pulled and the pistol fired, but before recoil. Figure 2 represents the parts in the position they occupy when the trigger is still being pulled but after recoil, the barrel having returned to its firing position and the breech bolt being retained in its recoiled position. Figure 3 represents the parts in the position they occupy when the trigger has been released and the breech bolt is advancing to close the breech.

Figures 4 and 5 are plans of the cartridge elevator shewn separately and indicating how the resilient members thereof engage with a cartridge during the recoil; Figure 4 representing said members in their open position relatively to the cartridge, and Figure 5 representing them in their closed position relatively to the cartridge.

Figure 6 is a side elevation, Figure 7 a plan, Figure 8 a front end view, and Figure 9 an underside view of the cartridge elevator shown detached.

Figures 10 and 11 are cross sections taken respectively on the lines 1—1 and 2—2 of Figure 6.

Figures 12 and 13 are plans similar to Figures 4 and 5, but show a modified form of the cartridge elevator, in which the resilient members depend upon a spiral spring for their resiliency.

Figures 14, 15 and 16 are sectional side elevations of an automatic pistol provided with our improved lock-mechanism; Figure 14 shows the parts in the position they occupy when the hammer is cocked and the pistol ready for

Improvements relating to the Breech Mechanism of Automatic Fire Arms.

firing; Figure 15 shows the position of the parts when the trigger has been pulled and the pistol fired; and Figure 16 shows the position of the parts when the barrel and breech bolt have recoiled and the barrel has returned to the firing position, the pull on the trigger by the firer being still maintained so that the detent is not yet released to permit the bolt to advance and close the breech.

Figure 17 is a detail view shewing the main parts of the improved lock-mechanism on an enlarged scale and in the position indicated in Figure 14.

A is the barrel. B is the pistol-body. C is the rotary portion of the breech bolt, and D the bolt-sleeve carrying said rotary portion. E is the crank-lever pivoted to the bolt-sleeve and having one arm engaging with a stud or pin *c* of the rotary bolt for angularly displacing the latter to unlock it from the barrel, when the other arm of said crank-lever is acted upon by the sliding plate F on the release of the latter by the detent G as fully explained in the specification of the aforesaid prior patent. H is the hammer, I is the trigger and I¹ the pivoted arm that extends rearwardly therefrom to the firing sear H¹. J is the cartridge magazine and K is the hinged cartridge elevator.

The said cartridge elevator comprises a pair of laterally resilient or spring arms *k k* which extend forwardly from a suitable base *k*¹ pivotally connected at *k*² with the bolt sleeve and having, on the underside, pieces *k*³ *k*³ engaging with a suitable cam *k*⁴ fixed to the pistol-body. When the breech is closed, this cam keeps the spring arms *k* of the cartridge elevator open, and in a position to embrace the rim or base of the uppermost cartridge in the magazine (Figure 4). On the recoil, the aforesaid lugs on the bolt-sleeve push said uppermost cartridge from the magazine and, as the elevator reaches a position in which the spring arms *k* leave the wedge *k*⁴ (see Figure 5), the said cam permits the spring arms to grip said cartridge and complete its withdrawal rearwardly, the said elevator being caused to turn upwardly about its pivotal connection *k*², to bring the cartridge into the path of the bolt, by the action of the hammer (due to its free movement or back lash) on the inclined part *k*⁵ as shown at Figure 2. Then on the advance of the bolt, the inclined portion *k*⁶ of the elevator strikes against the hammer (see Figure 3) after the forward end of the cartridge has entered the breech chamber of the pistol, whereby the elevator is caused to descend, thus liberating the base of the cartridge from the spring arms *k* and permitting the advancing bolt to complete the insertion of the cartridge into the breech chamber. At the same time that the completion of the insertion of the cartridge is taking place, the spring arms *k* are re-opened by the cam *k*⁴ which has its rear end wedge-shaped as shown in Figures 4 and 5. The said arms *k* therefore again resume their open position ready to embrace the base of the next uppermost cartridge in the magazine at the next discharge and recoil so that said cartridge can be withdrawn as already explained.

Instead of making the said spring-arms *k* in one piece with the body of the elevator and dependent upon the elasticity of the metal for their resiliency we may make them separate from the body, as shown in Figures 12 and 13, and connect them with the latter by pegs *k*⁷ *k*⁷ and a spiral spring *k*⁸ which tends to keep said arms pressed towards each other as shown in Figure 13. We do not however desire to limit ourselves to any specific form and construction of the said device so long as it has resilient arms controlled by a fixed wedge-shaped cam.

The rear part of the pivoted arm I¹ has two inclines *i*¹ *i*² (see Figure 17), one of which (*viz.*, *i*¹) operates on the inclined tail *h*¹ of the sear H¹ when the trigger is pulled to fire the pistol, and the other of which (*viz.*, *i*²) operates upon an inclined or cam piece *g* of the detent G. The said pivoted arm I¹ also has a lug *i* which lies behind the tail *g*¹ of the said detent. I² is the sear spring one end of which rests upon the floor of the lock casing and the other end presses against the nose *h*² of the sear. When the parts are in the position

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represented in Figure 14 and the trigger is pulled, the incline i^2 of the pivoted arm I^1 is caused to press against the inclined piece g of the detent G and the incline i^1 is caused to press against the tail h^1 of the sear. As the detent G is prevented from moving, by reason of the lateral arms or sides of the bolt-sleeve D , (in one of which the sliding plate F works) lying above it, the incline i^2 simply slides slightly downward upon the inclined piece g ; but as the sear is only restrained from moving by the pressure of the spring I^2 the latter is overcome and the sear tripped, whereby the hammer is released and flies forward to fire the cartridge. The barrel and breech-bolt then recoil together, and, as they reach the end of their recoil and the sides of the bolt-sleeve move from above the detent G , the latter promptly assumes its stopping position in front of the sliding plate F , as represented in Figure 16, by the pressure exerted on the inclined piece g of the detent by the incline i^2 , the trigger still being pulled. The extent to which the sear can move in becoming disengaged from the hammer is limited by its coming against a rigid part of the pistol-body, so that it cannot give way under the pressure exerted on it by the pull of the trigger transmitted through the arm I^1 . When the trigger is released, the inclined tail h^1 of the sear (under the action of the spring I^2) returns the pivoted arm I^1 and the trigger to their normal position, and in so doing brings the projection or lug i on said arm, against the tail g^1 of the detent and causes the latter to assume its lowered or disengaging position, whereby the sleeve carrying the breech bolt is liberated and permitted to advance towards the barrel and close the breech. The movements of the said detent and sear are so timed relatively to each other, that the sear engages with the hammer prior to the complete disengagement of the detent from the breech block.

In order to prevent the premature liberation of the breech bolt by said detent in the event of the trigger being released before the barrel has fully regained its firing position, we provide the trigger with an arm or extension I^3 which supports a pin I^4 or the like adapted to slide in a direction transverse with respect to the movement of the barrel. The barrel has near its breech end a recess a , which lies immediately opposite said pin I^4 when the barrel reaches its fully advanced position (Figure 14), thus permitting said pin to rise and the trigger to assume its normal position, with the consequent liberation of the breech bolt by the detent. If, however, the barrel has not fully regained its firing position, when the trigger is released, the said recess a does not lie opposite the pin and therefore the latter cannot move to permit the trigger to assume its normal position until the barrel completes its forward movement.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim in connection with automatic fire arms is:—

1. A cartridge elevating or lifting device in which the initial withdrawal of the uppermost cartridge from the magazine is effected by lugs on the bolt-sleeve, and the completion of the withdrawal is effected by the joint action of the said lugs and resilient or spring controlled arms on said device, which arms, during the last part of the breech closing movement, are opened or expanded by the action of a fixed wedge-shaped cam, so as to lie on opposite sides of said uppermost cartridge and are permitted to contract and grip said cartridge as they are moved away from the said cam during the recoil, for the purposes specified.

2. Lock mechanism in which the bolt-retaining detent is moved into its stopping position by the pull on the trigger acting through inclines on the trigger arms, co-operating with inclines on the sear and the detent respectively, so that the resistance presented by the detent to the movement of the breech bolt is independent of spring pressure and cannot be unintentionally overcome by the bolt substantially as described.

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3. In lock mechanism of the kind referred to in Claim 2, a loose pin situated between the arm of the trigger and the barrel, which pin is kept depressed by the barrel until it assumes its completely advanced position, whereupon said pin is liberated and permitted to enter a recess in the barrel when the trigger
5 is released, thus ensuring that unless the barrel has fully returned to its firing position after recoil the fire arm cannot be fired substantially as described.
4. Breech mechanism having its parts constructed arranged and adapted to operate substantially as hereinbefore described with reference to the accompanying drawings for the purposes specified.

10 Dated this 3rd day of July, 1906.

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7 & 8 Southampton Buildings, London, W.C.
Agents for the Applicants.

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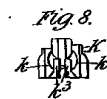
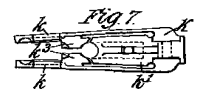
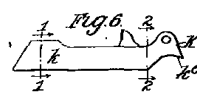
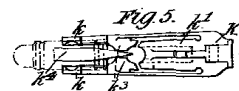
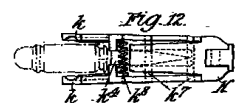
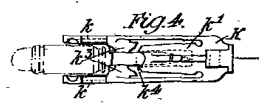
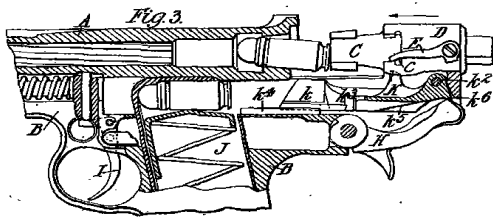
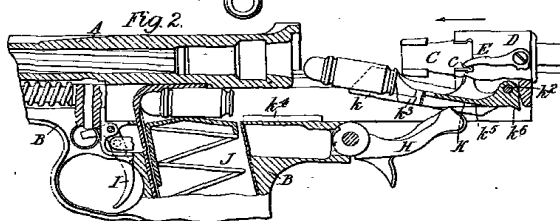
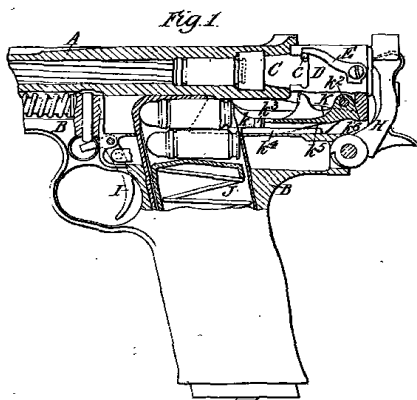


Fig. 1.

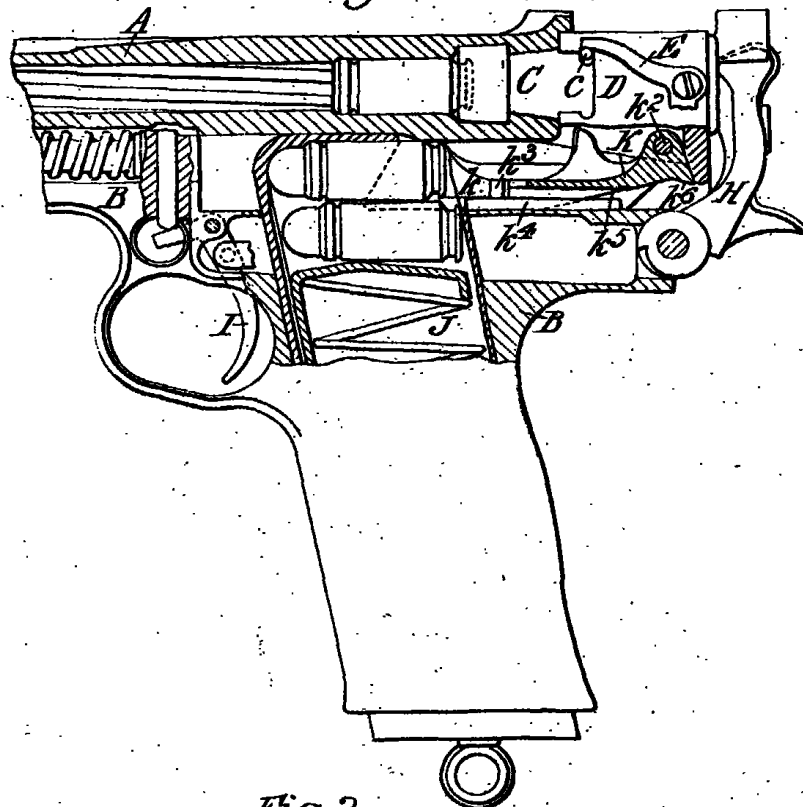


Fig. 2.

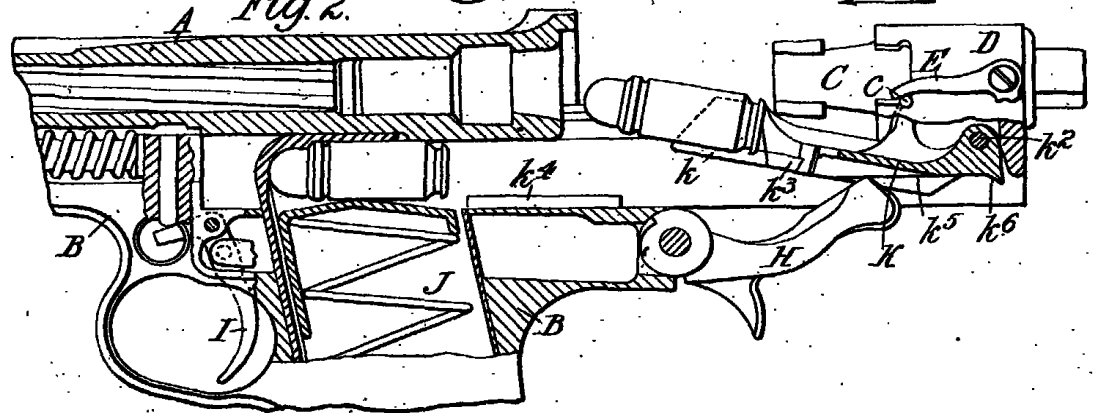
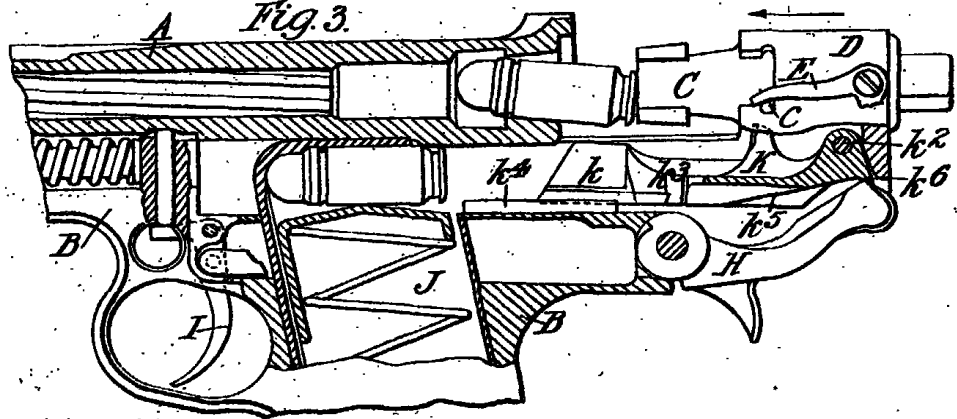
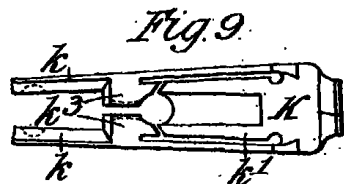
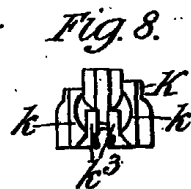
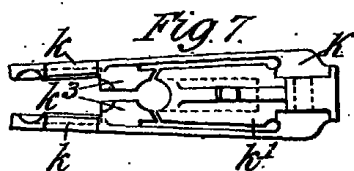
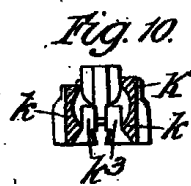
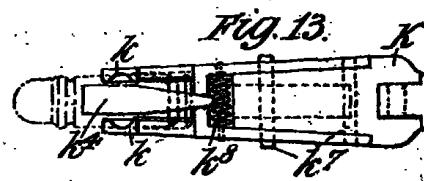
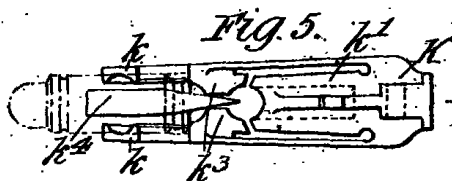
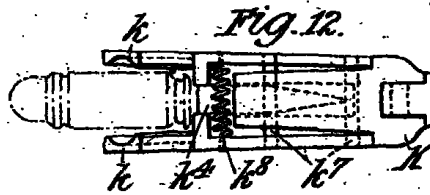
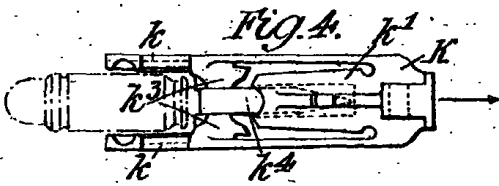


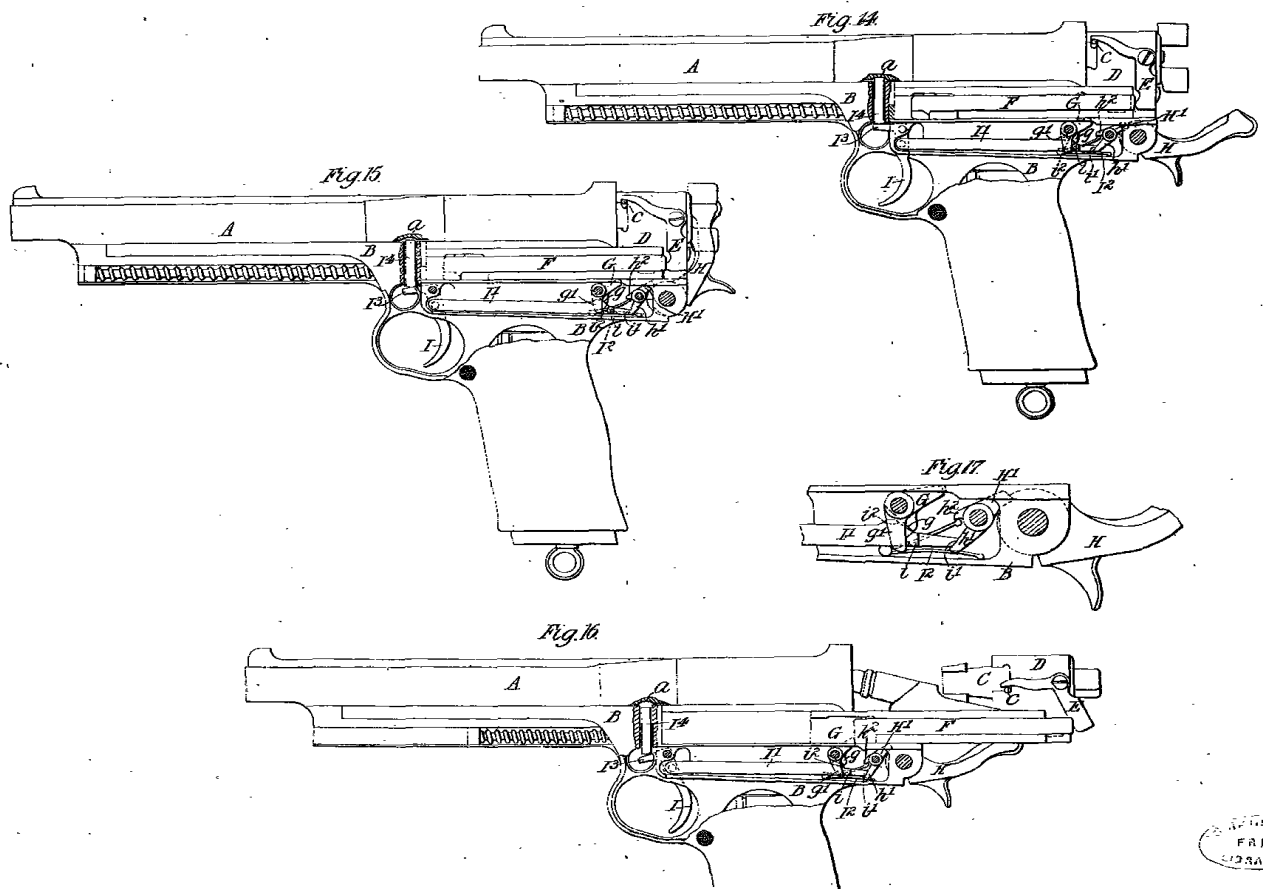
Fig. 3.



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THE MARS AUTOMATIC PISTOL SYNDICATE & another's COMPLETE SPECIFICATION.

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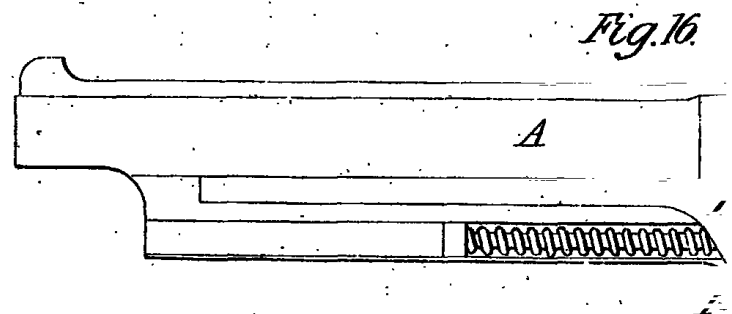
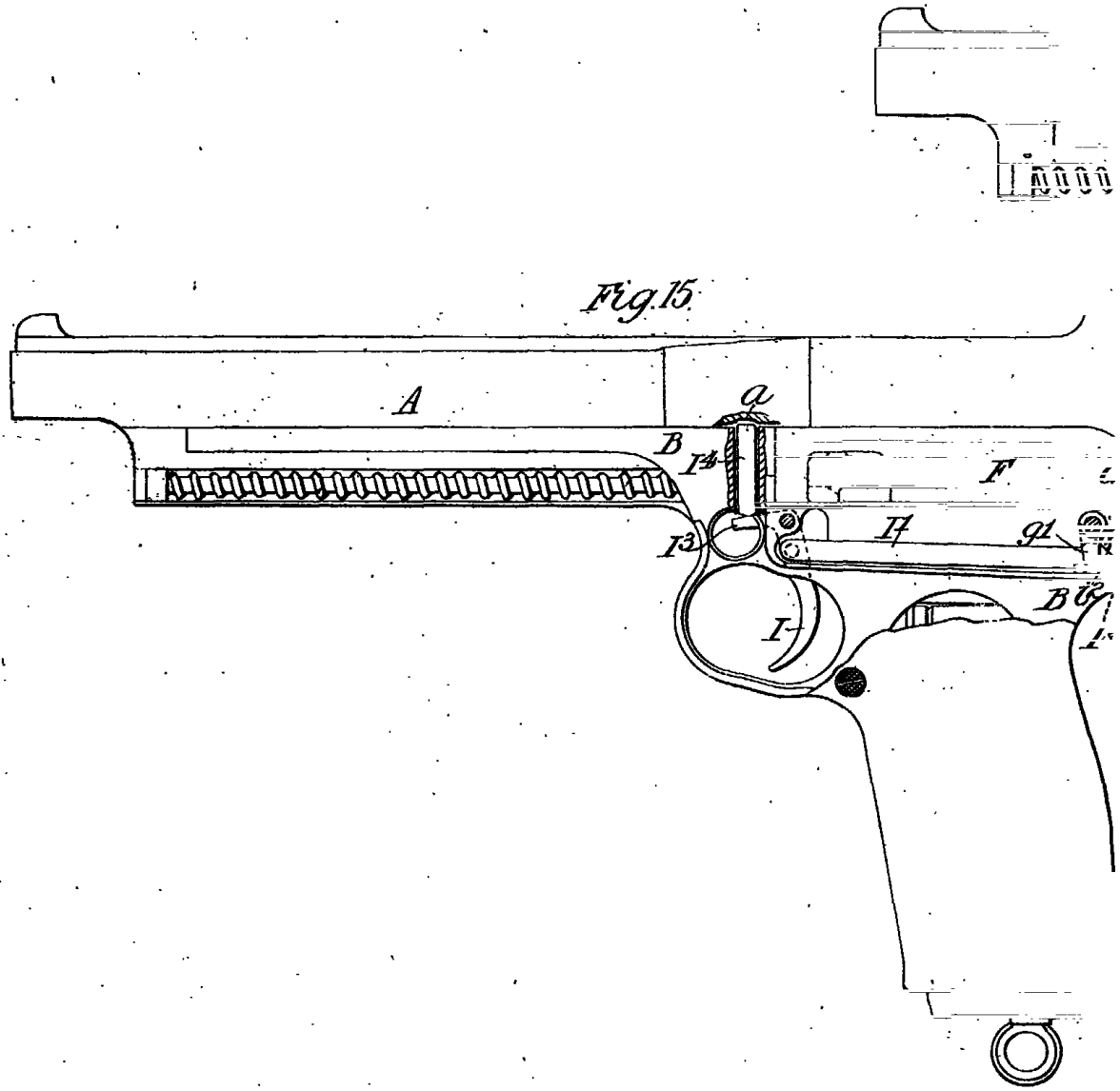


Fig. 14.

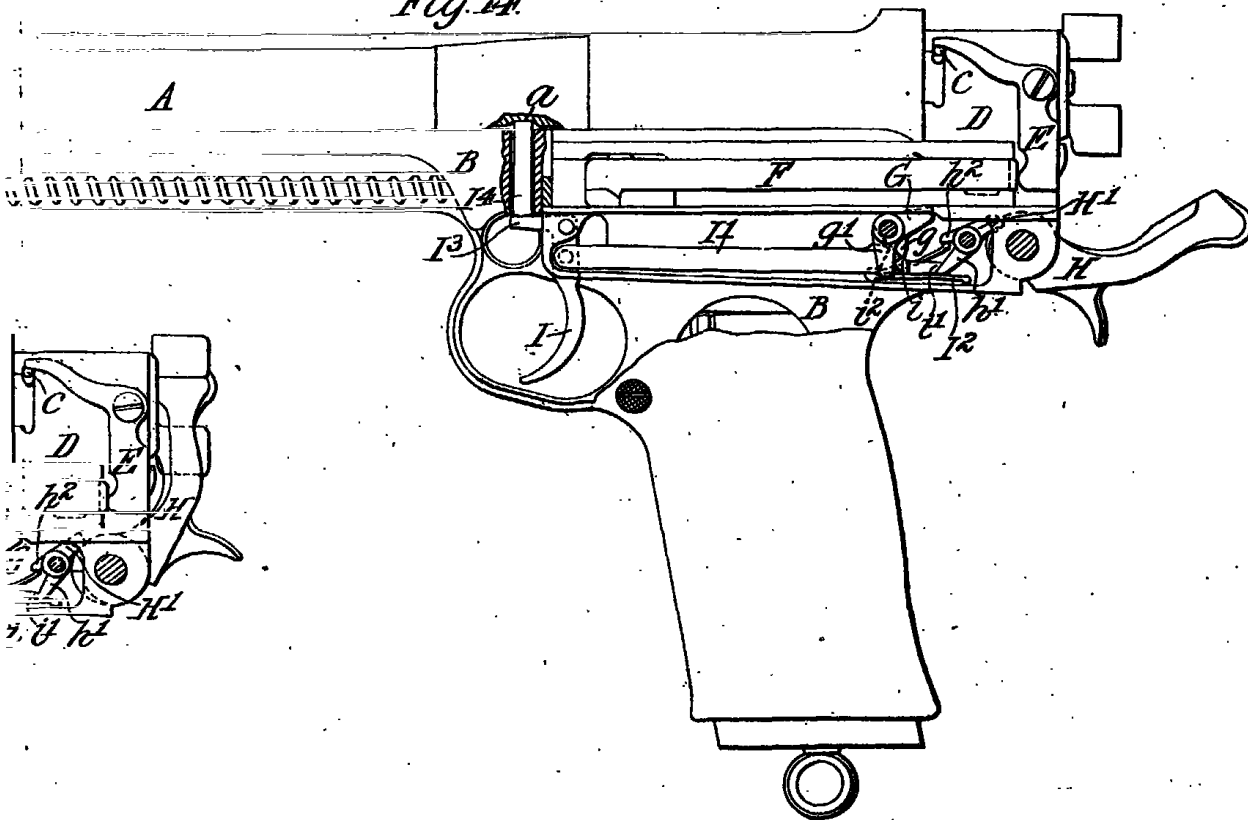
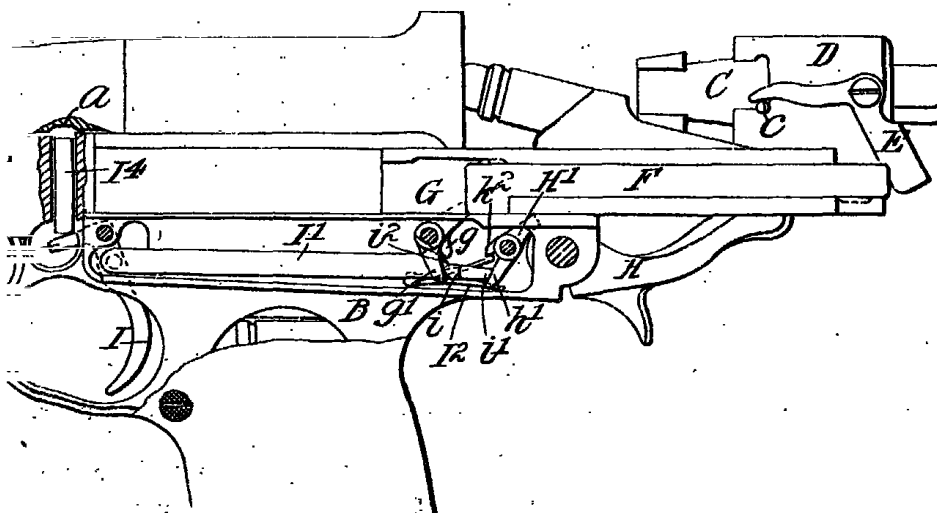
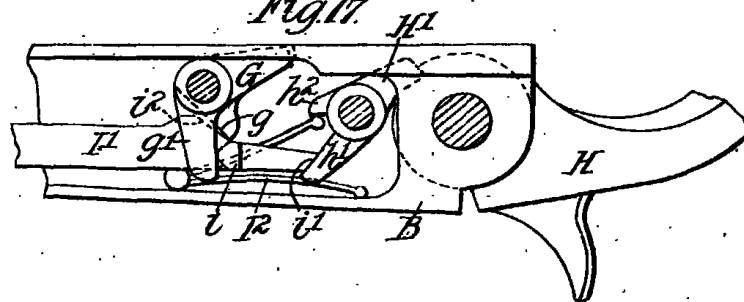


Fig. 17.



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