

Archaeological Journal.

JUNE, 1893.

ON THE DEVELOPMENT OF GUNLOCKS, FROM EXAMPLES IN THE TOWER.

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Any enquiry into the origin and development of gunlocks, as applied to firearms, must of necessity commence with an examination of the means employed for the discharge of the earliest weapon requiring such an arrangement. This weapon was the crossbow. A representation of one is, it is said, to be seen on a Roman bas-relief at Clermont Ferrand, but with that exception we do not find any view of the crossbow before about the twelfth century, when it constantly occurs in drawings and illuminated manuscripts. In these, unfortunately, the scale is so small that we are unable to determine clearly the mode of release for the cord when strained. All that is seen generally, is the stock with a stirrup at the fore end, in which the foot was placed during the process of bending the bow, and below the stock a long bar or rod issuing from the stock. This was the trigger, or as it was until the seventeenth century called the sear. It was pivoted on a pin passing through the stock and the forward end pressed against the nut behind which the cord of the bow was drawn. When the hinder or external end of this sear was pressed upwards to the stock the forward end disengaged the nut which was then enabled to revolve and cast off the cord, thus discharging the bolt or arrow (Fig. I.) This simple arrangement continued for some-years, and at the latter part of the fifteenth we are able to judge of the arrangement from numerous examples of crossbows now existing in public and private collections.

The portion of the sear behind the point on which it pivoted was naturally made longer than that in front of it, in order to obtain the advantages of the leverage in moving the forward end or nose which was exposed to the powerful strain of the cord. But in this prolongation of the trigger end of the sear, it was necessary to move that end through a proportionately greater angle, and such an arrangement made the trigger, when the bow was bent, stand out so far from the stock as to be most inconvenient and apt to discharge the bolt by any accidental touch, or catching in the garments of the person holding it.

It was, then, about the end of the fifteenth century that the long lever was broken up into a series of small ones all of which, acting in a parallel direction conveyed the necessary amount of deflection to the fore-end of the sear, with only a like amount of deflection at the trigger end.¹ This arrangement is seen in Fig. II., which shews diagrammatically the locks of a crossbow No. $\frac{1}{5}$, in the Tower collection.

In this class of lock we have not as in the gunlock a lockplate or foundation on which to build up the arrangement of springs and levers by means of pins or screws, but all the pivots consist of pins running through the stock from side to side and only held in their places by fitting tightly in the wood.

The next step was to obtain a fine and delicate system of release and this was arrived at, but by a very important advance on the earlier method.

This was the addition of a small and finely adjusted lock built up on a lockplate. The whole was let into the middle of the stock, and the slight trigger appears below, between the stock and the sear large trigger, which now ceases to bear upon the levers inside the stock. See Figs. III. and IV.

The small trigger being pressed the levers are set in action, and the nut is allowed to revolve as in the earlier arrangement. The large trigger having now become useless, its only *raison d'être* was to act as a guard to the small or hair trigger, and to effect this, we find a bar holding the sear at a fixed distance from the stock. This, with the sear, forms the trigger guard of later arms, whether

¹ The foremost lever did not act directly on the nut, but on a piece of iron, suspended in the stock by a transverse pin.

Fig. I.

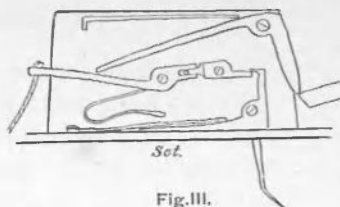
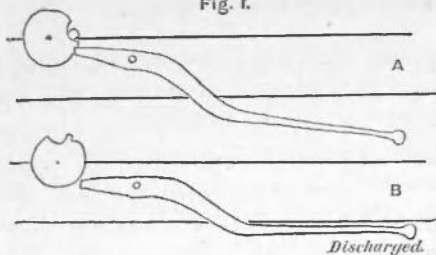


Fig. III.

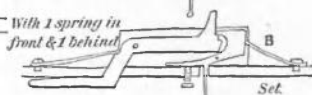
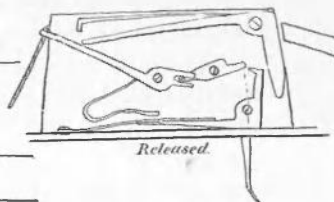
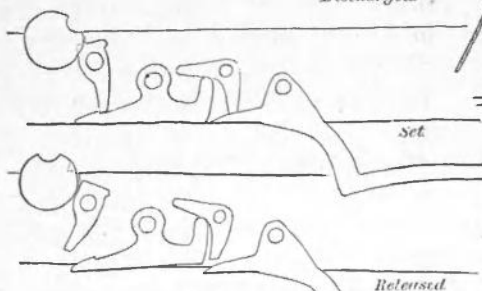


Fig. II.

Tower $\frac{1}{2}$

Fig. V.

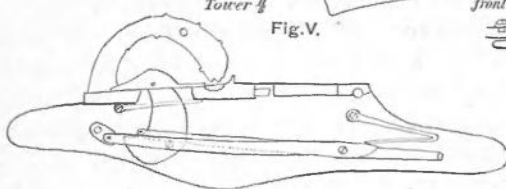


Fig. VI.

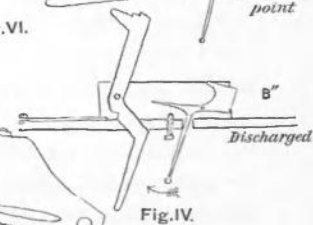


Fig. IV.

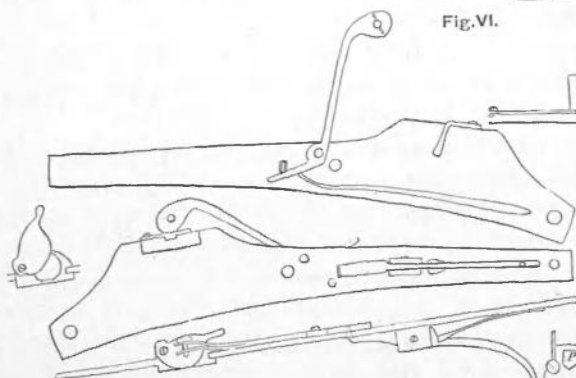
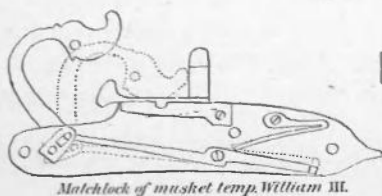
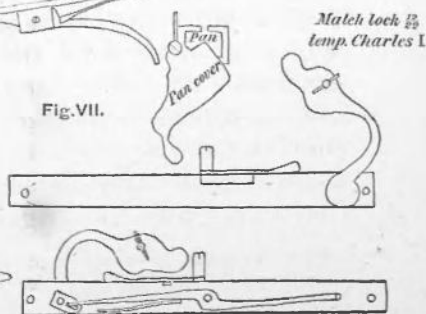


Fig. VIII.

Fig. VII.



Matchlock of musket temp. William III.

crossbows or firearms, and the shape of those of the sixteenth and seventeenth century shows their original purpose. In a crossbow of the seventeenth century, No. $\frac{11}{7}$, at the Tower, there is a further change. The old sear or large trigger is fixed as a trigger guard, and there is the small interior lock as in the last example, but in order to set the lock, there is another trigger. This being pressed and the hair-trigger being then moved, frees the pressure on the nut and the cord is released. In this example the long lever is reverted to instead of the series of short ones.

When the crossbow ceased to be a weapon of war and was employed only for the chase, it in many instances became a much slighter weapon, and required less powerful means for bending. Of the instruments employed for the bending, we need not speak as they were detached from the crossbow before it was prepared for the discharge of the bolt or guard placed on its upper surface. In one class of bows, however,¹ the bender and the lock were combined. The lock was placed on a lever attached to the stock and when this lever was raised, the lock with its catch for the cord, was pushed forward until the catch² could be placed under the cord or in a loop at the back of the bullet-holder. On bringing back the end of the lever to the stock, the cord and the lock were drawn backward to the necessary distance, when the lever was secured to the stock. A trigger in this latter, on being pressed, acted on the under side of the lock, and allowed the catch to turn on its pivot so as to release the cord. This class of crossbow lasted into the last century and many specimens are to be found in country houses and farms.

We shall see that the crossbow contributed many of the important features that were found in gunlocks, such as the large sear or trigger which gradually changed into the modern trigger guard. Also the trickerlock, which, at first an adjunct to the lock, in time became the lock itself. This trickerlock is said to have been invented about 1543, at Munich, and was, from its extreme delicacy, a very great advance on the earlier forms of lock, whether in the crossbow or firearm.

¹ Arquebuse à jalets.

² The *catch* was, in fact, the old nut

but now made of metal and firmly pivoted.

Of the method employed for discharging the earliest hand guns other than by application of the lighted match by hand to the priming, we have no definite knowledge, but it probably was an application of the earlier and simpler form of the crossbow lock.

We will therefore proceed to the examination of the earliest existing examples in the collection at the Tower of London.¹

Of the earliest form of matchlock, we have no example now existing, but it was doubtless as simple as the earliest crossbow lever, and the match-holder would work forward and downward to the priming in the pan.

The firearms in use from the beginning of the sixteenth century until the introduction of the percussion system may be best classified according to the modes employed for their discharge. We have then matchlocks, wheel-locks, and flintlocks. Besides these chief classes are combinations of these, as the match and wheel, and the match and flint. The wheel and flint do not appear to have been used on any one arm.

In the sixteenth century, however, we have a very good example $\frac{1}{1}$ in the Tower collection (figured in Plate 25, Vol. II., Scott's British Army), of a matchlock on a system which existed up to the times of William III., when the last matchlock muskets were in use in the English army. There is very good proof of its having belonged to Henry VIII., its external ornamentation showing that to

¹ The handfirearms mentioned in Henry VIII. Inventory 1547, are:—

“Demyhakes or handgonnes. Shorte gonnes for horsemen w^t cases of lether furnyshed w^t homes and purses. Italion peces fotemen. Italion peces guilte without Chambers furnished with flasks and Touche boxes. Italion peces guilte with Chambers furnished. Lardge Chamber peces set in stocks of Walnut-tree with fierlocks. Olde harquebusiers wth the Chambers. Harquebusier for haile shote. Doblehakes. Litle hackebutts. Handgonnes w^t fierlocks thone wth a c^hamber. Chamber peces. Shorte Chamber pece. Dagge with two peces in one stocke. Tacke with a fierlocke. Dagges w^t gonnes in cases of lether. Litle shote gonnes.”

Of the foregoing weapons the largest would be the Doblehakes which threw a

ball of two ounces. The Demyhakes or hand gonnes threw ounce balls, and were generally matchlocks and muzzle-loading, though some of them were breech-loaders, i.e., with chambers and fierlocks, that is wheel-locks. The Italion peces were those purchased in Italy, and some are noted as with chambers but none of them have fierlocks. There are also shorte gonnes for horsemen evidently matchlocks, though other shorte chamber pieces are also noted. There are also litle hackebutts, but not mentioned as with chambers. Several tackes with fierlocks, i.e., wheel-locks were the wheel-lock pistols of the sixteenth century. The dagges are not in any case noted as with wheel-locks or chambers. Olde harquebusiers with Chambers, show that breech-loading arms were of some standing as regards age.

have been the case. But in addition to that, there is the date 1537 on the rear end of the barrel. The weapon which is a breech-loader on a system very similar to the modern Snider rifle, has been well described by the late Mr. Latham at p. 90 of vol. IX. of the *Journal* of the Royal United Service Institution. The lock (Fig. V.) it will be seen is of very simple construction. It consists of a sear pivoted on the lockplate and with its nose working in a small tumbler to the axle of which the match holder is fastened. By pressing upward the rear end of the sear the tumbler is made to turn a quarter of a circle, and so to bring the match to the pan. The sear is kept in its normal position by a small spring on the inside of the lockplate, and fastened to the sear is an arm which moves backward and forward a pan-cover, in such a way that the pan is opened as the match descends. This arrangement is superior to the later forms of matchlock in which the pan was uncovered by the second finger of the right hand. The whole arrangement thus consists of one plate, one pan-cover, one sear with its attached arm, and two springs. In the later example $\frac{1}{5}$ (Fig. VI.) with the date 1562 on the barrel, of the Tower collection, we find a sharp snap action given to the match-holder. It is difficult to see what, if any, was the advantage of this over the steady motion of the earlier system, and it does not seem to have been generally adopted, for there is only one other European matchlock in the collection, No. $\frac{1}{8}$, with this snap action.

This is an Italian lock and of very beautiful construction and workmanship. The date 1621 occurs on the stock.

In both these snap actions the match holder has to be cocked by hand, and in the second instance a small pin on the outside of the lockplate has also to be drawn out to prepare the lock for action. In Figs. VII. and VIII. are seen matchlocks of the time of Charles I. and William III.

The matchlock had many advantages in its day over the later wheel-lock which it survived, so far as military weapons were concerned, and there is in the Tower one example, No. $\frac{3}{2}$, of a wheel-lock which has been gutted and the ordinary matchlock fitted to the lockplate instead. The barrel is dated 1546.

Indeed, the matchlock died hard, for we shall find it introduced later on as an adjunct to both the wheel-lock

and the flintlock. As in the crossbow, so in the firearm, the larger trigger was found inconvenient, and it had to resign its place to the small trigger, which suspended within the stock, acted on the portion of the large trigger or sear within the woodwork. The external portion was then fixed and became the trigger-guard.

It may be noted that in the representation of the funeral of St. Philip Sydney in 1586, all the firearms carried by the soldiers and city bands attending, are shown with the old-fashioned large trigger or sear. A musket and a caliver¹ from Penshurst Castle, in the Tower collection also have this form of trigger, but examples of such a system at this date are rare. The change was, no doubt, effected slowly, as in those days the arms belonging to the county musters were not often brought back to the Royal Stores.

In the William III. matchlock (Fig. VIII.), as in the examples of the time of Elizabeth, the pan-cover had to be moved off the pan just previous to firing, and any movement during the interval might cause the priming to be shaken out, or wind or rain might render the operation of repriming necessary.

The matchlock does not appear ever to have been applied to pistols (except in the case of the pistol shields of Henry VIII. in the Tower) which only appear among the weapons of war after the introduction of the wheel-lock.

The musketeer had to go through some twenty-three motions for firing. First, he took one of the bandolier boxes in his right hand, and pulling the lid off with his teeth, he poured the powder in, giving a "shogge or two" and then a "jogge" to the musket; then, taking the bullet from his mouth, he dropped it into the barrel and rammed it down, giving a good "jobbe or two." After returning his rod, he held the rest to the musket and took the match into the right hand and "blew his cole." The match was then fixed in the cock which had been opened to receive it, and putting the two forefingers of the right hand over the pan to guard it, he "blew his cole" to remove the ashes. With the middle finger of the right hand he opened the pan-cover, presented, and then fired, holding the musket on the rest and against the right breast. After this, the musket was taken out of the rest

¹ Some of those at Penshurst, bear the date 1595.

and the match drawn from the cock and restored to the left hand. The pan was then cleaned with the right thumb, blown on to, in order to clear out any powder and the pan then closed.

The wheel-lock invented in 1517¹, and for many years used on weapons of war and the chase, after some time ceased to be applied to any but sporting arms, but with these it is found as late as 1707 (not 1797 as stated in error in the catalogue), in the Tower collection, and 1759 at Paris.

During the whole course of its employment the system remained in most respects the same, but various improvements or modifications were from time to time added. Of these the following may be noted. In consequence of the brittle native of the iron pyrites, it was found necessary to add a second cock or holder with another piece, and working from the rear forward on to the original wheel. Another improvement was the piece of metal rising in a curve from the edge of the pan and so shielding the eye from the flash of the priming. The chain by which the mainspring was compressed was generally within the lock, but in some cases we find it outside and the mainspring itself was consequently also exposed, as in Fig. XI., No. $\frac{1}{3} \frac{2}{9}$, of the Tower collection, c. 1610; but such a system seems badly suited for war or sport, the exposure of the chain rendering both it and the mainspring liable to damage from weather, and the chances of a premature discharge owing to their catching in the clothes, etc., being much increased.

The wheel also was improved by transverse notches being cut on its working edge and a greater number of sparks being thus generated. The position of the wheel also

¹ Mr. Thurkle has kindly exhibited a fine series of locks of various dates, among which are two especially worthy of notice. The first (formerly in the possession of Mr. Pritchett, and by him engraved in pl. 39, vol. ii. of Sir Sibbald Scott's *History of the British Army*), bears an armourer's stamp and the date 1509. As this lock has a double feed, which was clearly an improvement on the single form, and one not likely to have suggested itself at first, it seems very doubtful if it be not a mistake for a later date or a premeditated ante-dating by some former possessor. The second lock is a very beautiful and

ingenious one in which the spanning of the fire-wheel is effected by a series of cog-wheels in connection with it, and acted on by another worked by the pyrites holder. When the holder is depressed and then drawn back, the fire-wheel is spanned and fixed. The holder can then be again moved into its proper position over the pan. The bridle in this case is in the form of a T with a long upper limb in which all the wheels pivot. The springs on the outside of the lock are beautifully carved, and the whole is most elegant and substantial.

varied, sometimes it was outside the lockplate and protected by one or more plain or pierced plates of metal which acted as a sort of extra bridle (as in Fig. XII., No. $\frac{12}{331}$, Tower collection). In other instances the wheel was on the inside of the lockplate (as in Fig. X., No. $\frac{12}{56}$, of the Tower collection, and dated 1969), and again sometimes we find it sunk into the substance of the plate. The lockplate itself became thicker and we find the screws only entering and not traversing the plate, thereby allowing of etching and other ornament on the exterior. This increase of thickness is considered by some as an index to the relative age of such locks, while General l'Haridon considers that the imbedded wheel, points to a later date than that merely placed beside the lockplate. The bridle also varied in shape.¹

The sears also vary in form, some being straight, while others have the neck bent so as to bring the nose higher up on the wheel. The tricker lock was applied to the wheel-lock weapon as it had been to the crossbow, but in some cases we find a small cord which was pulled to set the tricker instead of the large sear or trigger effecting this (see Fig. III.). There is also an ingenious plan for making the action more delicate by means of a small screw, which can be made to reach higher or lower and so make the hold of the tricker on the lever slighter or firmer, and adapting the weapon for a more rapid discharge at a given moment (see Fig. IV.). In many cases the string has been lost and it is at first difficult to see how the tricker was set, but the hole in the under part of the lockplate will always show when such a means was employed.

Ornament is so often lavished on the interior as well as the exterior of the lock, as for example in one belonging to the Lord A. Conyngham, that one is inclined to think it was the fashion to detach the locks from the stock on frequent occasions. It may be mentioned that the spanner which had the form of a key for winding up a clock and was often combined with a flask, screwdriver, and other useful implements, was generally carried in a trap-box in the stock. On the spanner much art was often bestowed,

¹ The writer at one time thought these differences might be due to different nationalities, but a great many locks of

known provenance must be examined to fix any rule.

as in some specimens recently sold from Baron de Cosson's collection. Instead of the second cock, we sometimes find a matchlock combined with the wheel-lock, and worked by a further pressure of the wheel-lock trigger (see Fig. XII., No. $\frac{12}{331}$, of the Tower collection, dated 1603). On the outside of the lockplate is often found a small safety catch, generally within reach of the thumb when the pistol was held with extended arm. In some cases there are two or even three wheel-locks to one pistol, but each lock is, of course, complete in itself, though all set on one plate. The wheel-lock was a great improvement in some ways on the matchlock and before the snaphaunce and later methods, was the only system that could be applied to the pistol, which weapon does not appear in history previous to the invention of this lock. Its chief drawbacks were, the uncertainty of discharge, owing to the nature of the pyrites, the cost of production and its want of simplicity in its parts. The vibration caused by the very powerful main-springs, must also have detracted from its accuracy.

Ward, in 1639, says, "they are not likely to get out of kilter, and will endure spanned twenty-four hours' together without hurt." But Ludlow, in 1642, mentions his not being able to discharge his pistols, being wheel-locks and having been wound up all night.

The earliest dated examples of this kind of lock are—excluding Mr. Thurkle's specimen dated 1509—at the Tower of London, a pistol by Boest der Iunge, 1569, and at Paris, a rifled arquebuze dated 1542. This last example is rather doubtful, as the double or hair trigger with which it is furnished is generally supposed to have been invented at Munich in 1543.

The latest wheel-lock at the Tower is a rifled sporting piece by Rewer, of Dresden, and bearing on an ivory plaque on the stock, the date 1707, not 1797 as stated in the catalogue.

At Paris are two Polish rifled arquebuses by Utter, of Warsaw, and dated 1759.

The tricker lock or hair-trigger is very often found added to the ordinary lock and to bring it into action the main trigger is first pressed. This sets the hair-trigger, which then, with very slight pressure and at a very small angle to its normal position, releases the sear, and so causes the wheel to revolve.

As to the combinations of match and wheel, No. $\frac{1^6}{331}$ of the Tower collection, is a fine specimen. The cock has to be lifted off from the pan after failing to ignite the priming and the pressure on the trigger being repeated (after a small spring stop on the outside of the lockplate has been moved), the match-holder is brought down by a spring smartly on to the open pan.

The general principle of the wheel-lock may be thus explained, taking as an example $\frac{1^2}{34}$ of the Tower collection. It is on a Reiter pistol of about 1599. (See Fig. IX.)

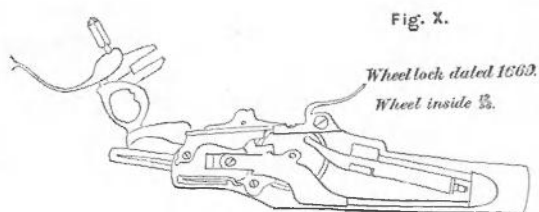
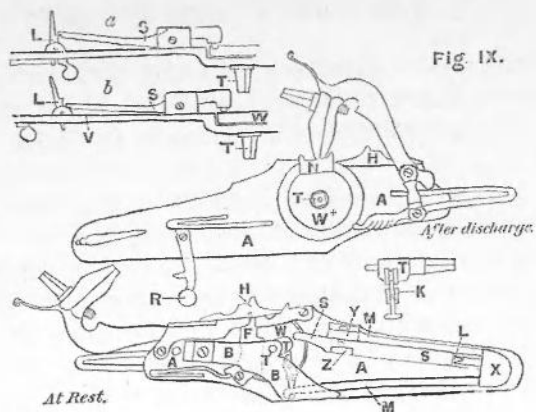
To prepare for firing, the spanner is put on, and about half to threequarters of a turn is made, which brings the depression in the wheel to the nose of the sear s, which at once enters it and retains it, the nose of s being pressed in the depression by a < spring at its other end, forcing the end away from the lockplate, the shoulder of D holding it in this position. When the trigger pin is pressed, the shoulder is drawn from under s, which can then move toward the plate, and in so doing the nose comes out of the wheel, which flies round. If not required to be used at once, the small lever (R) is moved upward, and its nose, getting behind the lower end of (L), prevents any movement forward or back. When, however, the lever (R) is pressed downward, the end of (L) is subject to the action of the trigger. At the same time as the wheel turns, the axle of the tumbler forces forward (F), thus uncovering the pan.

The wheel-lock consists of the following pieces :

A, the lockplate, on the outside of which is the wheel case w* ; on the inside are two blocks y and z, the plate x standing on a shank, which, placed in the angle of the mainspring, keeps it close to the lockplate. The under surface of y is cut away so as to hold the end of the short arm of the mainspring.

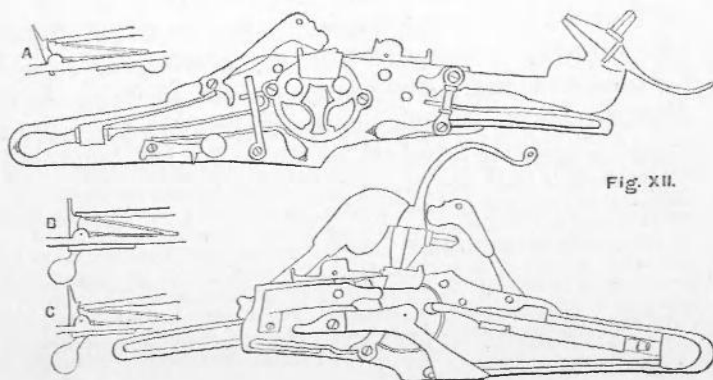
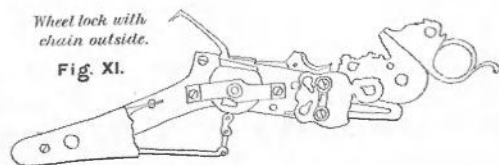
B, the bridle ; this is fastened to the lockplate at the two ends of its arms. In the upper part of the bridle is a hole in which the inside end of the tumbler axle pivots.

T is the tumbler, which, on its outer side, has the grooved wheel w set on its axle. The centre part of the axle, is of irregular shape and to it is attached the chain. This part of the axle is so constructed as to force back the



*Wheel lock with
chain outside.*

Fig. XI.



pan-cover lever (F), when it revolves. On the inside surface of the wheel (w) is a cavity into which the nose of the sear (s) is forced when the wheel is "spanned" round about threequarters of a circle.

s is the sear; it is pivoted between y and z by a screw pin in such a manner as to allow of sufficient play for its nose to enter or leave the shallow cavity of the wheel when necessary. At its forward extremity it has a projection or nose on its outer side. The hinder end is kept pressed from the lockplate a weak spring (<), and also supported by the shoulder of (L) which is brought under it by the same spring acting on a toe-piece.

M, the mainspring, is kept in place by its short arm resting against a slot on the under side of y its long arm grasping the crossbar of the chain. The angle of the spring is kept in position by the plate x, the shank of which is brazed to the lockplate.

N is the pan, which has a portion beneath, cut away to allow of the grooved edge of the wheel working in it.

H is the pan-cover, and consists of two pieces, the upper one sliding over the pan, and the other one F a stem, which is attached by a pin, so as to allow of the forward and backward action. The lower end of the stem is acted on by a spring v¹

It is curious that although most writers have attributed the invention of the wheel-lock to Nuremburg in about 1517, one German writer Von Leber, speaks of it as the French lock.

According to Crusoe in his "Military instructions for the Cavallrie 1632." The Cuirassier had to go through some sixteen motions to load and fire his pistol (a wheel-lock). First he mounted his horse, then turned down the caps of his pistol cases and drew out the left one. Placing the butt on his thigh, he wound up the wheel and then replaced the spanner. Next he primed, closing the pan-cover with

¹ The action of the wheel-lock is as follows:—The wheel is wound up, that is, turned about threequarters round by a spanner. The chain, is thus wound round the axle of the wheel, and drags up the end of the mainspring to which it is linked. When the threequarters of a circle have been travelled, the curved end of the sear is caught in a small cavity on the inside of the wheel which

is thus kept fixed. When the trigger is pressed, the back end of sear is released, and closing to the lock-plate, its nose comes out of the cavity of the wheel. The mainspring then acting on the wheel, turns it rapidly round and the pyrites holder having already been brought over to the pan, sparks are generated and the priming is exploded.

his right thumb. The pistol was now shifted to the left hand, and loaded with powder and ball, either by the flask and loose bullet or with a cartouche, which latter method became general by 1642. After returning the rammer or scouring stick the pistol was again brought to the right side and the cock pulled down so that the pyrites rested on the pan-cover. Taking the pistol in his right hand, the soldier then fired it with the lockplate upwards. If not wishing to fire at once, after bringing the pyrites down, he set the backlock (the safety catch), which could be moved with the right thumb when occasion required, and "so give the cock libertie." The movements for the other wheel-lock weapons, were similar.

The next class for consideration is that in which ignition of the priming is obtained by means of a piece of flint being struck against a piece of steel. For this purpose a sharp striking action was requisite, and it will be remembered that as early as 1562 such an action is found in the matchlock at the Tower. Whether suited for matchlocks or no it is a necessity with the flint.

In 1570 some change took place which was probably the introduction of the flint, for in that year Thos. Rigges, caliver maker, received £50 for making 100 calivers of old curriers at 10s. each with their furniture. Lewis Hilliarde also received 5s. a piece for making sixty-two calivers and 5s. a piece for the flask and touch-box to each caliver. Now Sir John Smith says, that the currier was longer than the caliver, but of the same height (or calibre), and it is clear that the 5s. was not paid for cutting down the barrel, but probably for the alteration of the lock from the long sear to some new pattern. Hewitt gives the date 1588 for the first notice of this change, quoting the payment to Henry Radoe by the chamberlain of Norwich, for making one of the old pistols with a snaphaunce and a new stock for it. We have, however, found an earlier mention of the snaphaunce in the changes in 1580 for the furnishing of light horse for Ireland by the authorities of St Paul's Cathedral, where "cases of snaphaunces at 40s." occurs.

The word snaphaunce no more implies the use of a flint than it does the use of such weapons by poultry stealers, who have been said to have first adopted the system.

The cock of a lock, whether used to hold a match, or pyrites, or flint, was in German called *hahn*, in French *chien*, in Spanish *gato*. The German *schnappen*, is to strike sharply. Therefore, whether hen, cock, dog, or cat was used as the name for this carrier matters not. The French soon turned *schnapphahn* into *chenapan* and by that name early flint locks are often referred to by their writers. The English only modified the spelling, and snap-haunce was used here. The word occurs in Lilly's play of "Mother Bombie" in 1594.

The earliest representation of this new arm that we have met with is in a portrait of Captain Thomas Lee, dated 1594, and now as it has always been at Ditchley, in Oxfordshire. Fig. XIII. He bears a flintlock pistol hanging at his waist.

The earliest actual example of such a weapon hitherto met with is in the Tower collection. (See Fig. XIV.) This is a light gun, bearing the date 1614 and the armourer's initials, R.A. It is said with all probability to have belonged to Charles I. when Prince. The lock is of a type which seems to have been popular in Scotland, the same principle to a great degree being found in the so-called Highland pistols. A carbine, dated 1685, at the Royal United Service Institution, has an almost precisely similar lock.

It will be seen from Fig. XIV. that when the flint-holder is drawn back, its lower end passes a small slot in the lock-plate through which the nose of the sear presses and so keeps the cock in position. When by pressing the trigger, the nose of the sear is withdrawn the cock descends rapidly, owing to the pressure of the mainspring on the tumbler which is fixed to the cock, and works inside the lockplate. The upper part of the cock and the external spring to keep the cock in position are wanting in the Tower weapon.

There is in the Tower collection a snaphaunce pistol $\frac{1}{8} \frac{2}{3}$ with the Nuremberg stamp on the barrel. (See Fig. XV.) This is probably an early specimen of the German snap-haunce, for in the lock we find some parts much resembling the details of the wheel-locks. The arrangement of the sear and the arm which communicates the action of the trigger to the sear, recall the arrangement of the wheel-lock. The tumbler itself is a small wheel, and instead of the cavity

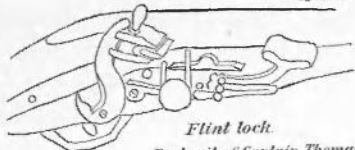
into which the nose of the sear would fit, a portion of the surface is cut away so as to form a ledge against which the sear nose catches when the cock has been drawn back. The pan-cover also is of the type usually found in these locks. The shank and cap to hold the mainspring is another feature. The action of this lock is simple. The cock being drawn back and with it the tumbler, the nose of the mainspring which sets in the notch of this (instead of being connected with it by a chain as in the wheel-lock), is raised and the spring itself compressed, being held in this state by the nose of the sear catching the ledge mentioned above. The hammer or batterie is then brought back so as to rest just over the pan-cover. On the trigger being pressed the sear nose releases the tumbler, which revolving brings the cock and its flint violently down to the grooved face of the hammer. On the axle of the cock is a small projecting tooth set obliquely. This, when the cock descends, strikes a glancing blow on another small tooth at the rear end of the lever, pressing it toward the lockplate and consequently the front end moves outward. This releases the pan-cover stem. The small straight spring which presses in this latter, then forces the pan-cover forward and so exposes the priming in the pan at the moment when the sparks from the face of the hammer descends.

The pistol is very interesting as being in so many ways a connecting link between the wheel-lock and the flintlock.

We now may mention the Spanish and Dutch *chenapans*, which were improvements on the early English and German *snaphaunces*, in that the pan-cover formed one piece with the *batterie*, and the usual arrangement for uncovering the pan at the moment of the generation of the sparks was greatly simplified. In the earlier instances a rod connected with the tumbler and acting in a horizontal direction like a piston-rod, caused the pan-cover to be moved forward and off from the pan.

The Spanish lock (Fig. XVI.) is on somewhat the same principle as the Scottish lock. That is, the cock is drawn back and held in position by one of two feet at its base resting on the nose of the sear, which passes outward and is pressed through the lockplate by a spring. When the trigger is pressed, the nose of the sear is withdrawn to a

Fig. XIII.



Flint lock.
Portrait of Captain Thomas Lee.
1594.



Snaphammer lock dated 1612.
It belonged to Charles I
when prince.

Fig. XIV.

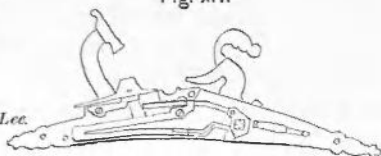


Fig. XV.

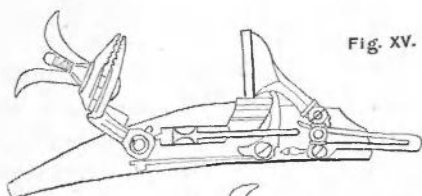


Fig. XVII.

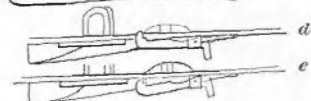
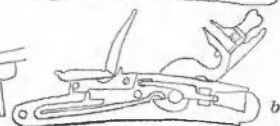
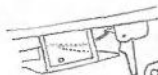
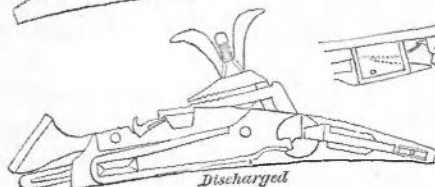
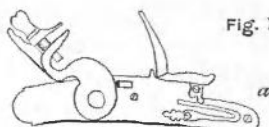


Fig. XVI.

Spanish Chenopan.



Fig. XVIII.

Vauban Lock
1602.
Trigger pressed.

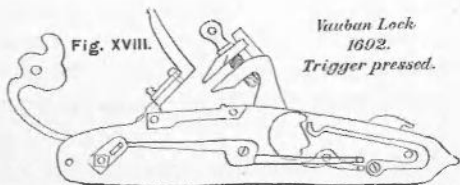
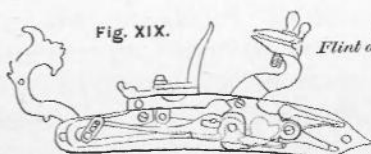


Fig. XIX.

James II
Flint and Match combined.



position flush with the lockplate, and the cock then descends, under the action of the mainspring, which is external. In this lock the face of the hammer (or *batterie*¹) is generally grooved. Major Schmidt gives 1625 as the earliest date for this pattern but that seem rather too far back.²

The Spanish locks generally have an eye in place of a notch at the top of the screw, which holds the flint between the jaws of the cock. The system appears to have lasted well into the eighteenth century, and the word UNZADA is often stamped on the inside of the lockplate.

The Scotch pistols with iron or gun metal stocks, are most of them of very rude workmanship. The barrels are fastened to the stocks, generally by a screw fixing the tang of the barrel to the head of the stock. The fore part of the barrel is attached by a button on its lower side fitting into a key hole in the stock. The barrel is then pressed backward and the screw through the tang and the head of the stock keeps the whole in position.

The action of the lock is simple. See Fig. XVII. The tumbler is bevelled toward its edge, and the action of cocking withdraws (downward), the bevelled edge from between the lockplate and the sear, which last acted on by its spring, is enabled to pass its nose through the lockplate. The top of the fan of the tumbler then rests against and presses upwards on the lower side of the sear. By pressing the trigger, the fore part of the sear is moved inwards and away from the lockplate, allowing the fan of the tumbler to come up, and this it does by the pressure of the main spring. This brings the cock forward to strike the hammer. These so-called Highland pistols exist in such great numbers, and are so uniform in construction, that it is clear they were made in England for the use of the Scotch regiments. There was no large manufactory in Scotland, to turn out the quantity, and the name Bissel to be found on most of those in the Tower collection points to their southern origin.

The actual date when the flintlock with tumbler, mainspring, sear, etc., the whole contained and working within the lockplate, was introduced, is uncertain, but 1648 is the date given for its origin in France and probably in England also. In France its adoption for military arms

¹ In Spanish *rastrillo*.

² General l'Haridon gives 1630.

was not general until about 1670, but at the earlier date 1648 in France the bridle was also used. This part of the lock does not occur in English weapons, until the reign of William III. Its use, namely to support the inner end of the tumbler axle, and so to ensure a true and easy action at right angles to the lockplate, was most important. It had been with the chain or swivel a constant feature in the wheel lock, and the disappearance of these two important features, from the early flintlocks can only be attributed to the introduction of the much weaker mainsprings of those locks.

In the reign of William III., however, we find the bridle again in English locks, though many arms in this and the following reigns are not so fitted. In this reign also the lockplate was lengthened forward of the pan, on account of a longer mainspring being used.

Though it would seem that the French were ahead of us in the system of gunlocks, it is interesting to note that the Vauban lock (Fig. XVIII.) invented in France in 1692, had been in use some time before in England. See Fig. XIX. This lock, which combined the matchlock and flintlock, was meant to meet the circumstances under which the flintlock failed to ignite the priming, and the effect desired was produced by a hole being cut in the pan-cover with a small sliding plate over it, which being turned round exposed the powder to the match. The match-holder was moved downwards by a lever put in motion by a prolonged pressure on the trigger. In this lock we find a bridle, but when the double arrangement of match and flint was abandoned the bridle also disappeared. This bridle did not, in fact, support the tumbler of the flintlock but was a sort of plate for the matchlock sear to be pivoted against.

In the James II. lock is found an improvement in the shape of a catch to hold back the hammer until it was about to be used. This dog-lock, as it was called, continued to be a part of the lock for some years. The action of the James II., William III., and Anne locks is alike in most respects. The lockplate of James II. is $6\frac{1}{4}$ in. long, while in the next two reigns it was $7\frac{1}{4}$ in., the extra length being all forward of the cock. The James II. mainspring is $3\frac{1}{4}$ in., and those of the next two reigns 4 in. In all these locks there is no bridle, the tumbler only being supported by the axle.

In 1746, the bridle appears and its upper part acts as a stop, to prevent the tumbler revolving too far, and allowing the mainspring to slip off. Up to this time, this had been effected by a block on the shoulder of the cock catching against the edge of the lockplate. From 1746 till 1832, there appears to have been no great change in the ordinary army lock. In the commencement of the century the Baker rifle had been supplied to the Rifle regiments, and in 1836, the Brunswick rifle with back action lock was introduced. In 1832, the percussion system had been adopted and the barrel had a square block with nipple attached to it. This block rested in a wedge-shaped trench cut in the lockplate and the pan. In 1846, there was a semi-circular piece cut in the lockplate for this purpose, and the nipple lump formed part of the barrel.

In 1838, Lovell's pattern lock with a large back action was introduced into the service generally, but in 1842, a smaller front or bar action was adopted and continued until 1853, when the inter-changeable rifle musket with its swivel and bridle became the weapon of the British soldier. This was an excellent lock, working strongly and well, and was in use until the Martini Henry rifle being adopted, a totally different system of lock was required.

FIGURES ILLUSTRATING DEVELOPMENT OF GUN LOCKS.

- I.—Diagram of simplest form of cross-bow lock.
- II.—Cross-bow lock. Tower $\frac{1}{5}$.
- III.—Tricker lock of crossbow. Tower $\frac{1}{6}$.
- IV.—Tricker locks. A, Tower $\frac{1}{8}$; B C D, Tower $\frac{1}{6}$.
- V.—Matchlock, Henry VIII. musket, dated 1537. Tower $\frac{1}{1}$.
- VI.—Matchlock, snap action, dated 1562. Tower $\frac{1}{5}$.
- VII.—Matchlock, temp Charles I. Tower $\frac{1}{2}$.
- VIII.—Matchlock, temp. William III. Tower $\frac{1}{3}$.
- IX.—Wheel-lock on Reiter pistol C. 1599 Tower $\frac{1}{5}$. Inside and outside view.
 - a, view from above when spanned.
 - b, „ „ „ „ released.

- X.—Wheel-lock, wheel inside, dated 1669. Tower $\frac{1}{3}\frac{2}{6}$.
- XI.—Wheel-lock, wheel and chain outside, C. 1610. Tower $\frac{1}{3}\frac{2}{6}$.
- XII.—Wheel and Matchlock. Tower $\frac{1}{3}\frac{3}{3}$,
 A, view from above at moment of discharge.
 B, " " " when spanned.
 C, " " " after discharge.
- XIII.—Flintlock, Earliest representation of, from portrait of Captain Lee, 1594.
- XIV.—Flintlock, Earliest dated example of. This belonged to Charles I., when Prince, dated 1614. Tower $\frac{1}{4}\frac{2}{9}$.
- XV.—Snaphaunce. Tower $\frac{1}{3}\frac{2}{3}$.
- XVI.—Spanish Chenapan. Tower add. $\frac{1}{4}\frac{2}{10}$.
- XVII.—Scottish pistol lock. Tower $\frac{1}{4}\frac{2}{14}$.
 a, external view, cocked; b, inside view, cocked; c, inside view, at rest; d, view from above, cocked; e, view from above, at rest.
- XVIII.—Vauban lock, flint and match combined. Tower $\frac{1}{3}\frac{2}{3}$.
- XIX.—James II., English flint and matchlock combined. Tower add $\frac{1}{4}\frac{2}{6}$.
- All these, except No. I., are $\frac{1}{4}$ size of original.
- It must be remembered that the action of the trigger is in all cases upward or backward.