The locks made for break-action breech-loading hammer-guns.

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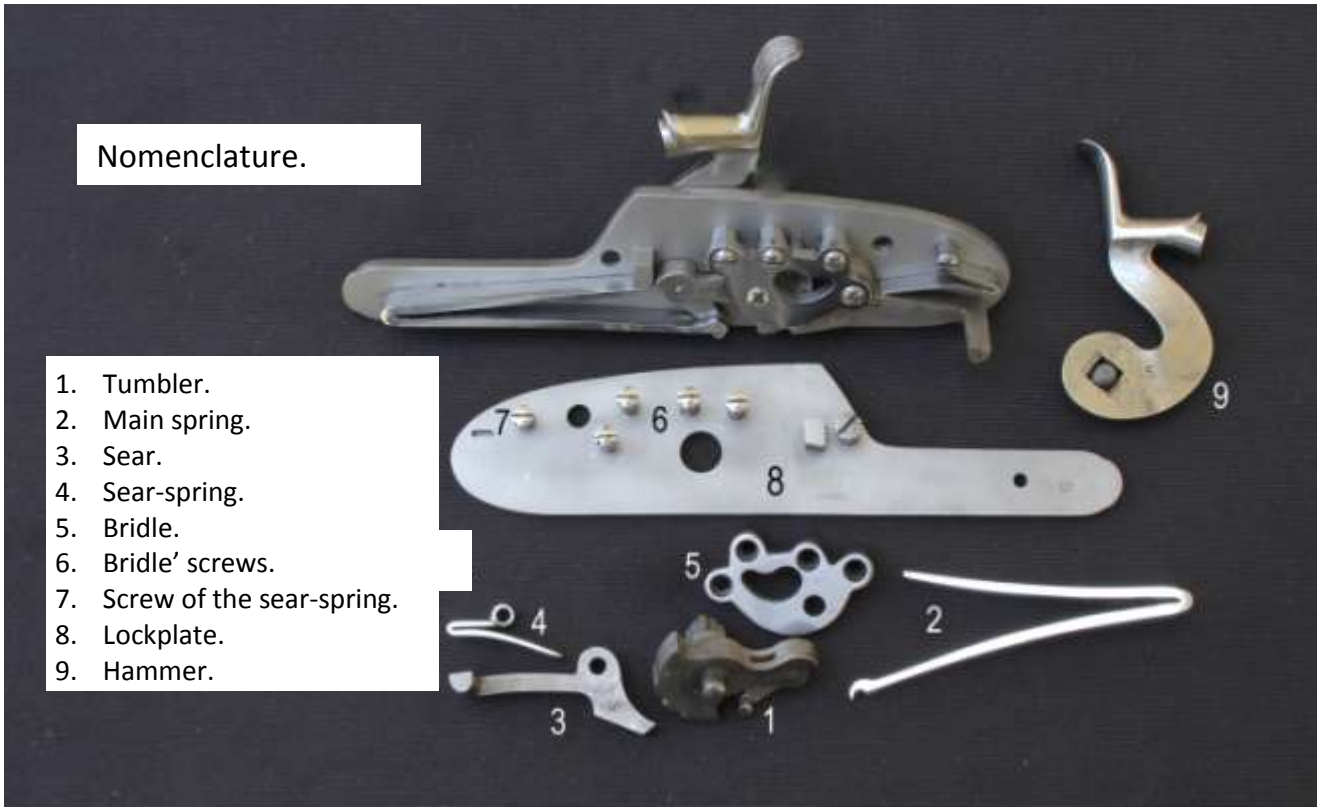
1. *Bar action sidelock.*
2. *Back action sidelock.*
   - *2a.Long lockplate cased in the stock' neck.*
   - *2b.. Long lockplate as for the bar action.*
   - *2c. Short lockplate.*
3. *The lock is inside the action.*
4. *All the mechanism is inside the action, only the thumbpieces protrude.*

To be as clear as possible we have done this theme deliberately simple in the form. Some technical term and pictures chosen to give substance to words. Showing different solutions to the same problem and calling the attention on what is well done or badly done, we would like to give a smattering to those who approach for the first time in guns of this type.



The hammer-gun lock ia a simple mechanism. A hammer, external to the lockplate, five pieces and some screws inside. Among the five pieces, two are able to rotate (1 and 3), two are springs (2 and 4) and the last one, fixed with screws, keeps the balance of all (5).

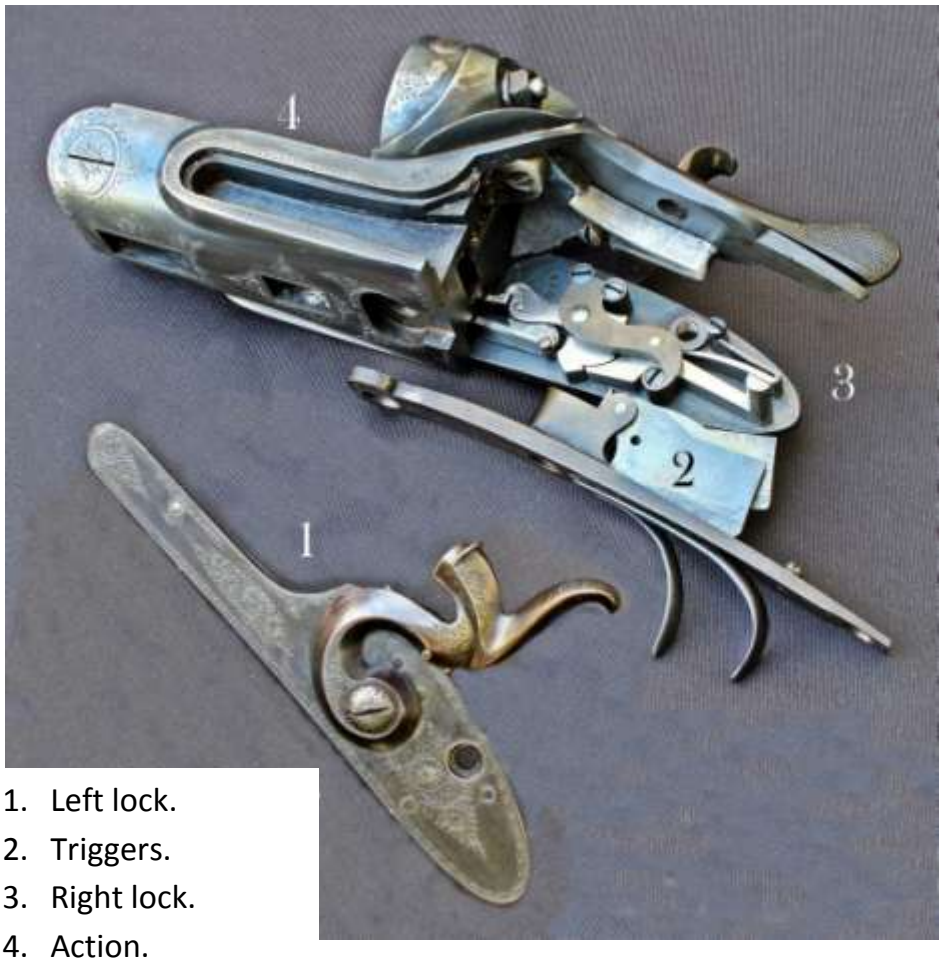
Amusingly: cocking the hammer, the tumbler 1 (firmly joined to the hammer) rotates and compresses the spring 2. When the hammer is completely backward the sear 3, pushed by the spring 4, restrains the tumbler. The hammer remains cocked, the main spring is fully compressed (fig. 2). Pulling the trigger the sear 3 rotates and releases the tumbler, the main spring 2 opens and the hammer strikes the striker (fig. 3).

This simple mechanism is subjected to hard work and for well-functioning it must be built with wisdom and time-consuming. The best ones created masterpieces, who had to (or wanted to) skimp produced poor things.

Locks, trigger plate and action of a side by side hammer gun.

The action' hips, to house the bar action locks, need expensive lavorations.

Back action locks can be mounted to the action in a much simpler way.



1. Left lock.
2. Triggers.
3. Right lock.
4. Action.

Features of a high quality lock.

By custom, 500 years old, we call lock a percussion mechanism mounted on a plate. Locksmith is the craftsman who build it.

The parts that compose it, obtained from the best materials, must be machined and finished with care. Then they have to be scrupulously adjusted, to grant the best mutual operation. Finally, they must undergo the appropriate heat treatments.

To reduce frictions as much as possible, tumbler and sear have to work "in the air". This is possible by obtaining a thin circular overhang on the sides of both, minimum friction surface placed around the hinge pin. The arms of the springs must work free too.

The bridle has to be firmly fixed to the lockplate with four or three screws (it is called four or three-pillars) and has to be parallel to the plate.

Superb craftsmanship lock. Please note: the springs, the air between the parts and the way the bridle is fixed to the lockplate.

Geometric features of a well-designed lock.

The necessary concepts are simplified to the maximum; please forgive us who struggled at the Faculties of Engineering.

A well-built lock has great percussion speed, light shooting and the hammer is cocked with decreasing effort. How is it possible to obtain these features if, cocking the hammer, the main spring, while compressing, stores energy and so gains strength? The cocking' fatigue should increase!! Moreover, if with the hammer cocked the main spring has the maximum energy, the shooting will be very hard. The solution was found by connecting the main spring and the tumbler with a little rod (called swivel). Let's see how it works.

Draw a line F through the swivel' pins. The hammer is uncocked. This is with good approximation the direction the spring force acts. Draw the distance between the line F and the rotation center of the tumbler. This distance – b – is the arm of the force F (Fig. 1). Let's do the same with the hammer cocked (Fig. 2). The arm is shorter.

Now, the inevitable formula: M= F x b.

M (moment) is the physical measure that causes the rotation of the tumbler (and of the hammer joined to it). F is the strength of the spring, b the distance between F and the center of the tumbler.

Let's make an example with dummy values:

Hammer uncocked: F=10, b=6. So M=10x6=60.

Cocking the hammer, F increases (because the spring is compressed) but b decreases. Therefore with hammer cocked: F=12, b=4. So M=12x4=48.

Concluding, the sear will have to free a tumbler that is 48, but the hammer will hit the striker with 60. Light shooting and vigorous percussion.

To gain all this the spring has to be of excellent quality. A cheap spring, badly bent and with wrongly profiled arms, will poorly use its power of non-constant progression. When it will be compressed by the cocking of the hammer, the force F won't pass from 10 to 12, but from 10 to 16 (let's assume) e we'll have M=64. More fatigue at the end of the cocking than at the striker (60 as previously).

A remarkable making' main spring. The two arms become gradually thinner. When closed they are parallel and there are no contact points.

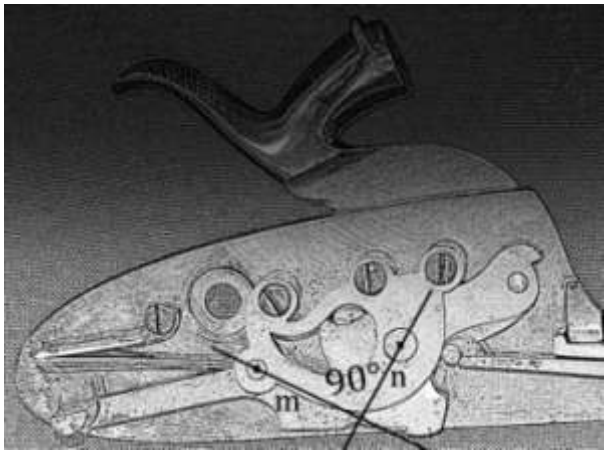
Spring of very poor quality mounted on a very simplified lock. When cocked, the arms do not close.

Rebounding action.

When the hammer strikes the striker, the tumbler slightly compresses the shorter arm of the main spring. This arm, going back to its retaining point, makes the tumbler rotate backward and the sear can fix into the safety notch. The hammer remains lifted away from the striker.

Relationship between tumbler and sear.

In the lower part of the tumbler there are the safety notch and the shooting notch. The first one must "imprison" the end of the sear, to avoid shooting because of a bump. The shooting notch has to be as far as possible from the axe of the tumbler to be light on the sear when the hammer is cocked.



When the hammer is cocked the lines **m** *and* **n** *must intersect perpendicularly on the shooting notch. The end of the sear will exit the notch without causing a rotation of the tumbler. The shooting, while being safe, will be light.*

There are two main variations of the hammer gun lock: bar action and back action. The first one, after 1870 approx., has remained the same, the second one had a significant shortening of the lockplate in the early 20s. Between the two world wars a great number of poor quality hammer gun were built, they had back action locks with short lockplate. The highly-refined hammer gun remained preserve of wealthy hunters and of some platform shooter.

After the second world war the hammer gun production continued, both cheap and more refined, than the semi-automatic and the platform' over and under imposed themselves.

The renewed interest for the side by side hammer gun is a recent thing.

1. Bar action lock.

Excellent quality lock. 1875 approx. Rebounding hammer. Perfect springs, wide tumbler, four-pillars bridle with retainer slot in the wood. Great execution. Cocking the hammer it is clear that the resistance decreases progressively. On the finest European guns we find locks similar to this as construction type and quality.

Same type of the previous one, three-pillars bridle. 1875 approx..We find this, well realized as the one shown, on best quality side by side guns. It is possible to buid it with nonchalant negligence, poorly finished and worst hardened, in this way it is the pretentious lock on guns of little worth.

Modest making lock. 1977 approx. When the hammer is cocked the short spring doesn't close. The tumbler' hinge pin is not cylindrical. Three-pillars bridle, one of the pillars is the sear' pin. Hasty finishing. It is a cheap gun' lock, but mounted on an expensive side by side, engraved and with demibloc lumps too.

Selfcocking lock with safety-sear. Realized in 1994 by Fabio Piotti.

Long mainspring hand-forged, wide tumbler, four pillars bridle with slot retainer carved in the wood. Made and finished at the best.

Taking a hammerless lock and adding a hammer means bringing together the advantages of two systems that have been parallel so far. We are not aware of similar realizations.

2. (a-b-c). Back action sidelock.

2a. Long lockplate, cased in the stock' neck.

This type of lock was not installed into the action, its case is the stock' neck. It was widely used because it had not to be coupled with the sides of the action, which became less expensive to work and stronger. It seemed not true to the makers of terrible guns, they made thousands, with rounded action and a couple of these pear shaped locks. In the meanwhile the greatest gunmakers built with art the "same" gun and they gave us the most elegant side by side guns of the late 19th. This was the lock of the express guns that needed a strong action. It came in disuse in the 1920' s.

Lock of excellent make. Year 1870. No-rebounding action.
When cocked, the clan of the perfect mainspring and the tumbler's pin are as close as possible. Three pillars bridle. The sear's pin, here still in a low position, was put higher in this period. The cocking of the hammer reveals the subtlety of the mechanism.

Low quality lock. End of the 19th century, rebounding action.
The long arm of the mainspring, that is well folded but bad hardened, slightly flexes down. There is friction among tumbler and lockplate. The third pillar of the ugly bridle is the sear's pin. Coarse finish. Cocking and shooting are acceptable only because the mainspring is weak.

2b. Long lockplate, as for the bar action.

The mechanism is put at the end of the lockplate.

The limit of this kind of lock, designed for low-price guns, is the few space available for the mechanism. The mainspring, that is behind the tumbler, struggles to find its place. The mainspring necessarily has to be short and if it is not of fine quality it becomes hard to cock. The shooting tends to be counteracted because the sears' pin finds place only in the lower part of the lockplate.

Poor quality lock. 1920's – 1930's.
Hard to make it worse than this. Even if the mainspring is better positioned, its clan could not get closer to the tumbler's pin because the back of the tumbler exits from the bridle's profile. There are signs of friction between tumbler and lockplate. The sear' spring is terrible. It's better not to talk about the cocking and the shooting. So poor locks, worn by use, can become dangerous.

Well constructed back action sidelock. 1900 approx..
The pins are wisely installed, good quality mainspring and backward elongated lockplate. With such measures it is possible to obtain a good mechanism even in a limited space. This is a self-cocking lock, controlled by the barrels opening.

2C. Short lockplate.

The lockplate is joined to the action through the circular washer, a screw fixes them.
Look at the ability of the anonymous locksmith of this lock of the 1930's. The tumbler's pin is located in the middle of the lockplate, so the mainspring has more space and is able to close in the right position. The lower part of the tumbler gain a little in wideness so that the shooting takes advantage. The sear's pin is installed as high as possible. The bridle is well designed. The lockplate is joined to the action through the circular washer, a screw fixes them.

3. Hammer gun with the mechanism inside the action.

This kind of mechanism is no longer mounted on sideplates. This structure belongs to the 19th century, widely used upon muzzle-loading guns. To reach the internal parts it is necessary to dismount the stock, the hammers and the screws that are on the sides of the action. The trigger inside the front guard controls the break-action.

This mechanism were abandoned in the late 19th century, rarely used on a side by side, it has been mentioned for the sake of completeness.

4. All the mechanism is inside the action, only the hammers' thumbpieces protrude.

This kind of lock, used since the muzzle-loading times, is still mounted on guns with one or two barrels, almost always small arms. The mechanism is simple: hammer, trigger, two springs and two pins (obviously doubled if there are two barrels).

The "fake hammers".

The side by side shown here could seem to be a hammer gun. Really it is not, the tumblers behind the lockplates are cocked by the barrel's opening. The hammer can cock, or un-cock, the tumbler.
This mechanism was requested by those who were not able to get used with the hammerless. It came into disuse at the end of the 19th century.

A final consideration. Guns made by the same great gunmaker can have different quality locks, proportioned, if the gunmaker is a serious one, to the finishing and to the price of the gun.
The first example shows a highly refined lock; the second shows a lock designed to reduce the production costs. Both belong to side by side guns of the same period and built by the same well known Brand.

The John Stanton punch, between the arms of the spring, certifies the high quality of the lock.

Observe the making of the springs and the evident hardening of the parts. The locksmith took great care of these essential features. Hammer and bridle instead are made with hasty design. Some parts have no finishing. The bridle is perplexing, two screws and a third unstable support don't grant maximum firmness. It remains, however, a honest lock.

Massimo Cassani said that the connoisseur, when evaluating a gun, listens to two sounds, the one that you (don't) hear while closing the barrels and the one that you hear while cocking the hammers.

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Translation by Piero Zanette.