THE EVOLUTION OF THE FLINTLOCK

BILLY G. JACKSON

THE EVOLUTION OF THE FLINTLOCK

A Dissertation

Presented to

the Faculty of the Graduate School

Austin Peay State University

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

History 599

by

Billy G. Jackson

May 1976

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

Chapter 1

ACKNOWLEDGMENTS

In the preparation of this thesis I have been helped by my association with Royland Southgate, who advised and informed me about several modern improvements to the flintlock. My professional association with both retailing and wholesaling sporting weapons and ammunition has enabled me to continue to be associated with arms and those interested in them, and this has aided my professional growth. I wish particularly to thank Ernst Tidwell, Dixie Gun Works, and Richard Wallman, Leonard Melton Company, without whom I would have had little opportunity to continue my association with knowledgeable persons in the area of weapons.

I wish to thank Dean Wayne Stamper of the Austin Peay State University Graduate School, without whose patient aid my progress toward an M. A. in history might have been deflected. My gratitude is also due to Dr. Wentworth Morris of the Department of History whose encouragement and assistance made the task of writing a thesis easier, even though it was in a field where love and labor combined to encourage this particular author.

Chapter 2

INTRODUCTION

In this bicentennial year of our nation's birth, many people are re-creating the costumes, the sayings, the food and the events of two centuries ago.

One of the areas in which there has been a rebirth of bicentennial interest is weaponry. Groups of men--hundreds, perhaps thousands--especially those belonging to the National Muzzle-Loaders Association, some connected with replaying Revolutionary battles, others just interested in antique weapons and black powder--have been restoring old weapons, moulding balls from lead and making replicas of old guns. These replicas have been constructed by a rather elite group of excellent gunsmiths. To be associated with these fine craftsmen, professionally and socially, has been the privilege of the present author. Their work is in demand all over the nation and fetches a large premium among those who shoot black powder and buy replicas of these old guns.

But a surprising thing about some of these replicas will be found in this paper. A few revolutionary improvements are now being invented by these gunsmiths in weapons which supposedly ceased their evolution over a century ago.

The present author's familiarity with modern and antique weapons, his knowledge of how they work and have

worked, his experience in manufacturing replicas in association with some of the great contempory gunsmiths, have led him to hope that he could contribute in some small measure to a knowledge of the history of the flintlock.

The flintlock was, and is, a device used to discharge a gun. Although its use antedates our bicentennial, it is in growing use today among black powder buffs. Contests are held among those who shoot black powder. Many hunters disdain using modern weapons and will use nothing but black powder. Some use it because of the less sharp muzzle blast. The elite sportsman is increasingly the black powder user. He must go to more trouble to procure his weapon and obtain his ammunition. He is among a more select and rapidly growing group. The mechanics or procedure of firing black powder and ball is more difficult and technical than that used in firing a modern mass-produced weapon using prepackaged smokeless ammunition. The black powder enthusiast is, arguably, more of a sportsman, and perhaps the quarry has more of a chance. And certainly, the user of replicas or antique guns is celebrating the bicentennial in a more fitting manner.

These reflections have led the present author to attempt a history of the technical development of the flintlock--a weapon thought to be as obsolete as the trilobite a few years ago. The flintlock is being used now by a surprisingly large number of sports buffs; it has a long and honorable history of development; improvements are now

being made on it technically.

Chapter 3

THE GENERAL BACKGROUND OF THE FLINTLOCK

The flintlock discharged a gun by causing tiny pieces of burning steel--sparks--to fall into a "pan" of gunpowder. This ignited it, and also a train of powder leading to the interior of the gun. The powder then exploded, forcing the projectile down the barrel of the gun.

There were other ways of accomplishing this. The other devices were also locks--one, for example, being the matchlock. Their origin and time of invention will be covered briefly in order to place all locks in their proper place chronologically. Finally, the development of the flintlock will be studied. Improvements in this lock over the years will be illustrated in detail.

The flintlock was one of three fire-producing gun-discharging locks. It proved to be the better of the locks in overall consideration. It was to last from its creation by Marin de Bourgeoys in 1610 until it was made obsolete by the invention of percussion cap ignition about 1814.[1] Illustration 1 shows an inside view of a flintlock with a nomenclature of parts.

We know gunpowder became available in Europe by 1300. Probably the formula for making gunpowder came from the works of Roger Bacon (c. 1214-92). Records from the

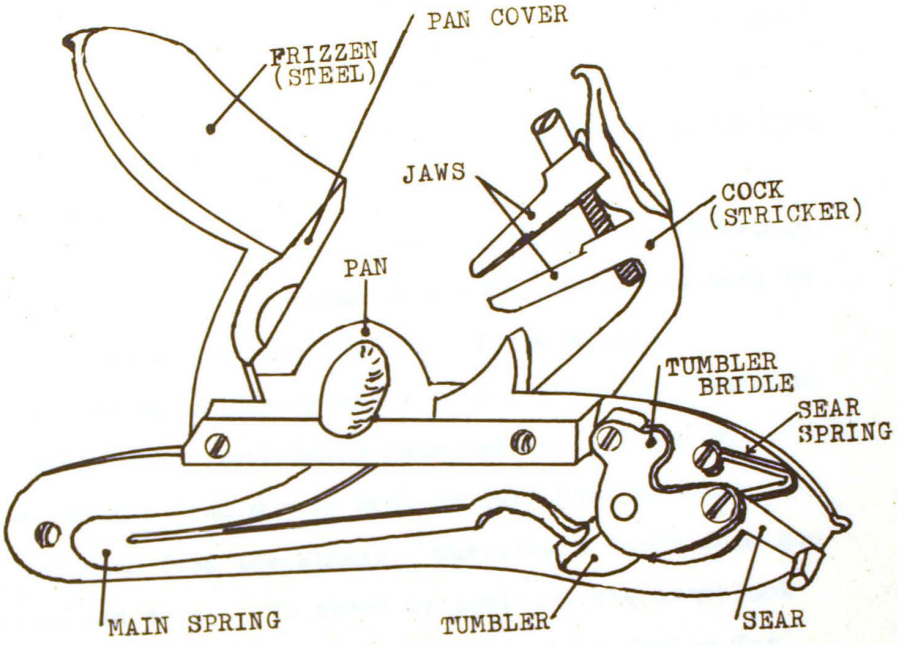


Illustration 1

Flintlock with Nomenclature

Council of Florence in 1326 show they ordered iron bullets and metal barrels to be made for defense of the city. In 1327 Edward III (1327-1377) received a manuscript from his chaplain, Walter de Milemete, which had a colored picture of a vaselike gun that fired a dart. This is proof that guns were then known.[2] Gunpowder was used at Crécy in 1346 by Edward III.

Once invented, guns were steadily improved. Drawings show wooden stocks were added in the fourteenth century to help cope with recoil and the heat of the metal.

The problem of firing early guns led to the invention of the matchlock. Very early guns had to be fired by torches carried from gun to gun, or just kept burning near a gun isolated from the others. Carrying a torch from gun to gun caused delay. To speed up ignition the matchlock came into being. The matchlock was simply a device for holding a lighted match.

The match was a loosely twisted rope, or wick, which had been soaked in a solution of saltpetre and spirits of wine. When lit, it burned very slowly as a live, glowing coal. However, it still required the soldier to have fire available, because the match often went out. The rules for the soldiers using the matchlock required them to burn the match at both ends, so that a lit end could be used to relight the other which was not burning.

The wheel-lock was developed shortly after the match-lock. It continued to be favored for several hundred years.

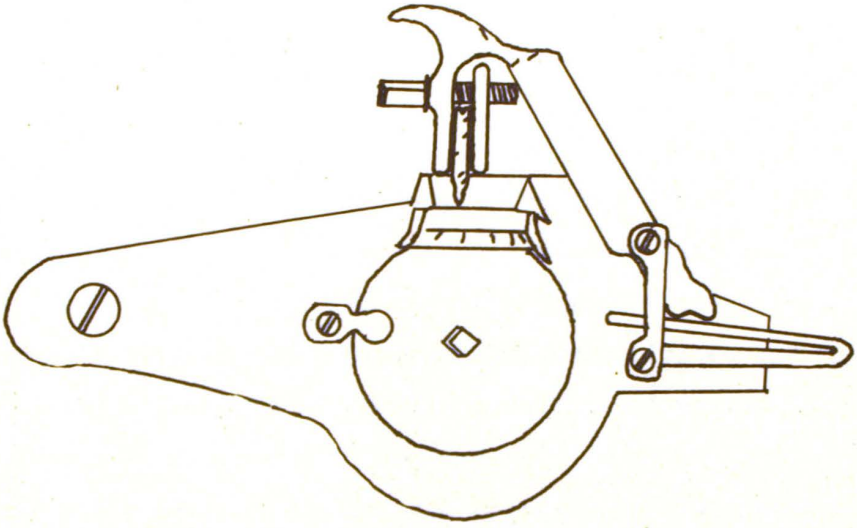


Illustration 2

Wheel-Lock

(See illustration 2). It could be compared with the modern cigarette lighter. A wheel of disc of hardened steel with a serrated rim had a spindle or axle protruding from its center. An arm on this axle was attached to a strong leaf spring. The wheel could be rotated against the tension of the spring and held by a trigger-like device. When the wheel was released it turned rapidly a portion of one revolution, striking sparks from a small piece of iron pyrite held against it and gave off sparks. The sparks ignited the gunpowder which was connected by a train of gunpowder to the main charge in the tube behind the projectile. This lock, the first fire-producing lock, was limited by its cost to the very rich. Though excellent, it was so expensive as to make other locks desirable.

Two other locks, both fire-producing, were then developed at about the same time but in different areas. Both, the snaphaunce (pronounced "snaphance") and the miquelet, were illustrated in pictures as early as 1540.[3]

The snaphaunce was developed in Holland or Scandinavia. It had a large S-shaped cock holding the flint. The steel against which the flint struck to produce sparks was controlled by a spring that allowed it to be positioned directly over the pan, which contained powder, or tipped forward out of the way. The forward position acted as a safety. (It is shown in illustration 3).

The miquelet, an excellent lock, was very popular in Spain and the Mediterranean Sea area. (See illustration 4).

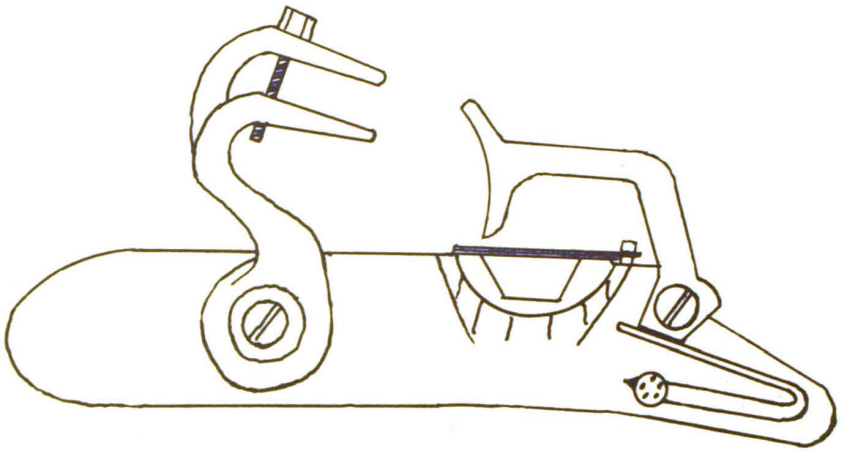


Illustration 3

Snaphaunce Lock

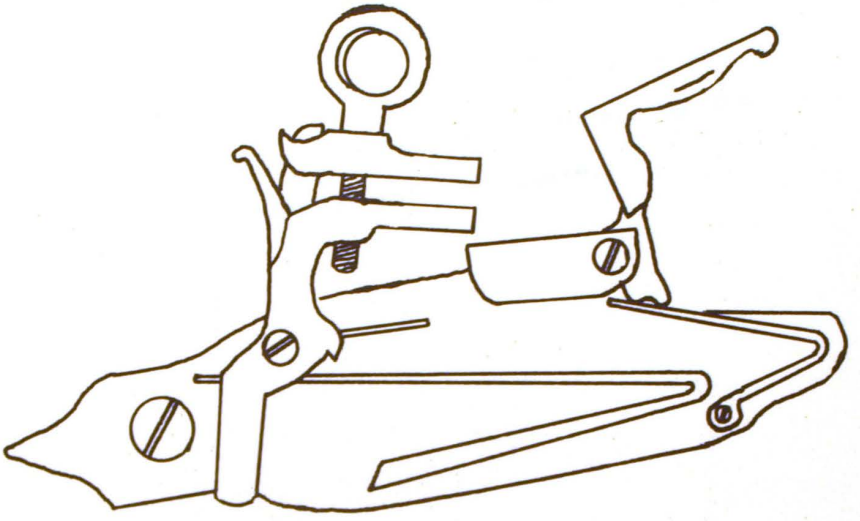


Illustration 4

Miquelet Lock

The key factor of the lock was the combination of the steel[12] and the pan cover into a "L" shaped piece, held in either the fire or safety position by spring action. Miquelet locks were easy to identify, even in drawings of poor detail. They were always made with the main spring and other parts on the outside of the lock plate.

Chapter 4

THE FLINTLOCK

In 1610 Marin de Bourgeoys combined the "L" shaped steel of the miquelet and the internal parts of the snaphaunce into what we know as the flintlock.[4] But de Bourgeoys' most important contribution was the redesigning of the sear, that part of the action which received the tension of the spring and provided the half-cock and full-cock positions of the cock. The improvement in the safety and the strength of the lock were quickly realized. The fame of the invention spread all over Europe by the mid 1630's. The sear became known as the vertical or French sear. (See illustration 5).

Each country developed its own version of the flintlock. It altered the whole concept of military hand weapons and was adapted to fowling pieces and pistols. However, the main benefit was to the army. It dominated the battlefields of Europe and America from the early 1700's to the 1820's.

Provided the flintlock got proper care and attention, that its flints were replaced regularly, and its powder kept dry, it was a good, dependable weapon. Refinements were innumerable and by the early nineteenth century it was at its peak in all forms of weapons, both military and sporting.

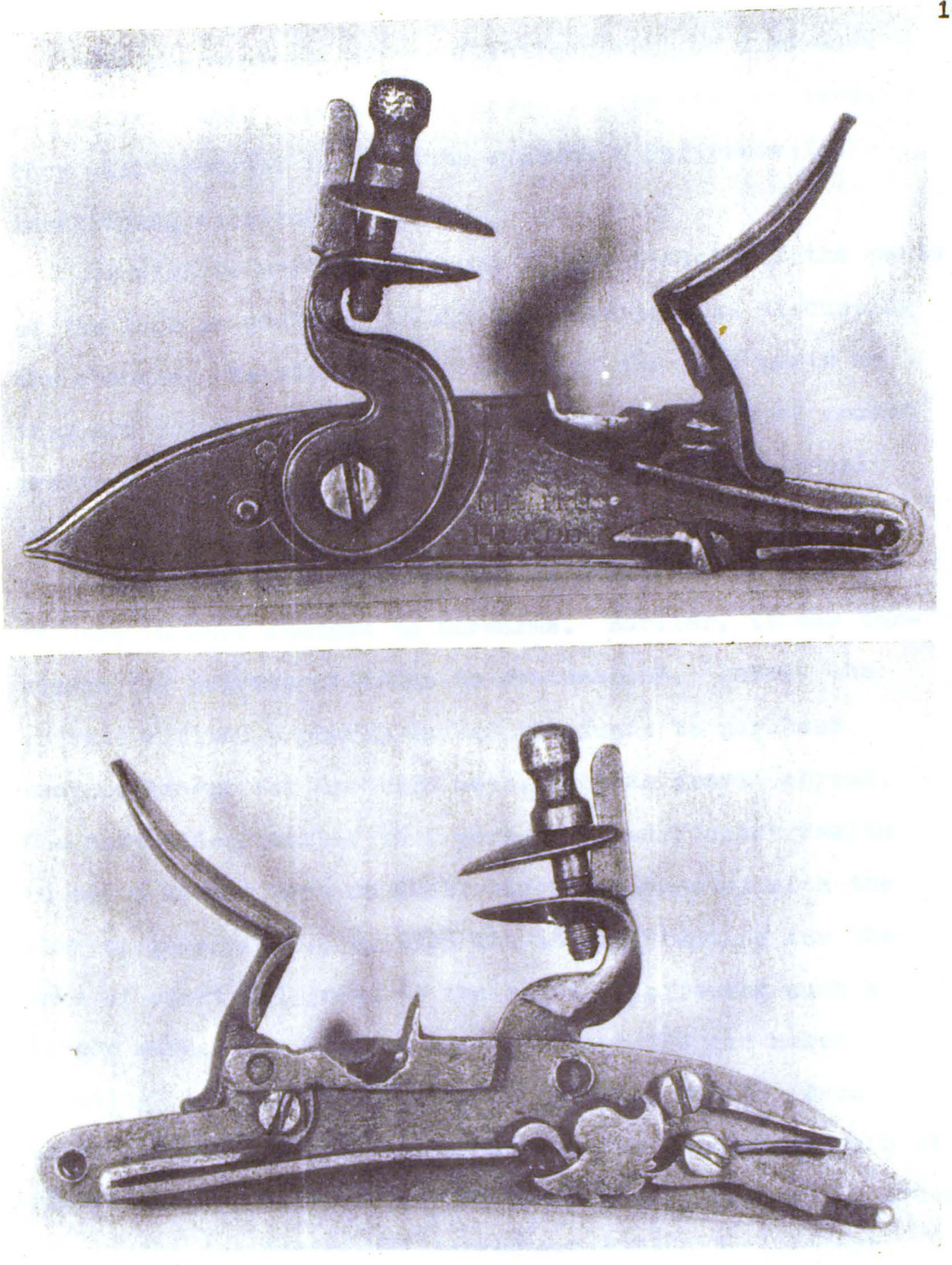


Illustration 5

Early Flintlock, 5 3/4 inches long
Probably French, About 1700

The improvements of the flintlock will be discussed and illustrated. Examples of known origin will be used. They will be dated to give the student a reference for identifying existing weapons.

It will be necessary to use a nomenclature of the parts of the lock in addition to the illustrations in discussing the changes. We will use the names of the lock parts as they are presently used. However, some of the more common previous names will appear in parentheses as additional information.

From 1327 to about 1725 the military forces were the leaders in most changes to firearms. Earlier, it was forbidden for private citizens to own weapons. Later, the private citizen probably lacked the funds to purchase weapons except for specific uses, such as travel abroad. One must also remember that persons of sufficient wealth to buy a weapon were no doubt already connected with the army or government. By 1725 the idea of hunting for the sake of sport had grown to the point of offering such a larger market for weapons as to warrant the gun maker devoting his time and efforts in catering to it. From about 1725 to the percussion period, the remaining years of the flintlock, we must look to non-military weapons in order to examine the additional improvements to the flintlock.

In illustration 5 we see a very basic lock. It shows most of the features of the original lock invented by de Bourgeoys in 1610; there is no feature of this lock that

would be out of place. The tumbler, unsupported, is correct and the frizzen, held to the lock-plate only by the frizzen screw from the outside is appropriate. Though this lock came from a sporting rifle built just after 1700 it could be explained in either of two ways; either the gun maker used an old lock salvaged from an older gun or it was made, for unknown reasons, as simple as possible. Note how the inside bottom of the pan has been eroded by an incorrect angle of the touch-hole in the barrel. This lock could have been used in the War for Independence in 1776.

The first major improvement to the lock, the tumbler bridle, was but a short time in coming. The inside view of illustration 6 shows the tumbler bridle. By 1660 French locks show this improvement, but English weapons do not until after 1700. Germans, in this case, adopted the improvement shortly after the French. The tumbler bridle caused balanced support of the rather strong push of the main spring. Previously, the spring was supported only on one side by the tumbler shaft through the lockplate. Economically, the lock without a tumbler bridle was less expensive to make. Therefore, a student must be careful not to apply the absence of a tumbler bridle too freely less he misdate an inexpensive lock of later manufacture.

The next lock feature to come into general use was the pan bridle. It consisted of an arm integral with the flash-pan extending forward and acting as an outer support for the frizzen. The pan bridle and the tumbler bridle are shown

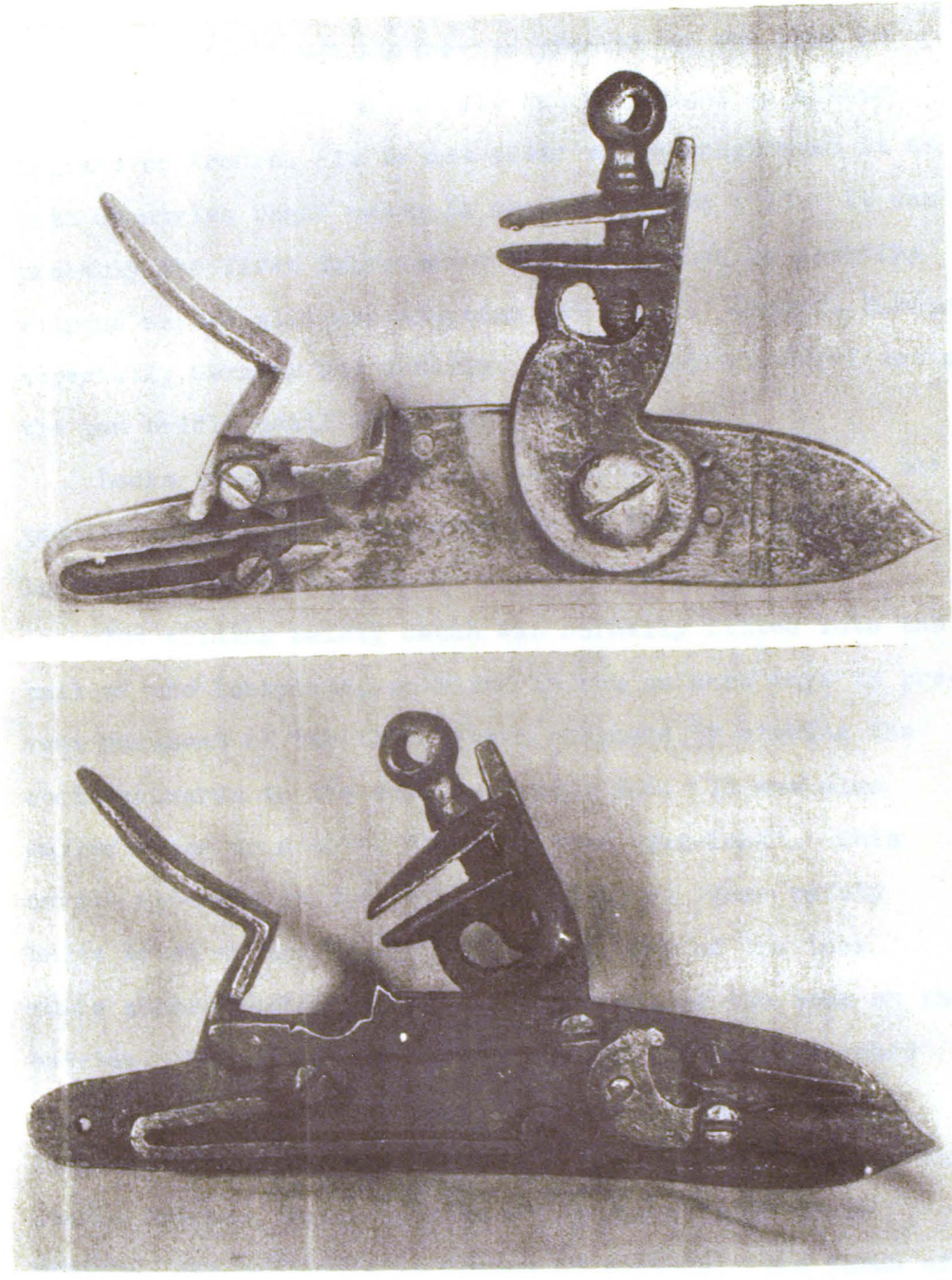


Illustration 6

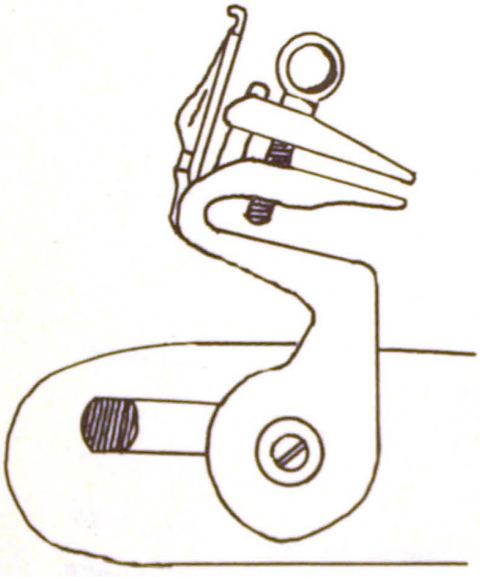
Flintlock, 5 3/8 inches long
German, About 1790

in illustration 6 but neither is present on the lock in illustration 5. The pan bridle was developed in either England or France. It is not clear which originated it as both countries began using it around 1700 to 1710. It was probably the first improvement to be advanced by sporting weapons as the military adoption was later. Central Europe, especially Germany and Austria, did not begin general use of the pan bridle until about 1785.

Locks possessing both the additional supports, on the tumbler and the pan, were more costly than the ordinary locks and came to be termed 'double bridle locks'.

The sliding safety catch was normally fitted into the tail of the lockplate, operated in one or more ways to prevent movement of the flint until released by drawing the cock backwards to the full-cock position. It was also called a dog or a bolt, thus the name 'dog-lock'. This device appeared in the late 17th Century. Some safety bolts acted on the inside tumbler or sear of the lock while others hooked directly on the base of the cock on the outside. Some locks had a sliding rod extending forward which fitted into a recess in the base of the frizzen, locking this part closed as well. This later addition, the locked frizzen, while used on all types of high grade weapons, was particularly common on pistols. Two forms of safeties are shown in illustration 7.

Unfortunately, the various safety catches enjoyed unequal lengths of popularity in different countries and this



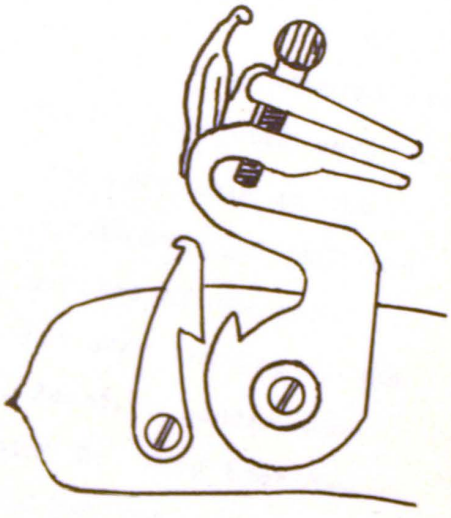


Illustration 7

Sliding Safety

Dog Lock

almost eliminates them as a means of dating locks. In France and particularly England they were found on pistols until well into the percussion period.

The raised pan, with the outer three sides of the surrounding pan cut away to allow water to run off more easily, appeared about 1740. It never came into general use on military flintlocks or cheaper sporting arms but several countries partially adopted it for army use early in the 19th Century. This was called the 'semi-waterproof pan' and was sometimes built with the mating surface of the pan-cover being grooved and recessed to fit over the lip of the slightly raised pan. The lock by W. Jacot, a London gun-smith of note, is shown in illustration 8. This lock has what would be called a semi-waterproof pan but of a re-strained version. Illustration 9 shows a lock plate engraved 'William Smith, London' that would be considered at the height of the development of this feature. It is unfor-tunate that no frizzen is available as it would show, also, the peak of advancement in fitting the recessed frizzen over the raised pan. Both the lock and the lockplate in these illustrations can be dated from 1820 to 1850, well into the percussion period.

Anti-friction rollers, fitted at first to the toe of the frizzen and finally to the tip of the upper limb of the frizzen spring, made their appearance on high quality arms about 1750. They, like the pan bridle, were used mostly in France and England but were not adopted by the other Euro-

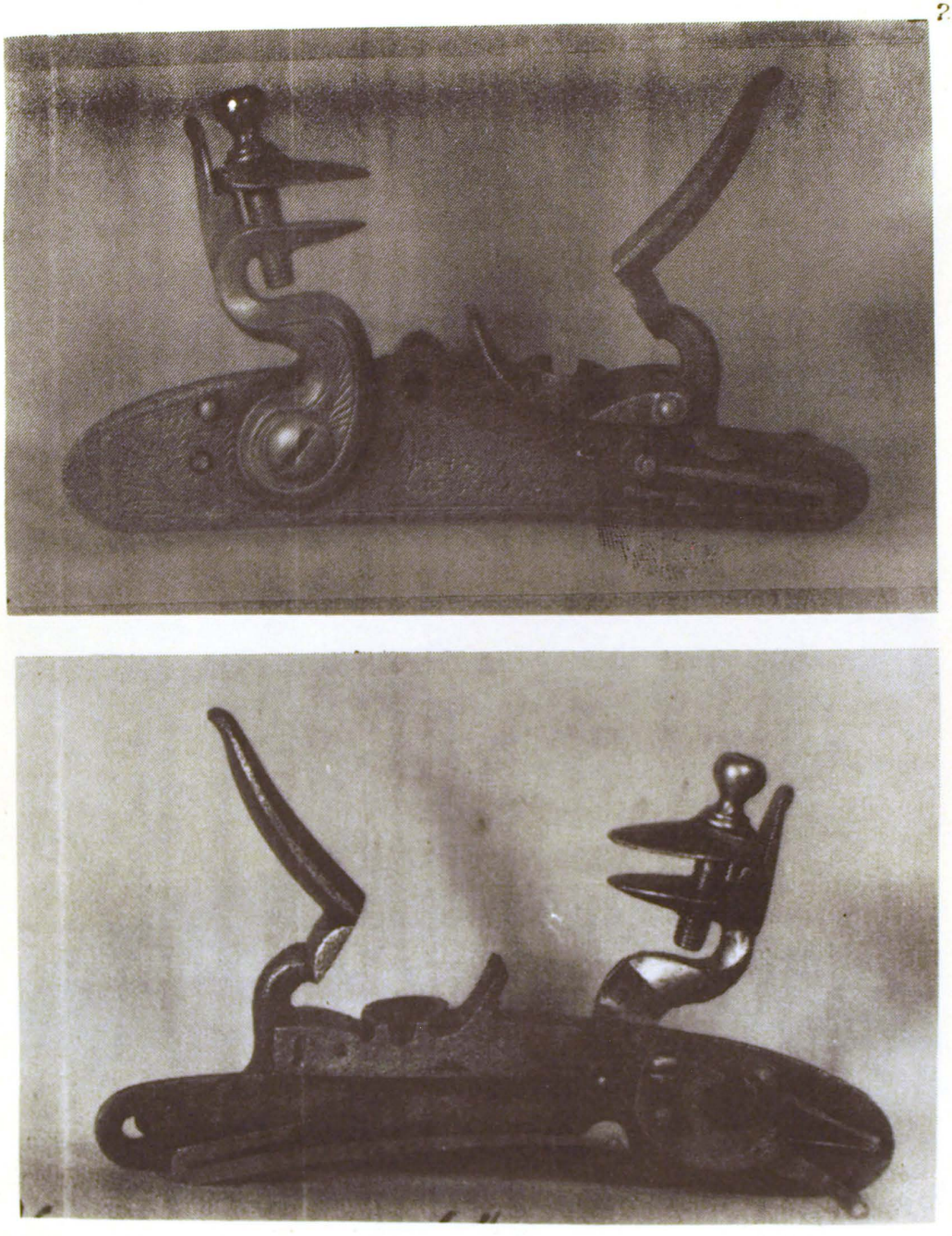


Illustration 8

Semi-Waterproof Flintlock, 4 5/8 inches long
Marked W. Jacot, London, About 1830

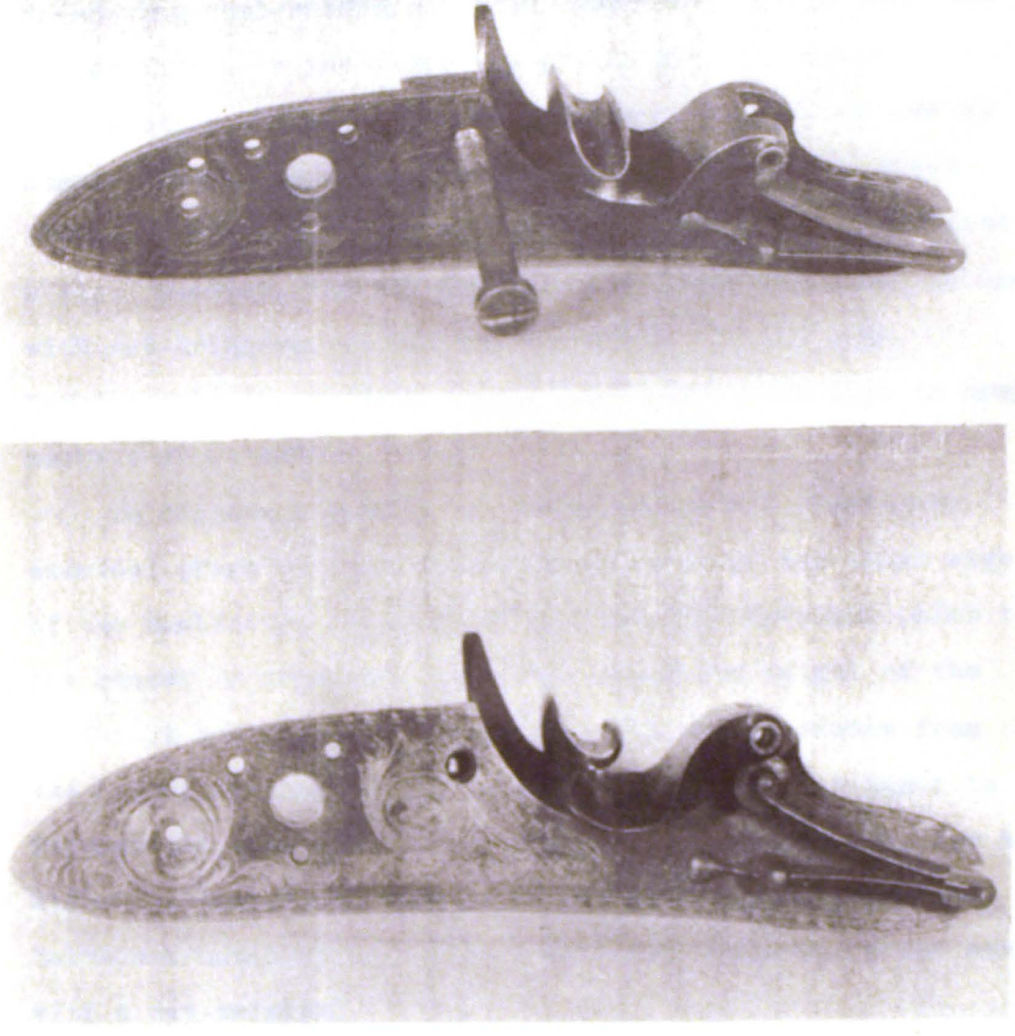


Illustration 9

Semi-Waterproof Lockplate, 4 1/2 inches long
Marked William Smith, London, About 1850

pean countries until fifty years later. Locks fitted with these devices were usually described as locks with 'roller steels' or 'roller steel springs'. Both illustrations used in showing semi-waterproof pans, numbers 8 and 9, show the roller fitted to the upper tip of the frizzen spring.

Another anti-friction device came into limited use at about the same period as the roller steel springs, about 1750. It was known then as the detent but later was called a fly. However, the fly was for a different purpose, to use with set-triggers, so was not practical for the army. Despite this the Germans fitted some locks with flys to army muskets about 1780.

To digress a moment, the tumblers of all flintlocks examined prove to have a uniform diameter of the outer edge of the tumbler in relation of the distance from any point to the center of rotation. In other words the height of the half-cock and full-cock notch were the same distance from the center of rotation. The shooter pulled the trigger to release the lock; his reaction time was sufficiently slow to allow the tumbler to rotate and the sear tip to pass the half-cock notch without making contact. This would not work with a set-trigger.

The set-trigger, a mechanical unit in which one trigger was pulled to place itself under spring tension and held by a second trigger, lacked the slow response of a human finger. When the second trigger was released, usually by an adjustable but very small amount of pressure, the spring

tension on the previously "set" first trigger gave a sharp but unfortunately quick blow to the sear release of the lock. Although it pulled the sear from the full-cock notch, allowing the tumbler with the cock to start rotating, it also allowed the sear tip to return toward the tumbler, striking the tip of the half-cock notch. The unwanted clash with the half-cock notch caused many broken sear tips and tumbler notches. The detent or fly was needed.

The fly, a small diamond shaped piece of metal, is shown in illustration 10. It is attached so as to pivot in a cutout in one side of the tumbler with the tip protruding between the half- and full-cock notches. Its effect is omni-directional. It allows the sear to enter the half- or full-cock notch as the cock is pulled to the rear. However, it is so positioned as to hold the sear tip away from the half-cock notch as the tumbler rotates forward.

The fly, in conjunction with set-triggers, saw fully as much use on German weapons as on those of other countries. The German 'Jaeger' rifle, from which the American long rifle evolved, was normally fitted with set-triggers and needed the fly in the lock tumbler.

The last anti-friction device to make its appearance on the flintlock was the swivel mainspring. This consisted of a small metal link between the tumbler and the tip of the mainspring, so that the bearing points were greatly reduced. It is shown on the inside view in illustration 8. This swivel appeared about 1750 and the exact origin is not

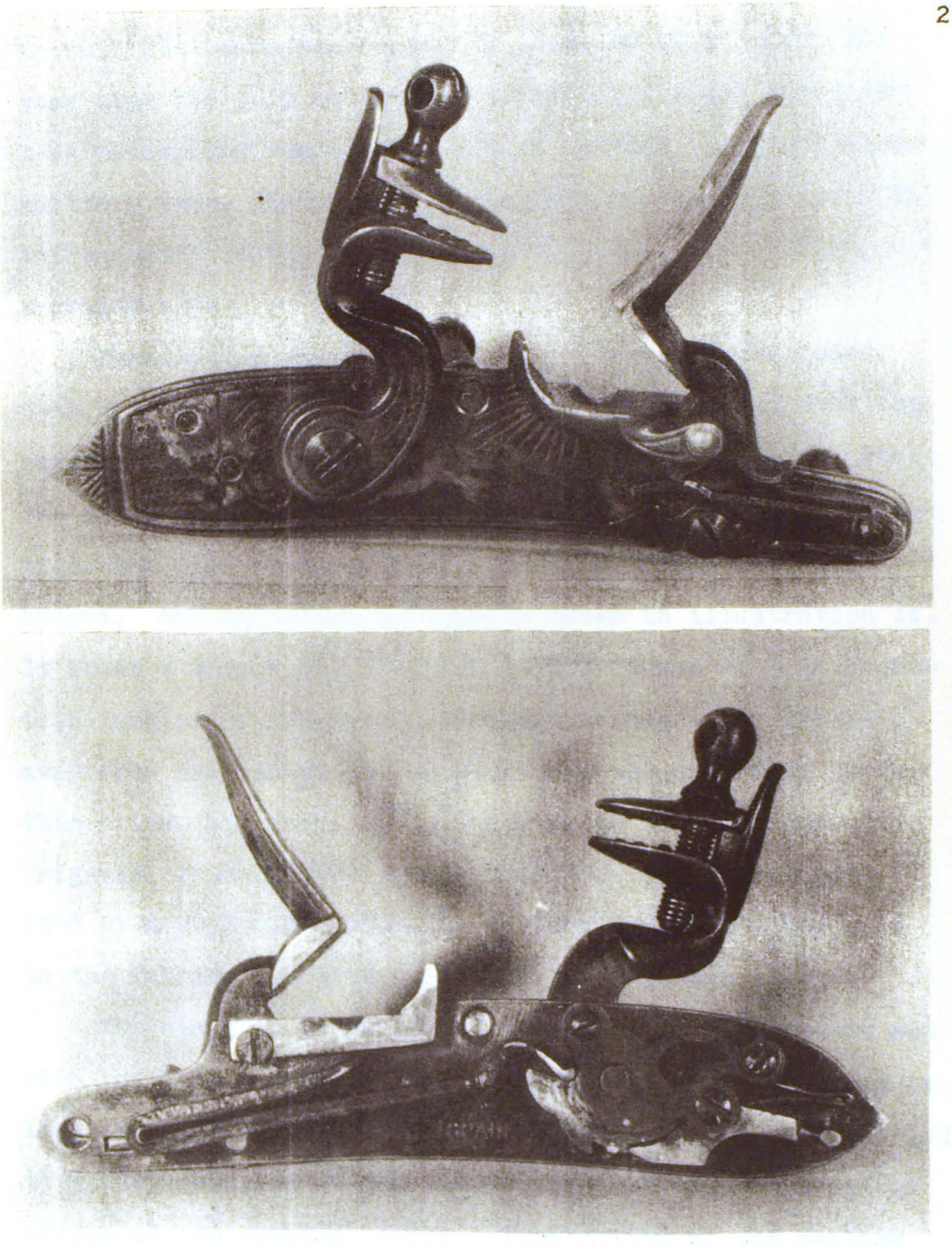


Illustration 10

Reproduction Flintlock
4 3/8 inches long, Note Fly

known. Most European countries produced it at about the same time but only on weapons of quality, since the older hook mainspring remained in use on cheaper locks and most military arms. Actually, it was used on military locks so infrequently it can almost be said it was used only on sporting arms.

Examination of the tumblers on all the locks found, both originals and modern reproductions, substantiated the statement made in the discussion on detents or flies, that the tumbler was always made concentric to the axis of rotation, the full-cock and half-cock notch being the same height. One exception to this is shown in illustration 11. It shows a modern reproduction lock designed with an eccentric tumbler so the full-cock notch is higher or further away from the center of rotation than the half-cock notch. This allows the lock, without a fly, to be used with set-triggers or the normal single trigger. It was designed in 1946 by a Tennessee gunsmith, Royland Southgate, and used in the fabrication of replicas of black-powder rifles.

The study of locks caused notice of an improvement not with the lock itself, the use of gold and later platinum to line the vent and pan on expensive weapons. It was intended to prevent erosion of the iron by the hot gas and chemical action of the burning powder. Examination of the melting temperature of gold, platinum, and iron show they are all subject to melting by the intense blast of heat from the touch-hole of the weapon. Therefore, we can conclude the

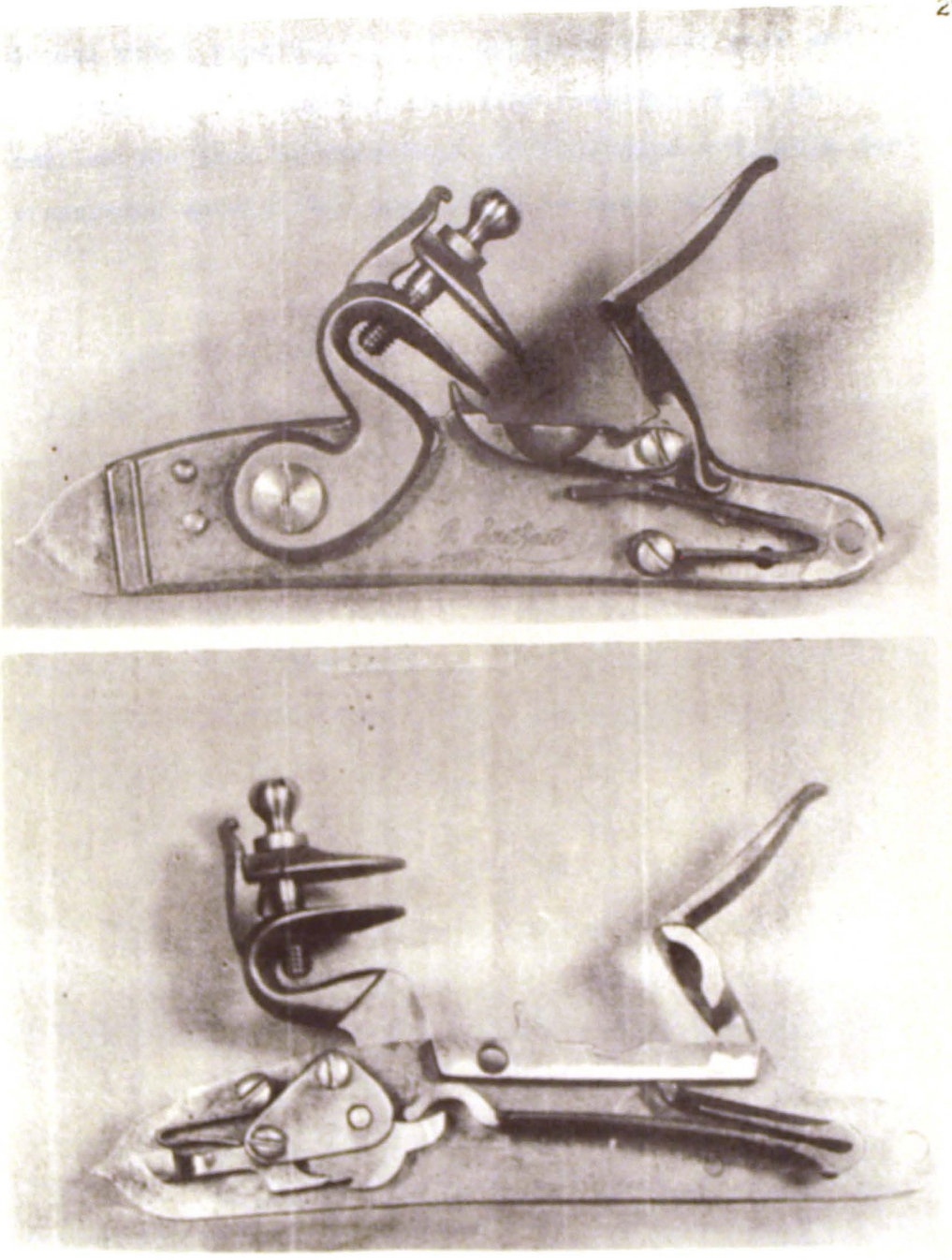


Illustration 11

Reproduction Flintlock, 4 5/8 inches long,
Maker Royland Southgate, Tennessee

actual value received for the contined use of gold and platinum was to keep the iron from rusting. When we realize the lack of materials and knowledge available for preserving metals this assumption is more valid.

Chapter 5

CONCLUSIONS

Despite its long life and the various refinements and improvements, the flintlock as an ignition system possessed serious faults which could not be completely remedied. The flint, tearing small and very hot particles of steel from the frizzen, was the source of ignition, and even best quality flints were liable to break or chip at the crucial moment. In any event they must be changed every fifteen to seventy-five shots, depending upon how cautious the shooter was and how good his flints.

There was another fault. The vent or touch-hole between the flash-pan and the main charge was liable to clogging from powder fouling, actually subject to being fouled at each shot whether the first or fifteenth one since the weapon was cleaned. Priming powder had to be changed periodically as it became damp and unreliable.

Still another fault of the flintlock lay in timing. Regardless of the precision of the lock mechanism there was still a small time delay as well as the disturbance to aim caused by the flint crashing into the frizzen.

All of these problems were accepted at the time by those desiring to fire a weapon except for a small number

of experimenters. Even after the development of the new percussion lock the flintlock continued to be preferred by many for several years. The flintlock died the hardest of any of the ignition locks on firearms. But this is not so surprising when it is recalled that it lasted from 1610 to about 1825, longer than any of the others. That there has been a rebirth of the weapon in modern times is certainly a tribute to its efficacy--an efficacy which has been achived by a long record of technical improvements and inventions. And perhaps the end of these improvements has not yet come. Who can say that the flintlock is obsolete?

After all, the longbow is still used, even if those who use it are confined to a small number of hobbyist. It was used to shoot Germans at Dunkerque in 1940.

FOOTNOTES

[1] Joseph G. Rosa and Robin May, The Pleasure of Guns (New York: Crown Publishers, Inc., 1974), p. 22.

[2] Ibid., p. 8.

[3] Ibid., p. 9.

[4] Ibid., p. 23.

BIBLIOGRAPHY

Bailey, DeWitt, Ian Hoag, Geoffrey Boothrand, and Frederick Wilkinson. Guns and Gun Collecting. London, WI: Octopus Books Ltd, 1972.

Gluckman, Arcadia. United States Martial Single Shot Pistols. New York: The Stackpole Co., 1956.

Moore, Warren. Guns Told in Pictures. New York: Grosset & Dunlap Publishers, 1963.

Roberts, Ned H. The Muzzle-Loading Cap Lock Rifle. Harrisburg, Pa.: Stackpole Books, 1952.

Rosa, Joseph G., and Robin May. The Pleasure of Guns. New York: Crown Publishers, Inc., 1974.

Wilkinson, F. Flintlock Guns and Rifles. Harrisburg, Pa., Stackpole Books, 1971.