

1.0

Firearms History

1.0.1 Introduction

It may seem that a history of firearms is an illogical way to begin this book, but any competent forensic firearms examiner needs to have a good working knowledge of this subject matter. As such, it should form part of the court qualification process at the beginning of any trial. Having said that, though, it would be unreasonable to expect a firearms examiner with many years' experience to be able to give, for example, a precise date for the introduction of the Anson and Deeley push button fore-end. Such an esoteric piece of firearms history may have formed part of the examiner's training many years ago, but unless s/he had a particular interest in shotgun history it would be unlikely that s/he would remember little other than an approximate date or period.

Knowledge of the subject matter will also add gravitas to the presentation and examination of witnesses by the legal team. It may not help the case, but it will show that the solicitor or barrister is familiar with the history and workings of the presented firearm and can pose knowledgeable questions without the fear of being bamboozled by an expert witness.

It should also be appreciated that there is a very large market in replica 'antique' firearms. Some of these are only approximate reproductions of the original weapon, while others are made to the exact measurements of the original. A working knowledge of what these particular weapons look like and how their mechanisms work is therefore a requisite.

While a history of firearms should start with the earliest of hand cannons, progressing through the wheel lock, miquelet and so on. For this book, however, it will start at the flintlock, as it is unlikely that anything earlier would be encountered in everyday case work. A much more comprehensive history of firearms is offered in Appendix 4.

1.0.2 The flintlock (Figure 1.0.1)

The flintlock ignition system really signalled the advent of an easy-to-use firearm with a simple mechanism for the discharge of a missile via a powdered propellant. In this type of weapon, the propellant was ignited via a spark produced by striking a piece of flint against a steel plate. The piece of flint was held in the jaws of a small vice on a pivoted arm, called the *cock*. This is where the term 'to cock the hammer' originated.

The steel, which was called the *frizzen*, was placed on another pivoting arm opposite the cock, and the pan containing the priming compound was placed directly below the frizzen. When the trigger was pulled, a strong spring swung the cock in an arc so that the flint struck the steel a glancing blow. This glancing blow produced a shower of sparks which dropped into the priming pan, igniting the priming powder. The flash produced by the ignited priming powder travelled through the touch hole, situated at the breech end of the barrel, igniting the main charge in the barrel and thus discharging the weapon.

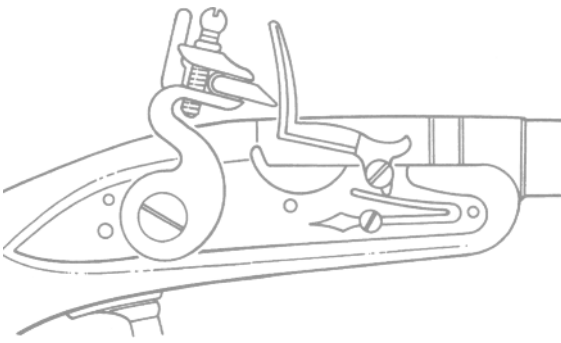


Figure 1.0.1 The flintlock.

The flintlock represented a great advance in weapon design. It was cheap, reliable and was not overly susceptible to damp or rainy conditions. Unlike the complicated and expensive wheel lock, this was a weapon that could be issued in large numbers to foot soldiers and cavalry alike.

As in the case with most weapon systems, it is very difficult to pinpoint an exact date for the introduction of the flintlock system. There are indications of it being used in the middle of the 16th century, although its first widespread use cannot be established with acceptable proof until the beginning of the seventeenth century.

Three basic types of flintlock were made:

Snaphaunce (Figure 1.0.2)

A weapon with the mainspring inside the lock plate and a priming pan cover which had to be manually pushed back before firing.

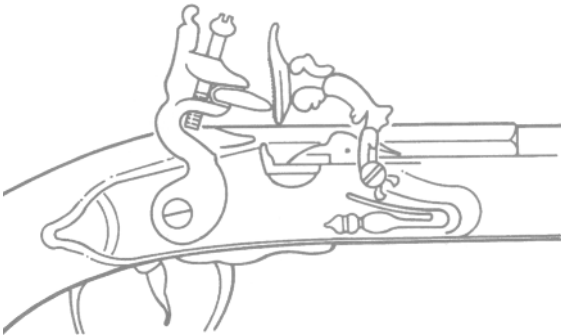


Figure 1.0.2 The snaphaunce.

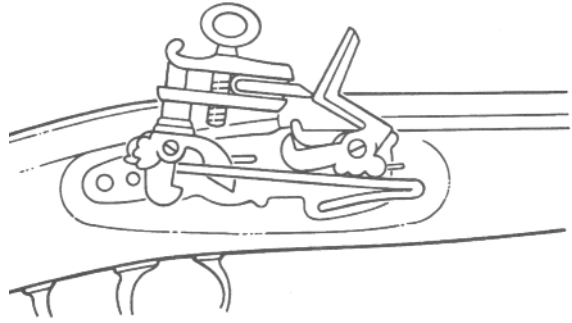


Figure 1.0.3 The miquelet.

The snaphaunce was used from about 1570 until modern times (in North African guns), but by about 1680 it was out of fashion everywhere except Northern Italy, where it persisted until the 1750s.

Miquelet (Figure 1.0.3)

A weapon with the mainspring outside of the lock plate, but with a frizzen and priming pan cover all in one piece. In this type of lock mechanism, the pan cover was automatically pushed out of the way as the flint struck the frizzen. The great advantage of this type of lock is that the gunpowder in the priming pan is covered up until the point of ignition by a spring loaded plate, thus allowing the weapon to be used in adverse weather conditions.

It is generally thought that the miquelet was introduced after the disastrous campaign of Algiers (1541), where 'wind and rain' prevented firing, firstly by blowing away the gunpowder and/or secondly by wetting the gunpowder. In less than three decades, a lock did appear that is known today as the miquelet lock.

True flintlock (Figure 1.0.4)

A weapon with a mainspring on the inside of the lock plate and with the frizzen and priming pan cover in one piece. This also had a half cock safety position, enabling the weapon to be safely carried with the barrel loaded and the priming pan primed with powder. This system was probably invented by

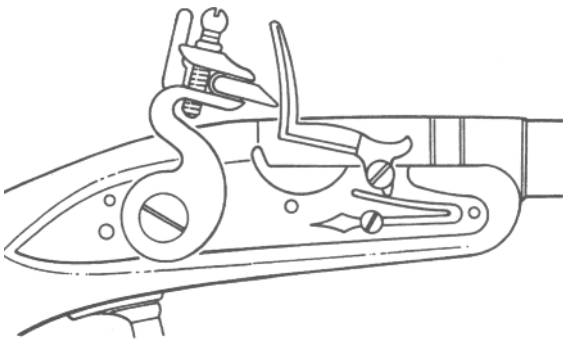


Figure 1.0.4 True flintlock.

Mann Le Bourgeois, a gun maker for Louis XIII of France, in about 1615.

1.0.3 The percussion system (Figure 1.0.5)

The flintlock continued to be used for almost 200 years. It was not until 1807 that a Scottish minister, Alexander John Forsyth, revolutionised the ignition of gunpowder by using a highly sensitive compound which exploded on being struck. When struck by a hammer, the compound, *mercury fulminate*, produced a flash which was strong enough to ignite the main charge of powder in the barrel. A separate sparking system and priming powder was now no longer required. With this invention, the basis for the self-contained cartridge was laid down and a whole new field of possibilities opened up.



Figure 1.0.5 The percussion lock.

Once this type of ignition, known as *percussion priming*, had been invented, it was still some time before ways for it to be applied practically were perfected.

From 1807 to 1814, a wide range of systems were invented for the application of the percussion priming system, including the Forsyth scent bottle, pill locks, tube locks and the Pauly primer cap.

The final form of the percussion cap was claimed by a large number of inventors. It is, however, probably attributable to Joshua Shaw, an Anglo-American living in Philadelphia in 1814. Shaw employed a small iron cup, into which was placed a small quantity of mercury fulminate. This was placed over a small tube, called a *nipple*, projecting from the breech end of the barrel. When the hammer struck the cap, this detonated the mercury fulminate, causing a strong flame to travel down the nipple and thus igniting the main charge in the breech end of the barrel.

1.0.4 The pinfire system (Figure 1.0.6)

Introduced in the United Kingdom at the Great Exhibition in London in 1851 by Lefauchaux, the pinfire was one of the earliest true breech-loading weapons, using a self-contained cartridge in which the propellant, primer and missile were all held together in a brass case.

In this system, the percussion cup was inside the cartridge case, while a pin, which rested on the open end of the percussion cup, protruded through the side of the cartridge case. Striking the pin with the weapon's hammer drove the pin into the priming cup, causing the mercury fulminate to detonate and so ignite the main charge of propellant powder. The pin, which protruded through a slot in the side of the weapons chamber, not only served to locate the round in the correct position, but also aided the extraction of the fired cartridge case.

The pinfire was at its most popular between 1890 and 1910 and was still readily available in Europe until 1940. It had, however, fallen out of favour in England by 1914 and was virtually unobtainable by 1935. Boxes of old ammunition can, however, still be purchased in shooting quantities, from specialised ammunition dealers. This could place into question

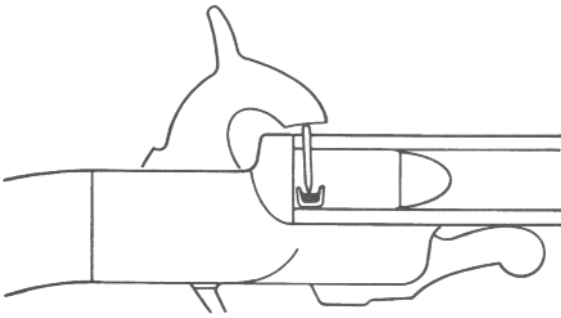


Figure 1.0.6 The pinfire.

the placing of this type of weapon into the category of 'Antique' rather than that of a firearm requiring certification.

Calibres available for pinfire revolvers were 5, 7, 9, 12 and 15 mm, while shotgun and rifle ammunition in 9 mm and 12 bore and other various calibres were also available.

The really great advance of the pinfire system was, however, not just the concept of it being a self contained cartridge, but *obturation*, the ability of the cartridge case under pressure of firing to swell and so seal the chamber preventing the rearward escape of gases.

1.0.5 The rimfire system (Figure 1.0.7)

Although the pinfire system was a great step forward, it did have a number of drawbacks, not least of which was the tendency for the cartridge to discharge if dropped onto its pin. The problem was all but eliminated by the rimfire system which, like the pinfire, was exhibited at the Great Exhibition in 1851.

The rimfire system consists of a thin walled cartridge with a hollow flanged rim. Into this rim is spun a small quantity of a priming compound. Crushing the rim with a firing pin causes the priming compound to explode, thus igniting the propellant inside the case.

The initial development was made by a Paris gunsmith, Flobert, who had working examples of it as early as 1847. It was some time before it gained acceptance, however, and it was not until 1855 that

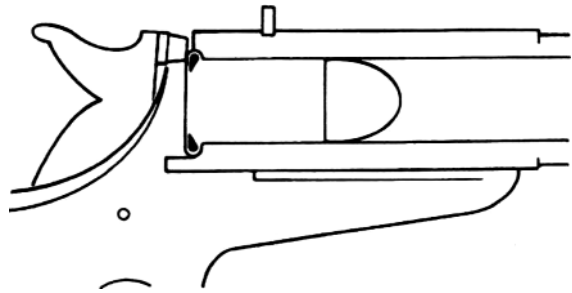


Figure 1.0.7 The rimfire system.

Smith and Wesson manufactured the first revolver to fire rim fire cartridges. This was a .22" calibre weapon in which the barrel tipped up by means of a hinge on the top of the frame. This enabled the cylinder to be removed for loading and unloading the weapon.

Although the rimfire was a great step forward, the rimfire cartridge was only suitable for high pressure weapons in small calibres. With any calibre above .22", the soft rim necessary for the ignition system resulted in cartridge case failures.

1.0.6 The Dreyse needle fire system (Figure 1.0.8)

The Dreyse needle gun was a military breech-loading rifle famous as the main infantry weapon of the Prussian army, who adopted it for service in 1848 as the Dreyse Prussian Model 1848. Its name, the 'needle gun', comes from its needle-like firing pin, which passed through the cartridge case to impact on a percussion cup glued to the base of the bullet.

The Dreyse rifle was the first breech-loading rifle to use a bolt action to open and close the chamber, executed by turning and pulling the bolt handle.

The Dreyse rifle was invented by the gunsmith Johann Nikolaus von Dreyse (1787–1867) and it was first produced as a fully working rifle in 1836. From 1848 onwards, the new weapon was gradually introduced into the Prussian service, then later into the military forces of many German states. The employment of the needle gun radically changed military tactics in the 19th century.

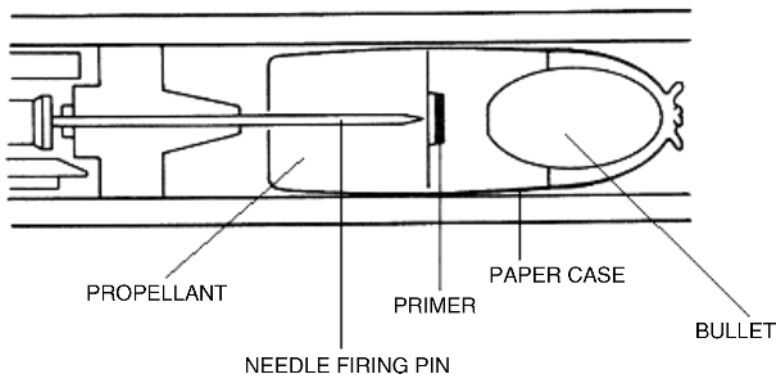


Figure 1.0.8 The Dreyse needle fire.

The cartridge used with this rifle was a self-contained paper case containing the bullet, priming cup and black powder charge. The bullet, which was glued into the paper case, had the priming cup glued to its base. The upper end of the case was rolled up and tied together. Before the needle could strike the primer, its point had to pass through the paper case, then through the powder charge, before striking the primer cup on the base of the bullet. The theory behind the placement of the primer was that it would give a more complete ignition and, thus, combustion of the charge of propellant. Unfortunately, this led to severe corrosion of the needle, which then either stuck in the bolt or broke off, rendering the rifle useless. It was, however, a major step forward in the production of a modern rifle firing a self-contained cartridge.

1.0.7 The centre fire system (Figure 1.0.9)

This was the great milestone in weapon and ammunition development. In centre fire ammunition, only

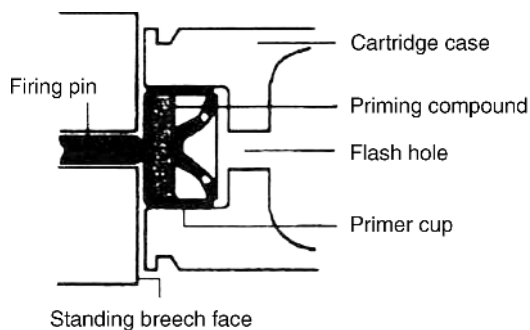


Figure 1.0.9 The centre fire system.

the primer cup needed to be soft enough to be crushed by the firing pin. The cartridge case could thus be made of a more substantial material, which would act as a gas seal (obturation) for much higher pressures than could be obtained with rimfire ammunition.

Once again, the exact date for the invention of the first centre fire weapon is difficult to ascertain, although a patent was issued in 1861 for a Daws centre fire system.

Probably no invention connected with firearms has had such an impact on the principles of firearms development as the obturating centre fire cartridge case. Although invented around 1860, the principles are still the same and they are utilised in every type of weapon, from the smallest handgun up to some of the largest artillery pieces.

Rocket-propelled bullets (the Gyrojet), caseless ammunition, hot air ignition and many other esoterica have come and gone. However, for simplicity, reliability and ease of manufacture, the centre fire ignition system in an obturating cartridge case has not been excelled.

1.0.8 The revolver (Figure 1.0.10)

A revolver is a weapon that has a revolving cylinder containing a number of firing chambers (basically a revolving magazine) which may be successively lined up and discharged through a single barrel.

In the long history of revolvers, no name stands out more strongly than that of Samuel Colt. However, despite his claims to the contrary, Colt did not invent the revolver.

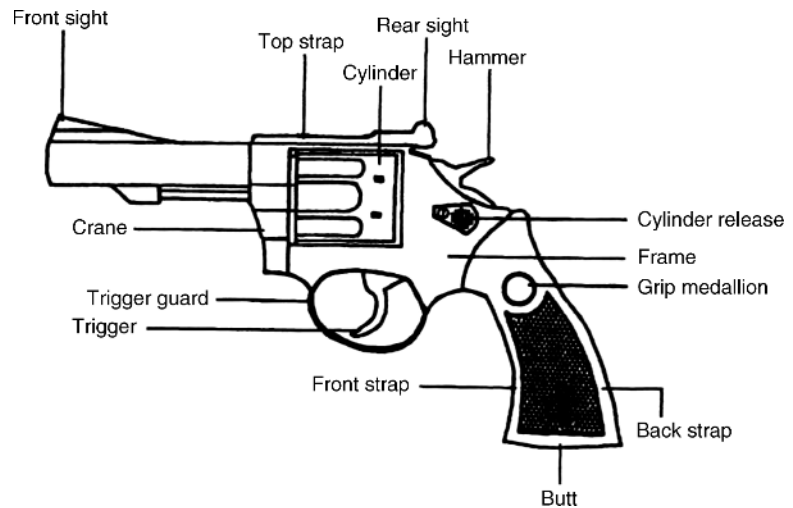


Figure 1.0.10 Major parts of a typical solid frame revolver.

The earliest forms of the revolver include a snaphaunce revolver made in the days of King Charles I, said to have been made before 1650, and an even earlier weapon made during the reign of Henry VIII, some time before 1547.

Those early revolvers were, surprisingly enough, practically identical to the actions covered in Colt's early patents. The actions for those early patents are still in use today in the Colt Single Action Army or Frontier model.

Colt's original patent, dated 1835, dealt with revolving of the cylinder via a ratchet and pawl arrangement. The original patents belonging to Colt were so tightly worded that no other manufacturer had any real impression on the market until these patents ran out in 1850. After this, the market opened up, with Dean-Adams in 1851, Beaumont in 1855, and Starr and Savage in 1865 all bringing out innovative designs. These were, however, still all muzzle-loading percussion systems.

It was not until the advent of the rimfire in 1851 that breech-loading revolvers really started to appear. Even then, it was not until 1857 that Smith and Wesson introduced the first hinged frame .22" rim fire revolver. The patent for bored-through chambers and the use of metallic cartridges gave Smith and Wesson the market until 1869.

With the passing of the Smith and Wesson patents, there was a flood of breech-loading arms in calibres from .22" to 50". However, except for .22" target shooting, the days of the rimfire were

numbered, thanks to the introduction of the centre fire system.

The first centre fire Colt revolver to be patented was the Colt Single Action Army Model 1873. In 1880, Enfield produced a .476" hinged frame revolver, but it was a design monstrosity and was soon superseded by the now familiar Webley top latching hinged frame design in 1887. In 1894, this was modified slightly and it became the standard Webley Mk.1 British Army service revolver. In 1889, the US Government officially adopted a Colt .38" revolver, using the now familiar swing-out cylinder system.

A multitude of variations on the Smith and Wesson and Colt designs followed, but little has really changed in the basic design of the revolver mechanism since then. It would seem that little can be done to improve on the efficiency of the basic Smith and Wesson and Colt designs.

1.0.9 The self-loading pistol (Figure 1.0.11)

The principle of the self-loading pistol was grasped long ago. It is reported in Birche's History of the Royal Society for 1664 that a mechanic had made a claim of being able to make a pistol which could 'shoot as fast as presented and stopped at will'. However, without the necessary combination of a self-contained cartridge, smokeless propellant and

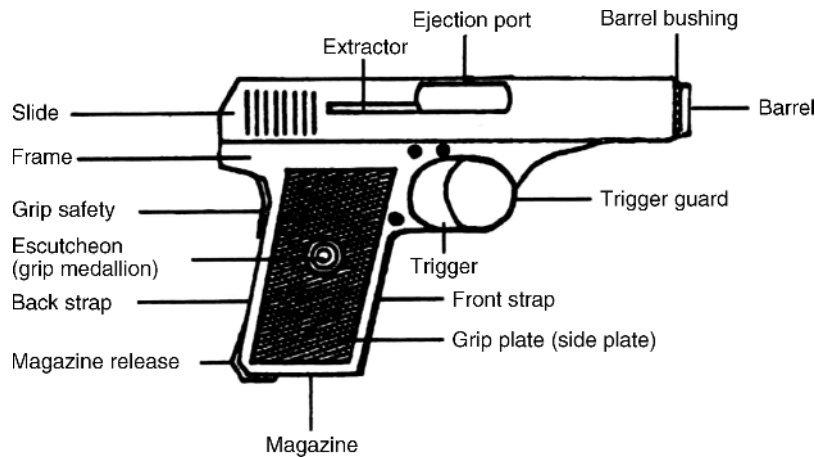


Figure 1.0.11 Major parts of a typical self-loading pistol.

metallurgical advances, it was not possible to utilise these principles in a practical way.

While patent records from 1863 show numerous attempts to develop a self-loading pistol, it was not until 1892 that the first successful weapon appeared. This was a weapon patented by the Austrian Schönberger, and made by the company Steyr. It was a blowback design and made for the 8 mm Schönberger, a very powerful cartridge.

The first commercially successful design was by an American, Hugo Borchardt. Unable to finance his design, he took it to Germany to have it manufactured there. Although clumsy, this weapon was of radical design, containing the first magazine to be held in the grip and the 'knee-joint' toggle locking system. It was this design which was slightly modified by Luger to become Germany's first military self-loading pistol, the Walther P08.

In 1893, Bergman produced a whole range of pistols, one of which, the 1897 8 mm 'Simplex', is of particular interest as the cartridge became the .32" Colt Automatic Pistol (ACP) cartridge.

In 1896, the story of the truly successful self-loading pistol really began with the introduction of the 7.63 mm calibre Mauser 'broom handle' pistol (Mauser Model C96 pistol). This was the pistol made famous by Winston Churchill, who purchased one for use during the Sudan campaign of 1898. Churchill credited the weapon with saving his life when he shot his way out of a native trap, 'killing several

fuzzy-wuzzies'! I have lost count of the number of Mauser C96 pistols I have examined which have had 'Winston Churchill' engraved on the side. So far not one has proved to be genuine!

In 1898, the German factory of DWM brought out the first model of the famous Luger pistol in 7.65 mm Parabellum calibre. In 1904, the weapon was made available in 9 mm Parabellum, which was the calibre adopted for the German service pistols.

In 1897, John Browning, the greatest of all American small arms designers, produced his first patent. This was finally introduced as the Model 1900 Colt .38" automatic.

Webley made a few unsuccessful forays into the self-loading pistol market, with their .455" calibre 1904 model, the .45" 1905 model, the 1910 .38" calibre and the .455" Navy model in 1913. The Webley design was not, however, very successful and never became popular.

Probably the most successful pistol ever to be introduced was the Colt Model 1911. This was designed by Browning and was placed into military service as the Colt Government Model in .45" calibre. With minor modifications, as the Model 1911A1, the weapon was the standard issue military weapon for the USA until the late 1980s.

Since then, the main innovations have been in the use of lightweight aluminium and plastics for the weapons frame, the move towards smaller calibres and higher velocity bullets, the development of

magnum handgun ammunition and the use of gas-operated locking systems. These are, however, only variations on a theme and, as with revolvers, it would seem that there is little that can be done to improve on the basic design.

Further reading

- 1 Chase, K. (2003), *Firearms: A Global History to 1700*, Cambridge University Press, ISBN 0-521-82274-2.
- 2 Myatt, F. *An Illustrated History of the Development of the World's Military Firearms During the 19th Century*.
- 3 Fowler, W., North, A. & Stronge, C. *The Development of Small Firearms, from 12th-century Hand Cannons to Modern-day Automatics*.
- 4 Fowler, W., North, A., Stronge, C. & Sweeney, P. *The Illustrated World Encyclopaedia of Guns: Pistols, Rifles, Revolvers, Machine and Submachine Guns through History in 1200 Colour Photographs*.
- 5 Hogg, I. *Jane's Guns Recognition Guide: Every firearm in use today*. Jane's Recognition Guides.
- 6 Hogg, I.V. *The Greenhill Military Small Arms Data Book*.
- 7 Greener, W.W. *The Gun and Its Development*.
- 8 *Jane's Infantry Weapons* (2012).
- 9 Mathews, *Firearms Identification* Vol. I, II & III.