

2. The History of Firearms

Literature to this Chapter

Only books and the corresponding abbreviations containing substantial amounts of historical data referring to the development of firearms are listed below. Further references are marked with an abbreviation and can be found in the reference and bibliography section at the end of the book.

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Goal of this Chapter

The development of small arms and handguns will be explained through selected illustrations with accompanying text in a condensed, systematical and clear manner.

13th Century

Fig. 2 – 1a



Ca. 1260: Roger Bacon Black Powder Recipe

The Franciscan Monk of Ilchester, England, (1214 – 1294) makes mention in his manuscript, “Opus Majus”, of the oldest known recipe in Europe for black powder at the time. Firearms from this time are not known.

Source GaJo, Page 15

Recipe for black powder:

Saltpeter:	7 parts
Sulfur:	5 parts
Charcoal:	5 parts

Photo: Wikipedia

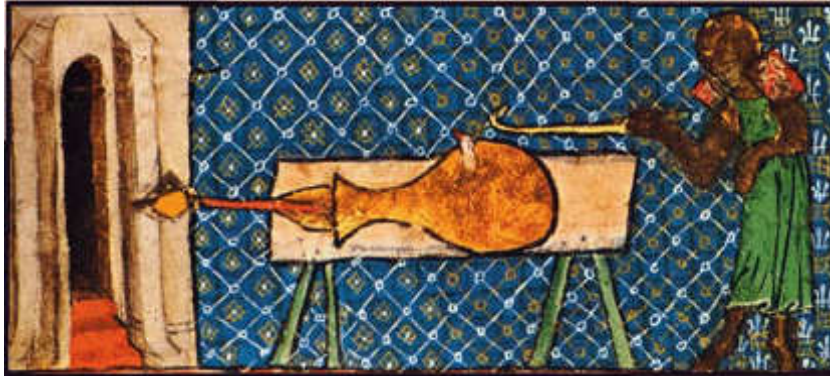
14th Century

Ca. 1326: Bronze Barrel, Walter de Milemete

Oldest illustration of a firearm from Chaplain Walter de Milemete under King Edward III of England in the year 1326 in his manuscript, "De Secretis Operibus Artes et Naturae et de Nullitate Magiae". A vase shaped barrel is lit by a Knight. An arrow leaves the barrel.

Source: WiFr, Page 8–32

Fig. 2 – 1b



Touch hole: On top
 Ignition: Kindling on a stick
 Projectile: Arrow

Christ Church, Oxford
 Photo: PeHa, Page 32

Fig. 2 – 1c



Touch hole: On side
 Ignition: Glowing iron rod
 Projectile: Arrow

Christ Church, Oxford
 Photo: PeHa, Page 32

Ca. 1340: Loshult Bronze Barrel

Oldest firearm still in existence, found 1861 in the Swedish town of Loshult. Its form shows great resemblance to the illustrations of Walter de Milemete. According to metallurgical tests, the bronze stems from the mining area of the Middle Slovakian Mountains.

Source: DuJa, Page 25

Fig. 2 – 2



Material: Bronze
 Length: 300 mm
 Bore length: 270 mm
 Caliber: 31 mm

Statens Historiska Museum, Stockholm
 Photo: PoDu, Page 9

Ca. 1370: Bernese Hand Gun

Short, hand forged, nine-edged iron barrel on original wooden stock attached with two iron bands. Touch hole without pan lies on top. The iron hook to receive the recoil on the edge of a wall is fastened in a slot and was most likely added in the 15th century.

Source: WeRu, Bd. IV, Page 153–154

Fig. 2 – 3



Total length: 952 mm
 Barrel length: 185 mm
 Caliber: 35 mm

Bernese Historical Museum
 Photo: BHM

Ca. 1375: Iron Fist Barrel

The iron fist barrel from the area of Trübau in Mähren has an octagonal barrel forged over a mandrill. It has reinforcements in the powder chamber and the muzzle area. The barrel is cracked on the side. The powder groove ends in the shape of touch hole.

Source: DuJa, Page 25

Fig. 2 – 4



Barrel length: 221 mm
 Caliber: 17.5 mm
 Bore length: 196 mm

City Museum, Moravská Trebova,
 Zzech Republic
 Photo: DuJa, Page 10

Ca. 1375: Four Barrel Hand Cannon

This is one of the earliest multi-barreled firearms. Four round barrels are forged to a central part. Its back end is constructed as a sleeve to incorporate a wooden rod. In addition, the iron barrels are held together with three forged iron bands. Each iron barrel has its own touch hole.

Source: PoDu, Page 41

Fig. 2 – 5



Total length: 185 mm
 Barrel length: 100 mm
 Caliber: 10 mm
 Weight: ca. 8 kg

Bernese Historical Museum
 Photo: BHM

Ca. 1380: Swedish Bronze Hand Arquebus Barrel

On the backside, the wall gun has a socket to attach a wooden rod. A hook and head also allow the pole gun to be used as a truncheon.

Source: PeHaL, Page 16

Fig. 2 – 6



Caliber: 23 mm

Statens Historika Museum, Stockholm
Photo: PeHaL, Page 16

Ca. 1380: Bombard with Elevation Adjustment

Early adjustable artillery: A barrel forged from rods is reinforced with three rings. The attachment is made with two open brackets on an offset stock. An iron rod inserted through the stock serves as a pivot shaft for the elevation adjustment. The selected elevation can be maintained with a friction lock at the rear end of the stock. The tunable unit is mounted on a cylindrical stanchion.

Source: PoDu, Page 24

Fig. 2 – 7



Caliber: 50 mm
Adjustment range: Circa 45°
Gun carriage: Wooden carriage reconstruction

Bernese Historical Museum
Photo: BHM

Ca. 1385: Mons Meg Bombard

Oldest and largest preserved bombard with a barrel forged from iron rods, reinforced with iron bands and detachable powder chamber. With it, iron balls of 510 kilograms could be shot 1250 meters. 250 kilogram stone balls could be shot 2500 meters.

Source: PeHa, Page 35

Fig. 2 – 8



Caliber: 508 mm
Chamber diameter: 254 mm
Barrel length: 4108 mm
Weight: 5 t

Edinburgh Castle
Photo: FfCh

Ca. 1390: Cast Iron Stone Gun

One of the oldest preserved cast iron stone guns from Castle Landskron in Ahrweiler. This archeological find shows that cannons and mortar barrels were cast in iron very early.

Source: EBGf, IN EW533

Fig. 2 – 9



Zeughaus, Berlin
Photo: BeSt, Page 21

Ca. 1390: Italian Stone Bombard

The Stone gun with wooden carriage and forged iron barrel was made in Susa, close to Turin. There is a simple touch hole on top of the barrel. The elevation is adjusted with a vertical post at the back end of the carriage. The carriage was reconstructed from drawings from 1449.

Source: PoDu, Page 26

Fig. 2 – 10



Caliber: 12 cm
Barrel weight: 65 kg

Bernese Historical Museum
Photo: PoDu, Page 26

Before 1399: Tannenberg Hand Gun

Light and compact bronze hand cannon with small flash pan on top, slightly moved to the side with an integral socket for the insertion of a wooden rod. It was dug up at the Castle Tannenberg in Hessen, which was destroyed in 1399.

Source: HoAr, Page 8

Fig. 2 – 11



Barrel length: 320 mm
Caliber: 17.3 mm

Germanisches Museum, Nuremberg
Photo: HoAr, Page 6

15th Century

Ca. 1400: Vedelspang Iron Rod Arquebus

It is very likely that the iron rod gun came from the destroyed Castel Vedelspang in Schleswig. Its iron rod is forged into the barrel as a breech plug and serves as a stock. The hook is forged around the barrel as a band. Source: HoAr, Page 9

Fig. 2 – 12



Total length: 750 mm
 Barrel length: 180 mm
 Caliber: 19 mm

Tojhusmuseet, Kopenhagen
 Photo: HoAr, Page 9

Ca. 1430: Tiber Hand Gun

Early hand gun with iron barrel and stepped square stock. Forged barrel made from two layered iron rods with eight reinforcement bands. In the area of the touch hole, the pipe is cracked. To hang up the hand gun there is a side ring on the middle reinforcement ring. The weapon was found in the Tiber, near Rome. Source: WeRu, Bd. IV, Pages 154–155

Fig. 2 – 13



Total length: 755 mm
 Barrel length: 250 mm
 Caliber: 23 mm

Bernese Historical Museum
 Photo: BHM

Ca. 1430: Iron Pole Wall Gun

Octagonal forged iron barrel. The front third is turned by 45° on its longitudinal axis. An iron rod is welded into the barrel as the breech plug. The vertical oval iron ring serves the handling of the gun during firing and to hang it in the arsenal. The Wall gun comes from the Tyrol. Source: WeRu, Bd. IV, Page 157

Fig. 2 – 14



Total length: 1225 mm
 Barrel length: 510 mm
 Caliber: 25 mm

Bernese Historical Museum
 Photo: BHM

Ca. 1435: Pole Gun, Kurisches Haff

In 1871 a bronze Pole gun was found in Kurisch Haff. This early firearm is of special interest since it has still its original stock. The flash pan at the top with swiveling lid, as well as the ramrod inserted into a drilled hole in the wooden pole stock, indicate a very advanced weapon of the time.

Source: ThM, Page 4

Fig. 2 – 15



Barrel length: 444 mm

Bore length: 365 mm

Caliber: 17 mm

Muzeum Wojska Polskiego, Warszaw

Photo: HoAr, Page 8

Ca. 1450: Five Barreled Artillery, Southern Germany

Five barrels are held in a bundle by specially cut wooden boards. The barrel bundle is held on a wooden carriage with bands. Each barrel has its own touch hole. These are arranged in two layers. Origin: Southern Germany.

Source: PoDu, Page 37

Fig. 2 – 16



Fürstlich Hohenzollerisches Museum,
Sigmaringen

Photo: PoDo, Page 37

Ca. 1455: Light Match Lock Gun (Culverin) on Carriage

French breech loader with an iron barrel forged from iron rods, reinforced with numerous rings. To adjust the elevation, the barrel bed is lifted in the front or the back and then secured by cross pins.

Fig. 2 – 17



Total length: 1360 mm

Barrel length: 562 mm

Caliber: 27 mm

Bernese Historical Muesum

Photo: BHM

Ca. 1464: Dardanelles Artillery of Mohammed II

The largest known cannon barrel still in existence. It has a bronze pipe of 5.4 meters in length, a caliber of 64 centimeters and a weight of 18 ³/₄ tons. Mohammed II, the Turk, at the siege of Constantinople, cast the bronze barrel in front of the city walls. The threaded powder chamber with a diameter of approximately 50 centimeters is visible. Thirteen cannons were successfully put into action at the siege of Constantinople.

Source: PoDu, Page 33–38, FfCh

Fig. 2 – 18



Length: 5385 mm
 Caliber: 635 mm
 Stone ball: 720 pounds
 Rate of fire: 7 balls per day

Tower, London
 Photo: FfCh

Ca. 1470: Wall Gun with Iron Tail

Forged, round and conical iron barrel with reinforcement bulge at the muzzle. The touch hole widens like a funnel towards the flash pan. The hook is forged on. At the end of the barrel, there is a slightly curved tail with a rectangular cross section welded on. The gun comes from the region of Lake Constance.

Source: WeRu, Bd. IV, Page 157

Fig. 2 – 19



Total length: 1510 mm
 Barrel length: 920 mm
 Caliber: 21 mm

Bernese Historical Museum
 Photo: BHM

Ca. 1470: Mobile Breech Loading Artillery

The forged iron barrel, reinforced with iron rings is held to a mobile wooden carriage with iron bands. The elevation is not adjustable. The powder chamber is missing.

Fig. 2 – 20



Barrel length: 600 mm
 Caliber: 23 mm

Bernese Historical Museum
 Photo: BHM

Ca. 1475: Breech loading Artillery

Forged barrel with an upward pointing opening at the rear to insert an iron breechblock. The mobile wooden carriage is a later reconstruction. The elevation is adjusted with a vertical wooden support strut.

Source: PoDu, Page 30

Fig. 2 – 21



Caliber: 100 mm
Carriage: Reconstruction

Bernese Historical Museum
Photo: BHM

Ca. 1480: Mönch's Gun

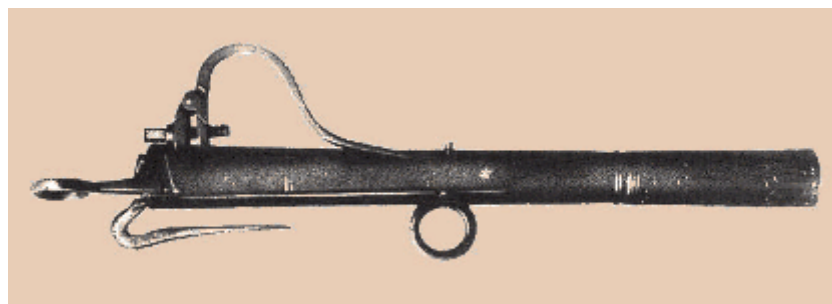
Oldest preserved hand gun with a spark producing ignition system. An iron pyrite is clamped into a serpentine. A flat adjustable file like iron is installed in the flash pan. The priming powder is piled onto the grater. By pulling the grater, the pyrite creates a spark that ignites the priming powder in the flash pan and fires the shot. The fact that the handling of the Mönch's gun as a firearm is difficult could indicate that it is a unique prototype.

Source: HeRo, Page 47, PoDu, Page 67

Fig. 2 – 22a



Fig. 2 – 22b



Total length: 320 mm
Barrel length: 278.1 mm
Caliber: 11.8 mm

Rüstammer
Staatliche Kunstsammlung Dresden
Photo: MüHe, Fig. 27, Page 82

Ca. 1480: Stocked Half Arquebus

A forged, round iron barrel, changing into octagonal shape at the chamber area. Small, forged on, protruding flash pan on the upper left inclined flat of the barrel. The barrel is attached with an iron band, set in a groove at the octagonal area. In addition, three iron pins are installed at the fore end of the shaft. A light wall gun, with or without hook is often called a Half Arquebus.

Source: PrCo

Fig. 2 – 23



Total length: 1792 mm
 Barrel length: 980 mm
 Caliber: 18.8 mm

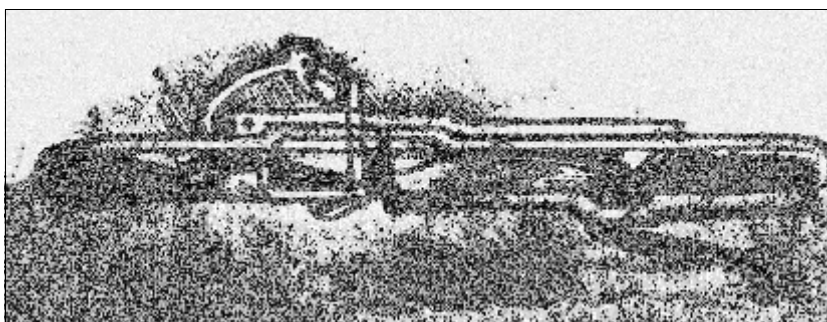
Private collection
 Photo: KuPe

Ca. 1480: Leonardo Da Vinci Wheel Lock

The sketch shows a sectional view of a wheel lock. With an S-shaped spring, the serpentine with the clamped pyrite is pressed onto the friction wheel. Lifting the trigger lever allows the U-spring to turn the friction wheel clockwise via a chain link. The moving friction wheel, together with the pyrite produce the sparks for the ignition. It is possible that this sketch illustrates an early draft for a wheel lock.

Source: RiHo, Page 18

Fig. 2 – 24



Leonardo da Vinci, Codex Atlanticus

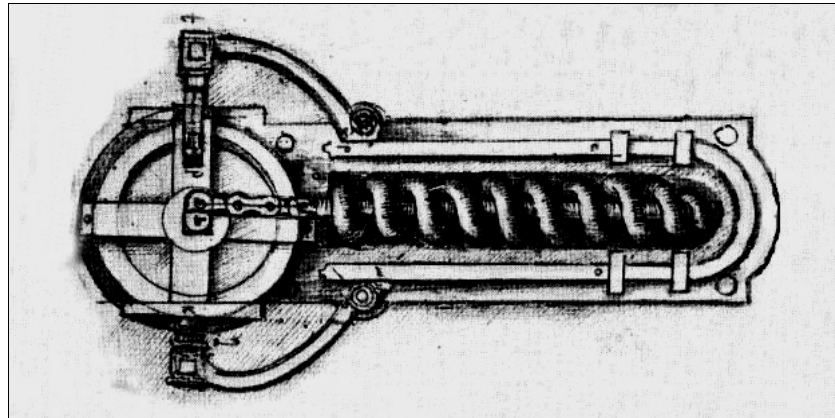
Photo: RiHo, Page 18

Ca. 1480: Leonardo Da Vinci, Wheel Lock with Coil Spring

The illustration shows a wheel with an eccentrically mounted chain that connects the wheel with the end of a coil spring. A U-shaped flat spring wraps around the coil spring. The lower arm of the flat spring is pushing an arm and cam holding a piece of iron pyrite against the lower section of the wheel. The wheel is held in its neutral position by the upper arm with the locking bolt and corresponding hole in the wheel. The locking bolt is held in position with the pressure of the upper end of the flat spring against its cam. The actual sear is a quarter turn counter clockwise away from the neutral position. With a separate key the wheel can be turned counter clock-wise until the sear locks into the locking bolt. This action also rotates the excenter thereby pulling the chain and compressing the coil spring. Lifting the upper arm will free the sear allowing the wheel to rotate under pressure of the coil spring. The resulting rotation and friction against the iron pyrite will create sparks on the lower side of the wheel.

Source: WaUn

Fig. 2 – 25



Leonardo da Vinci, Codex Atlanticus

Photo: RiHo, Page 18

16th Century

Ca. 1490: Early Match Lock Gun

Early version of a matchlock gun with rotating serpentine attached to the side of the stock. The upper end clamps the slow match, the lower serves as the trigger. The counter weight on the lower lever returns the hammer to the vertical position. The illustration shows a reconstruction based on old drawings.

Source: HeRo, Page 26

Fig. 2 – 26



Total length: 925 mm
 Barrel length: 558 mm
 Caliber: 19 mm

Private collection
 Photo: KuPe

Ca. 1500: Match Lock Double Wall Gun

Heavy wall gun with a bronze barrel integral hook and tunnel rear sight. The snap match lock with push button release is attached on the right side of the stock. The barrel was found in the Rhine at Stein am Rhein. Stock and lock are reconstructions copied from a sample in the Landesmuseum Zürich.

Source: PrCo

Fig. 2 – 27



Total length: 1610 mm
 Barrel length: 1040 mm
 Caliber: 22 mm

Private collection
 Photo: KuPe

Ca. 1514: Target Gun with Snap Tinder Lock

The tinder lock would suggest that this weapon is a target gun. The shape of the stock is typical of the area of Basel. Reconstruction of the stock is based on an original owned by the historical museum in Basel, Switzerland.

Source: PrCo

Fig. 2 – 28



Total length: 805 mm
 Barrel length: 505 mm
 Caliber: 18 mm

Private collection
 Photo: KuPe

Ca. 1520: Mobile Cannon, Stein am Rhein, Switzerland

This cannon, also called a Falconet, was placed in an artillery position in the tower of the Castel Hohenklingen, above Stein am Rhein in 1526.

Source: Stadtarchiv, Stein am Rhein

Fig 2 – 29



Castle Hohenklingen, Stein am Rhein

Photo: KuPe

Ca. 1525: Early Wheel Lock Musket, Italy

In this early wheel lock gun, the parts of the lock are external to the weapon.

Source: RoHo, Page 18

Fig. 2 – 30



Total length: 55 cm
 Barrel length: 42 cm
 Caliber: 16 mm

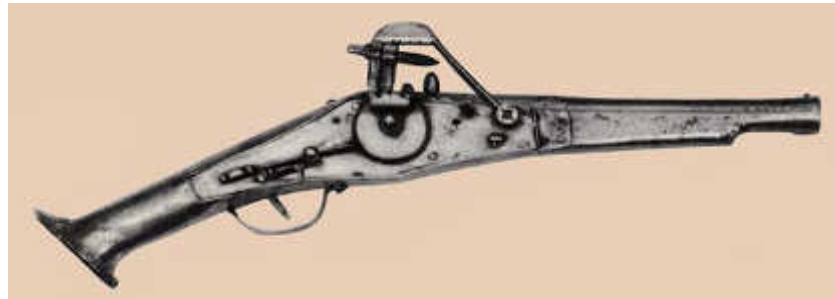
Germanisches Museum, Nürnberg
 Photo: MüHe, Fig. 28

Ca. 1565: Military Wheel Lock Pistol, Germany

All parts of this unusual wheel lock pistol are made of iron. The hammer spring is on the inside. The lock has a safety lever on the side..

Source: RiHo, Page 19

Fig. 2 – 31



Total length: 360 mm
 Barrel length: 280 mm
 Caliber: 14 mm

Wallace Collection
 London
 Photo: RiHo, Page 19

Ca. 1570: Multi Barrel Pole Gun, England

This weapon was also used as a thrust and blow weapon. It has three barrels and nine radially arranged iron points. Two of the muzzles are always covered by a rotating section of sheet metal. Each barrel has its own touch hole. Apparently, the multi barreled gun was owned by King Henry VIII of England and is known as King Henry's walking stick. It is not clear why Henry VIII would have owned an outdated weapon, since at that time the wheel lock was already in use.

Source: HeRo, Page 25

Fig. 2 – 32



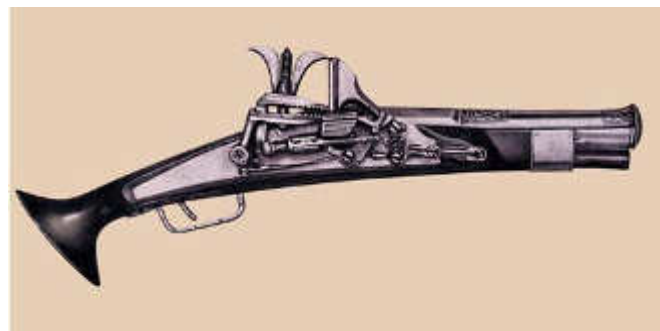
Tower, London

Photo: PoDu, Page 68

Ca. 1580: Pistol with Nuremberg Snaphaunce

This pistol has a lock with a most ingenious pan cover opening mechanism. During the firing rotation of the cock the spring loaded cover lever is released by a cam on the cock.

Fig. 2 – 33



Tower, London

Photo: HoAr, Page 182

Ca. 1580: Over and Under Double Barreled Wheel Lock Pistol, Germany

The wheel lock pistol has two barrels in an over under configuration with two wheel lock systems. The front wheel lock mechanism ignites the load of the lower octagonal barrel. The rear system ignites the upper round barrel.

Source: SaAd

Fig. 2 – 34



Total length: 632 mm
Barrel length: 482 mm
Caliber: 11.5 mm

Victoria and Albert Museum
London
Photo: KuPe

Ca. 1590: Wheel Lock Pistol, Regensburg, Germany

The illustrated wheel lock pistol has an unusual shape with a sharply angled stock, ball knob butt and an iron barrel that has a Tromblon or Blunderbuss muzzle. The prove marks of the city of Regensburg are on the barrel. The advantage of the sharp angled shape and its trigger operation are unclear.

Source: FiAu, 2004, Nr. 652

Fig. 2 – 35



Total length: 280 mm
Barrel length: 225 mm
Caliber: 14.8 mm

Private collection
Photo: KuPe

Ca. 1590: Wheel Lock Pistol, Germany

This wheel lock pistol has a stock similar to a Petronel. It can be shot like a regular pistol or in a shoulder firing position.

Source: PoDu, Page 140

Fig. 2 – 36



Total length: 450 mm
Barrel length: 170 mm
Caliber: 12.4 mm

Owner unknown
Photo: PoDu, Page 140

Ca. 1590: Wheel Lock Pistol, Germany

This beautifully designed wheel lock pistol has a ball knob stock and a slightly angled wheel lock without an outside wheel bearing. The ball knob stock has the advantage that it can be easily taken out of a holster and aimed easily without fear of losing grip.

Source: PrCo

Fig. 2 – 37



Total length: 285 mm
Barrel length: 143 mm
Caliber: 15 mm

Private collection
Photo: KuPe

Ca. 1590: Military Wheel Lock Musket

Muskets with wheel lock were used seldom by light infantry due to their cost and tendency of malfunction in dirty conditions. However, wheel locks combined with matchlocks were used on wall guns and Arquebuses to defend fortified cities and castles. The depicted wheel lock musket is a replica based on an archaeological find and information from museums.

Source: PrCo

Fig. 2 – 38



Total length: 1605 mm
Barrel length: 1208 mm
Caliber: 18.2 mm

Private collection
Photo: KuPe

17th Century

Ca. 1609: Wall Gun, Falconet

The original muzzle loading barrel on the tripod carriage was later converted to a breech loading system. The elevation can be changed with a threaded rod below the barrel. The tripod carriage is made from wood. The small wheels suggest the weapon was used to defend fortifications with hard surfaces.

Source: ZiJü

Fig. 2 – 39



Citadel, Jülich
Photo: KuPe

Ca. 1610: Baroque Double Wheel Lock Pistol

The wheel lock pistol with two barrels has two regular wheel lock pistol systems that are placed across from each other. For the firing of the second system, the pistol must be rotated on its longitudinal axis. This is probably the main reason why a rather outdated dagger handle was used.

Source: MüHe, Page 100

Fig. 2 – 40



Total length: 429 mm
Barrel length: 257 mm
Caliber: 11.2 mm

German Historical Museum
Berlin
Photo: SaDa, Page 124

Ca. 1630: Match Snaphaunce Wall Gun, Suhl, Germany

Octagonal Suhl barrel with integral forged hook and threaded breech plug. Match snap lock with push button release on the right side. Short stock made from ash with carvings and the emblem for the arsenal of Zurich.

Source: WeRu, Page 165

Fig. 2 – 41



Total length: 1635 mm
Barrel length: 1145 mm
Caliber: 22 mm

Bernese Historical Museum
Photo: BHM

Ca. 1650: Large Hunting Rifle with Wheel Lock

The illustration shows an octagonal barreled rifle with a relatively large caliber and deep rifling. Recessed wheel lock. Beautiful inlays with bone.

Source: PrCo

Fig. 2 – 42



Total length: 1023 mm
 Caliber: 23 mm
 Rifling: 15 lands,
 right hand twist

Private collection
 Photo: KuPe

Ca. 1650: Plain Cast Iron Mortar

The barrel has been cast from iron in Kufstein, Austria in the shape of a 16th century mold. A block made from bolted together timber pieces with attachment rings on the side served as carriage.

Source: PoDu, Page 53

Fig. 2 – 43



Barrel length: 290 mm
 Caliber: 94 mm

Bernese Historical Museum
 Photo: BHM

Ca. 1650: Military Wheel Lock Pistol

Wheel lock pistols were put into action by the cavalry for only a relatively short and moderately successful period. They were presented mostly as recognition for deserving officers.

Source: MAZ

Fig. 2 – 44



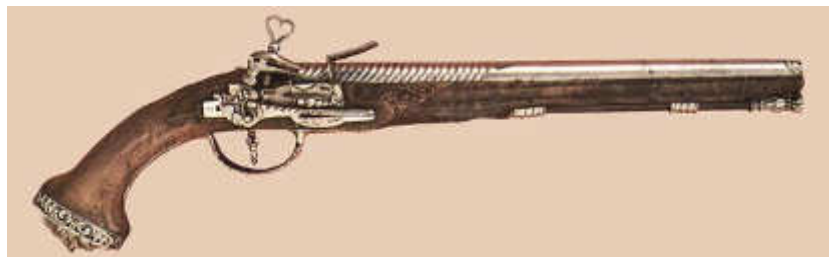
Total length: 551 mm
 Barrel length: 361 mm
 Caliber: 14.5 mm

Museum Altes Zeughaus
 Solothurn
 Photo: KuPe

Ca. 1650: Catalan Snaphaunce Pistol

The Spanish presentation pistol has a Catalan snaphaunce lock with elaborate engravings, relief cut iron barrel and a Mascaron on the butt plate. Source: DuJa, Page 54

Fig. 2 – 45



Total length: 532 mm
 Barrel length: 349 mm
 Caliber: 14 mm

Owner unknown
 Photo: DuJa, Page 55

Ca. 1650: Wall Guns

Tripod carriages with attached large muskets were used to defend fortresses.

Source: MAZ

Fig. 2 – 46



Front wall gun:
 Barrel length: 2322 mm
 Caliber: 37 mm

Rear wall gun:
 Barrel length: 1947 mm
 Caliber: 31 mm

Museum Altes Zeughaus, Solothurn
 Photo: KuPe

Ca. 1650: 39 Barrel Organ Cannon

Three groups of 13 barrels surround a central cannon barrel. They are arranged in a triangular block and have three powder pan ignitions. Source: MAZ

Fig. 2 – 47



Organ barrels:
 Number of barrels:
 3 x 13 barrels
 Barrel length: 610 - 680 mm
 Caliber: 17 mm
 Cannon barrel:
 Number of barrels:
 1
 Barrel length: 2365 mm
 Caliber: 29 mm

Museum Altes Zeughaus, Solothurn
 Photo: KuPe

Ca. 1670: 36 Barrel Organ Cannon

On a triangular wooden frame there are 12 barrels attached per side. The barrels to be fired have to be turned to the top. An ignition groove connects the touch holes of one line of barrels.

Source: PoDu, Page 40

Fig. 2 – 48



Fürstliche Waffensammlung, Liechtenstein
Photo: PoDu, Page 40

Ca. 1680: Match Lock Breech Loading Wall Gun

This gun from the late 1600's has an octagonal barrel with a blade front sight and a flip up rear sight. It was most likely converted to a breech loader at the end of the 17th century. High quality barrels were often converted in this way.

Source: WeRu, Page 168

Fig. 2 – 49



Total length: 1553 mm
Barrel length: 1047 mm
Caliber: 25 mm
Lock: Sliding wedge
breech block

Bernese Historical Museum
Photo: BHM

Ca. 1700: Flint Lock Pistol, France

Flintlock pistol with octagonal barrel, blending into a round middle and front part. Flint lock without tumbler bearing, meaning there is only one plain bearing supporting the hammer axis in the lock plate. The tumbler already has a safety notch.

Source: PrCo

Fig. 2 – 50



Total length: 322 mm
Barrel length: 200 mm
Caliber: 13.5 mm

Private collection
Photo: KuPe

18th Century

1715: Revolver Gun, James Puckle

Large caliber barrel with a smooth bore. Exchangeable drum shaped magazines for projectiles of cross sections. The cylinder in the weapon is for projectiles with a square profile. The one at the base is for ball projectiles. The advance of the cylinder is done with a hand crank. It has a manual ignition. Source: PoDu, Page 129

Fig. 2 – 51



System: Muzzle loader
 Ignition: Flintlock
 Cylinder Capacity: 10 shots
 Rate of fire: 9 shots/minute

Tower, London
 Photo: PoDo, Page 129

Ca. 1735: Mobile Mortar

The mobile mortar has a bronze barrel and is attached to a two wheeled carriage. The elevation is adjusted with a screw thread under the front of the barrel. Source: MAZ

Fig. 2 – 52



Barrel length: 264 mm
 Caliber: 89 mm

Museum Altes Zeughaus, Solothurn
 Photo: KuPe

Ca. 1740: Flint Lock Blunderbuss with Damascus Barrel

A Tromblon or Blunderbuss is a firearm with a funnel shaped barrel. It is easier to load this type of barrel with multiple projectiles. It was believed that the funnel shape resulted in a wider scattering of the load. For this reason, the Blunderbuss was popular as a defense weapon against robbers and mutineers. More recent shooting tests showed a minute increase in the scatter pattern because of a shorter projectile support and not the funnel shape. The effect of the large muzzle was probably more of a psychological advantage. The illustrated Blunderbuss has an edged ribbon Damascus barrel. It has an octagonal back part, cylindrical middle and an oval funnel shaped muzzle. The weapon has a French Flintlock, delicate carvings on the stock and masterful engravings on the brass fittings. Often Blunderbusses of this kind accompanied gentry in carriages, to deter robbers.

Source: PrCo

Fig. 2 – 53



Total length: 965 mm
Barrel length: 577mm
Caliber: 16mm
Manufacturer: I. V. Boessel, Zella

Private collection
Photo: KuPe

Ca. 1745: Flint Lock Pocket Pistol

This flint lock pocket pistol is made by the gunsmith, Israel Segalas of London. For easier loading, it has a detachable front barrel. The loading is done by unthreading the front end of the barrel, loading black powder and ball into the back end of the barrel, screwing front part of barrel back on, filling of the pan with priming powder, cocking the hammer and flint, closing the pan cover, and locking the pan cover by moving the trigger forward. The weapon was secured by pulling back the trigger guard.

Source: PrCo

Fig. 2 – 54



Total length: 172 mm
Barrel length: 68 mm
Caliber: 7 mm

Private collection
Photo: KuPe

Ca. 1747: Cast Iron Cannon Barrel

Already in the middle of the 18th century, iron cannon barrels were being manufactured in large quantities. They were made of different calibers and were fabricated mainly by forging together iron rings. They were then bored and cleaned up on a lathe. Source: FfCh

Fig. 2 – 55



Manufacturer:
John Fuller, London

Tower, London
Photo: FfCh

Ca. 1750: Bronze Mortar

Cast bronze barrel with two integral cast trunnions at the breach. The wooden carriage with the trunnion bearings has four carrying handles. Source: BeHi

Fig. 2 – 56



Weight: 125 kg

Bernese Historical Museum
Photo: PoDu, Page 107

Ca. 1750: Hand Mortar

This mortar with a French stock has a bronze barrel and a flintlock.

Source: MAZ

Fig. 2 – 57



Total length: 577 mm
Barrel length: 178 mm
Caliber: 55 mm

Museum Altes Zeughaus, Solothurn
Photo: KuPe

Ca. 1750: Four Barreled Flint Lock Wander Pistol

Wander: Two or more barrels can be turned on the axis parallel to the barrel and then fired. The depicted pistol has on the top two box flintlocks without batteries, meaning it does not have a pan cover and a frizzen. Each barrel has its own battery. After loading the black powder, lead ball and priming powder, the powder pans must be closed by lowering the batteries. The two hammers must be secured in the full cocked position.

Source: WaUn

Fig. 2 – 58



Wallace Collection, London
Photo: CiAl, Fig. 61

Ca. 1765: Muzzle Loading Cannon, M. 1759, Prussia

Bronze barrel on a wheeled wooden carriage. The elevation can be changed with a wooden wedge.

Source: PrCo

Fig. 2 – 59



Private collection
Photo: KuPe

Ca. 1780: Cavalry Flint Lock Pistol, M. 1777, France

French flint lock pistol of unusual construction. The central bronze part has an integrated powder pan and is also the lockbox, into which all parts of the cock mechanism are installed. The barrel, trigger guard and the iron connecting band to the knob are attached with screws to the lockbox. The trigger mechanism, as well as the storage bore for the ramrod are part of the bronze casting. This ingenious construction did not catch on outside of France.

Source: WaUn; CaRa, Page 46, IN 004

Fig. 2 – 60



Total length: 350 mm
Barrel length: 189 mm
Caliber: 17 mm

Private collection
Photo: KuPe

Ca. 1779: Naval Cannon, England

This cast iron ship's cannon was made by Charles Gascoigne. The barrel was designed with trunnions underneath. Source: FfCh

Fig. 2 – 61



Tower, London
Photo: FfCh

Ca. 1780: Four Barrel Flint Lock Pistol

All four barrels are ignited at the same time with a flint lock. The pistol is often called a ducks foot pistol. To achieve a wider scattering, the barrels are not arranged parallel. It was used against mutineers and apparently to hunt flocks of ducks. Source: PrCo

Fig. 2 – 62



Total length: 245 mm
Barrel length: 95 mm
Caliber: 9 mm

Private collection
Photo: WiFr, Page 125

Ca. 1780: Small Bronze Mortar

A pivoting bronze barrel mounted on a small simple wooden carriage. A wooden wedge locks the barrel at the adjusted elevation. Source: MAZ

Fig. 2 – 63



Barrel length: 365 mm
Caliber: 48 mm

Museum Altes Zeughaus Solothurn
Photo: KuPe

Ca. 1784: Musketoon of the Austro-Hungarian Navy, M. 1784

This Musketoon is built as a Blunderbuss (Tromblon) with barrels widening into a funnel shaped muzzle. The Navy used them in small numbers as part of the ship's equipment. They have no slings, because they were only handed out to the crew when needed. There is a lateral fireguard by the powder pan.

Source: GaEr, Page 238

Fig. 2 – 64



Total length: 1190 mm
 Barrel length: 765 mm
 Caliber: Oval, 47 x 68 mm

Heeresgeschichtliches Museum
 Vienna
 Photo: GaEr, Page 239

Ca. 1790: Air Gun, M. 1779, Austria

Instead of a black powder charge, the driving force is air pressure. The detachable buttstock is designed as an air reservoir based on the system of Bartholomaeus Girandoni. A carrying case with two spare buttstocks and four bullet magazines are an accessory to this weapon. The advantage of this weapon was that it was silent. Air guns did not prove themselves in military action, but have been used as a hunting rifle for some time.

Source: MAZ; GAEr, Page 382

Fig. 2 – 65



Total length: 1225 mm
 Barrel length: 832 mm
 Caliber: 11.5 mm

Museum Altes Zeughaus, Solothurn
 Photo: KuPe

Ca. 1798: Jäger Rifle, Converted Similar to M. 1807, Austria

According to the signature, the barrel was made by Hans Zeller of Zell, around 1665. The original flint lock with the embossed year of 1798 was most likely transformed to a percussion lock in 1850. The shape of the stock also points to the time around 1800. This is an example of the reuse of well made and expensive parts.

Source: PrCo

Fig. 2 – 66



Total length: 1030 mm
 Barrel length: 660 mm
 Caliber: 17 mm, right hand
 twist

Private collection
 Photo: KuPe

19th Century

1807: Percussion Lock, System Forsyth

Based on the discovery of mercury fulminate by Charles Edward Howard of England in 1796, Pastor Alexander Forsyth developed and patented a revolutionary lock mechanism. By turning the primary flask a measured amount of mercury fulminate was brought between an anvil and ignition plunger. The impact of the hammer, brought the primary to an explosion. This was probably the first percussion ignition on a firearm and was the beginning of percussion locks.

Source: HaAr, Bd. 1, Page 371 ff.; LuJa, Bd. 1, Page 59 ff., Page 561

Fig. 2 – 67



Total length: 1350 mm
Barrel length: 985 mm
Caliber: 15 mm

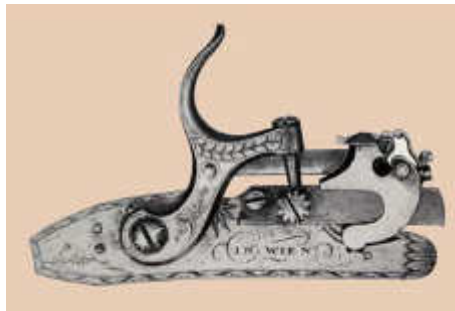
Milwaukee Public Museum
Photo: KuPe

1812/1835: Percussion Locks, System Broutet and Console

Based on Forsyth's invention, several designers developed and manufactured similar or modified percussion locks. Representative of all others, the percussion locks of Broutet and Console are described.

Source: LuJa, Bd. 2, Page 68

Fig. 2 – 68a



1812: System Broutet

Instead of the manual measuring required by of the Forsyth lock, the measuring with the Broutet lock happens with a lever while cocking the hammer.

Owner unknown
Photo: LuJa, Bd. 1, Fig. 185

Fig. 2 – 68b



1835: System Console

Here, an ignition tube is inserted into a depression in the anvil. The Console system can be seen as the predecessor of the percussion locks with percussion caps.

Owner unknown
Photo: LuJa, Vol 1, Fig. 182

1824: Flint Lock Revolver

This very rare flint lock revolver was made according to a patent of the American Captain, Artemus Wheeler. It has an octagonal ribbon Damascus barrel and a five shot cylinder. This weapon represents the peak in the development of the flintlock firearms. It was designed and manufactured after there was already knowledge of more advanced percussion locks.

Source: FiAu, Kat. 2004, IN 687

Fig. 2 – 69



Total length: 350 mm
Barrel length: 160 mm
Caliber: 12.7 mm

Owner unknown
Photo: KuPe

Ca. 1840: Percussion Pistol, Converted

In the year 1818, while living in England, Joseph Egg from Solothurn, Switzerland, acquired a patent for a metal percussion cap filled with mercury fulminate. This was the beginning of percussion firearms with piston and percussion caps. The following illustration shows a pistol that originally had a flint lock and was converted to a percussion lock about 1840.

Source: PrCo

Fig. 2 – 70



Total length: 245 mm
Barrel length: 118 mm
Caliber: 12 mm

Private collection
Photo: KuPe

Ca. 1842: Percussion Cadet Rifle, Hallau, Switzerland

After the initial conversions from flint lock rifles and pistols, new percussion locks were introduced.

Source: ScSc, Page 52



Fig. 2 – 71

Total length: 1255 mm
Barrel length: 983 mm
Caliber: 16 mm

Private collection
Photo: KuPe

Ca. 1841: Dreyse Needle Rifle, M. 1841, Prussia

Sometime around 1832, the Prussian, Johann Nikolaus Dreyse, developed and patented a needle ignition system. This ignition system is based on a paper cartridge which is penetrated with a long needle. This brings a pellet primer of mercury fulminate between black powder and base of the lead projectile to an explosion. Prussia was the first country to introduce this ignition system and therefore had considerable military success. The Dreyse lock can be seen as the predecessor to the Bolt action.

Source: LuJa: Bd. 1, Page 72 ff.; HoAr, Bd. 1, Page 399 ff.

Fig. 2 – 72



Total length: 1365 mm
 Barrel length: 1035 mm
 Caliber: 15,5 mm
 4 lands right hand
 twist

Private collection

Photo: KuPe

1845: Tape Ignition Lock, System Maynard

In the year 1845, the American dentist Maynard, was awarded the patent for a percussion ignition in which mercury fulminate pellets were embedded in a paper or fabric strip. This ignition tape was automatically moved into a firing position under the hammer by cocking it.

Source: Public Museum Milwaukee

Fig. 2 – 73



Milwaukee Public Museum

Photo: KuPe

Ca. 1850: Pepper Box Revolver

The bundle revolver with six barrels and percussion ignition represents a compact design of a multi-shot handgun. Due to the closed breech area of each barrel, the danger of cross firing was much smaller than with a percussion revolver.

Source: PrCo

Fig. 2 – 74



Total length: 210 mm
 Barrel length: 75 mm
 Caliber: 12 mm
 Number of barrels: 6

Private collection

Photo: KuPe

Ca. 1855: Double Barrel Percussion Pistol, Brescia, Italy

This pistol has two Damascus barrels, one arranged above the other and two percussion rear action locks. The lock plates and the hammers are decorated with engravings. On the stock there are ornamental carvings. The manufacturer was Antonio Nefsi of Brescia.

Source: PrCo

Fig. 2 – 75



Total length: 248 mm
Barrel length: 120 mm
Caliber: 14.25 mm

Private collection
Photo: KuPe

1859: 22cm. Mortar

This heavy 'portable' mortar was a testing mortar for black powder in the young Swiss Army.

Source: MAZ

Fig. 2 – 76



Barrel length: 555 mm
Caliber: 220 mm

Museum Altes Zeughaus, Solothurn
Photo: KuPe

Ca. 1860: Blunderbuss Pistol, Spain

Bronze barrel with a widening at the muzzle. Percussion lock is transformed from a flintlock. The pistol has been used by Naval officers.

Source: PrCo

Fig. 2 – 77



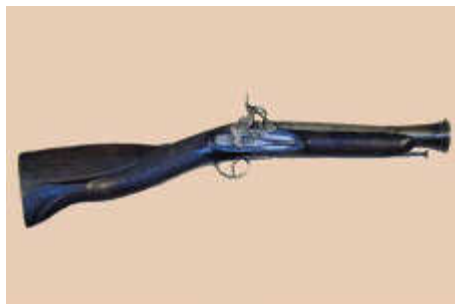
Total length: 248 mm
Barrel length: 118 mm
Caliber: 17.1 mm

Private collection
Photo: KuPe

Ca. 1860: Blunderbuss, Spain

Tromblons were also called Blunderbuss. The illustrated weapon came from Fernando Arrate in Eilbar, Spain. It has a Catalan snaphaunce lock converted to a percussion lock. It was an officer's weapon used against mutineers when needed. Source: PrCo

Fig. 2 – 78



Total length: 584 mm
 Barrel length: 260 mm
 Caliber: 16 mm

Private collection
 Photo: KuPe

Ca. 1860: Lefauchaux Double Shotgun with Pin Fire Ignition

In the year 1835, the Parisian gunsmith Casimir Lefauchaux, received the patent for a shot paper cartridge with metal base and a side-ways protruding firing pin. The pin fire cartridges were used in large numbers for brake open shotguns and revolvers.

Source: PoDu, Vol. 1, Page 81 ff., Page 251ff.; HoAr, Vol. 1, Page 396 ff.

Fig. 2 – 79



Total length: 1153 mm
 Barrel length: 742 mm
 Caliber: 17.5 mm

Private collection
 Photo: KuPe

Ca. 1860: Lefauchaux Pin Fire Revolver

For private use, these and similar revolvers were manufactured in large numbers in Liege, Belgium. Source: PrCo

Fig. 2 – 80



Total length: 208 mm
 Barrel length: 100 mm
 Caliber: 9 mm

Private collection
 Photo: KuPe

1864/1871: Snider Breech Loading Carbine, England

Because of the clear superiority of the Prussian needle rifle, the existing muzzle loaders of most armies were converted to breech loaders under great time pressure. The existing muzzle loading barrel was cut and a single shot breech lock for rim fire cartridges was threaded on. The most common lock was the Snider lock. From it, the French La Tabatière lock was derived.

Source: LuJa, Bd. 2, Page 103

Fig. 2 – 81



Total length: 1392 mm
Barrel length: 995 mm
Caliber: .58 Inches

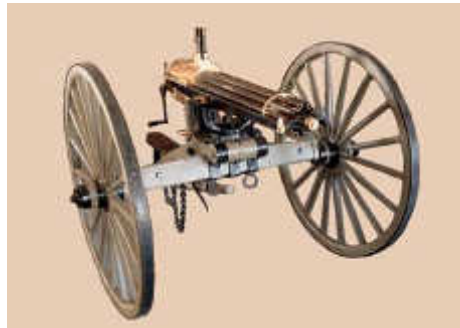
Private collection
Photo: KuPe

1865: Gatling Machine Gun

The first successful machine gun was developed in 1861 by Richard Jordan Gatling from Indianapolis, and patented in 1865 in America. Six rotating barrels were used to prevent overheating. The Gatling principle is still used today on aircraft cannons and for air defense cannons.

Source: WiPe

Fig. 2 – 82



Model: 1881
Number of barrels: 6
Caliber: .450 Inches
Rate of fire: 400 to 1000 rounds per minute

Fort Laramie, Wyoming
Photo: wiki, Gatling Gun

Ca. 1865: My Friend Revolver

A five shot pocket revolver by James Reid, New York. The pistol grip is made in the shape of a knuckle duster.

Source: WiFr, Page 218f.; WiFr, Page 152

Fig. 5 – 83



Total length: 110 mm
Barrel length: 40 mm
Caliber: 5 mm

Private collection
Photo: KuPe

Ca. 1869/1870: Vetterli Rifle, M. 1869/1871, Switzerland

Parallel to the conversion from muzzleloaders to breechloaders, the development and introduction of repeating rifles was given high priority. As the first army in Europe, Switzerland introduced a repeating rifle with a tubular magazine under the barrel. At the same time, the change from the large 18 mm caliber to the smaller 10.5 mm caliber was introduced. This was a big step in the personal armament of the armies. Source: SnHu

Fig. 2 – 84



Caliber: 10.5 mm
 Rifling: 4 lands, right hand twist
 Magazine: Tube, 12 cartridges
 Amunition: Ordonance 1867/71

Private collection
 Photo: KuPe

Ca. 1870: Walking Cane Percussion Firearm

The walking cane with the look of a bamboo cane is in reality a percussion firearm, with a hidden percussion lock. By pulling out the hammer, the piston with percussion cap is exposed and on the opposite side the trigger appears. Before firing, it is recommended to remove the point of the walking stick. Source: PrCo

Fig. 2 – 85



Total Length: 972 mm
 Barrel length: 787 mm
 Caliber: 12 mm

Private collection
 Photo: KuPe

Ca. 1873: Harmonica Pistol, A. E. Jarre

This bulky percussion pistol has 10 laterally arranged barrels. By pulling back the large cocking/trigger lever, the barrel organ is moved sideways by one barrel, and the hammer is cocked at the same time. Source: MüHe, Page 196

Fig. 2 – 86



Barrels: 10
 Caliber: 7 mm

Deutsches Historisches Museum, Berlin
 Photo: MüHe, Fig. 160, Page 196

Ca. 1874: Revolver System Le Mat

The design of the revolver with center fire is based on the percussion revolver developed by Jean Alexandre Francois Le Mat in 1856. The center fire version has been manufactured in France until 1874. The Revolver has 2 barrels. The center shot barrel serves as rotation axis for the cylinder with 9 cartridges. One hammer nose can be selected to fire either the revolver barrel or the shot barrel. Source: PrCo

Fig. 2 – 87



Total length: 350 mm
 Center barrel: 170 mm
 smooth bore
 16 gauge
 Upper barrel: 170 mm
 Rifled
 11 mm
 Cylinder: 9 Cartridges
 One center shot load

Private collection Photo: KuPe

Ca. 1880: Percussion Booby Trap

In this weapon with a bronze housing and barrel, the shot is triggered by activating a lever. The use of the firearm is unknown. Source: PrCo

Fig. 2 – 88



Total length: 232 mm
 Barrel length: 85 mm
 Caliber: 9 mm

Private collection
 Photo: KuPe

Ca. 1880: Revolver with Cartridges, USA

Six shot revolver with center fire, a set of cartridges and cleaning tools in a wooden box. Source: PrCo

Fig. 2 – 89



Total length: 215 mm
 Barrel length: 102 mm
 Cylinder: 6 cartridges
 Ignition: Center fire
 Caliber: 7.5 mm

Private collection
 Photo: KuPe

Ca. 1882: Protector Pistol

This five shot pistol can be held in the hand while being barely visible. The barrel is placed between the index and middle fingers, while the flat disc-like magazine lies in the palm. The thumb and the ball of the hand are on the backside of the trigger. To fire a shot, the shooter presses the handle from behind, similar to that of squeezing a lemon.

Source: PoDu, Page 220

Fig. 2 – 90



Manufacturer: Jacques
Turbiaux
Caliber: 7 mm

Private collection
Photo: KuPe

1882/1902: Artillery Carbine for County Cadets, Martini-Enfield, England

The falling block lever action developed by the gunsmith Martini from Frauenfeld, Switzerland, was manufactured for the single shot carbine of the English artillery by the Enfield Armory, in England.

Source: EnCa, Page 81 ff.

Fig. 2 – 91



Total length: 947 mm
Barrel length: 533 mm
Caliber: .303 Inches
Rifling: 5 lands, left hand twist

Private collection
Photo: KuPe

Ca. 1885: Double Barrel Lefauchaux Pistol

This pistol has a brake open action with a dagger to be flipped forward, and a double box lock for the pin fire cartridges. By pulling back the hammers, the stiff triggers fold down from the lock box.

Source: PrCo

Fig. 2 – 92



Total length: 222 mm
Barrel length: 115 mm
Caliber: 9.8 mm
Folding spring bayonet

Private collection
Photo: KuPe

1889: Repeater Rifle System Schmidt, M. 1889, Switzerland

In Switzerland, a repeating straight pull, bolt action rifle with a detachable twelve shot box magazine was introduced.

Source: ScSc, Page 92 ff.

Fig. 2 – 93a



Fig. 2 – 93b



Total length: 1300 mm
 Barrel length: 780 mm
 Caliber: 7.5 mm
 Rifling: 3 lands, right hand twist

Private collection
 Photo: KuPe

Ca. 1890: Percussion Shooting Apparatus

This shooting apparatus can be used to kill voles using a load without bullets. It would be positioned at the entrance to a vole hill and the gas pressure would kill the rodents. With bullets, the apparatus was used to kill small animals. When loading, the hammer is pulled back and held in the cocked position with a safety wire. By pushing the ring against the muzzle, the hammer is released for the ignition of the percussion cap. Source: PrCo

Fig. 2 – 94



Total length: 168 mm
 Barrel length: 80 mm
 Caliber: 7.5 mm

Private collection
 Photo: KuPe

Ca. 1890: Deringer Pocket Pistol

With a length of only 118 mm this one shot flat pistol is one of the smallest pocket pistols.

Source: PrCo

Fig. 2 – 95



Total length: 118 mm
 Barrel length: 65 mm
 Caliber: .22 Inches
 Amunition: Flobert cartridge

Private collection
 Photo: KuPe

Ca. 1893: Gaulois Pistol

This pistol is based on a French patent by P. Blachon and E. Mimard. It was manufactured by Manufacture Francaise Armes et Cycles, Saint Etienne, France. The loading of the five cartridges happens from the top. The loading gate also serves as a case ejector.

Source: DoVI, Page 289

Fig. 2 – 96



Total length: 100 mm
Barrel length: 35 mm
Caliber: 5 mm

Private collection
Photo: KuPe

Ca. 1890: Parlour Rifle

This rifle has the similar size and weight of a regular target rifle, and similarly handles like one. For target practice in the parlour, the front section of the barrel is designed to hold a separate loading gate to use 4 mm Flobert cartridges. The loading gate is opened by rotating down the trigger guard.

Source: PrCo

Fig. 2 – 97



Loading gate: 140 mm aft of muzzle
Caliber: 4 mm
Rifling: 12 lands, right hand twist

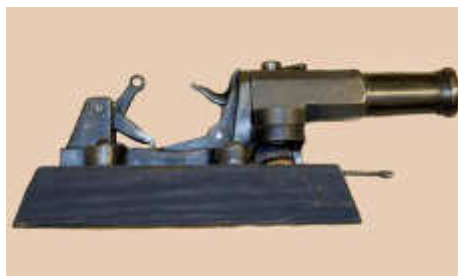
Private collection
Photo: KuPe

Ca. 1895: Boobie Trap Shot Gun

A thin piece of string is stretched over an area and connected to the trigger lever of the firearm. Touching the string triggers the load if it is used as a trap. The barrel is rotated to the side for reloading.

Source: PrCo

Fig. 2 – 98



Total length: 228 mm
Barrel length: 120 mm
Caliber: 18.8 mm

Private collection
Photo: KuPe

20th Century

Ca. 1905: Toy Cannon

The ignition occurs by pulling back and letting go of a spring loaded firing pin. The firing tape must be positioned into a slot in the breech by hand. Source: PrCo

Fig. 2 – 99



Total length: 648 mm
Barrel length: 330 mm
Caliber: 10.5 mm
System: Tape ignition

Private collection
Photo: KuPe

Ca. 1905: Pocket Revolver with Hinged Grip

One of the smallest pocket revolvers, with a caliber of 6.35 mm. The grip and trigger can be folded towards the frame of the revolver. Source: PrCo

Fig. 2 – 100a



Total length: 115 mm
Barrel length: 32 mm
Caliber: 6.35 mm
Cylinder: 5 cartridges

Private collection
Photo: KuPe

Fig. 2 – 100b



Private collection
Photo: KuPe

Ca. 1906: Four Shot Shattuck-Unique Pistol

This elegant pocket pistol for the lady uses Flobert cartridges and has four barrels arranged in a bundle. It was registered for patenting in 1906 by O. Mossberg, Massachusetts. The trigger button is above the barrels at the front. Source: BaDe, Page 50

Fig. 2 - 101



Total length: 114 mm
Caliber: .22 Inches

Private collection
Photo: KuPe

Closing remarks to this chapter

As noted at the beginning, only a small selection of interesting historical dates and technical developments are shown.

Additional information can be found in the bibliography at the end of the book.