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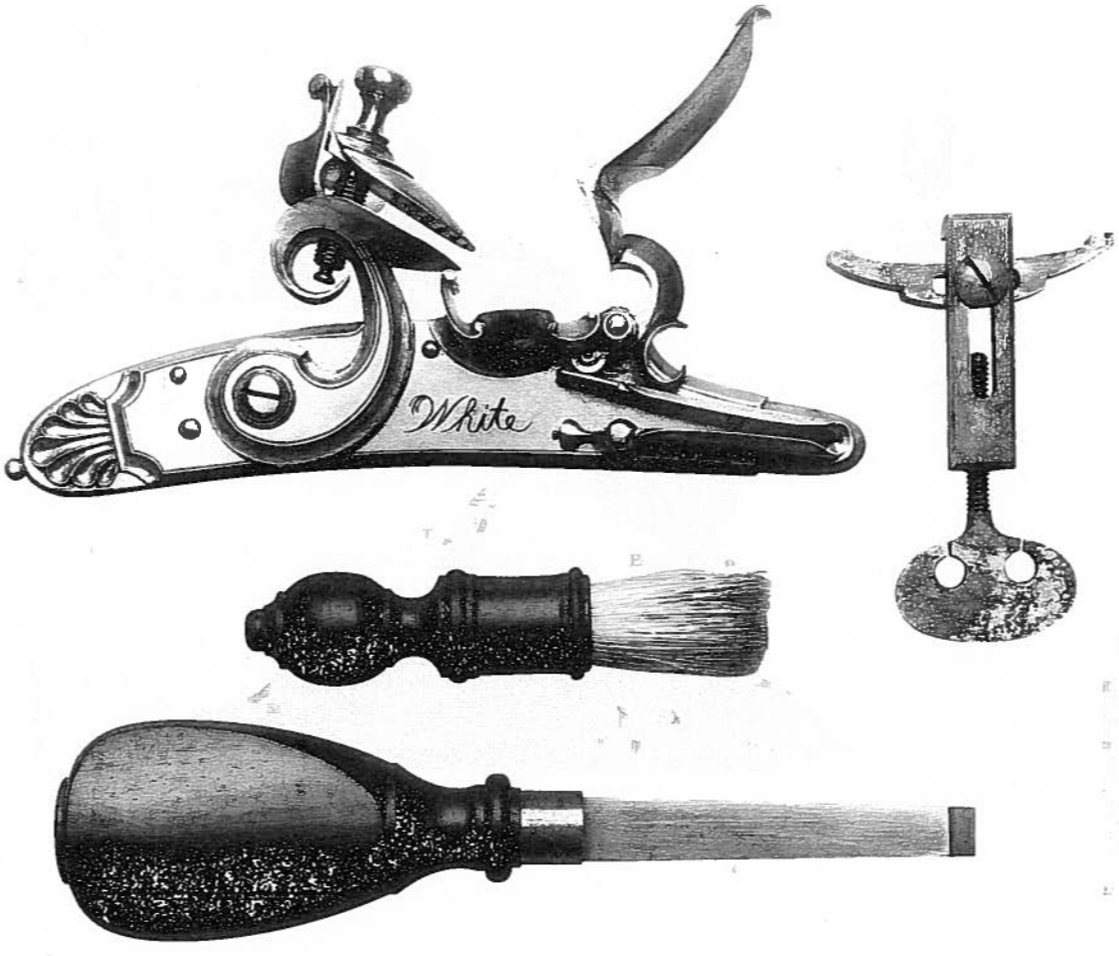
Technical Bulletin

Care and Preservation of Firearms

16



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The Care and Preservation of Firearms

by Philip R. White

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Abstract

The purpose of this Technical Bulletin is to give some guidelines on the care of firearms to curators, conservators, and others unfamiliar with the subject. Handling, examination, conservation, deterioration, cleaning, restoration, exhibition, and storage of firearms are discussed. A glossary is included, and a bibliography is provided for further research on the subject.

Cover

Photo by Carl Bigras.

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Introduction

Firearms have been manufactured and distributed throughout Europe since the 14th century. This technology spread to North and South America and to other European colonies. Over the years, there have been thousands of changes in design and technology of firearms, and it is quite beyond the scope of this publication to describe all of these changes and how the guidelines that follow may apply to each. It will be necessary to have some reference material on hand for a fuller understanding of individual cases. A select bibliography is provided for this purpose.

Because the majority of firearms in museum collections are muzzle-loading weapons, much of what follows is oriented to them. However, most of the general information on care and handling can be applied to more modern weapons as well. For identifying various parts of a firearm, and for reference purposes, labelled diagrams of two firearms and two locks are provided (see Figures 1 and 2).

Handling

Handling firearms requires special care. Unlike most other museum objects, when care is not taken the results can be harmful not only to the object but to the handler and to others nearby. A few basic guidelines follow:

- Handle every firearm as though it is loaded and ready to fire until it is proven otherwise.
- Do not handle a firearm with your finger on the trigger.
- Keep the muzzle of a firearm pointed at the ceiling or away from other people.
- Use trollies, dollies, or trays to transport heavy or multiple firearms.
- Avoid carrying a firearm, particularly a long arm, only by the wrist of the stock (see Figures 1a and 1b). The stock may be weak or split. Use both hands.
- Check for loose or broken pieces before moving a firearm. If any such pieces are present, bag them before moving the firearm and keep them with the piece.
- Never cock or work the action unnecessarily until it has been examined thoroughly. The mechanism may be damaged or worn.
- Never "dry fire" by cocking the mechanism and pulling the trigger. Firearms were designed to be fired only when charged.
- Wear disposable cotton or synthetic rubber gloves when handling firearms, particularly where polished metals are present.
- If the weapon has a wooden case, use it. Cushion the artifact inside with pieces of Ethafoam or Microfoam, if necessary. Carry the case flat by the bottom, never by the handle or the lid.
- Avoid storing firearms in leather cases. Leather holds moisture and organic acids that may cause metals to corrode.

Examination

Muzzle-Loading Firearms

Muzzle-loading firearms were often kept loaded and ready for use. Over time, the charge in the barrel may have been forgotten. Therefore, on initial receipt, assume that all firearms are loaded. Check whether a muzzle-loading firearm is loaded using the following procedure:

- Select a piece of wooden dowel slightly longer than the firearm's barrel and slightly narrower than its bore. Carefully insert the dowel down the bore as far as it will go. Using a pencil, mark the dowel at the muzzle and remove the dowel.
- Lay the dowel alongside the barrel with the mark at the muzzle. Compare the length of the dowel along the barrel to the position of the touch hole on a flintlock or the nipple on a percussion lock at the breech (see Figures 3a to 3d).
- The dowel should have stopped within 0.5 cm of the touch hole or nipple base. If a "patent" breech is present, the dowel should have stopped within 1 cm to 1.5 cm of the touch hole or nipple base, due to the length of the breech block. (See Figures 3a to 3d for a description of "patent" and common breeches.)
- If the dowel stopped 3 cm or more from the touch hole or nipple base, it is possible that the barrel is loaded or at least is obstructed. If this is the case, seek the advice or assistance of a professional gunsmith or a conservator familiar with firearms. Gunpowder, regardless of age, is very dangerous.

Breech-Loading Firearms

Breech-loading firearms have been made since at least the 16th century, and appear with a variety of ignition systems. Check whether a breech-loading firearm is loaded using the following procedure:

- Open the breech, being careful not to touch the trigger, and examine the chamber. With some firearms, an extractor mechanism may automatically eject a cartridge if one is present.
- If it is impossible to open the breech, follow the procedure for checking whether a muzzle-loading firearm is loaded. In this case, the dowel should stop at the base of the barrel.

- Before closing the mechanism, or the "action", check the magazine (if present) for other cartridges. Remove any cartridges that remain.

- When closing the action, depress the trigger so as not to leave the piece cocked. If the firearm has a magazine, it may have to be loosened to allow the action to close. This mechanical feature varies with designs.

- If a cartridge is found and cannot be removed easily without using force, contact a professional gunsmith or a conservator familiar with firearms. Do not close the action if the cartridge cannot be removed.

General Examination

Once a piece has been proven to be unloaded, examine it thoroughly. Prepare a detailed examination and condition report before beginning any conservation or restoration treatment, and before loaning the artifact. A great deal of curatorial information can be gleaned from tool marks and from the evidence of use on an artifact. Prior to the Industrial Revolution, gunmakers employed or contracted to a variety of artisans (e.g., barrelmakers, locksmiths, stockmakers, engravers, silversmiths), and it is not uncommon to find, in addition to the proof marks and gunmaker's mark, the marks of one or several other artisans on a single piece. If the piece is of military origin, it may have additional marks such as ordnance stamps or armoury marks. All of these are important to the historical interpretation of the piece and, in some cases, will dictate how it should be treated.

By examining the finishes on the wood and metal parts of a firearm, it is often possible to determine whether or not the piece has been damaged or altered in any way (e.g., has been refinished, has been cut down, has had pieces replaced). Tool marks on the surface of a firearm can yield such evidence as method and tools of manufacture, and can also indicate whether any alterations were made to the artifact. A knowledge of past and present woodworking and metalworking methods is an asset in interpreting these marks. Modern machinery such as lathes, milling machines, grinding wheels, and welding equipment leave characteristic, regular marks, whereas historical techniques such as hand forging, planing, filing, and scraping leave less regular marks. It should be noted, however, that some machinery was in use prior to the Industrial Revolution. The ability to identify materials of manufacture, and a good knowledge of what machinery was used when and where, are also an asset.

Examining the piece for damage (such as broken or lost pieces), alterations, and past use and abuse is helpful not only in describing its condition but also in understanding some of its history. Firearms were often altered as they changed hands, to suit various purposes and styles or to keep up with new gunmaking technology. For example, many fine flintlocks were quickly and crudely converted to percussion weapons, and just as many trade and presentation pieces were altered to suit various styles.

Deterioration

When considering long-term preservation of a firearm, realize that, as with any other artifact, it is subject to a variety of elements that can contribute to its deterioration. The foremost of these is the environment in which the firearm is kept. Firearms must be thought of technically as composites of different materials that are fitted and locked together very closely. Each material of a firearm will react in a different way in the presence of light, temperature, relative humidity (RH) fluctuations, and atmospheric pollutants.

As relative humidity fluctuates, the wood in gunstocks will expand and contract to some degree, regardless of its age. In figured or inlaid stocks, this can cause splitting, loss of inlay, damage to finishes, and even damage to fine metal parts. High RH will contribute to metal corrosion and/or to mould growth. Low RH can cause wood to dry, shrink, and/or check, and can cause embrittlement of the adhesives that adhere inlay or overlay work.

High light levels can be harmful to organic materials commonly found on firearms (e.g., wood, bone, antler, ivory, horn). This is particularly true of sunlight and of the light from most fluorescent tubes, which often contain high levels of ultraviolet radiation. The results of excessive or long-term exposure to light may be darkening or fading of surfaces and finishes. Checking and embrittlement will also occur if heat accompanies this exposure.

Acidic woods from which many display cases have been made (e.g., particle board, mahogany, oak), contact cement, tile cement, and other acidic adhesives give off vapours. These vapours, as well as atmospheric pollutants, all contribute to the corrosion of metals, particularly in humid conditions. For more information on this subject, please see the article by Jean Tétreault listed in the Bibliography under "Sources on Care and Conservation".

Dust may contain pollutants and mould spores and, if allowed to build up, can absorb and hold moisture against the surface of the piece, thus contributing to corrosion and to mould growth.

Pests, such as wood-boring insects and rodents, can also cause severe damage to a firearm if left unchecked.

By controlling the environment in which a firearm is kept, a great deal of damage can be avoided. Maintain relative humidity at a medium range of 45% to 50%, with minimal fluctuations (35% to 60% is acceptable, given the capabilities of most museums). Avoid sunlight in exhibition spaces by blocking or blacking out windows. Use incandescent lights rather than fluorescent tubes for exhibition and curatorial purposes. Construct cases and shelving units from enamelled metal padded with Microfoam, where possible. Alternatively, Melamine-coated particle board or high-density overlay plywood provides a very stable, impermeable barrier and is convenient for storage and for display case construction.

Good housekeeping and regular inspection will significantly reduce dust and pest problems.

Treatments

When an artifact is mishandled, abused, or damaged in any way, it may be necessary to treat it. This may involve anything from quick surface cleaning to full restoration. In deciding the extent of any treatment, a number of factors should be considered. The foremost of these is whether the problem that caused the damage (e.g., handling, poor environment) has been removed or eliminated; if not, then treatment would be pointless. The extent of the treatment proposed should be governed by the extent of the damage. Finally, the long-term effects of any treatment should be taken into account. Finishes, adhesives, and other materials used in the treatment should be stable over the long term and should be removable at a later date without causing further damage.

Disassembly

In the majority of cases, all that is required is a light surface cleaning and perhaps some minor repairs. To accomplish this, partial disassembly of the firearm may be necessary. Partial disassembly involves removing the lock to check for dirt, hardened oils and greases, corrosion products, and other damage. With most firearms manufactured prior to the last half of the 19th century, this procedure is relatively straightforward. More modern firearms, which have more powerful and rapid loading and firing systems, require quite complex disassembly procedures and sometimes necessitate the manufacture of special tools. When faced with a complex system, it is best to seek advice from a professional conservator regarding the ease or complexity of disassembly. Most firearms are designed with the idea that the average hunter or soldier will be required to do some maintenance but will leave anything more complex to a gunsmith or armourer.

Even removing a flintlock or percussion lock requires some skill and patience. When loosening screws, the blade of the screwdriver may slip out of the slot and cause damage or injury. Screw heads must have clean slots, and the blade of the screwdriver must fit the slot exactly. It may be necessary to grind or file the screwdriver blade. The slot of the screw can be picked out with a toothpick or dental pick, if necessary. The lock will be held in place by one or more screws that pass through the stock. If it is a percussion lock, or "cap lock", the hammer must be cocked to the half-cock position, or to the first "click", to allow the hammer to bypass the nipple when the lock is lifted out of the stock. This is a safety position; if it fails to engage, the lock is very dirty or damaged inside and the advice of a qualified professional should be sought. If the piece is a flintlock, wheel lock, match lock, or other spark ignition system, the half-cock position will not need to be engaged unless broken internal parts restrict removal of the flint or percussion lock.

To remove the lock, place the firearm lock-side-down on a firm padded surface and remove the lock screws by applying downward pressure while turning the screwdriver. If a screw is stuck or is badly worn, do not force it; seek the help of a professional conservator or leave the screw in place. Once the lock screws are removed, the lock should be easy to remove and may even fall out. Hold the lock by the hammer and slowly rock it from side to side to loosen it from the stock. Removing the lock quickly or forcefully may cause damage to the lock moulding at the stock.

Further disassembly, such as removing a barrel or fittings, should only be carried out by or under the supervision of qualified individuals. The means of attaching barrels and fittings to stocks and other metal parts are numerous, and it is beyond the scope of this Technical Bulletin to describe them all. The benefits gained from disassembly should always be balanced against the potential damage that disassembly may cause. Therefore, if there is very little to gain by removing a part, leave it in place.

Cleaning

If cleaning is required, remove loose dust and dirt by gently brushing it with a bristle brush into the nozzle of a vacuum cleaner. A piece of cheesecloth or window screening attached to the nozzle will prevent large pieces from being sucked into the vacuum cleaner. Remove caked-on dirt, wax, polish residue, loose corrosion products, and grease by scraping and picking with wooden scrapers fashioned from wooden sticks (e.g., tongue depressors) or with toothpicks. Use horn picks, dental picks, bone picks sawn from boiled longbones, or old bone folders for the most resistant deposits. Only use dental picks as a last resort because they may scratch the metal surface. Keep the scraping edges of non-metallic tools sharp by trimming them regularly with a sharp knife, by filing them, or by sanding them with sandpaper. Avoid using metal tools on metal surfaces. Oil, fresh fingerprints, or light deposits of grease can be removed by cleaning with cotton swabs moistened with mineral spirits. Use solvents only in a well-ventilated area.

Firearms were regularly oiled when in use and, later, were often oiled by collectors, so it may not be possible or even desirable to remove all the oil from the wood that surrounds the metal parts. Oil in the wood may be evidence of past use. While oil should not be removed completely unless it is causing problems, neither should it be left in abundance. Excess oil or grease will attract dust and may stain other materials with which it is likely to come into contact in the collection.

Some corrosion products such as the waxy green substance found on brass, commonly known as "verdigris", can often be removed first with wooden picks and scrapers and then by swabbing with mineral spirits or acetone. Acetone is extremely flammable and should be used only with great caution. If solvents are to be used on or around wood, first test the finish for solubility in a small, obscure area.

To remove large areas of light surface rust, use extra-fine or 0000 steel wool, or abrasive-free nylon rubbing pads. Rubbing the surface lightly in the direction of any tool marks should remove the majority of the rust. Never use steel wool too aggressively. Also, never use steel wool on coloured case-hardened surfaces that show mottled blues, browns, and greys, or on the flame-blued surfaces that are often found on some early barrels and trigger assemblies. Chemically blued, blackened, or browned iron and steel can be cleaned safely with steel wool, but should be tested first in an obscure area. If the exact technique by which the surface colouring was applied is unknown, it is best not to use any abrasive treatment on the metal.

Brass and other polished metals such as silver often require cleaning. If the patina on brass is yellow to brown and is even in appearance, it is usually quite stable and is often desirable. It should be noted that completely removing a patina can seriously devalue a piece. If polishing is required to remove fingerprints or the blotchiness left by deteriorated old coatings, use a wadding polish such as Duraglit. This is much less messy than liquid polishes and can be applied locally to small or hard-to-reach areas by wrapping the wadding around a wooden stick or toothpick. Take care not to polish excessively, particularly where engraved surfaces are concerned, because wadding polish can be aggressive. A little tarnish left on the surface, particularly in recessed areas, can be quite pleasing to the eye as well as being protective of the underlying metal. Never polish plated or gilded surfaces because the metal layer is very thin and is easily removed.

While cleaning a firearm, further curatorial evidence may be uncovered, such as maker's marks or tool marks. Document these marks and, if they were hidden when the piece was assembled, photograph them, if possible.

Restoration

In the past, most approaches to treatment of firearms have involved restoration. Restoration is defined by the International Institute for Conservation of Historic and Artistic Works—Canadian Group and by the Canadian Association of Professional Conservators in *Code of Ethics and Guidance for Practice* (see Bibliography under "Sources on Care and Conservation") as "all actions taken to modify the existing materials and structure of cultural property to represent a known earlier state. The aim of restoration is to preserve and reveal the aesthetic and historical value of a cultural property. Restoration is based upon respect for remaining original material and clear evidence of the earlier state." (p. 19)

This statement can be applied to any treatment action from simple polishing to returning a piece to firing condition by removing old or worn parts and replacing them with new ones. There are many things to consider before deciding whether to undertake any restoration:

- Structural elements may be damaged and their condition may worsen or they may become lost if they are not repaired. For example, inlay may be loose, the stock may be cracked or broken, and fasteners may be missing. Structural repairs may prevent further damage and/or loss to weakened areas or loose pieces.

- If the piece is visually unappealing due to damage, or if pieces critical to its interpretation have been lost, some restoration may be required for display or study purposes. Although this sort of restoration is of no particular benefit to the preservation of the piece, it does have its place. Only restore what is absolutely necessary on a piece to allow it to be displayed or studied adequately.

- Actually being able to fire a firearm plays no part whatsoever in its preservation or interpretation and can be dangerous, so restoring a piece to firing condition should never be considered. This is the role of reproductions.

- Any restoration should be carried out under professional supervision or by qualified museum professionals with a thorough understanding of the particular piece being restored. This may involve extensive research, consultation with experts on a particular style of mechanism, and examination of available technical drawings and existing similar objects.

Note that removing original material, damaged or otherwise, from a firearm not only compromises its integrity but can also remove vital evidence pertaining to the manufacturer and some design features significant to the study of the piece. This can lead to misinterpretation and, if the piece is being reproduced, to potential misrepresentation. Documentation of any restoration must fully record the actions taken and must be carried out thoroughly. Treatment reports and photographs before, during, and after the restoration are essential. Mark any material added to the piece by engraving or stamping the date and source (e.g., "CWM 1995"). Store any material that was removed with the piece for future reference. Whenever possible, anything added to the piece should be easily removable with little or no harm to the original materials (i.e., use removable adhesives like hide glue or fish glue instead of epoxy or white glue; use screws or tight friction fits instead of welding or soldering to hold metal parts).

Coatings

As a final protective measure, coatings for wood or metal may be applied to a firearm. Coatings are useful in improving the appearance of the piece and in providing it with some protection from the environment and from handling. Avoid using such traditional coatings as linseed oil and acidic machine oils because these have often been the reason why firearms require extensive cleaning.

The best traditional coating for metal on firearms has been a light film of non-drying oil. Provided that this is maintained

as required and is not handled often, non-drying oil can be very effective, particularly where moving parts are concerned. A light lubricating oil, such as "3 in 1" or gun oil, can be wiped on with a soft cloth or can be applied locally with a cotton swab. Wipe off excess oil to avoid it attracting dust. Where there are no moving parts, as on the barrel or on brass fittings, and where the piece may be handled often, a light wax coating is acceptable. A microcrystalline wax or a commercial paste wax, such as Antique Wax or Aero Paste Wax, can be applied cold and then be buffed with a soft cloth when dry, leaving a thin film on the surface. If necessary, the same wax may be applied to wooden stocks. Do not wax inlaid stocks because the wax will accumulate in crevices and because rubbing or buffing may loosen the inlay.

Avoid coatings such as lacquer or varnish because they inevitably scratch, crack, or peel with handling. They can also yellow or darken, hiding detail and becoming difficult if not impossible to remove without damaging the underlying surface.

The importance of regular inspection cannot be overstated. As pieces are handled, oil and wax coatings will have to be re-applied as necessary.

Exhibition and Storage

As previously stated, the environment in which a piece is stored or displayed is very important. Although firearms have few requirements that differ from those for other artifacts with regard to exhibition and storage, special consideration must be given to security.

Exhibit all pieces in cases covered with acrylic, polycarbonate, or safety glass. Either lock cases or screw them shut with enough screws to discourage theft.

Lock storage areas at all times with at least two dead-bolt locks to which there are few duplicate keys, preferably of a sort that cannot be reproduced easily. Keep pistols in locked metal drawer units, such as map cabinets, as an extra security measure. Choose a storage area that is strong, ideally with concrete block walls and no windows. Avoid chain or bar locks that secure several firearms to a rack because they can cause wear to areas on the firearms with which they come into contact and because they are very inconvenient for examination purposes. Store long arms vertically on racks, as opposed to horizontally on shelves. Shelf storage reduces visual accessibility and requires that pieces be placed next to each other and be drawn out for examination. This can result in pieces scraping against one another, causing damage. If it is not necessary for the firearms to be seen, place them on storage racks in metal or sealed wood cabinets to decrease the problem of dust. Closed cabinets may cause problems in an actively used study collection, but the protective benefits of the closed system far outweigh the inconveniences posed by it.

Canadian law requires that all persons handling a firearm possess a current Firearms Acquisition Certificate (FAC). For further information regarding legal requirements or special considerations for firearms, contact your local firearms authority (e.g., provincial police, RCMP).

Conclusion

This Technical Bulletin is not meant to be a manual for treating every firearm ever made. The preceding guidelines are intended to provide only an overall view of firearms care. Considering the diversity in design of firearms and their special exhibition or study requirements, it may be possible that some of the guidelines may not apply to all pieces. Good judgement should always prevail. If any doubt exists regarding the care or treatment of a firearm, contact a professional conservator familiar with firearms.

Glossary of Terms

Action
The mechanism that loads and unloads a cartridge into the breech of a breech-loading firearm. The type of action mechanism may be bolt, lever, pump, semi-automatic, automatic, etc.

Barrel
The metal tube through which a bullet is fired.

Bluing
A blue-black patina applied to ferrous metals through a hot alkaline process. Its function is to act as a corrosion inhibitor and to reduce glare on polished metal. Bluing was used from the late 19th century to the present. It varies in composition, depending on the solution used.

Bore
The finely machined hole that runs longitudinally through the barrel.

Breech
The back end of the barrel that points towards the shooter when the firearm is held in firing position.

Breech Block
A machined block that screws into the breech to seal the bore at the breech.

Breech-Loading Firearm
A firearm in which the bullet and powder, or the cartridge, are inserted at the breech.

Browning
A dark brown or reddish-brown patina applied to ferrous metals through an acidic process that is performed at room temperature. Its main functions are to act as a corrosion inhibitor and to tone down the brightness of polished metal. It varies in composition, depending on the solution used, but usually contains nitrates and/or chlorides and a metallic salt such as copper sulphate. Prior to the invention of firearms, a form of browning, called "russetting", was used on arms and armour.

Cap Lock
See *Percussion Lock.*

Cartridge
A sealed unit that consists of a bullet or shot, gunpowder, a primer that explodes when hit by a mechanical firing pin, and an outer casing that holds the other items together.

Case Hardening
A process that hardens the surface of ferrous metal parts by exposing them to a combination of heat (above 720°C) and a carbon source of either carbon or cyanide salts in a reducing atmosphere. This process is done to small parts to increase wear resistance and strength, and is recognizable by mottled grey-brown-purple colours.

Chamber
The part of the breech that is machined to accept a cartridge.

Cock
(*verb*) To engage the mechanism of a firearm in order to prepare to fire it.
(*noun*) In a flintlock, the cock is the part that holds the flint (see Figures 2a and 2b). In a percussion lock, the cock is the part that strikes the cap positioned on the nipple (see Figures 2c and 2d). A synonym of *Hammer.*

Flame Bluing
A method of adding a blue patina to the surface of ferrous metal parts by holding them over a clean flame until a blue oxide film appears. Unlike chemical bluing, this film is a brilliant deep blue colour.

Flintlock
A mechanism developed in the 17th century in which an L-shaped piece of hardened steel is struck with a piece of flint, causing sparks to fall into a teaspoon-shaped pan full of fine gunpowder that is ignited and, in turn, that ignites the main gunpowder charge. See Figures 2a and 2b.

Gunpowder
A powder that is set off by sparks or by other small explosions.
Black Powder: An explosive containing a mixture of sulphur, potassium nitrate, and carbon (charcoal).
Smokeless Powder: A fast-burning powder invented in the late 19th century that is made of nitrocellulose.

Hammer
See *Cock* (*noun*).

Lock
A mechanism designed to fire the main gunpowder charge in a firearm.

Magazine
A spring-loaded container for cartridges. The magazine is an integral part of a firearm and its firing mechanism.

Match Lock
A simple firearm mechanism that pushes the burning end of a slow match (a potassium nitrate-soaked cord) to a teaspoon-shaped pan filled with fine gunpowder that, when ignited, in turn ignites the main powder charge.

Muzzle
The forward end of the barrel through which a bullet leaves the bore.

Muzzle-Loading Firearm
A firearm that is loaded through the bore. A measured amount of powder is poured into the muzzle, followed by a projectile (ball, bullet, or shot) secured in place by a cloth patch or by felt wadding. The entire load or charge is then pushed down into the breech with the aid of a wood or metal rod called a ramrod or wiping stick.

Nipple
The projection on the breech of a percussion firearm on which a percussion cap or detonator sits. See Figure 2c.

Percussion Cap
A thin copper cup or cap containing a sealed charge of fulminate of mercury (a contact explosive). The percussion cap is used with a percussion lock to detonate the main powder charge.

Percussion Lock
A mechanism first developed in 1807 in which a small explosive charge is ignited by striking it with an external hammer. The explosive charge is directed through a small hole in the breech to the main powder charge. See Figures 2c and 2d.

Proof Mark
The mark or marks, usually stamped on the breech of a barrel, that indicate that the barrel has been test fired with a substantial charge (usually two or three times the normal charge), has been inspected, and is safe to fire with a normal charge.

Stock
The part of a firearm that serves as a handle and that holds all metal parts in position. The stock is usually made of wood, but may be made of plastic. See Figures 1a and 1b.

Touch Hole
The small hole in the breech of the barrel that connects a flintlock's priming powder charge to the main charge. It is located on the side of the breech. See Figures 3a, 3b, 3c, and 3d.

Wheel Lock
A large, complex firing mechanism in which a spring-loaded wheel rotates against a piece of pyrite to produce a spark that ignites a small charge of fine gunpowder or priming powder that in turn ignites the main powder charge.

Supplies and Suppliers

Supplier of Gunsmithing Tools

Brownells, Inc.
Route 2, Box 1
200 South Front Street
Montezuma, Iowa
U.S.A. 50171
Telephone: (515) 623-5401
Fax: (515) 623-3896

The following equipment is available from the types of suppliers indicated:

Hardware Stores

screwdrivers
files
sandpaper
saws
paste wax
hide glue
fish glue
steel wool
machine oil
mineral spirits
metal polish

Drug Stores or Photography Stores

disposable gloves
cotton swabs
toothpicks
tongue depressors

Art Supply Stores

bristle brushes
flat wooden sticks

Suppliers of Plastics or Suppliers of Packing Materials

Ethafoam
Microfoam

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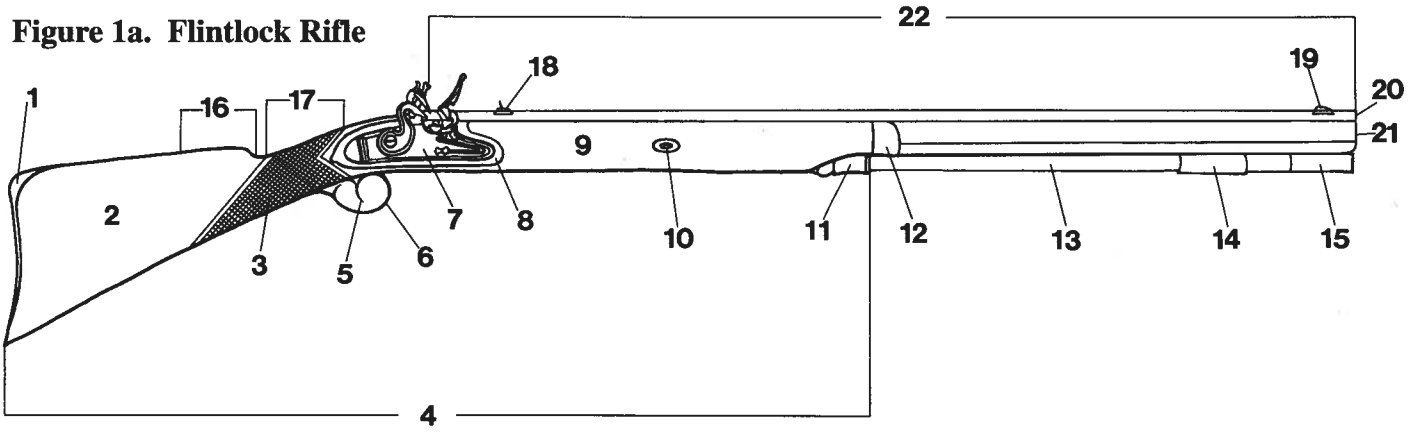
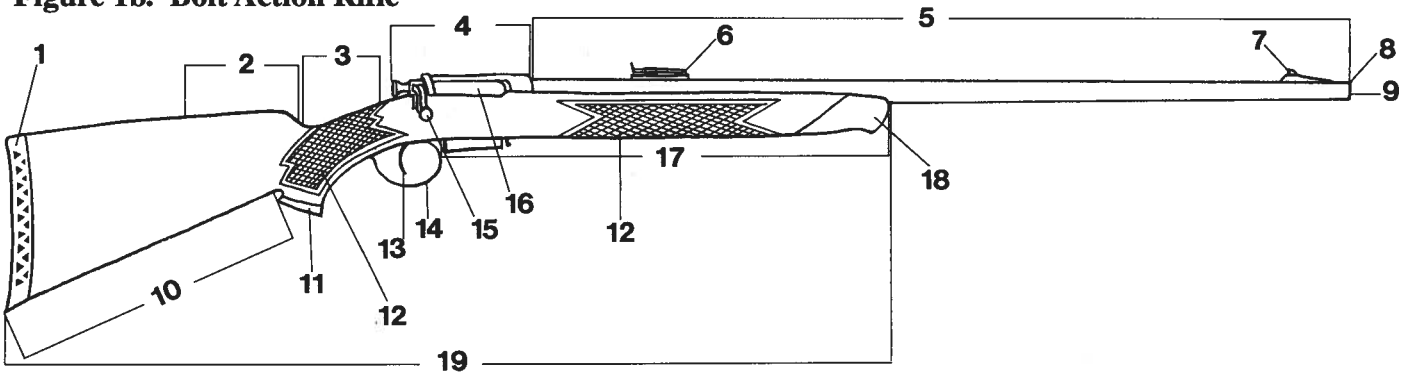
Figures

Figure 1a. Flintlock Rifle



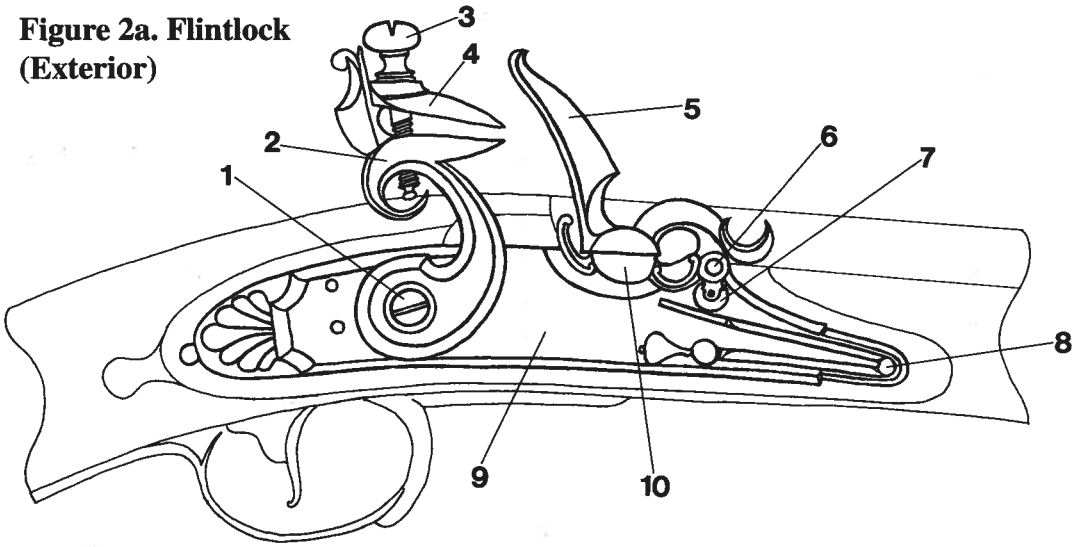
1. Butt plate
2. Butt stock
3. Chequering
4. Stock
5. Trigger
6. Trigger guard
7. Lock (flint)
8. Lock moulding
9. Forestock
10. Key
11. Entry tube (thimble)
12. Forend cap
13. Ramrod (wiping stick)
14. Tube (thimble)
15. Ramrod tip
16. Comb
17. Wrist
18. Rear sight
19. Fore sight
20. Muzzle
21. Bore
22. Barrel

Figure 1b. Bolt Action Rifle



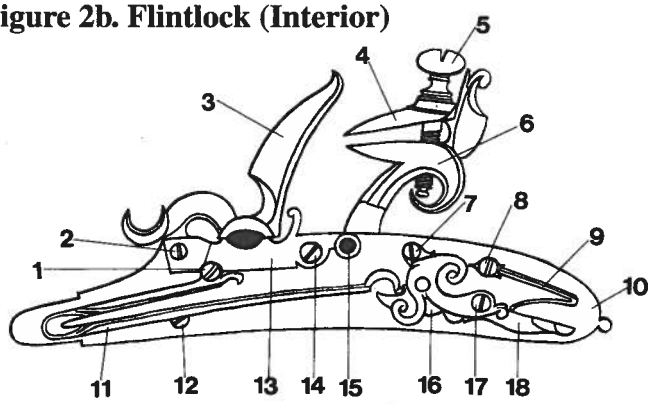
1. Recoil pad
2. Comb
3. Grip (pistol type)
4. Receiver
5. Barrel
6. Rear sight
7. Fore sight
8. Muzzle
9. Bore
10. Butt stock
11. Grip cap
12. Chequering
13. Trigger
14. Trigger guard
15. Bolt handle
16. Action (bolt)
17. Fore stock
18. Fore end cap
19. Stock

Figure 2a. Flintlock (Exterior)



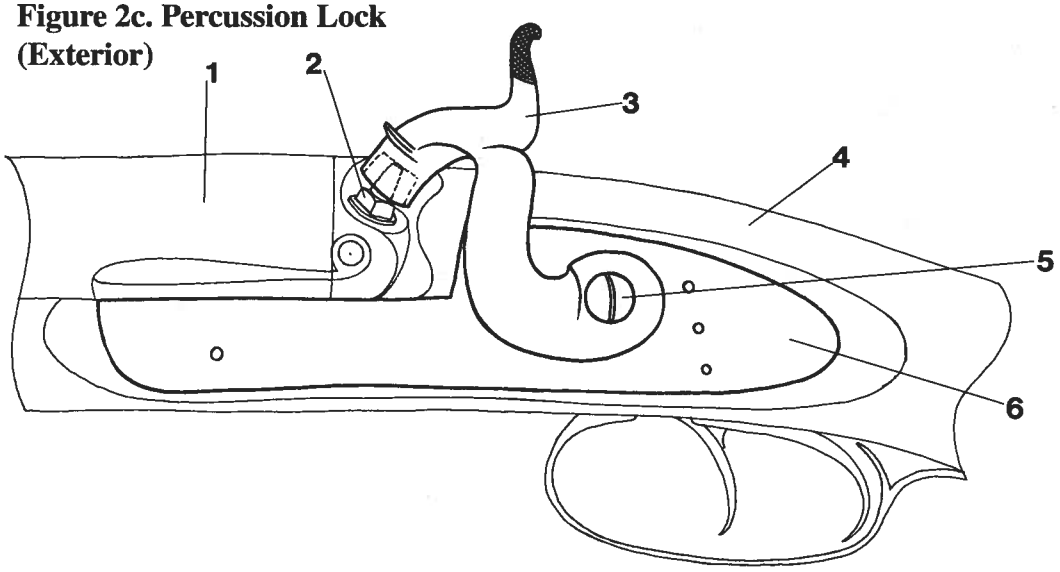
1. Cock screw
2. Cock
3. Cap screw
4. Cap (top jaw)
5. Frizzen
6. Frizzen screw (tip)
7. Roller
8. Frizzen spring
9. Lock plate
10. Flash pan

Figure 2b. Flintlock (Interior)



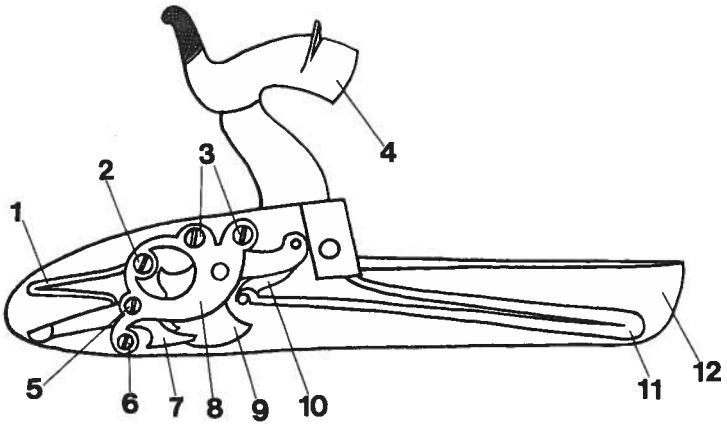
1. Mainspring screw
2. Frizzen screw
3. Frizzen
4. Top jaw (cap)
5. Cap screw
6. Cock
7. Bridle screw
8. Searspring screw
9. Searspring
10. Lock plate
11. Main spring
12. Frizzen spring screw
13. Removable flash pan
14. Pan screw
15. Hole for lock bolt
16. Tumbler
17. Sear screw
18. Sear

Figure 2c. Percussion Lock (Exterior)



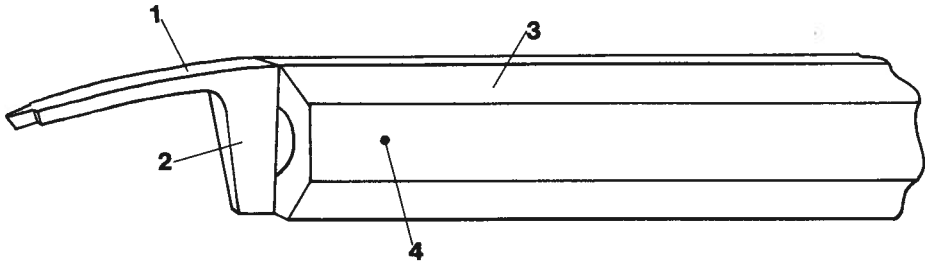
1. Barrel
2. Nipple
3. Hammer (cock)
4. Stock
5. Hammer screw
6. Lock plate

Figure 2d. Percussion Lock (Interior)



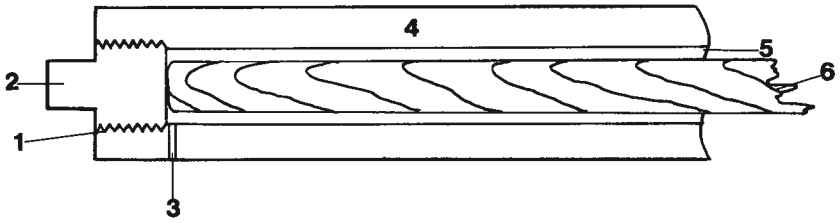
1. Sear spring
2. Sear spring screw
3. Bridle screw heads
4. Hammer (cock)
5. Sear screw
6. Bridle screw
7. Sear
8. Bridle (double)
9. Tumbler
10. Link
11. Main spring
12. Lock plate

Figure 3a. Common Breech – As seen



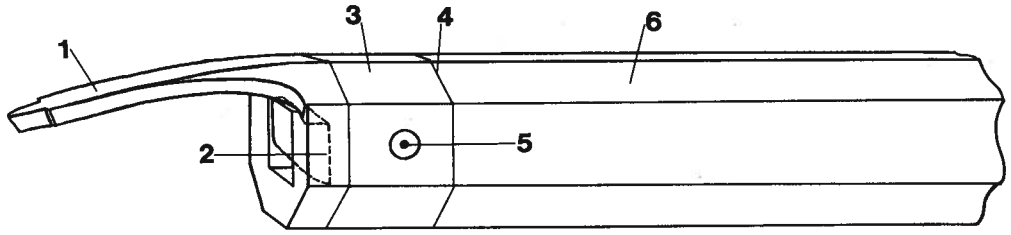
1. Tang
2. Breech block (pin)
3. Barrel
4. Touch hole

Figure 3b. Common Breech – Cutaway from top



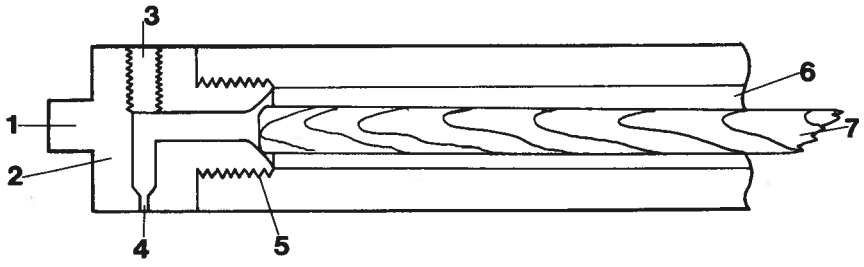
1. Threads
2. Breech block
3. Touch hole
4. Barrel
5. Bore
6. Dowel

Figure 3c. Patent Breech (Hook Type) – As seen



1. Hook tang
2. Hook
3. Breech block
4. Visible joint
5. Touch hole
6. Barrel

Figure 3d. Patent Breech (Hook Type) – Cutaway from top



1. Hook
2. Breech block
3. Plugged access hole (may not be visible)
4. Touch hole
5. Threads
6. Bore
7. Dowel