# THE REENACTOR'S GUIDE TO

# LEATHER CARE IN THE 19TH CENTURY

**By David Jarnagin & Ken R Knopp**

How did the "Boy's of 61" care for their leather equipment? What did they use? Was there common knowledge about leather care in the mid-19th century? Is leather different today? How should reenactors care for their leather gear? Should we use oil? What kind? How much? These are questions that have been debated for years among reenactors and historians alike. Clearly, mis-information, myth's old and new prevail. What if anything, is an authentic reenactor to do with his leather equipment?

First, lets start from the beginning. Until our modern age there was no material that could match the functional flexibility, durability and beauty of leather. Since the times of the Egyptians animal hides have been tanned for all types of applications from fine leather used for clothing to thick, strong leather used for harness. Today, synthetic and petroleum based products have substantially replaced leather but until their invention and widespread use in the mid-20th century leather was certainly the most universal material that mankind has ever produced.

It was the vegetable tanning process that turned raw hides into leather making it both useful and far less perishable. Nevertheless, as an animal byproduct it was still biodegradable. Moreover, the effects of sweat, dirt, re-wetting, mold and time dramatically deteriorate leather which made appearance important and safety a major concern especially with horse equipment. Perhaps more practical for the 19th century leather owner it was also expensive to replace. Cleaning and oiling were thus critical to safely extend its use or preserve its beauty so, "*...new methods and directions are found in every Agricultural Journal.*" Proper care was indeed common knowledge and common practice in the period. 1.

Routine maintenance and minor repairs were done at home. However, old, weathered or worn footwear, saddlery and harness was taken to the local harness maker for more professional rehabilitation. Here, leather was repaired, rejuvenated or replaced. An 1875 harness makers handbook goes into great detail about how to take used harness, rework then recondition it by cleaning and oiling to like new condition. 2. Little was discarded. Even leather from dilapidated harness was saved to be re-used in other equipment. The authors have often seen leather pieces excavated from well preserved war-time trash pits including saddle skirts, shoes, boots, straps and their hardware that were clearly re-used in patching other gear. In fact, field repairs were also routine. Both Federal and Confederate ordnance records show artillery batteries were issued sides of leather, oil, tools and additional hardware for repairing damaged or fatigued harness. In addition, the Confederate War Department spent a great deal of resources gathering and repairing

equipment recovered from the battlefields while the Federal's contracted firms to specifically repair and restore used accoutrements to serviceable condition. (3).

To be sure, leather today differs widely from that tanned in the 19th century. Most leather available in the United States is not bark tanned in the same manner as it was a century and a half ago. True, some leather is still vegetable tanned but using barks (mostly Quebracho from South America) and chemicals as well as chemical dyes that are completely different from the period. Tanning methods also took longer then than now. Even the cattle raised today for hides are bred and fed differently using accelerated feeds and generally slaughtered at an earlier age than cattle of the period. For example, modern shoe leather by design requires much less care which allows little or no break in period but also shortens its life span. Perhaps more significant, as a result of the passing of time and our "throw away society" we have unfortunately lost a lot of basic knowledge about the correct way to care for vegetable tanned leather and worse, allowed misinformation and myths to take hold.

For example, the proper use of soap and how/when to clean leather has long been a serious question. According to 19th century edicts, leather should be brushed and wiped down as often as used and, routinely thoroughly cleaned. The following passage is from a 1915 U.S. Army publication called the "Privates Manual". It provides a look into the aspects of leather care at a time when this information was beginning to be lost. Since the army at that time still depended heavily on leather equipment it was a required and no doubt, an "employed" knowledge.

*"Cleaning. Daily, or as often as used, leather equipment should be wiped off with a cloth slightly dampened in water, merely to remove mud, dust or other foreign substances.*

*At intervals of from one to four weeks, depending upon the circumstances, it is essential that the equipment be thoroughly cleaned in accordance with the following instructions.*

*A. Separate all parts, unbuckle straps, remove all buckles, loops, etc. where possible.*

*B. Wipe off all surface dust and mud with a damp (not wet) sponge. After rinsing out the sponge, a lather is made by moistening the sponge in clear water, squeezing it out until nearly dry, and rubbing it vigorously upon the soap. When a thick, creamy lather is obtained, thoroughly clean each piece without neglecting any portion. Each strap should be drawn its length through the lathered sponge.*

*C. After the leather has been allowed to become partially dry, it should be rubbed vigorously with a soft cloth to give it the neat, healthy appearance that is desired.* (4)

This original Federal cap pouch was stored in a very dry climate. The age hardening is quite severe. However, a careful cleaning and light oiling will bring alot of life back the cap pouch as can be seen in the second picture of the same artifact.

Civil War period leather soaps were apparently such a common item they are not easily defined today. Harness makers of the period often made their own soaps selling the excess from their shops. A few such as English "Crown","Scotch" or "Castile" soaps were available on the commercial markets yet the appropriate soap was of such major importance period leather manuals urged that, "*strong soap should never be used, as the alkalies penetrate the leather and harden it"*. (5) (photos/drawings # 1)

The importance of simply brushing the leather should not be overlooked: *"brushing is often omitted, but it is almost as important as the cleaning of the surface of the leather, as the fine dirt is thus removed, and it does not interfere in anyway with the penetration of the oil or grease into the pores of the leather or around stitches."* (6)

The reason for routine cleaning is to prevent a condition known as "Age Hardening". *"This phenomenon is observed mainly with thicker leathers found in military, carriage, and rural industries collections. It manifests itself by a darkening in the colour and a loss of flexibility. In severe cases, the surface structure is damaged and cracks appear". When the humidity is high, the leather absorbs moisture which partially dissolves water soluble materials present between the fibers. As the humidity reduces, moisture within the structure of the leather moves towards the outer surface, taking non-tans and other material with it. These are then deposited in the grain and flesh layers as the moisture evaporates. Over a period of time, months or years, there is a gradual build*

*up of material in the surfaces layer. This physically restricts movement of the fibres, particularly in the grain surface."*(7)

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Age hardening: This picture shows the severe cracking effects over time of the age hardening process. This is an original belt but if proper care and cleaning had been taken the cracking may have been prevented

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Age hardening as well as the wetting and drying effects from exposure to weather will attack thinner leather (accoutrements) too and eventually cause the grain surface to harden, crack and curl. Doing the recommended cleaning above will remove this build up of excess non-tans. Of course, a little oil will be removed at the same time and that is the reason for the crucial but judicious use of proper leather oils.

Without question, the two largest issues of debate and myth regarding leather are the use of oils and water. The fact is, both are critically important to rejuvenate leather. Oil and water compliment each other to penetrate the fibers by changing their shape and the way they are packed in the leather itself. As they permeate the leather the fibers plump up and grow ever so slightly in length. This causes them to become less tightly packed and thus loosens the leather to become softer. Over oiling loosens the fibers too much which causes the leather to loose tinsel strength and actually makes it weaker. It also accumulates dirt and soils clothing. On the other hand if there is not enough oil to lubricate the fiber over time it will become stiff, brittle and break or tear. So there is a fine line between enough and too much oil and this is where the significance of water comes in.

*How to apply oil. The quantity of oil to be used can not be definitely prescribed. The leather should, therefore, be saturated with sufficient oil to be soft and pliable without excess sufficient to cause it to exude. <u>In applying the oil the following general instructions should govern:</u>*

*A. The oil should be applied to the flesh side of the equipment where practicable when the leather is clean and still damp after washing (about half dry), because it penetrates more uniformly when applied from the flesh side, and when the leather is damp.*

*B. The oil should be applied with an oiled rag or cotton waste by long, light, quick strokes---light strokes, so the pressure applied may not squeeze out an excess of oil; The endeavor should be to obtain a light even distribution.*

*C. After applying the oil the leather equipment should be allowed to stand for 24 hours, if practicable, in a warm dry place. It should then be rubbed with a dry cloth to remove any unabsorbed oil."*(8)

As one can see the use of water is equally important as oil. Water helps oil penetrate the leather fibers and prevents over oiling which can do as much damage as under oiling. This is the same way a tannery oils leather during the currying process. From another perspective, skin oils and water worked well for the cow's hide when still "on the hoof" so why not after being tanned?

Now that we know that oil is important, what oil is best to use? For authentic applications, a look back to period records provide the answer. When it came to military leathers, most tanners liked to mix neat's-foot oil and animal oils (tallow), *"neat's-foot is undoubtedly the best, as it restores to the leather some of its natural properties, and therefore better assimilates with the fiber".... and fits it to take up a much greater quantity of tallow, which is, after all, the only real protection against the action of water."* (9) With properties of oil and a natural water repellent tallow alone was often a popular economic alternative to oil. However, neat's-foot oil although one of the more expensive oils at the time, was widely used due to its superior lubricating qualities. In fact, the use of neat's-foot oil was so important the Federal and Confederate ordnance manuals directed its application in the same manner as noted above and also required it be issued in battery wagons for use in the field. (10) (photos/drawings # 2)

Routine cleaning with soap and the proper use of water and oils has long been thought the best way to maintain leather. Perhaps, the 1917 Cavalry Manual sums it up best, *"Saddle soap should be used to clean all leather....Should...leather be soaked by rain or by swimming they will not become hard if covered with a light coat of neat's-foot oil applied just before they dry out. Leather can be preserved for years by use of saddle soap and neat's-foot oil but once it becomes hard and cracked nothing will make it serviceable."* (11)

There is one other major myth that deserves to be dispelled. That is that neat's-foot oil rots stitching thread. The problem of thread rot is not the oil itself but the moisture trapped in the leather by the "over use" of the oil. The fact is, leather must breath. As air humidity rises and falls leather constantly takes up and loses moisture. As one adds

excessive oil leather will loose its ability to breath until it gets so much oil that moisture is virtually trapped. Bacterial action from debris and the trapped moisture is what rots the thread. On the other hand if the correct amount of oil had been used this would not have happened. (12) On another note, oil does not make leather waterproof. Leather's ability to repel water comes from either the finish applied to the leather at the tannery (including tallow) or by applying a wax based product to seal the surface. Harness dressing or finishing waxes were important to penetrate, soften and seal leather to protect it from dirt and moisture. (13) While repelling water they still allow the leather to breath. Therefore, after a proper cleaning and oiling the application of a good, soft leather wax is an authentic and good idea.

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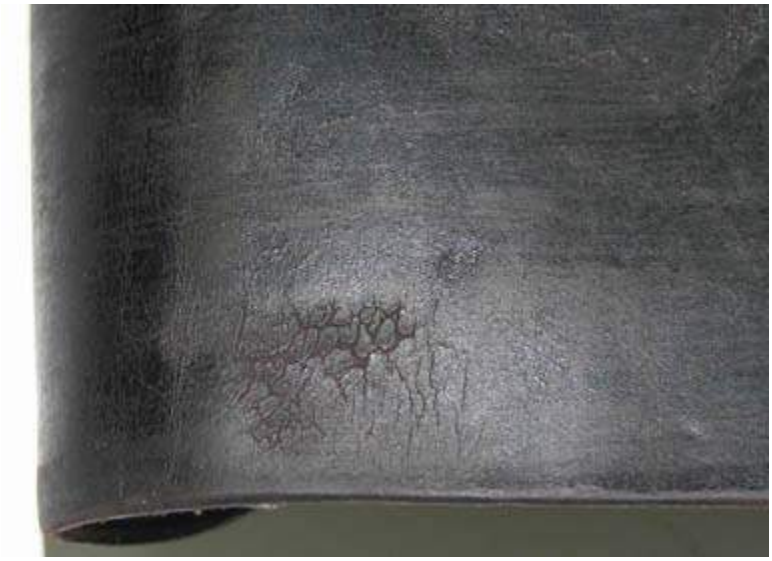

The cracking on the grain of this cartridge box is caused by too much oil. The amount of oil introduced to this artifact is quite excessive and has caused the fibres to expand beyond what the grain surface can handle. Other ways over oiling can show up is when the grain actually tears itself loose from the fibre structure underneath it.

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Mold (fungi) is another problem encountered with leather especially when in storage. *"Tanners are only too aware, all skin based products are susceptible to attack by moulds. "Leathers may be destroyed if excessive mould growth is allowed to take place." "The large majority of fungi are only viable if there is enough moisture to support growth. It has been shown that is the relative humidity of the atmosphere surrounding the object is less than 65%, growth does not occur."* (14) There is always a fight with humidity especially for those that live in the South, but it is a fight that must be fought. The problem is a little mold in one spot will soon spread to all of your leather and eventually decay its surface. It will also return again without some preventative measures. However, the cure is easy. First, light is mold's enemy so exposure to sunlight will dry it out but to really get rid of mold a cleaning with white vinegar is a thorough solution.

Simply wipe the leather. The PH of vinegar will not hurt vegetable tanned leather since it's PH is about the same.  There are also products on the market that help to prevent mold by natural additives that inhibit the growth in even the dampest of climates. With just a little care you can keep your leather from being green and fuzzy and possibly save it from destruction.

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This box has mold on the leather.  Mold is green, circular and spiders out.  A little white vinegar will remove the mold.

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This is not mold but rather a heavy fat such as tallow that has returned to the surface. Called "spewing" this is caused by the over use of oils especially those containing mineral oil. English leather of the period and today were known for spewing. There is nothing wrong with the leather it is just the way English leather curriers do their work. Spew can be removed by simply wiping or buffing the fat away.

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Sadly today we have lost some of our ancestors basic knowledge of leather care and even their values of thrift. While leather care in the mid-19th century was largely economically driven it was also simplistic. They may not have understood the chemical reasons for what they did but hundreds, perhaps thousands of years of experience told them what clearly worked. However, on a more realistic note the proper care noted above probably did not happen exactly as it should then nor, can it be expected to now. Nevertheless, if you want your leather equipment to be safe, to wear well, maintain its value and be authentic in your historical purpose then the “correct” leather care is more than just a fanciful or quaint ideal.

**About the authors:** Jarnagin and Knopp have co-authored several articles on Civil War leather. David Jarnagin of Corinth Mississippi is co-owner of C & D Jarnagin, the nation’s largest manufacturer of 18th and 19th century military reenactment clothing and equipment. A passion for research in period leather tanning, dyeing, equipment manufacture and of course, handling thousands of artifacts has made David uniquely qualified in the subject of 19th century leather processes and leather equipment.

Ken R. Knopp, of Hattiesburg, Mississippi, is a Financial Advisor for Edward Jones Investments and the author of two books, *Confederate Saddles & Horse Equipment* and *Made in the CSA, Saddle Makers of the Confederacy*, as well as numerous articles about Civil War saddlery, leather and Confederate accoutrements.

AUTHOR’S THANKS: Go to.....Fred Gaede, Shep Hermann of Hermann Oak Leather Company, Doug Kidd of Border States Leather and Neill Rose.

**FOOT NOTES:**

1. *The Harness Maker's Illustrated Manual*, By W.N. Fitz-Gerald, New York, 1875 (what pg. 290.

2. IBID, pgs. 290-295

3. *Ordnance Manual for use of the Officers of the United States*, 3rd Edition, 1861. Reprinted almost verbatim for the Confederacy as the, *The Ordnance Manual for The use of Officers of the Confederate States Army*, First Edition, Richmond, Va. 1863, pgs. 328 and 337. List of contents noted in Confederate battery wagons and forges as from the following arsenals. Vols. 33,34,36, Augusta Arsenal; Vols. 32,101,3,4,6,7,36, 58,59 1/2,83 Macon Arsenal; War Dept. Collection of Confederate Records, Chapt. IV, Record Group 109; National Archives, Washington DC.

*CS Storms*, North South Trader Magazine, Vol. 31, No. 4, (2005).Additional research on Federal contracts with firms of J.I. Pittman and C.S. Storms.

4. *Privates Manual*, by Major James A Moss, George Banta Publishing Co. Menasha, Wis., 1915. Pg 54-57.

5. *The Harness Maker's Illustrated Manual*, By W.N. Fitz-Gerald, New York, 1875. pgs. 291-292)

6. *IBID*, pgs. 291-292)

7. *Journal of the Society of Leather Technology*, Leather International, Vol. 90, January 2007, Sidcup, England, pg. 139.

8. Virtually the same process using both water and neat's-foot oil is described, albeit with more brevity, in the ordnance manuals. *Ordnance Manual for use of the Officers of the United States*, 3rd Edition, 1861. Reprinted almost verbatim for the Confederacy as the, *The Ordnance Manual for The use of Officers of the Confederate States Army*, First Edition, Richmond, Va. 1863, pg. 153

9. *The Harness Maker's Illustrated Manual*, By W.N. Fitz-Gerald, New York, 1875 pg. 325

10. *Ordnance Manual for use of the Officers of the United States*, 3rd Edition, 1861. Reprinted almost verbatim for the Confederacy as the, *The Ordnance Manual for The use of Officers of the Confederate States Army*, First Edition, Richmond, Va. 1863, pgs. 328 and 337.

Ordnance & Property Report for Forrest's Artillery Battalion, AAIG. Report, May 20th - 24th, 1864, at Tupelo, Nat'l Archives, War Depart. Collection of Confederate Records, R.G. 109, RGM 935, Roll 4.

11. *Manual for Non-Commissioned Officers & Privates of Cavalry of the Army of the United States.* War Dept. Office of the Adjutant General, Gov't Printing Office, Washington DC., 1917, pg. 29.

12. Conversations by David Jarnagin with Shep Hermann of Hermann Oak Leather Company. The Hermann's have over 100 years of experience with leather tanning and employ leather chemists as a regular part of their research and development.

13. Boot or belt pastes (sometimes called boot blacking) were a common commercial item. They were sold commercially and sometimes issued in the Federal army. *French Uniforms, Clothing & Equipment in the Union Army*, Part 1. By Don Troiani. North South Trader Civil War, Vol. XXVI, No. 2.

14. *Journal of the Society of Leather Technology*, Leather International, Vol. 90, January 2007, Sidcup, England, p.138

Text box about soaps

Prior to the Civil War leather care products were sold commercially but were also routinely made at home or by local tanneries and harness shops then sold to the public. After the war an explosion in the commercial catalog saddlery and harness business created an equally large expansion in the sale of their care products including soaps, oils, dressings, dyes, blacking, polishing pastes and waterproofing agents.

Period leather soap recipes included variations of natural ingredients such as lye of potassa, tallow, whale or cod oils. Two very popular soaps of the Civil War period were imported from England -"Crown Soap" (British patented soap) and "Castile Soap" (made from vegetable oils).

Period leather oils were commonly called "Harness Oil" or simply "Leather Oil". Variations of Cod Oil, Caster Oil and of course, neat's-foot oil were considered as the best by tanners at the time. Neat's-foot oil: The word "neat's" comes from the old English word for "cow". "Foot oil" comes from the animal by products that are used to make the oil. In the rendering process to make neat's-foot oil hooves taken from slaughtered cattle, sheep and other animals are boiled multiple times for long periods with the resultant liquors and oils

skimmed off as a leather lubricant. Interestingly, the heaviest of these rendered oils were used not as a penetrate but to water proof leather.

"Tallow" was simply by-products of animal fats. Different animals required diverse rendering processes that yielded tallow of varying consistency, quality and uses. Tallow was also sold commercially and often used as an additive with or as an economic alternative to neat's-foot oil.

Harness or leather dressings of the period made for black and russet leather were called "Harness Dressing", "Leather Polish", "belt paste", "boot paste", "dubbing" or simply "blacking". They were variously used to penetrate, soften and seal the leather for protection. Their ingredients included waxes, tallow, various oils and, for black leather- lamp black.

Iron buckles and hardware coming in contact with leather were japanned or tinned for good reason. In the tanning process iron mordants are used to interact with the natural tannin agents in the leather to turn it black, hard and brittle. Therefore iron hardware had to be japanned or tinned to protect the leather and to prevent rust. The Federal and Confederate ordnance manuals directed that iron parts that are not so protected, "*or from when the coating is rubbed off, are greased with tallow.*"

**STEPS TO "AUTHENTICALLY" AND "CORRECTLY" CARE FOR LEATHER**

NOTE: The following steps are for modern "using" leather. Caring for artifacts or collectible leather is a completely different process. We DO NOT recommend you apply these ingredients or methods to artifacts or collectible leather. You may cause your artifact great harm. The following authentic products and methods can be used for all reenactor leather but especially for horse equipments that are exposed to the harmful effects of sweat.

1. The first line of defense in caring for your leather is to **USE IT**! Using your leather flexes the fibers and allows it to breath.

2. After each use brush your leather with a soft brush to remove embedded dirt then wipe down with a damp cloth.

3. Every few months unbuckle and take apart your pieces for a thorough cleaning using a damp sponge or cloth with natural leather soaps applied as noted above. Allow to partially dry. Note: Use only natural soaps. Most of

today’s saddle soaps contain petroleum based “glycerine” that are both unnatural and have potentially harmful long term effects to leather.

4. With the leather still damp apply a light coat of oil being careful not to saturate your leather. Rub with a woolen cloth. Allow the oil to soak in then wipe off the excess. Beware: Most modern leather lubricants contain petroleum based distillents. Over time, petroleum products turn into a solvent that will actually de-tan leather. Only natural products are therefore recommended. Those containing natural and authentic ingredients such as tallow, Cod oil, lanolin, lard and of course, neat’s foot oil are best. If you use neat’s-foot oil be sure to use “pure” neat’s-foot oil rather than “neat’s foot oil compound” which contains mineral oil. Immediately after removing the excess oil apply a coating of warm tallow or other animal grease. Gently rub into the leather with a woolen cloth. Let stand for a few hours then wipe off the excess.

5. Finish by “sealing” the leather with tallow or a good natural, wax-based “dubbin” or dressing. Then buff to a smooth shine.

6. Storing your leather: Leather is best stored at 50% humidity and 70 degrees.

PHOTOS: (Note: all drawings courtesy original catalogs of : Moseman's 1890's Illustrated Catalog of Horse Furnishings, D Mason and Sons 1880's catalog, Perkins Campbell & Co. catalog of 1888.

Except for drawings #'s 1 and 2, use all other photos and drawings where desired.


English Crown soap by the jar and "Castile" soap by the bar. Both were popular Civil War period commercial soaps.

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Neat'-foot oil goes back centuries. Gladdings was established in 1875 as a commercial supplier of all kinds of common household use oils such as castor, sperm, axle oils and witch hazel. D. Mason & Son's was a large catalog company in Birmingham England dating back to at least 1870. Like most items in their catalog they branded neat's foot oil as their own with this decanter.



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Frank Miller & Son's of New York City was established in 1838. By the 1880's their leather care products were sold all over the U.S. and Europe.




Colgate & Company was established in New York City in 1806 as a maker of soap, candles and starches. It was the precursor of today's Colgate Palmolive Company.

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Leather workers at the Federal Quartermaster Bureau trim shops display the various tools of their trade. Note the men in the foreground astride their stitch horses. (L to R) Tradesman #'s one and three are sewing bridles for quartermaster wagon teams. Library of Congress photo.