

# **Production of Russia Leather (Recipe from the Year 1807)**

*Juchten (Russia) or also Juften leather is a fine cow's leather, tanned with willow bark and saturated with birch oil. It is waterproof, supple and strong smelling. It is used for upper shoe leather, purses, etc.*

There are many assumptions and opinions about the making of Russia leather, some of them from very worthy men such as Pallas, Lepechin and the like. These gentlemen also give rather dependable reports, though they do leave out some things that the practitioner needs to know. It is all the more interesting that Mr. von Meidinger of Vienna not only studied and tested these descriptions, but also as commissary of a Russia leather factory built at Vienna some years ago learned all the details of making Russia leather from a Russia leather tanner. According to his opinion, it should no longer be at all difficult to produce Russia leather in Germany and everywhere.

The following is most pertinent:

The preparation of Russia leather depends on three main things, namely:

1. On the actual tanning or steeping of the hide
2. On the saturation of the tanned skin with birch oil, by which it becomes Russia leather, and acquires the characteristic smell; finally
3. On the dyeing and the preparation of the required red and black dye

Discussion of these three items will thus constitute the rest of this essay.

## **A. About the Processing or Preparation and Tanning of Hides for Russia Leather**

1. Of the soaking and cleaning of the raw hides.

The first business here is, as in any leather treatment, the soaking of the raw, fresh or dried hide. One brings, as an example, to a six-foot-deep and equally wide barrel or vat, which is completely buried in the ground, equipped with a lid and a work board and half filled with water, fifty raw, but not too heavy cowhides, that weigh about an estimated 8 or 9 pounds, and 100 hides from one- to three-year-old steers and calves, which weigh about 5 to 6 pounds, and puts them in the vat half filled with water. But if clean running water is at hand, no vat is needed; rather one hangs the hides on cords in the river. They must be kept totally underwater by weighting them and not removed until they are completely soaked, which will have happened in three to six days. Then they are removed and laid out in piles on the work board over the vat, so that the water completely drips away and runs back into the vat.

This done, the hides that before lay doubled in the water are spread out one by one, then submerged with sticks once again in the water, where they must soak anew for three days, by which means they become completely soft. Now the hides are once again spread out, and after the water runs off are laid or extended across the scraping beam, by means of which they are stretched and cleaned of the many superfluous fleshy bits. Afterwards they go into another barrel with fresh water, where they remain soaking for four more days in order to attain their perfect softness and elasticity. This is the end of the first process.

## 2. Ashing in Lime

The ashing in lime is the work which swells the hide and inclines it to release the hair. To this end one takes the hides from the soaking barrel and lets them drain on the work board. Then they go in a vat with old or decayed ashes, which is a lime dissolved in water [1] in which hides have been previously ashed, and as a result has little strength left. If one doesn't have any more old ashes, then you have to make some new mild material, because the hides at first should not be too actively worked upon. The ash is of the usual common sort. In this old ash the hides lie 14 days, but they are opened up twice each week, and this is done the first time on the second day after putting them in. Having lain 14 days in the first ashing, one removes the hair on the scraping beam, meanwhile taking the old ash out of the ash tub and filling it with fresh ash, in which the hairless hides are left to rest another 14 days. Then they are once again cleaned of lime and flesh on the scraping beam, folded with the folding iron, and given a uniform thickness all over. This last step is accomplished by planing. Next one takes rye flour, steeps it in a sufficient quantity of warm water, and slowly treads the hides with the feet in this flour water until the hair and grain side has become right smooth and slippery, after which the skins are worked with a sharp scraping or rubbing iron until the lime is extracted. Now the skins are rinsed completely clean in water.

## 3. Tanning or Steeping the Hides

The tanning or steeping of hides for Russia leather proceeds in the usual manner with some tanning agent [2], but in Russia the bark of the poplar willow (*Salix arenaria*) is used for tanning, and in Siberia the bast or inner brown bark of the birch. Mr. von Meidinger maintains, however, that spruce bark is just as good, if not more effective, and has the advantage that it can be found any place. One must figure 72 *Butten* [3] for 50 cow or 100 young cow skins for all 6 tannings, which last five weeks.

When the 150 skins have been scraped clean of lime and rinsed in water as described above, they are placed a whole day in two tanning vessels placed next to one another containing sour or old tan, which has already been used once. Then they are opening up and allowed to drain thoroughly. While this is going on, one

makes fresh or warm tan by scalding a measured amount of spruce bark in warm water in a small vat and throwing it with a wooden shovel into the tanning vessel, also pouring in the warm liquid. The hides are then laid in it, and thus one proceeds throughout five weeks, except that the skins get new tan twice in the first week and then only once every week, and the whole time they must be opened up twice daily. Whenever fresh bark is provided, the old is removed with a fishnet [4] and discarded, because it has no more strength and is only fit to be burned.

It has been mentioned that in five weeks six tans will have been provided, that is to say two the first week and then only one tan in each of the other four weeks. As the 150 skins are divided between two vats standing next to one another, thus 75 in each vat, it follows that for every tanning in each vat, six *Butten* (or 240 liters) of spruce bark must be provided, which all together makes 72 *Butten* (or 2880 liters). The spruce bark can be used un-pounded and just broken into small pieces. If you want to pound it, you can save on volume.

After a period of five weeks and after receiving six treatments the tanning is complete. Thus the tanned skins are opened up and allowed to drain, then taken into the workshop where they are rubbed on the scraping beam with the scraping iron, not only to remove any attached bits of the tanning agent but also to squeeze out any liquid that remains in them.

## **B. About Saturation or Penetration with Birch Oil**

The preparation of skins thus far differs little from the customary tanning of calfskin. Now begins a process, however, which is the essential part of making leather into Russia leather. This is the saturation or impregnation with birch oil. This oil gives the leather the particular smell which repels all worms and insects, suppleness, strength and durability in water, in short all properties whereby leather becomes Russia leather.

Later the necessary information about procuring this birch oil will be given. For the moment we are merely explaining the treatment of the leather with it.

The skins, which, as noted, have been freed of tan and water by scraping, are brought into the soaking room still moist and laid on top of one another, spread out on a large, broad plank, so that the flesh side of each lies upwards. Onto these flesh sides, birch oil from a nearby pail is daubed around by two men, one standing on either side of the board, using a wool rag or wisp, and with the rag is quickly spread and rubbed in all over. As each hide is done this way, one man grasps half the skin and flips it over the other half, so that the skin is folded in such a way that the treated inward surfaces rest on one another, in order that the hides do not besmirch or stain one another's grain sides, for the cleaner these can be kept, the better and smoother the color will look later. The folded hides are laid aside. One continues with the saturation and the folding until all hides are done, when they are put on the floor and then hung up next to one another, grain side out, to dry. In drying, the birch oil completely penetrates the leather,

and depending on the weather, this is accomplished in several days. It should be noted that in winter, when cold and freezing close the pores of the leather, the application cannot be done in a cold room.

### **C. About Dampening with Alum Water, About Stretching, About Softening and Dyeing the Russia Leather Hides**

When the skins, as described above, are treated and dried, they have as a result taken on stiffness, which has to be removed. This happens on the so-called stretching frame. Because these stiff skins cannot be placed on the stretching frame without cracking them, they are for this reason, and also in order prepare a base for the dye that will follow, dampened on the grain side with alum water on a rag or sponge, and left lying on one another for it to penetrate a while. Then a man puts one skin after another onto the two studs and under the lever arm of the stretching frame, which two men press sideways into the two grooves by means of the lever arm, which are then removed by the first man by raising the lever and processed in all directions or quarters. The stretching continues in this manner until the skins have lost all stiffness.

After the stretching one proceeds to another rubbing of the grain side with alum water and then to the tooling.

Tooling is a work that contributes nothing to the quality, but is undertaken purely to give the leather, in the accustomed Russian manner, a refined appearance. The best Russia leather, were this property lacking, would not be taken for it. The tooling is performed with a brass serrated roller with two movable hand grips that looks like a small wheel. With it one cuts the lines on the grain side of the skin, first just parallel, then obliquely criss-crossed, as is seen on Russia leather. This tooling requires a certain skill acquired through practice, in order that the lines are spaced right evenly across the skin and do not show wide gaps. Since the roller, depending on how it is cut, incises a certain number of lines with each pass, as one continues it is important to be sure that the first notch is placed in the last line, to as to avoid having uneven spaces.

After that the skin is dried and then dyed. This is best done in the following manner. One spreads out the skin on a board, takes a brush made of the hair of a cow's tail, dips it in the nearby dye, whose preparation will be explained later, and brushes it well and evenly on the grain side, so that the upper surface is well colored. Then the dye is allowed to dry, and the dyeing and drying of the skin is thus repeated six times, until it is fully colored.

The preparation of the dye is done as follows:

For red dye you take, for example, five pounds of cut up *Fernambuk* or red sandalwood, throw it in a relatively large copper or tinned iron kettle, and pour in about one and a half buckets of clear lime water. This water is acquired by pouring a sufficient amount of

cold water into a vat of un-slaked lime [5], thus slaking it, and, after the lime has settled to the bottom, the very clean and clear water is removed. The dye wood has to be boiled in this lime water under constant stirring for nearly three hours or as long it takes with frequent stirring for the dye stuffs to be completely extracted and for the liquid to attain the consistency required for dyeing. Finally, about 1 *Loth* [6] of *Salmiak* [7] and half that amount of Spanish *Sode* [8] are added to the dye in the kettle and the red brew with wood chips is poured into a vat in which it must cool. This dye may not be kept for several days, as it spoils easily and becomes watery, but rather it must be made fresh just before use. This applies likewise to the lime water, which also easily goes bad from exposure to the air.

Black dye is used less frequently for Russia leather, and in even in Russia is never produced except when ordered and mostly from horsehide. The dye for this can be made in two very easy ways. Namely, some of the red dye introduced above is put into a kettle and mixed with enough crushed iron sulfate [9] to make it appear coal black, allowed to warm up a bit and then used. Another method of preparation is to pour cold water over a sufficient quantity of rye flour in a vat and leave it several days in a warm place. Thus begins a fermentation which produces an acidic liquid they call *Quas* in Russia. This filtered acidic water is poured into a container with iron filings, old nails, and bits of iron and is then left in a heated space under frequent stirring for eight or nine days. This produces an iron solution that can be used like the black dye above and only turns black when it is put on the leather. This is the usual iron solution used on upper leather; but the leather does not get as black as with the first dye, and with time turns foxy red.

#### **D. Softening, Shaving, Sizing, and Brushing**

When the Russia leather skins have been dyed for the last time and are still a bit moist, they are laid on top of one another for a while so that they work upon one another. Then the flesh side of each skin is bruised on a table with a sharp or notched bruising stick [10] throughout all quarters. Thus is the skin that was somewhat stiff from dyeing becomes soft and light again. Then comes the shaving, which is done on the flesh side on a shaving stand with a special shaving iron. One would be correct in calling this planing, since it makes the thicker parts of the skin thinner. The iron has on both sides a sharp, somewhat bent edge, which cuts off the superfluous thick leather in the form of shavings. After the shaving, the skins go onto the sizing frame, where they are sized with a particular round, sharp, steel disk, called the sizing moon. This makes the flesh side quite clean and white and gives the skins an even more uniform thickness. This work requires a skilled and practiced tanning assistant and much care, because it is easy to ruin the leather and cut holes in it. After sizing, the Russia leather is again worked, or ruffled up as we say, first with the bruising stick on the red side and finally with the slipper bruising stick on the flesh side. When this is complete, lastly the Russia leather's red side is brushed out on the table, using strong pressure and a stiff brush, thus making it clean and lustrous. Now they are finished and rolled up together with the red or black sides in and put away in storage to sell.

Over time Russia leather gets white spots here and there which look like mold. It is called bloom and considered to be a sign of true Russia leather, though it is most surely nothing more than the efflorescence of the alum with which the skins were treated before dyeing and which tends to appear in moist, damp spots.

This is the whole business of producing Russia leather. Now it should not be hard, with the help of a skilled tanning assistant (journeyman), go make excellent Russia leather any place. The main issue will always be whether to produce for oneself in the following manner the birch oil necessary for the saturation process or to acquire it from Russia or Poland.

### **E. About Distilling the Birch Oil or Tar Needed for Treating Juchten**

The distillation of birch tar is a chief industry of the village of Ural, not far from Tabinsk in Siberia. In summertime the residents prepare a sufficient quantity of birch bark. The best time for peeling birch, in their opinion, is when the wheat begins to shoot up or at the fast of St. Peter [late June]. At that time, they say, the birch stands in its sap, and the barks is readily removed. They peel it mostly from old birches, from wind breaks and isolated trunks, or from the blackish birch, for experience has taught them that such bark gives the most tar. When they have peeled off enough birch bark, they lay it together in layered stacks and spread out in such a way that it makes a flat surface and don't roll up. To this end they place a weight, beams, or some such on the stacks. The stacks must remain weighted for at least a week so that the birch bark becomes very flat and can stay that way.

When they wish to distill birch tar, they find a clayish spot and dig a pit in it like a kettle. If it is to be a big fire, a pit is made that measures about 50 *Faden* [11] in circumference (which makes a diameter of about 16 *Faden* [app. 30.5 meters]), which has a downward funnel shape, so that its bottom measures not much more than 13 inches. On this bottom they put a ring (collar) and rub it with clay, make channels in it, through which the tar runs into the drain underneath, and near this drain they lay others, from 4 to 5 *Faden* long, which lead into another pit dug deeper at a distance of about 5 *Faden* from the other pit. In the bottom of this a vat is buried; to which the covered drains lead. But in order accommodate the drains even better, they dig a passage underground from one pit through to the next. On the collar in the burning pit (the first pit) they place half of a sphere, on whose surface likewise channels or grooves are cut, which fit into the grooves on the collar through which the birch tar runs off and into the covered drains. This half sphere they call *Maslenik*, and it especially serves to make sure that when the bark has burned to the ground no ash falls onto the bottom of the pit and thickens the tar, or that the fire does not burn all the way to the bottom and ignite the tar. The sides of the pit are lined with linden hulls, and then they fill the pit with birch bark as follows: the first level to the height of a man's breast they fill with layers of birch bark, but pack it so tight with tampers that no loose areas remain and the bark is so evenly everywhere that it is totally level. They perform this task with such care and precision that a knife blade cannot be inserted into the packed layers. Four or five of these levels are made in a large pit.

When the pit is full of birch bark, there is a raised protrusion in the center, which they cover with straw, and on the straw they throw dung, rotten musty wood and other such material which does not catch fire easily, leaving only small air holes through which they light the straw when the weather is calm. The straw transmits its flames to the birch bark, which it with vigor suddenly ignites. As soon as the surface of the birch bark is ignited, the tar burners plug the vent holes with dung, so that the flames cannot break out anywhere and the birch bark smolders, so to speak; but if the fire breaks out anywhere, they instantly throw dung on it. Among their methods for producing much *Degot* (tar), they take care to keep the birch bark smoldering evenly everywhere and make sure that one side does not burn down deeper than the rest, which they detect if one side sinks lower than the other. In that case, they dump more dung and rotting things on the side that has sunk, in order to slow the embers, and they poke around with long sticks to help the dung in its work of dampening the fire; but when this area is again at the same level as the rest, they again give the fire free rein to spread itself.

To do this business, the tar burners divide themselves into two groups. The larger part of them circle the pit to watch the fire; the others dip the distilled tar from the vat and pour it in barrels.

Into a pit such as we have described will go about five hundred *Fuhren* of birch bark, from which one gets, if the firing is successful, some three thousand buckets (or 39000 measures of birch tar). If the timing is right and all goes well, no more than ten days are needed to fire out such a pit.

Such a pit firing is called a community firing. Individual people, however, make their own birch tar in pots as follows. There are pots especially made for this purpose, about 30 inches high, which are made like kettles. A small hole is drilled in the bottom. These pots are also filled, just as we described above, with birch bark, covered with brick and so sealed up that the pot has no opening. The pots are buried about six inches in the ground and the surrounding area covered with clay. Each pot is placed over a drain dug in the ground. A fire is made all around the pot, which extracts the tar from the birch bark, as it were. The tar runs out the opening in the bottom and into the drain, and from there into a small barrel set underneath.

This way of burning birch tar is actually nothing more than a downward distillation. Although the birch tar obtained in this manner has the property of making leather durable and protecting it from rot in water, which is really the advantage Russia leather has over any other leather, a tar produced in this fashion from other tree barks could likewise have the same effect. But because birch tar has a very particular smell, which one greatly esteems in Russia leather, one must stick to using it, and where it cannot be produced because of lack of sufficient stands of birch, one must know how to acquire it through trade with Russia or Poland.

[1] *Kalklauge*=slaked lime + water

[2] *Lohe* or *Gerberlohe*: plant material with high amounts of tan, for example, chopped bark from oak, spruce, acacia, that is used in tanning.

[3] 1 *Butte* ca. 40 liters

[4] *Fishhamen*: fish net, with brackets attached across the ends.

[5] ungelöschter Kalk (unslaked lime) = calcium oxide

[6] 1 *Loth* ca. 17 grams

[7] *Salmiak* = ammonium chloride

[8] Spanish sod?

[9] *Eisenvitriol* = iron (II) sulfate

[10] *Krispelholz* = bruising stick

[11] 1 *Faden* ca. 1.9 meters