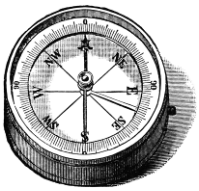

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Important information

Victorian Police's –
Re-enactors Guide Booklet
http://www.police.vic.gov.au/retrievemedia.asp?media_id=36984&status=active

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September

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Ph: 03 5753 4455
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Mad As A Hatter

These days we associate ***mad as a hatter*** with a bit of whimsy in Lewis Carroll's famous children's book *Alice in Wonderland* of 1865. Carroll didn't invent the phrase, though. By the time he wrote the book it was already well known.

Few people who use the phrase today realise that there's a story of human suffering behind it; the term derives from an early industrial occupational disease. Felt hats were once very popular in North America and Europe; an example is the top hat. The best sorts were made from beaver fur, but cheaper ones used furs such as rabbit instead.

A complicated set of processes was needed to turn the fur into a finished hat. With the cheaper sorts of fur, an early step was to brush a solution of a mercury compound — usually mercurous nitrate — on to the fur to roughen the fibres and make them mat more easily, a process called *carroting* because it made the fur turn orange. Beaver fur had natural serrated edges that made this unnecessary, one reason why it was preferred, but the cost and scarcity of beaver meant that other furs had to be used.

Whatever the source of the fur, the fibres were then shaved off the skin and turned into felt; this was later immersed in a boiling acid solution to thicken and harden it. Finishing processes included steaming the hat to shape and ironing it. In all these steps, hatters working in poorly ventilated workshops would breathe in the mercury compounds and accumulate the metal in their bodies.

We now know that mercury is a cumulative poison that causes kidney and brain damage. Physical symptoms include trembling (known at the time as ***hatter's shakes***), loosening of teeth, loss of co-ordination, and slurred speech; mental ones include irritability, loss of memory, depression, anxiety, and other personality changes. This was called ***mad hatter syndrome.***

It's been a very long time since mercury was used in making hats, and now all that remains is a relic phrase that links to a nasty period in manufacturing history.

But ***mad hatter syndrome*** remains as a description of the symptoms of mercury poisoning which today is usually caused by the leaking of mercury out of teeth fillings.

Ref: World Wide Words, Michael Quinion, 1996–2009. http://www.worldwidewords.org

The Beaver Fur Hat

From about 1550 until 1850, felt hats were fashionable in much of Europe and the felt hat industry became the driving force behind the fur trade. By the late 1500's, the beaver was extinct in western Europe and was close to extinction in Scandinavia and Russia. The North American fur trade became a new source and kept the fashion going for another 200 years

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This section describes the process of making a beaver felt hat during the 1700's and early 1800's. A variety of factors contributed to the cost of beaver felt hats including the great distance the fur traveled to get to the hat makers and the rugged conditions under which the trip was often made. Once the fur reached the hat maker however, a long and complicated process was still required to convert it into a desirable hat. Given the time and effort involved, a beaver felt hat was considered extremely valuable.

European gentlemen wanted fine hats. Quality hats demanded the best felting material available. Beaver fur was an excellent raw material. Beaver fur is tight yet supple and will hold it's shape far better under rough wear and successive wettings than felt made from wool or other types of fur.
Two types of pelts were sought. **Coat** and **parchment**.
Coat beaver were pelts that had been worn by Indians as winter coats before trading them.
Parchment beaver were those pelts trapped for immediate trade.
Of the two types, coat beaver was preferred until the late 17th century because it was easier to process. Prior to the end of the 17th century, only the Russians new how to comb the wool, from parchment to beaver. Therefore those pelts had be sent to Russia for processing. Of course, sending the pelts to Russia added more to the cost of the hats produced.

Coat beaver could be processed without sending the pelts to Russia because the Indians had worn off the **guard hairs** before trading the pelts. The main disadvantage of coat beaver was the uneven quality. Once the Russian technique for processing parchment beaver became widely known, the English and French felt makers preferred the parchment beaver.

The Process

Step 1: Preparing the Fur

Pulling

To prepare the fur for felting, the guard hairs had to be removed. These hairs were unsuitable for the Hatter's purposes. The pelt would be placed on the Hatter's knee and with thumb and a large knife (or tweezers), the guard hairs would be **pulled** leaving only the beaver wool on the skin.

Carroting

A solution of **"nitrate of mercury"** would be brushed on the pelt. This produced a yellow-red color on the fur tips. The fur became "carrot" colored. The mercury caused miniature scales to raise on each individual fiber. This roughened the fiber and increased the wool's matting ability. The pelt would be dried and then the wool shaved from it using a semi-circular knife.
Note: In subsequent steps using heat and moisture, the mercury would be released as a vapor. After long term exposure to these fumes, the amount of mercury in the Hatter's body would reach dangerous levels

Mercury attacks the nervous system causing uncontrolled muscle twitching, a lurching gait, difficulties talking and thinking. Eventually, the term "mad as a hatter" became a common description of someone experiencing severe mental problems. Many Hatters eventually died of mercury poisoning.

Mixing

Once the wool was removed from the pelt, it was called fluff. For the finest hats the Hatter would mix two different types of fluff: one part **dry castor** from a sun dried beaver pelt which still retained its guard hairs and two parts **greasy beaver** with the guard hairs removed due to the friction of wear by native people. The wool of the greasy beaver was thought to make a more luxuriant hat.

Carding

Both types of fluff were then carded together. Carding is the process of taking fibers that are arranged in a random form and organizing them so they are ready for the next step in the felting process.

Weighing

The fluff was then weighed according to the amount needed for the particular size and thickness of hat to be made. This would be about 8 to 12 ounces of fluff, usually equivalent to the amount produced by one prime beaver.

Step 2: Matting

Bowing

The process of bowing was both a cleaning and fluffing operation. At this stage, the fluff would begin to mat together loosely. Bowing was done by placing the fluff on a hurdle or square table with many evenly spaced parallel slots. The table would be located by a window to provide good lighting. Drafts were avoided to keep the valuable fluff from blowing away during the process. Hatters considered bowing an art and one of the most delicate parts of the process.

The fluff was divided and bowed one half at a time. The Hatter's bow resembled a large violin bow. It hung from the ceiling directly over the hurdle. The bow's one string would be plucked with the thumb or with a wooden bow pin.

This caused the string to vibrate over and among the fibers. The wool was fluffed, separated and agitated by this process. Dust and dirt fell through the parallel slots in the hurdle. The wool was spread out much like rolling a pie crust and the fibers continued matting together.

The wool, now called a **batt**, would be in the shape of a large oval sheet about 4 feet long, 3 feet wide and 6 to 12 inches high. Pressure would be applied with a slotted wooden Hatter's basket and maybe an oil cloth. By this point the fibers were matting together enough to allow handling of the batt. The procedures are then repeated with the other half of the beaver wool producing a second batt.

Basoning

The next step is not well understood. It appears each batt was manipulated into a triangular shape called a **capade** or gore. Then additional fluff was placed where the brim, crown and circumference of the brim would be located. Each capade was wrapped in a leather skin called a **hardening skin** and placed on the **bason**. The bason was a wooden bench with an iron plate located in the center. Under the plate was a small heat source. The batt was sprinkled with water, heated and worked with the hands. Of course, unbeknownst to the Hatter, the heat was releasing the dangerous mercury fumes. Basoning used heat, pressure and moisture to strengthen and condense the batt.

After the two triangular batts were condensed, they were placed one on top of the other and manipulated further around the edges to form a cone. It probably looked very much like an oversized dunce cap at this point. Since the hat body is still very large it required further shrinkage and toughening.

Planking

The hat now ballooned, was placed in a large copper kettle to complete the next process called **planking**. In the kettle was a very hot solution of diluted sulfuric acid, beer-grounds and wine sediments. The hat body was immersed in this solution over and over again. Then it was worked by hand or with a rolling pin on sloping **planks** located around one side of the kettle. The Hatters protected their hands from scalding by either wearing a sort of glove or by first dipping their hands in a bucket of cold water. The process of using pressure, heat and moisture helped compact the felt to half its former size!

In some cases, **plating** may have occurred. This was usually done on cheaper hats made from a mixture of other furs. A thin batt of cotton and beaver would be made and wrapped on the outside of the conical hat body. With pressure it could be manipulated to become securely attached to the rest of the hat body.

Step 3: Shaping and Finishing

It seems that there were different steps used by different Hatters at this point. The differences may have been part of "trade secrets" or simply differences in the way individual Hatters liked to finish their work. There are some basic techniques they probably all used.

Blocking

The shrunken hat body, still in shape of a cone, would be forced on a **block** made of wood. The block acted as a mold, roughly creating the desired style and size of the top hat. Blocking occurred by tying a cord around the top of the crown and driving this down toward the base of the block using a copper or iron **stamper**. This tightly stretched the hat body over the block.

What remained at the bottom became the brim of the hat. The brim would be cut with a **rim-jack** at the desired size. Before being dyed, some initial trimming and brushing may have occurred. The surface of the hat might further be treated to make the nap as fine as possible by rubbing it with pumice or seal-skin.

Dyeing

Still wet from the planking stage, the hat would first require drying before being placed back on another block for dyeing. The block and hat (sometimes mounted on a rotating wheel), would be placed in a very large **dyer's copper**. This was so large it would often hold ten to twelve *dozen* hats at one time! The dyer's copper could be filled with a dye made of "logwood, verdigris, copperas and alder-bark". The hat would be kept boiling in this mixture for about an hour and then removed to cool. This would be repeated ten to twelve times until the hat became the desired color.

Stiffening and Waterproofing

Stiffening and waterproofing were the most closely guarded secrets of the Hatter's. For stiffening, "gum Arabic, common gum and Flaunder's glue", would be dissolved in water and brushed mostly on the underside of the hat. This kept the mixture from ruining the outside appearance of the hat. It is reported that some hats were so stiff that they could support the weight of a 200 pound man! Waterproofing would probably have occurred earlier, during the planking stage, by rubbing a ball of "rosin, bee's wax and mutton suet" on the inside of the hat.

Steaming, Ironing and Brushing

In order to make the hat more pliable for a few last finishing touches, steam would be applied and the hat returned to the block. Any seams would be disguised.

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Minor alterations of shape would take place based on the style of the time. Ironing and brushing would produce a smooth and glossy surface. Finally, the brim would be turned up slightly and trimmed with ribbon.

Lining

Once the desired shape and gloss were produced, an adjustable lining was carefully sewn in. The hat would be further lined with a leather ban on the inside lower edge of the hat. Finally, the hat would be complete with the stamping of the company's trademark on the leather headband.

At last the hat was ready for market. Considering the lengthy process, from the pelt being trapped, transported and then transformed in the hatting factory, it is not surprising that a fine beaver felt top hat was a prized possession.

Ref: *White Oak Society, Inc http://www.whiteoak.org/learning/furhat.htm*

Beaver Top Hat

Top hat made from beaver felt and worn by Green Bay resident Morgan L. Martin, c. 1825. Made by Hatter Orel Cook *(*Wisconsin Historical Museum - *Museum object #1968.644)*

Orel Cook, the Rutland, Vermont hat manufacturer who made Martin's hat, had a large enough establishment to keep "quite a number of workmen in the business." Because of this, he probably had extra stock he could ship to dealers in New York. According to an 1886 Rutland County history, Cook began making hats before 1808 and continued to do so until around 1839.

Hat Details: Crown has concentric circles showing it was pressed flat from a cone shape

Orel Cook's Maker's mark , known at the time as a "Tip Dye" on the interior of the hat

Fashionable European and American men had been wearing beaver felt hats for centuries, but top hats were an early nineteenth century phenomenon. During Martin's lifetime the beaver population in New England and the Great Lakes area became so depleted that hat makers gave up making top hats of beaver felt and turned to silk plush as its replacement. Martin's hat, therefore, represents the end of the beaver hat era.

Cook made this hat out of beaver probably caught by Native Americans in the Great Lakes region possibly even in Wisconsin, and traded East. After receiving the beaver pelts.

Cook stopped making hats when he was in his early 60s, about the time beaver pelts became hard to obtain. We know that he lived into his early 80s, but his last twenty years may not have been easy for him. The mercury brushed on the beaver pelts became a vapor when the hatter ironed the felt during the finishing process. This vaporized mercury attacked the worker's nervous system and gave him the "hatter's shakes," which started in the eyelids, but made its way to the limbs and tongue giving those affected "a lurching gait" and "tangled tongue," and eventually affected his brain turning him into a "Mad Hatter" as portrayed by Lewis Carroll in *Alice in Wonderland*.

There is a possibility that the beavers used by Cook to make Martin's hat traveled full circle. Growing up and being hunted in the Great Lakes region, sent to Vermont to be made into hats, and coming back home on Morgan Martin's head in Green Bay.

Ref: Wisconsin Historical Museum - Curators' Favorites http://www.wisconsinhistory.org/museum/artifacts/archives.asp