

FULLING.

Fulling. A process by which cloth made of a felting fiber is condensed, strengthened, and thickened, with a loss of width and length. Some fibers will felt, others will not. (See FELT.) In felting, the fibers — wool, for instance — slip past each other, and their toothed edges interlock, so that a continuation of the process causes them to be more and more intimately associated, huddling together and holding tight.

The cloth is folded or rolled, and treated with soapy water. It is then beaten with wooden stocks or mallets, by which the serrated edges are forced past each other and the fibers closely commingled. Precautions are taken in some cases to prevent adherence of the folds of cloth by felting together. For this purpose cotton cloth may intervene between the folds of woolen cloth in the roll. It is usually folded, however.

Fulling and felting are dependent upon the same principle of action. Felted cloth is made by this process of associating the fibers, and is not woven. Woven cloth exposed to the fulling or felting action is said to be *milled*. Repetition of the process constitutes it *double-milled* or *treble-milled*, as the case may be. Each milling thickens and solidifies it, while diminishing the area.

In a tomb at Beni Hassan about the time of Osirtasen, who was probably the Pharaoh that invited Jacob to Egypt and settled him in Goshen, we find a representation of the fulling process (shown at *a*, Fig. 2125). The roll of cloth is wetted and worked between a block and the inclined table, the water running into a trough below.

After this record of the eighteenth century B. C., it is easy to discredit the statement of Pliny that the art of scouring and fulling cloth and woolen stuffs was invented by Nicras, the son of Hermias, who was a governor of Megæra under Augustus. The Romans worked the cloth with lye and fuller's earth, then washed it in a decoction of saponaceous plants, and then bleached it by fumigation with sulphur.

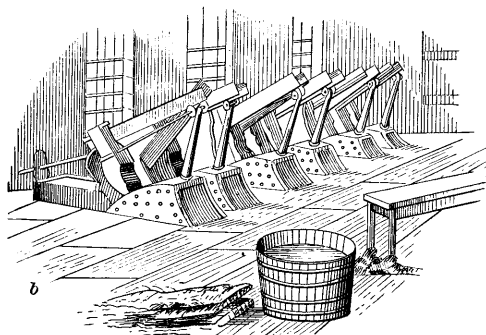
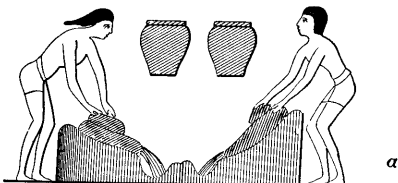
The instruments of the fuller are mentioned by the Greek authors. One form is a pounder, and the other a wooden roller.

The operations of fulling are shown in the paintings on the walls of Pompeii. At that time the fullers were also the washers of ordinary clothes.

“The largest and best executed paintings representative of the art were discovered in 1820, in the house of a fuller opening on one side on the street of Mercury, and on the other on a street called after

him, Fullonica. In the court, a pillar covered with pictures was standing alongside a fountain. This pillar has been removed and deposited in the Naples Museum. In the lowest division, a woman, sitting, hands a piece of cloth to a little female slave. A workman, whose tunic is closely tied around the body, is looking at them while at the same time carding a white cloak with a purple border, suspended from a stick. Another workman is in the act of sitting down alongside a crate of wicker-work on which the cloth is to be spread out; in one hand he holds a vase, on which sulphur thrown on burning charcoal will develop a gas capable of bleaching the cloth. This is the same method which is used to-day. On another face of the pillar arched niches contain large vats where the goods are soaked. Slaves standing in those vats trample the fabric with their bare feet in the same manner as Arabian women wash their clothes by trampling them against the rocky bed of a stream; this is what the ancients called "the fuller's dance" (*saltus fullonicus*). The artist has painted with the same care the press with its two uprights, its two enormous screws, which were turned by means

Fig. 2125.



Fulling-Mill.

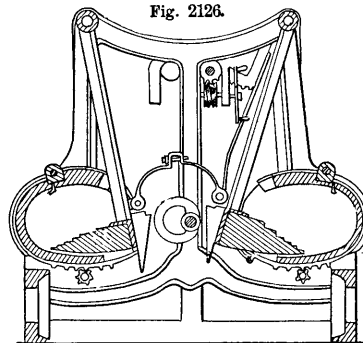
of cranks, in order to flatten the cloth beneath the planks, which imparted the necessary finish. Finally, the drying-chamber is shown by long sticks hanging on chains from the ceiling. The linen is spread out on them; a slave hands to a young woman an open fabric, while the wife of the fuller makes a note of it on her tablets. I have visited with particular curiosity the houses in Pompeii where these pictures had been gathered. I counted there in a court twenty-two tanks constructed of stone, and at different levels, so that the water could run from one into the other. Little benches in front of them served for the reception of the goods. At the other end of the court, seven smaller tanks served for fulling. The store-room, with traces of the planks, which were laid like rays radiating from a center, the hearths, the drying-chamber, may still be recognized. In other fullers' establishments I have seen very thick sheet-lead lining the interior of vats made of cement. Sometimes, also, we find jars full of greasy earth, which must be the fuller's earth of which Pliny speaks, and which contributed

as much to the whiteness of the goods as the fumigation with sulphur." — M. BEULÉ.

The modern fulling-mill *b* consists of an iron framework supporting the shanks of heavy wooden mallets, which are raised by projecting cams on a tappet wheel. The mallets being raised to their full height are released, and drop by gravity on the cloth, which is contained in an iron trough beneath. Soap is added as a detergent, grease in any form tending to mar the felting action of the fibers. The end of the trough is curved, so that the cloth is turned round and round by the action of the mallets.

Fig. 2126 is a vertical section of a double mill in which a spring or weight forces the tub up to the

Fig. 2126.

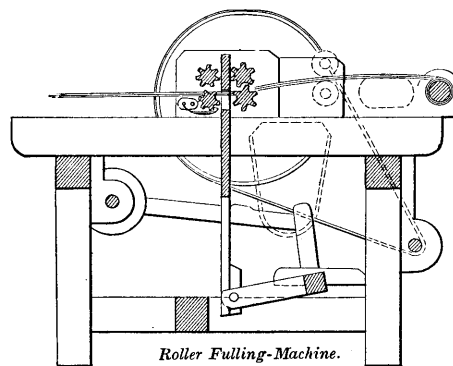


Double Fulling-Machine.

beaters with a yielding pressure, rendering the tub capable of adjusting itself to a larger or smaller quantity of goods. The beaters are arranged in pairs, each pair being connected together by springs and acted upon by a common eccentric.

In Fig. 2127 the felted cloth is held slack between two pairs of fluted rollers while a beater operates upon it. The variation in the velocity of the respective pairs of rollers is equal to the contraction of the cloth, which is damped and dried at the

Fig. 2127.



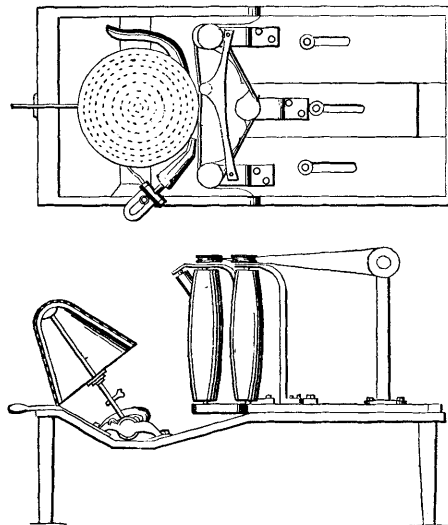
Roller Fulling-Machine.

commencement and close, respectively, of the operation.

Fig. 2128 shows a machine for fulling and felting hat bodies, in which the rollers carry around the apron, which, by contact, rotates the "form," and acts upon every portion of the perimeter of the hat body, the latter being saturated with water, which may be conducted through the tubular support of the form, and be diffused between the walls of the form, so as to escape outward. Owing to the eccentricity of one of the rollers, the apron is repeatedly stretched and relaxed, laterally, and in the act of

FULLING.

Fig. 2128.



Hat Fulling-Machine.

drawing narrower the apron produces a greater pressure upon the hat body, and has the effect to interlock and compact the fibers.

A *broad-cloth* having 3,600 threads in the warp, a width of $3\frac{3}{8}$ yards, and a length of 54 yards, will be reduced in fulling to $1\frac{3}{4}$ yards wide and 40 feet long. The process will take 60 to 65 hours, and require 11 pounds of soap.

A *Venetian* cloth will require about twelve hours, take from 6 to 7 pounds of soap, and will shrink in width from $1\frac{1}{2}$ yards wide to $1\frac{1}{8}$.

After fulling, the cloth is washed to remove the soap.

The method of fulling woolen goods in early times in Ohio is well described by Judge Johnston of Cincinnati, in his address before the Pioneer Society of that city, 1870.

KICKING BLANKETS.

“When wool became abundant, the method of scouring and fulling blankets, flannels, cassinets, and even cloths, was simple. Every house had hand-cards, and as many spinning-wheels as spinners, and no respectable house was without a loom. When the goods were carded, spun, and woven, then came the kicking frolic. Half a dozen young men, and a corresponding number of young women, “to make the balance true,” were invited. The floor was cleared for action, and in the middle was a circle of six stout splint-bottomed chairs, connected by a cord to prevent recoil. On these sat six young men with shoes and stockings off and trousers rolled up above the knee. In the center the goods were placed, wetted with warm soapsuds, and then the kicking commenced by measured steps, driving the bundle of goods round and round; the elderly lady, with a long-necked gourd, pouring on more soapsuds, and every now and then, with spectacles on nose and yardstick in hand, measuring the goods till they were shrunk to the desired width, and then calling the young men to a dead halt.

“Then while the lads put on their hose and shoes, the lasses stript their arms above the elbows, rinsed and wrung out the blanket and flannels, and hung them on the garden fence to dry.”