shade with dyestuffs similar to those which have been used in producing the pattern under examination. The patterns are then immersed in the iodine solution for a few seconds and washed. With careful observation the degree of mercerization can be ascertained with fair accuracy.

Fig. 40

It is however not always an easy matter to tell by means of the microscope whether cotton threads found in a sample have been mercerized or not, since, as mentioned before, during the process of mercerizing the inner fibres of the hank are relatively protected against the action of the caustic soda, in turn of which many of the fibres will retain their charac-

Fig. 41

teristic twisted form of untreated cotton. It is therefore essential to supplement a microscopical examination by a chemical test.

Other Vegetable Fibres.

FLAX, when viewed under the microscope, as shown in Fig. 40, has the appearance of long grasses or reeds, with bamboo-like joints or nodes, arranged at regular intervals. The cell wall is regular in thickness and leaves a narrow

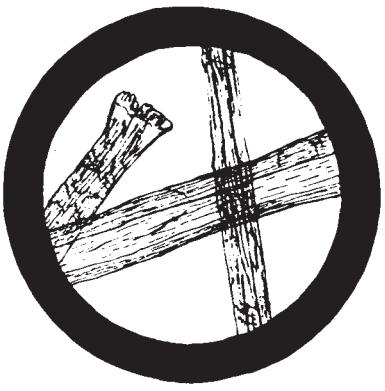


Fig. 42

internal channel, which, if visible, appears as a fine dark line. When bleached, flax (*i. e.*, linen fibre) becomes snowy white and lustrous.

Tow yarn, made from the waste in flax spinning, may be distinguished from linen yarn by its uneven, rough and knotty appearance, due to containing particles of shives, from which linen yarn is free.

JUTE, if viewed under the microscope, is shown to consist of stiff lustrous and cylindrical fibrils, the walls being irregular in thickness, with a comparatively large central opening. Fig. 41 shows specimens of jute fibres magnified.

RAMIE. These fibres are about twice the breadth of that of cotton, and appear under the microscope as a broad flat ribbon. Ramie fibres in the raw state have a soft, silky feel, but by pulling the staple, this quality becomes reduced and gives way to more or less harshness in the feel. Fig. 42 shows specimens of the fibre magnified.

HEMP. A view of the fibre as seen under the microscope, is given in Fig. 43. It somewhat resembles that of flax, being however coarser and consequently stronger.

Comparing linen threads, principally such as used in heavy stuffs, under the microscope with cotton threads, the former are more or less irregular in their diameter, and in their length there are some parts stronger than others, whereas cotton

Fig. 43

threads are of a more regular character. The difference will be more readily seen in goods that are ironed and where in the fabric, linen threads show larger, *i.e.*, more prominently in some places than in others. A good procedure is to examine the fabrics by holding them up to daylight and when the regularity of cotton threads will be then noticed at once.

(To be continued.)

THE CONSTRUCTION OF CURVED TWILLS.

These weaves are a combination of our 27, 45, 63, 70, 75 and 80 deg. twills; the latter two systems are only little made use of. As the name indicates a curved twill effect is given to the new twill weave.

The 45 deg. twills are the foundation for this system of fancy twills, the different steep twills, as well as the mate reclining twill obtained from said foundation twill forming the basis for the construction of the curve of the new weave.

As a rule, the 45 deg. twill forms the harness chain for the curved twill, the drafting (drawing-in) for the various different fancy twills used corresponding to the systems of steep twills or reclining twills they refer to.

Six examples are given to explain the construction of these weaves.

Weave Fig. 1 has for its foundation the $\frac{5}{3}$ 8-harness twill, using in rotation always 4 threads every time of 45, 63, 70 and 63 degree twill, giving us for the repeat of the curved twill 16 warp-threads and 8 picks.

Drawing-in Draft: 8-harness, fancy draw (see *dot* type below weave).

Harness Chain: The $\frac{5}{3}$ 8-harness regular twill.

Weave Fig. 2 has for its foundation the 6-harness even sided twill, having 4 threads of the regular twill exchange with 4 threads of its mate 63 degree twill, the curved twill repeating on 8 warp-threads and 6 picks.

Drawing-in Draft: 5-harness fancy draw (see *dot* type below weave).

Harness Chain: Use 5 warp-threads of the $\frac{3}{3}$ 6-harness twill, the 6th harness of said twill not being called upon by the curved twill, hence is omitted in the harness chain.

Weave Fig. 3 has for its foundation the $\frac{4}{4}$ 8-harness regular twill, the drafting for the curved twill being:

8 warp-threads 45 deg. twill,
8 warp-threads 63 deg. twill,
4 warp-threads 45 deg. twill, and
4 warp-threads 63 deg. twill.

—

24 warp-threads are used for the repeat of the arrangement of drafting, the complete fancy drawing-in draft, however, calling for 48 warp-threads, it taking two repeats of the previously quoted drafting to make up the complete draft for the drawing-in.

Repeat of Weave: 44 warp-threads and 8 picks.

Drawing-in Draft: 8-harness fancy draw (see *dot* type below weave).

Harness Chain: $\frac{4}{4}$ 8-harness regular twill.

Weave Fig. 4 shows us a curved twill, having for its foundation the $\frac{4}{4}$ 8-harness twill. The drafting of the curved twill from the foundation twill, by means of the fancy draw given below the weave is to take in rotation always four warp-threads of the following degree of grading of twills: 63, 45, 27, 45, 63, 45, 27, 45, 63, 45, 27, 45, 63, 45, 27, 45, giving us in turn ($16 \times 4 =$) 64 warp-threads and 8 picks for the repeat of the curved twill, to be woven on the 8-harness fancy draw previously referred to.

Harness Chain: $\frac{4}{4}$ 8-harness regular twill.

Weave Fig. 5 illustrates a broken curved twill, *i. e.*, a fancy weave of this curved twill system, the same having for its foundation the $\frac{5}{5}$ 10-harness twill, the curved twill being obtained from it by drafting thus:

6 warp-threads 27 deg. twill,
6 warp-threads 45 deg. twill,
6 warp-threads 63 deg. twill, and
3 warp-threads 70 deg. twill.

This closes the drafting of the foundation twill for that portion of the new curved twill (21 warp-threads) as is running from the left to the right, the last warp-thread of the 70 deg. twill system being in this instance the point thread.

We now draft-in the reverse way thus:

3 warp-threads 70 deg. twill,
6 warp-threads 63 deg. twill,
5 warp-threads 45 deg. twill, and
6 warp-threads 27 deg. twill.

Now a complete break in the curved twill is made.

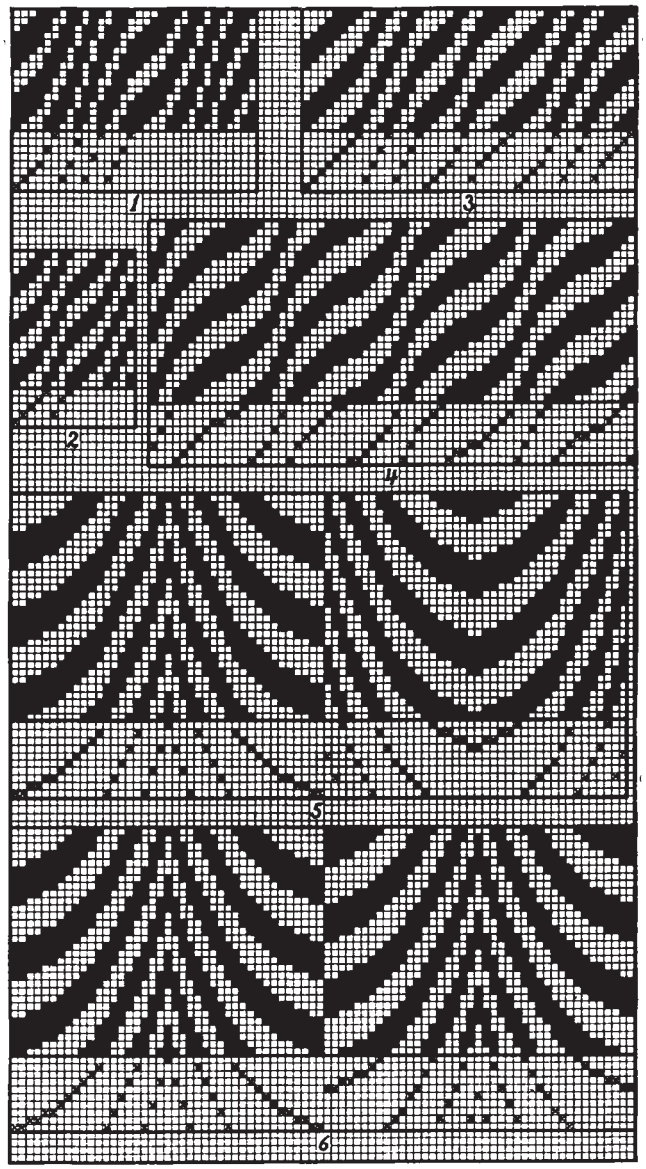
Considering the next effect of the curved twill, we find the following drafting done:

4 warp-threads 70 deg. twill,
6 warp-threads 63 deg. twill,
5 warp-threads 45 deg. twill, and
6 warp-threads 27 deg. twill.

The last two warp-threads of the 27 deg. twill form again the point for reversing the drafting thus:

4 warp-threads 27 deg. twill,
6 warp-threads 45 deg. twill,
6 warp-threads 63 deg. twill, and
3 warp-threads 70 deg. twill.

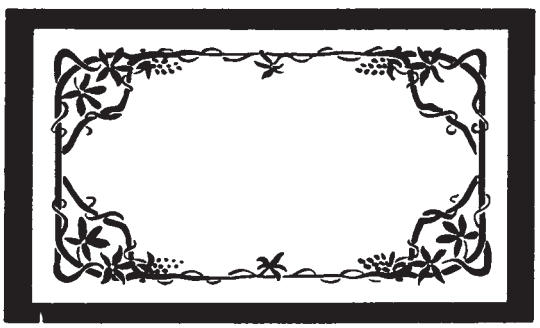
In this instance we make again a solid break between the first and last thread of the complete weave, which repeats on 81 warp-threads and 10 picks, and which by means of the fancy drawing-in draft, as given below the weave in *dot* type, can be woven on 10-harness, using the $\frac{5}{5}$ 10-harness twill for the harness chain.



Weave Fig. 6 shows us a change of effect of the previously given example of a fancy broken curved twill weave, calling for:

Repeat of Weave: 82 warp-threads and 10 picks.
Harness Chain: $\frac{5}{5}$ 10-harness regular twill.

Design for a Grass Rug.



The above illustration shows the design for a new Grass Rug or Carpet, by the Waite Grass Carpet Co., of Oshkosh, Wisconsin.