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A STUDY IN WEAVE FORMATION.
HOW BROKEN TWILLS ARE DESIGNED.

Broken twills refer to a class of fancy weaves frequently met with in the manufacture of cotton, woolen, worsted and silk fabrics. You will not be able to pass a tailor's show-window without finding a liberal supply of these weaves used in the construction of the various lines of goods shown for trouserings, suitings, over-coatings, etc. They will come to your notice on the dress goods counter of the department store, whether you visit their cotton, wool, worsted or silk department.

Broken twills, considered from a technical point of view, can be divided into "Balanced" and "Not Balancing" Effects, the latter calling for a higher number of harnesses required in the loom. In turn they also refer again either to such as broken warp ways only, or such as broken in both directions, *i. e.*, broken warp and filling ways.

BALANCED EFFECTS.

Broken Warp Ways Only.

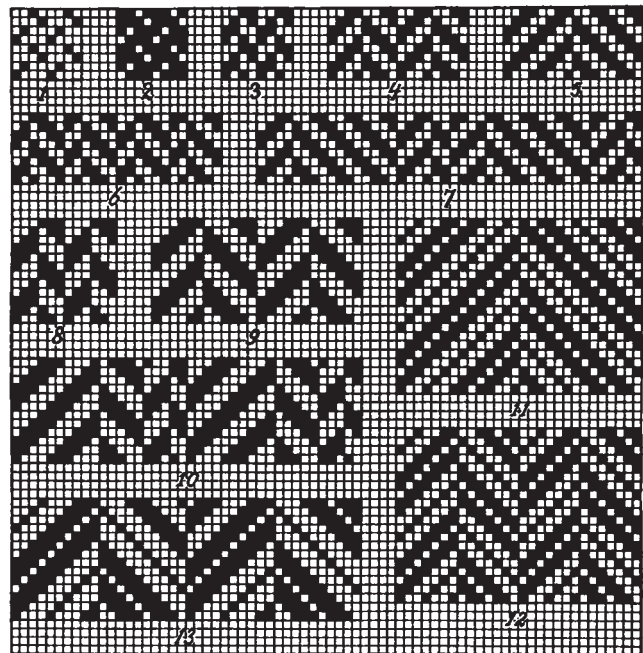
Rule for Constructing these Weaves:

(1) Select your foundation weave. The same (with the exception of the 4-harness uneven sided twill) must always be a balanced even sided regular twill. This compels us to not only refer to twills repeating on an even number of harness, but we must remember also that a balanced even sided twill must read the same, by its formula of writing the weave, whether we read the latter forwards or backwards.

For this reason the ${}^2_1\text{-}{}^2_2\text{-}{}^1_1$ 10-harness twill or the 2_2 4-harness twill, etc., are balanced even sided twills, whereas, for example, the ${}^2_1\text{-}{}^1_1\text{-}{}^1_1\text{-}{}^1_2$ 10-harness twill, although also an even sided twill, does not present a balanced effect, hence cannot be used in the construction of broken twills without taking into consideration that this weave cannot have its number of harnesses reduced. The first mentioned 10-harness regular twill, and which we pronounced as a balanced effect, will (as a broken twill) require 10 harnesses, whether running the direction of this twill one way or the other. In opposition to this, the last mentioned even sided twill, and which we pronounced as not balanced, will not permit this reduction, *i. e.*, this weave calls for 10 harnesses for each direction of twill, compelling you thus to use 10 additional harnesses; in other words, each direction of the twill requires its own set of 10 harnesses, provided a full draft (10 warp-threads at the least) is used.

(2) Having selected your proper foundation twill, run the same for a certain number of warp-threads in

one direction, and then in the reverse direction, being careful to have a complete exchange of risers opposite sinkers on the two break threads, *i. e.*, the last thread used in the one direction of the twill and the first thread used in the reverse direction of this twill must interlace the opposite to each other, *i. e.*, when one thread is in the upper shed the other thread must be



in the lower shed, and vice versa. Continue in this way, drafting your twill from left to right and right to left until repeat of weave is obtained. It may take only two pieces of twill to accomplish this, again, more may be required. In the same way the length of the twill pieces used may be varied, in fact there is no limit to the scope of the designer at his disposal to produce Novelties by means of using broken twills for his weaves.

With reference to arranging a complete break at the points of reversing the direction of the twill, remember this means: "Miss half the number of threads of the repeat of your foundation twill minus one". Thus for example, if dealing with a 6-harness foundation twill, you miss $(6 \div 2 = 3 - 1 =)$ 2 threads of your foundation twill and when you will have produced

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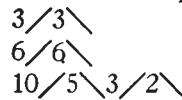
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the following arrangement of twill pieces in the repeat of the three weaves quoted:



Six is the lowest number of harnesses any one of these three weaves can be woven on. Use 12 harnesses in practical work whenever it is possible.

Weaves Figs. 11 and 12, both have the $\frac{2}{1} \frac{2}{2} \frac{1}{2}$ 10-harness twill for their foundation, using in the first

the perfect break. Using a 10-harness foundation twill it will mean to you, miss or skip 4 warp-threads of your twill, etc.

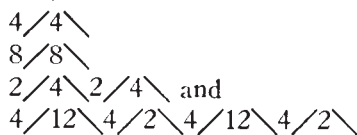
This feature will later on permit you to make out the drawing-in draft and harness chain for fancy broken twills, broken warp and filling ways, without preparing the complete design.

Collection of weaves Figs. 1 to 12 are given to illustrate the subject.

Fig. 1. Foundation: 4-harness uneven sided twill, running twill for 2 threads each way. This is the uneven sided twill previously referred to; the only one used. Being an uneven sided twill no clear break is possible, hence do the best you can at the break and place riser of one break-thread opposite center of the three sinkers of the mate break-thread. This weave is also known as the 4-harness satin, filling effect, also as the small crowfoot twill. Weave Fig. 2 is the same weave, warp effect.

Fig. 3. Foundation: 4-harness even sided twill. 2 threads against 2 threads, clear break. Repeat of weave 4 by 4.

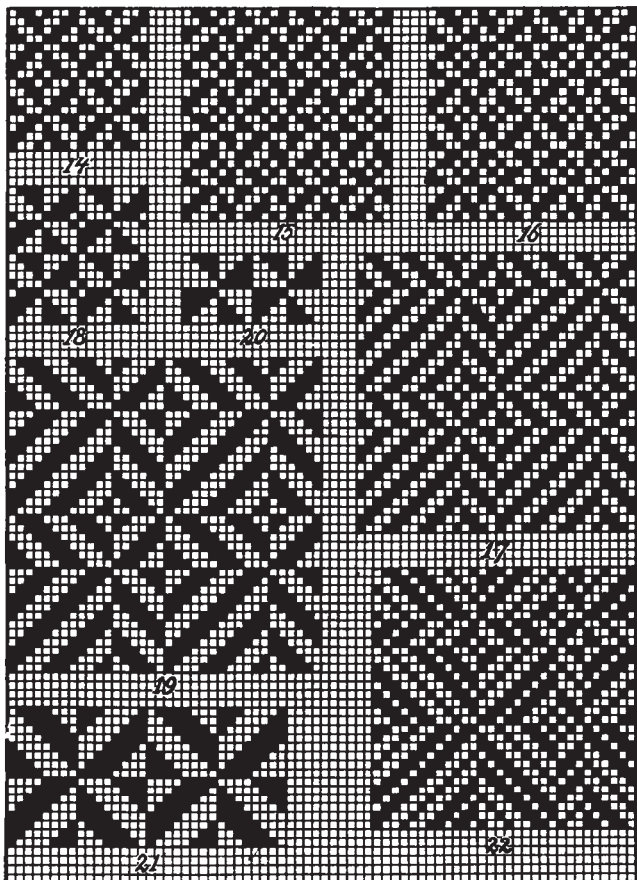
Weaves Figs. 4, 5, 6 and 7 also have the 4-harness even sided twill for their foundation weave, using respectively



pieces of twills in the respective repeat of each of the various broken twill weaves quoted, taken in rotation.

Four is the lowest number of harnesses any one of these four weaves can be woven on. Using 8 or 12 harnesses will be advisable where the scope of the dobbie permits this to be done.

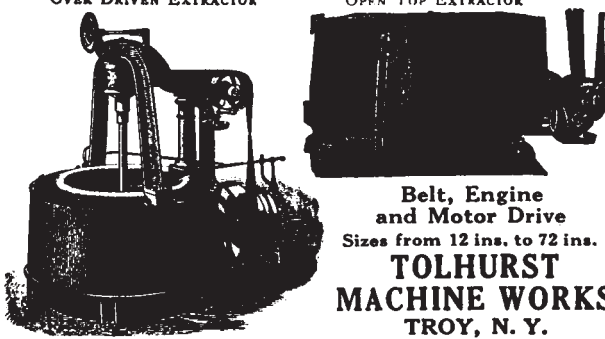
Weaves Figs. 8, 9 and 10 have the 3 up 3 down 6-harness even sided twill for their foundation, using



weave 14 threads of twill running from left to right against the same number of threads of twill running in the opposite direction. This number is reduced in weave Fig. 12, to 7 ends twill in each direction. Either weave, if so required, can be woven on 10-harness.

Weave Fig. 13 has for its foundation the $\frac{3}{1} \frac{3}{4} \frac{1}{3}$ 14-harness even sided twill with 10 threads drafted in either direction, the broken twill repeating on 20 warp-threads (and 14 picks).


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Broken Warp and Filling Ways.

In connection with weaves of this division of broken twills, the characteristic break effect as previously done only warp-ways, in this instance is applied to also filling ways, or in other words, the foundation twill is broken warp and filling ways, forming in turn what we might call a check effect. These check effects, as will be readily understood, will be prominently visible when drafting a great many threads of the foundation twill; drafting or using only few ends of the twill before arranging a break will result in what we term *small broken up effects*, in many instances closely resembling *granite effects*. Weaves Fig. 14 to and inclusive 22 are given to explain subject.

Weaves Figs. 14 to 17 have for their foundation the 4-harness even sided twill, using respectively the following pieces of twill running against each other warp and filling ways:

- Fig. 14: $4/4 \setminus$, repeat 8 by 8.
- Fig. 15: $4/2 \setminus 4/2 \setminus$, repeat 12 by 12.
- Fig. 16: $4/2 \setminus 2/4 \setminus$, repeat 12 by 12.
- Fig. 17: $12/4$, repeat 16 by 16.

Weaves Figs. 18 and 19 have for their foundation the 3 up 3 down 6-harness twill, using in the first weave 4 ends twill against 4 ends twill, both warp and filling ways, and in the latter weave 12 ends twill against 6 ends twill, both warp and filling ways.

Weaves Figs. 20 and 21 have for their foundation the 4 up 4 down 8-harness twill, using respectively $4/4 \setminus$ and $8/8 \setminus$ pieces of twill, broken warp and filling ways.

Weave Fig. 22 has for its foundation the $\frac{2-2-2-1}{1-2-2-1}$ 10-harness, fancy, even sided twill; drafting observed being:

- 12 ends drafted from left to right
- 9 " " " right to left
- 3 " " " left to right and
- 6 " " " right to left

30 ends in repeat of drafting.
 $12+3=15$
 $9+6=15$; hence one repeat of the draft results in the repeat of the weave, 30 warp threads and 30 picks.

(To be continued.)

Industrial Use of Alcohol in Russia.

The Russian Minister of Finance has issued an official proclamation offering valuable prizes under the following three heads:

- (a) The invention of a suitable de-naturing process;
- (b) New or improved outlets for the use of alcohol in industrial operations;
- (c) The utilization of alcohol as a motive power and heating agent.

Under the first heading there are three prizes of \$15,000, \$7,500, and \$2,500, the chief conditions being that the denatured spirit must be completely unfit for drinking, but must not possess an objectionable smell, nor must it contain any substance harmful to ordinary metal vessels. The separation of the denaturing agent must be reasonably impracticable, and the substances used must be obtainable in Russia.