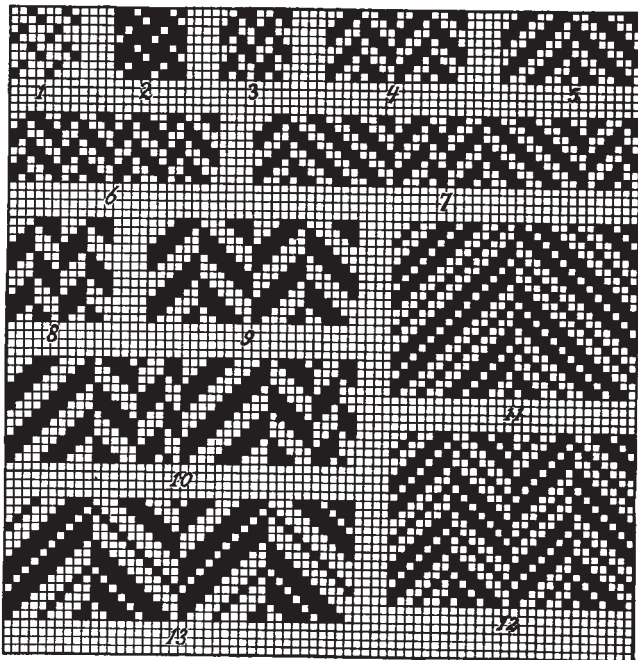


## Broken Twills.

"Broken twills" are derived from the regular twills by running the direction of the twill one-half of the repeat from the left to the right; and the other half from the right to the left. These changes of the direction of twill must be arranged so as to produce a well broken up effect. By means of this break, or change of twill, we produce a like change of the twill line, visible upon the face of the fabric; hence this classification as broken-twill weaves.



The first number of harness for producing a broken twill is four-harness, and the regular twill to be used is the  $\frac{1}{3}$  twill.

After interlacing the first warp-thread in the first pick and the second warp-thread in the second pick, change the direction of the twill by interlacing the third warp-thread with the fourth pick, and the fourth warp-thread with the third pick.

Fig. 1 illustrates this 1 up 3 down 4-harness broken twill (filling for face in fabric).

Fig. 2 represents the opposite effect or the 3 up 1 down 4-harness broken twill (warp for face in fabric).

Fig. 3 shows the 4-harness even sided i. e., 2 up 2 down arranged for a break every 2 warp-threads; running 2 ends up to alternate with running 2 ends down.

Fig. 4 shows the same weave arranged for change of 4 warp threads.

Fig. 5 shows the same weave arranged for change of 8 warp threads.

Fig. 6 shows the same weave arranged for a change of 2 warp thread to change with 4 warp threads running down, resulting in a weave repeating on 12 warp threads and 4 picks.

Fig. 7 shows the same weave arranged for a change of: 4—12—4—2—4—12—4—2 the weave requiring 44 warp threads for its repeat.

Fig. 8 shows similar combinations with 3 up 3 down—6 harness even sided twill running twill for 3 ends to the right then change to the left. Repeat 6 warp threads and 6 picks.

Figs. 9 and 10 show different combinations that can be made.

Figs. 11, 12 and 13 show the combination of larger fancy twills.

## Determination of Fastness of Dyed Fabrics.

**AIR, LIGHT AND WEATHER:** The samples are affixed to a board of convenient size. They are then covered with a strip of cardboard so that only one-half of the sample is exposed to the influence of the air, light and weather. If a standard sample be exposed at the same time under the same conditions the relative fastness of the two colors can readily be observed. If only the fastness to light is to be tested the experiment must be carried out under a glass cover. By removing the glass and exposing the sample to the air, protected from the action of dust and rain, the fastness to air may be observed. The fastness to all three influences can be determined by subjecting the sample to the action of light and exposing it to the action of the air, dust and rain at the same time.

**CARBONIZING:—Wool:** Treat the sample with sulphuric acid (3.5% strength). Squeeze and dry in the oven for two hours at 80° C. Neutralize with diluted soda solution. Rinse, dry and examine. In order to observe the degree of carbonization to which the sample has been subjected it is advisable to sew the sample with a few threads of cotton.

**CROCKING—Wool:** This test may be carried out by rubbing the sample on a white linen cuff or other suitable white surface.

**FULLING—Wool:** The sample of yarn is plaited with white wool and white cotton, then thoroughly rubbed in a strong solution of soap at 30° C. (25 g. neutral soap + 25 g. soda ash per liter). A second experiment is carried out with a solution containing 50 g. neutral soap per liter.

**COTTON:** In this case the test is carried out by rubbing in a solution of soft soap or by immersing in a 1% soap solution for 12 hours or by immersing in a soda solution (15 g. soda ash per liter). In all cases the yarn should be plaited with white wool and white cotton.

**LIGHT:** (See under *Air*). When stating the fastness to light it is of importance to note whether sunlight or diffused daylight has acted on the sample. Furthermore the time of exposure should be noted.

**PERSPIRATION:** The sample of cloth should be suspended about the neck of a white person for 10 days. The sample may be examined each day in order to note any change which has taken place. The laboratory test is carried out with a solution containing 50 grams of 50% acetic acid and 100 grams of sodium chloride per liter. Another perspiration substitute which has been suggested consists of 50 c.c. of 50% acetic acid + c.c. butyric acid per liter of distilled water. Whatever solution is used the sample is dried after each immersion. The fabric is examined each day in order to note any change which has taken place.

**RAIN:** Fabrics intended for flags, umbrella covers and raincoats should be colored with dyestuffs capable of resisting the action of this agency. The sample is sewed to a piece of white wool, another sample is sewed to white cotton and a third to white silk.

The samples so prepared are subjected to the action of rain and then dried. After repeating this five times, the samples are compared with the standard.

**STEAMING:** This test is best carried out by placing the sample between two layers of a cloth which is about to pass through the actual steaming operation in the works. A small piece of undyed fabric should be