TURNED TWILLS • 2

THE TIE-UP

To design a tie-up for any particular project, we first make a "short" tie-up draft. It will have as many horizontal rows as there are blocks in threading (lines in a profile), and as many vertical columns as there are blocks or combinations of blocks used in weaving. In fig.1 we have a framework for a tie-up which has two blocks of pattern in threading and four combinations in treadling:

1	2	3	4	2nd block
5	6	7	8	1st block
A	B	C	D	

Fig.1

1:2	1:2	2:1	2:1
1:2	2:1	1:2	2:1

Fig.2

If the treadles in the group A are supposed to weave the "ground", or in our case 1:2 twill, all across, then in the square 1 we should have a tie-up for 1:2 twill, and the same in square 5. If B should give block one, then square 6 should have a tie-up for 2:1 twill, and square 2 - 1:2 twill. If C should give block 2, then Square 3 is 2:1, and square 7 - 1:2. Finally the group D is supposed to produce 2:1 twill all across the fabric, therefore both squares: 4 and 8 must have the tie-up for 2:1 twill. Our tie-up now is as in fig.2.

All we have to do now is to insert in each square the proper tie-up: either 1:2 or 2:1. But which is the proper one? Even the simplest twill has 6 different tie-ups for 1:2 and also 6 for 2:1:

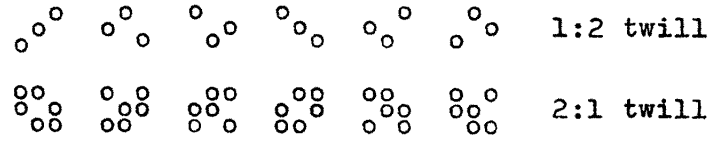
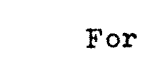
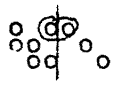
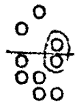


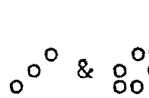
Fig.3

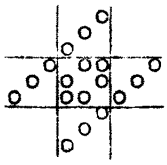
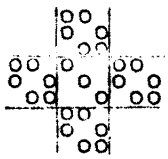
Out of these 12 tie-ups we must select two: one for 1:2 and one for 2:1 twill. Which ones? The answer is very important, and it applies to all Turned Twills:

ANY TWO TIE-UPS WILL DO, PROVIDED THAT THEY MATCH EACH OTHER IN ALL DIRECTIONS. WHEN PUT SIDE BY SIDE ALL MARKS FOR A TIE (o) SHOULD BE OPPOSITE EMPTY SPACES ACROSS THE LINE DIVIDING THE TWO TIE-UPS.

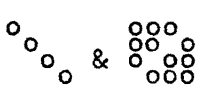
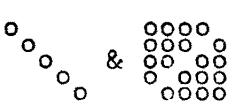
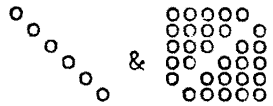
For instance:  and won't do, because 

 and are not better, because: 

but  & are all right, and so are: & because:

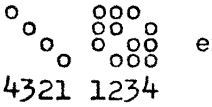
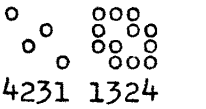
 and  Fig.4

As a rule we start with a simple tie-up with a diagonal of ties running in one direction, and <u>then we select the second tie-up with a similar diagonal in empty spaces running in the opposite direction.</u> Thus for higher twills we shall have:

   Fig.5

1:3 twill 1:4 twill 1:5 twill

Those are not the <u>only</u> tie-ups which fulfil the conditions, but they are the easiest to find. Other tie-ups can be derived from the above ones. If we have a pair selected on the above principle, we can exchange two vertical lines of ties in both tie-ups. For instance:

 exchange 2 & 3:  Fig.6

4321 1234 4231 1324

We count the vertical lines in the direction of the ascending diagonal, and exchange the same two numbers on both sides.

One may wonder why all the fuss about the tie-ups. After all <u>any</u> two tie-ups of the type 1:N, and N:1 must give a turned twill. Indeed they will, but the two twills won't match each other: there will be floats crossing the dividing line between blocks of pattern and, which is still worse: some of these floats may be longer that the standard float of a given twill.

With more than two blocks of pattern the problem of treadles becomes embarassing. For instance if we have a 12-shaft loom, we can weave four blocks of pattern in 1:2 twill. If we are satisfied with single, independent blocks, without plain ground, we need also 12 treadles. But if we want all possible combinations of blocks, there are 16 of them, and each requires 3 treadles, which makes 48 in all. With a 16-shaft loom and 1:3 twill we need 64 treadles. Compound treadling does not help, because we have only two feet. A table loom seems to be the answer, but then the weaving becomes too slow. Dobby, Jacquard and similar shedding machines are all right for very long projects. Otherwise setting them up takes longer than weaving.

Thus we must plan carefully the pattern, analyse it, and make sure that we have enough treadles to weave it. Incidentally analysis gives us at the same time the short tie-up draft, which is necessary to build our tie-up. For instance as a result of analysis we get the profile in fig.7, and also the short tie-up draft. The first tells us

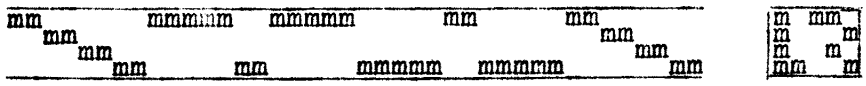


Fig.7

that we have 4 blocks of pattern, the second that we have 5 groups of treadles. With 1:2 twill we need 12 shafts and 15 treadles. Thus we must weave this project on a 16-shaft loom to get enough treadles, or we must simplify the pattern.

Here are our limitations:

With an 8 shaft and 10 treadle loom we can have two-block patterns in 1:2 and 1:3 twills. With 1:2 twill we have 3 combinations of blocks in a plain tie-up, and 4 in compound tie-up. With 1:3 twill 2 blocks or combinations (0,1; 0,2; 1,2) in plain tie-up. Compound tie-up does not help.

With a 12-shaft, 14 treadle loom we have 4 blocks or combinations in 1:2 twill; 3 blocks or combinations in 1:3 twill; and 2 blocks, or combinations in 1:4 or 1:5 twill.

Finally with a 16-shaft loom we have 5 blocks of 1:2 twill, 4 blocks of 1:3 twill, 3 blocks of 1:4 twill, and 2 blocks in 1:6, or 1:7 twill. Obviously the last three will be satins if so desired.

So much for the tie-ups.

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