

THE JOURNAL'S TEXTILE SCHOOL.

WOOL, COTTON AND SILK DESIGNING AND FABRIC STRUCTURE FOR HARNESS WORK.

Lesson 3.

SATIN WEAVES. This is the third system of our foundation weaves. The characteristic features of fabrics interlaced with satin weaves, or as they are more frequently called *satins*, consists in that they are without the prominent line effects characteristic to twills, in turn imparting to the fabrics in connection with which they are used, a smooth face.

	2	5	1		5 th pick
	1	2		4	4 th ..
		3	1	2	3 rd ..
	2		2	1	2 nd ..
	1	1	2		1 st ..
	1 st	2 nd	3 rd	4 th	5 th → warp thread

		1	2	4	5 th pick	
	2	2			4 th ..	
			1	2	5 th ..	
	1	2	3		2 nd ..	
	1			1	2	1 st ..
	1 st	2 nd	3 rd	4 th	5 th → warp thread	

Fig.50

Fig.51

	3	2	5	1	5 th pick	
	2	4	1	3	4 th ..	
	1	3	2	3	3 rd ..	
		2	2	1	3	2 nd ..
	1	1	3	2		1 st ..
	1 st	2 nd	3 rd	4 th	5 th → warp thread	

	2	3	3	1	5 th pick	
		1	2	3	5 th ..	
	3	2		1	2	3 rd ..
	1	2	3	4		2 nd ..
	1		1	2	3	1 st ..
	1 st	2 nd	3 rd	4 th	5 th → warp thread	

Fig.52

Fig.53

Satins might also be designated as double twills, *i. e.*, two positions of one twill intertwined or mixed into one weave (for example with the 5-harness satin filling effect, the 1 up 4 down 5-harness twill) taking alternately one warp thread or one pick from one position of this mate twill and then from another position (except either one of the joining picks of the one used before) of said mate twill. This, as will be readily seen by the student, kills the prominent twill effect, the joining two floats, whether warp or filling, covering the point of interlacing of the satin, giving in turn to the fabric the characteristic smooth face.

Satin weaves are always uneven sided interlacings, *i. e.*, a satin weave is either a warp or a filling effect, the first being the most often used effect in connection with plain fabric structures; filling effect, although also in some instances used in connection with plain fabric structures, finding its most important use in connection with figured work, *i. e.*, blending it against warp effect satins or other warp effect, etc., weaves, but never against another filling effect.

As a rule, whether warp or filling effect required, for practical work in the weave room, in connection with plain fabrics, the filling effect symbol of weave

is used, since it is easier constructed such a satin, and besides plainer to the eye—sinkers (□) being then considered for risers if the warp effect is required when building a harness chain. In connection with figured work, however, both symbols of weaves (warp and filling effect) however, must be used.

THE OBJECT aimed at in the construction of satin weaves is to arrange the interlacing of warp and filling as much as possible distributed and yet at the same time as regular as possible distributed.

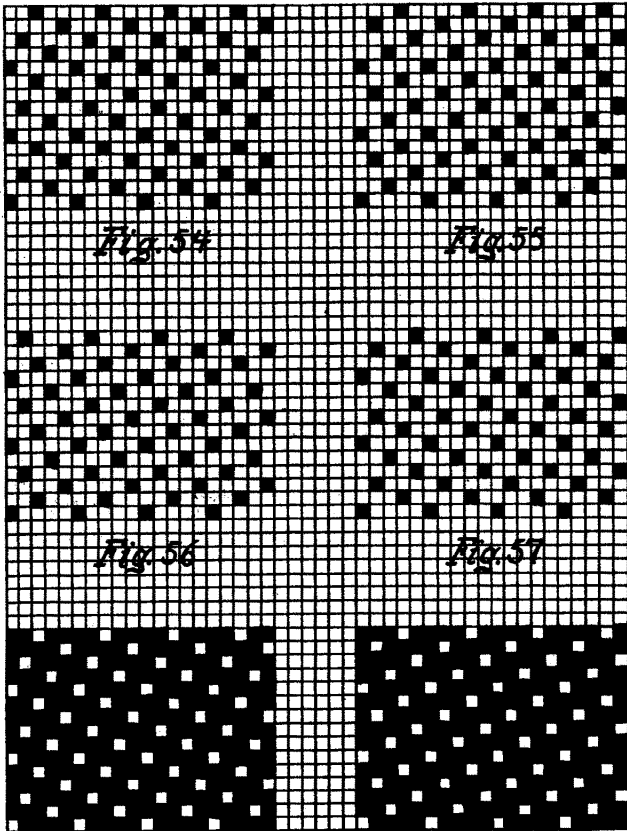


Fig. 54

Fig. 55

Fig. 56

Fig. 57

Fig. 58

Fig. 59

The lowest number of harnesses for constructing a satin is 5, after which, with the exception of 6, they can be constructed for any number of harnesses. Some designers consider the 4-harness broken twill, also known as the *small crow foot twill* as a satin, which however, is not the case and for the sake of system in classifying weaves, is better not done, although we must admit that in a great many instances it is hard for the designer to decide at a first glance whether we deal with this weave or a 5-harness satin in the fabric; for example, a doeskin or a beaver, and where we may come in contact with either weave, more particular in connection with the better class of these fabrics.

On 6-harness no regular satin can be constructed, for reason explained later on, we using in its place then what we technically term the 6-harness irregular satin also called the regular or *large crow foot twill* and which is a most important weave for cotton and silk manufacturers, it being a weave that is very extensively used in connection with figured stripes, checks, etc.

Rule for constructing satins: Divide the number of harnesses you are to construct the satin for into two prime numbers (neither number to be a multiple of the other, nor of the repeat of the weave). Either one of these two prime numbers we will call a *counter*. Next take either one of these counters only into consideration, and add it to 1, then add it to the sum, and keep this adding of the counter to the last sum obtained continually up, until the repeat of the weave is obtained. During this procedure of counting out our satin, take at the same time into consideration that in the construction of such a satin weave, we only deal with one repeat of it and for which reason any number of a sum, whenever coming in the second repeat of the weave, has to be transferred to its proper number in the first repeat. For example, if in connection with a 5-harness satin, the sum calls for 8, this means then (8 minus 5 =) 3, for the number to be taken in place of the last sum. Or in other words, more plain to the student, the 8th warp thread in a 5-harness satin constructed with more than one repeat equals the 3rd warp thread in the first repeat or the second, etc., repeat of this weave. In the same manner, the sum of 12, in connection with a 10-harness satin (12 minus 10) equals the 2nd warp thread in either the first or any successive repeat of this weave.

What has been said thus far with reference to warp, at the same time also refers to counting-off filling ways.

Explanations thus far given are best explained with a practical example, for instance the 5-harness satin and when we will explain at the same time all possible chances for counting-off, in this way helping the student over any possible doubt as what to do when having to construct a satin for any required number of harnesses. In the same manner, as thus explained in the lesson, the student—for exercise—may treat any different satin weave.

5-harness satin. $5 = 2 + 3$

Taking 2 as the counter we find:

$1 + 2 = 3 + 2 = 5 + 2 = (7 - 5 =) 2 + 2 = 4 + 2 = (6 - 5 =) 1$ giving us 1, 3, 5, 2, 4, as the rotation of stitch for the 5-harness satin.

One system of the threads, either the warp or the filling, is now taken in consideration in regular rotation, the other system being taken as per arrangement (counting-off) thus obtained; which system to use straight, and which distributed, is immaterial with reference to constructing the satin. Explanations following later on will explain subject.

We will now take warp straight and filling distributed as counted-off and when:

the 1st warp thread intersects with pick	1
2 " " " " "	3
3 " " " " "	5
4 " " " " "	2
5 " " " " "	4

This procedure of counting-off the 5-harness satin is shown on point paper in diagram Fig. 50.

Now let us take the filling straight and distribute the warp, and when

the 1st warp thread interlaces with pick	1
3 " " " " "	2
5 " " " " "	3
2 " " " " "	4
4 " " " " "	5

This procedure of counting-off the 5-harness satin is shown on point paper in diagram Fig. 51. The difference between using either way of counting, will result in a different double twill effect for the satin; which to use depending on the fabric under consideration and consequently has nothing to do with the construction of the weave.

Previously we mentioned that either counter (2 or 3) may be used, and in order to simplify study to the student and at the same time possibly set many a practical man's mind at rest, we will next repeat the procedure as done with counter-off 2 now with counter-off 3.

$1 + 3 = 4 + 3 = (7 - 5 =) 2 + 3 = 5 + 3 = (8 - 5 =) 3 + 3 = (6 - 5 =) 1$ giving us this time 1, 4, 2, 5, 3 as the rotation of stitch for either one or the other system of threads.

Taking the warp in rotation and skipping the filling gives us:

1st warp thread interlaces with pick	1
2 " " " " "	4
3 " " " " "	2
4 " " " " "	5
5 " " " " "	3

This procedure of counting-off the 5-harness satin is shown on point paper in diagram Fig. 52.

Taking next our last chance of a change in producing this 5-harness satin into consideration, *i. e.*, skipping warp and taking filling in rotation we find:

1st warp thread interlaces with pick	1
4 " " " " "	2
2 " " " " "	3
5 " " " " "	4
3 " " " " "	5

This procedure of counting-off the 5-harness satin is shown on point paper in diagram Fig. 53.

In the same way as referred to, when counting-off with 2, the difference between using either way of counting-off (either the one obtained in diagrams Figs. 52 and 53) will result in a change of the double twill effect for the satin; which to use depending on the character of the fabric to be made, however, it has nothing to do from a point of constructing the weave.

We now come to a more interesting point. The student might think "we now have four 5-harness satins constructed"—nothing of the kind, since weaves Fig. 50 and 53 are identical and in the same way weaves Fig. 51 and 52, and which brings the matter in a nut shell to the fact *only one 5-harness satin* has been obtained, the only difference being either a left or right hand double twill effect.

To bring the affair more plain before the student, weaves Figs. 54, 55, 56 and 57 have been given, either

one showing twelve repeats of a 5-harness satin, *i. e.*, four repeats warp ways and three repeats filling ways. Of these four weaves

Fig. 54 = diagram of construction	1
" 55 = " " " "	2
" 56 = " " " "	3 and
" 57 = " " " "	4.

We mentioned before, that satin weaves, for plain structures, are best constructed filling effect, although the warp effect is the one required for face in almost all cases.

Until now we have shown the 5-harness satin always filling up, since however, in connection with figured fabrics the warp effect must be also painted out, we have shown the latter in weaves Figs. 58 and 59, and of which

Weave Fig. 58 is the mate of Fig. 54 and " " 59 " " " " 55.

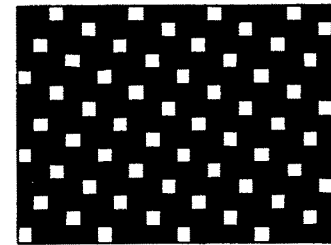


Fig. 60

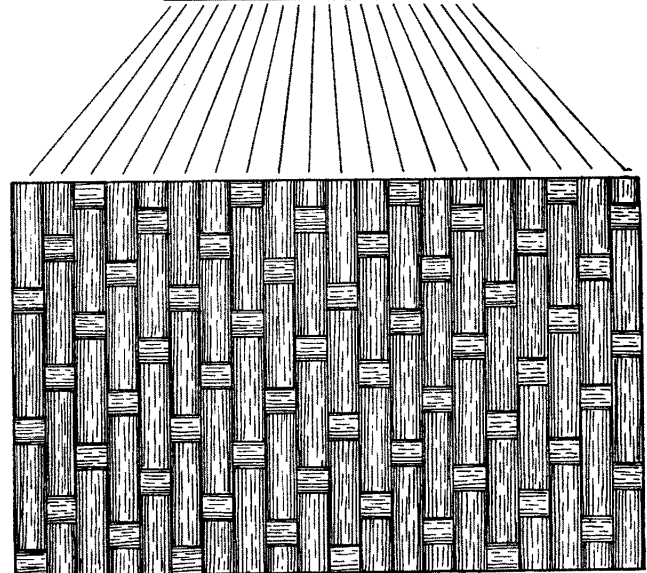
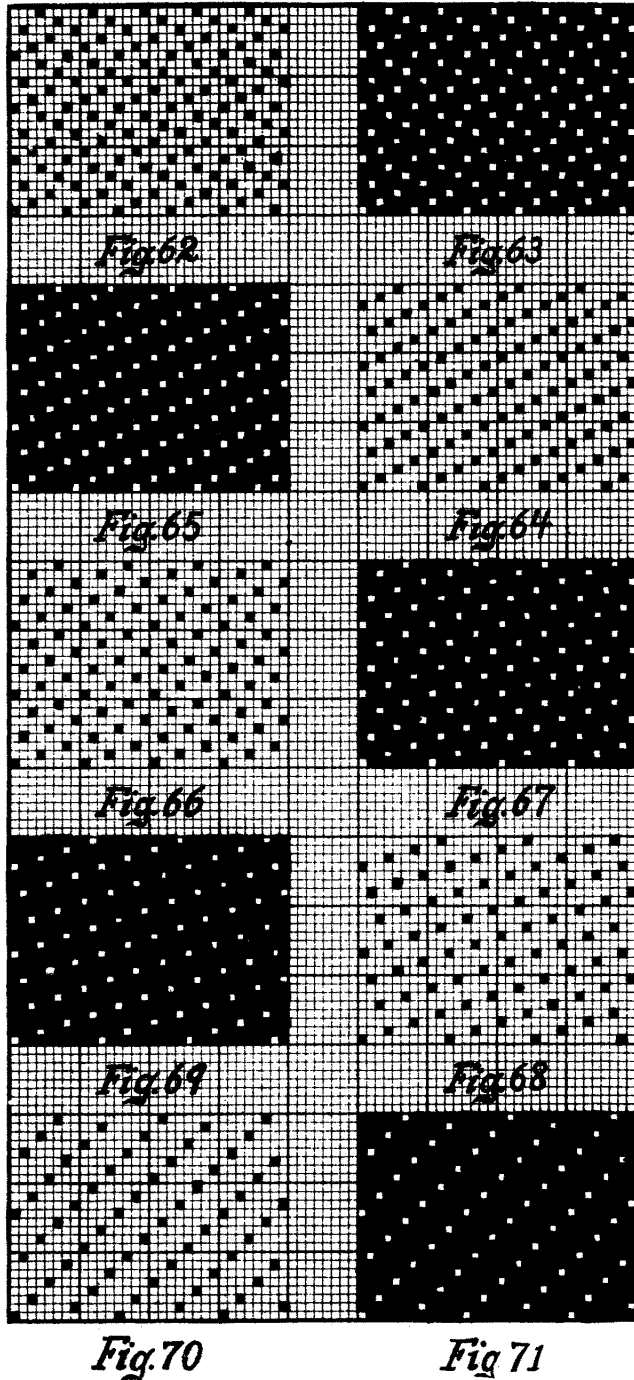


Fig. 61

In order to show the general interlacing of fabrics with satin weaves, diagrams Figs. 60 and 61 are given, and of which weave Fig. 60 corresponds to the 5-harness satin warp effect shown in connection with diagram Fig. 58, it being four repeats warp ways and three repeats filling ways of said satin. Diagram Fig. 61 shows a portion of a corresponding fabric, the lines between weave and fabric structure indicating the respective warp thread in each.

6-harness satin. For this number of harnesses, as mentioned already, no regular satin can be designed, for the fact six cannot be divided into two prime numbers. For this reason, whenever required to use a 6-harness satin we have to use an irregular

satin, which however, is a weave used very extensively in connection with the cotton and silk trade, for the fact that it produces a most exquisite face on account of its broken up satin effect.



The drafting for this weave is thus: Drafting filling in rotation, draft alternately every other warp thread for three picks, next find the centre, which forms a new starting point and from which reverse drafting of three alternate threads, in connection with the next three picks. Finding the centre between each break or change of drafting will always place your initial starting point on the proper place in order that every warp thread throughout the repeat of the weave is taken up. With reference to our example, we will draft thus 1 — 3 — 5 (find cen-

tre =) 2 — 6 — 4. This weave on account of the breaking of the double twill effect every three picks, is called for this reason the crow foot twill, *i. e.*, the regular or large crow foot twill, in order to distinguish it from the 4-harness broken twill. To simplify matters to the student, weaves Figs. 62 and 63 are given and of which weave Fig. 62 is the 6-harness irregular satin, filling effect, and Fig. 63 its warp effect. The weave in either instance repeating on 6 warp threads \times 6 picks.

Having now given a thorough explanation of the construction of satins and which refers to any satin to be constructed any time by the student, *i. e.*, explanations which must guide him to construct any satin he ever will come in contact with, we will now simply elaborate the subject somewhat by guiding him in constructing the satin weave for four more additional repeats of harnesses, (7, 8, 10 and 12-harness) and for which reason diagram Figs. 64 to 71 are given.

7-harness satins. For this number of harnesses there are eight different ways of constructing a satin possible, for the fact that 7 can be divided into 2 + 5 and 3 + 4, and that either warp or filling can be taken in rotation, the other system being counted for.

Weave Fig. 64 shows the 7-harness satin obtained by using 2 as a counter, taking the filling in rotation and counting off or skipping the warp thus:

$1 + 2 = 3 + 2 = 5 + 2 = 7 + 2 = (9 - 7 =) 2 + 2 = 4 + 2 = 6 + 2 = (8 - 7 =) 1$, or repeat. Using any other number for a counter-off will give us the same satin weave, only that the double twill effects run in a different direction, which matter is immaterial to us with reference to construction of weave, but will come into consideration when dealing with the laying out of fabric structures, *i. e.*, their face effect required, etc. Diagram Fig. 65 shows us the 7-harness satin warp effect taken from the preceding weave.

Weave Figs. 66 and 67, show us the 8-harness satin, filling and warp effect, respectively.

Weave Figs. 68 and 69, show us the 10-harness satin, filling and warp effect respectively, and finally

Weave Figs. 70 and 71, the 12-harness satin, filling and warp effect respectively.

By studying diagrams, weaves and explanations thus given, the student cannot help but master the construction of any satin weave he ever will come in contact with.

Questions:

- (1) What is the difference in constructing satins from that of twill weaves.
- (2) Which is the lowest number of harnesses you can design a regular satin for.
- (3) Quote reason why no regular satin can be constructed on six harnesses.
- (4) Count out the 8-harness satin, using 3 as a counter.
- (5) Count out the 10-harness satin, using 7 as a counter.

- (6) Count out and construct the 9-harness, 11-harness and 16-harness satin.
In either instance when painting a weave for your exercise, always be sure to paint two repeats each way, in order to convince yourself that your answer is correct.
- (7) Which fabric will permit you to use a higher texture warp and filling ways, in connection with a given count of yarn: (A) the 4-harness even sided twill, or (B) the 7-harness satin; giving at the same time the reason for it.
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