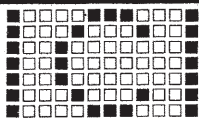


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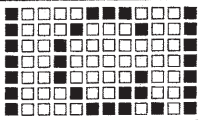
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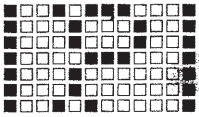
Construction of Weaves



A
Text Book
for Use in
Textile
Schools



and for
Designers,
Overseers,
Loom fixers,
Webdrawers
and others.



By
Charles G. Petzold



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L. J. KNOWLES,
THE INGENIOUS INVENTOR OF THE FAMOUS KNOWLES LOOM,
DESIGNED BY C. G. PETZOLD.



WITH KIND PERMISSION OF
FRANKLIN W. HOBBS,
ASSISTANT TREASURER OF THE ARLINGTON MILLS.

PREFACE.

This work is the result of thirty years' practical experience in the designing and weave room. The principal object of the work is to establish, if possible, a universal system of Drafting, originating of Weaves, and the laying out of Weaving Plans for the Designing and Weave Room. The value of this work will, no doubt, be appreciated by its readers. The rules are simple and instructive.

Each part contains a portrait of noted men, such as L. J. KNOWLES, SCHILLER and GOETHE, A. LINCOLN, GARFIELD and ARTHUR, WILLIAM I, BISMARCK, Admiral DEWEY and others.

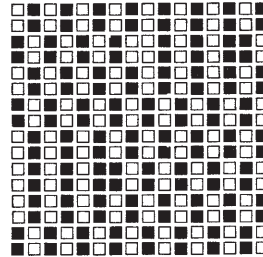
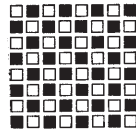
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Mr. CHARLES H. HUTCHINS, President of the Crompton and Knowles Loom Works, Worcester, Mass., kindly granted me permission to use the design of Mr. L. J. KNOWLES as the first illustration on Portrait Designing.

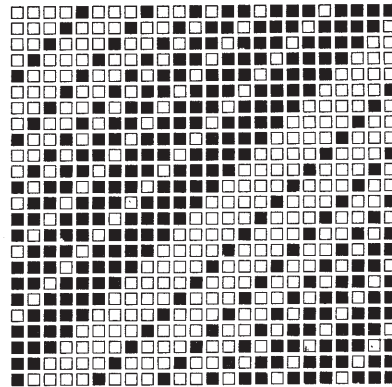
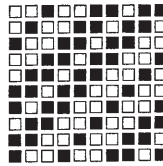
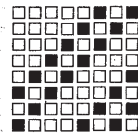
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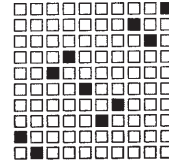
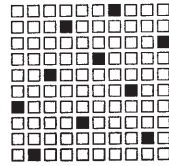
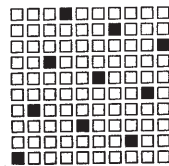
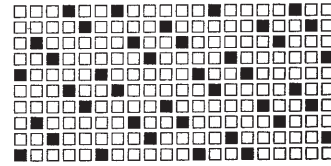
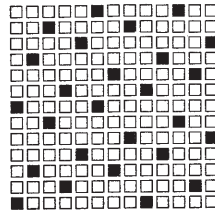
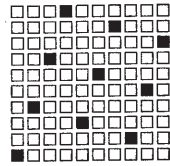
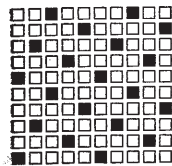
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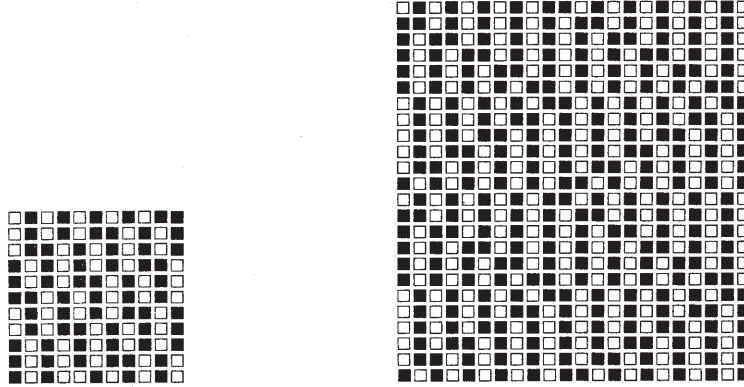
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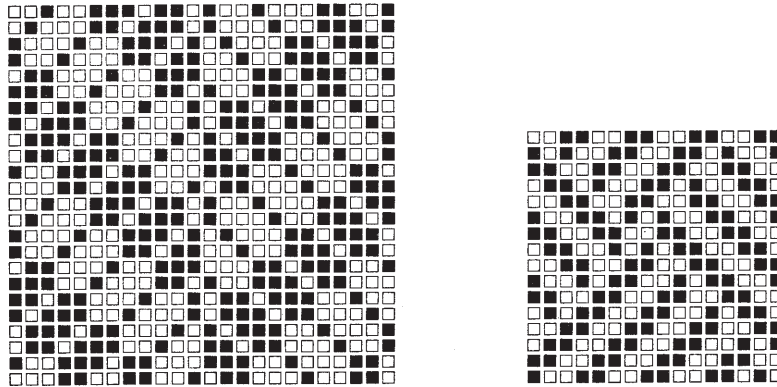
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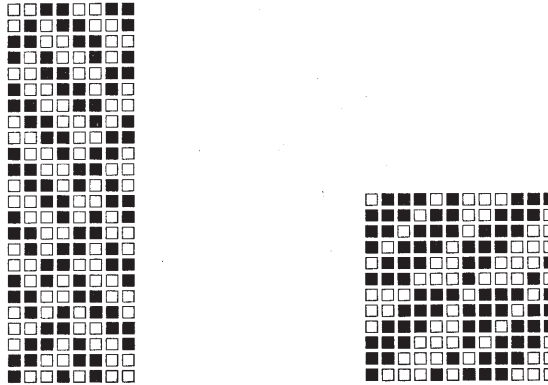
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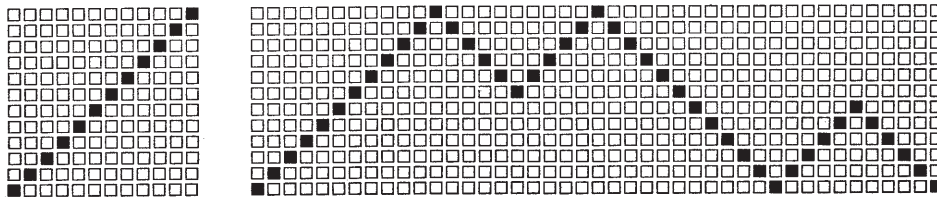
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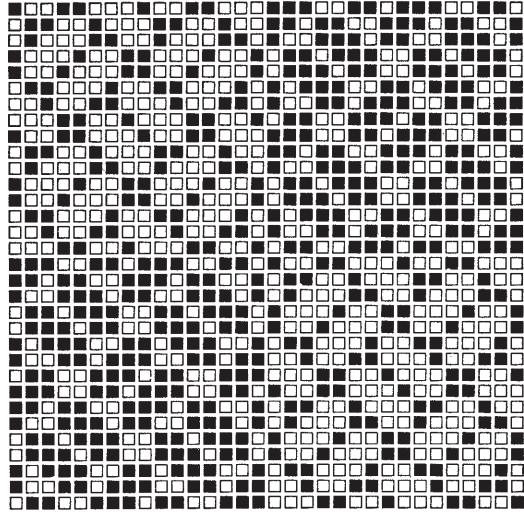
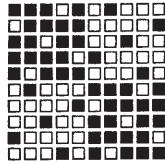
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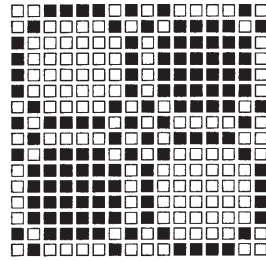
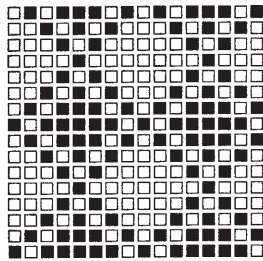
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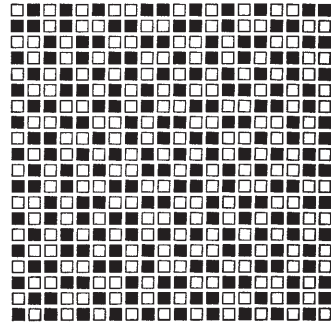
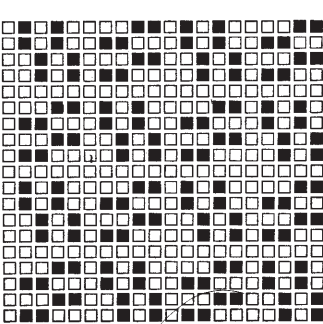
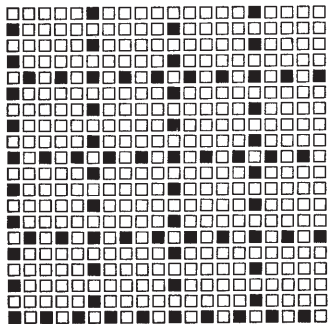
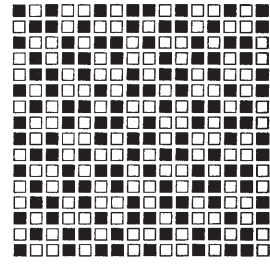
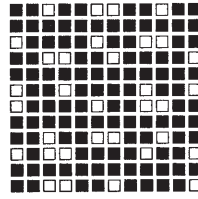
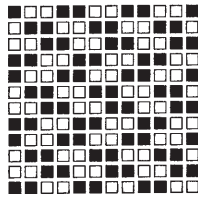
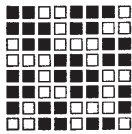
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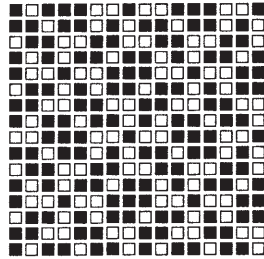


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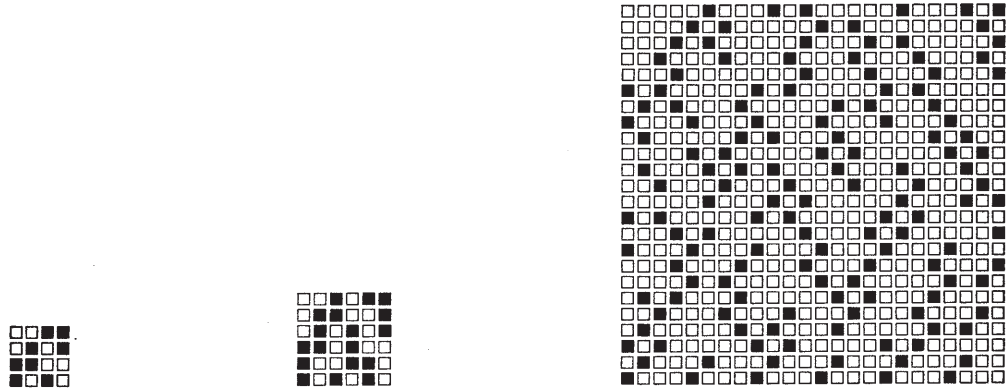


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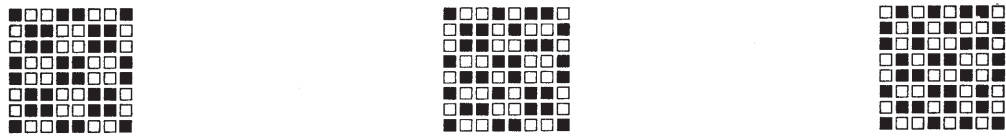




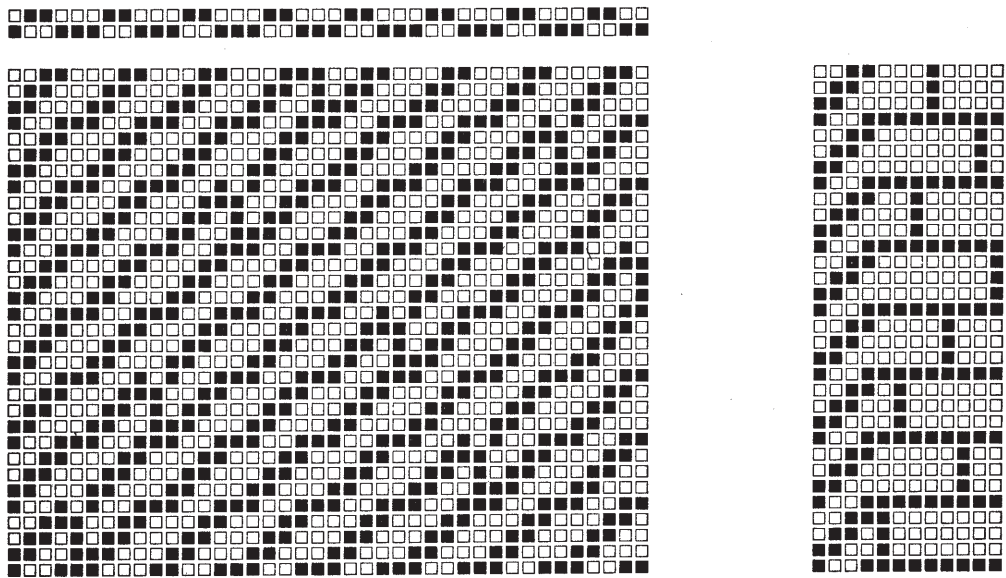
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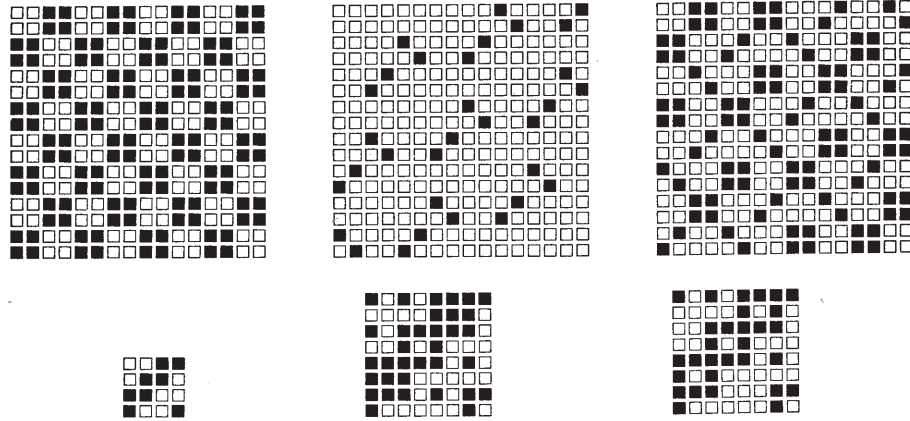
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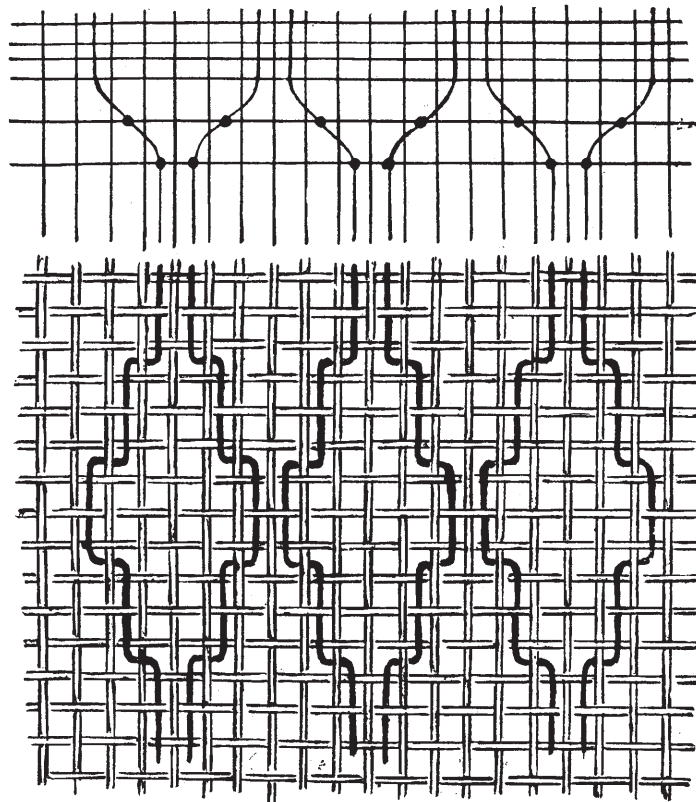
REGULAR WEAVES WITH FANCY EFFECTS.



COMPOSITION OF WEAVES.



LENO.



JACQUARD DESIGNING IN GENERAL.

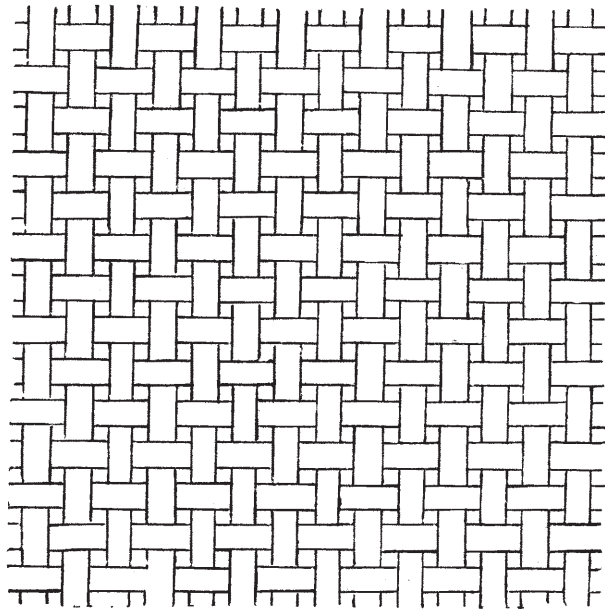




THE whole textile industry embraces three distinct branches. The first of these branches includes all such work as is necessary to form the raw material into threads, or, as commonly called, yarn. The systematically arranged explanation of this work is known as the technology of fibres and yarns. The second branch includes all such work as is necessary to form cloth. That is to say, the yarn or threads are interlaced after certain rules, methods, and mathematical calculations, and this is known as composition and construction of fabrics, and includes weaving and knitting. This branch will be treated in this work.

The third branch includes all such processes as are necessary to give the raw fabric a marketable form and appearance, for either luxury or every day use. These are known as the finishing processes, and embrace the dyeing and finishing of fabrics.

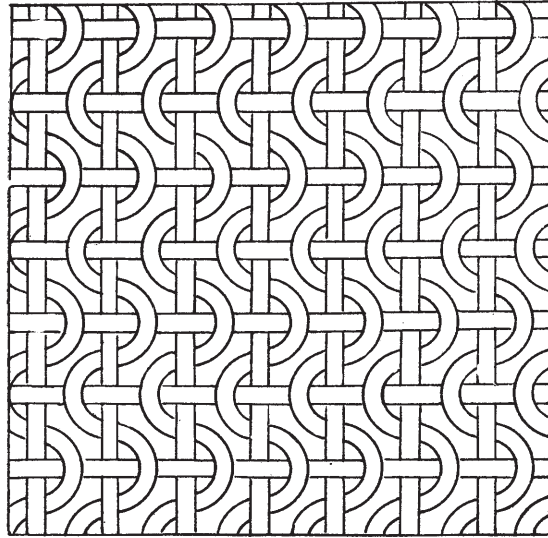
The definition of a fabric is a system of threads which are, after certain rules, interlaced, and interlacing of threads can be accomplished in three distinct forms. First with horizontal and perpendicular interlacing threads. The fabric so obtained is cloth. *See figure A.*



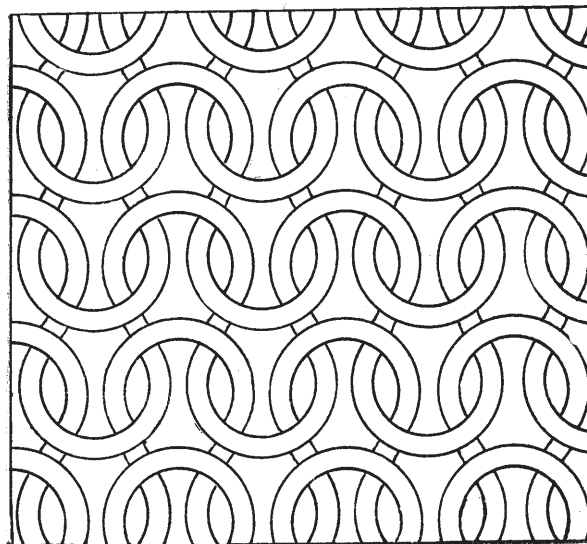
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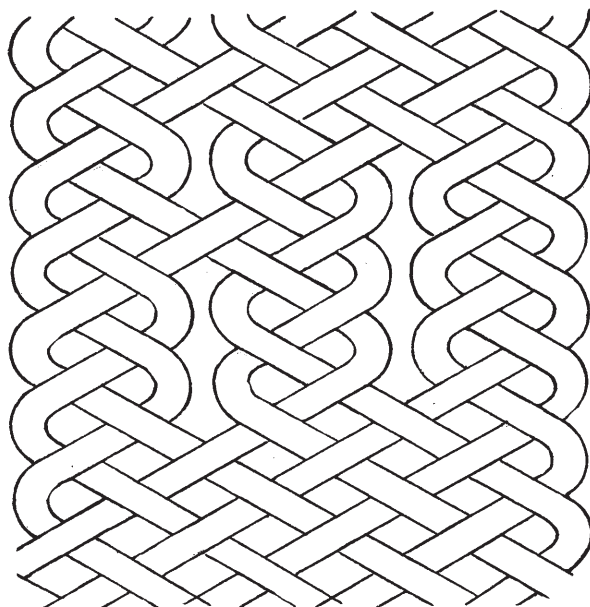
Second, with horizontal, perpendicular, and twisting threads, of which the

fabric is known as leno or gauze. *See figure B.*

**B**

Third, with only one system of threads, which are interlacing, and are known as net, mesh, or knitting threads, and the fabric is known as lace and braids. *See figures C and D.*

**C**



D

Plain Weave.

The plain weave is used in every branch of weaving, and is known in cotton weaving as cotton, in woolen weaving as cloth, in worsted weaving as muslin, and in silk weaving as taffeta. It is a double faced fabric, with two ends of warp and two picks of filling; all threads belonging to a repeat are interlaced.

In a fabric of coarse construction the plain weave can be produced on two harnesses. The finer the construction the more harnesses are required; but only for convenience, to avoid too many ends on a certain space. In fine silk weaving there are often times from eight to twelve harnesses in use to weave a plain cloth. The plain woven fabric has a firmer feel; a finer, closer, and smoother appearance, but less elasticity than any other weave of the same construction.

Figures 1 to 4 explain and show the designs for plain weave.



1



2



3



4

Plain weave is also the foundation for all rep weaves; the latter does not materially differ from the plain weave, except that two or more warp or filling threads are working in groups. Plain or common warp rep is represented by Fig. 5 and each warp thread incloses two picks of filling.



5



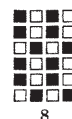
6

Each warp thread incloses three picks of filling.



Each warp thread incloses four picks of filling.

7



Each warp thread incloses two and one filling picks alternating.

8



Each warp thread incloses three and one filling picks alternating.

9



Each warp thread incloses four and one filling picks alternating.

10



Each warp thread incloses four and one and two and one filling thread.

Fig. 8, 9, 10 and 11 are mostly used if the cloth is made from two or more different materials.

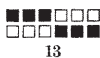
11

Plain Rep formed by the Filling.

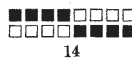
All the foregoing warp rep designs, from Fig. 5 to 11 inclusive, can be used for filling rep by turning these designs 90° which is illustrated by Fig. 12, 13, 14, 15, 16, 17 and 18.



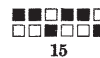
12



13



14



15



16



17

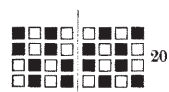


18

Figures 12 to 18 inclusive can be made on two harnesses, but the threads should be drawn in groups into their harnesses, to allow those threads to weave into the cloth side by side. It could be done in this way, to draw each group into one mail; but this would be detrimental to a clear picture of the fabric, as nothing would control these threads to weave side by side into the cloth, and the smooth and desired appearance would be lost.

Mixed or Seedy Rep formed by Warps.

In these designs the rep effect does not show straight up and down lines; the rep lines are broken and have more the appearance of a crepy or seedy "picture". Fig. 20 illustrates one of these weaves.



The four ends of the left half of the design show plain warp rep with two inclosed filling threads. The same is also seen in the four ends on the right half of the design, but the right half is set one pick higher.

Figure 21 is constructed in the same manner; but instead of groups and halves of two, we use in this case groups and half of six threads, and three picks in each shed.

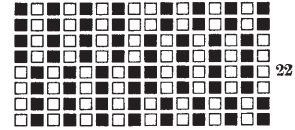
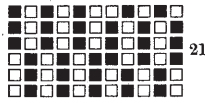
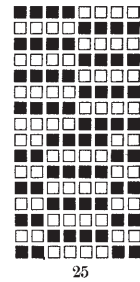
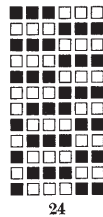


Figure 22 is also formed by the same principle, but differs in this way: Four picks are inclosed in one rep and the right half of the design is set two picks higher.

Mixed or Seedy Rep formed by Filling.

In this class of weaves figures 20, 21 and 22 can be used by turning them 90°. These are illustrated by Fig. 23, 24, 25.



Seedy Rep produced by Plain Rep.

The left half as well as the right half of the design are produced by plain rep three and one, which is illustrated by Fig. 26.

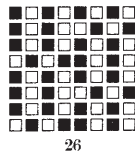
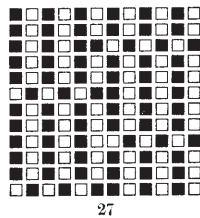
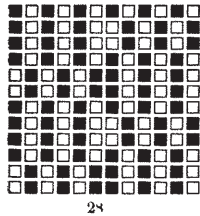


Figure 27 is formed of the same weave as 22, but five and 1 picks are used to form the rib.

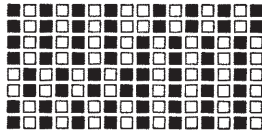


In figures 26 and 27, you will see that only odd picks of rep are used. This is necessary to get the binder pick in the centre of the three, five, or more pick rib.

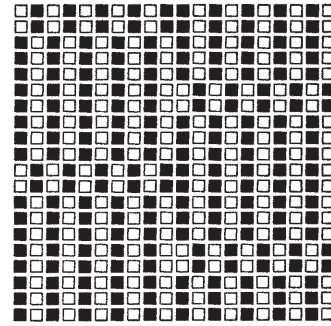
Figures 28, 29 and 30 are produced by even numbers of picks, and are formed by two kinds of plain rep; two and four as in Fig. 28, two and six as in Fig. 29, and two and eight as in Fig. 30.



28



29



30

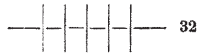
Twills and Diagonals.

In the twill and diagonal weaves, every succeeding pick is interlaced with each succeeding warp thread. For example we take a three harness twill. On the first pick the first harness rises over the first pick, on the second pick the second harness rises over the second pick, and on the third pick the third harness rises over the third pick. *For illustration see Fig. 31.*



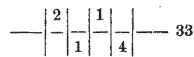
31

In laying out these weaves for twills and diagonals, a very simple method is applied. Draw a straight line and divide it into as many parts as changes are required for the desired weave. For example, we want to lay out an eight harness twill or diagonal with four changes. We draw a straight line and divide this into four parts. *See Fig. 32.*



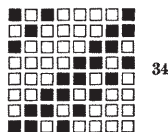
32

Divide the eight into four parts $2+1+1+4=8$ and place these figures alternating above and below the centre line. Those above the centre line denote warp up, and those below down. *See Fig. 33.*



33

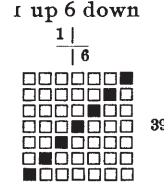
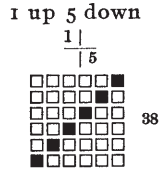
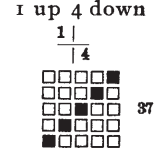
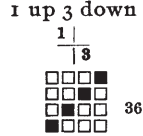
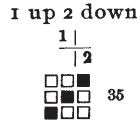
We now make a plan of eight fields and begin to indicate the warp up according to our plan represented by Fig. 33, and start on the lower line. On the next line we step one to the right, and place our indication mark for warp up in the same manner, and continue up to the eighth line by stepping one end to the right on every new line. *See Fig. 34 for the complete weave for eight harnesses.*



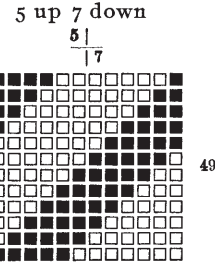
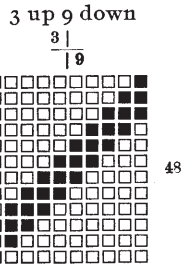
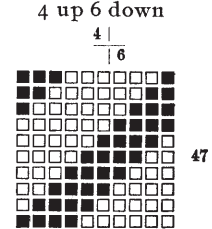
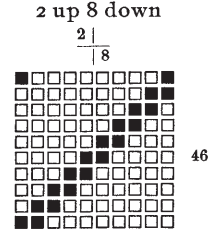
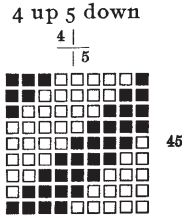
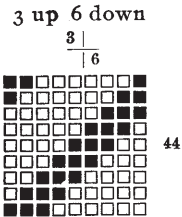
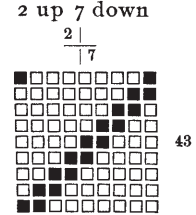
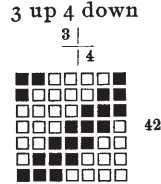
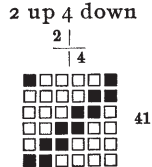
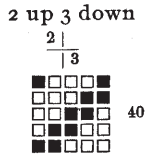
34

We will now give a series of different twills and diagonals.

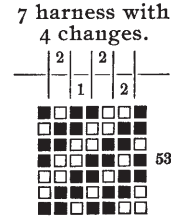
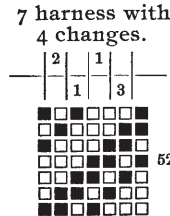
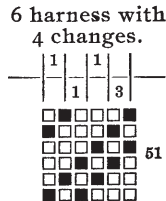
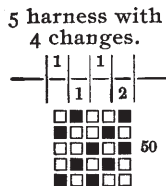
Regular Twills.



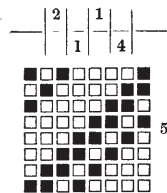
Twills in which two or more threads adjacent to each other are used to form the diagonal lines.



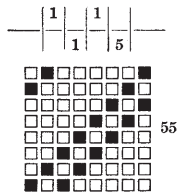
Twills in which irregular fine and coarse diagonal lines are used.



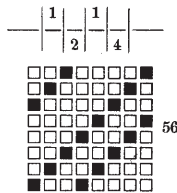
8 harness with 4 changes.



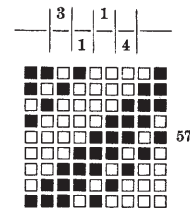
8 harness with 4 changes.



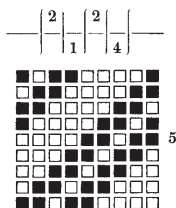
8 harness with 4 changes.



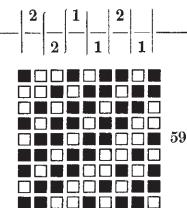
9 harness with 4 changes.



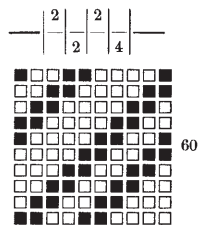
9 harness with 4 changes.



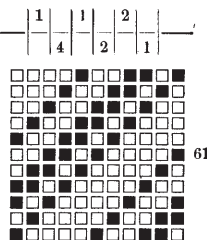
9 harness with 6 changes.



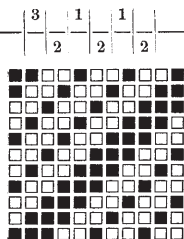
10 harness with 4 changes.



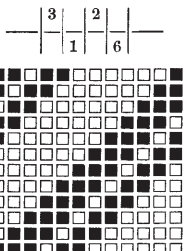
11 harness with 6 changes.



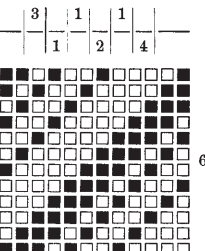
11 harness with 6 changes.



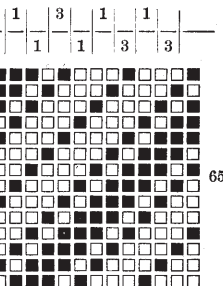
12 harness with 4 changes.



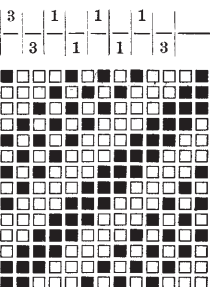
12 harness with 6 changes.



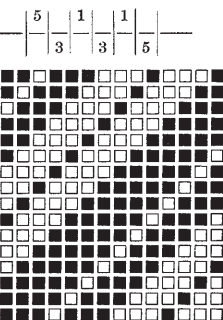
14 harness with 8 changes.



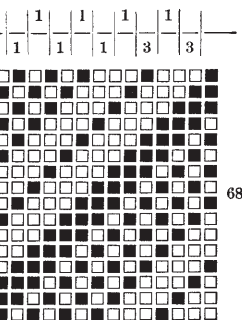
14 harness with 8 changes.



16 harness with 6 changes.



16 harness with 10 changes.



Double Twills.

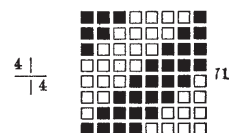
4 harness with 2 changes.



6 harness with 2 changes.



8 harness with 2 changes.



Crompton and Knowles

Loom Works,

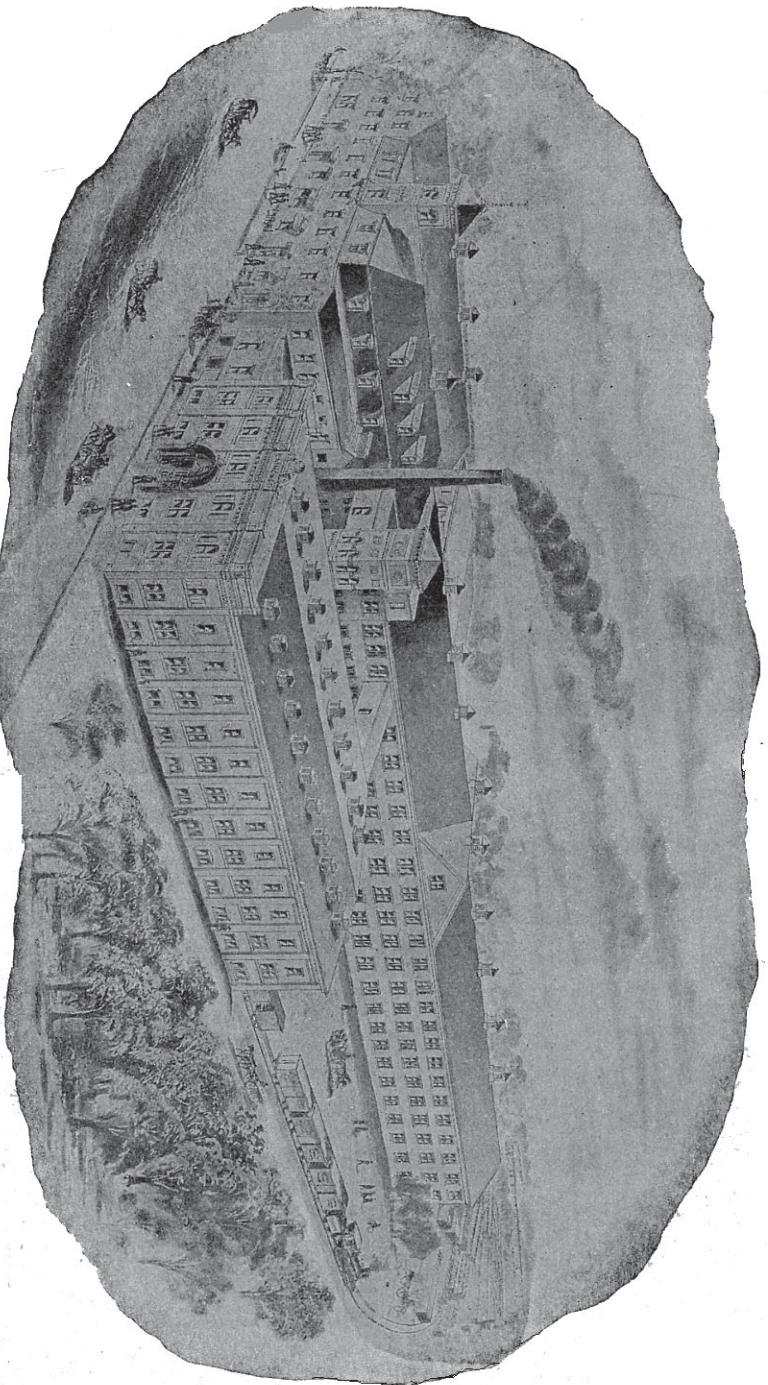
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