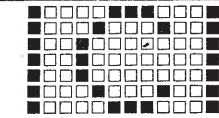


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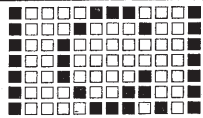
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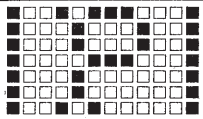
Construction of Weaves



A
Text Book
for Use in
Textile
Schools



and for
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Overseers,
Loom Fixers,
Webdrawers
and others.



By
Charles G. Petzold



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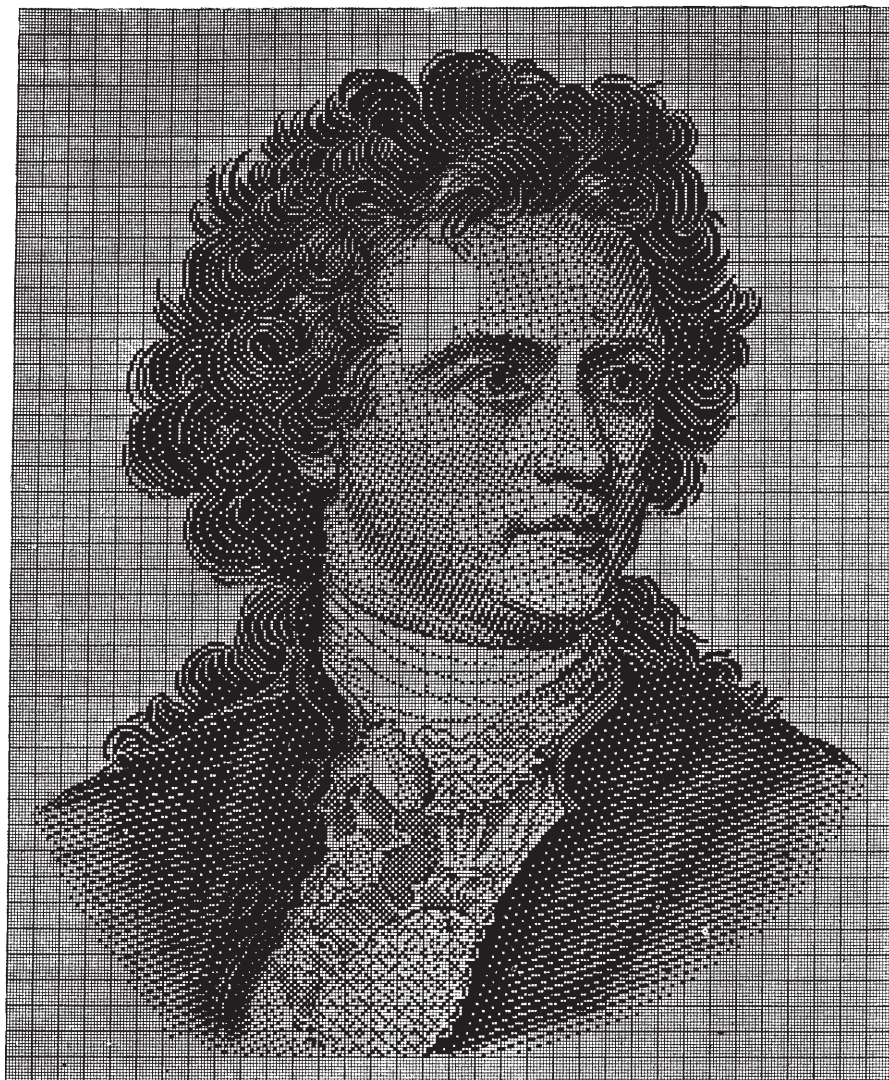
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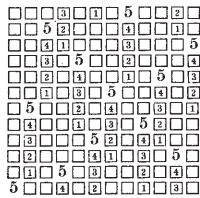


CHRISTOPHER COLUMBUS.

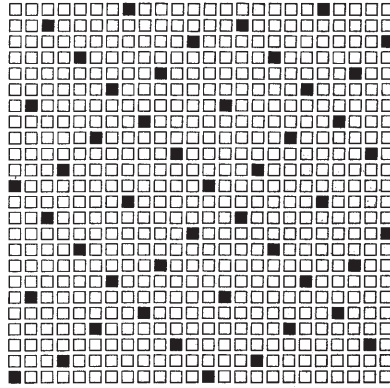
DESIGNED AND WOVEN BY EWALD FELDMANN, CREFELD, GERMANY

Figures 181 and 181B are constructed from 12-harness satin, step-number 5, group number 6=12 ends. Step regularly on the first, second and third lines, from the third to the sixth and back to the fourth, from the fourth to the seventh, eighth and ninth, from the ninth to the twelfth and back to the tenth. Figure 181B is carried out twice each way.

181

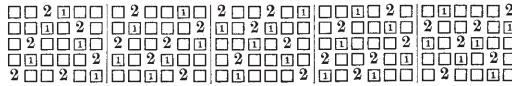


181B

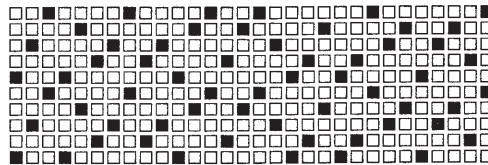


Figures 182 and 182B are constructed from 5-harness sateen, step-number 2, group number 6. We step regularly on the first, second and third, and from the third we step to the sixth and back to the fourth, from the fourth we go over to the second group, and so on. Harness number 5, group number 6. 5x6=30 ends. Figure 182B shows the design double height.

182

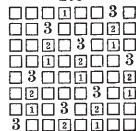


182B

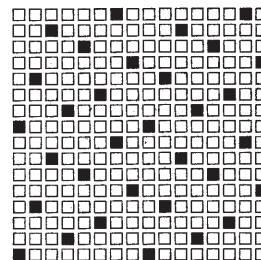


Figures 183 and 183B are constructed from 8-harness sateen, step-number 3, group number 4. As group number 4 is contained in harness number 8, this will be completed in eight lines. We now step regularly on the first, second, third and fourth; from the fourth we step to the fifth. The design is carried out twice each way.

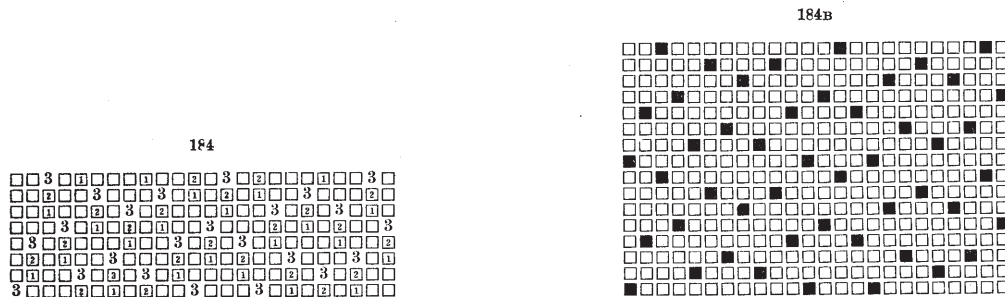
183



183B



Figures 184 and 184B are constructed from 8-harness sateen, step-number 3, group number 6. The smallest number in which six and eight can be divided is twenty-four. Therefore 24 ends are required to carry out the design. The design itself is repeated twice in height, to give a better idea of the effect obtained.



Some of these sateen weaves, however, may not be practical for a cloth; but for positions of small effects and Jacquard designing they are indispensable and are of great value to the practitioner as well as the student.

Sateen Weaves with Additional Binders.

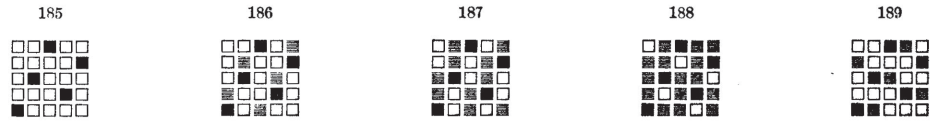
The sateen weaves produce a looser fabric than any other weave, and the larger the harness number is, the less is the firmness of the cloth, and the great variety of sateen weaves would be of no value to the manufacturer if we had no means to overcome this fault. In worsted weaving the eight-harness sateen is about the limit; in cotton and silk weaving we can take sateen weaves up to 13 harnesses, since the cotton and silk yarns can be spun to a much finer thread than worsted yarns, and more ends per inch can be used without increasing the weight of the fabric. To overcome the fault above mentioned, we add to any of our regular sateens 1, 2, 3 or more additional binders, and for the purpose of illustration we take regular 5-harness sateen with step-number 2 which is represented by fig. 185. To figure 185 we add one additional binder above the original and produce figure 186.

Again we use figure 185 and add 2 binders above the original which produces figure 187.

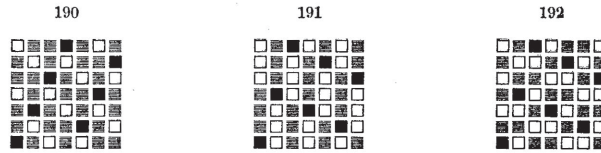
By adding 3 additional binders to the original binder in figure 185 we obtain figure 188.

It is in our power to place these additional binders above, under or on either side, in clusters or detached arrangements, just as fancy may dictate. In figure 189 we have added one additional binder to the right of figure 185.

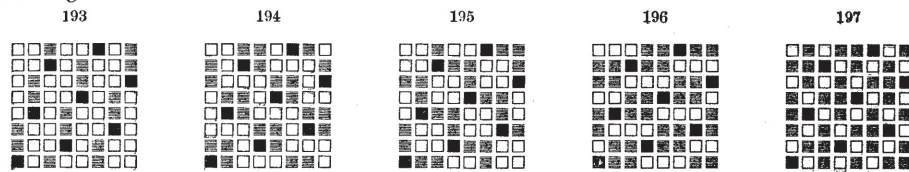
Sateens with additional binders are very extensively used in the manufacture of cloth, and therefore we will now give a series of these sateens, which, after the above explanations, will be easily understood by the aid of the explanations given for figures 185 to 189 inclusive. The original binders for this class of sateens are indicated with black characters and all the additional binders with shaded characters.



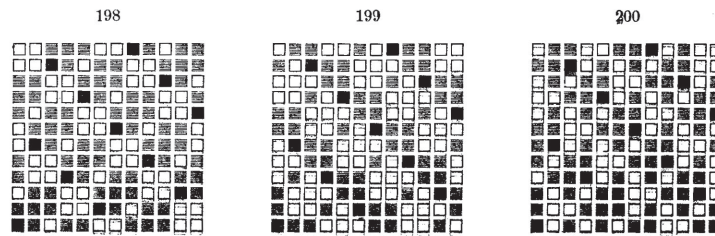
Figures 190, 191 and 192 are based on 7-harness sateen and step-number 3.



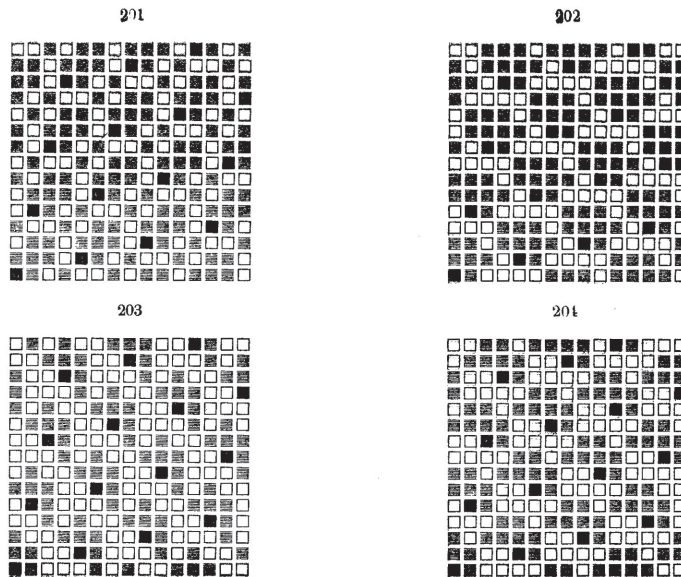
Figures 193, 194, 195, 196 and 197 are based on 8-harness sateen with step-number 3.



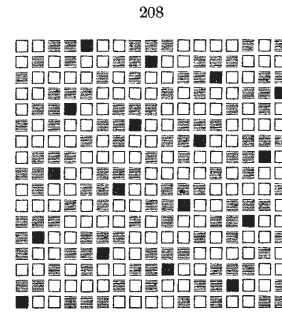
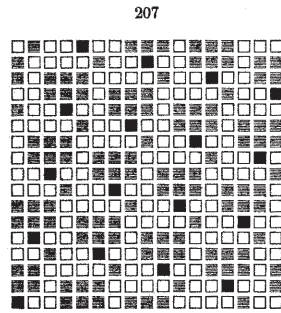
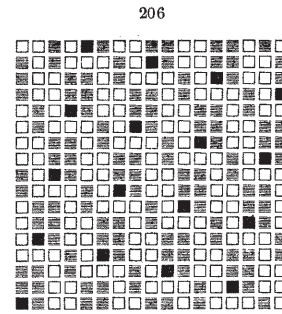
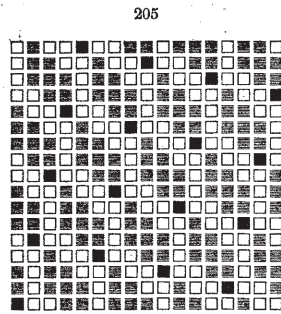
Figures 198, 199 and 200 are based on 12-harness sateen with step-number 5.



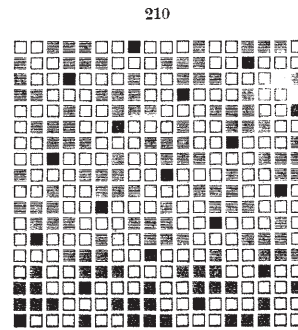
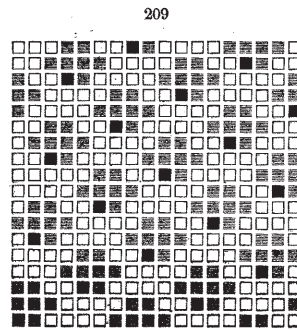
Figures 201, 202, 203 and 204 are based on 15-harness sateen with step-number 4.



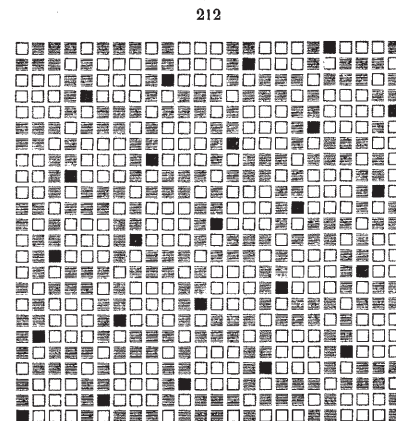
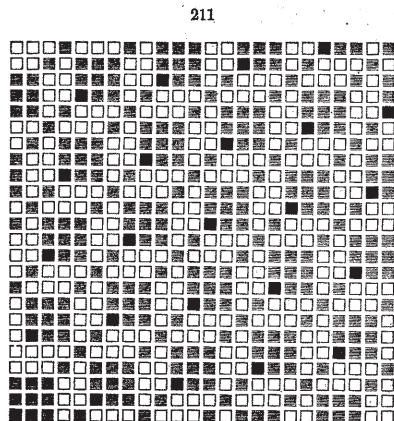
Figures 205, 206, 207, 208 are based on 17-harness sateen with step-number 4.



Figures 209 and 210 are based on 18-harness sateen with step-number 5.



Figures 211 and 212 are based on 24-harness sateen with step-number 5.



Diagonal Rep and Corkscrew Weaves.

The diagonal rep can be classified as a special form of sateen and can be worked out on the same principle as sateens. To work out a 5-harness diagonal rep or corkscrew weave, divide the 5 into 2 and 3 as in "Sateen Rule" and step up by 3, using all the fields which are numbered for the weave. See Figures 213 and 213b.

The fields containing the numbers represent the warp up, the blank spaces the filling up. It may be well to state here that the appearance of this weave is derived from the warp.

The above rule will serve for all the following weaves of this class.



Figures 213, 213B, 214, 214B, 215, 216, 217 illustrate some of these weaves, but we will state here that only odd harness numbers can be used and the rule proper will be as follows. Take any odd harness number, add one and divide by two.

Harness number 5, step-number $\frac{5+1}{2} = 3$. See Fig. 213 and 213b.

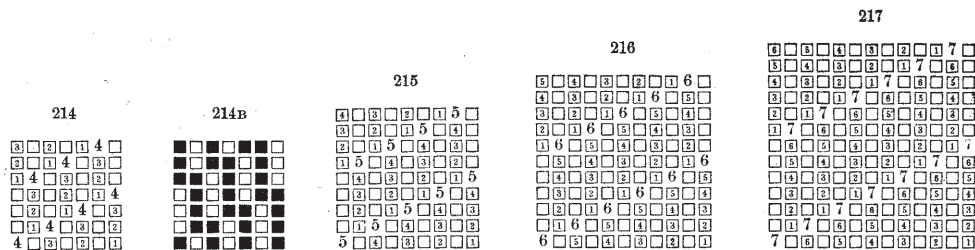
Harness number 7, step-number $\frac{7+1}{2} = 4$. See Fig. 214 and 214b.

Harness number 9, step-number $\frac{9+1}{2} = 5$. See Fig. 215.

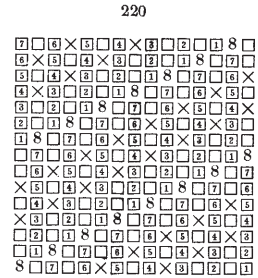
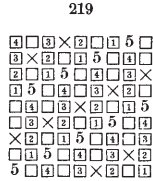
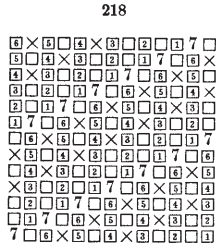
Harness number 11, step-number $\frac{11+1}{2} = 6$. See Fig. 216.

Harness number 13, step-number $\frac{13+1}{2} = 7$. See Fig. 217.

215, 216 and 217 will readily explain themselves.

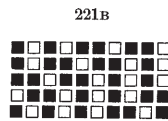
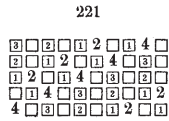


The larger the harness number is in these weaves, the looser the fabric will be. To overbalance this, we shorten the floats on the back of the design by adding one or more binders. The so added binders will not show on the face of the cloth, but will produce some filling effect on the back of the cloth and the firmness of the fabric will thus be obtained. See Figures 218, 219, 220. The additional binders are indicated with x,

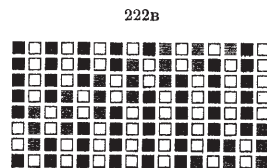
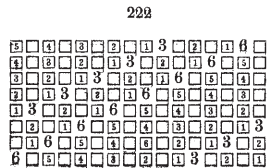


Diagonal Rep with Coarse and Fine Ribs.

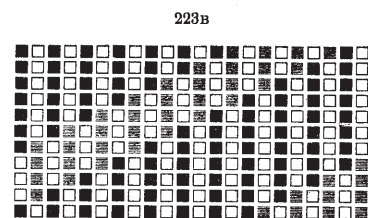
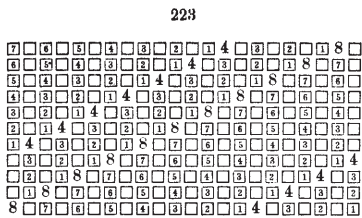
The next possible change from our ground form is to produce coarse and fine diagonal ribs. For example see Figures 221, 221b. This is a five-pick weave of this class, and for the diagonal ribs we use step-numbers 4 and 2 alternating, as a complete step-number requires 2 ends. Ten ends are necessary to complete the design.



The next example is an eight-pick rep diagonal and as step-numbers 6 and 3 are used, to complete the design 16 ends are required.



For a third example we wish to work out an eleven-pick diagonal rep and use step-numbers 8 and 4. For the complete design 22 ends will be required. See Figures 223 and 223b.



Our next chapter will explain the combination of three different sizes of ribs in rep diagonals. For example, we wish to design a diagonal rep with a 4-2-2 rib floats. The rule for this class of rep diagonals is as follows: Add the rib floats together, $4+2+2=8 \times 2=16-3$ (the harness and pick number)=13. See Figure 224. Figure 225 is worked out on the same principle. We use rib floats of $4+4+2=10 \times 2=20-3$. The harness and pick number=17.

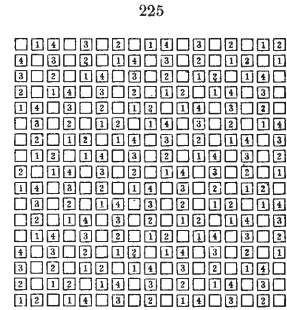
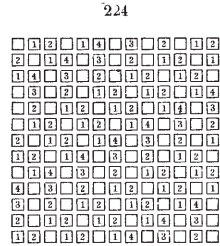
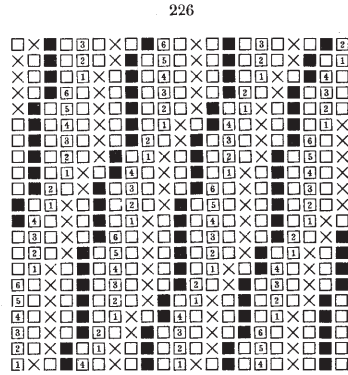
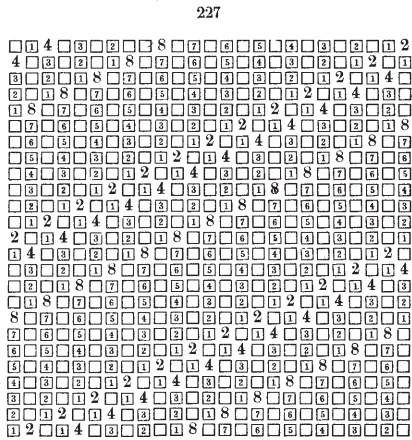


Figure 226 is another weave of the same construction. We use step-numbers 6, 4, 2= $12 \times 2 = 24 - 3 = 21$. Thus twenty-one harnesses and picks are required for the design.



In figure 227 we use step-numbers 8, 4, 2= $14 \times 2 = 28 - 3 = 25$. Twenty-five harnesses and picks are necessary for the complete design. The rule proper for laying out these weaves is as follows: We add the step-numbers together and multiply the product by two, then subtract the number of step-numbers, which is three in our example, and the product equals the harness and pick numbers that are necessary for these designs.



In the previous weaves of diagonal reps all the designs run at an angle of 27° . But according to fashion, reps may be wanted to run at an angle of less than 27° , and this shall be explained in our next chapter. In figure 228 we illustrate apparently a 5-harness rep with step-number 3. Stepping up this time does not take place in every two ends as in our previous chapter. It takes place in groups of four ends; therefore the relation of stepping up would be 1. 4, and the necessary harness number explains itself out of the following rule: Instead of single reps of two ends each, we use rep pairs, and for the formation of each rep pair 4 ends are required. Next to each rep pair a stepping up of one field takes place, and the total step-number is 3 by pair number 4. Therefore the harness number should be $3 \times 4 = 12$, but in looking over the design we only use 11 harnesses for the repeat, because our rep pairs are not adjacent, since they run into each other with one field. The result is that with each pick two ends are working alike.

228

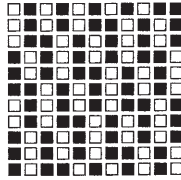


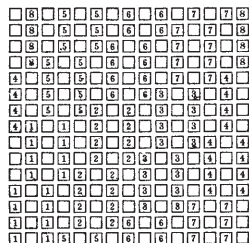
Figure 229 will readily explain itself; the rep pairs are 4, the step-number is 4; therefore $4 \times 4 = 16$, but as again each pair is set one pick higher, the harness number will be 15. With figures 229, 230, 231, 232 we give a few more examples of this class of weaves.

$$\left. \begin{array}{l} \text{Step-number 3, group number 6,} \\ 3 \times 6 = 18 - 1 = 17. \end{array} \right\} 230.$$

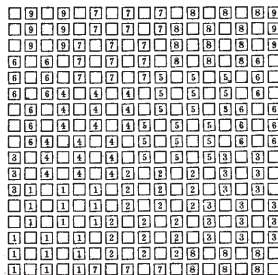
$$\left. \begin{array}{l} \text{Step-number 4, group number 6,} \\ 4 \times 6 = 24 - 1 = 23. \end{array} \right\} 231.$$

$$\left. \begin{array}{l} \text{Step-number 3, group number 8,} \\ 3 \times 8 = 24 - 1 = 23. \end{array} \right\} 232.$$

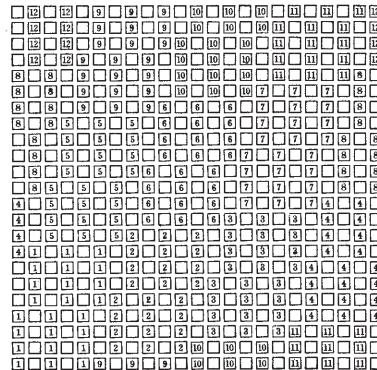
229



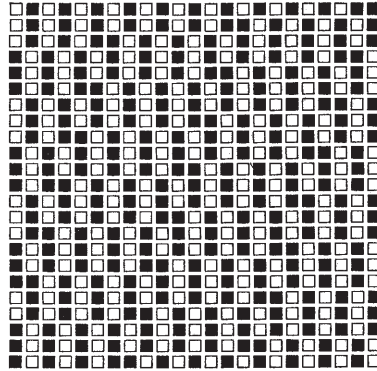
230



231



232



Diagonal Rep in Broken and Undulated Lines.

There is no special rule for this class of weaves, but in order to cover this series we will give a few examples which will be easily understood by the aid of our previous chapters relating to diagonal rep weaves.

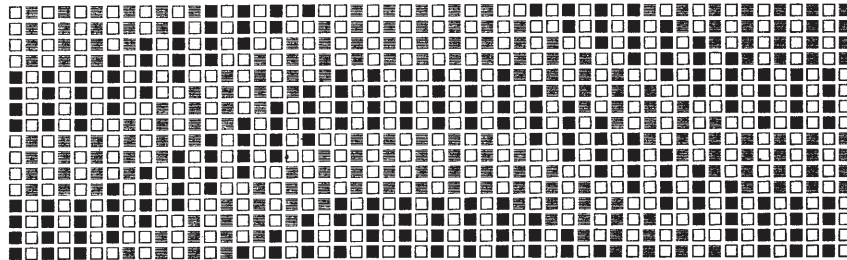
In figure 236 we have placed the groups of floats in 13-harness position, and for lack of space the design is carried out only one-half the repeat.

In figure 238 the objects are placed in 6-harness sateen position.

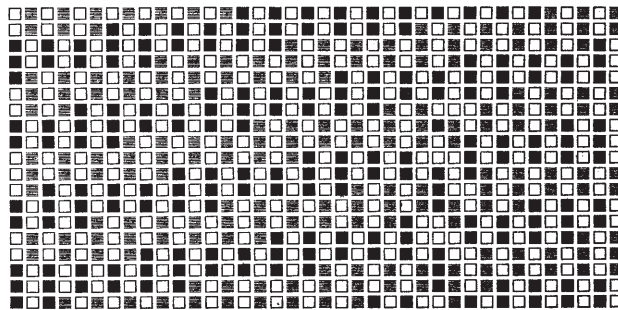
In figure 239 the groups of floats are placed in 4-harness sateen position.

Figures 233, 234, 235, 237 and 240 are laid out to suit fancy in twill arrangement.

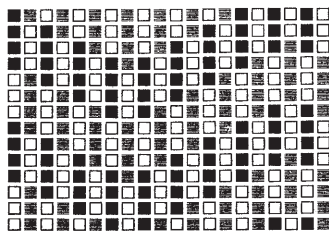
233

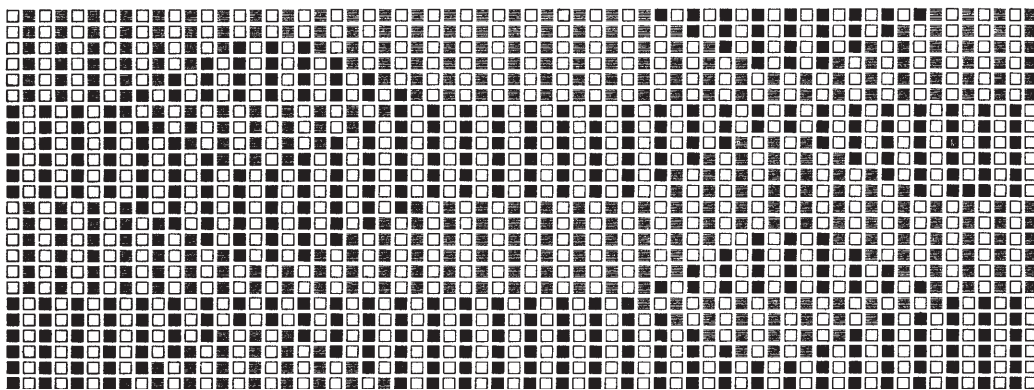
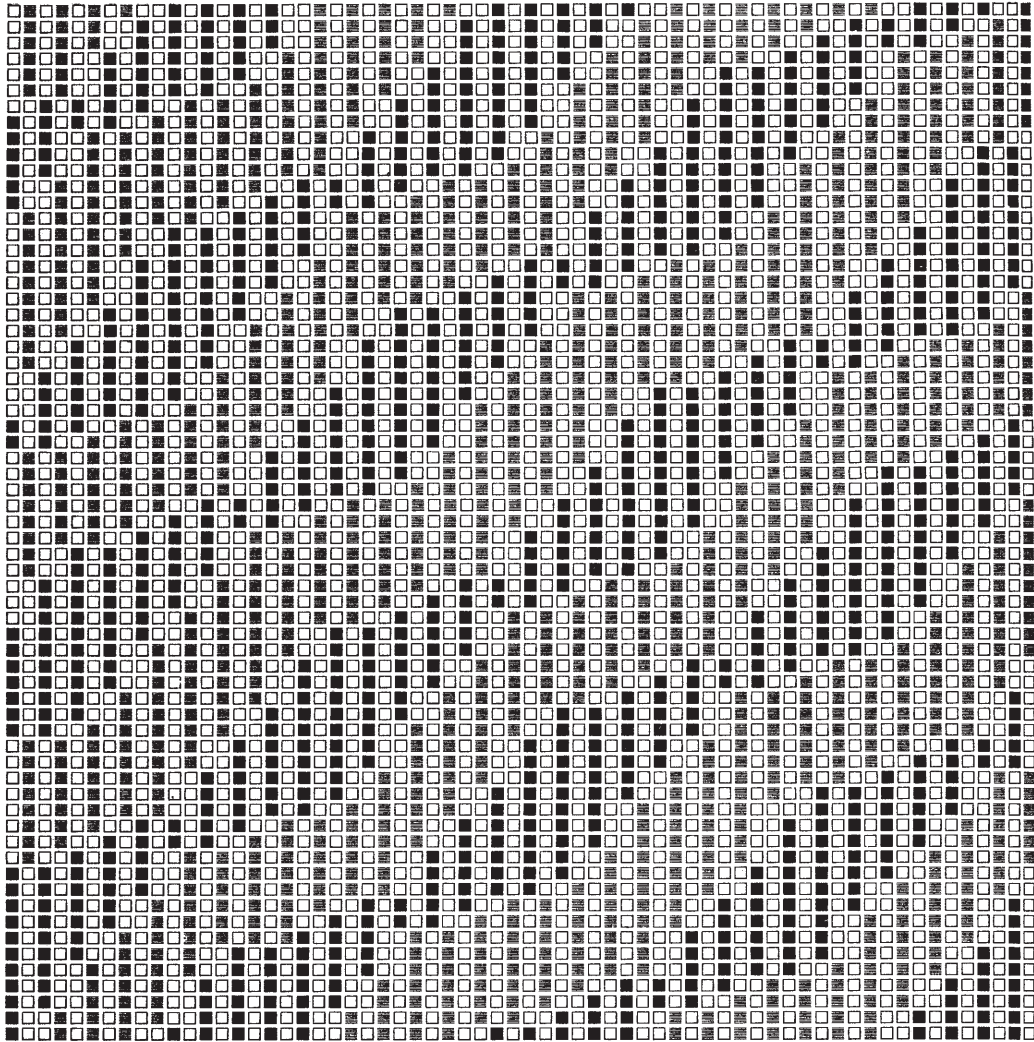


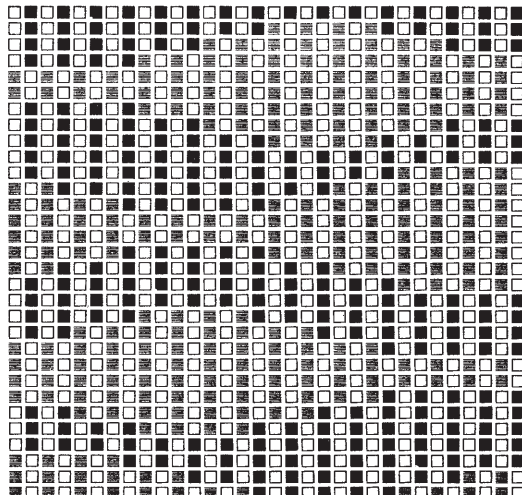
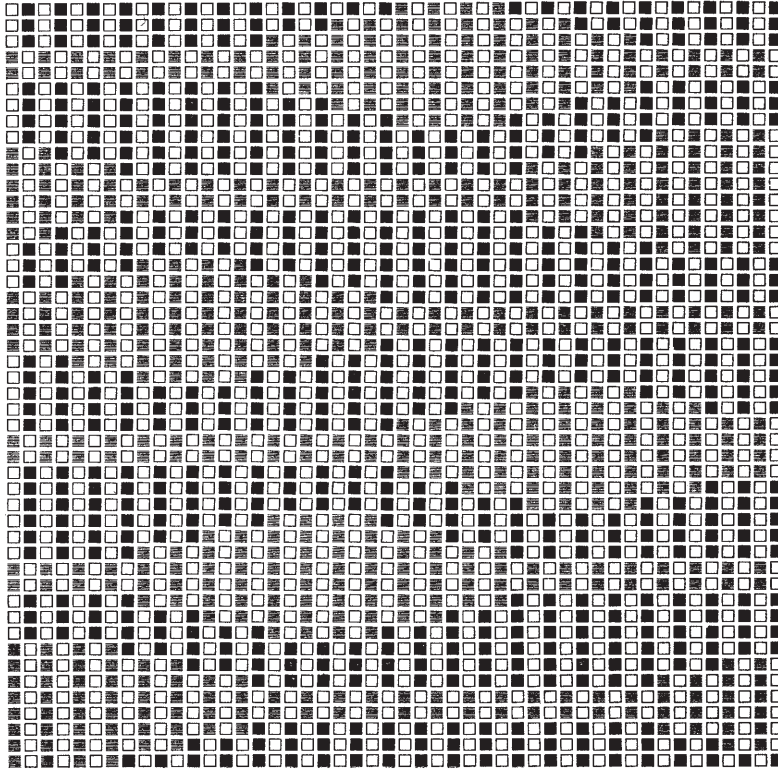
235

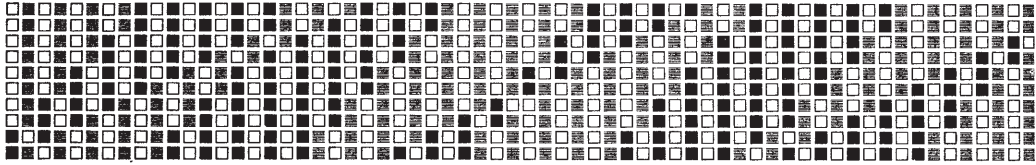


234





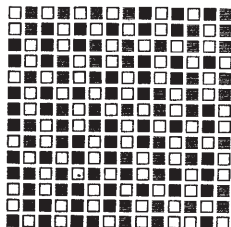




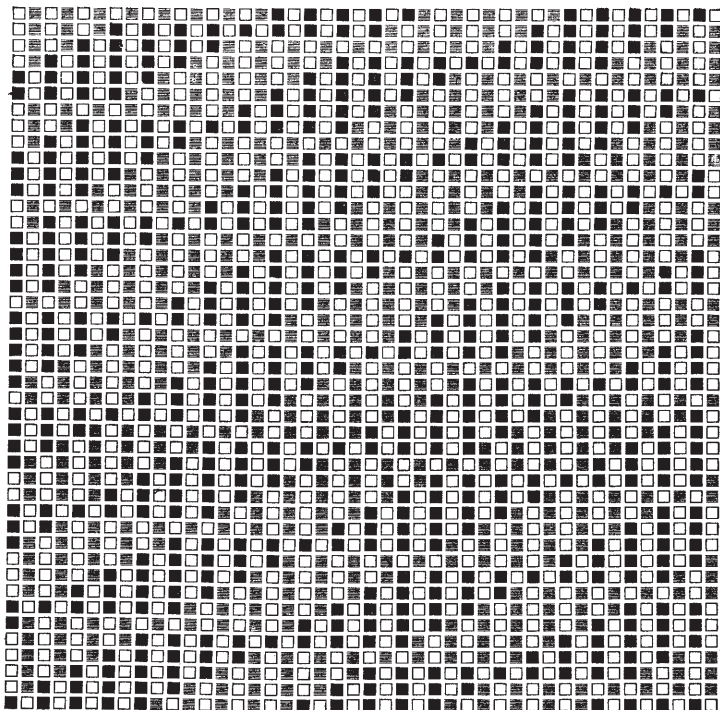
Diagonal Reps with Increasing and Decreasing Floats.

For example we use as the shortest float 1 and as the longest float 3. To find the necessary number of harnesses and picks, the following formula has to be applied. The longest float 3 minus the shortest float $3-1=2$ $(3 \times 2)+1=7$. $2 \times 7=14$ ends and picks will be required to complete the design. See Figure 241. This formula stands for all of this class of weaves, but to prove the same it is necessary to use the process of Algebra. Fig. 241B may illustrate another example of the same class of weaves. For the longest float we use 5 and shortest float 1. 5 minus 1=4 $(5 \times 2+1=11)$. $4 \times 11=44$ ends and picks are the total number required to complete design 241B.

241



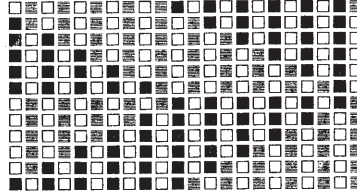
241B



Figures 242, 243, 244 and 245 illustrate a few more of this class of weaves.

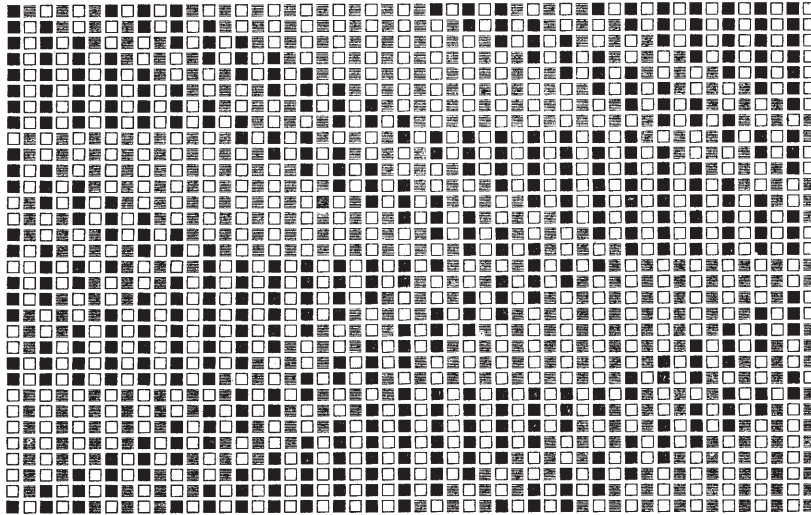
In figure 242 we have placed each group of increasing and decreasing floats in plain weave position.

242



In figure 243 we have placed each group of increasing and decreasing floats in a 4-harness sateen position for the foundation of the design, and have filled in the remaining spaces with twill lines.

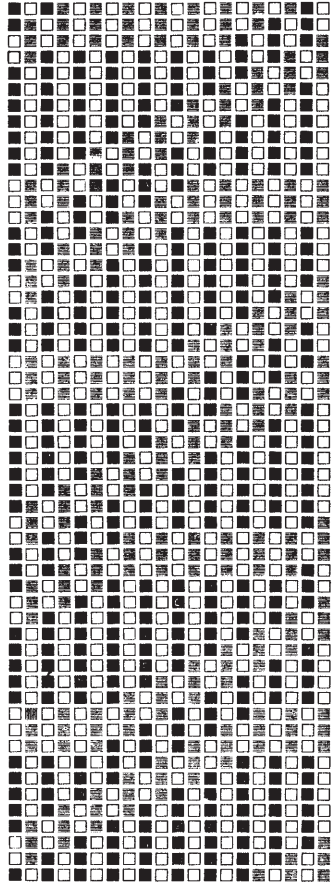
243



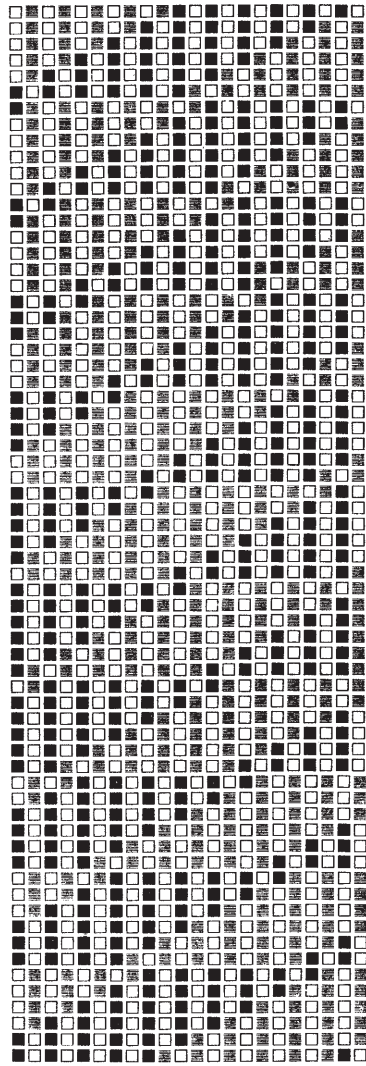
In figure 244 we have selected the 5-harness sateen position for the main object and then have filled in the remaining spaces with broken parts of regular and diagonal reps.

In figure 245 we have placed the groups in the position of a regular 11-harness diagonal.

244



245

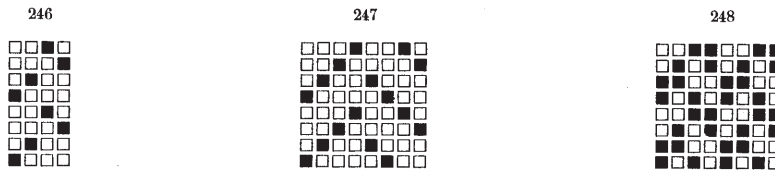


All of the foregoing rep weaves are particularly useful in producing mosaic effects on the cloth. We make the warp of two colors, one end light and one end dark; the groups then will have the same appearance in the fabric as is shown in the design by the use of the two different characters. Especially ornamental are designs 241B, 242, 243 and 244, worked out in the above manner.

Chevron, Cross or Herringbone Twills.

In this class of twills the twills run in opposite directions and meet at an angle of 90° . Examples of the simplest forms are illustrated in figures 246, 247 and 248. Figure 246 is a four-harness $\frac{1}{2}$ cross twill, also known as four-harness sateen. It may be well to state here that the opposite running twill must be placed and begin in the centre of the regular running twill. This design is carried out twice in height.

Figure 247 is constructed from the same twill as 246, but four ends are running in opposite directions; the design is also carried out twice in height. Figure 248 is designed from regular $\frac{2}{2}$ twill with two ends for each twill part. The design is carried out twice in width and height.



Figures 249, 250 and 251 are also designed from $\frac{2}{2}$ twill.

In figure 249 there are three ends each, in figure 250 four ends each, and in figure 251 eight ends each running in opposite directions.

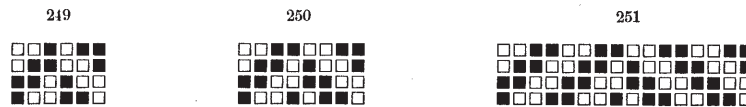


Figure 252 is constructed from $\frac{3}{3}$ twill with 12 ends running each way. Figure 253 is formed from 10-harness twill with four changes $\frac{3}{1} | \frac{1}{1} | \frac{1}{5}$ 10 ends each from left to right, and 10 ends from right to left.

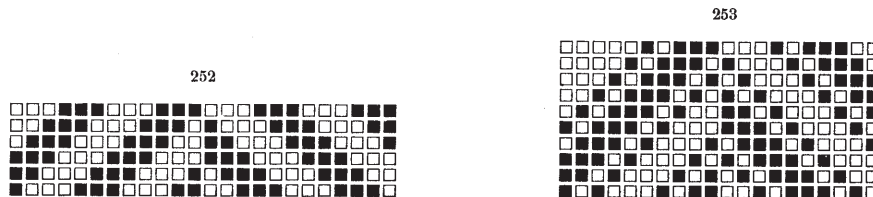


Figure 254 illustrates cross diagonal of 12 harnesses; the principal twill line floating over six, while the remaining space is filled in with smaller floats of warp and filling effects. Twelve ends from left to right and 12 ends from right to left.

254

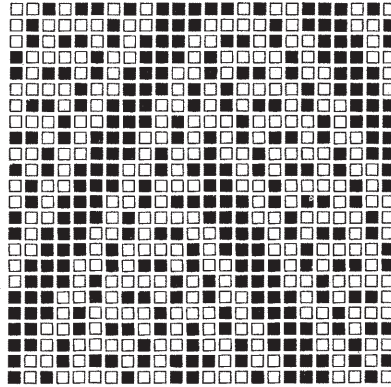
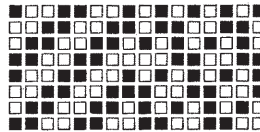


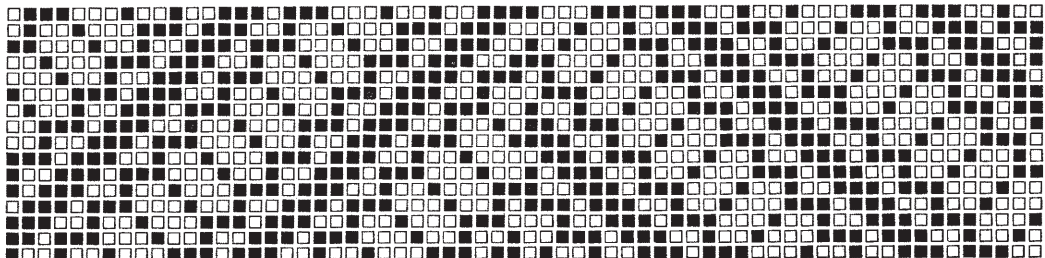
Figure 255 illustrates another idea of cross twills. In this design we have combined steep twill and regular twill. These designs, however, are very little used in practical work, therefore one of this class may be sufficient to explain the idea. Eight ends from left to right are regular $\frac{2}{1}$ twill, and 8 ends from right to left are steep twill. $\frac{3}{2}$ | $\frac{1}{1}$ | $\frac{1}{2}$

255



A special class of cross twills can be formed from fancy twills. The designs thus obtained are of great interest and study, especially for their beauty and endless numbers which can be worked out. For illustrations see Figures 256, 257, 258 and 259.

256



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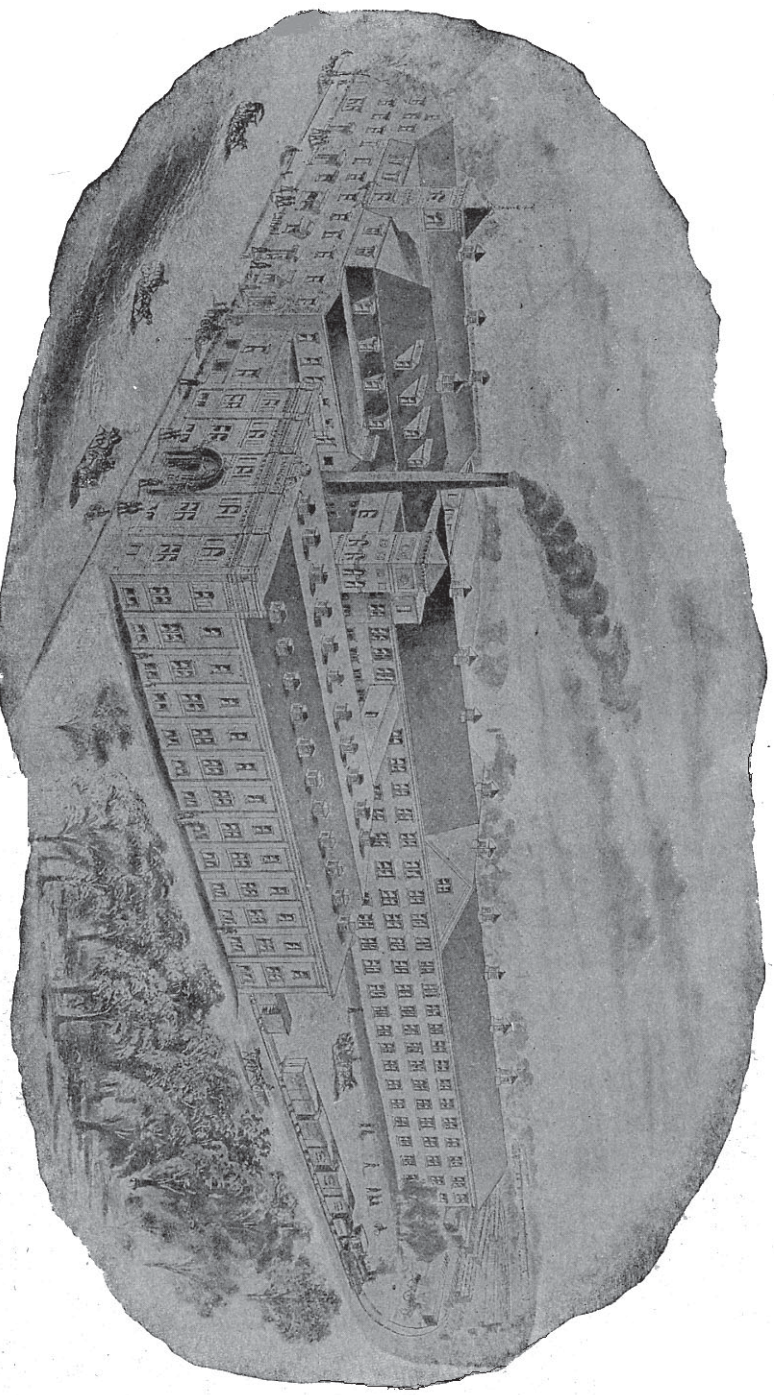
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