

Design and Construction of Narrow Woven Fabrics

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Designing Drop-Lay Patterns for Single Cloth Labels

The first step in laying out designs for drop-lay patterns is to determine, according to the proportion of ends to picks in the fabric, the proper point paper to use. Then, if the design is to be taken from a sketch that is a different size from the proposed label, the sketch should be marked off in rectangles corresponding as nearly as possible to the large squares on the point paper. The purpose of the rectangles is to facilitate the transfer of the design.

The length of the design, that is, the number

of picks required, is next determined and marked off on the paper and the design then traced in by free hand. If the sketch is the exact size of the proposed label the transfer may be made in exact proportions, according to measurements taken with a small pair of hair-spring dividers, and converted into the proper number of ends and picks by the use of a finely graduated scale. For instance: A proposed label is to be constructed of 112 ends, is to have 104 picks per inch, and to be $\frac{1}{2}$ " wide. The 112 ends for $\frac{1}{2}$ " equals 224 ends per inch. Therefore, the texture is 224 ends per inch and 104 picks per inch (requiring a point paper of 24 x 11, approx.). If a scale graduated to

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64ths of an inch is used this will mean that each 64th will equal 3.5 ends, or 1.625 picks. A block of figures measuring 1/8" each way would, therefore, require a space of 28 ends and 13 picks.

The use of a scale graduated to 100ths of an inch facilitates this part of the work, and where the sketch is natural size the hair-spring dividers may be dispensed with. These scales are made by the better manufacturers and are 6" long. For exactness the measurements may be taken under a pick glass.

In determining the number of picks to apportion to each of a number of letters in a line running warp-wise, first decide the required length of the line of letters in terms of picks in the woven label, and divide this number by the number of letters in the line. The result will be the total number of picks that may be assigned to each letter and the space between that letter and the next. (It is not necessary to make any allowance for space after the last letter in the line. The reason is obvious.)

Example: The space available or required for a certain group of letters is equal to 78 picks. The number of letters required to be placed in this space is 10. $78 \div 10 = 7.8$. This may be considered as 8 and used as a tentative figure for experimentation. If each letter is allotted 8 picks—6 picks for the letter proper and 2 picks for spacing—the 10 letters will require 60 picks, and the spaces between will require 18 picks (9 spaces between the 10 letter \times 2 picks per space). $60 + 18 = 78$ (the exact number of available picks) thus justifying the adoption of the tentative figure, 8.

The letter *I* usually requires many less picks (or ends) than any of the other letters; the capital letter *A* an additional pick or two, especially in the less expensive quality labels; and the letters *M* and *W* usually require several additional picks. Due allowances should be made when these letters are to be used. The height of the letters must be determined by measurement.

When the dimensions of the different portions have been decided upon the design may be blocked in with pencil; and after all alterations have been made may be painted over.

Green paint is usually employed for this part of the work. Where more than one figure shuttle is to be used the different picks or parts of picks must be represented on the point paper by a different color paint for each extra shuttle. No consideration of the ground weave is taken at this point. Any pencil marks that are not required may be removed by the use of an art gum eraser after the paint has dried.

Woven Face Down and Backwards

Drop-lay patterns for name labels are usually woven face down and backwards; i.e., the first (lower) portion of the design is woven last. Consequently the figure picks are numbered on the point paper from the top downwards, and the cards are cut and numbered accordingly.

The reason these patterns are woven face down is to reduce the strain on the Jacquard head, as often in the course of these designs all or nearly all of the ground ends would otherwise have to be raised at one time. Incidentally, there is less cutting to be done on the cards and, of course, less ends to be raised over the extra shuttle with a corresponding decrease in possible warp breakage.

Being woven face down, it is obvious that these fabrics must also be woven backwards. Otherwise the designs would necessarily have to be laid out backwards—an almost impossible task, especially when required in script.

Figure 1 illustrates a name label constructed with one warp and two fillings (a ground filling and an extra filling for figure) and woven on a drop-lay loom; Figure 2 shows the same label in the position in which it was woven—face down and backwards.

In drop-lay designs it is seldom necessary to paint in more than one repeat of the ground weave. This is usually shown in red paint, and is often placed below the figure part of the design and numbered from the bottom or lowest pick in the design upwards. A far better method, however, is to place the ground weave above the figured portion of the design and number the picks from the top downwards, as in the figured portion.

The ground weave in the majority of labels is plain weave. Second in order is the satins

of which the 5-harness is the most common. Occasionally a label is made using a twill weave.



Figure 1

Label Woven with One Warp and Two Fillings



Figure 2

Back of Figure 1 Position in which Label was Woven

Figure 3 shows a part of a design for a label such as is illustrated in Figures 1 and 2, with the ground weave, which is plain, placed above the figured portion.

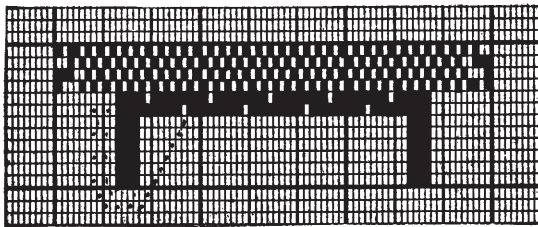


Figure 3
Part of Label Design

In designs such as is shown in Figure 3, and which are made with two shuttles, each of the picks in the portion in which the figure appears represents two picks (and Jacquard cards), one ground pick and one figure pick. When designed to use more than two shuttles, each pick in the design will represent one ground pick and as many extra filling picks (and cards) as there are different colors of paint appearing on that pick. A pick on which no figure appears represents only a ground pick (and card).

Should there be an uneven number of figure picks and no cut mark, or the cut mark consist of two or an even number of picks; or should there be an even number of figure picks and the cut mark consist of one or an uneven

number of picks (the total number of picks in either case being odd), then it will be necessary, on the type of loom on which this class of material is usually made, to insert a blank card either immediately after the ground card following the last figure or cut mark card, or immediately before the ground card preceding the first cut mark or figure card. This is to bring the shuttle carrying the extra filling over to the proper side of the tape or space in preparation for making the next figure.

The necessity for doing this is because, where two shuttles are being used, the drop-lay is usually operated by a ball and bush chain that is arranged one-and-one (i.e., lifts and drops the lay on alternate picks), and if the total number of extra filling picks is uneven the lay will drop down a pick earlier than it should and the wrong shuttle will enter the shed. In other words a ground shed will be formed but the pick will be inserted by the figure shuttle. If the loom is allowed to continue in this manner the result would be that every alternate label would be made with the fillings reversed. On the pick on which the blank card operates no interlacing takes place.

In portions of the label where the extra shuttle is not used, if amounting to only an occasional pick or so, a blank card may be substituted for each missing figure pick. Where several successive figure picks are missing, it is best to treat the space so formed in the same manner as the space between the successive labels and thus effect a small saving in picks.

When using rayon filling, and the space between the labels is rather long, it is usually advisable to insert the first pick of the cut mark in the same direction as the last preceding pick of the figure, and to have the first pick of the next figure interlace with the warp ends in the same direction as the last preceding pick of the cut mark. This means that a blank card will have to either succeed the last pick of the figure or precede the first pick of the cut mark, and either succeed the last pick of the cut mark or precede the first pick of the figure. In either case the total number of cut marks and figure picks must be made an even number.

Figure 4 is the reverse side of a label showing how the filling has been crossed both before and after forming the cut mark. If not so treated the rayon filling, on account of its more or less wiry nature, is apt to appear at either edge in the form of a loop, as shown in Figure 5.



Figure 4

Reverse Side of Label showing how Rayon Filling has been crossed



Figure 5

Rayon Filling shows as objectionable Loop at Edge

In cutting the cards for a fabric similar to that shown in Figures 1 and 2, first the figure cards are cut and set aside; then a sufficient number of repeats of the ground weave are cut so that the total number will equal the number of ground picks required for the label.

When cut the two different groups of cards are arranged alternately, usually one ground, one figure order, numbered 1, 01, 2, 02, 3, 03, etc., and then laced. Blank cards should always be treated as figure cards and so arranged in the set.

Control of Take-Up

In portions of the label or fabric where two shuttles are operating, it is evident that to afford time for the insertion of the extra picks the material must be drawn down over the breast beam rod at only one-half the speed that obtains throughout the unfigured portion of the fabric. To accomplish this the pawl

that operates the pick gear may be lifted to escape the teeth of the pick gear on every alternate pick throughout the figured portion, and be allowed to engage every tooth in the pick gear throughout the portion where there are no extra filling picks.

This action is usually controlled by the Jacquard cards. A cord is attached from the pawl at the pick gear to a hook on the side of the Jacquard head nearest the pick gear, and a hole corresponding to this hook is cut in every figure card and blank card throughout the set. As the cards may be used on either a left-hand or a right-hand head, and the required position of the holes vary accordingly, it is advisable to cut the card for either hook.

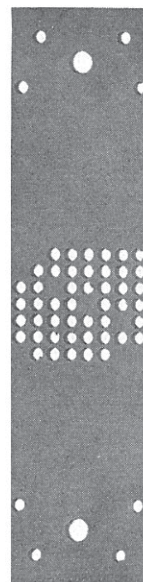


Figure 6

Figure Card for 208-Hook Head

Figure 6 represents a figure card for a 208-hook head cut from the design shown in Figure 3. The two holes at the top and the two holes at the bottom are lace holes; the large holes are peg holes; the hole below and to the left of the peg hole shown at the top, and the hole above and to the left of the peg hole shown at the bottom are the holes that operate, respectively, the first hook on the first row and the first hook on the 26th (last) row.

If the figure is to be continuous throughout the entire set of cards there will be no need of any card control. Compensation for the additional picks may be made by attaching the

in the design as *sinkers*. Note the stitching of the long extra filling pick in Figure 3.

Where the figure picks have been painted in solid the stitching points may be designated by removing (washing out) the paint from the different spaces, or by the application of either black or yellow paint over the green figure paint. If black paint is used proper instructions to the card-cutter should accompany the design; where yellow paint is used no instructions will be necessary as it is usually understood that yellow is always ignored, or rather considered as white.

When any part of the design consists of two or more successive picks of extra filling the stitching must be done in a certain manner (in relation to the ground weave) to present the best appearance in the finished product. If not properly done the first and last pick in the group, instead of being held closely to the adjacent picks, will be drawn away and will allow the ground texture to appear in the space so formed.

In designs planned to be woven face down, the sinkers representing the stitches in the first pick of a group of two or more picks of extra filling should always follow raisers of the ground weave. Lowering a warp end under the extra filling, immediately after it has been raised over the ground filling, tends to hold or bind this first pick of extra filling close to the other picks in the group.

Note the location of the stitches in the first extra filling pick in Figure 3. Although each sinker on this pick seems to be following a sinker of the ground weave, in reality it is following a raiser, because each pick in this portion of the design represents two picks, or two cards, and the arrangement being one-ground-one-figure, it follows that the ground card immediately preceding the first figure card is the same as the first ground pick. A study of Figure 9, which shows the actual arrangement of the cards for both ground picks and extra filling picks throughout the figured portion of the design, ought to make this point clear.

On the lower or last pick in a group of extra filling picks a sinker (stitching point) should always immediately precede a raiser of the ground weave. Lowering a warp end under

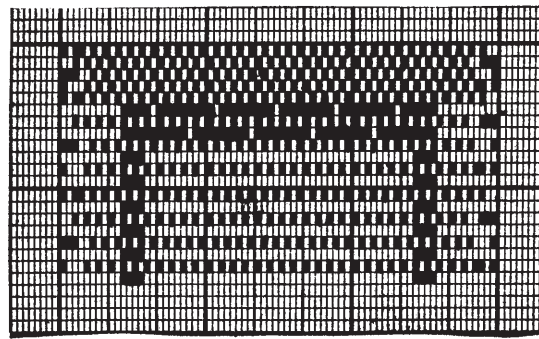


Figure 9
Arrangement of Cards for Both Ground Picks and Extra Filling

the extra filling, immediately before it is to be raised over a ground pick, has a tendency to hold this last figure pick close to the other picks of the group.



Figure 10
Cross-Section Illustrating one Effect of Stitching

Figure 10 is a cross-section illustrating how stitching in the manner explained above tends to hold the extra filling picks closely together. The solid circles represent the extra filling picks; the outlined circles the ground picks.

If the stitching points (sinkers) on the first



Figure 11
Cross-Section Illustrating another Effect of Stitching

of a group of extra filling picks follow sinkers of the ground weave, and the stitching points in the last of a group of two or more extra filling picks precede sinkers of the ground weave, the tendency of both these picks would be to draw away from the rest of the group, as illustrated in Figure 11. If desired, however, advantage may be taken of this tendency to round out those letters or figures which might otherwise be flat.

To determine the location of the possible stitching points in the lowest pick of a group of extra filling picks, the ground weave may be followed down on the point paper with a pen-oil, as shown by the small dots in Figure 3.

It seems to make little difference how the intervening picks of extra filling are stitched, but the custom is to follow the order of the first pick.

When using an extra filling of rayon it is usually not necessary to stitch at as close intervals as when using cotton. The rayon being more wiry than most other materials tends to hold more nearly to a straight line. On the other hand, Japan tram silk and Tsatlee tram silk, on account of their pliable nature, usually require additional stitching.

In instances where it is impossible to adjust the tension of the extra filling, so as to avoid pulling of the figure without causing loops to appear at either edge of the fabric, it may be advisable to catch the extra filling at either edge. This is usually accomplished by interlacing the extra filling with a back end of the edge warp (a face end on a face-down design) at either side, on alternate picks, as illustrated in Figure 13. Figure 14 shows the obverse and reverse sides of a label so treated.



Figure 12
Labels Using one Extra Shuttle on Plain Weave Ground

Figure 12 shows a representative group of labels using one extra shuttle on a plain weave ground. The warp yarn in labels of the type shown usually ranges from 50/1 to 100/1 or from 100/2 to 150/2. The ground filling ranges about the same. Picks vary from 96 to 120, with an occasional 128 or 132. The extra (figure) filling may be cotton, mercerized, Japan tram silk, Tsatlee tram silk, spun silk, or rayon.

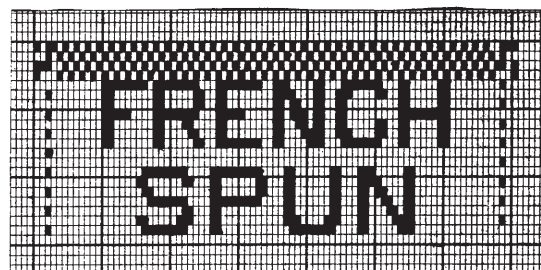


Figure 13
Extra Filling Caught at Edges

Extra Warp for Figure

Figure 15 illustrates a three-color label made with but two shuttles—the third color being made by the use of an extra warp for figure.

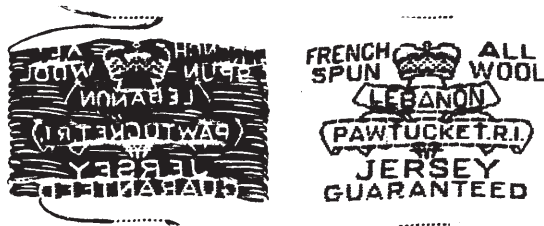


Figure 14
Back and Face of Label with Extra Filling Caught at Edges



Figure 15
Three-Color Label made with Two Shuttles

The ground texture is white; the words "Guaranteed Fast Color" are blue; the balance of the figure is Turkey-red.

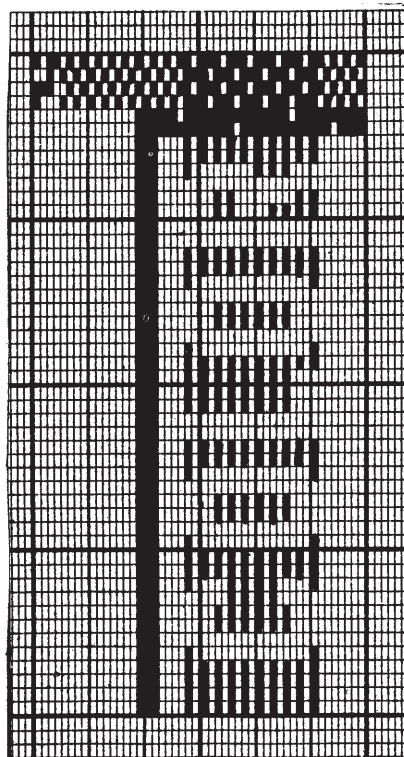


Figure 16
Method of Including an Extra Warp for Figure

Figure 16 shows enough of a design to illustrate the method of incorporating an extra warp for figure. When the ground weave is being laid out, the proper spaces are allowed for the extra warp ends; and when the letters or figure for which the extra warp ends are intended are penciled in, allowance must be made for the intervening ground warp ends. On account of the ground ends the height of the letters formed by the extra warp will appear in the design twice their proportional height.

When painting in the extra warp ends the *penciled portions are avoided*; only spaces between are painted. This procedure raises the extra warp ends over all the ground picks excepting where they are to appear on the face as figure. When cutting the figure cards the raisers of the extra warp ends are ignored, but they must be cut on the ground weave cards. For this reason every ground weave card throughout the figure portion of the design must be considered individually. To facilitate this part of the work the extra warp ends may be designated by a color of paint different from either the ground weave or the extra filling figure; blue paint is suitable.



Figure 17
All-Rayon Label;
5-Harness Satin Weave

Figure 17 illustrates a label constructed wholly of rayon. The weave is the 5-harness satin, two picks in each shed. There is an extra filling for figure.

Figure 18 shows a part of the design for the label at Figure 17. In each instance where two successive picks of extra filling appear they are stitched down with the same warp end and

by a single float. By stitching down the two figure picks in this manner, the tendency with this weave is to draw the two picks together—an effect that is desired where comparatively heavy rayon yarn (300 denier in this case) is used for the extra filling. The fabric is designed to be woven face down.

Note that the warp ends are lowered under the figure picks at points that do not immediately precede or succeed raisers of the warp. The object here is to avoid, so far as possible, the points where the warp ends have either just been returned from the back to the face of the fabric, or are about to change from the face to the back. In the first instance the long extra pick would appear to be pulled in a downward curve; and in the second instance it would appear to curve upwards.

In Figure 18 the ground weave repeats on 40 picks—this number being the least common multiple of 10 (5-harness satin, two picks in a shed) and 8 (the number of picks on which the 2-2 warp-rib tubular edge weave repeats).

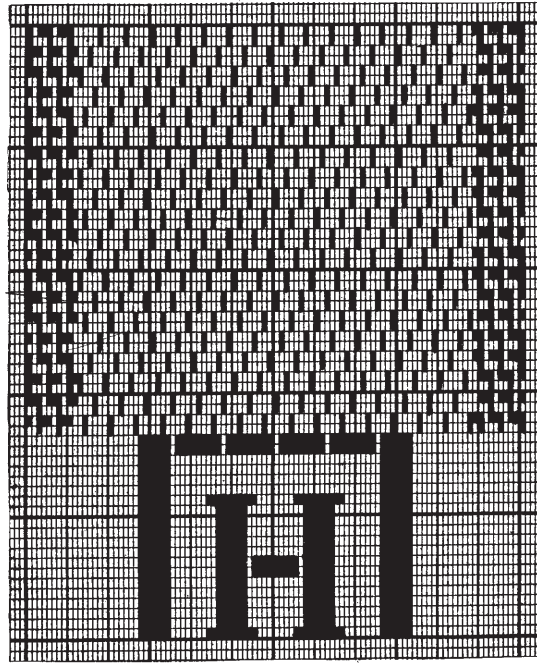


Figure 18
Part of Design for Figure 17