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## FIGURING WITH DOUBLE PLAIN REVERSIBLES.

### Harness and Jacquard Work.

WITH SPECIAL DETAILS HOW TO CUT THE JACQUARD CARDS FOR TWO SECTION AND FOR STRAIGHT THROUGH TIE-UPS; ALSO FOR 3-PLY STRUCTURES.

This system of fabric structure is met with in the manufacture of bedspreads, quilts, draperies, uphol-

latter instance also full details of "how to cut the cards."

Fig. 1 shows us, on point paper, a design for harness loom work, a dot distributed by the plain setting. The repeat of this design calls for 18 squares each way, which, since it refers to a double cloth structure, calls for  $(18 \times 2 =)$  36 warp threads and 36 picks for the repeat of the weave. Each row of squares in the design, considered in a vertical direction, stands for two threads and in the same way each horizontal row of squares for two picks.

Fig. 2 shows the plan how warp and filling interlace with each other in the fabric structure. Different characters of type have been used in building up this weave-plan so as to simplify matters to the reader.

On top and at the left of this plan the two systems of warp and filling are indicated respectively by *full* and *dot* type.

*Full* type in weave-plan Fig. 2 equals *full* type, *i. e.*, figure up, in design Fig. 1.

*Dot* type in weave-plan Fig. 2 equals *empty* type, *i. e.*, ground up, in design Fig. 1.

### Rule for Constructing the Double Cloth Weave.

(1). Insert the four harness  $\frac{1}{3}$  twill all over the weave-plan (see *cross* type); start this weave on a

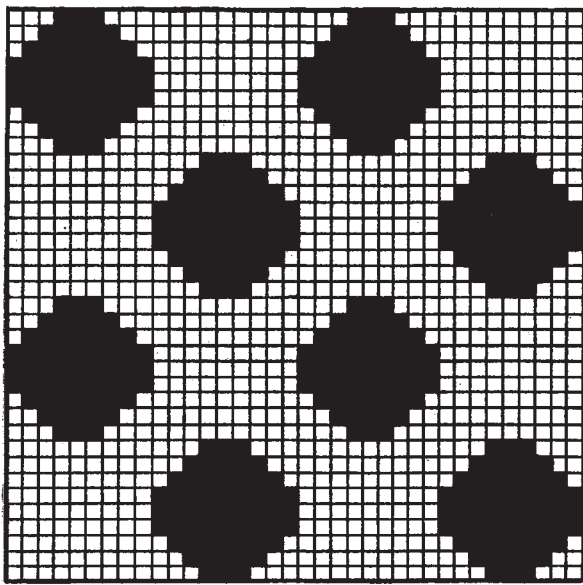


Fig. 1

stery goods, trimmings, labels, etc., and has for its object to exchange 2 or 3 plain weave single cloth structures after a given design; cutting, in connection with Jacquard work, the cards afterwards direct from the design on a *Royle* Repeater and one of their *Piano* Card Stampers provided the mill has a Repeater, otherwise the cards will have to be cut entirely by the Card Stamper.

### 2-Ply Fabric Structures.

In the same, two single cloth structures, interlaced with the plain weave, are exchanged after a given design. One of these single cloth structures forms the ground, the other the figure, the affair being the reverse on face and back, the structure (color) that forms ground on the face of the fabric forming figure on the back of the fabric and vice versa, the structure that forms figure on the face of the fabric forming ground on the back of the same. The more often this exchanging of ground and figure is made use of in a given amount of fabric structure, the stronger the resultant fabric, this being the only stitching of the two fabric structures. Ground and figure will appear in its own, distinct, color on either side of the fabric.

We will explain the subject of how to prepare the design and how the fabric structure interlaces, with a harness and a Jacquard design, giving in the

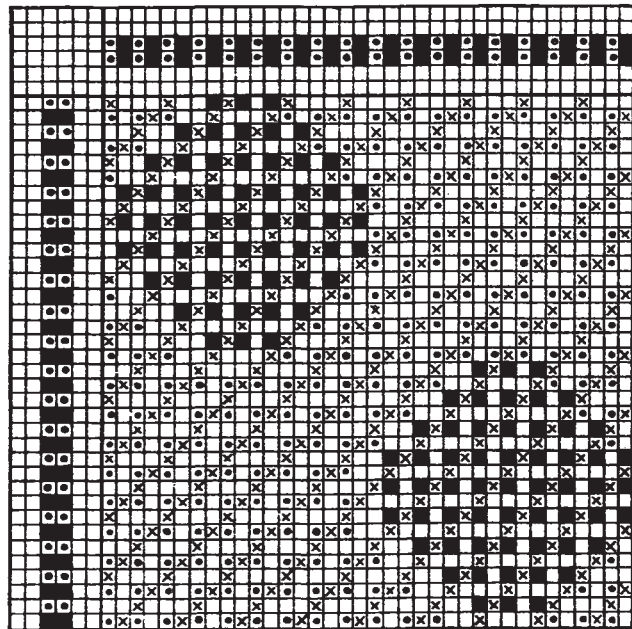


Fig. 2

square calling for the same system of warp and filling. By this we mean that we can start this twill in connection with our weave-plan, on the first pick.

either with warp thread 2, 4, 6 or 8. We used warp thread 2, or the first of our possible chances for starting the twill.

(2). Transfer ground effect (*empty* type) from design Fig. 1 upon weave-plan Fig. 2, taking only the ground warp threads in the latter (every uneven number of warp thread in the weave-plan) into consideration (see *dot* type). Draft in this way every horizontal row of squares in your design, successively taken, onto every other pick of your weave-plan (see every uneven number pick).

(3). Transfer figure effect (*full* squares) from design Fig. 1 upon weave-plan Fig. 2, taking in this instance only the figure warp threads in the latter (every even number of warp thread in the weave-plan) into consideration (see *full* squares). Draft in this way every horizontal row of squares in your design, successively taken, onto every other pick of your weave-plan not considered in rule 2 (see every even number pick).

Rules 2 and 3 can be reversed, *i. e.*, draft figure effect first and then ground effect, without changing result of weave-plan in the fabric.

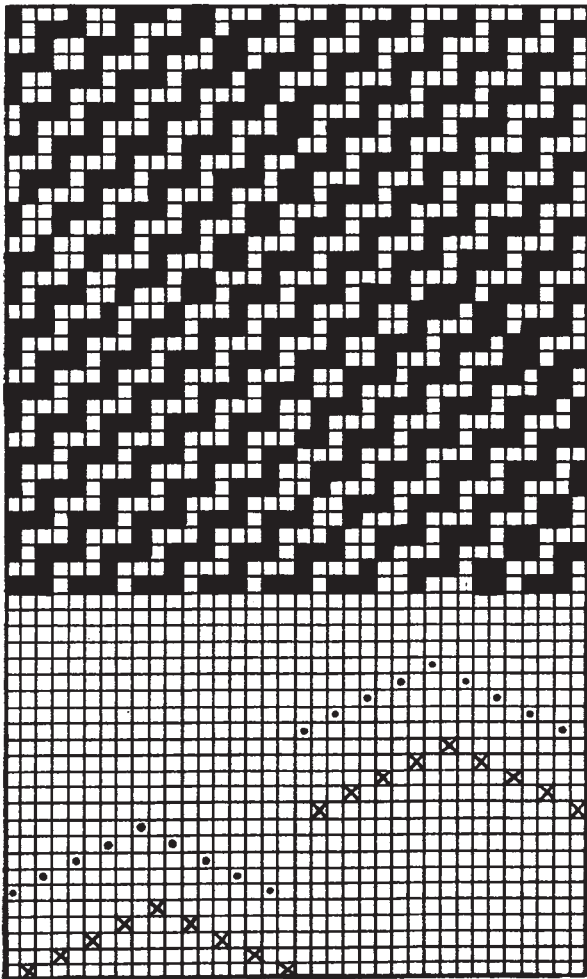


Fig. 3

Fig. 3 shows the weave-plan Fig. 2 in one kind (*full*) type; the repeat, 36 warp threads and 36 picks, by means of "double point section draw" given below the weave, calling for 20 harnesses on the loom.

Jacquard Designs.

The principle of designing these double cloth reversible structures, as previously explained in con-

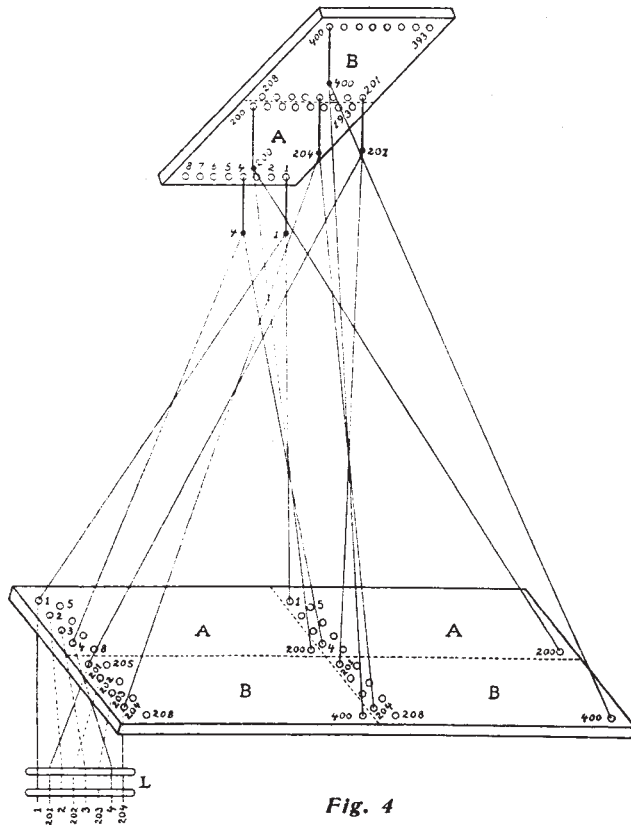


Fig. 4

nection with harness work, also finds use with Jacquard work. Two systems of tie-ups are available for this purpose, viz:

- (a) the two section tie-up.
- (b) the common straight through tie-up.

THE TWO SECTION TIE-UP.

Fig. 4 shows the plan for this method of tie-up for a 400 Jacquard machine (no notice of reserve row is taken). The principle of threading observed in either section is straight through. From the diagram, it will be seen that the machine and the comberboard are divided into two even parts, marked in both instances *A* and *B*, respectively.

In the rear section *A* of the comberboard we threaded, on a straight through tie-up, the harness cords as operated by neck cords, protruding from section *A* of the bottom board of the Jacquard machine. In a similar way the front section *B* of the comberboard carries on a straight through tie-up, the harness cords as operated by the neck cords, protruding from section *B* of the bottom board of the Jacquard machine.

The Jacquard machine used for explaining subject is a 400 machine, with 200 needles, hooks and neck cords for each section, using

- needles, etc. 1-200 for section *A*,
- needles, etc. 201-400 for section *B*.

Only the first and the last row of each section of the bottom board of the Jacquard machine are indicated in diagram Fig. 4, so as not to bewilder the

reader with too many numerals, etc., in the illustration. The simpler these tie-ups presented, the easier they are understood.

The comberboard is shown (for example) arranged for 2 divisions, explaining at the same time any number of divisions that may be called for, to suit texture and width of a fabric under consideration.

The threading of each division of the comberboard will start on its first row deep with harness cords from leashes 1, 2, 3 and 4 for section *A* and 201, 202, 203 and 204 for section *B*, followed on the second row deep with harness cords from leashes 5, 6, 7 and 8 for section *A* and 205, 206, 207 and 208 for section *B*, until ending the tying up of the harness on the fiftieth row deep of the comberboard with harness cords from leashes 197, 198, 199 and 200 for section *A* and 397, 398, 399 and 400 for section *B*.

To simplify illustration to the reader, only such harness cords are shown threaded in the comberboard as are required to guide in understanding subject, viz: first and last harness cords for first row of each section (1, 4, 201 and 204) and the last harness cord of the last row (50th) for each section (200 and 400).

The leasing of the harness cords for the purpose of drawing-in the warp is always done by alternately threading one thread from section *A* and that of section *B*, as shown in diagram at *L*, below the comberboard.

Section *A* may refer to either figure or ground effect, section *B* in either instance calling for its mate effect.

Fig. 5 shows, for example, a portion of a design (80 by 80 lines) intended to be produced in double plain reversible, to be made on a loom tied up by plan Fig. 4. Allowing two warp threads and two picks in the fabric (one for each ply) respectively for each vertical and horizontal row of squares of the design on the point paper, and considering our 400 machine with section *A* to be figure effect and section *B* ground effect, the stamping of the cards will be thus:

The plain weave for each half card may be cut ahead on a repeater in quantities and when the card stamper then only has to cut the remaining half card, *i. e.*, the design only.

Making in this manner an analysis of the fabric so as to show interlacing of threads (as rest in the 2-ply structure, one above the other) side by side, for

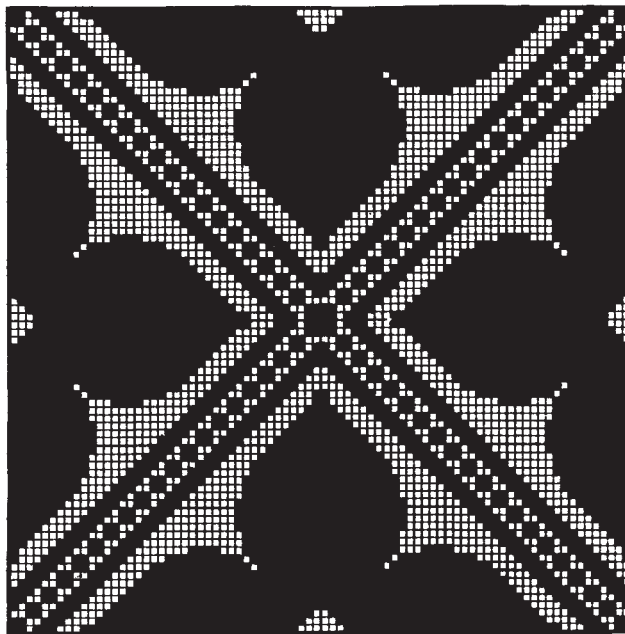


Fig. 5

both warp and filling, results in diagram, *i. e.*, fabric analysis Fig. 6, representing the 80 warp lines (160 warp threads) of said design with its first 16 filling lines (32 picks).

Black type in Fig. 6=black type in Fig. 5.

Dot type in Fig. 6=empty type in Fig. 5.

Cross type in Fig. 6 is the plain weave for the two plies of fabric structure.

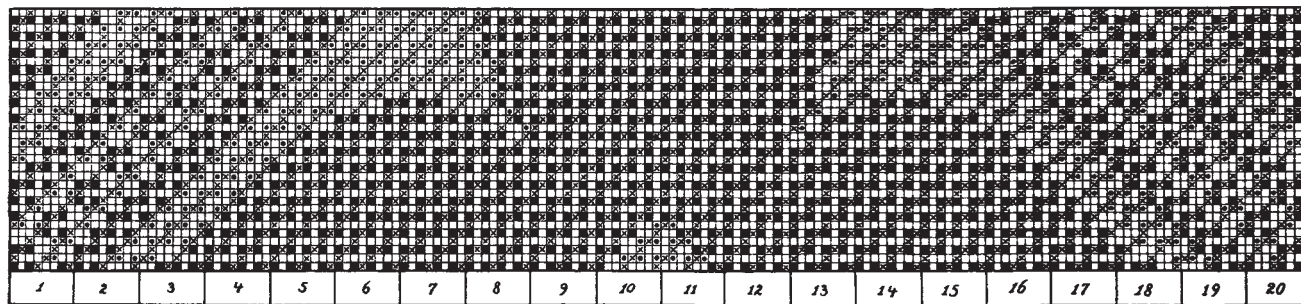


Fig. 6

1<sup>a</sup> cut black for section *A*; cut plain weave  $\perp$  for section *B* (insert ground pick).

1<sup>b</sup> cut plain weave  $\perp$  for section *A*; cut white for section *B* (insert figure pick).

2<sup>a</sup> cut black for section *A*; cut plain weave  $\perp$  for section *B* (insert ground pick).

2<sup>b</sup> cut plain weave  $\perp$  for section *A*; cut white for section *B* (insert figure pick).

Fig. 7 shows a perspective view of the machine for stamping the Jacquard cards; the well known Royle Piano Power Card Stamper.

THE PLAIN OR SINGLE SECTION TIE-UP.

Fig. 8 shows us the most approved arrangement of this tie-up, known as the English system, applied to a 400 Jacquard machine with 2 divisions (for example—more may be used without changing the prin-

inciple of the tie-up) in the comberboard. In the same the Jacquard machine is adjusted on the loom so as to have its cylinder placed parallel with the comberboard (see Fig. 4 where the arrangement is crosswise, *i. e.*, at 90 deg.) or what means the same, running in the direction of the width of the fabric in the loom. The eight hooks of one cross-row (one hook from each of the 8 griffe bars of the Jacquard machine) runs in the direction from the cloth beam towards the warp beam. Having the same number of rows in depth in the comberboard as there are griffe bars, one may readily see the advantages of this tie-up.

The first row in depth of the comberboard contains harness cords from neck cords 1, 2, 3, 4, 5, 6, 7 and 8.

The second row deep of the comberboard contains harness cords from neck cords 9, 10, 11, 12, 13, 14, 15 and 16, finishing each division on the last row (50th) with harness cords from neck cords 393, 394, 395, 396, 397, 398, 399 and 400. No notice is taken of any reserve row in this diagram, the same being optional.

If dealing with a 600 Jacquard machine, with 12 rows, the comberboard will also have 12 rows. The first row of the comberboard then receives the harness cords 1 to 12 inclusive, the second 13 to 24 inclusive and so on, finishing in turn the last row (50th) of the comberboard with harness cords connected to neck cords 589 to 600 inclusive respectively.

Often times a manufacturer, who has the Jacquard harnesses of his looms tied up with these plain or single section tie-ups (making single cloth fabrics) may labor under the impression of not being able to weave double plain reversibles, thinking that to do this he would have

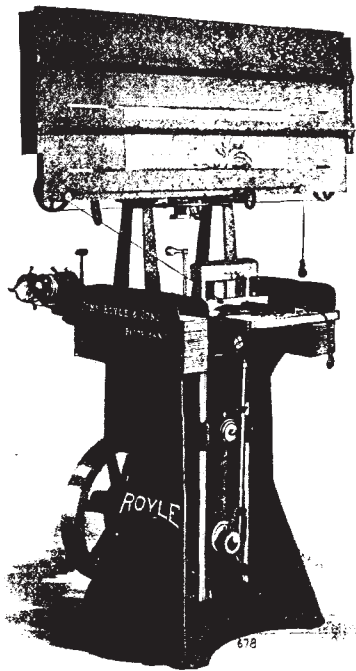


Fig. 7

to go to the heavy expense of cutting his Jacquard harnesses down or what would be just as bad, think that an analysis of the 2-ply reversible fabric structure is required for cutting the cards.

A study of this article will convince him that his tie-up is equal to the two section tie-up, in fact some mills prefer this mode of tying up the Jacquard har-

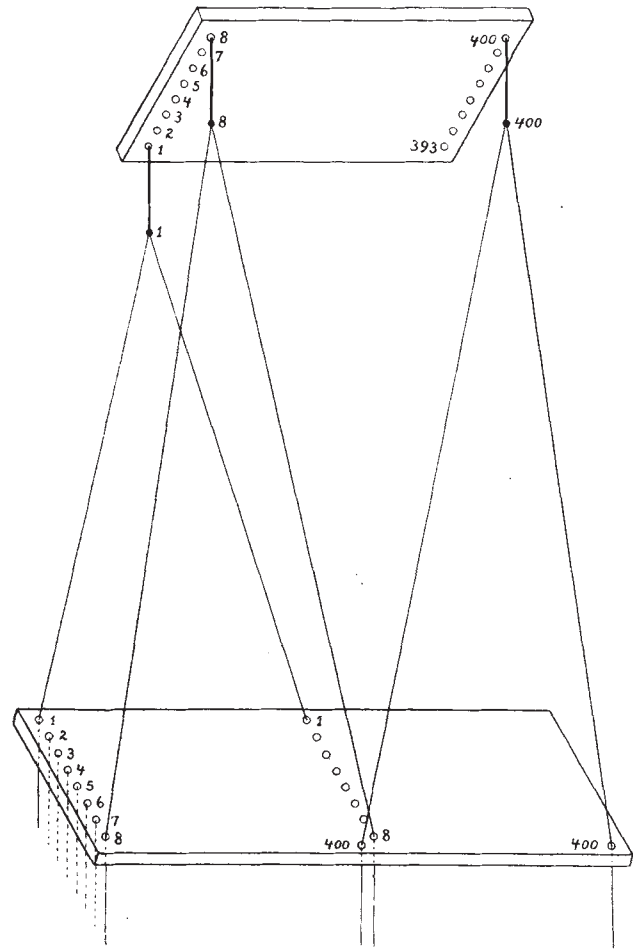


Fig. 8

ness and its special method of cutting the cards, the latter being cut directly from the design (Fig. 5) no fabric analysis being required.

#### HOW TO CUT THE CARDS FOR A SINGLE SECTION TIE-UP.

This subject will bring us for a moment back to fabric analysis Fig. 6, *i. e.*, explain its formation from design Fig. 5, which represents, for example, a portion of a Jacquard design, to be produced on double plain reversible, on a straight through single section tie-up, 400 machine, 8 row deep.

80 warp threads are represented in the design and which call for  $(80 \times 2 =)$  160 warp threads in the fabric structure. *i. e.*, needles, hooks and harness cords in the loom of the 400 machine previously referred to.

Fig. 6 shows us the fabric analysis, *i. e.*, the actual interlacing of warp and filling, showing 160 warp threads and 32 picks, constructed thus:

(1) Insert  $\frac{1}{3}$  4-harness twill, see *cross* type, started in this instance  $\frac{1}{3}$ .

(2) Insert figure effect of design, considering only the uneven number of warp threads and this on the uneven number of picks (see *black* type).

(3) Insert ground effect of design, considering only the even number of warp threads, and this in

connection with the even number of picks (see *dot type*).

The card stamping, as previously mentioned, is done direct from the design (Fig. 5), based on explanations given in connection with the fabric analysis previously explained.

Fig. 9 explains the subject of how the cards are cut directly from the design, showing the stamping of a portion of the first four cards, representing a portion of the first four picks of our fabric analysis, *i. e.*, a portion of stamping from the first two lines of design Fig. 5. The cards are shown in two stages, *viz*:

*A* shows the stamping of the double plain principle, *minus* raising face warp on every back pick, or as we have called it previously (to simplify matters to the readers) shows the  $\frac{3}{1}$  4-harness twill. This cutting is repeated on every four cards in the set.

In practical work the cards are numbered 1<sup>a</sup>, 1<sup>b</sup>, 2<sup>a</sup>, 2<sup>b</sup>, 3<sup>a</sup>, 3<sup>b</sup>, etc., indicating by these numerals the respective lines on the design they refer to.

Letter of reference *a* indicates, in the present example, *cut figure, i. e., cut black type*, or as the designer would get it *cut red*; letter of reference *b* indicates *cut ground, i. e., cut empty type*, or *cut white* as we give it to the card stamper.

The cards are cut with reference to the 4-harness twill, in changes of four, on the *Royle Repeater, i. e.*, prepared for the designer in quantities; if no repeater is at his disposal he has to stamp this weave on the cards previous to stamping the design.

Jacquard cards are stamped, *i. e.*, to be read from right to left, row for row, and which means to the reader to read cards in illustration downwards. In the repeat of the 4-harness twill, *i. e.*, 4 threads,

Card 1 reads: 3 down 1 up, *i. e.*, miss 3, cut 1;  
 Card 2 reads: 1 up 3 down, *i. e.*, cut 1, miss 3;  
 Card 3 reads: 1 down 1 up 2 down, *i. e.*, miss 1, cut 1, miss 2;  
 Card 4 reads: 2 down 1 up 1 down, *i. e.*, miss 2, cut 1, miss 1.

It will be readily understood that in connection with cards 3 and 4, the miss 1 and miss 2, as join in either instance, equal the miss 3 of the repeat of the 4-harness twill.

Having prepared the necessary amount of cards (*i. e.*, the 4-harness twill cut into them) on the repeater, or first on the piano card stamper, the actual card stamping now takes place, and which is (side by side for each card) shown at *B* by means of a portion of the completely cut cards. In the same

*Cross* in circles show the cutting of the 4-harness twill.

*Black* circles show the stamping of the design; both cuttings being easily traced to the fabric analysis.

After having cut the 4-harness twill into the required number of cards needed for the design, and which must be a multiple of four (4), then in connection with

Card 1<sup>a</sup>: cut figure; cut 1st line *black* from design;  
 Card 1<sup>b</sup>: cut ground; cut 1st line *empty* from design;  
 Card 2<sup>a</sup>: cut figure; cut 2nd line *black* from design;  
 Card 2<sup>b</sup>: cut ground; cut 2nd line *empty* from design.

and keep on this way until the complete repeat at the design is cut. *Black* in our illustration means red for the card cutter.

To simplify matters for the reader, we have shown the fabric analysis Fig. 6, ruled off, below, indicating the corresponding rows on the Jacquard card, the first

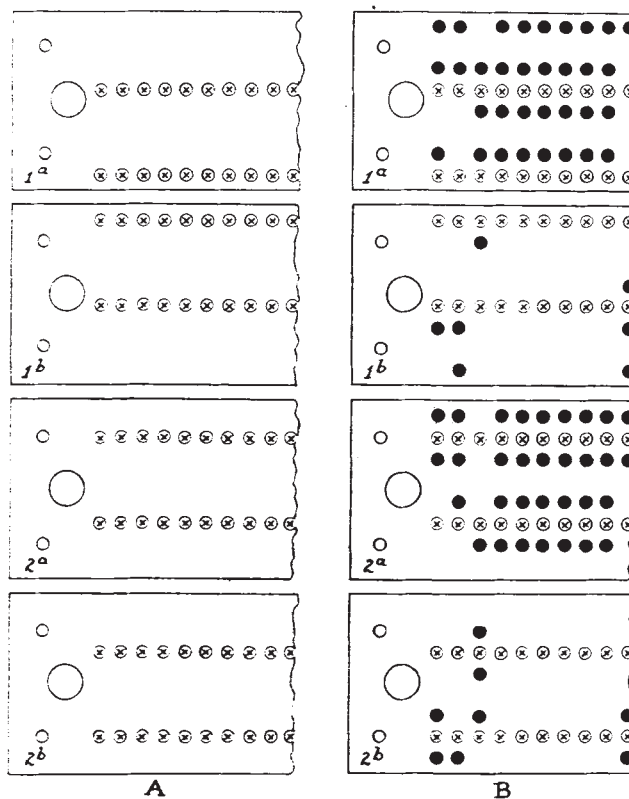


Fig. 9

20 rows being shown in the analysis. 9 complete rows and one broken row are shown on each card (*B* Fig. 9).

(To be continued.)

**RIBBONS, TRIMMINGS, EDGINGS, ETC.**

(Continued from page 4, July issue.)

**Three Systems Warp and Three Systems Filling.**

Fig. 175 shows us a portion of a point paper design and Fig. 176 a portion of its analysis, *i. e.*, plan necessary to be prepared, to in turn, either cut from it the cards or build the harness chain for the dobbie.

Fig. 175 has been prepared to illustrate figuring with two extra systems of warp and two extra systems of filling, upon a fabric interlaced with a ground warp and a ground filling.

1st Figure warp is shown by type *shaded* from right to left ( );

2nd Figure warp is shown type *shaded* from left to right ( );

1st Figure filling is shown by *full* type;

2nd Figure filling is shown by *cross* type.

The design is prepared by painting (showing effect wanted) all the different figure picks to be inserted between two ground picks, on one horizontal row of squares of the design. In the same way paint all figure warp threads as resting between two ground warp threads, upon its respective vertical row of squares.

Analysis, Fig. 176, illustrates the method of interlacing of the 16 lines indicated by the bracket, shown