Special Mechanism for Ornamentation of Fabrics

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A new method of lifting panel has been developed for minimizing the length produce patches, arranged at required intervals. The arrangement consists of a wooden disc of predetermined size, a microswitch (roller type) and electrical solenoid which lifts the dobby pawl and facilitates in reducing the length of dobby lattice.

Textile designers have to constantly innovate in order to keep pace with the requirements imposed by fast changes in fashion and style. In the present work, an attempt has been made to develop patches on a plain woven cloth using the basic principle of double cloths, where two series of warp threads are taken along with two series of weft threads. After a certain plain length of fabric had been woven a patch was developed with the help of extra weft threads. After weaving, the floating ends and picks were cut; this gave the appearance of extra patch which may otherwise appear on a poor man's shirt.

The extra warp ends or patch ends were taken in groups through a second beam and were put over the ground ends so as to maintain the same density level of warp. At the time of weaving, two picks of patch and ground weave were woven alternately, the patch pick being interlaced with patch ends only and floating over ground ends. Also, during the insertion of ground pick all patch ends were raised up. After the patch weave had been completed, the patch ends went up, so that the ground plain weave was woven for a length of 5 or 6 in (according to picks per in). Since these 5 or 6 in of length required plain weave with patch ends floating over, it was possible to weave this length with one lag only, thus reducing a long dobby lattice. The mechanism developed to produce such fabrics with this method is described.

Materials and Methods

A two-fold polyester/viscose/cotton (75:15:10) yarn (nominal count, 2/60's) was used for both warp and weft.

Drawing-in and sleying-in—The warps were drawn by hand. Eight heald shafts were used. Through the first four heald shafts, ground warp threads were drawn with straight draft of the order of 1-2-3-4. The next two heald shafts, i.e. 5th and 6th, were used for binding threads with the straight drafts of the order of 5-6. The last two heald shafts, i.e. 7th and 8th, were used for extra ends with plain draft. Wherever the extra ends were occurring, the arrangement of ground and extra ends was 1:1. Thus, the first four heald shafts were used for plain ground weave, the next two for binding extra and ground ends and the last two for developing the patch in the fabric.

During the experiments, several changes of warp sett were required and re-sleying for these various setts was done in the loom. The order of sleying was 2 ends per dent through 80's reed for ground and binding ends. Wherever the extra ends were occurring, the order of sleying was 4 ends per dent.

For the achievement of plain effect, the take-up pawl was lifted according to the peg plan shown in Fig. 1. However, the drop box pegging was not made in this case. For obtaining the drop box check effect, the peg plan was used as a whole. The photographs of the finally ornamented plain and check fabric are shown in Figs 2 and 3 respectively.

Beam gaiting—The ground beam was placed on the brackets at the rear end of the loom and tension on the...
beam was controlled with the help of chain, lever and weight with negative let off. The top beam was mounted on two brackets fitted on the rear side of the loom wall and tension was applied with the help of chain and weight.

Modification in take-up motion—Take-up motion was kept idle while inserting the picks for extra warp or patch. The take-up pawl was lifted up by a dobby jack. The pawl was tied by a cord through pulleys to the tenth jack of dobby.

Dobby pawl lifting arrangement—The fabric design required a repeat on 5512 ends and 416 picks. For such a long repeat, constant attention was necessary during the setting up of the warp-way and weft-way arrangements. As far as warp-way arrangement was concerned, there was no problem in setting the warp threads by keeping a careful eye on drawing-in and reaching-in operations. But the main difficulty was with repeat of 416 picks occurring weft-way. Of these, only 106 picks required a different lifting arrangement and the rest 310 required plain order interlacements, except the patch ends which were to float over 310 picks. It is obvious that these 310 picks were to be operated by dobby design selecting lags, since each lag governs two picks. It was necessary to cut down the number of lags in dobby to reduce the load on dobby pawl and also to cut down the time to make lattice.

For weaving a plain cloth with dobby, no pattern is required; simply a lag with pegs for two picks is put. By raising the pawl with the help of some cord, it is possible to weave plain cloth with one lag only. The same principle is applied in producing fancy fabric, but in this case the pawl is lifted up by an electric magnetic solenoid. The solenoid lifts the pawl at the time when a particular lag, i.e., the lag which puts the ground ends for plain weave and patch ends to float, is under the feelers. This process continues for 310 picks and again the solenoid releases the pawl and the pawl by its own weight falls on to the retchet wheel and another patch starts.

Description and working of pawl lifting arrangement—The crankshaft was extended by 12 in and a double worm was put on to it, as shown in Fig. 4. This worm was made to mesh with a 104 teeth wheel A. On the shaft of wheel A another wheel B of 15 teeth was fixed. Wheel B meshed with another wheel C of 120 teeth. The number of teeth of gears is such that the ratio of crankshaft revolution per minute and wheel C revolution per minute is given by the relation

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\frac{\text{Revolution per min of wheel C}}{\text{Revolution of crankshaft per min}} = \frac{\text{double worm} \times B}{A \times C} = \frac{1}{416}
\]

Hence, for 416 picks, wheel C rotates once. Now if a circular disc is fixed on the same shaft, it will also rotate once for complete repeat and from the periphery of this disc the individual pick to be inserted can be governed. Considering a movement of 0.5 × 416 = 208 cm, a circumference was prepared from wood. The wooden disc was fixed on the shaft of wheel C. A suitable microswitch (roller type) was selected and put in contact with the disc. The working of the microswitch was such that when its roller moving on the disc periphery was pressed, the electrical circuit through it was disconnected. This switch was put in contact with the disc periphery and connections were

![Fig. 4—Pawl lifting mechanism (A, worm wheel (104 T); B, wheel (15 T); C, wheel (120 T); D, disc (208 cm); S, crankshaft; W, double worm; and M, microswitch (roller type))](image-url)
extended to the electrical solenoid through ac mains; the switch was placed over the driving pawl. To start the dobby working or to press the switch roller, a metallic strip was placed over the periphery in an arc. The length of the strip governed the number of picks to be inserted by dobby. In the present work, 106 picks were to be operated by dobby and, therefore, a strip of $106 \times 0.5 = 53$ cm was placed over the circular disc periphery.

A periphery of 208 cm governed 416 picks. Of these, 106 picks, corresponding to 53 cm length, are projected by some metallic strip. During normal running, the last lag of the lattice is put under the feeler, so that all the ends (excluding patch ends) are working in plain order. The patch ends remain up until the roller rides over the projected part of the disc and the pawl drops down and patch formation starts. The adjustment is made in such a way that the last patch pick inserted in the projected length ends and the roller of the switch again rolls down. By that time the last lag of repeat again comes under feelers and plain weave starts.

Development of check effect—The check effect was also developed using the drop box. Drop box is required only when patch is being formed. Therefore, the drop box can be well governed by selecting a jack of dobby which in lifting may cause a strip to come in the way of drop box finger and change the shuttle box when required. This would virtually eliminate the necessity of having a drop box chain.

**Weft pattern**—For ground warp, always blue weft was introduced, but for patch, the pattern used is given below:

4 - White
4 - Blue
4 - White

$\times 5$

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**References**