Bolivia Cloth: Analysis of Weave and Finish

A MONG several special fabrics, which are at the present time attracting attention, "Bolivia" cloth is a leader. It is an ideal of the construction and manufacture of this cloth is given in the following analysis of a fabric re- tailing at $2.50 to $7 per yard, 6/4 width.

In appearance, the fabric resembles chilchilla, but whereas the latter is a woolen cloth with soft, rich, if somewhat dull finish, Bolivia is a worsted fabric, with a lively handle and bright lustre. Indeed, in the finished goods it will last much longer. The sample before us weighs 15½ ounces per yard, on a basis of 37 5/8 inches width.

**Warp Particulars**

The warp contains 47 to 48 ends to the yard and is finished cloth, which gives a total of 2,772 ends in the full warp. The count of the yarn is 2/60s, and our judgment was made on the Bradford system. It seems superfluous to advise the use of a first-class worsted yarn for the best results. One of the three yarns, one was of outstanding excellence with correspondingly good results in weaving, we are informed, was at times in the finished cloth. Better dressing and weaving, greater production, much less burling and sever in fact, than the advantages of yarn of high quality will result. A warp made of 2/60s can be run without sizing, if it is a soft spun yarn, but better results can be obtained by sizing. Mere weight and stiffness in sizing do not necessarily mean better weaving, in fact, they very frequently result in poorer weaving. The best results are obtained by a light weight, which just lays the fiber, and renders it more compact, thus reducing friction, without impairing the yarn's natural elasticity. In the Bradford system, where it is necessary to spin its own yarn, the warp for Bolivia cloth would probably be prepared in the center of the system, where the yarn is put on section beams, and a large number of cuts run on to the spool, the end of this system, full broad warps are run in succession through the slasher, sized, dried and beamed in one operation.

The average mill on worsted work buys the yarn required from a spinner and in all probability these warps would be delivered on dresser spoons or with a roll of ends on the spool according to the wants and convenience of the weaver. In this instance, 36 ends per spool seems a convenient number. The warp of 2,772 ends would be run in sections in 236 ends each, taking 11 spools to a section.

The average mill, if it sizes warps at all, uses a sizing or a starch, and the number of ends to a section (236) would permit of a fair rate of speed in dressing, with the possibility of the warp to be well dried before it leaves the drying chamber, and is run on to the reed. In some mills the warps are dressed and beamed dry and then run through a sizing slasher on to another beam, which method permits of a larger production.

In our opinion, however, a warp yarn suitable for this Bolivia fabric can be obtained, which may be made without sizing.

The warp should be put on the beam about 26 inches wide. In beaming, particular care should be exercised against undue tension, which might result in the yarn on the beam being too hard. The warp should be beam firm, but not hard. A hard banded warp will weave poorly, particularly so in the case of fine yarns. A set of good straight headed of fine light wire should be used. Old worn bobbins are responsible for much loss of production in weaving, and for a great deal of expensive sewing.

**Drawing-In**

The draft is straight over on 18 harnesses, which calls for 154 healds on each harness. A reed with 12½ dent to the inch is called for, with three threads in each dent. This will give a width in the reed of practically 74 inches, and care should be taken to see that the warp occupies the center of the reed.

In setting in the loom, see that harnesses are level and hung evenly at both ends. The jacks should be set so that the lower shed at its maximum of separation rests lightly on the race plate. See that the beam spindle rests in well oiled bearings; that the friction bands are well covered with cloth, and that in no case is any pressure put on the metal of the beam with the tangends. The edges must be cut to provide material to form the curl. The spaces enclosed by heavy lines on bars 1, 3, 5, 7 and 9 indicate the places where the warp threads hold and bind the floated pile filling into the foundation fabric, and it is around these threads that the cutting out, during the finishing processes, forms the small curls characteristic of the Bolivia fabric. The marks, V, at the top of Fig. 3, indicate the points at which the indentations appear, which form the longitudinal rib effect in the fabric; but these do not appear on the cloth as it comes from the loom. They also are developed in the final finishing processes.

**Filling Particulars**

There are two fillings in Bolivia cloth. A filling for the foundation fabric to give strength, and a filling for the formation of the pile. Both are French spun worsted yarns. The basic yarn which is woven on bars 2, 4, 6, 8, 10 and 12 is a 2/24, 3½ blood, of ordinary standard twist. The pile filling, which is woven in on bars 1, 3, 5, 7, 9 and 11, is a 2/24, high½ quality, of good lustre stock. The yarns forming the pile are first spun as single 24s, and then two threads twisted together in the reverse direction to the single twist, making a 2½ ply slacker twist, putting in on the reverse twist just enough turns to form a soft thread, not more than 3 or 4 turns per inch, thus producing a soft bulky yarn, readily susceptible to the process of cutting by digging, which forms an important part of finishing.

Particular care should be given to the adjustment of the filling stop motion, for the filling of the foundation weave cannot be seen by the weaver. It goes on the back of the cloth. Misprints and broken picks cannot be detected, except by the stop motion. While as a rule, imperfections on the back of a cloth are not considered as so detrimental in ordinary fabrics, in the case of such a high priced fabric as Bolivia, perfection is desirable both on face and back.

Few mills care to take up the manufacture of such a fabric as this, because of the very high number of picks per inch for which it calls, viz., 130. A production of 10 to 12 yards per day would be considered good. The cost of this fabric is $2.38, and the mill may get a profit of 50c per yard; a profit of $6 per hundred yards. Consider this with another special novelty, of which the writer has knowledge, start costing around $2.25 at the mill, and on which a profit of 20c per yard is obtained. The second fabric calls for only 24 picks per inch, and comes from the loom at the rate of 40 to 50 yards per day, a profit of $12 per loom per day. However, it is a question of time, as the mill should ask and we believe may obtain, a higher profit per yard for specially high pick goods.

**Finishing Processes**

The cloth should come from the loom with little or no fulling. The蜘蛛的结论是，但有许多小结，但必须要有足够的毛纱。在进行漂白时，这些小结可能有助于漂白的最终效果。过量的水会妨碍漂白的最终效果。过量的水会妨碍漂白的最终效果。
After dying, the pieces should be dried and again inspected, then taken to the gig, where the pile filling must be cut open, to form the material for the small curls. This gigging should be carefully done. No attempt should be made to break records of production at this point. Violent work, with speed in view, would utterly ruin the face of the cloth, and all depends on the good judgment of the man in charge. The gigging should be continued until the floated filling is cut clean through to the foundation weave.

The pieces should then be placed on a whipping machine, such as is used for high grade chinchillas, and beaten on the back to straighten up the cut pile. The next step is to top off with the shear, but this is not absolutely necessary.

The piece should then be put through a regular chinchilla machine to curl up the pile. A fine, close plush should be used to cover the upper rub motion, while a good corduroy may be used for the bed plate of the machine. Once through the machine ought to be sufficient, as the chinchilla rub is not wanted in this case. The process is required only to give a curled direction or tendency to the pile.

The piece is then taken to the shear, and the rub effect shown off gradually until only the small curl effect remains; and at the same time the longitudinal indentation should appear,形成 the rub effect. The appearance of this indentation should guide the man at the shear as to the extent to which the shearing process should be carried. Again, this last shearing ought to be a careful, gradual process. The piece can now be inspected, rolled, weighed and shipped.

This fabric will lose considerable weight in the finishing processes, for in addition to the usual loss, the mapping and shearing will remove an unusual amount of fiber. The piece ought to weigh 20 ounces per yard from the loom. The pile fillings will lose a large percentage of fiber, and the total loss may be placed at 18 per cent, which reduces the weight per yard to 16 4/10 ounces. In addition to this, there must be taken into account the fact that the fabric gains in length in finishing, at least 5 per cent, possibly 7 per cent, which will still further reduce the weight per yard and make it 15½ ounces finished.

**LAYOUT AND COST**

The layout and cost are as follows:

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<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Cost per Yard</th>
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<tbody>
<tr>
<td>2700 dz. wool warp, 2/40s white worsted, Bradford system.</td>
<td>14½ x 2 reed = 2½ inches wide over all.</td>
<td>77c white French apon.</td>
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<tr>
<td>200 yards filling</td>
<td>3/4 c. white French apon.</td>
<td>2½ c. white French apon.</td>
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<tr>
<td>1000 yards</td>
<td>1½ c. white French apon</td>
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Cost of material: $1.785

Per yard dressing and dressing-in: $0.050

Per yard weaving: $0.080

Per yard finishing: $0.080

Per pound warp, counting only: $0.080

Per yard fixed charges: $0.080

Cost of manufacturing: $1.800

Allow for gain in length of 5 per cent: $0.047

Cost per yard: $1.372

Some manufacturers contend that a gain in length should not be taken into consideration in calculating cost, but the same men would never dream of omitting to take into account any shrinkage, so we hold that so long as the gain is regular an allowance in calculating cost should be made.

**POSSIBILITIES OF DEVELOPMENT**

Bolivia fabric should lend itself very readily to fine fancy effects. For example, a black warp with a black base filling for bars 2, 4, 6, 8, 10, 12; a dark blue 2/24s pile yarn on bars 1, 3, 7, 9; and a dark wine or green 2/24s pile yarn on bars 5 and 11, would give an effective color stripe effect.

With black warp and black filling for foundation weave, and makeup changes only in the pile filling yarns, a large variety of beautiful colorings and styles could be developed.

There is little chance of any duplication in a cheaper fabric, although the construction lends itself to, in fact invites, manipulation. A cotton warp would scarcely be noticed, but the difference in the total cost would be so small, that this reduction is not worth developing which would pay would be a 2/40s black cotton warp; a 1/16s black cotton filling, and a pile filling of 3½ run bright luster wool. This fabric would figure out around 1/2.55 at the mill, reeling 13½ x 3, reducing width to 66 ½ inches.