threads and picks over a greater distance at the point where they reverse, than at any other point in the

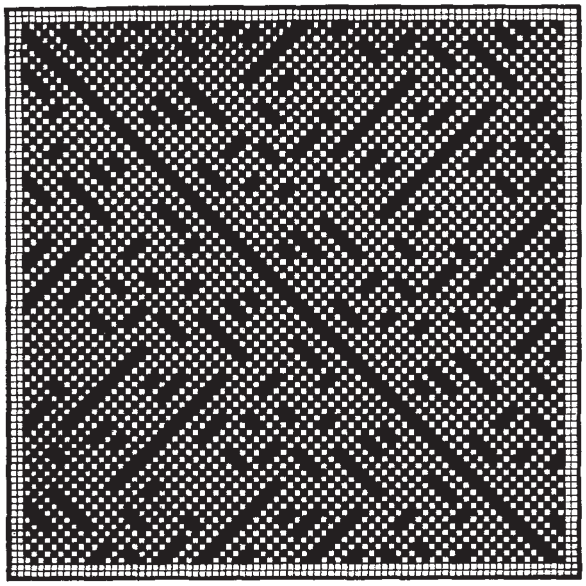

Fig. 3

design. This defect can be avoided, when reversing designs of similar construction to the one shown at Fig. 3, by leaving out three threads when reversing the draft, instead of only one thread, as in the usual plan.

Fig. 4 is also a suitable design to be reversed in both the warp and filling directions, resulting in a diamond effect pattern, *i. e.*, an entwining twill check-effect, standing on one of its four points.

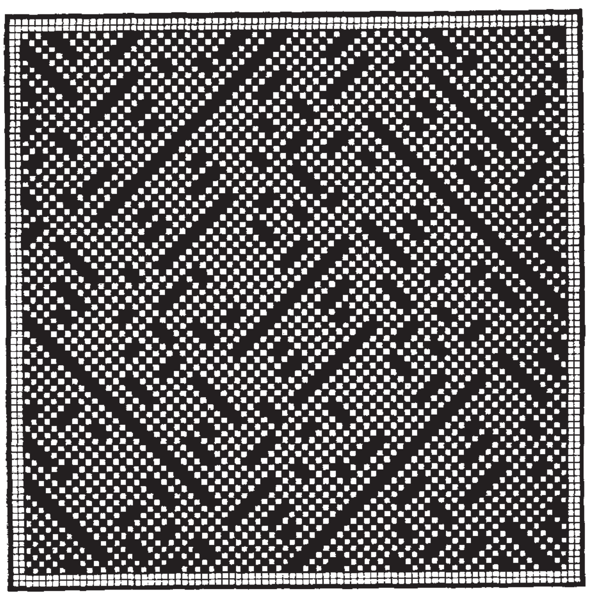

Fig. 4

Weave Fig. 4 could also advantageously be reversed in one direction only, when a long, narrow stripe effect would result. The same development may be applied to designs Figs. 1 and 2, when the results, although possibly not so bold and clear, would weave on 12 harnesses.

A great obstacle to the general employment of designs of the description just given is the cost of producing pattern samples for the market. If a sample warp is drawn in to suit Fig. 4, the amount of variety to be obtained, by changing the harness chain, is rather limited, and (for example) to produce Fig. 3 a complete re-drawing of the warp would be necessary.

A 400 jacquard machine would be a very convenient adjunct to the mill, so as to be able to produce fabric samples (to sell by) of these irregularly drafted patterns. It would be no impediment if the pattern did not repeat exactly on 400 ends; a number of repeats, plus a portion of one repeat, might be cut on the cards, and if the cloth were severed at each 400 ends, the sample would be wide enough for all practical purposes, showing several repeats (as well as their connection) warp and filling ways.

TERRY PILE FABRICS.

Their Quality, Production and Cost.

By H. Barlow.

(Continued from August issue.)

Temples.

There is more imperfect and damaged cloth due to imperfect terry at the sides caused by imperfect temples, than from any other cause. Familiar to the weaver, loom fixer and percher is the complaint "looping or mingling" at the side of cloth, and this defect is due almost entirely to the bearing inwards of the warp-threads, owing to the difference between the width of cloth at the fell and the width of yarn in the reed. It is not possible in terry weaving to keep the width of the fell of the cloth even with the width to the yarn in the reed, but it may be said that the efficiency of the temple is less in terry pile weaving than in ordinary plain or twill weaving, for the following reasons:

(1) The loops of terry, particularly in reversible cloth (loops on both sides) occupy space and prevent the temple pins from acting to the extent that is the case in weaving ordinary cloth.

(2) The pile considerably increases the bulk of the fabric, and therefore, owing to the temple cap, it is not so easy to draw the cloth forward, besides there is a tendency for the sides to hang back and cause the ends for 3 and 4 inches to be slack.

(3) Much annoyance is caused by the loops of terry being pulled by pins, and by the warp-threads getting between the temple rings and washers when fringing, thus preventing the rings from turning round.

The following are measurements taken from nine looms:

Loom.	Reed.	Width of yarn in reed in inches.	Width of cloth at fell in inches.	Difference in inches.
1	48	46.4	45.6	0.8
2	48	23.6	23.0	0.6
3	45	49.45	49.2	0.25
4	45	24.6	24.15	0.45
5	39	45.75	44.75	1.0
6	39	23.25	22.75	0.5
7	39	45.5	44.6	0.9
8	39	39.75	39.12	0.63
9	39	34.0	33.5	0.5

Highest difference = 1" or ½" each side.
Lowest difference = .25" or .125" each side.
Mean difference = .62" or .31" each side.

On account of this difference in width of warp in reed, as compared to the width of the cloth at its fell, when the reed moves forward the warp-threads are forced outwards, until when the reed is about to beat up the three picks which are to form a loop; not only have the threads been moved outwards, but also the threads at the fell of the cloth. Actually what happens at the loom is, that the threads are not in a horizontal

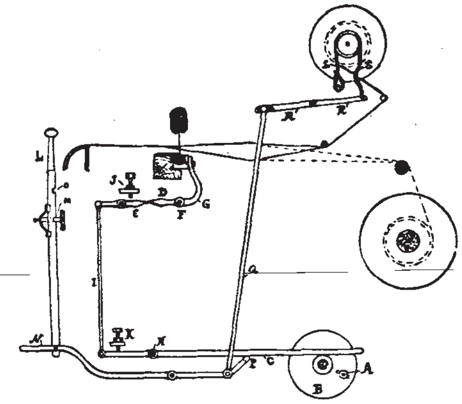

Fig. 14

plane, but are one above the other, each bearing against the reed wire. How is it possible to expect other than unsatisfactory work under such conditions? Is it not possible to devise a more efficient or "reed width temple"? The only remedy seems to be that the loom fixer should see that the temples are correctly set and as near to the fell of the cloth as possible, that they are systematically cleaned, and that the boss weaver should arrange for a periodical inspection of all the temples, rejecting, after due inquiry as to cause, all temple rings or rollers with pins or points bent, worn or otherwise defective. A few dollars spent in this way by the mill will be fully justified by improved production and quality of cloth.

Reeds.

The reed also needs consideration. The thickness of the dent wires is important, as the thinner the wire the more space for the free movement of the threads. In one case where difficulty arose in making clear terry in a reversible check, near the selvedge, a terry free from mingling was obtained by cutting out the warp and re-drawing the same in a reed having finer dent wires. In very fine reeds it is an advantage to have the reed with less dent wires per inch for a few inches at each side.

It often happens that the wires are worn flat by the shuttle pins, temples, or other unfair usage, giving a sharp edge, with a result that the warp is frayed or cut, causing breakages. When this happens the cause should be attended to, the warp cut across, and the reed taken out, polished up and turned over, or else a new reed substituted and the warp redrawn in the latter.

Double reeds are often used when weaving heavily picked terries, 52 in. wide and upwards; also for low reeds when using inferior terry yarns, such as the coarse "linotow" so as to give more space for the thick, irregular, soft and slubby yarn, and reduce the reediness which occurs when 4 threads are put in one dent.

Double reeds are constructed by setting the alternate dent wires back about $\frac{1}{8}''$ and midway between the dent wires in the front. The double reed thus formed is much stronger than the ordinary reed, giving a firmer beat-up and allowing more space for the movement of the warp-threads in shedding.

Terry Motions.

Two motions will be considered, based on the following principles:

(1) Where the reed is moved or swivelled back at its lower end, from a vertical to an inclined position as it approaches the fell of the cloth, so as to leave the pick about $\frac{1}{4}$ inch from the fell of cloth.

(2) Where the reed in its normal position is level with the box-back and does not beat-up the pick to the fell of the cloth, but is moved an additional distance forward on the beat-up picks only.

Reed Moved.

The lower ribs of the reed, shown in loom diagram Fig. 14, are supported in a case which can be moved backward a short distance, the reed swivelling in a groove cut in the underside of the lay cap. A stud *A* is bolted to wheel *B*, which for a 3-pick terry makes one revolution every 3 picks. The long lever *C* rests on the extended boss of the wheel *B* for two picks, and in this position wedge-finger *D* would move on top of wedge *E*, turning shaft *F*, move supporting arm *G* and the reed, backward, leaving the pick a short distance (say about $\frac{1}{4}$ inch or $\frac{3}{8}$ inch) away from the fell of the cloth. On the third or beat-up pick, long lever *C* is lifted by stud *A*, and turning on fulcrum *H*, it turns up by means of rod *I*, the wedge *E* causing the finger *D* to pass under wedge *E*, thus holding the reed firm in its normal position, driving the three picks to their final position in the cloth.

The arrangement is simple: Screw adjustments *J* and *K* are provided for both fast and loose reed positions, bowls are dispensed with, thus enabling a finer setting of the part; the wedge fingers, where they come in contact, are case-hardened—this being often the defective part of the arrangement. Long lever *C* may be lifted from the dobby if desired. To beat up every pick when weaving headings, handle *L* is moved

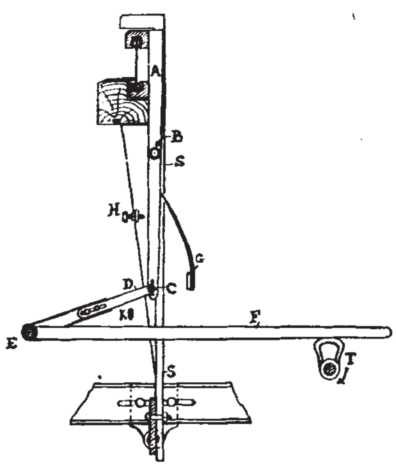

Fig. 15

off projection *M*, foot lever *N* is moved downwards, lifting up long lever *C* by means of stud *P*, putting at the same time additional tension on terry beam through rod *Q*, lever *R*, and chain *S*.

Reed Stationary.

Another terry motion, shown in Figs. 15 and 16, causes the reed to move an additional distance forward on the beat-up picks, the reed being normal or in line with the box-back on loose picks. The reed is set in perfect alignment with the back of box, and remains in this position while the shuttle is moving across, and while pushing forward the loose picks. The distance from the reed to the raceboard is the distance allowed for the forward movement of the picks, and other adjustments equal, this would give the maximum loop. The less distance the reed is moved forward, the less the length of loop. The reed is held in a strong wooden frame which is securely fixed to the upper ends of two vertical arms *A*, fulcrumed upon studs *B*, bolted to the lay swords *S*.

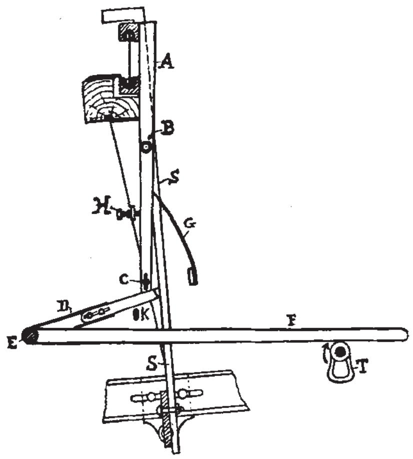

Fig. 16

At the lower end of arms *A*, there is an adjustable stud *C*, capable of being acted upon by the notched arm *D*, which is set-screwed upon shaft *E*, which extends across the loom inside the framing. Lever *F* is also fastened on shaft *E* midway, so as to rest on cam *T*, which for a 3-pick terry makes one revolution for 3 picks.

On the 1st and 2nd picks, cam lever *F* is down, as shown in Fig. 15; notched lever *D* is also down and out of the path of stud *C*, therefore vertical arm and reed are normal and beating-up does not take place.

On the 3rd pick, as shown in diagram 16, cam *T* lifts lever *F*, and raises notched arm *D*, so that it is opposite stud *C*, and as the lay comes forward the upper part of vertical arm *A* and the reed is given an additional move forward to drive the three picks to their position in the cloth, and form the loop. The lever *F* may be lifted by a chain, so as to permit of easy changes, or it may be lifted from the dobby. The flat bow springs must be strong enough to press the vertical arm against the adjusting stud *H*, yielding on the beat-up picks. By means of said stud *H* the reed is adjusted to be level with the box-back. The times terry or forward movement of the reed in beating up may be increased or decreased by loosening bolts, and sliding lengthening piece *D* away from, or near to, shaft *E*. More time terry, or a longer loop, can be made with this motion than with the first motion mentioned and this with greater ease. There is always a space between reed and raceboard when the shuttle is passing across. In practice the shuttle does not run so true in this type of motion as in those with ordinary raceboard, particularly is this the case when there is more than 12 inches of reed space without yarn. As the shuttle meets the ground warp it rises and as it enters the box at the opposite side it has a tendency to shake in the box.

FABRIC ANALYSIS.

(Continued from August issue.)

Dissection of Woolens and Worsteds.

There is probably no branch of textile work which is more dependent upon practical experience for its accurate accomplishment than that of estimating from a finished sample of woolen or worsted cloth the original counts of the yarns employed, the ends and picks per inch, as well as the width in the reed the fabric should be set in the loom. In this they differ from cotton, linen and silk fabrics, which in finishing are not subjected to such severe processes.

The difficulty which arises in connection with woolens and worsteds, more particularly the first, is due to the extreme variations which occur in different makes of cloth, *viz:*

(1) in the loss in weight when subjected to the processes of scouring and finishing;

(2) in the amount of shrinkage in width and length from the loom to the finished state.

So far as regards the counts of yarns, the above influences more or less tend to neutralize each other, for while the shrinkage of the fabric makes each thread shorter, and therefore proportionately thicker and heavier in the finished cloth than it was originally, the loss in weight makes each thread proportionately thinner and lighter. The shrinkage of the cloth affects the setting, and the number of threads per inch in the loom must necessarily vary from the number in the finished cloth, according to the degree of contraction which takes place.

It is an easy matter to count the ends and picks per inch in a sample, and to estimate the counts of a given pattern, but beyond that no rule can be employed which is applicable to all cases. It is purely a matter of observation, coupled with the preservation of records of cloths which have already been made, and then of using the experience gained in this way in estimating the weaving particulars from a finished sample by working retrogressively.

Loss in Weight.

As a rule, the greatest loss is sustained during the scouring of the cloth, as it is in this process that the various impurities which are present in the piece are removed. These impurities consist of the oil which is added to the wool before spinning, and the sizing matter which is put on the warp; also a certain amount of dirt which has been contracted during the weaving of the cloth is removed, though this, of course, has no effect on the counts of the yarns.

The amount of each of these depends upon the character of the fabric. Thus, low woolen cloths, which are largely composed of shoddy, are usually heavy in oil, and may lose from 15 to 20 per cent and upwards during the scouring. On the other hand, yarn-dyed fabrics are free from oil, though there may be sizing matter on the warp, and, as a rule, they only lose from 2 to 5 per cent in weight. Woolen cloths of the tweed and cheviot type, made from mixture yarns, contain more oil than worsted fabrics, and frequently lose from 10 to 15 per cent in weight, while the latter lose from 5 to 10 per cent. Flannels should lose less in weight than the ordinary run of woolen cloths, as the yarns employed in their manufacture require to be fairly free from grease and dirt in order that a mild scouring agent may be employed.

A further loss in weight takes place during the processes of fulling, gigging and shearing; in each of these operations a small quantity of flock is produced, which varies in amount according to the condition of the fabric and the severity of the process. The loss is usually only a very small percentage of the weight of the piece, being greatest in faced fabrics of the doeskin and beaver type, which are heavily felted, wet gigged and slightly cut to even the pile. Clear-faced worsted fabrics, which are neither fulled nor gigged, suffer very little loss in weight after the scouring, since the flocks produced during the shearing process make no appreciable difference to the weight per yard of the piece; while the same remarks apply to fabrics of the cheviot type, which are only slightly fulled.

The difficulty of estimating the effect of the loss in weight on the counts of the yarn is made greater, owing to one series of threads being liable to suffer in the scouring and finishing to a greater degree than another. For example, in a botany worsted fabric backed with low woolen filling, the face yarns may contain no more than from 5 to 7 per cent of oil, while the low woolen backing yarn may contain double the amount. Again, (though this is of minor importance)