Principles of Velvet Construction—Chiffon Velvet

By E. H. DOUTE

In the preceding article, "Technology of Velvet Construction," printed in the November issue of this publication, the writer endeavored to illustrate the construction and lay-out preparatory to the final mounting of the loom. In this article the writer illustrates the mounting of the harness and the beams, the adjusting of the latter in relation to the harness and the up-take motion of the weft and the let-off motion of the warp. These are items of great importance in the weaving of all fabrics, but most important in the weaving of a double velvet fabric.

The warp and the cloth are controlled through the let-off and up-take motions together with the temples holding out the width of the cloth, balancing the uptake motion of the pin roller performing the gripping action of the sand roller and the positive action of the cloth take-up roller, which in velvet weaving, on account of its crushing effect, cannot be employed.

Regarding the let-off motion of the warp beam, considerable interest has been aroused in many mills during the past few years, due to patented new devices for automatic let-off, each claiming and stamping it to be the only device that will positively eliminate all kinds of defects. There are dozens of types of let-off motions in use now.

Analyzing each of these motions from different angles, none of them is an absolute positive compensating device that could help to overcome the unevenness of the filling material on a type of loom built with a direct positive take-up as used in this country, without a compensating attachment.

If the let-off motion is geared and timed up to release the warp as much as the take-up is, which is the only way it can be timed to do, it will not compensate according to the diameter of the filling threads and overcome the irregularities of size of the material on a given number of picks and the various degrees of humidity from day to day having a bearing upon the elasticity and stretch.

It is the writer's conviction that with a compensating spring and a little improvement upon the general method of using ropes around the flanges of the beam, with plenty of weight attached to the levers, a cloth can be woven just as good and clean without costly special let-off attachments for ground beams as demonstrated in Figures 1 and 2 for comparative demonstration. Figure 1 showing the side view of a loom illustrates the type of a semi-positive let-off most commonly used for the ground beam in velvet weaving. The warp *a* is turned by a ratchet wheel *b* and a worm gear *c*. The ratchet getting its movement from a rocking lever connected to the sley. The warp tension is regulated by a lever *d* and weights *e*, the weight lever being connected by a rod *f*, with the rocking lever regulating the motion of the ratchet. If the warp tension increases it changes the position of the tail of the ratchet driving lever in the slot of the rocking lever, the rate of letting off is increased, lower warp tension causes a reduction in the rate of letting off.

As this let-off motion is mechanically regulated by the positive motion of the sley and the let-off controlled by the tightening and slackening of the warp, there is not enough compensation for regularity in the let-off and the difference in the diameter of the filling on a given number of picks, nor is there any compensation to regulate the stretch and the elasticity that will vary with the variation of humidity, resulting in an uneven woven cloth. Furthermore, it requires the adjustment of weights on lever as the beam empties which is commonly not attended to; the inertia effects are therefore considerable.

The warp ends run from the beam over a back rest of two connecting rollers, *g* and *h*, of which the roller *g* is fulcrumed to the weight lever *d*, from which the top roller *h* receives its rocking motion; from roller *h* the warp ends, dividing the top and bottom warp, run over and under two compensating rollers *i* and *k* moving up and down following the motion of the warp threads in the harness *o*. The warp threads leaving the compensating rollers *i* and *k* are run over and under two lease rods *l* dividing the top and bottom warp, entering the warp stop motion device *m* and again being split by a single lease rod *n*, entering the heddles of the harness *o*. The pile warp *p* is regulated by a gearing system for the let-off of the pile and the motion of the pile roller *q*. The timing of these two movements depends entirely on the length of the tuft, slower or faster.

Roller *r* represents the pressure roller, the pile warp running in between the lead roller *q* and the pressure roller *r*. These two rollers are covered with a soft substantial cloth (coarse pile cloth will cause shifting of the ends) to prevent the crushing of the rayon pile ends. This precaution is exceedingly necessary on account of the upper pressure roller *r* being held down with weights from a specially attached lever to the pressure roller to effect a better grip on the pile ends sliding through the two rollers.

The pile ends after leaving the pile rollers q and r are divided by a lease rod s leading up to the compensating rods t and u which follow the up and down movement of the pile ends as they change their position for the interlacing of the top and bottom tuft, for the top and bottom cloth.

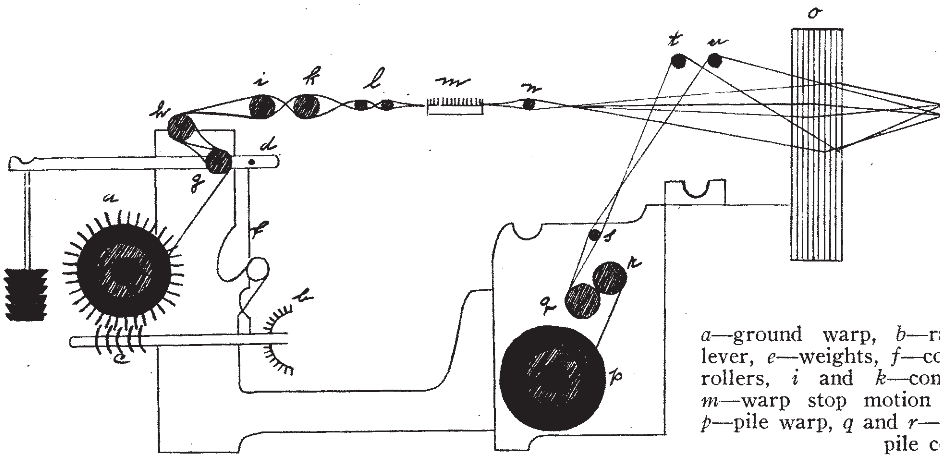

Fig. 1
a—ground warp, *b*—ratchet, *c*—worm gear, *d*—weight lever, *e*—weights, *f*—connecting rods, *g* and *h*—back rest rollers, *i* and *k*—compensating rollers, *l*—lease rods, *m*—warp stop motion device, *n*—lease rod, *o*—harness, *p*—pile warp, *q* and *r*—pile rollers, *s*—lease rod, *t* and *u*—pile compensating rods

The mounting of the two warps, the ground and the pile warp, as illustrated by Figure 1 is the generally accepted procedure, although opinions may differ as to the advisability of splitting the ground warp for the top and bottom cloth in such a manner, to allow the

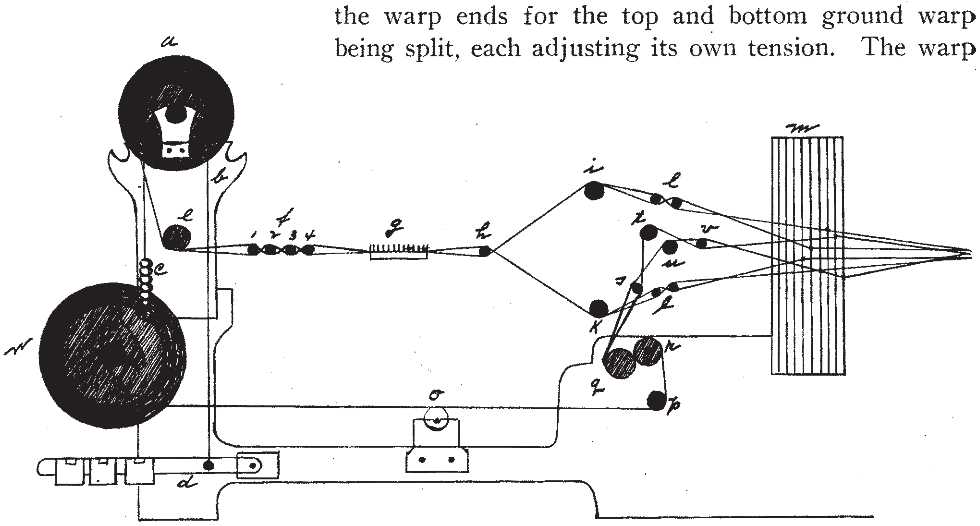

Fig. 2
a—ground warp, *b*—chain, *c*—spring, *d*—weight lever, *e*—whip roll, *f*—lease rods, *g*—warp stop motion device, *h*—lease rod, *i* and *k*—top and bottom whip rollers used for dividing ground warp, *l*—lease rods, *m*—harness, *n*—pile warp, *o*—rest roller for pile warp, *p*—lower whip roll for pile, *q* and *r*—pile rollers, *s*—lease rod, *t* and *u*—compensating rods, *v*—lease rod

pile warp being placed in the center between the two warps instead of above them, as illustrated by Figure 2.

Figure 2 showing the side view of a loom illustrates a different type of let-off for the ground beam. This let-off is on the principle of a rope friction let-off but with lever weighting that makes adjustments much easier and a spring attachment acting as a shock absorber, however no ropes are used as they are very susceptible to atmospheric conditions.

The spring attachment instead of the rigid fastening of the fixed end to the framework, imparts the necessary sensitive motion, the beam responding to any variation in tension, keeping the latter fairly uniform if the loom speed is not too fast. At extremely high speed, the inertia effects of the beam and weights lead to tension variation which becomes more pronounced if direct rope weighting is resorted to.

The ground beam a is flanged on either side, a heavy felt is imbedded into the groove of the flanges. The chain b is wound three or four times, according to tension requirement, over the top of the felt, the fixed end is connected to a spring c, the balancing end is connected with the lever d. The warp ends run from the beam down over a rotating whip roll e. With this mounting, no compensating rollers are required, the warp ends for the top and bottom ground warp being split, each adjusting its own tension. The warp ends leaving the whip roll e are run over and under four lease rods f. Lease rods 1 and 4 have a single end lease, lease rods 2 and 3 have a double end lease. The ground warp being a right and left twist crepe will run better with the single and double cross lease rods for this mounting. The warp ends leaving the lease rods enter the warp stop motion device g then being split by a single lease rod dividing the top and bottom warp ends. The top warp ends go over whip roll i, the bottom warp ends over whip roll k, enter the lease rods *l* and finally the harness *m*. The pile warp *n* is mounted at the back stand of the loom, the pile ends run over a rotating roll *o* and *p* and up to the pile roller *q* and *r* through the lease rod *s* and up to the compensating rods *t* and *u* enter another lease rod and finally the harness *m*.

The let-off motion for the pile is exactly the same as outlined for Figure 1. The mounting of the pile as illustrated by Figure 2 has the advantage of a long stretch equalizing the pull of the tight and slack ends that invariably creep in coming off a beam carrying 2,400 yards or more of pile warp.

Considering the exceptional stress the ground beam and the pile beam warp ends have to go through, it will be easily understood that only the very best material can be employed to attain tolerant weaving conditions and finally to obtain perfect merchandise.