

Yarn Limitations in Manufacture of Barmen Torchon Laces—Use of Rayon Increasing

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In common with other products of the textile art, the narrow lace and particularly the Barmen or imitation crochet lace, presents an extremely fascinating picture. Its appeal is, first of all, to the eye. Its manufacture presents no little difficulty, mixed with the natural limitations of the Torchon machines themselves and the materials that are used in their manufacture.

The Torchon or one-thread lace machines are, of course, highly specialized and are centered in only a very few plants in this country. Their designing and operating difficulties have helped to contribute to the rather extreme concentration of all the country's Barmen machines in so small a number of plants.

In appearance the machine does not seem unusual. Not until one has been put in operation does its uncanny accuracy make itself felt. Very similar to a large braider, it seems, but when looking down on the machine a continuous figure 8 forming a track around the entire top, is the most noticeable feature. Into this track spindles to carry the yarn are set. This yarn is wound on special ratcheted spools, given varied tensions by springs, and caused to move in a predetermined manner by the special jacquard at the rear. These various threads must always cross each other in the form of a X.

To beat these crossings into position some definite action must always take place a split-second after the crossings have been effected. For this purpose a series of dull knives known as "beaters" are used. These are accurately timed and enter the crossing just as it is completed, beating it directly up and on to the preceding plait.

During each crossing and plaiting, the various yarns on each spindle are subjected to:

(1). The spring tension.

(2). The torsion or twisting motion

(3). The action of the beater

These three factors must all be considered in choosing various yarns for the work under consideration.

The spring tension represents an almost constant factor, determined both by the individual designer and the pattern to be woven. This tension is the forming factor of the design and it may vary in pull or positive resistance from a fraction of an ounce to as much as 6 or 8 ounces.

Fig. 1, shows a complete spindle assembly ready for mounting in the plate of a Torchon machine. This figure shows a ratchet spool (4) mounted and threaded. The vital features of this spindle are the spring (5), yarn eye (3), and spool ratchet (2).

When a pattern has been properly threaded, the yarn leads from the spool itself through the eyelet of the spindle (9), up to the fixed eyelet (10), through the yarn eye, and then to the braiding or crossing point.

As the yarn is used in weaving the thread pulls the spring out to its full length, causing the yarn eye to lift the spool ratchet. When the ratchet is so released it permits the spool to unwind to the next projection on the bobbin. A break in the yarn will cause the tension spring to contract suddenly. As the spring contracts it forces the wire (6), to which it is fastened, against the movable stop motion ring (7). The stop motion ring drops and on the next motion of the spindle it comes into contact with an arm connected to the starting lever. This knocks off the lever and stops the machine, preventing the making of unnecessary damage.

Not all yarns can withstand the varied tensions of the eyelet, needle spring and pawl or "let-off." But when these are combined with the torsion or twisting motion,

unfit yarns literally fall by the wayside.

This torsion motion is the jacquard-controlled right or left movement of the spindle in a predetermined track. The spindle movements are both to right and left, with the amount of right and left twisting motions not necessarily equal.

Action of the beater knives, used in beating-up to position the thread crossings, is a supplementary factor which is of importance. As this beating and crossing process takes place, yarns are subjected to side friction which, if overlooked in judging the adaptability of a yarn for Barmen machines, can cause an unlimited amount of trouble in working.

Cotton Yarn Requirements

From the point of commercial usage, cotton enjoys the distinction of being first in usefulness and service. Exhaustive tests of various marketed cotton yarns have shown that straight-carded yarn is practically useless for the production of good work. This fact holds because the general run of staple is much too short to withstand the torsion action of our machine.

Again, most carded yarns are far from clean. The constant beater action tends to collect all loose fibers together. Frequently these fibers become so massed that improper braids are formed. The braids are not taken up properly and tangles or snarls result. This slows production unnecessarily and gives more than the average amount of damage, with a consequent loss of production.

These facts, then, eliminate carded cotton yarns and offer strong arguments for the use of combed yarns of various types. These combed yarns are clean, smooth and long stapled. It is these yarns which are required for uniformly accurate work.

Experience in actual use has proved that more spindle movements are executed to the left than to the right. This necessitates the use of a right-hand twisted 2-ply yarn for general use.

To prevent "opening up" and consequent breakdown of the yarn, more twist than is

usual for ordinary work is given. Sixes, eights, tens and sixteens, all two-ply, are the usual counts and they have respectively eight, ten and twelve turns of right-hand twist in the doubling.

The very nature of the cotton thread is inflexible rather than elastic. For this reason the tension resulting from the pull of

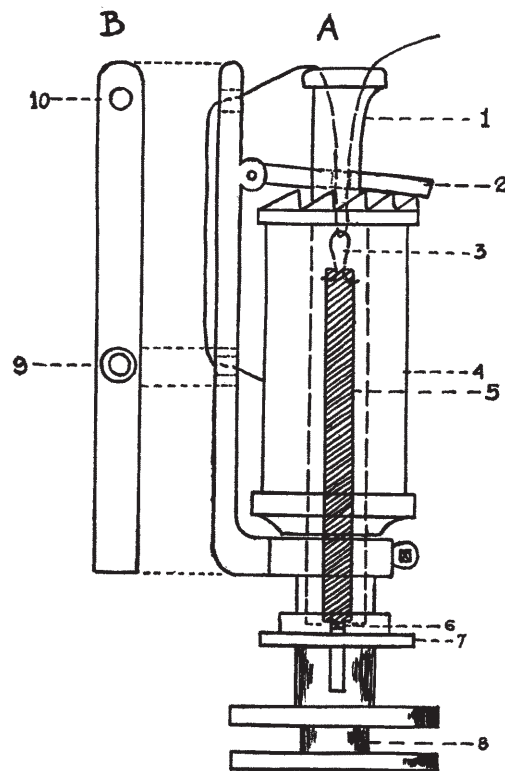


Figure 1

A—Complete Spindle (Threaded)

- 1—Hollow spindle tube with pawl groove.
- 2—Hinged pawl raised in groove of 1.
- 3—Needle eye.
- 4—Yarn bobbin.
- 5—Needle spring.
- 6—Needle spring anchor.
- 7—Stop motion ring.
- 8—Plate guide groove.

B—Side View of Spindle

- 9—Porcelain yarn eye.
- 10—Top thread guide.

the take-up rolls against the pull of the spindle spring may cause some trouble. This can and usually is eliminated by the proper conditioning of work in process.

Rayon Becomes Staple

The appeal to the popular fashion of the past few years has necessitated the widespread use of rayon. With the introduction of this material many manufacturing difficulties presented themselves.

asset, and since it was almost totally free from knots and very even in size, only the overcoming of mechanical difficulties could slow up its inevitable adoption as a staple yarn for Barmen Torchon laces.

The standard deniers of 150 and 300

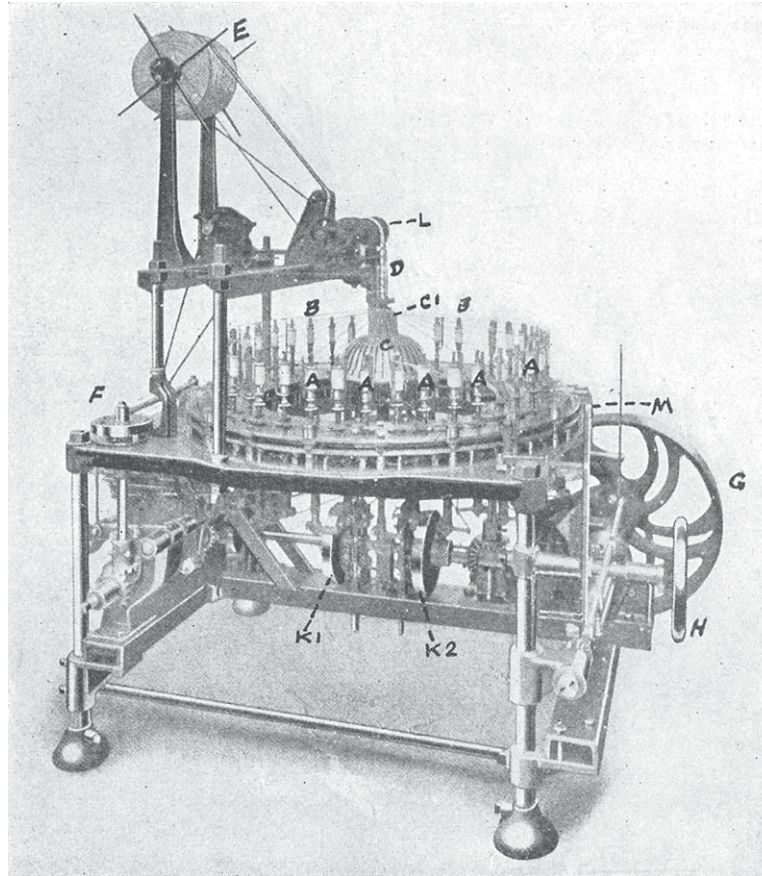


Figure 2
Barmen Torchon Machine

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| A—Spindle set in top plates of Barmen machine. | F—Jacquard machine. |
| B—Yarn threaded up to mandrill. | G—Drive pulley. |
| C—Beater dome. | H—Hand wheel. |
| CI—Beater knives (closed). | K1— } Beater cams. |
| D—Mandrill (or width factor—changeable for various desired widths). | K2— } |
| E—Finished lace on reel. | L—Take-up rolls. |
| | M—Starting handle. |

Rayon presented an entirely new problem to the manufacturer. Constant use of cotton, with its comparatively rough surface and lack of elasticity, prevented the immediate adoption of rayon for the laces in process of manufacture. The smooth glossy surface of the rayon yarn was a big

were found to be entirely too fine for the patterns of lace in use. This meant plied yarns, and from this point many difficulties had to be overcome.

It will be recalled that spring tension is one of the governing factors in the choice of a yarn. Springs of the tension used for

cotton corresponding in size to the rayon in use were found to be worthless. Rayon being so smooth in structure did not offer as much friction at the point where the yarn passed through the needle eye. This, then, meant that strong needle springs must be used.

The plying of the yarn presented another difficult manufacturing problem. The yarn as first used was very sensitive to the torsion motion of the spindles. It lost all semblance of twist, seeming to be just a number of individual fibers.

This open yarn, when subjected to the constant action of the beater knives, either snapped in individual filaments or else became so badly hacked that the resulting product was worthless.

The usual method, perhaps, would have been to use a light size of some sort. But these laces undergo no finishing process after they come from the machines and that possibility eliminated itself at once.

After much experiment a rayon yarn having $2\frac{1}{4}$ turns of right-hand twist in the ply was found to be satisfactory. This yarn has a sufficient amount of twist so that it

does not open up while being braided, and yet it produces an extremely soft and beautiful piece of lace.

The principal difficulty at present experienced in the use of the plied rayon is the presence of knots. Dog-knots, if used, tend to produce nothing but damage. They do not slip through the needle eye and they also break open with the motion of the working spindle.

Small weaver's knots usually have withstood the torsion action of the spindle, but even they have slipped apart and much damaged lace results. But with all this, consumption of rayon is steadily increasing in the manufacture of these laces.

A Barmen lace machine, properly set up and threaded, is shown in the accompanying Fig. 2. For clarity, the essential points are detailed. May I call particular attention to "A," which is a complete spindle assembly, and to "C," which is the beater dome with the knives themselves in a closed position. These beater knives consist of two sets, each set being operated alternately by the cams ("K1," "K2") directly under the top plate.