WARP KNIT ENGINEERING

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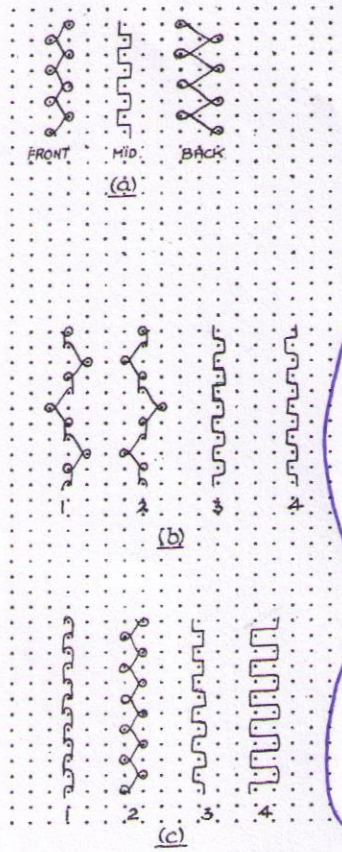
FIGURE 4



Although better stretch and recovery results would be obtained by using elastomeric yarn on both bars, it is not done due for economic reasons. For example, 40 denier spandex (bare) costs about $18 a pound on warps and when knit into a fabric in combination with 40 denier nylon it has to sell upwards of $3.50 per sq. yd. If the fabric were made in 100 per cent spandex it would become unsaleable on account of its prohibitive cost.

The spandex is used bare as covering would greatly increase its cost out of proportion to the advantages. Two-way stretch tricot fabrics are either made of 40 denier spandex/40 denier nylon or 70 denier spandex/70 denier nylon combinations. (.706).

In referring to spandex denier, it should be realized that its nominal designation changes considerably at different stages of processing. Thus, the yarn sold as 40 denier is only 40 denier in the relaxed state. On warping, a 100 per cent stretch is imparted to it making it 20 denier on beams. The knitting tensions reduce the denier down to 17. Yet, once knit the yarn recovers to 25-26 denier.

All this makes calculation of percentage spandex content impossible since the final denier in the finished fabric is unknown. The only way to determine this is to remove the spandex component from a test sample of known weight by mechanical or chemical means and weigh the nylon residue.

Following are the points to be observed in knitting of bare spandex yarns on tricot equipment:

1. Power driven let-offs are absolutely essential for uniform tension.

2. Tensometers must be provided on the warp sheet of each spandex spool to verify the constancy of warp tension. The runner indication is meaningless unless correlated to tensometer reading.

3. Due to the very high coefficient of friction of spandex, all guide and tension rods coming in contact with it mus made rotary and of matt fi to minimize the yarn drag.

4. The knockover set should be high.

5. The presser should be firm.

6. Selvage spreaders shc be used to prevent exces fabric narrowing and tens problems at the selvages.

7. Sley points should not used to avoid drag on the ya

Dyeing and finishing of sp dex fabrics requires special p cedures and close control. T technology is still in its ea stages of development. (707)

RASCHEL FABRICS—The be known Raschel elastomer product is so-called "power ne extensively used in the found tion garment industry. Its co struction is shown on Figu 4 (b). Front bars 1 and threaded 1 in, 1 out with nylo rayon or other non-elastic yarr knit a simple ground mesh re peating on six courses. Bac bars 3 and 4 threaded 1 in, out with an elastomeric yar perform a short inlay move ment.

The back bar yarns are fed in under heavy tension and are incorporated in the ground structure in an almost vertical configuration. Once the fabric is removed from the machine, the elastomeric yarn recovers from its extension, collapses the ground mesh and lends the entire structure a good measure of two-way stretch.

Because bars 1 and 2 have a symmetrical movement and equal runners, their yarn is put up on a common, full set warp. The same applies for bars 3

f the "Velcro" type fast-
:mployed in a variety of
:l and non-apparel fields.
unbroken loop principle
itself well to a develop-
of raised pattern effects on
ground in the form of
, diagonals and checks.
patterns are produced by
bined effect of a partially
ed front bar and a suit-
apping movement.
ping, particularly of un-
ı loop fabrics, is a diffi-
d exacting art. The reader
erred here to literature
g the subject of napping
eral. (698 to 704).
stic fabrics—Warp knitting
ıent is capable of making
ety of elastic fabric for
ıtion, underwear, swim-
medical and industrial
ses.
manufacture of elastic
for foundation garments
own in the last decade
major industry. It suc-
in capturing the lion's
of the market from weav-
d lace makers who tradi-
y dominated it.
re are two basic methods
nufacturing elastic fabrics,
ing to the type of yarn

3y using elastomeric yarns
as spandex, extruded or
tural rubber. Fabrics made
hese yarns are marked by
m to high modulus.
3y using stretch yarns proc-
on false twist, edge crimp
ıer texturizing principles.
fabrics have a compara-
ow modulus and are lower
than those made with
neric yarns.
rics knit with elastomeric
will be discussed first.

Distinction must be made between tricot and Raschel fabric since each is knit on a different basis and employs different materials.

TRICOT ELASTIC FABRICS — Tricot elastic fabrics may be divided into two groups according to the type of stretch developed:

- Fabrics with unidirectional or one-way stretch.
- Fabrics with a two-way stretch.

UNIDIRECTIONAL STRETCH FABRICS — Fabrics with unidirectional stretch are made on 3-bar equipment as shown in Figure 4 (a). The front and back bars threaded with nylon knit the ground structure incorporating the elastomeric inlay yarn carried on the middle bar. Due to the tension under which the inlay is kept, its threads have a vertical configuration in the fabric. The stretch is produced by the elastomeric yarn collapsing the ground fabric structure in the length direction and thus permitting its extension when the fabric is stressed. Its recovery is a function of the elastomeric yarn modulus.

The ground bar yarn may be 15, 20, 40 denier or heavier nylon while the inlay 140 - 280 denier spandex or equivalent gauge rubber. The elastomeric yarn may be single, double covered or bare. The latter, however, though less expensive, poses considerably greater problems at all levels. The bare materials require special, costly warping equipment and rotary warp sheet guiding devices on the tricot machine. (705). Dyeing may pose difficulties on account of the different affinity for a color between the elastomeric and ground yarns.

The amount of fabric stretch depends mainly on the yarn elongation, runner of the middle bar and on the mode of finishing. The runner is kept down to 3 - 6 inch which introduces yet another problem due to the difficulty of making the power let-offs deliver consistently such short runners.

Fabrics made in this manner can develop up to 150 per cent stretch. Very attractive effects have been obtained by printing and flocking.

TWO-WAY STRETCH FABRICS —Two-way stretch fabrics are made as a rule on 2-bar machines by knitting the elastomeric yarn, not laying it in as in the previous case. One bar carries the elastomeric, while the other a non elastic yarn, usually nylon. The construction is either jersey or 1 - 0, 1 - 2 on one bar and 1 - 2, 1 - 0 on the other. (705 A.)

The presence of elastomeric yarn does not, contrary to a general assumption increase substantially the widthwise extension of the fabric. This is limited by the nylon component of the fabric structure. The elastomeric yarn, however, has a recovery power or "snap" much greater than a similar all-nylon construction.

The elastomeric yarn knit into loops collapses the fabric in the length direction to produce longitudinal stretch. The latter is inferior to width wise stretch but sufficient to qualify the fabric for a two-way stretch designation.