

PATENT SPECIFICATION

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(54) WOVEN BELTING

(71) We, JOHANN BERGER and JOSEF BERGER both German citizens and both of Obere Schlosstrasse 114 (formerly Endersbacher Strasse) D-7071 Alfdorf, West Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to woven belting and more particularly to woven belting of the kind comprising a single-ply central portion and tubular edge portions, e.g., as described in British patent specification No. 1,489,668.

A number of different kinds of belting, and particularly those used for vehicle safety belts, are heat-set after weaving. By this heat-setting, the desired reference elongation of the belting, lying between 5% and 20%, is determined. It is also known from the above-mentioned British Patent specification No. 1,489,668 to impart a higher elongation at break to the warp threads in the tubular edge portions of the belting than to the warp threads of the central portion. According to the said specification, the elongations at break should differ only by a small percentage.

It has been found that the known belting of this kind lacks adequate abrasion resistance. Wear occurs substantially only at the tubular edge portions and hardly at all in the central portion. When, under an overload, the abraded belting is torn, tearing begins at the edges. As a result, a safety belt of such belting which has been in use for a long period of time will tear under an appreciably lower load than a new safety belt.

In abrasion tests it has been found that the warp threads of the tubular edge portions tends to shrink beyond the shrinkage imparted thereto by heat setting due to the heat which is generated by abrasion. As a result, the belting warps about its longitudinal axis in such a manner that the object against which the belting is chafed is engaged only by the two tubular edge portions whilst the central portion of the belting warps away from such object. As a result, the wear is restricted almost exclusively to the tubular edge portions

whilst the central portion remains substantially unworn.

The present invention provides a woven belting comprising a single-ply central portion and tubular edge portions integral with the central portions, the belting having been heat set and the warp threads of the tubular edge portions having a higher elongation at break than the warp threads of the central portion, wherein the tubular edge portions comprise warp threads which before weaving and heat setting of the belting have been pre-shrunk by an amount (v) according to the formula:

$$v \approx m - f$$

wherein

m = the potential shrinkage of the warp threads of the tubular edge portions,
 f = the shrinkage exhibited by the belting during heat setting,

≈ = equal to or substantially equal to.

It will thus be appreciated that, after heat setting, belting is obtained in which the warp threads of the tubular edge portions have been shrunk to substantially the full extent of their potential shrinkage, this being accomplished by pre-shrinking the warp threads which are to be used in weaving the tubular edge portions by an amount which corresponds substantially to the difference between the potential shrinkage of the warp threads and the actual shrinkage which is caused by heat setting. This produces the desirable result that any subsequent heat caused by abrasion cannot result in additional shrinkage of the warp threads of the tubular edge portions. It has been found that such belting wears uniformly throughout its width and for this reason has a much longer life than conventional belting.

Example

The following yarns were used for the warp threads in the central portion of belting for safety belts and for the weft threads:

Polyester, Trevira (Registered Trade Mark) yarns consisting of 100 filaments and having a fineness grade of 1100 dtex, 100 Z-turns per meter and a shrinkage of about 13%. The shrinkage values stated herein in per cent of

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the net length so that a shrunk thread portion can be stretched by that percentage, e.g., by 13%.

5 The following warp threads were used in the tubular edge portions:

Polyester, Trevira (Registered Trade Mark) yarns consisting of 50 filaments and having a fineness grade of 550 dtex, 130 Z-turns per meter and a shrinkage of about 21%.

10 The central portion of the belting contained 390 warp threads and each tubular edge portion contained 16 warp threads. The pick count was 92 picks per 10 cm. Strips of

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15 right hand and
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left hand twill weave respectively, alternated in the central portion. The tubular edge portions were woven in a

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plain weave.

25 The yarns, prior to weaving were subjected to preliminary tests to determine their potential shrinkage. The potential shrinkage of the warp threads for the tubular edge portions was 40% and as the entire belting was to be shrunk 8% by heat setting, the warp threads for the tubular edge portions were pre-shrunk 32% by a heat treatment
30 before they were woven. The warp threads

for the central portion were found to have been shrunk about 13% before receipt and were used as received. Finally the woven belting was shrunk 8% by heat-setting.

The resulting belting had in its central portion a shrinkage of about 21% and had tubular edge portions which had been shrunk to the full extent of their potential shrinkage.

WHAT WE CLAIM IS:—

1. A woven belting comprising a single-ply central portion and tubular edge portions integral with the central portion, the belting having been heat set and the warp threads of the tubular edge portions having a higher elongation at break than the warp threads of the central portion, wherein the tubular edge portions comprise warp threads which before weaving and heat setting of the belting have been pre-shrunk by an amount (v) according to the formula:

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≈ = equal to or substantially equal to.

2. Woven belting substantially as herein described.

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wherein

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