

PROCESS FOR THE PRODUCTION OF WARP-KNITTED FABRICS
REALISED WITH DISCONTINUOUS YARNS AND APPARATUS FOR THE
REALISATION THEREOF

DESCRIPTION

5 The present invention relates to a process for the production of warp-knitted fabrics, constituted for at least 50% by discontinuous fibre yarn.

The invention also relates to warp-knitted fabrics comprising at least 50% discontinuous fibre yarn, as
10 well as the apparatus for the realisation thereof.

As is known, knitted fabrics may be obtained according to various production processes, in particular by knitting on circular knitting looms, for instance for the production of woman stockings, by knitting on
15 Raschel looms to obtain open-work fabrics, curtains, laces, patterned fabrics in general, and by knitting on warp-knitting looms for warp-knitted fabrics, to obtain fabrics intended for the technical-industrial field, furniture and upholstery, footwear, the medical
20 field, clothing and the like.

As is also known, with the working processes on circular looms and with those on Raschel type loom, it is possible to utilise both yarns constituted of continuous fibres such as nylon, polyester and the like
25 obtained with chemical processes, and yarns constituted of discontinuous fibres obtained by means of mechanical spinning processes starting from flock and staple

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fibres or in any case from short and fragmented fibres, such as cotton, wool, polyesters, etc., as well as wool or cotton wastes and the like.

With the working processes on warp-knitting looms for
5 warp-knitted fabrics, it is possible to realise a very thin knitting with very high working speed, and therefore with very high yields, but, as is known, by this type of working it is possible to use only continuous fibre yarns obtained from chemical processes, or mixed
10 yarns prevailingy composed, for at least 50%, of continuous fibres.

Discontinuous yarns, more hairy and less resistant than the continuous ones, has proved unfit for being worked according to this type of working, as frequent inter-
15 ruptions occur during the working due to loom stopping, yarn breaking, etc.

The same drawbacks take place, as is known, with mixed yarns, when the content of discontinuous yarns is higher than 50%.

20 Object of the present invention is to provide a process for the production of warp-knitted fabrics, with yarns substantially and prevailingy constituted of discontinuous fibres, i.e. having a content of 50% to 100% of discontinuous fibres, using warp-knitting looms for
25 warp-knitted fabrics having a plurality of reeds, high speed and high yield.

Another object of the invention is to realise and

provide fabrics to be used in technical-industrial fields, furniture, upholstery, footwear, in health-sanitary field, for clothing and the like, having a high thickness, realised from prevailingly discontinuous fibres, in a quantity in excess of 50%, using high speed, high yield warp-knitting looms of the tricot type.

Still a further object of the invention is to realise an apparatus suitable for the realisation of a process of warp-knitting with discontinuous or prevailingly discontinuous yarns.

These and still other objects and related advantages which will appear from the following description are achieved by a process for the production of warp-knitted fabrics realised on looms having a plurality of bars, said process comprising an unwinding stage of the yarn from the yarn supporting and housing beams, a yarn collection and winding stage on winding tubes synchronised with said stage of yarn unwinding, and a knitting stage of said yarn by high speed axial movements of a plurality of reeds placed close to one another, said knitting stage being realised in the presence of a continuous or intermittent current of a gas circulating in correspondence of said reeds, suitable to remove powder particles and/or fibre fragments from the surface of said reeds.

As is known, said reeds are constituted of a plurality

of sinkers located next to one another on a bar along the whole reed, and act cumulatively in correlation with the needles-carrying bar. Particularly, said needles are advantageously of the kind compound needles.

According to this invention, it has been found that by operating in a gas current, it is possible to work on high speed warp-knitting looms yarns comprising more than 50% discontinuous fibres and even constituted from 100% discontinuous fibres, without giving rise to drawbacks such as loom stopping, and ensuring production continuity and economy. It has been found that, according to the process subject matter of this invention, it is possible to work on high speed warp-knitting looms also yarns constituted from discontinuous natural and synthetic yarns, and blends with more than 50% discontinuous fibres.

Always according to the present invention, said gas current is obtained through continuous or interrupted inlet of a gas jet from a special nozzle, under a pressure sufficient to reach and remove said powder particles and/or fibre fragments from the surfaces of said reeds.

According to an alternative embodiment of the present invention, said gas current is obtained by creating a suction near said surfaces of said reeds.

Preferably, said gas is air or any other gas or gas

mixes, such as nitrogen, carbon dioxide and the like, possibly on prior drying of the same.

According to the process subject matter of the present invention, it is possible to obtain warp-knitted fabrics with discontinuous yarns or yarns comprising at least 50% discontinuous fibres, realised on warp-knitting looms having a plurality of bars, said fabrics being usable in technical-industrial fields, such as coagulation, coating, resin-coating, lamination and the like, for furniture and upholstery, footwear, the medical field, apparel field and the like.

An apparatus or loom suitable to realise said process according to the present invention, comprises:

- a plurality of yarn supporting and housing beams and the related mechanism for the unwinding of said yarn;
- at least a fabric collection and winding tube and the related winding mechanism synchronised with said yarn unwinding;
- a plurality of reeds constituted of several sinkers located next to one another along a bar, said sinkers being provided with a groove or cavity suitable to allow the passing and downwards fall of the powder and/or fibre fragments deposited on the surface of said reeds;
- at least a blowing duct conveying a pressurised gas, positioned near said reeds and provided with a plurality of holes or nozzles so oriented as to direct a flow

of said gas on the surface of said reeds and to remove said powder, causing it to fall under said apparatus.

The present invention is described hereafter with reference to the attached drawing provided only by way
5 of non limitative example, wherein:

Figure 1 shows a schematic section of the detail of an apparatus according to the invention, of the type comprising two reeds or bars.

With reference to such figure, the apparatus according
10 to the invention comprises a plurality of yarn supporting and housing beams and at least a fabric winding beam, not shown in the figure, being of a conventional type, and the two reeds 1 and 2, constituted of several sinkers 5 and 6 located on bars 3 and 4 respectively.

15 Sinkers are provided with cavities or grooves 7 and 8 between the sinker body and the bar.

Through the blowing duct 9, substantially constituted of a hollow bar supported by arm 10, pressurised air is blown according to arrow A, through the nozzles or
20 holes 11, towards top 5a, 6a of the sinker, when the

corresponding reed is in the knitting stage under nozzles 11. The air blown according to A causes the powder and/or fibre fragments to fall under bar 12 carrying fallers 13, and besides keeps cavities 7 and 8

25 clean, so that sinkers need not bearing a flexure due to infiltration of impurities, keeping in this way reeds perfectly clean and preventing any jamming and

subsequent stop of the loom.

Besides, always according to the invention, said warp-knitting loom has free sides with beams loads without central support.

5 For instance, such free sides, with three beam loads with flange diameter of 40 inch. each, are fit for housing two fractions per discontinuous yarn knitting with flange diameter of 1000 mm, and also knitting beams with continuous yarn with flange diameter of 30
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The free realisation of sides allows to place as one wishes said blowing duct for crossbeam and healding gears, even of serial type.

The advantages reached thanks the process and the
15 related apparatus according to the present invention comprise the realisation of a new high thickness fabric from discontinuous fibres or prevailingly discontinuous fibres, having special technical characteristics, in particular elastic and high resistance properties, that
20 at present can be obtained only with continuous fibre yarns, and special touch properties; besides, there is an increase in yield, as fabric production with warp-knitting looms is equal to about six times the one obtained with weaving-looms according to the known art.
25 Another advantage reached with the realisation of the process and apparatus according to this invention is due to the fact that, by using discontinuous yarns, it

is possible to utilise the same fabric supporting and housing beams, fraction and/or section warped, which are conventionally used in the other types of weaving instead of the beams usually used for warp-knitting with continuous yarn. As is known, the latter which can also be used for carrying out the process and the apparatus according to the present invention, are more complicated and expensive than the beams usually employed for the other types of looms. In fact, the beams used for continuous yarns utilised for warp-knitting are provided, as is known, with end flanges that are conical insideways, and besides they are much more strong and heavy than those used for the other types of weaving. Besides, by standardising formats and characteristics of beams, these become interchangeable with one another, with obvious and remarkable advantages for the running of the apparatuses, stock and spare part keeping, etc.

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CLAIMS

1. A process for the production of warp-knitted fabrics realised on knitting looms having a plurality of bars, comprising a stage of yarn unwinding from yarn support and housing beams, a stage of collection and winding of the fabric on winding tubes, synchronised with said yarn unwinding stage, and a knitting stage of said yarn by means of high speed axial movements of a plurality of reeds next to one another, said knitting stage being realised in the presence of a continuous or intermittent current of a gas circulating in correspondence of said reeds, suitable to remove powder particles and/or fibre fragments from the surface of said reeds.
2. The process according to claim 1, characterised in that said yarn is a discontinuous fibre yarn or a yarn constituted of at least 50% discontinuous fibres.
3. The process according to claim 1, characterised in that said gas current is realised by continuous or intermittent inlet of a gas jet from a special nozzle under a pressure sufficient to reach and remove said powder particles and/or fibre fragments from the surface of said reeds.
4. The process according to claim 1, characterised in that said gas current is realised by creating a suction near the surface of said reeds or looms.
5. The process according to claim 1, characterised in that said gas is air or any other gas or gas mixes,

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such as nitrogen, or carbon dioxide, possibly on prior drying of the same.

6. Warp-knitted fabrics containing at least 50% discontinuous fibre, realised on warp-knitting looms having a plurality of bars, said looms being usable in technical-industrial fields, such as coagulation, coating, resin-coating, lamination, in the furniture and upholstery field, footwear, the medical field, apparel/clothing and the like.

7. An apparatus suitable to realise the process according to claim 1, characterised in that it comprises:

- a plurality of yarn supporting and housing beams and the related mechanism for the unwinding of said yarn;
- at least a fabric collection and winding tube and the related winding mechanism synchronised with said yarn unwinding;

- a plurality of reeds constituted of several sinkers located next to one another along a bar, said sinkers being provided with a groove or cavity suitable to allow the passing and downwards fall of the powder and/or fibre fragments deposited on the surface of said reeds;

- at least a blowing duct conveying a pressurised gas, located near said reeds and provided with a plurality of holes or nozzles so oriented as to direct a flow of said gas on the surface of said reeds and to remove said powder, causing it to fall under said apparatus.

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8. Apparatus according to claim 7, characterized in that said reeds act cumulatively in correlation with a needles-carrying bar.

5 9. Apparatus according to claim 8, characterized in that said needles are of the kind compound needles.

10. Apparatus according to claim 7, characterized in that said beams are fraction and/or section warped.

11. The apparatus according to claim 7, characterised in that said yarn supporting and housing beams are of
10 the type normally employed in the common weaving technologies that use discontinuous or prevailingly discontinuous yarns.

12. Apparatus according to claim 7, characterized in that said beams are of the type normally employed in
15 the common weaving technologies that use continuous yarns.

13. The apparatus according to claim 7, characterised in that it has free sides with beam loads without central support.

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