

The invention concerns reinforcing yarns for stiffening fabric or technical textile applications and a process for their manufacture.

Such yarns are designed to be woven or to be inserted in a knitted fabric. They are frequently used in articles designed for stiffening of the tailor's canvas or stiffening fabric type. They bring their stiffening properties and their strength to the products in which they are incorporated.

For a long time, animal horsehair threads have been used to produce these reinforcing yarns for stiffening. Attempts have already been made to replace these natural threads with monofilament synthetic threads which exhibit stiffening properties and a strength close to those of the natural horsehair. However, the use of these synthetic fibres remains limited because the yarns thus obtained tend to slip inside the structure of the fabrics.

In order to avoid this slipping, it has been proposed to glue the fabric, with acrylic resins for example, after the weaving or knitting operations. This method makes it possible to avoid the slipping mentioned previously but makes the textile rigid since, as a result of the gluing, the yarns are joined to one another at their point of contact. Thus, this method does not make it possible to obtain textiles which retain good flexibility and good resilience while having the required stiffening and strength.

Consideration has also been given to twisting together two threads of the same length, for example a monofilament thread and a hairy thread. The rough surface of the hairy thread prevents the composite yarn from slipping (FR-A-2 270 355). Such a process cannot be used with threads having great rigidity which would remain straight during any attempt at twisting.

The object of the present invention is a partially synthetic, composite reinforcing yarn the composition of which avoids slipping in the structure of the fabric or the knitted garment in which it is incorporated, making it possible to avoid gluing the entirety of the textile or knitted fabric in which it is incorporated.

To resolve this problem, the invention proposes a reinforcing yarn for stiffening fabric or technical textile applications, designed to be incorporated in a textile base, characterised in that it comprises a synthetic or artificial

central thread, first covering fibres disposed around the central thread, the first covering fibres being glued on the central thread with the aid of an adhesive substance, these first covering fibres forming roughnesses which make the reinforcing yarn stand out.

The first covering fibres may constitute a thread which is wound around the central thread. They may also be individualised and be associated with the central thread by the friction spinning process.

According to one preferred embodiment, this reinforcing yarn comprises second covering fibres lodged in the roughnesses formed by the covering thread and designed to modify the feel of the reinforcing yarn.

The invention also concerns the process for manufacture of a reinforcing yarn for stiffening fabric or technical textile applications in which first covering fibres are wound around a central thread, the assembly of the central thread and the covering thread being impregnated with an adhesive substance then pressed out and dried.

According to one preferred variant of this manufacturing process, second covering fibres are lodged in the roughnesses formed by the first covering fibres, for example by friction spinning.

The invention will be described in detail with reference to the attached drawings in which :

- Figure 1 shows the reinforcing yarn of the invention in a first embodiment.
- Figures 2A and 2B show the reinforcing yarn of the invention in a second embodiment in a front view and a sectional view respectively.
- Figure 3 shows the reinforcing yarn of the invention in a third embodiment.
- Figures 4A and 4B show the reinforcing yarn of the invention in a fourth embodiment in a front view and a sectional view respectively.
- Figures 5A and 5B show the reinforcing yarn of the invention in a fifth embodiment in a front view and a sectional view respectively.

- Figure 6A shows the wrapping of the covering thread around the central thread.
- Figure 6B shows the gluing of the wrapped thread.
- Figure 6C shows the association of the covering fibres on the thread by friction spinning.
- Figure 6D shows the association of the second covering fibres by wrapping on the thread.

The reinforcing yarn 1 for stiffening fabric or technical textile applications is designed to be incorporated in a textile base. When this textile base is a woven fabric, the reinforcing yarn 1 is woven; when the base is a knitted fabric, the reinforcing yarns are incorporated in the system of stitches without participating in the formation of the latter. Depending on the intended use of the textile, they may be introduced parallel with the columns of stitches or on the other hand perpendicular to these.

These reinforcing yarns have a diameter generally greater than 10 hundredths of a millimetre.

The reinforcing yarn comprises a synthetic or artificial central thread 2 and first covering fibres 3 disposed around the synthetic central thread 2. The first covering fibres 3 are glued on the central thread 2 with the aid of an adhesive substance 4. The central thread 2 is generally monofilament. However, it may also be multifilament.

The central thread 2 is made in a synthetic or artificial substance such as polyamide, polyester or viscose.

The adhesive substance 4 serving to glue the first covering fibres 3 on the central thread 2 comprises a thermosetting polymer. Moreover, it may additionally or alternatively comprise a polymer which can be interlaced. The gluing may also be obtained by using a thermofusible polymer or thermofusible fibres associated in a mixture with the first covering fibres 3 or incorporated parallel with the central thread 2 at the time of covering.

The first covering fibres 3 may constitute a thread which is wound around the central thread 2 (figures 1, 3 and 5). The covering thread 3 makes the thread

2, 3 stand out. These two threads 2, 3 associated by gluing are locked to one another. The fact that the yarn thus formed stands out allows it to be secured in the structure of the woven fabric in which it is incorporated and thus prevents it from slipping. The covering thread 3 may be made from short fibres or from filaments.

The first covering fibres 3 may also be individualised and be associated with the central thread by the friction spinning process. These fibres 3 are then glued on the central thread 2 (figures 2 and 4). In this way, the first covering fibres also make the yarn stand out, which allows it to be secured in the structure of the woven fabric in which it is incorporated and prevents it from slipping.

Here the term "individualised" is used to qualify the state of the fibres used in the friction spinning process as opposed to the fibres which have been subjected to twisting and constitute a thread, or again as opposed to the filaments of great length.

It is particularly interesting to improve the feel of the thread provided with the first covering fibres 2, 3 by associating second covering fibres 5 lodged in the roughnesses formed by the first covering fibres 3.

The second covering fibres may form a covering thread which is spiral-wound around the assembly of the central thread and the first covering thread 2, 3 (figure 3). In the case in which the first covering fibres 3 themselves constitute a thread spiral-wound around the central thread 2, the second covering thread 5 preferably forms a spiral with the same pitch. It may be multifilament.

It is also possible to use individualised second covering fibres 5 which are interposed between the roughnesses formed by the first covering fibres 3.

According to a first embodiment described below, the first covering fibres 3 constitute a thread (1, 3 and 5).

When manufacturing the reinforcing yarn 1 for stiffening fabric or technical textile applications, a covering thread 3 is firstly spiral-wound around a central thread 2. The apparatus permitting the implementation of this phase of manufacture is shown in figure 6A. The central thread 2 is supplied from the bobbin 6 and the covering thread 3 from the hollow bobbin 7. When the central

thread 2 is multifilament (2a, 2b), it is composed from a plurality of bobbins such as 6a and 6b.

The wrapping spindle 8 winds the covering thread 3 in a spiral around the central thread 2. The yarn 2, 3 thus obtained is wound onto the bobbin 9.

After this winding or a wrapping phase, the assembly of the central thread 2 and the covering thread 3 is impregnated with an adhesive substance 4 then pressed out and dried, so that these two threads can be locked together (figure 6B). To this end, the yarn 2, 3 supplied from the bobbin 9 runs through an impregnating tank 10 filled with an adhesive substance 11 comprising a thermosetting polymer and/or a polymer which can be interlaced thermally. The yarn 2, 3 is then pressed out between the rollers 12, 13 and is then dried as it passes through the oven 14, then wound onto the bobbin 15.

The term "drying" used here embraces all the physical or chemical phenomena likely to occur after gluing to produce the adhesion of the covering thread 3 on the central thread 2. In particular, the adhesive polymer may be interlaced as it passes through this oven.

Other processes for locking the central thread with the covering fibres may be used, such as:

- Impregnating the threads with liquid polymers in solvent phase.
- Impregnating the threads with thermofusible polymers brought into contact in a molten state, either by impregnation in a bath kept at high temperature or by a nozzle or by pulverisation.
- Incorporating thermofusible fibres which will be fused later thermally and will serve to glue the threads to one another or the covering fibres to the central thread.
- Impregnating with synthetic resins or polymers sensitive to UV radiation, microwaves, etc.

The adhesive substance 4 may comprise a thermosetting resin, for example an acrylic resin, based on melanin, formol, polyester, etc..., or polymers which can be interlaced by UV radiation.

According to a second variant, the first covering fibres 3 may be individualised and be associated with the central thread by the friction spinning process. These fibres 3 are then glued on the central thread 2. The wrapping phase for the first covering fibres described previously (figure 3A) is replaced by a covering phase for the first fibres 3 by means of friction spinning (figure 3C). The other phases of the process are then unchanged.

Whether the first covering fibres 3 constitute a thread or whether they are individualised and associated with the central thread by friction spinning, it is possible to improve the feel of the yarn by disposing second covering fibres 5 on the first covering fibres 3. The second covering fibres 5 are lodged in the roughnesses formed by the first covering fibres 3. They may be made in two ways:

- The second covering may be made with discontinuous fibres by the friction spinning method known per se (figure 6C). The bobbin 15 of glued thread is used to feed a spinning machine 16 comprising perforated spinning drums 17, 18. These drums are also supplied through the intermediary of rollers with a rove of fibres 20; the fibres 20 are associated with the glued assembly of the central thread and the covering fibres 2, 3. The fibres 20 then constitute the second covering fibres 5 lodged in the roughnesses formed by the covering thread 3 and producing the yarn shown in figure 3. This yarn, ready for use, is then wound onto the bobbin 24. It is also possible to introduce fibres 23 parallel with the central thread, before disposing the covering fibres 5, to obtain a feel of superior quality.

- The second covering fibres 5 may also form a thread which is itself wrapped on the assembly of the central thread and the first covering fibres 2, 3 (figure 6D). The glued assembly of the central thread and the first covering fibres 2, 3 is then used to supply a wrapping spindle 22 jointly with a hollow bobbin 23' for the covering thread 3. After wrapping, the yarn obtained is wound onto a bobbin 24.

The central thread 2 is a coarse size of thread, for example 300 decitex. The first covering fibres 3 preferably constitute a thread with a size of between 100 and 150 decitex. The second covering fibres may be natural, artificial or synthetic in sizes of the order of 0,5 to 9 decitex. The spiral formed by the covering thread 3 preferably exhibits of the order of 2 to 5 turns to the millimetre.

The synthetic reinforcing yarns 1 thus obtained do not slip in relation to the textile structure in which they are incorporated, their feel is mainly determined by the nature of the covering fibres 5 and may thus be freely controlled. They may advantageously replace the wrapped horsehair yarns.

The central threads may have great rigidity; the length of the covering thread is greater than that of the central thread. The covering thread may be smooth.

PATENT CLAIMS

1. Reinforcing yarn (1) for stiffening fabric or technical textile applications, designed to be incorporated in a textile base, characterised in that it comprises:
 - a synthetic or artificial central thread (2);
 - first covering fibres (3) disposed around the central thread (2);
 - and in that the first covering fibres (3) are glued on the central thread (2) with the aid of an adhesive substance (4), these first covering fibres forming roughnesses which make the reinforcing yarn stand out.
2. Reinforcing yarn according to claim 1, characterised in that the first covering fibres (3) constitute a thread which is wound around the central thread (2).
3. Reinforcing yarn according to claim 1, characterised in that the first covering fibres (3) are individualised.
4. Reinforcing yarn according to claim 1, characterised in that the central thread (2) is monofilament.
5. Reinforcing yarn according to claim 1, characterised in that the central thread (2) is multifilament.
6. Reinforcing yarn according to any one of claims 1 to 5, characterised in that the central thread (2) is made of polyamide.
7. Reinforcing yarn according to any one of claims 1 to 5, characterised in that the central thread (2) is made of polyester.
8. Reinforcing yarn according to any one of claims 1 to 5, characterised in that the central thread (2) is made of viscose.
9. Reinforcing yarn according to any one of claims 1 to 8, characterised in that the adhesive substance (4) serving to glue the first covering fibres (3) on the central thread (2) comprises a thermofusible polymer.
10. Reinforcing yarn according to any one of claims 1 to 8, characterised in that the adhesive substance (4) serving to glue the first covering fibres (3)



on the central thread (2) comprises a thermosetting polymer.

11. Reinforcing yarn according to any one of claims 1 to 8, characterised in that the adhesive substance (4) serving to glue the first covering fibres (3) on the central thread (2) comprises a polymer which can be interlaced.

12. Reinforcing yarn according to any one of claims 1 to 11, characterised in that it comprises second covering fibres (5) lodged in the roughnesses formed by the first covering fibres (3) and designed to modify the feel of the reinforcing yarn.

13. Reinforcing yarn according to claim 12, characterised in that the second covering fibres (5) form a second covering thread, this second covering thread being multifilament.

14. Reinforcing yarn according to claim 12, characterised in that the second covering fibres (5) are discontinuous.

15. Process for manufacture of a reinforcing yarn (1) for stiffening fabric or technical textile applications, characterised in that :

- first covering fibres (3) are spiral-wound around a central thread (2),
- the assembly of the central thread (2) and the covering fibres (3) is impregnated with an adhesive substance (4) then pressed out and dried.

16. Manufacturing process according to claim 15, characterised in that second covering fibres (5) are lodged in the roughnesses formed by the first covering fibres (3).

17. Manufacturing process according to claim 16, characterised in that the second covering fibres (5) are spiral-wound around the central thread (2).

18. Manufacturing process according to claim 17, characterised in that the second covering fibres (5) are associated with the assembly of the central thread (2) and the first covering fibres (3) by friction spinning.

