May 8, 1951 W. B. PARKER 2,552,210

METHOD OF MAKING PLY YARN

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Fig. 1

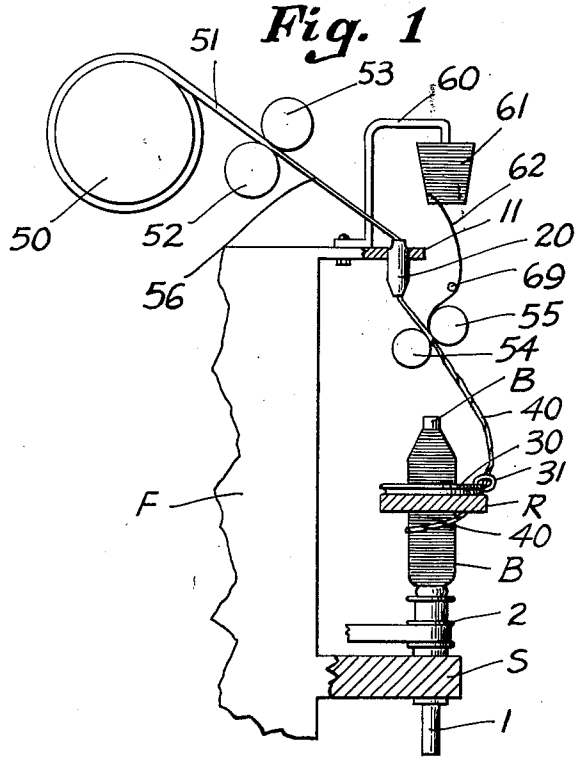


Fig. 2

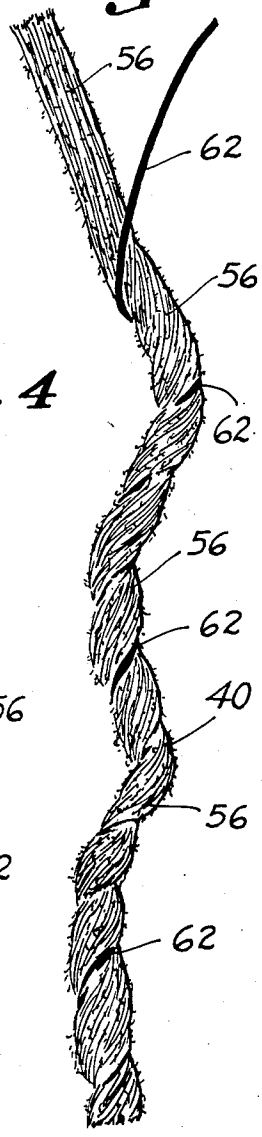


Fig. 4

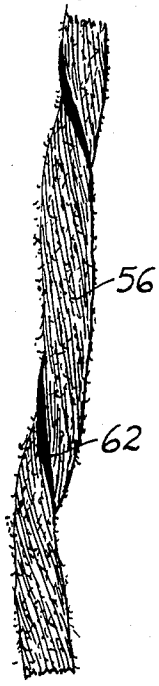
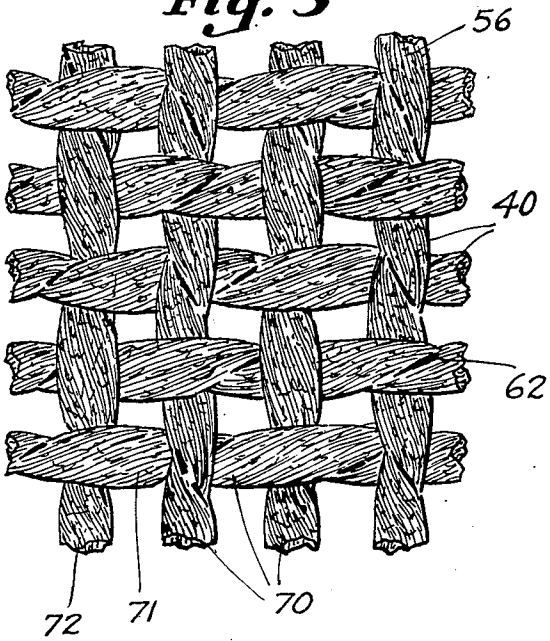


Fig. 3



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METHOD OF MAKING PLY YARN

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1 Claim. (Cl. 57—157)

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This invention relates to a new method of making ply yarn.

In the textile industry ply yarns have usually been made on a twisting frame. Two or more strands, each on an appropriate supply package and each in the form of twisted roving, spun yarn or filament yarn have been twisted together into a single twisted strand, known as ply yarn, on ring, cap or flyer type twisting frames.

Ply yarns have also been made on a spinning frame, by using it as a twisting frame. In this method the drafting mechanism on the frame is by passed entirely and the strands to be twisted are run from their supply packages directly into the ring, cap or flyer devices on the spinning frame.

In both of the above methods the strands are what may be called pre-made, for example a continuous synthetic filament already wound on a spool or a strand of fibrous material already spun into yarn on a bobbin. The process therefore has called for two operations, the making of several pre-made strands on one type of machine and the twisting of such strands together on another type of machine.

One of the objects of my invention is to produce a new ply yarn in one operation and on a single machine, the spinning frame, thus eliminating the separate twisting frame operation, and to do so while one of the strands is being spun into yarn on the spinning frame.

One object of my invention is to produce a new ply yarn which is not only less expensive to manufacture but which meets and exceeds the requirements of similar yarns made by former methods and which exhibits improved characteristics when knitted or woven into fabric.

A further object of my invention is to produce a ply yarn in small sizes which cannot be made by former methods because the roving is too weak to withstand the twisting operation and to give such small size ply yarn a high tensile strength.

A still further object of my invention is to enable the use of extremely fine counts of wool fibres, in making ply yarns which have the feel, appearance and wearing quality of the fibrous material, have high tensile strength and can be made into a strong, light fabric hitherto impossible to produce from such fibres.

The spinning frame used in my process is of the usual well known construction. Strands of wool fibres are delivered to it in the form of roving, the fibres being more or less parallel and the strand being substantially untwisted. The roving is guided through a back or feed drafting

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roll and through a front or delivery drafting roll which draws out the roving to the required size. The roving is then given the desired amount of twist, into what is known as yarn, by a cap, ring or flyer twisting mechanism also on the spinning frame.

My invention improves on the yarn made in the above normal manner on a spinning frame, by adding a pre-made, finer count, strand of high tensile strength, namely a fine filament nylon yarn, to the roving as it passes through the nip of the front or delivery draft rolls. The two strands are thus entwined together into a ply yarn while the roving is twisted into yarn in a single operation. While useful to give additional strength to strong rovings my method is particularly applicable for use with weak rovings.

The roving used in my ply yarn is of too low a tensile strength to stand independent twisting on a ring spinning frame, for example, rovings of short fibres of wool which tend to break easily. A roving which is not only of short fibres of wool, but is also of extremely fine count, is of course exceptionally weak and my invention is particularly useful with weak rovings of this kind.

By the term "twisting" I means the holding of one end of a single strand, or of several strands, and the revolving of the opposite end, or ends, on the longitudinal axis thereof. I use the term "entwining" to describe the action of two or more strands when subject to such twisting.

I use as a strengthening or reinforcing strand a filament of nylon of thirty denier or less, which corresponds in size to a woolen yarn count of 186 or more and is exceptionally fine.

Depending on the size of the roving to be twisted into yarn, I prefer to use a nylon strand which is considerably smaller in size, than the roving for example from one half to one tenth as large. The nylon strand thus becomes well embedded between the twists of the roving in the resulting ply yarn. However the nylon strand and the roving may be nearly equal in size and still give good results since the fibres tend to curl over and around the nylon strand more or less embedding it therein.

In some suitable location on the spinning frame I attach supply packages of nylon strands and guide each end through the nip of each set of front or delivery draft rolls. The rotation of the rolls draws the strand off the supply package, thereafter, and feeds it into the twisting mechanism together with the drafted roving also passing through the nip so that both strands are entwined into ply yarn.

In the contradistinction to prior devices, there is no tension whatever on my nylon strand between the package and the nip of the draft rolls. Neither the nylon strand nor the roving strand is fed more rapidly than the other as is the case in the making of a core yarn or a covered yarn. Instead, the two strands spiral around each other to form a ply yarn.

The addition of the nylon strand gives support to the weak roving as it is subected to the stresses and strains of the cap, ring or flyer twisting mechanism caused by the inertia or drag of the travelers or similar tensions. Upon receiving twist from the twisting mechanism, a strong serviceable ply yarn is formed from the nip of the front draft rolls down to and onto the bobbin in one continuous operation on the spinning frame. The resultant ply yarn improves over ordinary ply yarns having a reinforcing strand, because in my invention the fibrous strand is twisted into yarn as part of the operation of entwining it with a nylon strand of much finer count thus causing the twists of the roving to partially cover the nylon strand and giving a completely new yarn of improved characteristics.

In the drawings,

Fig. 1 is a diagrammatic side elevation, partly in section of a typical ring spinning frame and illustrating the apparatus used in my new method of making ply yarn.

Fig. 2 is an enlarged plan view of the ply yarn produced by my new method and

Fig. 3 is a plan view of a fabric made from the yarn shown in Fig 2 and

Fig. 4 is a plan view of ply yarn produced by my new method with less twist than that shown in Fig. 2.

As shown in the drawings, F is the frame of a typical ring spinning frame having a ring rail R, spindle rail S and a member 11 for supporting false twist tubes 20. Spindles 1 are shown as fixed in spindle rail S and a bobbin B is revoluble on said spindles by means of a whorl 2 all constructed in a well known manner.

I do not limit myself to this particular type of spinning frame, since my process is usable on frames having traversing spindle rails, traversing bobbin rails or traversing ring rails as well as all types of cap or flyer frames.

Ring rail R carries a ring 30, upon which a traveler 31 is guided and through which my ply yarn 40 passes as the traveler and yarn revolve around the ring 30 and are wound upon the bobbin.

50 is a large spool or similar supply package upon which roving 51 is wound and from which it is drawn by the nip of the back or feed rolls 52, 53 of the drafting mechanism. The roving 51 then passes through false twist tube 20, revolving in member 11, which imparts a false twist to strengthen the roving during the drawing out process.

Roving 51 is drawn to the required size by the action of front or delivery drafting rolls 54, 55 which revolve faster than 52, and 53 thus stretching out the roving and reducing its diameter as shown at 56. The roving 51 has only a false twist and is thus comparatively weak when it is delivered by the draft rolls 54 and 55 to pass through the twisting process.

My invention lies in the provisions of a nylon strengthening strand 62, wound on a volute, filling or cone wound supply package 61, carried by a suitable support 60 attached to frame F, said strand 62 passing over or under suitable guides 69 and being introduced between the nip of front drafting rolls 54 and 55. Strand 62 is continuously drawn off the supply package 61 by the rotation of rolls 54 and 55 and joins roving 56 to support it while the two strands become twisted together into a single strand of ply yarn.

As shown in Fig. 2, the roving 56 and strengthening strand 62 may have considerable twist so that the strand 62 is substantially imbedded or as shown in Fig. 4 if a less twist is imparted the strand 62 may be more prominent.

The supply package 61 is of the well known cone type, the foundation being a cone and the winding being of such a character that when pulled off, especially if the cone is upside down as shown, there is actually no tension whatever on the strand 62, such as is inevitable where a spun or twisted thread must turn a bobbin or spool for delivery. The spinning ring 30 and traveller 31 spin the roving 51 and strand 62 causing them to spiral about each other as in types of ply yarn made from preshrunk strands.

In actual practice, since the roving is soft and fibrous and of considerably greater diameter than the strengthening strand, the latter is substantially embedded in the fibres, giving the twisted strand the feel and appearance of the wool fibre material.

When my ply yarn is woven or knitted into fabric, the fabric has the appearance of the wool fibre material. As shown in Fig. 3, in woven fabric 70, I can use my ply yarn for the filling 71 or the warp 72 or for both and the fabric may be unusually light in weight for the strength achieved. The fabric has the feel of the fibrous material and is cheaper to manufacture than fabrics of corresponding quality, or made by old methods, because of eliminating the cost of the twisting frame operation, because the fibres used can be shorter, weaker and less expensive or because the yarn used can be of finer counts of long or short fibres.

It should be noted that the amount by which my strengthening filament may be covered or imbedded in the wool fibre roving is not dependent on the tension of the filament when introduced, as is the case with prior devices which produce only core yarns. I secure more or less prominence for my strengthening strand by varying the amount of twist imparted to the ply yarn by the twisting device, as shown in Figs. 2 and 4, with no tension on the filament at any time. I call my ply yarn "uncored" to differentiate it from core yarns in which the strengthening strand is tensioned rather than free running as in my invention.

I claim:

The method of making a ply yarn of two strands intertwined each of equal length and pitch which consists of passing roving of low tensile strength through the back rolls of a spinning frame, thence giving it a false twist between front and back rolls and thence through the front draft rolls and at the same time unwinding a fine pre-made strand of high tensile strength from the small end of a cone wound package, the small end of the package being down, and delivering both roving and pre-made strand in juxtaposition from the nip of the front rolls through a traveler on a ring positioned in said spinning frame onto a revolving bobbin.

WALTER B. PARKER.

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