

[54] **FRICION CRIMPING OF SYNTHETIC
THREADS**
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[57] **ABSTRACT**
Friction crimping of synthetic threads with the aid of rotating discs characterized by the employment of the thread to be crimped for driving the discs. There may be a simultaneous crimping of two threads with twists of the same or of opposite hand, of which only one thread serves to drive the discs. Apparatus for carrying out the method of friction crimping is also provided.

9 Claims, 7 Drawing Figures

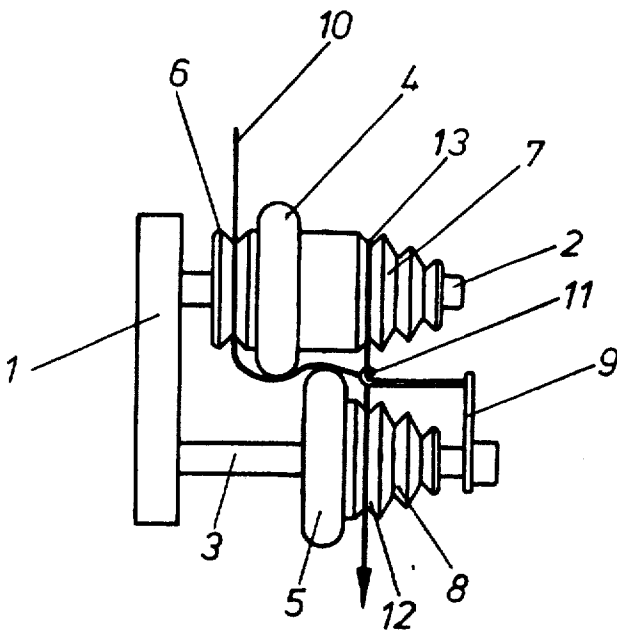


Fig. 1

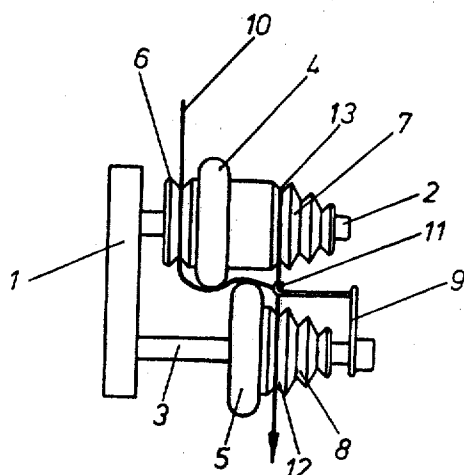


Fig. 2

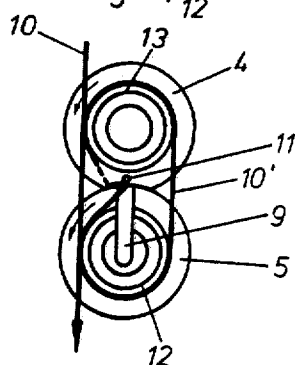


Fig. 3

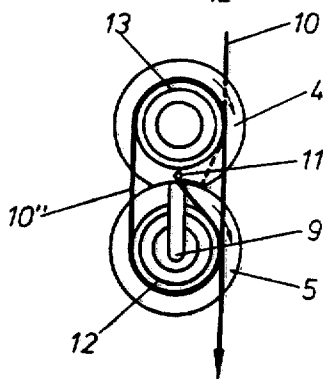


Fig. 4

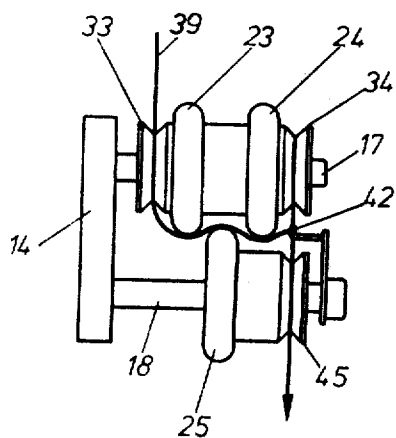


Fig. 5

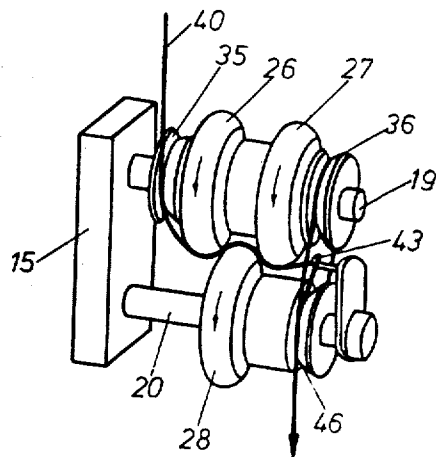
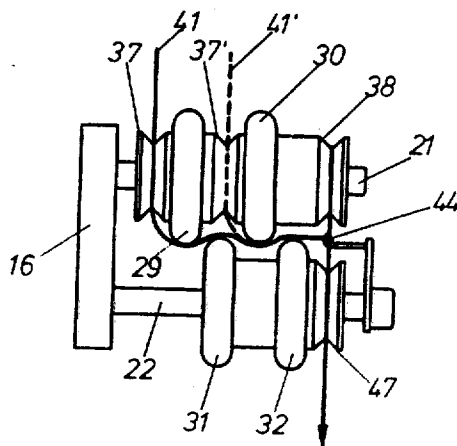


Fig. 6



FRICION CRIMPING OF SYNTHETIC THREADS

This invention relates to a method of friction crimping synthetic threads with the aid of rotating discs, and to apparatus for carrying out the method.

Crimping methods of this kind for the purpose of producing a false twist are broadly known. They have hitherto been put into practice with the aid of various devices, and especially with the aid of rotating discs. For this purpose the periphery of the disc is generally covered with a material which, like polyurethane for example, has a high coefficient of friction. Up to now, in crimping arrangements of this kind the rotatable discs have been driven from an external source of power. This requires a separate motor, making the arrangements in question expensive and liable to various faults.

These drawbacks are overcome, according to the present invention, by employing the actual thread to be crimped as the means for driving the rotating discs. In particular, where two threads are crimped simultaneously, with twists of the same or of the opposite hand, it may be preferred to arrange it in such fashion that only one of the threads serves to drive the discs, and this shows particular advantage because of the increase in production which is thereby obtained.

According to another preferred feature of the present invention, in apparatus for carrying out such friction crimping at least one thread-receiving grooved pulley is mounted on each side of that disc which receives the incoming thread. The groove provided in the thread entry pulley serves to guide the thread while the other provides the drive for the rotating disc.

When two interconnected rotatable discs are mounted in bearings so as to be freely rotatable on each of two parallel axes, then in such apparatus for carrying out friction crimping, according to a further feature of the present invention, an additional groove can be provided between those discs which are present to act on the moving thread. This additional groove is then arranged to perform the thread entry either sequentially over all the discs present or only over those two which come last in the path of travel of the thread.

Of particular significance for the chief feature of the invention mentioned above is its further feature that, in apparatus for performing the crimping in question, each of the two rotatable discs or pairs of discs effecting a frictional action on the thread in direct succession has associated with it a set of grooves of like formation comprising at least two grooves of different diameters. This allows the speed of rotation imposed by the crimped thread on the rotatable discs to be varied in steps so as to match the degree of crimping. This is further possible in a variable manner if, likewise according to the present invention, a releasable connection is provided between the sets of grooves and the friction discs.

Finally, in apparatus of the kind here indicated, the provision of an adjustable thread guide on the axis of at least one of the rotatable discs makes it possible, according to this invention, to guide the thread to be crimped easily into that groove track which has been selected to give the desired ratio. Moreover, through this adjustability, the necessary guiding and engagement of the thread to be crimped as it passes through the apparatus can be made to suit the quality or nature of the friction surfaces provided on the friction discs.

Further details of the invention are given in the following description taken in conjunction with the accompanying drawings which illustrate a number of embodiments by way of example.

In particular, FIG. 1 shows a side elevation of an arrangement in which the crimping is achieved with the aid of two friction discs which rotate on separate axes and of which each disc has an associated set of grooves of like form made up of a number of grooves of different diameters in the manner set out above. The guiding of the thread through the apparatus can be arranged either to obtain a twist in the S direction as shown in FIG. 2 or in the Z direction as shown in FIG. 3. FIGS. 4 to 6 show in side elevation and in a perspective view embodiments with altogether at least three friction discs, and finally, in FIG. 7 there is illustrated a perspective view of a construction by which it is possible to crimp two threads of opposite twist simultaneously, as set out above.

In the arrangement of FIG. 1 spindles 2 and 3 are rigidly mounted on the common baseplate 1. Friction discs 4 and 5 are mounted to be freely rotatable on the spindles, the disc 4 being connected rigidly to the pulley 6 with the entry groove and to the pulley 7 with a set of grooves. The disc 5 has secured to it the pulley 8 with a set of grooves which is identical in its construction to the pulley 7. The thread guide 9 is adjustably mounted on the free end of the spindle 3.

The synthetic thread 10 to be crimped runs in the entry groove in the pulley 6, provided for the sole purpose of guiding it, and is then led by the eye 11 of the thread guide 9 to the friction surfaces of the discs 4 and 5 either in the path shown in FIG. 2 to give it an S-twist or in the path shown in FIG. 3 to produce a Z-twist. It will be noted that, from the eye 11 of the thread guide, the thread passes round the groove 12 of the pulley 8 to lead either into the intermediate portion 10' (FIG. 2) or into the intermediate portion 10'' (FIG. 3). In each case the friction disc 5 is rotated by the passage of the moving thread 10 around the groove 12 of the pulley 8.

Also the friction disc 4 is driven by the moving thread as it passes round the groove 13 of the pulley 7. After leaving the groove 13 of the pulley 7 the thread is guided in a free tangential path into the groove 12 of the row 8 in the direction of the arrow shown, whereupon it then emerges from the friction disc assembly.

In the arrangements of FIGS. 4 to 6, spindles 17 to 22 are rigidly secured on baseplates 14 to 16. Friction discs 23 to 32 are mounted to be freely rotatable on the spindles. The discs 23 and 24, 26 and 27, 29 and 30, and 31 and 32 are secured together in pairs, respectively. In addition to the pairs of discs 23 and 24, 26 and 27, 29 and 30, formed in this way, the entry pulleys 33, 35, 37 or 37' and the driving pulleys 34, 36 and 38 are attached securely to the discs. Likewise the discs 25, 28 and the pairs of discs 31, 32 are secured to the driving pulleys 45, 46 and 47. The thread 39, 40 or 41 to be crimped passes over the entry pulley 33, 35, 37 or 37' to the thread guide 42, 43 or 44 and is thus brought into contact with the friction surfaces of the discs 23, 25 and 24 or 26, 28 and 27 or 29, 31, 30 and 32, or simply with the discs 30 and 32. Coming from the thread guide 42 to 44, the thread to be crimped first passes around the driving pulley 45, 46 or 47 and then the driving pulley 34, 36 or 38, thus rotating the discs. The thread is lightly guided by the pulley 45, 46 and 47 as it leaves the crimping apparatus in the direction of the arrow as shown.

In the particular embodiment of the crimping device of FIG. 6, the length of thread exposed to frictional engagement can be reduced if desired by loading the thread 41' into the entry pulley 37'. The friction discs 29 and 31 and the pulley 37 then have no function.

In the arrangement for the simultaneous friction-crimping of two threads, as shown in FIG. 7, only the one thread is used for driving the friction discs 51 to 53. The two spindles 49 and 50 are rigidly mounted on the baseplate 48. The pair of friction discs 51, 52 is rotatably mounted on the spindle 49 and has the pulleys 54 and 55 with sets of grooves rigidly secured to it on both sides of the pair. The friction disc 53 is freely rotatable on the spindle 50 and has pulleys 56 and 57 secured to it.

The thread 60 passes from an entry groove of the pulley 54 to the eye 62 of the thread guide 59 and is thereby brought into engagement with the friction discs 51, 53 and 52. Coming from the eye 62 it first passes around the driving groove 57 and then around one of the driving grooves of the pulley 55. In this way it drives the friction discs 53 and 51, 52 before it leaves the apparatus in the direction of the arrow as shown, being loosely guided in the groove 57. The thread 61 passes through the entry groove of the pulley 55 to the eye 63 of the thread guide 58 and is thereby brought into engagement with the friction discs 51, 52 and 53. As the thread 61 is not required to drive the crimping apparatus, it leaves the friction disc assembly in the direction of the arrow as shown, coming from the eye 63 and being loosely guided by the pulley groove 56.

What is claimed is:

1. In an apparatus for imparting a false twist to a running synthetic thread by means of rotating friction elements engaging said thread and driven by said thread, the thread being subjected to a setting treatment while in a state of high twist to obtain a crimped thread; the improvement comprising two friction elements each rotatable about one of two parallel axes and each including at least one annular drive groove and at least one friction disc having a friction surface consisting of a resilient and abrasion-resistant material with a high coefficient of friction, the inner diameters of the drive grooves being equal, the outer diameters of the friction discs being equal and the friction discs being axially spaced from and overlapping each other; there being furthermore provided a first annular thread-receiving groove in one friction element and thread guide means; the arrangement being such that the thread is fed via said thread-receiving groove and leaves via said drive grooves thereby entraining the friction elements for rotation; the thread being guided by the thread-receiving groove and by the thread guide means along the friction elements in a path substantially parallel to said axes of rotation and perpendicular to the friction discs; the thread guide means guiding the thread coming from the friction discs into the drive grooves.

2. The improvement of claim 1, wherein the two friction elements are arranged for rotation in the same direction.

3. The improvement of claim 1, wherein the inner diameters of the thread-receiving groove and of the drive grooves are equal.

4. The improvement of claim 1, wherein each friction element is provided with a set of axially spaced annular drive grooves having different inner diameters, the two sets of grooves being identical.

5. The improvement of claim 4, wherein each set of grooves is releasably connected to an associated friction element.

6. The improvement of claim 1, wherein the thread guide means is adjustable with respect to the friction elements.

7. The improvement of claim 1, wherein the two friction elements are each provided with at least two axially spaced friction discs connected with one another, at least one of the two friction elements being provided with at least one further annular thread-receiving groove axially spaced with respect to the first annular thread-receiving groove.

8. The improvement of claim 1, wherein there are provided at least two friction discs on one friction element and at least one friction disc on the other friction element axially enclosed by the said two friction discs, there being furthermore provided on both sides of the friction discs a thread guide means an an annular thread-receiving groove, the arrangement being such that two threads are guided along the friction elements engaging the friction discs, only one thread then passing through the drive grooves to entrain the friction elements for rotation.

9. The improvement of claim 1, wherein each friction disc is provided with a friction surface consisting of polyurethane.

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