

A Device for Storing and Supplying Thread,
in Particular for Textile Machines

The invention relates to a device for storing and supplying thread, in particular, for textile machines, with a storage drum in the style of a bar cage comprising a number of elongate thread supporting elements arranged at equal radial distances from the drum axle and distributed uniformly in the circumferential direction, which, extending substantially in the axial direction of the drum, are attached at both ends to a drum body or to parts connected thereto, and each of which is in the form of a narrow support comprising on the thread feeding side a radially inwardly tapering area acting as run-on slope for the incoming thread and an adjoining area which is substantially straight at least in sections thereof, forming a thread supporting area for several windings of a coil of thread, followed by a radially protruding, circular, continuous thread run-off rim of the drum body or of a part connected thereto, the tapering and substantially straight areas of all supports being located on common, conceived solids of revolution coaxial with the drum axis and with thread feeding and thread removing elements associated with the storage drum on the thread feeding side and the thread removing side, and with a driving mechanism for producing a relative rotational motion between the storage drum and the thread feeding and thread removing elements.

Thread supplying devices whose storage drum, as a rule, rotatably mounted on a holder, is in the form of a bar cage whose thread supporting elements formed by straight cylindrical wires or thin bars are secured at both ends to flange-like parts of a drum body arranged on the storage drum axle, are known in several embodiments (for example,

German Offenlegungsschrift (unexamined patent application) 3,104,516, German Offenlegungsschrift (unexamined patent application) 2,723,210). The coil of thread formed on the bars acquires a polygonal shape corresponding to the number of bars, which is conducive to good slip-free thread entrainment, while, on the other hand, the relatively narrow thread supporting surfaces formed by the bars create favourable conditions for axial advance of the storage coil. Suitable advancing mechanisms which are relatively expensive and elaborate are, however, required to effect this axial advance of the storage coil.

A prior art thread supplying device (German Offenlegungsschrift (unexamined patent application) 3,437,252) of this kind, whose storage drum in the form of a bar cage is provided with thread supporting elements comprised of thin spring wire supports which are attached at both ends to the drum body and each of which comprises on the thread supplying side a radially inwardly tapering area acting as run-on slope for the incoming thread and adjoined by a substantially straight area forming the thread supporting area for several windings of the thread or storage coil, dispenses with such advancing mechanisms. The windings of the incoming thread formed in the run-on area are automatically axially advanced onto the thread supporting area by the slope of the run-on area under the effect of the thread tension, which ensures continuous advance of the storage coil.

The thread runs from the storage coil via the radially protruding, circular run-off rim which is continuous in the circumferential direction, to the thread removing eyelet. The arrangement is such that the thread run-off rim is arranged on the drum body in the style of a circular

disc whose plane of symmetry extends approximately at right angles to the thread supporting area of the thread supporting elements. This arrangement also applies, in principle, to the storage drums of the thread supplying devices mentioned at the outset.

In the processing of certain yarns, in particular, low quality polyamide or polyester yarns, torn off single filaments or other fibre pieces may become detached from the yarn and twirl around the bars or thread supporting elements which generally stand alone, in particular, in the thread run-off area. Such yarn or fibre pieces may also get stuck between the bars or thread supporting elements in the thread run-off area and accumulate over a longer operating period. As a result of these phenomena, the thread is finally prevented from unwinding from the storage drum in an orderly fashion and disturbances occur in the thread supply.

The object of the invention is, therefore, to remedy this deficiency and to so improve a thread supplying device of the kind mentioned at the outset that also in the processing of such yarns which are difficult to process, for example, low quality polyamide or polyester yarns, an undesired accumulation of pieces of yarn which have snapped off or become detached from the yarn, for example, endless filaments which have broken loose, is eliminated in the thread run-off area of the storage drum.

In order to attain this object, the device for storing and supplying thread is characterized in accordance with the invention in that the thread run-off rim is adjoined in the direction of the run-on slopes of the supports by a radially inwardly inclined circumferential surface of a

rotation-symmetrical cover which is coaxial with the drum axis and which is continuous in the circumferential direction, at least in the areas located between neighbouring supports, and into which the supports sink in a substantially uninterrupted manner, and in that the circumferential surface on the thread run-off side of the storage drum is continuously axially scrapeable by the thread as it unwinds from the thread supporting area and travels to a thread removing element.

The circumferential surface of the cover which is constantly scraped by the unwinding thread prevents fibre accumulations from continually settling in the thread run-off area. Since the thread supporting elements sink uninterruptedly into this circumferential surface, there are no dead angles in which undesired accumulations could develop in the proximity of the thread supporting elements.

Starting in an area of large diameter located in the proximity of the run-off rim, the circumferential surface of the cover advantageously extends with an area of smaller diameter radially inwardly as far as at least to the centre of the substantially straight support parts. It is also expedient for one end of the circumferential surface to directly adjoin the run-off rim in an uninterrupted manner.

The all around continuous circumferential surface of the cover may comprise apertures accommodating the substantially straight support parts so that the supports are surrounded on all sides by the circumferential surface.

The circumferential surface of the cover may be of substantially conical shape, but it has proven particularly advantageous for the circumferential surface to have a

concave curvature.

It is expedient for the cover to consist of a material which at least in the area of the circumferential surface is wear-resistant so that impairment of the surface by the thread constantly scraping over it is also excluded over long operating periods.

To obtain a particularly simple structure, the drum body comprises two coaxial circular flanges to which the supports are attached at the ends and at one of which the run-off rim is formed. The supports are advantageously arranged so that they stand alone between the flange adjacent to their run-on slope and, at least in the area of the circumferential surface, the cover. This enables simple cleaning by means of a jet of compressed air.

The supports may also merge in the area of their run-on slope substantially tangentially into inclined surface parts of the adjacent flange, and the inclined surface parts may be formed on rib-like parts of the corresponding flange or the drum body which are associated with the individual supports and are so arranged that they extend substantially radially. The drum body itself advantageously consists of plastic.

To facilitate axial advance of the storage coil, the supports may lie with their substantially straight areas on a conceived cone whose diameter decreases towards the run-off rim. In practice, it has proven advantageous for the diameter taper of the straight areas of the supports to be approximately 0.2 to 1 mm throughout their length.

It is expedient for the supports to be bent from wear-

resistant wire, but it is, in principle, also conceivable to make them out of plastic, preferably with a wear-resistant coating, and they may then be directly moulded on the drum body or be in the form of punched or injection-moulded shaped parts etc.

To force the unwinding thread into contact with the supports and the circumferential surface cover throughout its entire surface, a ring for the unwinding thread may be placed loosely, but so that it cannot get lost, on the supports in the area of the cover.

An embodiment of the subject of the invention is illustrated in the drawings, in which:

Figure 1 is a side view of a device for storing and supplying thread according to the invention;

Figure 2 is a side view on a different scale of the storage drum of the device for storing and supplying thread shown in Figure 1;

Figure 3 is a partial plan view of the storage drum shown in Figure 2, taken along line III-III of Figure 2; and

Figure 4 is a partial side view of a detail of the storage drum of Figure 2.

The device for storing and supplying thread illustrated in Figure 1 comprises a holder 1 which is adapted for attachment to a frame ring of a circular-knitting machine and on which a storage drum 4 is rotatably mounted by means of an axle 2 (Figure 3). Associated with the storage drum as

driving mechanism is a belt pulley 5 which is mounted on the axle 2 for rotation therewith and which can be made to rotate by a driving belt, not illustrated in further detail.

Arranged on the holder 1 as thread feeding mechanisms are a thread feeding eyelet 6 and a thread feeding eye 7, through which a thread 8 coming from a spool, not illustrated, is fed to the storage drum 4 via a thread brake 9, likewise provided on the holder 1. An inlet feeler 10 senses the thread as it is fed to the storage drum 4 and has the machine stopped in the event of thread breakage. The thread 8 running off the storage drum 4 passes through a removing eyelet 11 constituting the thread removing mechanism which is attached to the holder 1 and is arranged laterally adjacent to the storage drum 4 and at a pre-determined distance below its run-off rim 12 so that the thread running tangentially off the storage drum 4 is guided downwardly at an incline and radially outwardly. The thread is sensed by an outlet feeler 120.

The structure of the storage drum 4 is shown in detail, in particular, in Figures 2 and 3:

The storage drum which is made substantially of plastics material comprises an approximately disc-shaped, circular upper flange 13 and a similarly circular lower flange 14 forming the continuous run-off rim 12, which are arranged in spaced coaxial relation to each other and are joined together by a coaxial hub section 15. A number of elongate thread supporting elements distributed uniformly in the circumferential direction and arranged at equal radial distances from the drum axle 2 are provided in the style of a bar cage. They are formed by substantially L-shaped supports 16 which are bent from tempered cylindrical steel

wire with a polished surface. The ends of the supports 16 are anchored in the two flanges 13, 14. They each comprise on the thread feeding side (at the top in Figure 2) a radially inwardly tapering area 17 forming a run-on slope for the incoming thread 8, adjoined via a radius 18 by a substantially straight area 19 serving as thread supporting area for several windings of a thread or storage coil indicated at 20. The radius 18 between the run-on slope and the thread supporting area may be of the order of magnitude of approximately onefold to fourfold the wire diameter of the supports 16. Both the tapering areas 17 and the areas 19 associated with the radius 18 of all supports 16 lie, in each case, on a common conceived solid of revolution which is coaxial with the drum axle 2.

The conceived solid of revolution associated with the straight area 19 is a cone of weak inclination whose diameter decreases towards the run-off rim 12. The taper of the diameter in the case of the straight areas 19 is approximately 0.2 to 1 mm throughout their length.

In the area of their run-on slope at 17, the supports 16 merge substantially tangentially into inclined surface parts 21 of the adjacent flange 13 formed on rib-like parts 22 of the flange 13 which are so arranged that they extend substantially radially. Alternately, a continuous, uninterrupted, i.e., closed inclined surface 21 is also feasible.

A cover 23 consisting of metal or a plastics material with a wear-resistant surface is placed on the lower flange 14. It may also constitute an integral part of the flange 14. The cover 23 which is constructed in the style of a solid of revolution coaxial with the drum axle 2 comprises a

circumferential surface 24 which is radially inwardly inclined in the direction of the run-on slopes 17 of the supports 16 and into which the supports 16 sink with their straight areas substantially uninterrupted, i.e., with a smooth transition. For this purpose, the all around continuous circumferential surface 24 of the cover 23 comprises apertures 25 accommodating only the substantially straight support areas 19 with their rims closely adjoining the support areas 19. In the (lower) area of largest diameter, the circumferential surface 24 uninterruptedly adjoins the circular run-off rim 12 and then extends radially inwardly with a concave curvature. With its area of smallest diameter, it extends at least as far as the centre of the substantially straight support areas, but, in the instant case, as far as behind the radially inwardly located side of the substantially straight support areas 19.

In a variant of the illustrated embodiment, the circumferential surface 24 could also be a conical surface. In that case, the width of the storage coil 20 must be of such dimensions that the unwinding thread 8 separates from the storage coil 20 only at a very low point.

Finally, a ring 27 for the unwinding thread which encloses the supports 16 with play is placed loosely, but so that it cannot get lost, on the cover 23 to enable the unwinding thread 8 to pass through between the ring 27 for the unwinding thread and the circumferential surface 24 of the cover 23 or the run-off rim 12.

The incoming thread 8 coming from the inlet eyelet 6 hits at approximately 28 in Figure 2 the inwardly inclined parts 17 of the supports 16 forming the run-on slope and

begins to form the storage coil 20 in the area of the radius 18. The incoming thread 8 is supported at the top at the parts of the supports 16 which are outwardly bent in the radius 18 and at the run-in slope and, therefore, continually pushes the storage coil 20 in an axially downward direction. This advancing of the storage coil 20 is facilitated by the substantially straight thread supporting areas 19 of the supports 16 lying on a conceived cone tapering slightly towards the run-off rim 12, as described hereinabove.

The thread 8 running from the storage coil 20 to the removing eyelet 11 and from there to the knitting point strokes in the area of the storage drum 4 illustrated in Figure 2, from the left to the right, continually from the top to the bottom, the straight areas 19 of the supports 16 located under the storage coil 20 and the areas of the circumferential surface 24 of the cover 23 located between and below the apertures 25. Both the supports 16 forming the thread supporting elements and the circumferential surface 24 are thereby continuously scraped or wiped in a substantially axial direction, as illustrated again schematically in Figure 4. An accumulation of thread or fibre particles carried along by the thread 8 is thus effectively prevented. Filaments which have broken away are also kept from twirling round the supports 16 in the thread run-off area. Since the support areas 19 sink into the circumferential surface 24 via the closely adjoining apertures 25 in a smooth continuous manner, dead angles which cannot be stroked by the thread 8 and could, therefore, lead to an accumulation of fibres are avoided.

The ring 27 for the unwinding thread which consists, for

example, of a plastics material and is placed on the cover 23 forces the thread 8 passing through the ring into contact throughout its entire surface with the support areas 19 and the circumferential surface 24 of the cover 23.

In the illustrated embodiment, the circumferential surface 24 is of all around continuous design, with only the apertures 25 permitting passage of the support areas 19. Alternately, it is also conceivable to divide the inclined circumferential surface 24 into surface areas between the support areas 19, and, in that case, the supports 16 could be bent outwardly at an incline, as at 17, in the proximity of the flange 12, i.e., adjoining the substantially straight areas 19, which would result in a substantially C-shaped support design.

As is apparent from Figure 2, the supports 16 are arranged to stand alone, beginning at their area 17, until they sink into the apertures 25, which is achieved by a correspondingly small diameter of the hub section 15. Embodiments wherein the supports are, for example, embedded throughout half of their diameter in the plastics material of the drum body or the hub section 15 are also conceivable.

The supports 16 may also be shaped parts which are punched out of sheet steel or injection-moulded from plastics material etc. It is similarly conceivable to use profiled wires having a cross-sectional shape other than the circular cross-sectional shape for this purpose.

Patent Claims

1. Device for storing and supplying thread, in particular, for textile machines, with a storage drum in the style of a bar cage comprising a number of elongate thread supporting elements arranged at equal radial distances from the drum axle and distributed uniformly in the circumferential direction, which, extending substantially in the axial direction of the drum, are attached at both ends to a drum body or to parts connected thereto, and each of which is in the form of a narrow support (16) comprising on the thread feeding-side a radially inwardly tapering area (17) acting as run-on slope for the incoming thread and an adjoining area (19) which is substantially straight at least in sections thereof, forming a thread supporting area for several windings of a coil of thread, followed by a radially protruding, circular, continuous thread run-off rim (12) of the drum body or of a part connected thereto, the tapering and substantially straight areas of all supports being located on common, conceived solids of revolution coaxial with the drum axis, and with thread feeding (6) and thread removing elements (11) associated with the storage drum on the thread feeding side and the thread removing side, and with a driving mechanism (5) for producing a relative rotational motion between the storage drum and the thread feeding and thread removing elements, characterized in that the thread run-off rim (12) is adjoined in the direction of the run-on slopes (17) of the supports (16) by a radially inwardly inclined circumferential surface (24) of a rotation-symmetrical cover (23) which is coaxial with the drum axle (2) and which is continuous in the circumferential direction, at least in the areas located between neighbouring supports (16), and into which the supports (16) sink in a substantially uninterrupted manner such that the circumferential surface (24) on the thread run-off side of the



storage drum (4) is continuously axially scrapeable by the thread (8) as it unwinds from the thread supporting area (19) and travels to a thread removing element (11).

2. Device as defined in Claim 1, characterized in that the circumferential surface (24) of the cover (23), starting from an area of large diameter located in the proximity of the run-off rim (12), extends with an area (26) of smaller diameter radially inwardly as far as at least to the centre of the substantially straight support areas (19).

3. Device as defined in Claims 1 or 2, characterized in that the circumferential surface (24) of the cover directly adjoins the run-off rim (12) at one end in an uninterrupted manner.

4. Device as defined in one of the preceding claims, characterized in that the all around continuous circumferential surface (24) of the cover (23) comprises apertures (25) accommodating the substantially straight support areas (19).

5. Device as defined in one of the preceding claims, characterized in that the circumferential surface (24) of the cover (23) is of substantially conical shape.

6. Device as defined in one of claim 1 to 4, characterized in that the circumferential surface (24) of the cover (23) has a concave curvature.

7. Device as defined in one of the preceding claims, characterized in that the cover (23) consists of a material which is wear-resistant, at least in the area of the circumferential surface (24).



8. Device as defined in one of the preceding claims, characterized in that the drum body comprises two coaxial, circular flanges (13, 14) to which the supports (16) are attached at the ends, and at one of which the run-off rim (12) is formed.

9. Device as defined in Claim 8, characterized in that the supports (16) are arranged so that they stand alone between the flange (13) adjacent to their run-on slope (17) and, at least in the area of the circumferential surface (24), the cover (23).

10. Device as defined in Claims 8 or 9, characterized in that in the area of their run-on slope (17), the supports (16) merge essentially tangentially into inclined surface parts (21) of the adjacent flange (13).

11. Device as defined in Claim 10, characterized in that the inclined surface parts (21) are formed on rib-like parts (22) of the corresponding flange (13) or the drum body which are associated with the individual supports (16) and are arranged so that they extend substantially radially.

12. Device as defined in one of the preceding claims, characterized in that the drum body consists of plastic.

13. Device as defined in one of the preceding claims, characterized in that the supports (16) lie with their substantially straight areas (19) on a conceived cone whose diameter decreases towards the run-off rim (12).

14. Device as defined in Claim 13, characterized in that the diameter taper of the straight areas (19) of the supports (16) is approximately 0.2 to 1 mm throughout their length.



15. Device as defined in one of the preceding claims, characterized in that the supports (16) are bent from wear-resistant wire.

16. Device as defined in one of claims 1 to 14, characterized in that the supports are punched or injection-moulded shaped parts.

17. Device as defined in one of the preceding claims, characterized in that a ring (27) for the unwinding thread surrounding the supports (16) is placed loosely, but so that it cannot get lost, on the cover (23).

