This invention relates to spools for collecting filamentary material. More particularly, the invention relates to a novel textile spool having a flexible head and designed to facilitate removal of yarn therefrom in the form of a bank or skain.

In textile practice, it is often necessary to collect the first lengths of yarn undergoing processing which may be of substandard quality onto separate spools called waste spools. Waste spools, in one application, are used on drawtwister machines employed to draw and twist yarn in textile processing.

Drawtwisters, in brief, comprise a frame with multiple yarn drawtwist positions, and include a support member adapted for mounting a supply bobbin packaged with yarn thereon. The yarn from the supply bobbin travels continuously from a driven feed roll assembly to a draw roll means driven at a faster rate of speed to stretch the yarn therebetween. After being drawn or stretched, the yarn travels to a twisting means for twisting the drawn yarn before it is finally taken up on a shipping bobbin. Typically, the twisting means includes a waste spool for collecting the initial lengths or outer wraps of yarn from the supply bobbin which may have been exposed to light, soiled, or damaged.

Conventional waste spools are made of metal and have rigid, unyielding heads or flanges. To remove yarn from such metal waste spools it is necessary to burn or sever the yarn therefrom, thus rendering the yarn unsuitable for secondary uses. Although yarn wound on the waste spools may not be of the highest quality, such yarn in bank form does have a commercial market if properly salvaged.

It is an object of this invention to provide a yarn spool permitting removal of yarn therefrom in the form of a bank.

Another object is to provide a flexible yarn waste spool adapted to be used on textile yarn drawtwisters and other textile machinery where the initial yarn is similarly collected.

Another object is to provide a spool adapted for holding windings of yarn, said yarn being easily removable therefrom en masse without being unwound.

According to one construction, the invention comprises a ring-like spool provided with flanges arranged at opposite ends of a frusto-conical body portion. At least one of the flanges is formed in the configuration of a flap which is resilient and segmented. A slot is defined in and extends across the yarn engaging surface of the body. A tool having a hooked stem is inserted into the slot beneath the yarn wound on the spool to remove the hank as illustrated in FIG. 5.

FIGURE 5 is a perspective view showing the method of removal of the hank of yarn from the spool; FIGURE 6 is an elevation view showing a spindle adapter which may be used in conjunction with the novel spool; FIGURE 7 is a side elevation view, partially in section, of a modified construction of the spool; and FIGURE 8 is a broken section showing the spool reinforced with a rigidizing ring.

In the drawing, like reference numerals are used to refer to similar components in the various figures for purposes of convenience.

The construction of the flexible spool 1 comprising the invention and its manner of operation are shown in the drawing, FIGURES 1–8. Preferably, flexible spool 1 is constructed of a plastic material capable of recovering original size and shape after deformation, such as polyurethanes, polyesters, rubber, polyolefins, polymides, and the like.

Spool 1 is ring-like to permit mounting on a spindle 2 of such as a yarn twister device 3 shown in FIG. 4. Spool 2 has flanges 4, 5 arranged at opposite sides of a frusto-conical body portion or face 6 upon which yarn is normally wound. The diameter decreases from flange 5 to flange 4 so that yarn wound tightly therearound can be pushed or slipped across face 6 toward the reduced diameter portion thereof to loosen its hold on the tapered surface. Flange 4 is modified in the configuration of a springy flap that yields to pressure and returns to its original shape once the pressure is removed. Flange 4 is also, preferably, segmented. That is to say, that the flap is not continuous circumferentially.

Flange 5 can be more rigid than flange 4, if desired, and includes a radially inwardly projecting lip 7 at its outer side thereof to permit mounting of the spool on an adapter having a circular disc. Lip 7 is designed to snap over and to grip a circular disc. A disc-adapter 8 is shown in FIG. 6 mounted on spindle 2.

At least one transverse slot 9 is formed across face 6 of spool 1 and, as shown in FIG. 3, extends into part of flange 5. Slot 9 is aligned with a space provided between the segments of flange 4. Spool 1 may be reinforced with an annular rigidizing ring 10 as is shown in FIG. 8, to provide rotation stability when the spool is in operation.

In use, spool 1 is securely mounted axially on the vertically positioned spindle 2 of a yarn twister device 3 with the springy flange 4 as shown in FIG. 4. Preferably, spindle 2 of twister device 3 is provided with a separate or integrally formed disc-adapter 8 so that the spool could be securely clamped to the disc by means of lip 7. However, the spool may be constructed without lip 7 and in this case the spool would be attached directly to the spindle 2.

Yarn 11 is led, from a drawn assembly incorporated on a conventional drawtwister (not entirely shown), through a traveler guide 13 mounted on a reciprocable ring 14 and then wound around the spool 1. Reciprocable ring 13 is at start-up positioned in the horizontal plane of spool 1 and is not operated while the spool is driven by a conventional belt means and power assembly 14 including a whirl 15 mounted on spindle 2. After a predetermined amount of yarn 11 is taken up on spool 1, the ring 13 is reciprocated. Upon upward movement of ring 13 away from spool 1 the yarn 11 is wound about a take-up bobbin 16 positioned on spindle 2.

After bobbin 16 is packaged with yarn it is doffed or removed from spindle 2 and the yarn end is severed therefrom. The yarn wound on spool 1 is now removed as illustrated in FIG. 5. A tool 17 having a hooked stem is inserted into slot 9 beneath the yarn wound on the
face 6 of spool 1. By applying a lifting force to tool 17, the yarn is pushed toward the reduced end of face 6 thereby loosening the yarn; the yarn en masse is then easily slipped over the springy flap or flange 4. The yarn is removed intact in Hank form.

Slot 9 is preferably extended into flange 5 to allow the stern of tool 17 to be conveniently inserted into slot 9. It will be noted that slot 9 is aligned with the space between adjacent ends of adjoining segments of flap 4. With such an arrangement, the yarn is quickly freed at the point between the segments because the ends of the segments which are contacted bend readily.

Utilization of a spool of the type embodying the invention results in quick and facile removal of yarn in a condition to permit subsequent economical sale thereof. Although an integrally constructed spool is preferred, the spool 1 may also be constructed with a metal body and a springy flap attached thereto as shown in FIG. 7; and, the flange 4 may be continuous, discontinuous, or segmented.

It will be understood that changes and variations may be made without departing from the spirit and scope of the invention as defined in the appended claims.

What is claimed is:

1. A yarn holding spool comprising,
   (a) a ring-like body having a frusto-conical outer face,
   (b) springy flap means arranged adjacent to the reduced end of said outer face,
   (c) means forming adjacent to the larger diameter end of said outer face,
   (d) means defining a slot in said outer face.

2. A yarn holding spool as in claim 1, wherein said springy flap means is discontinuous.

3. A yarn holding spool as in claim 1, wherein said springy flap means is segmented with spaces provided between the segments.

4. A yarn holding spool as in claim 3 wherein said slot is aligned with said spaces between said segments.

5. A yarn holding spool as in claim 1, wherein said slot extends into said flange means.

6. A yarn holding spool as in claim 1, wherein the spool construction is unitary and the spool is made entirely of plastic material.

7. A yarn holding spool as in claim 6, wherein an annular rigidizing reinforcing member is provided within said spool.

8. A yarn waste spool of unitary construction comprising,
   (a) a ring-like plastic body having a frusto-conical outer face,
   (b) segmented springy flap means arranged adjacent to the reduced end of said frusto-conical outer face with spaces provided between the segments,
   (c) means forming adjacent to the larger diameter end of said outer face,
   (d) said flange means having a radially inwardly extending yieldable gripping lip for mounted said spool,
   (e) means defining a slot formed in said outer face and extending into said flange means,
   (f) said slot being aligned with said spaces between said segments of said segmented springy flap means.

9. A yarn twister device comprising in combination,
   (a) a spindle adapted to be driven and to carry a bobbin thereon,
   (b) a reciprocable ring arranged coaxially about said spindle,
   (c) a traveler guide mounted slidably on said ring,
   (d) a ring-like yarn holding spool fixedly mounted on said spindle,
   (e) said spool having a frusto-conical outer face,
   (f) springy segmented flange means arranged adjacent to the reduced end of said outer face with spaces provided between the segments,
   (g) said flange means forming adjacent to the larger diameter end of said outer face,
   (h) means defining a slot formed in said outer face and extending into said flange means,
   (i) said slot being aligned with said spaces between said segments of said springy flange means,
   (j) whereby, yarn normally traveling from said traveler guide is wrapped about said yarn holding spool forming a hank of yarn which is thereafter readily removed en masse therefrom in an undamaged condition by sliding the yarn over said springy segmented flange means.

10. A yarn holding spool comprising,
    (a) a ring-like body having a frusto-conical outer face,
    (b) springy flange means arranged adjacent to the reduced end of said frusto-conical outer face,
    (c) means forming adjacent to the larger diameter end of said outer face and provided with a radially inwardly extending flexible mounting lip, and
    (d) means defining a slot in said frusto-conical outer face.

11. A yarn holding spool comprising,
    (a) a ring-like body having a frusto-conical outer face,
    (b) springy flange means arranged adjacent to the reduced end of said frusto-conical outer face,
    (c) means forming adjacent to the larger diameter end of said outer face and provided with a radially inwardly extending flexible mounting lip,
    (d) means defining a slot in said frusto-conical outer face,
    (e) said ring-like body and said flange means formed adjacent to the larger diameter end of said frusto-conical outer face being made of a rigid material and said springy flange means arranged adjacent to the reduced end of said frusto-conical outer face being made of a plastic material.

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