A spool and cover assembly for wound filamentary material, such as thread, yarn and the like having a winding core section and end head sections, and a cover for the spool mounted and encasing the spool, the spool and cover being provided with mating seating areas at their opposite ends for frictionally mounting the cover on the spool, the cover and spool being mounted for relative rotation one with respect to the other about the axis of the winding core section, the cover section being formed with an egress orifice for the spool wound filamentary material.

8 Claims, 12 Drawing Figures
SPOOL AND COVER ASSEMBLY

This invention relates to a spool and cover assembly usable generally in varied fields, and more particularly in the sewing field. It consists of a multi-function spool and cover assembly, which may be utilized with any windable filamentary materials, such as sewing thread, knitting and crochet yarns, wire, trimmings, ribbon and ribbon-like materials, rope, elastic, rolled cloth, etc.

The main object of this invention is to improve in many ways, the practical and the functional properties of existing spools for filamentary materials by the devising of a new and unique multi-functional spool and cover assembly.

The co-related objects of the invention are to provide a spool and cover assembly structured:

1. To prevent the soiling of the spool filamentary material on the store counters - by furnishing covers that fully encase or enclose, and thereby protect, the filamentary material;

2. To eliminate the need for supplementary packaging; the protective function of the cover section of my invention making the assembly an integrally packaged unit;

3. To add greatly to the eye-appeal of the assembled product, this being accomplished by the use of an assembled cover section made of any suitable material, such as transparent plastic--that keeps the filamentary material soiffree and yet allows the product's colorings to show through with added sparkle and brilliance;

4. To enable the purchaser of spooled materials, such as thread, to keep same in a clean, neatly-wound and tangle-free manner (throughout its useful life), by means of the integral cover section provided;

5. To enable the assembly (if so desired), to be compatible with all existing display structures, multiple packaging units and shipping cartons that are now in use for spooled thread and the like, this being accomplished by designing the outside dimensions of my spool and cover assembly to conform (where necessary), to the outside dimensions of existing spools of thread;

6. To furnish an assembled cover section that is in open cylindrical form and is made in any suitable size (out of any suitable material such as transparent plastic), this cover section being so designed as to mate, be in partial contact with, and be concentrically rotatable upon the winding core section of the spool--thereby covering, protecting, and providing neat, tangle-free storage for the sewing thread (or any other suitable material) wound onto the winding core section, the mating of the component parts of the assembly taking place at any suitable stage of the manufacturing and assembling process and when used by the consumer;

7. To provide, in the cover section a means of egress for the filamentary material that is wound on the winding core section within, said means of egress being of any suitable form and size;

8. To create a mechanical interaction between the winding core section, the cover section, and the sewing thread, which enables the product to have the added and important function of acting as an automatic tension control, this function resulting in the release of the sewing thread in a state of controlled tension, the desired degree of which can be both predetermined and achieved, this mechanical interaction taking place as the sewing thread is being unwound from the winding core section and pulled through the egress opening provided in the cover section.

To the accomplishment of these and other objects that will become evident from the following disclosure, my invention is directed to a spool and cover assembly as more particularly defined in the appended claims taken together with the following description and the accompanying drawings in which:

FIG. 1 is a vertical elevational view, with parts broken away, of a generic species of a spool and cover assembly embodying the principles of my invention;

FIG. 2 is a cross-sectional view of FIG. 1 taken in section in the plane of the line 2—2 of FIG. 1;

FIG. 3 is a perspective exploded view of the separate cover and spool of the assembly;

FIG. 4 is a vertical elevation view of another and preferred species of the spool and cover assembly of the invention;

FIG. 5 is a vertical view of FIG. 4, taken in cross-section in the plane of the line 5—5 of FIG. 4;

FIG. 6 is a cross-sectional view of FIG. 4. taken in section in the plane of the line 6—6 of FIG. 4;

FIG. 7 is a vertical elevational view of the spool of the spool and cover assembly shown in FIG. 4;

FIG. 8 is a top plan view of the spool shown in FIG. 7;

FIG. 9 is a vertical elevational view of the cover of the assembly shown in FIG. 4;

FIG. 10 is a top plan view of the cover shown in FIG. 9; and

FIGS. 11 and 12 are detail views of certain modifications of guide members used for the unwinding thread used in the spool and cover assembly of the invention.

Referring now more in detail to the drawings and having reference first to the form of the invention shown in FIGS. 1 to 3, the spool and cover assembly of the invention comprises a spool generally designated as S for wound filamentary material, such as thread, yarn and the like, and a cover therefor, generally designated as C, encasing the same, the spool and cover being provided with mating seating areas as hereinafter described functioning for frictionally mounting the cover on the spool, the cover and spool being mounted for relative rotation, one with respect to the other, about the winding axis of the spool, the cover section being formed with an egress orifice generally designated as E, for the spool would filamentary material f which is unreeled or unwound from the spool.

The spool S comprises a winding core section 10 having the usual axial bore 12 and opposite end head sections 14 and 16; and the cover C, in the form of the invention shown in FIGS. 1 to 3, comprises a tubular or cylindrical member extending between the end head sections of the spool and which in this form of the invention encases only the winding core section of the spool, the cover for this purpose having top and bottom ends 18 and 20 respectively which engage and are frictionally seated in parts of the top and bottom head sections 14 and 16 of the spool. The frictional seating of the cover on the spool is provided by the marginal annular and tapered seating areas 22 and 24 of the top and bottom head sections, and the complementary mating seating areas of the cover are provided by the
top and bottom complementary tapered areas at the top and bottom ends 26 and 28, respectively, of the cylindrical cover C.

The spool S may be made of any suitable material such as wood or a light-weight plastic designed so as to receive and accommodate the cover section C. The cover section is preferably formed from a suitable plastic material having some elastic properties such that it may readily be expanded in moving the same over a head of the spool to be received by the spool, after which movement it will readily contract to its described seating position on the spool heads. With this described structure the cover is concentrically rotatable relative to the winding core section of the spool.

The egress opening E may be given any desired configuration, one of which is illustrated in FIGS. 1 and 2 of the drawings. This egress orifice may take a variety of shapes and forms and may be made as shown in the form of the invention illustrated in Figures 5 to 9 and described hereinbelow, and the filamentary thread issuing therefrom may also be related to the configuration of the orifice so as to accomplish the functions referred to below for facilitating the severing of the filamentary materials and the capturing thereof between the lower end of the cover and the mating part of the spool.

With this construction, it will be seen that as the thread is pulled, the winding core section revolves; and this filamentary thread, by bearing on the cross section of the egress opening in the cover section, restrains said cover section from revolving in the same direction as the winding core section. In use, the cover section is held stationary as the thread is withdrawn. With respect to its component spool however, the cover section is actually revolving, concentrically, and in an opposite direction to the winding core section. For example, if the exiting thread imparts a clockwise movement to the winding core section, the cover section (at the same time) will be concentrically rotating in a counterclockwise direction.

Since the two components of the assembly are in partial surface contact with each other at their mating seating areas their opposing relative movements set up a frictional force. This force is automatically transmitted (in use) to the exiting thread, enabling it thereby to attain the desired (and automatically controlled) tensional state.

The special advantages incident to the ability of the spool and cover combination to release the sewing thread in an automatically controlled state of tension include the following:

1. The unwinding of more thread than is desired is prevented;
2. The tangling and unraveling of the sewing thread is obviated; and
3. The tendency of a spool of thread to overrun when it is used on sewing machines in a stop-and-go fashion is eliminated.

The described structure, furthermore, has the new, unique and important ability to impart any suitable and predetermined amount of tension to the sewing thread, enabling the manufacturer of the thread thereby to consider the physical properties of individual sewing threads (said properties showing great variance with respect to strength and other behavioral characteristics). The manufacturer is therefore able (through the use of the product of my invention) to obtain the determined degree of tensional force that enables a particular sewing thread to perform with optimum results. By varying the design of the two component parts of my invention, particularly at their mating seating areas, a range of tensional force is possible that is flexible and broad enough to achieve optimum results with all threads. The desirability of this tensional force-flexibility feature can thus be readily seen.

The product of the invention also enables the elimination (if so desired) of tension control devices found on sewing machines (which are used to regulate the tightness of existing sewing thread), and to improve thereby the efficient use of the sewing machine. This is accomplished through the automatic tension control function of the product of my invention, said function allowing thereby great savings in time, effort, and labor costs. My spool and cover assembly also improves the use-efficiency of the sewing machine by automatically supplying the thread under the optimum tensile conditions (required by that particular thread), as compared to today's sewer who is constrained to use guesswork to decide the point at which existing machine tension control devices should be set.

In practice, the use of the product of the invention results in predictable, unvarying, and optimum stitch quality (regardless of the thread being used, the number of sewers, or their location). On the other hand, the guess work procedure of deciding the tensility, as employed by today's sewers, makes it impossible to obtain optimum stitch quality on either a predictable or a consistent basis. It can thus readily be seen that the ability in the use of the product of my invention to furnish optimum stitch quality (on both an individual and mass production basis), is a very valuable characteristic.

A further functional characteristic of the product is the provision of means by which an excess length of thread (withdrawn from the assembly) may be easily and quickly rewound into the assembly. The user need simply hold onto the cover section with one hand (preventing its turning), and with the other hand, turn the winding core section in the appropriate direction, effecting thereby the rewinding of the excess thread.

In the form of the invention shown in FIGS. 4 to 12 of the drawings, I show a spool and cover assembly structured to provide additional functions and advantages in the spool-cover combination including the provision of (a) a cover for the spool which encases and covers both the winding core section and a top head section of the spool, the cover being thereby structured as a cap-cover section; (b) such a cover that can easily and repeatedly be slipped onto and removed from the spool; (c) a combination of a spool and cover having an increased number of seating mating areas for the spool and cover; (d) a spool formed with a core section and an outer tubular part separated by a space open at the top which space defines a storage compartment for sewing-notion items, said compartment being covered by the cap part of the cap-cover section; and (e) a spool and cover combination in which the thread egress orifice or opening is designed to effectively permit an unvarying degree of angular pull and tensional force applied to the unwinding thread, and one which enables the severing of the issuing thread from the core.
wound thread as well as the capturing of the severed end of the thread and holding the same in a position for ready re-use. To these ends the spool and cover assembly comprise a spool S' and a cover C' designed and constructed as best shown in FIGS. 7 to 10 of the drawings and shown in assembly in FIGS. 4 to 6 of the drawings.

The spool S' of this form of the invention comprises a winding core section 30 and top and bottom head sections 32 and 34, and the cover C' comprises an outer tubular part 36 and a top cap part 38, the outer tubular part 36 encasing the winding core section 30 and the top cap part 38 covering the top head section 32 of the spool as best shown in FIGS. 4 to 6 of the drawings.

The spool S' is provided at its top and bottom end sections with seating areas 40 and 42, respectively, and the cover C' is provided at its top and bottom regions 44 and 46 with mating seating areas 48 and 50 for frictionally mounting the cover on the spool, this mounting providing for controlled relative rotation of the spool and cover about the axis of the winding core section 30 of the spool. The cover section is formed with an egress opening E' for the spool wound filamentary material. The bottom head section of the spool is preferably formed with an integrally knurled disc 52 and the cap part 38 of the cover is similarly provided with a knurled disc part 54 to permit facile manual relative rotation between the spool and the cover.

In this form of the invention additional seating areas between the spool and the cover are provided by means which also enable the ready and quick mounting of the cover on the spool. This is obtained by specially constructing the top of the core 56 of the spool and the cooperating center part 58 of the cover cap 38. To this end, the top of the core 56 of the spool is formed with a plurality of segmented members or arms 60, 60 (four such arms being shown in the drawings) which are flexible radially with reference to the main part of the core section 56; and the center member 58 of the cover cap 38 is formed as a truncated part having a center opening 62 in which the arms 60, 60 of the spool are yieldably and frictionally receivable. The arms provide seating points or areas 64, 64 which co-act with mating seating areas 66, 66 presented by the inner surfaces of the truncated part 58 of the cover cap, this mating of the contacting areas being best shown in FIG. 5 of the drawings.

The top of the segmented arms 60, 60 are preferably so designed that they present a button-like shape 68, 68 extending above the top head 32 of the spool, the said button ends being, however, housed or encased by the truncated member 58 of the cover in the assembled form of the combination as best shown in FIG. 5 of the drawings. These button parts may be readily engaged by the user to quickly and easily disengage the mated components (spool and cover) of the combination.

In this form of the invention, the spool S' is so shaped as to provide between the core section 56 and the outer cylindrical or tubular part 70 thereof an opening 72 defining a storage area for sewing-notion items such as needles, pins, snaps, hooks and eyes, and the like. The said storage area or compartment 72 is normally covered by the cap 38 of the cap cover C'.

Thus, in this form of the invention, the cover as a cap-like structure can be easily and repeatedly slipped onto (and taken off of) the spool. This cap-like structure may be made as a one-piece unit, requiring no further assembly, out of any suitable material such as transparent plastic. Although the outside form of the cap cover section is shown circular in design, the circular shape is by choice, and if desired, any other suitable outside design form could be substituted. For example, the outside form could just as readily be a square shape, a triangular shape, a hexagonal shape, etc. The spool is a multi-functional, single-unit structure of any suitable size, that requires no further assembly. This single-unit structure may be made out of any suitable material, such as a lightweight plastic, by any suitable process (such as injection molding). Although the outside shape selected for the base of the spool is shown as circular, said shape could readily be of any other suitable and desired form. The outside form of the cap of the cover is designed to be identical to the outside form of the base of the spool, said design being such that when these two components are assembled, they (together) take on the overall outside dimensional form that enables them to be compatible with existing spool displays and packaging.

This form of my invention also furnishes a greater number of contact points or areas between the spool and cover than in the form of my invention shown in FIGS. 1 to 3, enabling thereby an increased flexibility in the tensile force range that will be generated in use. More specifically, I have increased the number of contact points in my invention by the provision of the added contact mating areas at the center of the assembly. Since in addition to changing the number of contact points, we can also change their location, their shape, and their physical dimensions, the true flexibility is seen to be far greater than the excellent adaptability discussed previously. Any changes made, pertaining to the contact points, result in changes to the size and/or the range of the tensile force created by the mechanical interaction of the component parts of my invention. Therefore, my invention enables the design of the aforementioned component parts to function in any desired (force effect) manner, with all existent threads.

In the form of the invention of FIGS. 4 to 12 the means of egress for the sewing thread is made as a channelled opening E' having parallel sides (of any suitable width), which extends axially from the base of the lower head 34 to a height that is at least equal to the top of the spooled thread wound onto the spool core. My selection of this particular design for the egress was made, since its employ imparts to the thread (as it is withdrawn) an unvarying degree of angular pull and tensile force (see FIGS. 4 and 5). By way of illustration, if a channelled opening be selected which reached only halfway to the top of the spooled thread, then the unspooling thread (from points above and below the top of the channelled opening) would be subjected to varying degrees of angular pull; and this in turn would vary the degree of tensile force imparted to the thread, preventing thereby the continuous, unchanging application of the desired optimum tensile force (to the articular thread). The ability in using this preferred form of egress opening to achieve the desired optimum and uniform force results in superior thread performance during the sewing process.
The specific cross-sectional angle for the channeled opening $E'$ is also of importance in obtaining desired in-use behavioral characteristics. The angle I have selected for this form is 90° to the horizontal center line of the cap cover section. Due to this 90° angle selection, the channeled opening will tend (during use) to remain in line with the axial center-line of both the spool and the spindle-rest of the sewing machine. This "self-centering" behavior enables the desired tensile force to be imparted to the sewing thread, regardless of the direction in which the thread was initially spooled during manufacture (winding could be clockwise or counter-clockwise), and regardless of whether the spool is fully wound, partially wound, or almost depleted of sewing thread. To illustrate the effect of the use of an angle other than 90°, I have found that as the cross-sectional angle of the channeled opening is decreased (80°, 70°, 60°, etc . . .), the channeled opening will tend (in use) to revolve away from the axial center-line, moving in the same direction as the cross-sectional cut. For example, if cuts direction is left-to-right (from top view), the channeled opening will (in use) correspondingly move to the left. An opposite directional cut would have a correspondingly opposite effect. If the angle used is sufficiently acute, the channeled opening will move to a position where the thread will be able to pass through the opening without bearing on its walls; and at that point, the desired tensioning force will no longer be exerted upon the emerging thread. Although I have selected 90° as the angle to be used in the preferred form of my invention, the use of any suitable angle, for any given purpose or effect, is also considered to be within the scope of this invention.

To prevent the tearing or fraying of the sewing thread, during its tensioned exit, I design the internal corner surfaces of the channeled opening $E'$ in a rounded form 74, allowing thereby safe passage of the bearing thread (see FIG. 6). To furnish means by which a length of withdrawn or issuing thread may be easily severed, I design the external corner surfaces of the channeled opening to be as close to square (90°) as is possible as indicated in FIG. 6. Said design provides the user with two edges (along the entire length of the channeled opening) that can serve as cutting edges to help the user to sever the thread, whenever he desires to do so. In practice, the user would hold the two component parts (cover and spool) so they cannot revolve (relative to each other), and snap the thread against either of the two cutting edges provided, thereby severing it (FIG. 6).

I also furnish a second means by which a length of thread may be quickly and easily severed; and at the same time, a means by which the spool end of the severed thread is captured and held in a handy, easily recoverable position, until it is once again needed; this I accomplish by designing the bottom corners 76, 76 of the channeled opening (see FIG. 4) as rounded curves — joining the axially oriented surfaces of the channeled opening $E'$ to the horizontally oriented bottom surface of the cap cover section; and by designing the cross-sectional shape of the bottom surface of said section as a horizontally straight surface, with squared inner and outer edges 76, 78 (see FIG. 9). During the thread severing process, the function of the inner edge is to help hold the thread securely; while the function of the outer edge is to serve as a cutting edge, against which the thread will be snapped. In practice, after the user of my invention has withdrawn the desired length of thread, the exterior thread is held against the bottom edge and the cap cover section is then rotated in either direction. As a result of this rotation procedure, the thread is guided (by the rounded bottom edges of the channeled opening) to a position in between two pairs of contact point surfaces 78 and 80 that are furnished (see FIGS. 4, 7 and 9), where it is held securely in a captive position. The user then holds the two component parts S' and C' so that there is no rotation (relative to each other), and snaps the thread upwards (against the outer edge of the cap cover section's bottom surface), effecting thereby the desired severing action.

After said severing has taken place, the spool end of the severed thread remains in a visible, conveniently located, and captive position, until the user is once again desirous of withdrawing a length of thread. Whenever said need again arises, the cap cover section is rotated until the channeled opening is directly over the captive thread end, thereby effecting its quick, easy, and relatively effortless release.

I may also provide for the incorporation of any suitable number of suitable designed guide members and/or barriers, for the purpose of having the sewing thread follow a predetermined path and have exerted upon it thereby, pre-determinable desired forces. This object is readily accomplished by designing the aforesaid guides and/or barriers as integral-molded sections of the cap cover section or the spool. In FIGS. 4 to 6, I show such a guide member integral with and extending longitudinally of the cap cover section C'; and in FIGS. 11 and 12 I show variations of the same which may be made integral with either the cover C' or the spool S'.

The structure, operation and advantages of the spool and cover assembly of the described species of the invention will, it is believed, be fully apparent from the above detailed description thereof. It will be further apparent that many other changes may be made without departing from the spirit of the invention defined in the following claims.

I claim:

1. A spool and cover assembly comprising a spool for wound filamentary material such as thread, yarn and the like having a winding core section and end top and bottom head sections, and a cover for the spool mounted on and encasing the spool, the cover comprising an outer tubular part and an integral top cap part, the outer tubular part encasing the winding core section and the top cap part covering the top head section of the spool, the spool being provided at the marginal portions of its top and bottom end sections with seating areas and the cover being provided at its top and bottom ends of its tubular part with mating seating areas for mounting the cover on the spool, additional mating seating areas formed at the top end of the spool core section and at the center of the cap part of the cover, the mating providing for controlled relative rotation of the spool and cover about the axis of the winding core section of the spool, and the cover section being formed with an egress orifice for the spool wound filamentary material.
2. The spool and cover assembly of claim 1, in which the additional mating seating areas for the spool and cover includes a top member of the core section of the spool and a center member of the cap part of the cover, one being detachably receivable by the other, the said members being relatively flexible radially, one with respect to the other, for mating and unmating.

3. The spool and cover assembly of claim 2, in which the top member of the winding core section comprises a plurality of radially flexible segmented arms, and the center member of the cover cap part has an opening in which said arms are yieldably and frictionally receivable.

4. The spool and cover assembly of claim 1 in which said egress opening is a channeled opening in the tubular part of the cover having a cross-sectional angle which is 90° to the horizontal center line of the cover cap part of the cover.

5. The spool and cover assembly of claim 1 in which said egress opening is a channeled opening, the internal corner surfaces of which are in rounded form.

6. The spool and cover assembly of claim 1, in which the egress opening is formed with straight outside edges functional for severing thread exiting from the opening.

7. The spool and cover assembly of claim 1, in which the complementary seating mating areas at the spool bottom end head section and the cover bottom region comprise means for holding a severed thread in a captive position.

8. The spool and cover assembly of claim 1, in which the spool is formed with a core section and an outer tubular part separated by a space open at the top, said space defining a storage compartment for sewing-notion items, the storage compartment being closed by the cap part of the cover.

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