United States Patent

Rosen

[15] **3,648,939**

[45] **Mar. 14, 1972**

[54] YARN STORING DEVICE

[72] Inventor: **Karl Isac Joel Rosen,** Villa Haga, Ulricehamn, Sweden

[22] Filed: **Jan. 6, 1970**

[21] Appl. No.: **884**

[30] **Foreign Application Priority Data**

Jan. 7, 1969 Germany 19 00 619.0

[52] **U.S. Cl.**.....**242/47.01,** 66/132

[51] **Int. Cl.**.....**B65h 51/20**

[58] **Field of Search** 242/47.01, 47.02, 47.03, 47.05, 242/47.08, 47.09, 47.12, 47.13, 128, 147; 66/125, 132

[56] **References Cited**

UNITED STATES PATENTS

2,838,922	6/1958	Gift	242/128 X
3,225,446	12/1965	Sarfati et al.	242/47.12 X
3,411,548	11/1968	Pfarrwaller	242/47.12 X
3,490,710	1/1970	Mühlhäusler	242/47.01

Primary Examiner—Stanley N. Gilreath
Assistant Examiner—Werner H. Schroeder
Attorney—Woodhams, Blanchard and Flynn

[57] **ABSTRACT**

A yarn storing device, wherein the yarn running off a bobbin can be wound tangentially onto a storing drum and can be axially removed therefrom under a retarding ring which surrounds the drum. The retarding ring comprises a base ring which surrounds the periphery of the drum at a distance and flexible, thin, elongated elements extending therefrom towards the surface of the drum. The flexible elements are formed by resilient fingers which are inclined inwards from the base ring along an imaginary conical surface and extend in the direction of relative rotation of the yarn during its withdrawal from the drum, overlap one another in the direction of the periphery and are supported by their free ends on a shoulder of the drums.

11 Claims, 3 Drawing Figures

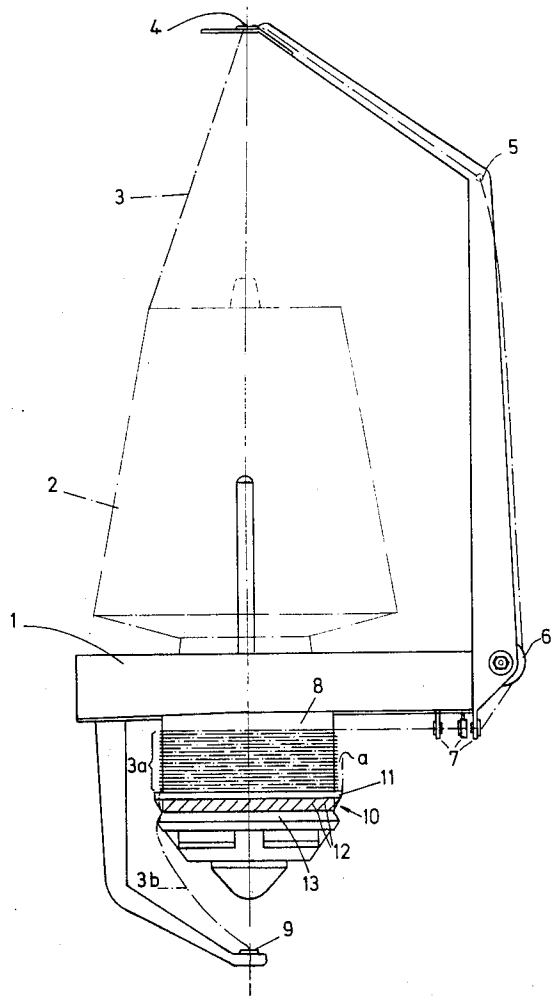
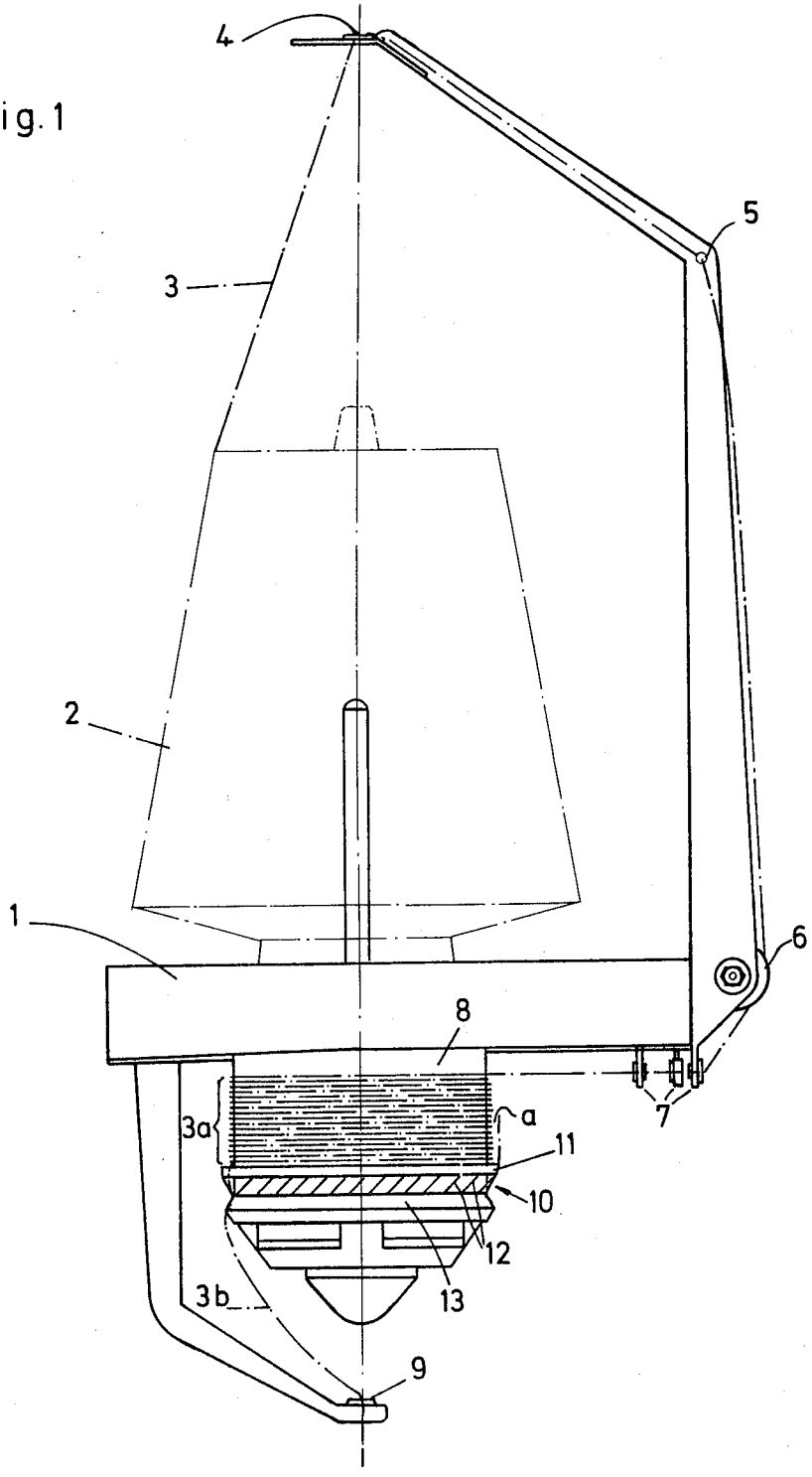


Fig. 1



INVENTOR
KARL ISAC JOEL ROSEN
BY
Woodhams, Blanchard and Flynn

Fig. 2

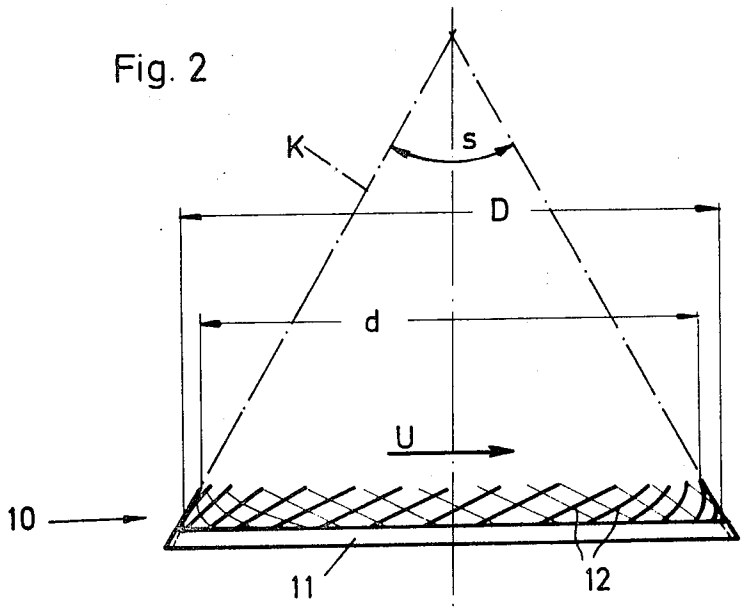
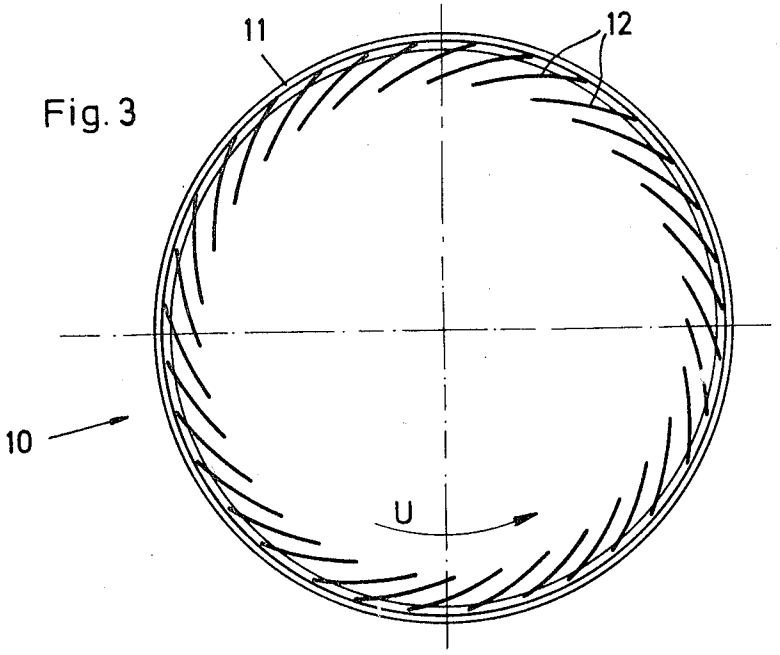


Fig. 3



INVENTOR
KARL ISAC JOEL ROSEN
BY
Woodhams, Blanchard and Flynn

YARN STORING DEVICE

This invention relates to a yarn storing device wherein the yarn running off a bobbin can be wound tangentially onto a storing drum and can be axially removed from the drum under a retarding ring which surrounds the drum, said ring comprising a base ring and flexible, thin elongated elements which extend there from towards the surface of the drum.

Yarn storing devices of this type are known. They are used to feed the yarn running off a bobbin to the knitting place of a textile machine, for example, a knitting, linking, winding or weaving machine, having a tension which is low and as constant as possible. In this connection, during withdrawal from the storing drum the yarn must be retarded with the aid of a checking device so that it never becomes entirely free of tension, but that the tension produced therein is very low and of a constant value.

In a known storing device of the type mentioned at the beginning the retarding ring is in the form of a simple, resilient ring which emcompasses the drum in the vicinity of yarn withdrawal and presses the yard resiliently against the surface of the storing drum. It has been shown that such a ring makes controlled retardation of the yarn possible but that the tension of the yarn running off is not sufficiently low and above all cannot be kept at a sufficiently constant value. In fact jerky variations in tension occur in the vicinity of the withdrawn yarn these variations being referred to as "tugging" which gives rise to flaws or defects in the textile article.

In another known yarn storing device the retarding ring is in the form of an eye which rotates about the storing drum on a clearly defined path, similar to the ring of a spinning machine. However, such an eye does not fulfil the requirements of controlled retardation in the case of low and constant tension values.

In another known embodiment the retarding ring of the storing device comprises a base ring covered with plush. The flexible, extended elements are therefore made of plush. They extend radially in-wards and are somewhat longer than the intermediate space between the base ring and the surface of the drum. The plush is slightly twisted thereby, and the soft hair which is usually irregularly arranged in plush forms a felt-like layer between the storing drum and the base ring through which the yarn must move during withdrawal from the drum. The braking resistance caused by such a layer is never fully constant, since the arrangement of the plush is not defined accurately enough. Moreover the plush is compressed after a certain period of time so that the braking resistance decreases with the operating time of the device. Moreover, since the plush cannot transfer any carrying power, the base ring must be supported on the outside by a separate supporting means, thereby rendering the storing device more costly.

The problem underlying the invention is to provide a yarn storing device of the type described at the beginning so that a simple embodiment ensures that a constant braking force is exerted on the out-going yarn. This problem is solved in accordance with the invention in that the flexible elements are formed by resilient fingers which are inclined in-wards from the base of an imaginary conical surface and extended in the direction of relative rotation of the yarn during its withdrawal from the drum, overlap one another in the peripheral direction and are supported by their free ends or a shoulder of the drum.

In the present application the flexible elements are formed by resilient fingers. The yarn passes along the fingers which extend along a conical surface in the direction of yarn withdrawal and bends then back resiliently. As a result of the fingers overlapping, the yarn passes from one finger to the next and always has to overcome a practically constant resistance during withdrawal. An extremely constant yarn tension is achieved thereby during yarn withdrawal and does not vary even during longer periods of operation. Since the fingers are at the same time sufficiently rigid to support the retarding ring on the storing drum, a separate supporting means is unnecessary. Therefore a constant yarn tension is ensured by simple means.

It is particularly advantageous if the fingers extend spirally. This spiral shape is responsible for a slight braking of the yarn.

In the preferred embodiment of the invention it is provided that, when the retarding ring is removed from the drum, the inner ends of the fingers lie in a circle, the radius of which is smaller than the radius of the drum. When the retarding ring is mounted on a drum the finger ends are brought to bear against the surface of the drum by a slight tension so that the yarn cannot be withdrawn between the finger ends and the surface of the drum without coming into contact with a finger.

The base ring and the fingers are advantageously moulded in a unitary section made of a plastics material, the frictional value of which is adapted to the quality of yarn with respect to the desired retardation. A braking ring consisting of an integral section of plastics material is relatively simple to manufacture. It hardly wears and therefore exerts a constant braking action on the yarn even for longer periods of time.

In order that the storing device may be adapted to varying qualities of yarn with reference to the retardation of yarn withdrawal, it is advantageous if the yarn storing device is associated with a set of interchangeable retarding rings made of plastics material of varying frictional quality. The retarding rings can be distinguished from one another by different colourings so that it is immediately known which retarding ring is to be mounted on the storing device for which quality of yarn.

Other advantages and details of the invention are shown in the following description of a practical embodiment in combination with drawings.

FIG. 1 shows a schematic side view of a yarn storing device according to the invention,

FIG. 2 shows a side view and FIG. 3 a plan view of the retarding ring of the storing device according to FIG. 1.

In FIG. 1 a bobbin 2 is mounted on a carrier arm 1 which is fastened to the frame of the textile machine to be provided with the yarn in a manner not shown. A yarn 3 is tangentially fed via a series of yarn guide elements 4, 5, 6 and 7 to a storing drum 8. The storing drum 8 is rotatably mounted in the carrier arm 1 and is rotated by an unshown motor. The rotation of the drum 8 forms a yarn supply 3*a* thereon which can have one or several layers. This supply is moved downwards in the axial direction of the drum by unshown means. For example, a conical extension of the drum in the vicinity of which the yarn 3 is fed can be used for this purpose. A spring-loaded spoke wheel which penetrates longitudinal slots in the drum can also be used for the axial movement of the yarn. The quantity of the yarn supply 3*a* is maintained within predetermined limits, the yarn supply being measured for example, by photoelectric means or by scanning the path of the described spoke wheel and the drive of the drum is disconnected when the upper limit of yarn supply is reached, or switched on when the lower limit is reached. The unwinding yarn 3*b* is axially removed from the drum 8 by an eye 9 which is parallel to the axis of the drum 8 and fed to the knitting place on the associated textile machine.

In order that the tension of the withdrawn yarn 3*b* may remain as low and as constant as possible, there is provided a retarding ring which is generally designated by reference numeral 10 and surrounds the periphery of the drum 8. This retarding ring in the illustrated embodiment comprises a unitary moulding of plastics material and is provided with a base ring 11 as well as fingers 12 extending therefrom. The base ring surrounds the periphery of the drum 8 and is spaced therefrom by the distance *a*. The free ends of the resilient fingers 12 are supported on a shoulder 13 which is slanted in the direction of the yarn withdrawal in the illustrated manner and is connected to the lower edge of the drum 8.

The details of the retarding ring 10 are shown in FIGS. 2 and 3. When assembled, the fingers 12 which extend from the base ring 11 in the direction of yarn withdrawal extend along an imaginary conical surface K, the vertex *s* of which is 60° in the illustrated embodiment. The fingers 12 are inclined in the direction of the rotation U of the yarn relative to the drum 8. The angle of inclination to the tengent on the periphery of the

base ring 11 is between 10° and 20° approximately. As can be clearly seen in FIGS. 2 and 3, the fingers 12 are dimensioned and arranged so that they overlap one another to a great extent in the direction of the periphery. Their length is approximately 1 cm. to 2 cm. and the thickness is of the order of 0.5 mm. to 1 mm. depending on the material in use. It can be clearly seen from the drawing that the fingers 12 are twisted in the form of a spiral. The fingers are so closely positioned that a finger can be seen for every centimeter in length along the periphery of the base ring 11.

During withdrawal of the yarn 3*b* the yarn moves along the resilient fingers 12 and bends them slightly sideways in the direction of the periphery U. The resilience of the fingers 12 and the friction between the yarn and fingers then reduce the retardation.

The force of the retardation is naturally dependent upon the material of which the retarding ring 10 is made. On the other hand, the retarding force has to be adapted to yarns of varying quality. For example, for a monofilament yarn of 20 denier, as is frequently used in the manufacture of ladies stockings, a much lower tension is required in the area of yarn withdrawal 3*b* than in thick woollen yarn which is used for outer garments. These varying requirements can be taken into account by using different plastics materials for the retarding ring 10. In this connection the various types of retarding rings can have different colourings so that it is immediately known which ring must be mounted on the storing drum for the yarn about to be knitted. Each storing drum then includes a complete set of retarding rings of variable rigidity.

The base diameter D of the fingers 12 is such that the mentioned space *a* remains between the base ring 11 and the periphery of the storing drum 8. The diameter *d* of the circle on which the free ends of the fingers 12 lie, is advantageously such that it is slightly less than the diameter of the drum 8 in order that the fingers may bear against the periphery of the drum under tension. The intensity of retardation can be varied not only by changing the plastics materials but also by altering the diameter *d*. The greater the retardation is, the smaller is the diameter *d* relative to the diameter of the drum, since the tension by means of which the fingers 12 engage on the periphery of the drum increases as the diameter *d* decreases. However, it is also fundamentally possible to make the diameter *d* as large as the diameter of the drum. Then retardation is also obtained by the resilient deformation of the fingers 12 during yarn withdrawal.

Polyamides have proved to be suitable material for the retarding ring 10.

The invention is not limited to the illustrated embodiments. In particular the dimensions of the various parts of the retarding ring and the various angles through which the fingers 12 pass can be adapted to the actual requirements at any given time. It is also fundamentally possible to insert the fingers in a base ring instead of producing a unitary molding of plastics material, but the result is a considerably more difficult manufacture. Furthermore, the retarding ring according to the invention can also be used in a storing device wherein the drum is stationary, and the winding-on of the yarn is effected by means of a rotating arm.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In a yarn storing device having a storing drum adapted to have yarn wound tangentially thereon and a retarding ring surrounding the drum and adapted to have the yarn passed thereunder for removal axially from the drum, comprising the improvement wherein said retarding ring includes a base ring surrounding the periphery of the drum and spaced a small distance therefrom and a plurality of thin elongated resilient fingers extending from the base ring toward the surface of the drum, the resilient fingers being inclined inwardly from the base ring along an imaginary conical surface, said resilient fingers extending in the direction of relative rotation of the yarn during its withdrawal from the drum and disposed so as to overlap one another in the direction of the periphery of the drum, and said drum having a shoulder thereon disposed in engagement with the free ends of said resilient fingers.

2. A yarn storing device according to claim 1, wherein the resilient fingers extend in the form of a spiral.

3. A yarn storing device according to claim 1, wherein the free ends of the resilient fingers, when the resilient fingers are in a relaxed condition, lie in a circle having a radius less than the radius of the drum.

4. A yarn storing device according to claim 1, wherein the vertex angle of the imaginary conical surface is approximately 60°.

5. A yarn storing device according to claim 1, wherein said plurality of resilient fingers are spaced around the periphery of the base ring at intervals of approximately 1 centimeter.

6. A yarn storing device according to claim 1, wherein said resilient fingers have a length of approximately 1 to 2 centimeters.

7. A yarn storing device according to claim 1, wherein said resilient fingers have a width of approximately 0.5 to 1 millimeter.

8. A yarn storing device according to claim 1, wherein the base ring and the resilient fingers are constructed of plastic with said fingers being integrally connected to said base ring.

9. A yarn storing device according to claim 8, wherein the retarding ring is made of a polyamide.

10. A thread storage and delivery device for transferring a thread from a spool to a working point of a textile machine, said storage device including a storage drum having peripheral wall means onto which the thread is tangentially wound to form on said drum a thread supply, said thread being tangentially wound onto said drum adjacent one axial end thereof, and retarder means disposed adjacent the other axial end of said drum for controlling the axial withdrawal of thread from said drum, said retarder means including a base ring disposed in surrounding relationship to the periphery of said drum whereby the yarn passes from said yarn supply beneath said base ring for withdrawal axially of said drum, comprising the improvement wherein said retarder means includes a plurality of thin elongated resilient fingers having one end thereof fixedly secured to said base ring, said fingers extending axially from said base ring toward said other end of said drum and being inclined relative to said base ring so that the adjacent fingers overlap one another in the direction of the periphery of the drum, said fingers being inclined and extending in the direction of relative rotation of the yarn during its withdrawal, from the drum, the other ends of said fingers being free, and said drum having a shoulder thereon disposed in engagement with the free ends of said fingers.

11. A yarn storing device according to claim 10, wherein said resilient fingers are inclined inwardly relative to the base ring along an imaginary conical surface.

* * * * *