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BALLOON LIMITER FOR A BALLOON-FORMING TWIST SPINDLE

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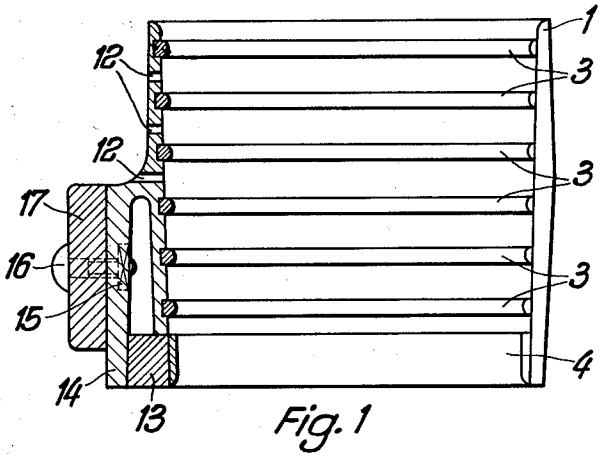


Fig. 1

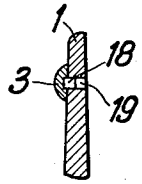


Fig. 3

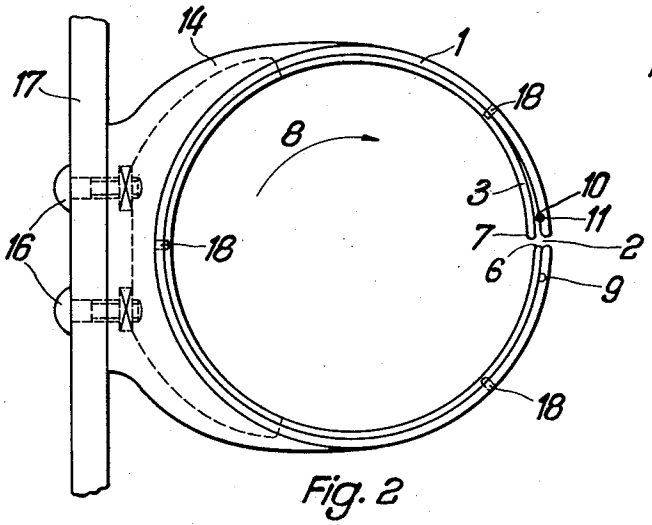


Fig. 2

Inventor:
Albert Kresslein
By Cushman, Darby & Cushman
Attorneys

United States Patent Office

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BALLOON LIMITER FOR A BALLOON-FORMING TWIST SPINDLE

Albert Kresslein, Krefeld, Germany, assignor to Volkmann & Company, Weeserweg, Krefeld, Germany, a partnership

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This invention relates to a balloon limiter for use in conjunction with any kind of yarn throwing twist spindle, particularly a double twist spindle, the contemplated balloon limiter being of the kind formed by a shell with an unbroken surface for containing the ballooning yarn and provided at most with a slit for the insertion of the yarn. As such, balloon limiters of the aforesaid kind are well known. Generally, they consist of a metallic material, especially of light metal, balloon limiters consisting of plastic being as a rule unable to stand up to the wear due to the constant lick of the yarn.

It is also known to construct balloon limiters which consist of a number of rings axially spaced in conformity with the outline of the balloon and concentrically surrounding the twisting spindle. In a modification of this known proposal balloon limiters of helical conformation are likewise already known. These balloon limiters which are comprised in individual wire rings or a continuous wire helix have the disadvantage that the throw of the yarn forming the balloon causes a considerable amount of wind which, on the one hand, is a nuisance to the operating staff and, on the other hand, causes considerable accumulation of dust on the machine. Moreover, in balloon limiters it is highly desirable that the balloon should revolve in an environment in which the air circulation is stable or in which an air swirl is generated which adapts itself to the motion of the balloon and which promotes the upward travel of the yarn. Preference must therefore be given to balloon limiters in the form of a closed shell save that a slit may be provided for the insertion of the yarn. Irrespectively of the material of which the limiter is made, the limiter is always liable to suffer considerable wear at all points where the ballooning yarn contacts its surface. Points which are more particularly subject to wear are the edges of the slit for inserting the yarn. When wear has occurred the balloon limiter must be re-machined. This cannot be done whilst the limiter is mounted on the spindle. The limiter must therefore be taken down, an inconvenient and time-consuming operation. Externally a balloon limiter would seem to be a relatively simple part of the machine. However, when re-assembling and fixing the limiter it is a matter of some importance that the original conditions should be re-established for the twisting spindle to operate in the same conditions as before.

It is therefore the object of the present invention to provide a balloon limiter which retains the advantages of the closed shell type of construction but at the same time avoids the disadvantages of the conventional form of balloon limiter of the said kind. It is a more particular object of the invention to permit wear and resultant damage to be made good by the replacement of parts without the necessity of dismantling the balloon limiter from the machine.

According to the invention the contemplated objects are achieved by providing the internal surface of the shell with exchangeable members which support the ballooning yarn. This arrangement permits a shell to be used which conforms with the desired shape of the balloon. Being entirely closed, the shell prevents the generation of undesirable wind and the contamination of the machine by the deposition of dust, the air movement

inside the limiter being of a desirable kind which assists the yarn in its travel. At the same time, when the supporting members are worn, they can be easily replaced without the necessity of dismantling the limiter from the machine.

The idea which underlies the invention can be embodied in two alternative ways. On the one hand, the internal surface of the shell may be provided with rings which are axially spaced. On the other hand, the internal surface of the shell may be provided with a sleeve or sleeves. Moreover, individual axial sections of the internal surface of the shell may be provided partly with rings and partly with sleeves, the resultant form of construction representing a combination of the alternatives previously mentioned. The spacing of the rings and/or sleeves may be adapted to existing requirements and, in given circumstances, substantially the entire internal surface of the limiter may be thus provided with rings and/or sleeves.

The rings and sleeves may consist of suitable non-wearing material. They may be made of steel or other metals or metal alloys. These materials may be provided with some form of surface protection. For instance aluminium might be provided with a surface layer produced by oxidation (eloxadised). Steel might be chromium-plated or chromised. Moreover, use could be made of plastics which are wear-resistant or have been rendered wear-resistant by the incorporation of special fillers. Conveniently, electrically conducting fillers may be thus used in order to impart sufficient electrical conductivity to the rings and sleeves for preventing the accumulation of an electrostaic charge.

It will be readily understood that there is now no objection to making the shell, for instance, of plastic, the rings or sleeves being suitably contrived to permit of their exchangeable insertion into the plastic shell. This can be arranged in a particularly simple manner by constructing the rings and sleeves in the manner of springy split rings. These may be slightly compressed, inserted into the shell, and then allowed to expand into grooves or the like formed in the inside surface of the shell. If the shell is one containing a slit for the insertion of the yarn the gaps in the rings or sleeves are so placed that they leave the slit unobstructed. Especially if the shell is of plastic, it can be readily provided with cylindrical, tapering, or double-coned sections, or any shape may be imparted thereto which assists in supporting the balloon and promoting the required travel of the yarn. The rings reinforce the plastic shell especially if this has a slit for the passage of the yarn.

For operating the balloon limiter according to the invention, it may be advisable to provide the wall of the shell with radial holes for carrying away accumulations of fluff when twisting certain types of flossy yarn.

In every balloon limiter particular difficulties arise in the region of the slit provided for the insertion of the yarn, because the ballooning yarn tends to strike the edge of the slit and to give rise to considerable wear. It has therefore been proposed to bend one edge of the slit slightly inwards in order to make the yarn skip over the slit. In a balloon limiter according to the invention, the leading edge of the slit, in relation to the direction of rotation of the balloon, can be readily thus bent slightly inwards. In the further development of the invention it is therefore proposed on each side of the axial slit in the shell, and parallel with the slit, to provide slots for the insertion of a stud adapted to bend one end of the split rings or sleeves radially inwards. The stud is inserted against that edge of the slit which leads when viewed in the direction of rotation and is inserted on the other side of the slit when the direction of rotation is reversed.

As already known in the case of other balloon limiters

the limiter proposed by the present invention may also be used to carry the magnets which serve for retaining the stationary part of the double twist spindle. To this end pockets, recesses, or the like, are provided at the bottom end of the shell into which the magnets can be inserted, the magnets being preferably enclosed at least on the outside by the plastic material of which the rest of the shell consists.

Since the presence of the slit for the insertion of the yarn is in any circumstances detrimental to the stability of the balloon limiter, limiters have already been proposed which lack such a slit. They have the disadvantage that their improved stability is secured at the expense of trouble which now arises in connection with the insertion of the yarn. According to a proposal for overcoming these difficulties which has not yet been published, a recess is provided at the bottom and possibly also at the top edge of the shell to permit the operator to insert a finger into the interior for pushing the threading needle through the same until it can be gripped from above. A balloon limiter according to the present invention may be constructed on similar lines. In such a case the rings or sleeves need merely be provided with rounded ends at the edges of the recesses cut into the shell.

As will be understood from the above explanations the most convenient arrangement is for the shell to be a self-supporting unit containing the rings, sleeves and possibly also the magnets. A carrier member may be formed integrally with such a shell for bolting the same to the frame of the machine and thus holding the entire limiter in position. If the shell is formed with a slit this integral carrier member will be located on the opposite side of the slit, and its shape and disposition will serve to improve the general stability of the device. The bottom part of the carrier member, which extends to the end of the shell, may then be used for holding the magnets.

Not quite so advantageous but nevertheless in some cases to be preferred is a combination of the rings and/or sleeves to form a self-supporting element, for instance in the shape of a basket, in such manner that the shell consisting for instance of plastic can be pushed over or suspended on the said basket.

A preferred form of construction of a balloon limiter according to the invention is illustratively shown in the drawings, in which:

FIG. 1 is a vertical axial section,

FIG. 2 is a plan view, and

FIG. 3 is a portion of the shell in the region of one of the rings.

1 indicates the shell which may consist preferably of plastic, although it could be made of a metal. In the illustrated example the shell has a slightly coned internal surface. However, it will be readily understood that any alternative shape which is satisfactory from the point of view of the configuration of the balloon and the generation of stable or unidirectional airflow conditions, or which assists the travelling yarn, could be employed. Moreover, the illustrated balloon limiter is one provided with a slit 2 which in known manner is intended to facilitate the insertion of the yarn.

The members for supporting the yarn, in the form of split rings 3 and a split sleeve 4 are inserted into shell 1. However, it will be readily understood that one or more split sleeves 4 might be provided in the regions in which split rings 3 are located in the example, and it is also possible to replace the split sleeve 4 shown in FIG. 1 by one or two split rings. Conveniently, the inside surface of shell 1 is provided with groove-like recesses at the levels at which the split rings or sleeves are to be located. However, this is not a necessity. Furthermore, two or several pins 18 may be provided (FIG. 3) which engage cooperating recesses or holes 19 and thereby prevent the axial or radial displacement of the rings or sleeves. In order to prevent the yarn of the balloon from whipping against the edges 6 and 7 on either side of the gap in the split rings 3 or sleeves 4, thus giving rise to wear, it is advisable, assuming that the direction of rotation of the balloon is as indicated by arrow 8 (FIG. 2), to bend the leading end of the ring slightly inwards and thus to cause the yarn to skip across the gap. To this end grooves 9 and 10, extending parallel with the slit 2 for the insertion of the yarn are provided in shell 1. A stud can be axially inserted into these slots. The stud is shown at 11 and, as will be seen by reference to FIG. 2, its purpose is slightly to lift the edge 7 of ring 3 and thus to deflect it in the inward direction. If the direction of rotation of the balloon is reversed, stud 11 may be withdrawn and inserted into groove 9.

Rings 3 and sleeve 4 may consist of a material which offers maximum resistance to wear caused by the lick of the yarn. If in course of time these members do begin to wear, it is obviously an easy matter to replace them by new ones. The rings 3 and sleeves 4 are gripped with a suitable tool, slightly compressed and then withdrawn in the upward direction. The insertion of fresh rings or sleeves is effected in analogous manner.

If the shell 1 is not provided with a slit 2 for the insertion of the yarn it is unnecessary for the rings 3 and sleeves 4 to have a specially wide gap. In fact, the ends 6 and 7 may in such a case be allowed to overlap in a manner otherwise already known in split rings.

If the yarn is one tending to shed a considerable amount of fluff it may be advisable to make arrangements to permit the abraded fluff to emerge from the shell to the outside. To this end radial openings 12 are provided between the rings. These may be equidistantly or irregularly distributed around the periphery of and axially along the shell. It may also be an advantage if these holes 12 flare slightly towards the outside. This will help to prevent them from choking.

At 13 is a permanent magnet which, in conventional manner, serves to retain the members of a double twist spindle which must be stationary during the twisting operation. The permanent magnet is inserted into a pocket in shell 1 and it is advisable to cover the same on the outside with the plastic constituting the shell 1.

In order to permit the shell to be secured to the machine frame in a convenient way a carrier member 14 may be formed preferably integrally with the shell 1. A captive nut 15 may be embedded in this carrier member or screwed into the same for the reception of a bolt 16 which establishes the connection with the machine frame indicated at 17. As will be seen, more particularly by reference to FIG. 2, the carrier member embraces a considerable portion of shell 1 and thus contributes towards the stability of the entire device. The carrier member shown in the drawing is located on the opposite side to the slit 2 for insertion of the yarn. Moreover, the carrier member 14 which extends to the bottom end of shell 1 may be utilised for accommodating the magnet 13.

It will be readily understood that a balloon limiter according to the invention may be constructed otherwise than is illustratively shown in the drawings, without deviating from the principle which underlies the invention. More particularly the round section wire may be replaced by wire of some alternative cross section which may be, for instance, elliptic or angular. Moreover, the sleeves may likewise have suitable sections. However, the shape of the wires, or split rings and sleeves, should always be such that with due regard to the nature of the yarn and the number of revolutions of the balloon the yarn cannot make contact with the shell 1. If on occasions there should be some contact between the ballooning yarn and the shell 1 this will not cause noticeable wear at the point of contact because the yarn of the balloon is substantially supported by the rings or sleeves. Furthermore, the spacing of the rings and/or sleeves may be such that contact between the wall of the shell and the yarn is out of the question. The accumulation of a significant electric charge on the body of shell 1 is

unlikely, because contact between yarn and shell 1 is substantially avoided. If the accumulation of a charge were thought to be likely, then this can be easily avoided by connecting the rings 3 or sleeves 4 with the machine frame by a wire inserted into the shell 1.

What I claim is:

1. A balloon limiter for a balloon-forming twist spindle, comprising a continuous shell having a slit for the insertion of the yarn, and withdrawable split ring members within said shell for supporting the ballooning yarn and relieving the shell of wear by the ballooning yarn, the splits in said rings registering with the said slit.

2. A balloon limiter according to claim 1, said shell being of a plastic material and said split ring members being expanded within said shell for supporting the ballooning yarn, the interior wall of said shell having means to locate said ring members axially.

3. A balloon limiter according to claim 2, comprising pockets or the like at the lower end of the shell, permanent magnet means in said pockets for holding a part of the spindle against rotation, the said plastic material enclosing the magnets at least on the outside thereof.

4. A balloon limiter according to claim 1, said withdrawable members being spring split-ring members, said shell having means to locate said ring members axially, and means for inwardly deflecting an end of the split ring members so that the ballooning yarn will skip across the gap during operation of the spindle.

5. A balloon limiter for a balloon forming twist spindle comprising a continuous shell having an axially extending slit for the insertion of the yarn, retaining means on the inner surface of said shell, a plurality of split ring members sprung into engagement with said retaining means for axial retention thereby, a groove parallel to the said slit on at least one side thereof, and a stud slideable along the said groove for deflecting an end of each split ring member.

6. A balloon limiter for a balloon-forming twist spindle comprising an enclosure shell and withdrawable members within said shell for supporting the ballooning yarn, said withdrawable members being split ring members axially spaced along the interior of said shell, said wall having a plurality of spaced circumferential grooves and said split ring members being sprung into said grooves.

7. A balloon limiter for a balloon-forming twist spindle comprising an enclosure shell and withdrawable members within said shell for supporting the ballooning yarn and relieving the shell of wear by the ballooning yarn, said withdrawable members being split ring members axially spaced along the interior wall of said shell, at least one of said ring members providing a smooth curved surface projecting within the interior wall of said shell and at least one of said ring members being a sleeve-like ring.

References Cited in the file of this patent

UNITED STATES PATENTS

949,733	O'Connell	Feb. 15, 1910
2,473,521	Gwaltney	June 21, 1949
2,660,856	Kingsbury	Dec. 1, 1953
2,745,239	Kingsbury	May 15, 1956