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(54) Improved spindle for automatic spinning frames or twisting frames.

(57) Improved spindle for spinning frames or twisting frames comprising a tube-holder ring nut, provided at its top with one or more rims (8, 9) with notches (10,11), inside which a vertical sharp blade (12) is positioned, which cuts the thread (13) when the bobbin (2) undergoes the doffing.

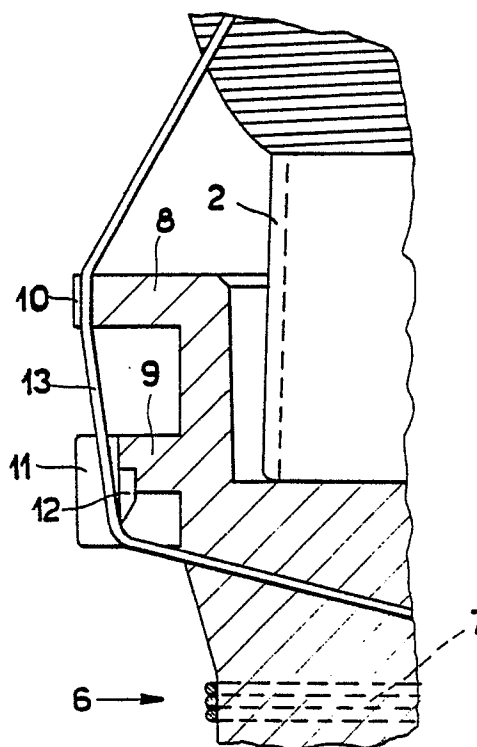


Fig. 3A

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"IMPROVED SPINDLE FOR AUTOMATIC SPINNING FRAMES OR TWISTING FRAMES"

The present invention relates to an improved spindle for automatic spinning frames and twisting frames, which makes it possible the operations of automatic doffing of the full pirns, and of their replacing with empty tubes, to be improved.

In the spinning or twisting operations on automatic spinning frames or twisting frames, when the pirns are complete, they must be doffed and replaced with empty tubes. Generally, the spinning ring frame carries out, first of all, an accelerated advancement, winding on each full pirn a set of extended spirals, and then moves to a lower position, leading the thread to wind on the lower portion of the spindle, which is constituted by a ring nut which supports the tube, wherein said ring nut remains fastened to the machine. Therefore, the thread remains wound both on the filled tube, which constitutes the pirn to be removed, with a substantially vertical winding path, and on the ring nut, which remains fixed on the machine, along a substantially horizontal winding path.

Generally, on automatic spinning frames or twisting frames, the replacement of the filled tubes takes place simultaneously at a plurality of positions.

The thread wound on the pirn must be removed together with the same pirn, and the thread deposited on the ring nut must remain in such position, until the production step is restarted.

During the tube change operation, the need hence arises of cutting the thread, with reliability and precision, in correspondence of the thread length comprised between the thread wound on the pirn, and the thread wound on the ring nut.

On automatic spinning frames or twisting frames of conventional type, such a cutting of the thread is only entrusted to the bobbin lifting stress, i.e., the interruption of the thread takes substantially place by means of a tearing action.

Such an operating way is affected by considerable drawbacks.

The first of such drawbacks is due to the fact that in breaking point of the thread is random, and this fact causes considerable disadvantages when the processing is resumed.

A second drawback is due to the fact that in some cases the lifting action does not cause the thread to be torn in the expected thread length, but causes, on the contrary, the turns wound on the pirn to unwind, so that the pirn is drawn and removed with its thread being still connected with the thread kept by the machine, with the obvious drawbacks deriving from such an occurrence, such as the need for a manual intervention, waste of thread, obstacles and soiling. Finally, a disadvan-

tage carrying a considerable weight, in particular when a large number, or even the totality, of the pirns of a spindle bed of the machine are replaced simultaneously, consists in that the pirn extraction device must also apply a large tearing force in order to tear the totality of the threads, which may be as high as hundreds of kilograms.

Therefore, the technical problem is of interrupting the thread with precision and reliability, and with a stress as small as possible: a true cutting action has hence to be carried out.

On most recent spinning frames, for that purpose the tube-holder ring nuts have been modified, by shaping the circumferential notches on the upper rim of said ring nut, inside which the thread is forced to run, with a sharp horizontal cutting edge.

Such a contrivance has actually enabled the thread breakage stress to be reduced by a certain extent, but one can still observe that the action of such a cutting edge, which crosses the thread according to a considerably open angle, does not make it possible a true cutting action, but, rather, an abrasion, to take place of the thread, which is worn off and weakened by rubbing, and still gets torn in a random position, and with fraying.

The present invention makes it possible the above reported drawbacks to be overcome, and the thread cutting stress to be considerably lowered.

The present invention consists in an improved tube-holder ring nut which, in its top portion, is constituted by one or more circumferential protrusions provided with notches. Such notches may have a rectangular, triangular, semicircular, or an equivalent hollow profile. Inside such notches, a sharp blade is provided, in a substantially vertical position, i.e., in such a position that the length of thread under traction, running along a substantially vertical path, is intercepted according to a small acute angle, and the horizontal length of thread, anchored to the ring nut, is intercepted perpendicularly.

In order to better illustrate the spirit and the scope of the present invention, a typical practical embodiment thereof is now disclosed, by referring to the hereto attached figures.

In Figure 1, the operation of the spindle during the winding of the bobbin is depicted;

In Figures 2A and 2B, the operation of the spindle is depicted during the step of winding on the lower ring nut and of cutting of the thread,

In Figures 3A and 3B, the improvement of the device according to the present invention, and its operation, is shown in greater detail.

During the winding of the filling thread on the tube 2, the thread-guide ring 3 reciprocates along a

vertical route between an upper position, at a not shown level, and a lower position.

The speed of the reciprocating motion is such that the thread is wound with small-slope turns.

In Figure 1, the thread-guide ring is performing pirn filling strokes.

When the bobbin is complete, according to as indicated by suitable sensors not shown in the figures, the thread-guide ring 3 performs an accelerated stroke, winding a spiral made of high-slope turns 5, and then reaches level 6, wherein it stops. Thus, some turns of thread are wound on the collar 7 of the spindle-holder ring nut.

According to a preferred form of practical embodiment of the invention, a knurling, or an equivalent machining, of the surface of the collar 7, is carried out, in order to increase the grip of the thread on it, and reliably constrain the same thread.

On the upper portion of the tube-holder ring nut, in the exemplifying practical embodiment depicted in Figures 1, 2 and 3, two circumferential protrusions 8 and 9 are present, which are provided with notches, or hacks, 10 and 11, by which the thread guided towards the collar 7 by the thread-guide 3 is engaged and held, to run along a trajectory of spiral shape from the bobbin 1 to the collar 7.

In Figures 2A and 2B, as well as 3A and 3B, the path of the thread is shown, for the sake of simplicity, from the notch 10 to the vertically underlying notch 11. In reality, the length of thread engaged between the upper notch 10 and the lower notch 11 is inclined, and therefore in general the notches 10 and 11 which engage the same thread are not on the same vertical generatrix, but are angularly staggered by one or more position(s). When the turns of winding on the collar 7 are made, the spindle is stopped and, by means of the automatic doffing devices, the tube 2 on which the bobbin 1 is wound, is drawn and lifted.

In the practical embodiment of Figures 3A and 3B, the sharp blade 12 is positioned in correspondence of the notches 11 of the lower circumferential protrusion 9.

Said sharp blade is placed in a substantially vertical position, such as to meet the thread 13, which is pulled when the tube 2 is lifted according to the arrow S, with a vary acute angle along the upper route towards the bobbin 1, and practically perpendicularly along the lower, horizontal route towards the ring nut.

Preferably, the angle between the pulled thread and the outer surface of the sharp blade does not exceed the value of 20°. The cutting action takes place with precision, and without generating frays in the thread.

A sharp blade 12 is present in correspondence of all of the notches of the circumferential protrusion

and may be made as a plurality of lengths, or as a single length concerning all of the notches.

The blade 12 can be obtained by machining the circumferential outline, or it can be produced separately, and then fastened to it in correspondence of the notches. The cutting edge of the blade 12 can have a linear shape, or it can be serrate.

According to a form of practical embodiment, the sharp blade 12 can be positioned in correspondence of the upper rim 8, inside the notches 10, or on both of the rims.

An advantageous characteristic of the invention is constituted by the fact that the cutting edge of the blade 12 is anyway in a sheltered protection, i.e., it cannot injury an operator who inadvertently approaches his hand to the tube-holder ring nut.

An important feature of the invention is that the radius R_{10} of the circumference which contains the innermost points of the notches of the upper rim is longer than the radius R_{11} of the circumference which contains the innermost points of the notches of the lower rim.

Such a condition ensures, in fact, that the thread 13 surely meets the cutting edge of the blade 12 in an efficacious position, whether it is on the rim 8, or on the rim 9, with the abrasion of the thread in other points, which can create drawbacks both during the doffing step, and during the step of winding resumption on the subsequent tube, being limited.

Claims

1. Improved spindle for spinning frames, or twisting frames, comprising a tube-holder ring nut provided at its top with one or more circumferential protrusions or rims, provided with notches, or hacks, characterized in that at least one of said circumferential protrusions and inside the notches, a sharp blade is provided, in a substantially vertical position, which meets the thread pulled by the bobbin during the operation of doffing of the same bobbins, according to an acute angle, preferably smaller than 20°.

2. Improved spindle according to the preceding claim, characterized in that the circumferential protrusions are two, or more than two.

3. Improved spindle according to claim 2, characterized in that the sharp blade is positioned inside the notches provided in the lower rim.

4. Improved spindle according to claims 2 or 3, characterized in that the circumference which contains the innermost points of the notches of the upper rim has a radius larger than the radius of the circumference which contains the innermost points of the notches of the lower rim.

5. Improved spindle according to one or more of the preceding claims, characterized in that the collar 7 of the ring nut on which the turns of thread are wound before the doffing of the bobbin is carried out, has a knurled surface, or a surface with an equivalent finishing, which reliably constrains the thread wound on it.

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6. Improved spindle according to one or more of the preceding claims, characterized in that the cutting edge of the blade 12 has a linear or serrate outline.

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7. Improved spindle according to claims 2 or 3, characterized in that the sharp blade is positioned inside the notches provided in the upper rim.

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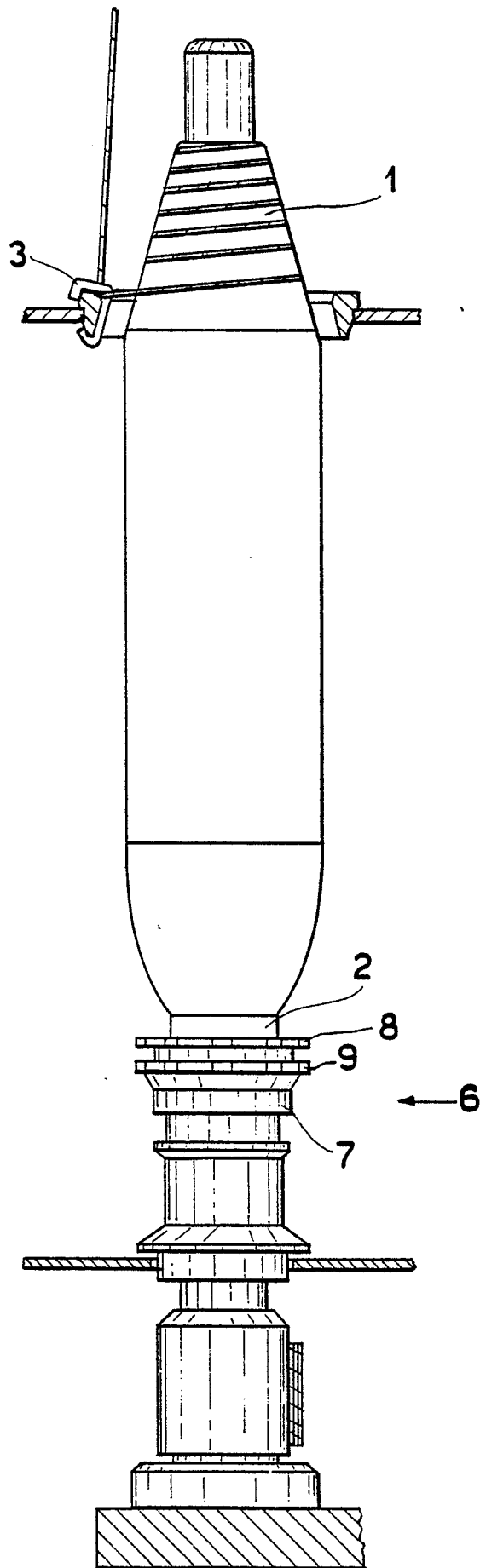
Fig.1

Fig.2A

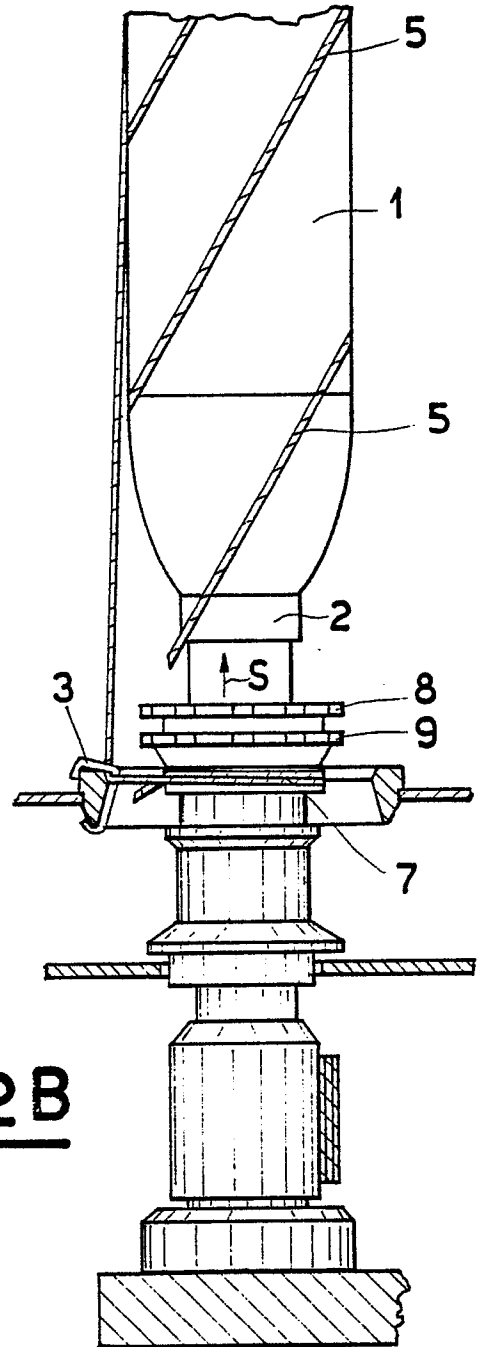
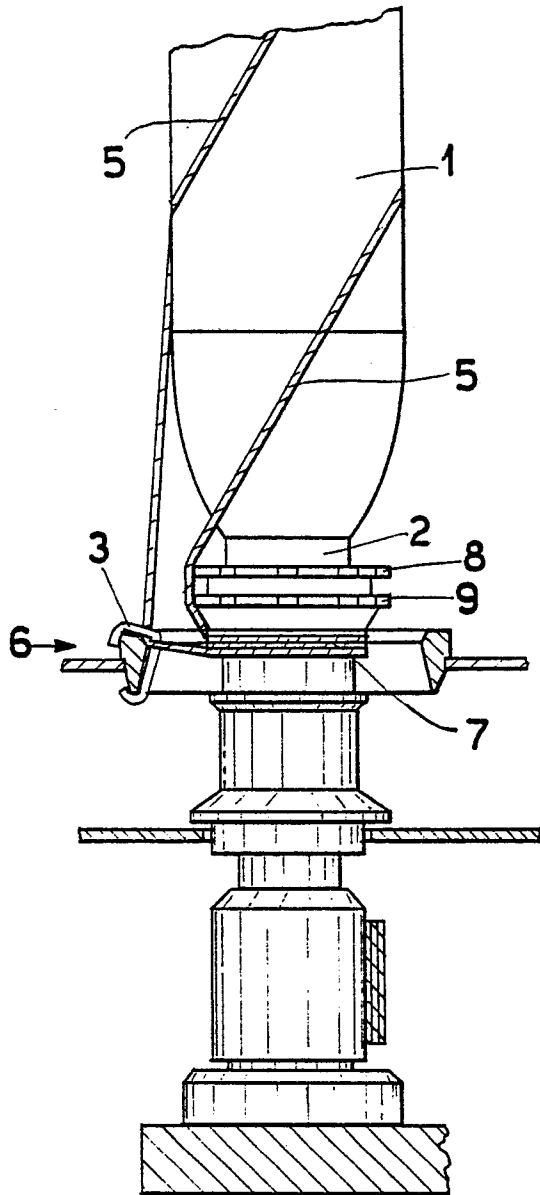


Fig.2B

Fig. 3A

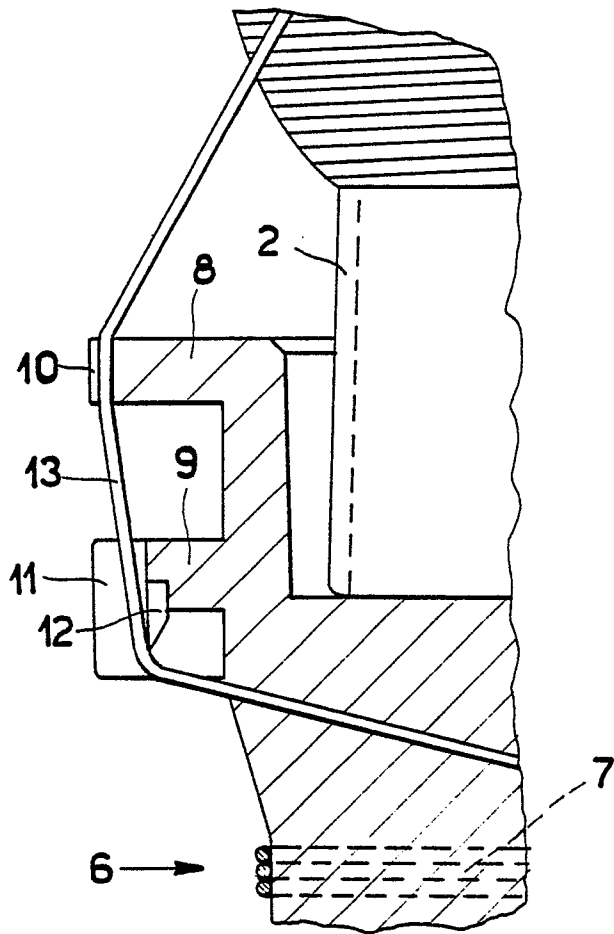
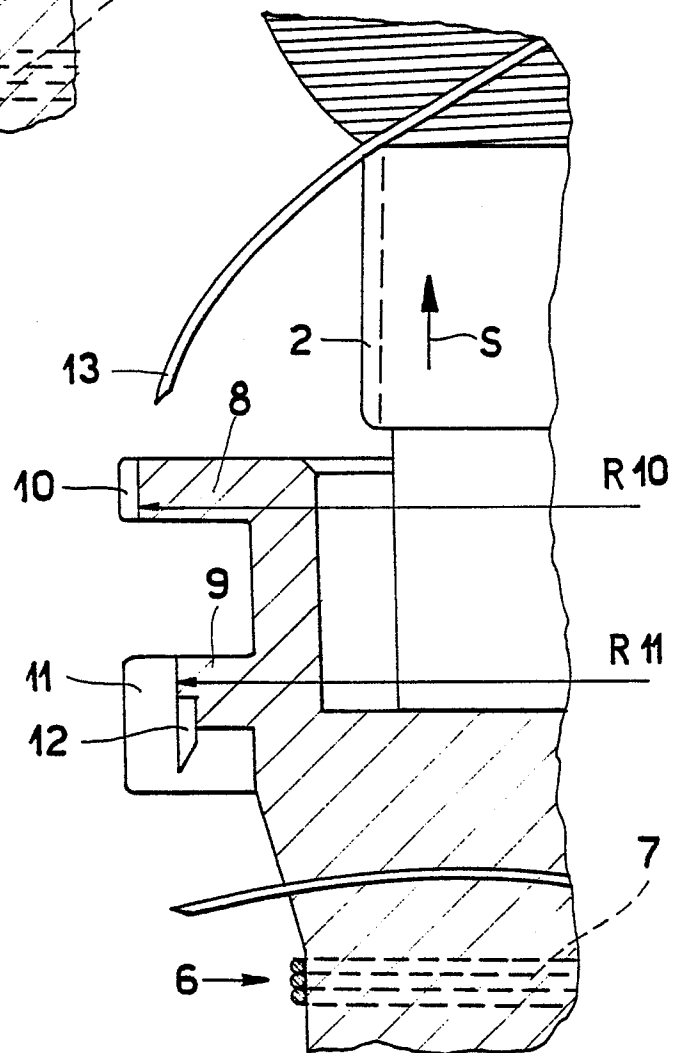


Fig. 3B





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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	PATENT ABSTRACTS OF JAPAN, vol. 7, no. 181 (C-180)[1326], 10th August 1983; & JP-A-58 87 327 (TOYODA JIDO SHOKKI SEISAKUSHO K.K.) 25-05-1983 * Abstract *	1	D 01 H 1/38
X	--- PATENT ABSTRACTS OF JAPAN, vol. 6, no. 239 (C-137)[1117], 26th November 1982; & JP-A-57 139 526 (FUTABA BOBIN K.K.) 28-08-1982 * Abstract *	1	
X	--- PATENT ABSTRACTS OF JAPAN, vol. 5, no. 4 (C-38)[676], 13th January 1981; & JP-A-55 132 722 (TOYODA JIDO SHOKKI SEISAKUSHO K.K.) 15-10-1980 * Abstract *	1	
X	--- JP-U-52 018 230 * Figures 1-4 *	1	
A	--- US-A-4 617 791 (P. LOUSBERG) -----		TECHNICAL FIELDS SEARCHED (Int. Cl.4) D 01 H B 65 H
The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
THE HAGUE	12-04-1988	HOEFER W.D.	
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