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(54) **Picking element for carrying out the operation of bobbin doffing and the operation of introduction of the empty tube on a spinning frame.**

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Description

The present invention relates to a gripping device for the automatic doffing of bobbins and replacing of empty tubes on a textile machine, preferably a spinning frame.

Devices for carrying out the operation of bobbin doffing and the operation of placing empty winding tubes on spindles are provided with picking elements for gripping and handling the empty tubes or the tubes filled with wound thread. Such picking elements are mounted on a longitudinal beam, in a cantilever fashion, to which beam the necessary movement is supplied, for simultaneously picking all the complete bobbins from the spindles, and, according to a suitable sequence, for simultaneously positioning all the empty tubes on the spindles.

Picking elements are known, which are based on the use of bushes containing elastically yielding inner sleeves which, under the action of a pressurized fluid, are inflated in order to be able to grip the full bobbins, or the empty tubes.

The picking elements destined to the automatic doffing of all the full bobbins, and those destined to the re-charge of all the empty tubes of the whole spinning bed are generally separated from one another, and are provided with well-distinct drive means.

However, other structural forms of picking elements are known. A structural type of picking elements for empty tubes, or tubes filled with thread, is disclosed in detail in US-A-3,367,098. In said patent, the picking element has a pin shape, and has an elastic-bellows body having the shape of a bag which presses, after being inflated, against the inner wall of the tube to be gripped, and in such a way grips and moves it. This type of picking element makes some drawbacks arise, which limit its application. These drawbacks are represented, in particular, by the non-universal nature of said picking element, in that some tubes have at their top end a limited-size bore, for advantageously providing a reinforcer rim, or, in extreme cases, the bore top end is closed by means of a plug, also used for reinforcement purposes.

Another drawback occurs whenever the pin-shaped picking element has to operate in connection with tubes whose top rim is damaged. In these cases, the empty tube, or the tube filled with wound thread (the bobbin), retained and gripped by the pin-shaped picking element, positions itself in an inclined position relatively to the longitudinal axis of the spindles, thus creating unfavourable conditions for reaching, in a correct position, the position provided for by the spindle, or supporting pin. That may cause unfavourable conditions for a correct support positioning on the spindle, or on

the supporting pin. Sometimes the inclination is such that, as the movements for the automatic doffing operation proceed, the empty tube, or the tube filled with thread beats against parts of the machine, which damage it, and, in extreme cases, also a damage may occur to the picking element, or to corresponding machine parts against which the same tube comes to interfere.

However, still other structural forms are known for the picking elements destined to the doffing of the tubes filled with wound thread, and to the re-charge of the empty tubes.

In the past, devices for the automatic doffing have been developed, wherein the picking element destined to the doffing of the tubes filled with wound thread and the picking element destined to the re-charge of the empty tubes are combined with each other in a single base rigid sleeve, as disclosed in IT-U-156,780 or FR-A-2 182 870.

These picking elements, together with some advantageous characteristics, like their relatively small overall dimensions and the simplicity of the operating cycle within the scope of the double-gripping device, suffer from some drawbacks, which complicate their manufacturing and assemblage steps and which consequently cause a considerable increase in their manufacturing costs. These drawbacks are mainly represented by the presence of two picking elements, which determine a double fastening, and which are manufactured with a plurality of mechanical elements associated with, and fastened to, one another, by means of assemblage operations, of a considerable overall cost.

In fact, in order to produce such picking elements, an operation of folding and clamping must be carried out in order to bind the elastic sleeves and the rigid sleeves at the ends of the two picking elements by snap-applying metal rings to the end edges, as well as assemblage operations have to be carried out in order to house ring gaskets inside the rigid sleeves, and still other operations have to be performed; furthermore, the feed of compressed air (or of another pressurized fluid), to feed the expandible chambers of the picking elements, takes place through separated ducts, each of said separated ducts being prearranged in order to feed bores and slots relevant to each elastically yielding sleeve; all the above contribute to increase the end cost of these double-gripping devices.

On considering the above, the purpose of the present invention is to render only one the picking element destined to grip the tubes and the bobbins (i.e., those tubes on which desired amounts of thread have been wound) and, furthermore, to considerably simplify the manufacturing operations thereof.

A gripping device having a picking element

capable of gripping both empty tubes and complete bobbins is further known from GB-A-2 118 523. This device comprises a single picking element for each gripping station and has the features of the preamble of claim 1.

Both the sleeve portion of the picking element and the elastically yielding sleeve member have a bell-shaped configuration, and they are both fastened at their top portion to the doffing beam by means of a screw screwed into the body of the beam, the screw thus extending coaxially to the picking element and the tube or bobbin to be gripped thereby.

Such a construction has the main drawback that when the movement of the beam with the picking element is hindered, especially on depositing incorrectly aligned tubes on the spindles, considerable forces act onto the interfering elements which can damage the picking element or parts of the gripping device or of the machine owing to the axial compression of these members between the spindles and the beam.

Furthermore, this known picking element is made of a relatively high number of mutually assembled components, and this increases the manufacturing costs.

Summing-up, the purpose of the present invention is to provide a picking element with a considerably reduced cost and which reacts and triggers a safety action when the movement which the picking element is expected to carry out is hindered during the change in position of the empty tube, or of the tube filled with wound thread.

This purpose is achieved by a gripping device as claimed in the characterizing portion of claim 1.

With a device according to the present invention, it becomes possible to prevent, even to a practically complete extent, any possible risks of damage to parts or elements of the automatic doffing device, or to machine parts, or the like, in a substantially better way than it was heretofore possible.

Each action of detaching of the picking element from the longitudinal support beam may be simultaneously signalized by an optical or acoustical signal, so that the attention of the attending staff is drawn onto the operative malfunctioning, and the attending staff may eliminate it with no delay, in order to restore the optimum conditions for carrying out the whole automatic doffing operation.

In particular, the safety element, owing to cost reasons, may advantageously have the structure of a self-tapping screw, which connects the longitudinal support beam with a pin suitably housed in a hole of the picking element.

Said pin is provided, through its middle, with a smooth bore, which is self-tapped under the action

of the self-tapping screw.

The self-thread generated by the screw in the pin is in fact the actual safety element, in that it results to have a limited, preset, strength, on a value preset during the design step.

In case the safety action is performed - which derives from a previously unexpected resistance due to an impact, or to a casual interference, and which causes the picking element to get detached from the longitudinal support beam -, the handling integrity is restored by simply replacing the pin provided with said smooth bore, which gets self-tapped during the action of screw connection, as above disclosed. Incidentally, the functionality of the picking element is restored without it having to be replaced.

The invention is now explained in the following in greater detail, on the base of an example of practical embodiment shown in the figures of the hereto attached single drawing sheet, it being understood, in this connection, that the invention can be practiced according to many further forms of practical embodiment.

In the drawing:

Figure 1 shows a schematic cross-section of a picking element fastened to a longitudinal doffing beam according to the present invention; Figure 2 shows a schematic view, in axonometric perspective, of the picking element together with the longitudinal beam.

The operation of some elements which operate in mutual cooperation with the picking elements in the automatic doffing device is not described in detail, because such elements are already known, and also because they do not concern the improvement according to the present invention.

Referring to the drawing, a picking element 1 has a rigid sleeve portion 2 (e.g., of a plastics material) housing an elastically yielding sleeve member 10 secured at its opposite ends to the sleeve portion 2. The picking element 1 is a single-piece element further having a bracket portion 2a extending generally radially to the sleeve portion 2 for cantilever supporting the picking element 1 by a longitudinal doffing beam 4, supporting all the picking elements 1 of the whole operating bed, which associates the spinning spindles in an approached position side-by-side to each other. A ring space 5 suitable for introducing a compressed fluid for inflating the elastically yielding sleeve member 10 surrounds the sleeve member 10 in the sleeve portion 2. A rigid ring 6 serves for positioning the bottom lip of the elastically yielding sleeve member 10 for the single high-pressure mould-casting operation during which the picking element 1 is manufactured. A channel 8 places the ring space 5 in fluid communication with a central feed duct 9 of the beam 4, so that a compressed fluid supplied to the

duct 9 feeds all the picking elements 1 of the whole operating bed through the respective channels 8. The compressed fluid causes the elastically yielding inner sleeve member 10 to be inflated in order to grip the top end portion of an empty tube, or of a tube filled with the wound thread (i.e. a bobbin).

The sleeve portion 2 has two wings 12 integral therewith, which have the shape of two circular sectors forming a divergent funnel extending downwards for inviting and guiding the picking element 1 on the outer portion of the top end of the tube or bobbin to be handled during the automatic doffing operating cycle. A safety element in form of a pin 14 is interposed between the bracket portion 2a and a fastening means in form of a screw 16 securing the picking element to the doffing beam 4. The pin 14 is housed in a hole 3 of the bracket portion 2a. The hole 3 extends perpendicularly to the axis of the sleeve portion 2a of the picking element 1. The pin 14 is further provided, substantially through its middle, with a smooth bore wherein the screw 16, which is a self-tapping screw, is screwed, so generating a screw-thread inside the bore of the pin 14 and binding the picking element 1 to the beam 4.

If gripping and handling an empty tube, or a tube filled with wound thread, is desired, first of all the automatic doffing device is positioned in such a way that the beam 4 positions the picking element 1 around the portions close to the top end of said either empty or thread-filled tube, and electrovalves, or similar means are then operated, which deliver compressed air to the main duct 9. Then, through the communication channel 8, compressed air is fed to the ring space 5, which causes the deformation of the elastically yielding member 10 to occur, causing the empty tube, or the tube filled with wound thread, to be gripped thereby. The subsequent handling causes either the doffing of the tube filled with wound thread from the spinning spindle, or the bringing of the empty tube in place of the already removed tube filled with wound thread, the whole according to a precise sequence of operating steps known from the prior art.

If the picking element 1 encounters any hindrance to its movement with the doffing beam 4, the calibrated strength connection formed by the pin 14 in which the screw 16 is self-tapped, causes the picking element 1 to get detached from the beam 4, whereas the beam itself can continue its operating movement with all the other picking elements 1 fastened thereto and without that parts of the machine or of the doffing device and picking element other than the pin 14 are damaged. The pin 14 can subsequently be easily replaced.

Claims

1. A gripping device for automatically doffing bobbins and replacing empty tubes on a textile machine, particularly a spinning frame, comprising a picking element (1) having a sleeve portion (2) for receiving therein an end of a bobbin or tube, an elastically yielding sleeve member (10) housed inside the sleeve portion (2) and secured thereto at opposite ends, an annular space (5) surrounding the sleeve member (10) in the sleeve portion (2), a channel (8) in the picking element (1) providing fluid communication between said annular space (5) and a feed duct of a doffing beam (4), and screw means (16) for fastening the picking element (1) onto the doffing beam (4), characterised in that the picking element (1) is a single-piece element having a bracket portion (2a) extending generally radially from the sleeve portion (2) for cantilever supporting the picking element (1) by the doffing beam (4), and in that a safety element (14) with a preset limited strength is interposed between said bracket portion (2a) and said fastening screw means (16), whereby the picking element (1) gets detached from the doffing beam (4) when the movement of the picking element (1) with the beam (4) is hindered.
2. A gripping device according to claim 1, characterised in that said safety element comprises a pin (14) within a hole (3) of said bracket portion (2a) and in that said fastening screw means comprise a self-tapping screw (16) screwed into a bore of said pin (14).
3. A gripping device according to claims 1 and 2, characterised in that said hole (3) and said pin (14) extend substantially perpendicularly to the axis of said sleeve portion (2).
4. A gripping device according to claim 1, characterised in that it further comprises an optical or acoustical signalling device associated to the picking element (1) for signalling detachment of the picking element (1) from the doffing beam (4).

Patentansprüche

1. Greifvorrichtung zum automatischen Abziehen von Spulen und Ersetzen von Spulenhülsen in einer Textilmaschine, insbesondere in einer Spinnmaschine, umfassend eine Greifeinrichtung (1) mit einem Büchsenabschnitt (2) zum Aufnehmen eines Endes einer Spule oder einer Hülse darin, ein elastisch nachgebendes Büchsenelement (10), das innerhalb des Büch-

senabschnittes (2) angeordnet ist und daran an gegenüberliegenden Enden befestigt ist, einen ringförmigen Raum (5), der das Büchsenelement (10) in dem Büchsenabschnitt (2) umgibt, einen Kanal (8) in der Greifeinrichtung (1), der eine Fluidverbindung zwischen dem ringförmigen Raum (5) und einer Zuführleitung einer Abziehschiene (4) verbindet, und Schrauben-elemente (16) zum Befestigen der Greifeinrich-tung (1) auf die Abziehschiene (4), dadurch gekennzeichnet,

daß die Greifeinrichtung (1) ein einstückiges Element mit einem Trägerabschnitt (2a) ist, das sich im allgemeinen radial von dem Büchsenabschnitt (2) erstreckt zum freitragenden Halten der Greifeinrichtung (1) durch die Abziehschiene (4), und daß ein Befestigungselement (14) mit einer vorbestimmt begrenzten Festigkeit zwischen dem Trägerabschnitt (2a) und den Befestigungsschraubenelementen (16) angeordnet ist, wobei die Greifeinrichtung (1) von der Abziehschiene (4) gelöst wird, wenn die Bewegung der Greifeinrichtung (1) mit der Schiene (4) behindert ist.

2. Greifvorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß das Befestigungselement einen Stift (14) innerhalb eines Loches (3) des Trägerabschnittes (2a) umfaßt und daß die Befestigungsschraubenelemente eine selbstschneidende Schraube (16) umfassen, die in eine Bohrung des Stiftes (14) geschraubt ist.
3. Greifvorrichtung nach Ansprüchen 1 und 2, dadurch gekennzeichnet, daß sich das Loch (3) und der Stift (14) im wesentlichen senkrecht zu der Achse des Büchsenabschnittes (2) erstrecken.
4. Greifvorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß sie ferner eine optische oder akustische Signaleinrichtung umfaßt, die mit der Greifeinrichtung (1) verbunden ist zum Anzeigen eines Lösens der Greifeinrichtung (1) von der Abziehschiene (4).

Revendications

1. Dispositif de préhension pour lever automatiquement des bobines et remettre en place des tubes vides sur une machine textile, particulièrement un métier à filer, comprenant un élément de cueillage (1) comportant une partie manchon (2) destinée à recevoir une extrémité d'une bobine ou d'un tube, un élément formant manchon (10) susceptible de fléchir élastique-

ment, logé à l'intérieur de la partie manchon (2) et fixé à cette dernière à ses extrémités opposées, un espace annulaire (5) entourant l'élément formant manchon (10) dans la partie manchon (2), un canal (8) dans l'élément de cueillage (1) assurant une communication de fluide entre ledit espace annulaire (5) et un conduit d'amenée d'une poutre (4) de levée de bobine, et une vis (16) pour fixer l'élément de cueillage (1) sur la poutre (4) de levée de bobine, **caractérisé** en ce que l'élément de cueillage (1) est un élément monobloc comportant une partie support (2a) s'étendant d'une façon générale radialement depuis la partie manchon (2) pour supporter en porte-à-faux l'élément de cueillage (1) à l'aide de la poutre (4) de levée de bobine, en ce qu'un élément de sécurité (14) ayant une résistance mécanique limitée préétablie est interposé entre la partie support (2a) et la vis de fixation (16), grâce à quoi l'élément de cueillage (1) se sépare de la poutre (4) de levée de bobine lorsque le déplacement de l'élément de cueil-lage (1) avec la poutre (4) est entravé.

2. Dispositif de préhension selon la revendication 1, **caractérisé** en ce que ledit élément de sécurité comprend un axe (14) à l'intérieur d'un trou (3) de la partie support (2a) et en ce que ladite vis de fixation est une vis auto-taraudante (16) vissée dans un trou dudit axe (14).
3. Dispositif de préhension selon les revendications 1 et 2, **caractérisé** en ce que ledit trou (3) et ledit axe (14) s'étendent de façon sensi-blement perpendiculaire à l'axe de la partie manchon (2).
4. Dispositif de préhension selon la revendication 1, **caractérisé** en ce qu'il comprend, en outre, un dispositif de signalisation optique ou acoustique associé à l'élément de cueillage (1) pour signaler la séparation de l'élément de cueil-lage (1) de la poutre (4) de levée de bobine.

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Fig.1

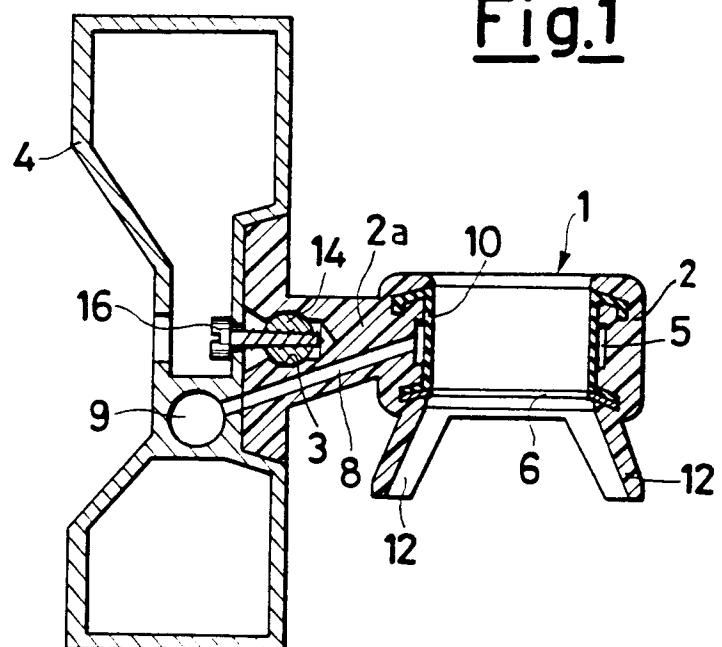


Fig.2

