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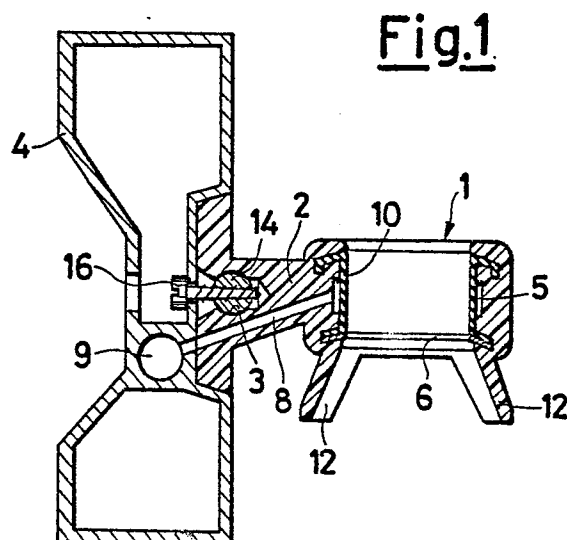
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(54) **Picking element for carrying out the operation of bobbin doffing and the operation of introduction of the empty tube on a spinning frame.**

(57) The present invention relates to improvements in a picking element for carrying out the automatic doffing of the bobbins, and the corresponding replacement of the empty tubes on a textile machine, preferably a spinning frame.

The bobbin gripping and tube gripping element (1) is made from a plastics material, as a monolithic part, and by means of a single high-pressure mould-casting operation. It extends downwards with two wings (12) having the shape of diametrically opposite circular sectors and forming a divergent funnel, for inviting and guiding the gripping of the outer portion, close to the top end, both of the tube filled with wound thread (the bobbin) at the end of the reeling step, and of the empty tube positioned on the spindle in place of the previously removed bobbin. Said bobbin and tube gripping element is fastened to the longitudinal support beam (4) by means of a safety element (3,14,16), which makes it possible the whole doffing device to be moved also in the presence of various kinds of interferences and hindrances.



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**"PICKING ELEMENT FOR CARRYING OUT THE OPERATION OF BOBBIN DOFFING AND THE OPERATION OF INTRODUCTION OF THE EMPTY TUBE ON A SPINNING FRAME"**

The present invention relates to improvements in the picking element of the device for the automatic doffing in a spinning frame.

The textile machines, preferably the spinning frames, are often equipped with devices for carrying out the automatic doffing of the bobbins, and the automatic replacement of these latter by empty tubes. Such automatic change devices can be possibly present also on other textile machines, e.g., on reeling machines, and the like.

The change devices for carrying out the operation of bobbin doffing, and the operation of introduction on the spindle of the empty winding tube are provided with picking elements, or means, 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 pirns from the spindle, and, according to a suitable sequence, for simultaneously positioning all the empty tubes on said spinning 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 pirns, 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 the picking elements are known. A structural type of the picking elements for empty tubes, or tubes filled with thread, is disclosed in detail in the specification of U.S. patent No. 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 gripping element, in said some tubes have at their top end a limited-size bore, for advantageously providing a reinforcing rim, or, in extreme cases, the bore top end is closed by means of the application of a plug, also used for reinforcement purposes.

Another drawback occurs whenever the pin-shaped gripping element has to operate in connec-

tion with tubes whose top rim is damaged. In these cases, the empty tube, or the tube filled with wound thread (the pirn), retained and gripped by the pin-shaped gripping 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 positions provided for by the spindles, or supporting pins. 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 occurs to the picking element, or to the 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, the same Applicant as of the present patent application developed an improved implement for the automatic doffing, wherein the picking element destined to the doffing of the tube 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 Italian patent for industrial model No. 156,780.

This picking element, together with some advantageous characteristics, like its small overall dimensions and the simplicity of the operating cycle within the scope of the double-gripping element implements, suffers from some drawbacks, which complicate its manufacturing and assemblage steps and which consequently cause a considerable increase in its manufacturing costs. These drawbacks are mainly represented by the presence of two gripping 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, the operation of grafting must be carried out, which is necessary in order to bind the elastic sleeves and the rigid sleeves of the two clamps, so the snap-application, or similar operations, for applying metal rings to the end edges, is necessary, as well as the assemblage operations have to be carried out, which are necessary in order to house the ring gaskets inside their slots, 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 gripping 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 element implements.

On considering the above, the primary purpose of the present invention is to render only one the gripping 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.

Summing-up, the purpose of the invention is to provide a picking element with a considerably reduced cost. A further purpose, which is also an object of the present invention, is to provide a safety device, which comprises one or more sensitive elements, which react and trigger a safety action when the movement which the only one 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.

Preferably, as the safety device a simple sensitive mechanical element is provided for, which carries out the unhooking of the picking element from the longitudinal support beam, whenever an unexpected resistance occurs.

By applying said safety device according to the present invention, it becomes it possible to prevent, event 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.

The fact that each action of unhooking of the picking element from the longitudinal support beam is also simultaneously displayed by an optical or sound signal, so that the attention of the attending staff is drawn onto the operative malfunctioning, and said attending staff may eliminate it with no delay, in order to restore the optimum conditions for carrying out the whole automatic doffing operation, meets well with the purpose of the present invention.

In particular, the safety element, owing to cost reasons, is advantageously given the structure of a simple self-tapping screw, which connects the longitudinal support beam with a pin suitably coupled with the picking element.

Said pin is simply provided, through its middle, with a bore, which is self-tapped under the action of said self-tapping screw, which joints and makes the above said safety device trip.

The self-thread generated by the screw on the

pin is in fact the actual safety element, in that it results to have a limited, and calibrated enough, 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 gripping element to get unhooked 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 simple action of connection, or binding, screwing-down, as above disclosed. Incidentally, the functionality of the picking element is restored without it having to be replaced.

These, and still other, purposes, are all achieved by means of the improving in the picking element for carrying out the automatic doffing of the bobbins, and the corresponding automatic replacement of the empty tubes on a textile machine, preferably a spinning frame, characterized in that it comprises:

- a single clamp with an elastically yielding inner sleeve preferably manufactured from a plastics material, as a monolithic part, by means of a single high-pressure mould-casting operation.

According to a form of practical embodiment, the only one picking element extends downwards with two wings having the shape of diametrically opposite circular sectors, and forming a divergent funnel shape, for acting as an invitation and a guide for the introduction of said gripping element into the length close to its top end, of the empty tube, or of the tube filled with wound thread, in order to carry out, and secure the gripping operation.

According to a further form of practical embodiment, the only one picking element is positioned and linked to the beam for longitudinal supporting and supplying with movement the picking element for the automatic doffing operation, by means of one or more elements which also take upon themselves the precise function of acting as operative safety means for unhooking from said beam said picking element when this latter acts as a casual cause of block and of hindrance to the movement of the whole doffing equipment.

According to a still further form of practical embodiment, the only one picking element picks the empty tube, as well as the tube filled with wound thread, by clamping the outer surface of its portion close to its top end.

The invention is now explained in the following in greater detail, on the base of the example of practical embodiment shown in the drawings of the figures of the hereto attached single drawing table, and further peculiarities and characteristics will be clarified, 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 the picking element fastened to the longitudinal beam by means of the safety device according to the present invention;

Figure 2 shows a schematic view, in axonometric perspective, of the picking element together with the longitudinal beam which supports all the picking elements of the whole operating bed of the textile machine.

In the figures, corresponding parts are indicated, for the sake of simpleness, by identical reference numerals.

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

In the attached single drawing table, we have:  
1 is the picking element; 2 is a rigid sleeve (e.g., of a plastics material) integral with the elastically yielding sleeve 10; 3 is the bore inside which the safety pin 14 is housed; 4 is the longitudinal support beam, 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; 5 is the ring slot suitable for introducing the compressed fluid for inflating the elastically yielding sleeve 10; 6 is a rigid ring for positioning the bottom lip of the elastical sleeve 10 necessary for the single high-pressure mould-casting operation during which the picking element 1 is manufactured; 8 is the channel which places the central duct 9 in communication with the ring slot 5; 9 is the main duct through which the compressed fluid feeds all the picking elements 1 of the whole operating bed through the communication channels 8; 10 is the elastically yielding inner sleeve which can be inflated in order to grip the portion close to its top end, of the empty tube, or of the tube filled with the wound thread; 12 are the two wings having the shape of circular sectors, and forming a divergent funnel shape, which extend downwards in a frontal position, for inviting and guiding the introduction of the picking element 1 on the outer portion of the top end of the tube to be handled during the automatic doffing operating cycle; 14 is the safety pin which is provided, substantially through its middle, with a simple bore which is self-tapped under the action of a screw 16, which fastens the picking element 1 to the longitudinal support beam 4; 16 is the self-tapping screw which generates the screw-thread inside the bore of the pin 14, binding the beam 4 and the picking element 1.

The operation of the picking element 1 evidenced in the hereto attached single drawing table can

be easily understood.

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 its top end, of said either empty or thread-filled tube, and the 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 slot 5, which causes the deformation of the elastically yielding sleeve or membrane 10 to occur, causing the empty tube, or the tube filled with wound thread, to be gripped. The subsequent handling evidently causes either the doffing of the tube filled with wound thread from the spinning spindle, or the gripping of the empty tube to be positioned in place of the already removed tube filled with wound thread, the whole according to the precise sequence of the operating steps of the automatic doffing known from the prior art.

## Claims

1. Picking element for carrying out the automatic doffing of the bobbins, and the automatic replacement of the empty tubes on a textile machine, preferably a spinning frame, characterized in that it comprises a single clamp with an elastically yielding inner sleeve preferably manufactured from a plastics material, as a monolithic part, by means of a single high-pressure mould-casting operation.

2. Picking element for carrying out the automatic doffing according to claim 1, characterized in that the only one picking element extends downwards with two wings having the shape of diametrically opposite circular sectors, and forming a divergent funnel shape, for acting as an invitation and a guide for the introduction of said gripping element into the length close to its top end, of the empty tube, or of the tube filled with wound thread, in order to carry out, and secure the gripping operation.

3. Picking element for carrying out the automatic doffing according to claim 1, characterized in that the only one picking element is positioned and fastened to the beam for longitudinal supporting and supplying with movement the picking element for the automatic doffing operation, by means of one or more elements which also take upon themselves the precise function of acting as operative safety means for unhooking from said beam said picking element when this latter acts as a casual cause of block and of hindrance to the movement of the whole doffing equipment.

4. Picking element for carrying out the automatic doffing according to claim 1, characterized in that the only one picking element picks the empty tube, as well as the tube filled with wound thread, by clamping the outer surface of its portion close to its top end.

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5. Picking element for carrying out the automatic doffing according to claims from 1 to 4, substantially as herein disclosed and as illustrated in the hereto attached single drawing table.

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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)
A	GB-A-2 118 523 (SCHUBERT AND SALZER MASCHINENFABRIK AG) * Page 2, lines 17-20 * ---	1,4	D 01 H 9/00
A	FR-A-2 182 870 (NUOVA SAN GIORGIO S.p.A.) * Page 4, line 11 - page 5, line 17 * ---	1,4	
A	FR-A-2 466 534 (SOCIETE ALSACIENNE DE CONSTRUCTIONS MECANIQUES DE MULHOUSE S.A.) * Page 3, line 38 - page 4, line 12 * -----	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			D 01 H B 65 H B 65 D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 08-07-1988	Examiner HOEFER W.D.
<b>CATEGORY OF CITED DOCUMENTS</b> X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document			