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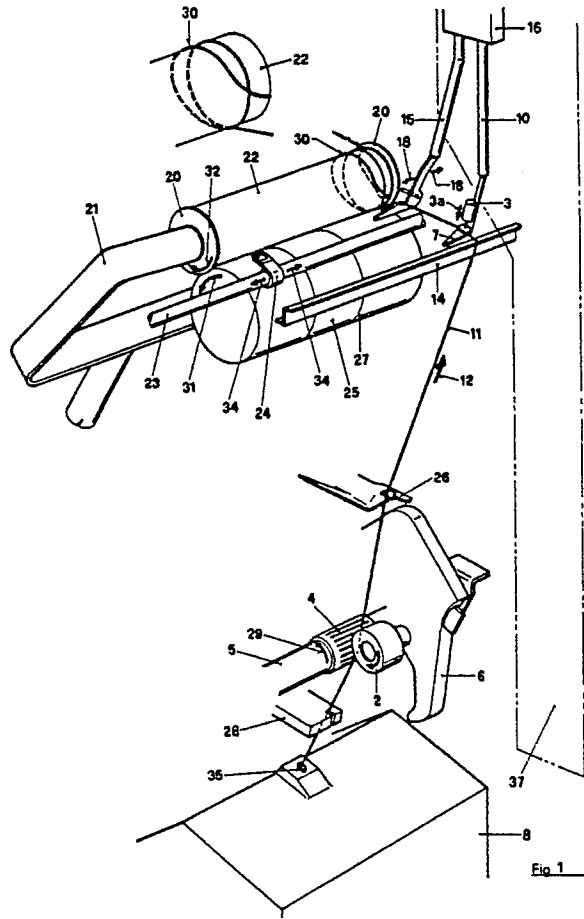
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I-20121 Milano(IT)(54) **Process and device for depositing a reserve of yarn on a tube without wound yarn.**

(57) The present invention relates to a yarn-tensioning runner (3, 7) for the formation of a reserve of yarn of a tube (22) without wound yarn in a rotor-spinning unit (8) during the full bobbin, doffing cycle, and said runner is constrained, as a single body, to the end of a lever (10) of an unit (10, 15) suitable for guiding the winding of some turns of yarn on a limited area, close to an end of said tube.

Said yarn-tensioning runner is provided with a yarn-tensioner load element (3) activated by a force of electromagnetic nature, or by the elastic force of a spring, or by a force generated by the pressure of a fluid, all of said forces being adjustable by using means known from the prior art.

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PROCESS AND DEVICE FOR DEPOSITING A RESERVE OF YARN ON A TUBE WITHOUT WOUND YARN

At the basis of the present invention, the presence is placed of a yarn-tensioner runner anchored, as an enbloc body, to the end of an arm lever which belongs, as an operating element, to the unit suitable for guiding and depositing some windings of reserve yarn on an area close to an end of a tube without wound yarn.

The invention can be applied, in particular, to a rotor-spinning unit during the cycle of doffing of a full bobbin, in order to constitute a compact yarn reserve of fine string-like character.

More particularly, the present invention makes it possible the reserve turns to be given a high enough tension and them to be given, in their geometric arrangement of deposit, that bond cohesion and mutual penetration, which secures a difficultly looseable and unwindable compactness.

The tension of the yarn plays an important role in the formation of the reserve windings.

A too low tension can originate an unstable reserve string, which will tend to loosen, originating the so-said "fallen turns" with dangling yarn lengths which, in their turn, cause entanglements of yarns belonging to different bobbins conveyed by a same conveyor belt, or to a same storage.

The yarns dangling from the bobbins furthermore originate undesired deposits around the various members of the belt conveyors, or around similar elements, often hindering, and, in extreme cases, even blocking the same conveyor units.

The reserve windings which collapse cause therefore disorders in the conveyances and entanglements of yarns in the storages of the cheeses, of wound yarn units, and cause as well difficulties in the downstream operations when the reserve length is absent, or is broken, or is pulled away (on the creel, the units of wound yarn, i.e., the cheeses, are jointed to each other by using the yarn length obtained from the unwinding of the reserve turns).

A wound yarn unit must be capable of maintaining the reserve turns wound around the tube even after a considerable amount of handling, making it possible the yarn to be quickly unwound in all of the subsequent operations, which contemplate the redrawing of the yarn.

Said wound yarn unit can be of any geometrical shapes, and in the present specification, and in the appended claims, it will be simply denominated as "bobbin" or "cheese", with both above terms being used interchangeably.

The causes of an insufficiently high tensioning derive from the difference between the speed of the extraction roll, which reaches nearly instantaneously its steady-state value, and the collection

speed, which has a less steep acceleration slope. Besides that, one should remind that the roller-roll extraction pair is preset at a revolution speed which is related to a helical winding mode, i.e., with a deposition speed which is the sum of the revolution speed of the drive roller and of the translational speed imposed by the yarn-guide element. On the contrary, the speed of deposition of the reserve turns, which are arranged on the tube in a nearly circumferential pattern, is approximately equal to the revolution speed of the drive roller, and is therefore considerably lower than said deposition speed with helical turns.

The use is already known as well of units, or of lever systems, which make it possible a yarn reserve to be generated during the step of preparation of the cheese starting end during the doffing cycle, so that the normal work of winding for the production of such wound yarn units, such as bobbins or cheeses, can be subsequently started up.

The disadvantages of these devices, or lever groups, known from the prior art, become evident, in particular, when the yarn reserve is formed, which results to be deposited with not enough tensioned windings, which are therefore easily unwound during the conveyance of the bobbin towards the processing bays and during the downstream manufacturing processes.

Furthermore, not always the processes and the devices known from the prior art are actuated by means of simple methods, i.e., they require complex lever systems, or drive units.

The process and the relevant device for practicing the present invention overcome such drawbacks by means of an original solution, which eliminates any possibilities that not enough tensioned reserve windings may be formed, in that it exploits the action performed by a yarn-tensioning runner, which is positioned between the extraction pair and the winding unit, for a time necessary for the reserve to be formed.

A further advantage of the herein disclosed device, as compared to the prior art, is its extreme structural simpleness, from which operating steps endowed with considerably high reliability derive.

These, and still further advantages are all achieved by means of the process of the present invention for forming a compact and gathered reserve, in a rotor spinning frame during the cycle of doffing of a full bobbin, by means of operations activated, after each other, by the elements of a device housed on a slider unit movable along the operating front of the spinning units; and said process is characterized in that a tension is applied to the yarn by means of a yarn-tensioner runner, for a

time necessary for the reserve of yarn to be formed on an area, close to the end, of the tube without wound yarn; and the activation of the tensioning action performed on the yarn by the yarn-tensioner runner arises from a force generated either by the pressure of a fluid, or by an electromagnet, or by the elastic force generated by a spring, and said forces are adjustable by means of known adjusting means.

The device used for practicing the above said process comprises a yarn-tensioner runner provided between the winding unit and the extraction pair.

The device, used for practicing the present invention, is furthermore associated with scheduler means for coordinating the sequence of activation of the various operating elements.

The invention is now disclosed in detail in the following on the basis of the example of practical embodiment schematically depicted in the figures of the hereto attached drawing tables, which summarily illustrate the characteristics of the invention, it being stressed that all the hereto attached drawings, as well as their description, correspond to a preferred form of practical embodiment of the invention, in order to make more understandable the way it is practiced; however, all those structural modifications which fall within the general idea which is exposed in the hereto attached drawings are understood as being comprised within the scope of the requested protection.

In the drawings:

- Figure 1 shows an axonometric perspective view of the device prearranged for forming the yarn reserve deposit wound on the empty tube taken from the tube distributor, and inserted between the cheese-holder arms and shows as well the time point at which the winding of the first reserve turns in the region close to the end of the tube has already been started, while the yarn-tensioner runner performs a pressure action on the yarn, supplying it with tension during its winding;

- Figure 2 shows a schematic, axonometric perspective view of the device prearranged for forming the reserve yarn deposit wound on the tube inserted between the cheese-holder arms and shows as well the time point at which the deposition of the reserve yarn turns is already ended and the winding of the collecting turns by means of the transversal displacement of the yarn guide has begun and while the yarn-guide runner has disabled the pressure action on the yarn, releasing it from its tensioning;

- Figure 3 shows a schematic side view of the yarn-tensioning runner while the yarn, shown in frontal cross-sectional view, is pressed by said runner during the necessary time for the reserve to be formed.

In the figures, same elements are indicated by same reference numerals.

Moreover for the sake of clearness, in the figures all those parts which are not necessary for the understanding of the invention are omitted, or they are presented in a generic way, in that they are already known from the prior art.

In said hereto attached figures we have that:

1 are the yarn reserve windings deposited according to a fine string pattern on a region close to the end of the tube 22;

2 is the extraction roller, which is pressed against the motor-driven extraction roll 4 extracting the yarn 11 from the rotor spinning unit 8;

3 is the actuator of the yarn-tensioning runner 9;

35 is the outlet opening for the yarn 11 from the rotor spinning unit 8;

5 is the shaft of the extraction rolls 4;

6 is the lever of resetting of the release unit, which intervenes when the preestablished length of wound yarn is reached, and therefore at bobbin end, or when a yarn breakage occurs, or in order to enable or disable the extraction pair 4 and 2;

9 is the yarn-tensioning runner either enabled, or disabled, according to the arrows 3a or 3b, which indicate the displacements of the stem 36 of the actuator 3;

7 is the flat end of the arm lever 10. Said end operates as a stop plane against which the yarn 11 is pressed by the action of the yarn-tensioning runner 9 all through the time, which is necessary for the formation of the reserve 1;

10 is an arm lever, suitably shaped, which is associated, as an enbloc body, in its lower portion, with the yarn-tensioning device according to the present invention. Said arm lever is provided with a rotational movement for the insertion, or disinsertion, of the yarn-tensioning runner through, or away from, the path along which the yarn runs for forming the reserve turns, which must be deposited in a compact, fine string-like arrangement. Said arm lever 10 operatively cooperates with the lever 15, obliging the yarn to deposit on an area close to the end of the winding tube 22, according to a well-precise arrangement, and in a well-precise position, both pre-established for the formation of a correct reserve capable of securing that the turns which constitute said reserve are not unwound during the subsequent handling of the bobbin full with wound yarn;

11 is the yarn exiting the spinning unit 8 and is collected, in the direction shown by the arrow 12, on the tube 22;

14 is a blade for shifting the path along which said yarn 11 runs, and said blade can have an either straight, or shaped outline, already known from the prior art:

16 is a case housing the motor devices which control and drive the arms 10 and 15, in order to insert them through the path of the yarn at the beginning of the formation of the reserve yarn turns, and in order to disengage them at the end of the formation of said reserve, leaving the yarn free for being picked by the yarn-guide unit 24.

Both the case and the arm levers 10 and 15 are housed on the slider carrying the automatic units, running along the machine fronts during its patrolling action, and schematically shown in chain 37;

19 is the arrow which indicates the revolutionary movement of disengagement of the end of the arm 10, and therefore of the yarn-tensioning runner 9, from the yarn 11 at the end of the formation of the reserve yarn turns 1, deposited in a compact, fine string-like pattern;

18 are the arrows which indicate the pendulum-like movement of transversal oscillation of the arm 15 which guides the yarn with its lower end to deposit on a limited band, obliging the turns to tie with one another in a precise geometrical arrangement which contributes, together with the extraction tensioning, to the formation of a compact fine string-like reserve 1;

20 is the element of reception of the tube 22;

21 is the bobbin-carrier frame;

25 is the friction area, having the shape of an annulus of limited width, in order that the bobbin which is being formed can be driven by the driver roll 27;

26 and 28 are fixed elements for guiding the yarn 11 which is being collected on the tube 22;

29 is the arrow which indicates the direction of revolution of the extraction cylinder 4;

30 are the turns of yarn wound on the tube 22 by means of the yarn-guide unit 24, moving with continuous reciprocating movements 34 by means of the control rod 23;

31 is the arrow which indicates the direction of revolution of the driver cylinder 27;

32 is the arrow which indicates the direction of revolution induced on the tube 22 by the driving action performed by the driver roll 27 by means of the friction band 25.

The following disclosure of the operating way of the machine made by referring to the hereinabove cited figures refers, first of all, to all those elements which are new, and, therefore, is directed to the device according to the present invention, which carries out a process for depositing a yarn reserve consisting of a plurality of yarn

turns on a tube without wound yarn, it being understood that for the device according to the present invention to perform its intended function, complementary devices are known, which are not described in that they are per se already known.

It is known to associate the revolving spinning frame with a slider unit, which essentially performs the functions of bobbin doffing when the pre-established winding length of yarn is reached, of re-fastening the yarn after a yarn breakage, and of cleaning the spinning units.

Said slider unit is made mobile along the spinning front(s); by means of running ways comprising one or more rails, of any shapes, cooperating with suitable rolling means.

During the operation of the rotor spinning frame, the slider unit is continuously driven in front of the line of the spinning units, reciprocating in order to perform its patrolling function. Whenever on one of the spinning units 8, the yarn reaches the pre-established length to be collected on the tube 22, said spinning unit stops and emits a signal by means of photo-cells.

The slider unit, when running before the spinning unit, stops also, and a member provided on the slider unit hooks the bobbin-carrier frame 21, opening the reception elements 20. The bobbin, full of wound yarn, is conveyed to the discharge conveyor belt.

The tube-taking device takes a tube without wound yarn from the tube distributor, and consigns it to the unit which will force the tube on the bobbin-carrier frame 21.

Then, the sequence (known from the prior art) of the operating steps for yarn re-fastening starts. At a predetermined time, presettable by means of digital selectors provided on the control panel, the resetting lever 6 of the release unit is actuated, obliging the extraction roller 2 to approach to, and press against, the extraction roll 4, enabling the extraction of the yarn 11 from the spinning unit 8 to take place and therefore restoring the spinning process. The slider, by means of its operating elements, inserts the tube 22 between the reception elements 20, which are closed, locking the yarn 11.

At the same time, the mechanisms contained inside the carter 16 activate the arms 15 and 10 inserting them with their ends through the path along which the yarn 11 runs. At the following time point the actuator 3 is activated and pushes, by means of the stem 36, the yarn-tensioning runner 9 in order to press the underlying yarn 11 against the flat end 7 of the arm lever 10. Said yarn 11, driven and dragged in the running direction 12, starts winding under tension around the tube 22, on an area close to an end thereof, with a geometrical configuration defined by the pre-arranged transver-

sal reciprocating motion 18 of the arm 15, which drives the yarn, clamped by the reception element 20 and tensioned by the runner 9, to form a first wide-turn winding 30 (see Figure 1, upper magnified detail), then driving said yarn to wind up in the opposite direction, forming nearly circumferential turns.

These latter circumferential turns, always tensioned by the runner 9, fasten the underlying first turn 30 and constitute a compact, fine string-like yarn reserve 1.

At the successive time point, the arm 15, reversing its reciprocating direction, guides the yarn 11 collecting it on the tube 22 as an upper wide turn, which furthermore ties the whole of the underlying reserve turns.

At the following time point, the yarn-tensioning runner is disabled by shifting the stem 36 upwards according to the arrow 3b, and at the same time the arm lever 10 rotates, according to the direction as indicated by the arrow 19, disengaging its end from the yarn 11. This latter, being free to be clamped by the yarn-guide element 24 starts forming the first layer of turns of wound yarn of the bobbin under way of formation.

Tests carried out by the present Applicant have demonstrated the perfect repeatability and the extremely high reliability of the above disclosed device, as developed and disclosed in the present invention, for depositing a compact, fine string-like reserve of yarn, which is difficult to be loosened and unwound.

In fact, the advantage of the herein proposed process and device, by means of an original solution, is that the deposition of the turns in order to form the reserve of yarn takes place always in the presence of the necessary tension for realizing a reserve of yarn arranged in a Compact fine string-like configuration, therefore not prone to be loosened during the successive transports, or the internal handling inside the manufacturing bays, of the bobbin full of wound yarn.

Therefore, no possibilities exist that said reserve turns are wound in a more or less loose arrangement.

The hereinabove disclosed form of practical embodiment was reported for merely exemplifying purposes, and is not limitative of the invention. It is clear that many variants, modifications and additions may be supplied by those skilled in the art, without thereby departing from the general concept of the process of the present invention.

Claims

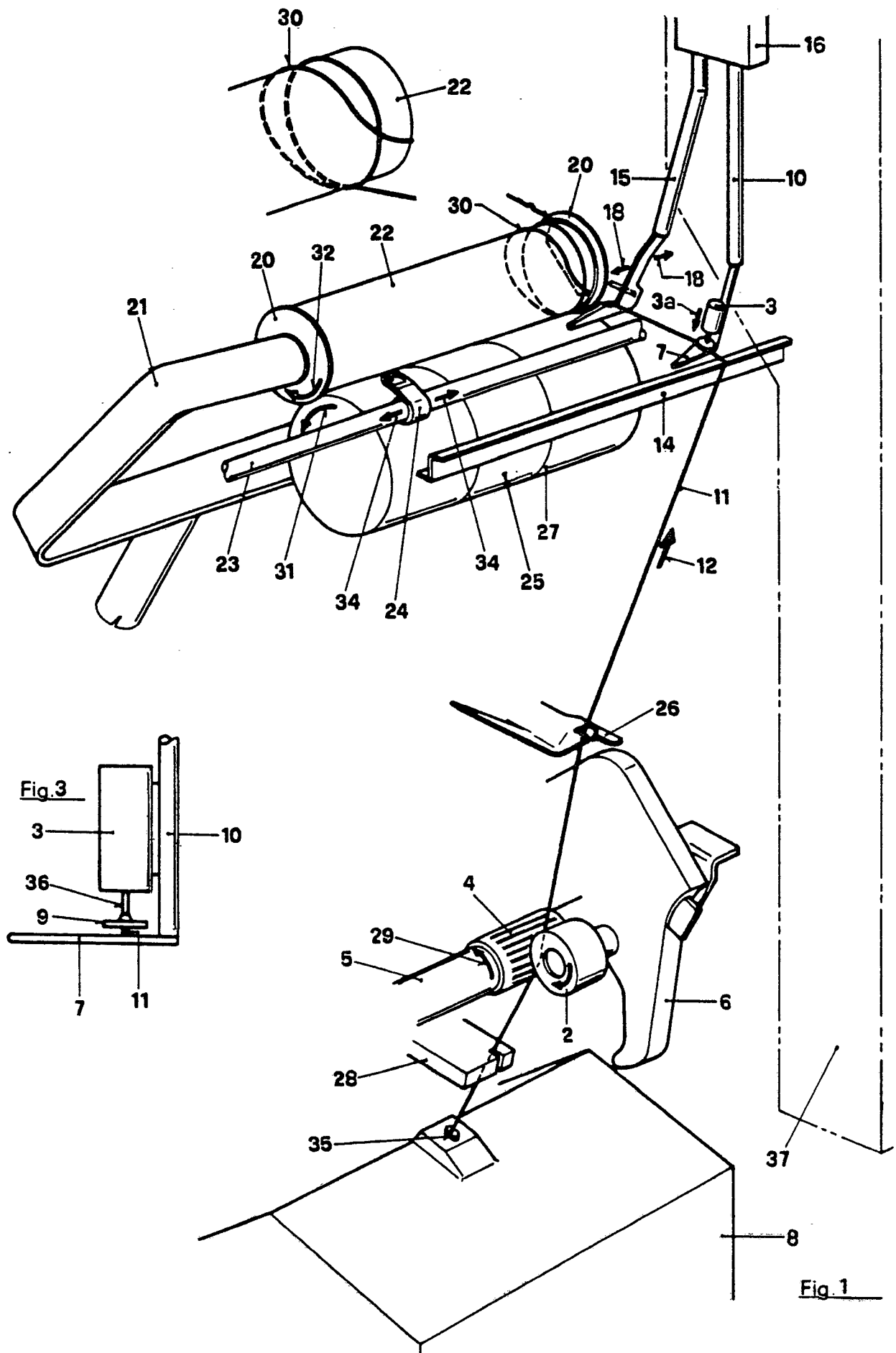
1. Process for depositing a reserve of yarn on a tube without wound yarn on a spinning station, during the cycle of doffing of a full bobbin, wherein said spinning station comprises a spinning rotor and a winding unit with an interposed extraction roller-extraction roll pair, characterized in that a tension is applied to the yarn by means of a yarn tensioner runner arranged between the extraction pair and the winding group, for a time necessary for the reserve of yarn to be formed on an area close to the ended of the tube without wound tube.

2. Process according to claim 1, characterized in that said yarn-tensioning runner is activated in order to perform its yarn tensioning action by a force of electromagnetic nature, the value of which can be adjusted by using means known from the prior art.

3. Process according to claim 1, characterized in that said yarn-tensioning runner is activated in order to perform its yarn tensioning action by the elastic force of a spring, the value of which can be adjusted by means of an adjustment screw.

4. Process according to claim 1, characterized in that said yarn-tensioning runner is activated in order to perform its yarn tensioning action by a force generated by the pressure of a fluid, the value of which can be adjusted by using known means.

5. Device for depositing a reserve of yarn on a winding tube during the cycle of doffing of a full bobbin on a spinning station which comprises a spinning rotor, a winding unit and an extraction roller-extraction roller pair interposed between the spinning rotor and the winding unit, characterized in that it furthermore comprises a yarn-tensioning runner positioned between said winding unit and said extraction pair.



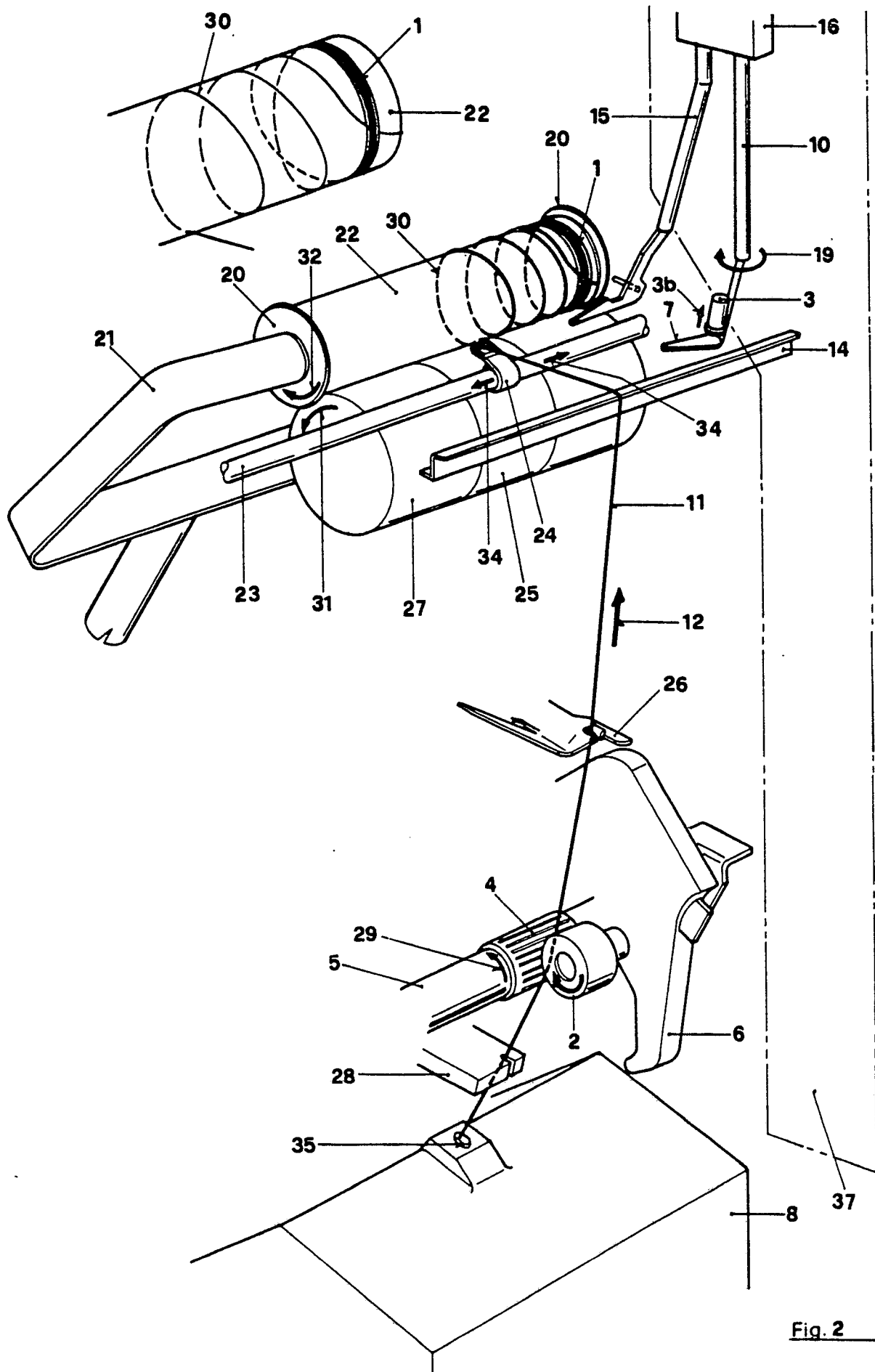


Fig. 2



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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	FR-A-2312445 (NUOVA SAN GIORGIO S.P.A.) * page 5; figure 7 * ---	1,3,5	B65H54/34
X	DE-A-2701985 (W. SCHLAFHORST & CO) * page 5, line 10 - line 13; claims 6, 7 * * page 6, paragraph 1 * Y * page 7, line 20 - page 8, line 2 * ---	1,5	
Y	DE-U-8713749 (ELITEX KONCERN TEXTILNIHO STROJIRENSTVI) * page 6 * ---	2,3,4	
Y	FR-A-610326 (F A J DUFOUR) * figure 2 * ---	2	
Y	DE-A-3210309 (W. SCHLAFHORST & CO) * claim 1; figure 1 * ---	3	
A	US-A-4195788 (T MIYAZAKI; T SHIMIZU; K ONOUE) -----	4	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			B65H
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 11 AUGUST 1989	Examiner D HULSTER E.W.F.
CATEGORY OF CITED DOCUMENTS 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	