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(71) Applicant:
DONGSIN MACHINE CO., LTD.
Seoul (KR)

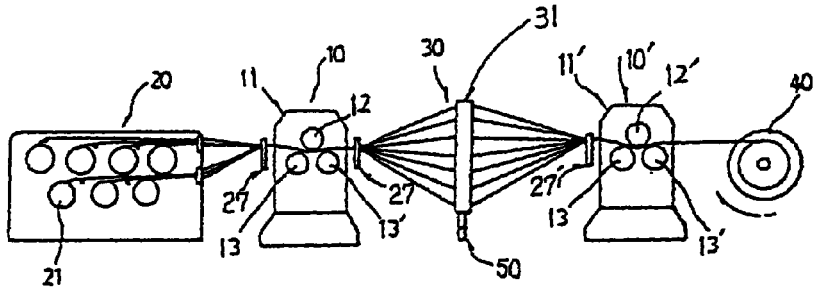
(72) Inventor: **Park, Dae-Kyu**
Kwanak-gu, Seoul (KR)

(74) Representative:
Casalonga, Axel et al
BUREAU D.A. CASALONGA - JOSSE
Morassistrasse 8
80469 München (DE)

(54) Device for sensing snapped thread of a divided thread warper having a yarn tension controller and a divided thread guider

(57) Provided with a device for sensing a snapped thread which includes a device for controlling yarn tension of a divided thread warper for providing an appropriate tension before and after dividing threads, and a device for guiding the divided thread of a divided thread warper for sensing immediately a fact that some pieces of the divided threads are snapped off and stopping the operations of a yarn feeding section(20) and a winding section(40), thereby making the division of threads without difficulties and preventing potential defects that may occur during a process for weaving the wound threads.

Fig. 1



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Description

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION:

[0001] The present invention generally relates to a divided thread warper for dividing yarn which has a number of pieces of string in a bundle, into a plurality of threads and then winding a desired number of pieces of the divided threads. More particularly, the present invention relates to a device for sensing a snapped thread which includes a device for controlling and providing appropriate yarn tension of a divided thread warper before and after dividing the threads, and a device for guiding the divided thread and for immediate sensing that some pieces of the divided threads have broken and stopping the operations of the yarn feeding section and a winding section, thereby making the division of threads without difficulties and preventing potential defects that may occur during a process for weaving the wound threads.

DESCRIPTION OF THE RELATED ART:

[0002] In general, yarn having a number of pieces of threads are wound in a plurality of threads and the wound threads are transferred to an area in which a process is performed for weaving a yarn.

[0003] To divide the threads, use is conventionally made of a divided thread warper which includes a plurality of bobbins on which a bundle of yarn having a number of pieces of thread are wound, the bobbins being installed in the yarn feeding section. Such a divided thread warper is used to feed the yarn, driving it into a desired number of pieces of thread, for example, 588 pieces of thread, and wind the divided threads on a weaving bobbin in a desired number of pieces of thread.

[0004] However, such a conventional divided thread warper has disadvantages in that the threads are required to have an appropriate tension externally applied before and after dividing the threads in order to enhance the quality of divided and wound threads, and there is no means for sensing whether a thread(s) has broke due to excessive tension so that in this case the number of pieces of thread is smaller than a predetermined number of pieces are wound on the bobbins, as a result of which a defect is caused in the course of the later weaving process.

SUMMARY OF THE INVENTION

[0005] Accordingly, an objective of the present invention is to provide, in a devied thread warper for dividing yarn which has a number of pieces of string in a bundle into a plurality of threads, a device for sensing a snapped thread, which includes a device for controlling yarn tension of a divided thread warper in order to provide the appropriate tension before and after dividing threads, and a device for guiding the divided thread of a divided thread warper for immediate sensing of a the snapped thread and then stopping the operations of a feeding section and a winding section, thereby enabling the division of threads to proceed without difficulties and preventing potential defects that may occur during the process for weaving the woumd threads, twisting the threads in a desired number of pieces of the divided threads.

[0006] The present invention includes a device for controlling yarn tension of a divided thread warper, which has a yarn feeding section provided with a plurality of yarn bobbins, and a yarn dividing section for dividing a yarn unreeled from the yarn feeding section into a plurality of pieces of thread. The device is used both before and after the yarn dividing section. The device includes driving rollers, which are axially installed on a main/fundamental frame, which are driven by a driving motor. A lift frame is installed under the driving rollers, which can be raised or lowered by a lift driving means. A pair of loose rollers, axially indtalled in the lift frame and rotating in gear with the driving rollers are used. A support frame is fixed to the lift frame and a lift guide plate is attached to the support frame, with thw lift guide plate being guided by a guide rail attached to the fundamental frames and tension controllers

BRIEF DESCRIPTION OF THE INVENTION

[0007]

FIG. 1 is a schematic view of a divided thread warper in accordance with the present invention;

FIG. 2 is a perspective view of a yarn tension controlling device in accordance with the present invention;

FIG. 3 is a perspective view illustrating the principal part of the yarn tension controlling device in accordance with the present invention;

FIG. 4 is an enlarged cross-sectional view illustrating the principal part of the yarn tension controlling device in accordance with the present invention;

FIG. 5 is a partial plan view of the yarn tension controlling device in accordance with the present invention;

FIG. 6 is a partial side view of the yarn tension controlling device in accordance with the present invention.

FIG. 7 is an enlarged cross-sectional view illustrating the principal part of a yarn tension controlling device in accordance with another embodiment of the present invention.

FIG. 8 is an enlarged perspective view illustrating the principal part of a snapped thread sensing device provided with a divided thread guiding device in accordance with the present invention.

FIG. 9 is an enlarged cross-sectional view illustrat-

ing the installation of the snapped thread sensing device provided with the divided thread guiding device in accordance with the present invention.

FIG. 10 is an exploded perspective illustrating the principal part of the snapped thread sensing device provided with the divided thread guiding device in accordance with the present invention.

DESCRIPTION

[0008] Hereinafter, a device for guiding a divided thread and sensing a snapped thread of a divided thread warper in accordance with the present invention will be described in detail by way of illustrative examples with reference to the accompanying drawings.

[0009] FIGS. 1-6 illustrate an embodiment of a device for controlling the yarn tension of a divided thread warper.

[0010] As shown in FIG. 1, the yarn tension controlling device includes a yarn feeding section 20 having a plurality of yarn bobbins 21, a yarn dividing section 30 for dividing the yarn discharged from the yarn feeding section 20 into a plurality of threads, and tension controllers 10 and 10' installed before and after the yarn dividing section 30.

[0011] In the tension controllers 10 and 10' illustrated in FIG. 1 are of the same construction. Thus, in the tension controllers 10 and 10', driving rollers 12 and 12' which are driven by a driving motor M, are axially fixed to fundamental frames 11 and 11'. A lift frame 16 is installed under the driving rollers 12 and 12' and is moved up and down by means of a lift driver 17. A pair of loose rollers 13 and 13', which rotate in engagement with the driving rollers 12 and 12', are axially fixed to the lift frame 16. Lift guide plates 15 and 15', which are guided by a guide rail 15a formed in the fundamental frames 11 and 11', are attached to a support frame 14. Support frame 14 is attached to the lift frame 16, as illustrated in FIG. 3.

[0012] The driving rollers 12 and 12' are metal rollers whose surfaces are smooth and the loose rollers 13 and 13' are coated with a hard rubber material which is somewhat elastic and resistant to wear so that a thread A' can be transferred easily and provided with a tension. The driving rollers 12 and 12' are combined in engagement with the driving motor M by a belt B and a pulley C, to which the construction the present invention is not specifically limited and the driving rollers 12 and 12' may be combined in engagement with the driving motor by a chain or sprocket.

[0013] According to this preferred embodiment of the invention, the lift driver 17 comprises a lift driving motor M', a decelerator 18, a driving screw 19 connected to the axis of the decelerator 18, and a driving nut 19' which engages the driving screw 19. The driving nut 19' is fixedly coupled to the lower surface of the lift frame 16. The lift driving motor M' makes a clockwise or counterclockwise rotation under the control of a controller (not shown) according to dividing or winding threads. The lift guide plate 15 is fixedly attached to the fundamental frames 11 and 11' by means of a mounting plate 14, which is installed on one side of the lift guide plate 15.

[0014] Herein, the guide rail 15a and the lift guide plate 15 are provided in form of a triangle notch, as see FIG. 5. In the present invention, there is no particular design limitation upon this, and the guide rail 15a and the lift guide plate 15 may be in the dovetail form.

[0015] Reference symbol A' represents a divided or wound thread of the present invention, and reference numeral 40 indicates a winding section for twisting the divided thread A' by a predetermined number of pieces of thread and winding the same.

[0016] In the device for controlling yarn tension of a divided thread warper according to the present invention, a yarn having a bundle of threads is unreeled from the yarn bobbin 21 which is installed in the yarn feeding section 20, divided through the yarn dividing section 30, and wound on a weaving bobbin (not shown) of a winding section 40.

[0017] In this case, the thread A' is first provided with tension by the tension controller 10 which is installed between the yarn feeding section 20 and the yarn dividing section 30. Passing through the yarn dividing section 30, the thread A' is again provided with tension by a tension controller 10' installed between the yarn dividing section 30 and the winding section 40, before it is wound.

[0018] In providing tension for the thread A' by the tension controller 10, the loose rollers 13 and 13' are moved with respect to the driving roller 12 which is rotating at a fixed position on the fundamental frame 11, thereby adjusting the contact pressure for the driving roller 12, which controls the tension of the thread A' passing between the driving roller 12 and the loose rollers 13 and 13'.

[0019] The entire tension of the thread A' can also be controlled by varying the extent of engagement of rollers 13, 13' with roller 12 of the transferring the thread A' from the tension controllers 10 and 10' each of which is installed on either side of the yarn dividing section 30.

[0020] FIG. 7 illustrates another preferred embodiment of a yarn tension controlling device of a divided thread warper, wherein the lift driver 17 is an oil pressure cylinder S which is fixedly connected to the lower surface of the lift frame 16 at the top of the rod R. The cylinder S is associated with an oil pressure system which is under the control of a controller and moves the lift frame 16 up and down while the rod R is ascending and descending. The other components are identical to those of the previously described embodiment. Therefore, the same reference numeral denotes the same component and will be omitted in the description.

[0021] FIGS. 8-10 illustrate a snapped thread sensing device provided with a divided thread guiding device of a divided thread warper in accordance with a preferred

embodiment of the present invention. FIG. 8 is an enlarged perspective view illustrating the principal part of the yarn dividing section 30 for dividing a yarn unreeled from the yarn feeding section 20 into a plurality of pieces of thread. As shown in FIG. 8, a plurality of bases 22 and support rods 23 are installed in the perpendicular and/or horizontal direction in a rectangular frame 31. Each space defined by the bases 22 and the support rods 23 includes a plurality of thread guiding pieces 26 having a thread guiding ring 26' for guiding the dividing thread. The thread guiding pieces 26 are associated with a switch operating piece 24' of a machine operating switch 24 in order to operate the machine operating switch 24.

[0022] The switch operating piece 24' of the machine operating switch 24 and the thread guiding pieces 26 are installed in the direction where the thread guiding rings 26' are upwardly inclined, so that the switch operating piece 24' is continually pressed by the tension of thread thereby holding in an "on" position the machine operating switch 24 while the divided thread A is travelling therethrough, and if the travelling thread A is snapped off, the switching operating piece 24' reverts to its upward "off" opsition due to an elastic force applied thereto.

[0023] The machine operating switch 24 is electrically connected to the driving motor M of the yarn feeding section 20 and the first and second tension controller 10 and 10'. While the tension of the divided thread A is imposed upon the thread guiding pieces 26, the machine operating switch 24 connects the power supply to the driving motor M. If the thread A is snapped off and no tension is imposed upon the thread guiding pieces 26, the power supply to the driving motor M is interrupted by the machine operating switch 24.

[0024] In FIG. 9, the switch operating piece 24' of the machine operating switch 24 can be associated with the thread guiding pieces 26 in a direction manner. However, it is more preferable for easier fabrication that the switch operating piece 24' and the thread guiding pieces 26 are associated with each other by means of a coupling piece 25 which has fitting and fastening structures made of a conductive metal on both ends.

[0025] Reference numeral 50 in FIG. 1 indicates a support foot for supporting the rectangular frame, and reference numerals 27 and 27' indicate an interval controller for regulating the interval from before the thread passes through a dividing port immediately after passing through the first tension controller 10 to before the thread passes through the second tension controller 10'. In addition an interval controller 27 is positioned before the first tension controller 10. As illustrated in FIG. 9, the interval controller is comb-shaped in order to make the divided thread A travelling in a straight line and passing through the second tension controller 10' at a predetermined distance from it.

[0026] The snapped thread sensing device, provided with a divided thread guiding device as constructed above, unreels a yarn having a plurality of pieces of thread in a bundle from the yarn bobbin 21 which is installed in the yarn feeding section 20, divides the yarn into a plurality of pieces of thread A' through the thread guide rings 26' of the thread guide pieces 26, and winds the threads A' on the weaving bobbin (not shown) of the winding section 40 shown in FIG. 1.

[0027] At this stage, first tension is imposed upon the thread A' by the first tension controller 10 of FIG. 1 installed between the yarn feeding section 20 and the yarn dividing section 30. Upon passing through the yarn dividing section 30, the thread A is provided with second tension by the second tension controller 10' before it is divided and wound.

[0028] Furthermore, the divided thread A passes through the second tension controller 10' at predetermined intervals by means of an interval controller 27 which is installed between the yarn dividing section 30 and the driving roller 12' of the second tension controller 10'.

[0029] In addition, the thread guiding pieces 26 is pressed down by the tension imposed upon the thread A, thereby maintaining the the switch operating piece 24' of the machine operating switch 24 associated with the thread guiding pieces 26,i.e., holding the machine operating switch 24 in an "on" position. As the machine operating switch 24 is on, the power is applied to the driving motors of the yarn feeding section 20 and the tension controllers 10 and 10'.

[0030] The thread A which is divided and wound under a tension provided by the first and second tension controllers 10 and 10' in FIG. 1 is wound at a high speed of several hundreds of meters per minute. When a piece of thread A is snapped off in such a dividing and winding step, no tension is imposed upon the thread guiding pieces 26 that guide the thread A so that the switch operating piece 24' returns its biased "off" position(by some tensioning means such as elastic), turning off the machine operating switch 24.

[0031] As the machine operating switch 24 is "off", the power supply to the yarn feeding section 20 and the tension controllers 10 and 10' is interrupted to suspend the feeding, division and winding of the thread A.

[0032] FIG. 8 is an enlarged perspective view illustrating the principal part of a snapped thread sensing device having a divided thread guiding device in accordance with the present invention, wherein the thread A guided by the two thread guiding pieces 26 is snapped off on the left top side.

[0033] As shown in FIG. 8, when the thread A is snapped off, the thread guiding pieces 26 are restored upwardly by the elastic force of the switch operating piece 24' of the machine operating switch 24 so as to turn the machine operating switch 24 "off", suspending the driving motors of the yarn feeding section 20, the first and second tension controllers 10 and 10', and the winding bobbin 40 of the winding section. This prevents the snapped thread A from being divided and wound in

succession.

[0034] Such as in the present invention as described above, in dividing a yarn unreeled from a plurality of yarn bobbins into a plurality of pieces of thread through the yarn dividing section and winding threads on the weaving bobbin in the winding section, the tension of the thread is controlled before and after the yarn dividing section, enhancing the quality of the divided and wound threads. Furthermore, if even a piece of the divided thread is snapped off, the driving motors of the yarn feeding section, the tension controllers, and the winding section are suspended immediately, whereby it is possible to avoid the potential defect in the subsequent weaving process.

Claims

1. A device for controlling yarn tension of a divided thread warper, which has a yarn feeding section(20) provided with a plurality of yarn bobbins(21), and a yarn dividing section(30) for dividing a yarn unreeled from the yarn feeding section(20) into a plurality of pieces of thread, the device comprising:

   driving rollers(12, 12') axially installed on fundamental frames(11, 11') before and after the yarn dividing section(30) and driven by a driving motor (M);
   a lift frame(16) installed under the driving rollers(12, 12') and making an ascending/descending motion by a lift driving means(17);
   a pair of loose rollers(13, 13') axially installed in the lift frame(16) and rotating in gear with the driving rollers(12, 12');
   a support frame(14) fixed to the lift frame(16);
   a lift guide plate(15) attached to the support frame(14), the lift guide plate(15) being guided by a guide rail(15a) attached to the fundamental frames(11, 11'); and
   tension controllers.

2. The device of claim 1, wherein the lift driving means(17) comprises:

   a lift driving motor(M');
   a decelerator(18) associated with the axis of the lift driving motor(M);
   a driving screw(19) associated with the axis of the decelerator(18); and
   a nut(19') being in gear with the driving screw(19).

3. The device of claim 1, wherein the lift driving means(17) is an oil pressure cylinder(S) having the top end of a piston rod(R) fixed to the lower surface of the lift frame(16).

4. A device for sensing a snapped thread having a divided thread guiding device of a divided thread warper, which has a yarn feeding section(20) provided with a plurality of yarn bobbins(21), and a yarn dividing section(30) for dividing a yarn unreeled from the yarn feeding section(20) into a plurality of pieces of thread, the device comprising:

   a plurality of bases(22) and support rods(23) installed in the perpendicular and horizontal directions in a rectangular frame(31);
   a plurality of thread guiding pieces(26) having a thread guiding ring(26') for guiding the divided thread in each space portion(32) defined by the bases(22) and support rods(23); and
   a machine operating switch(24) having a switch operating piece(24) associated with the thread guiding pieces(26).

5. The device of claim 4, wherein the switch operating piece(24) of the machine operating switch(24) is connected to the thread guiding pieces(26) by a coupling piece (25).

Fig. 1

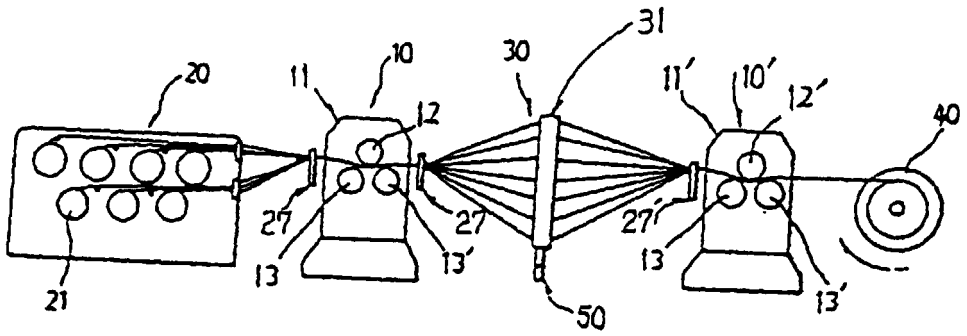

20
11
10
30
31
11'
10'
12'
40
12
27
27
27'
13
13'
13
13'
21
50

Fig. 2

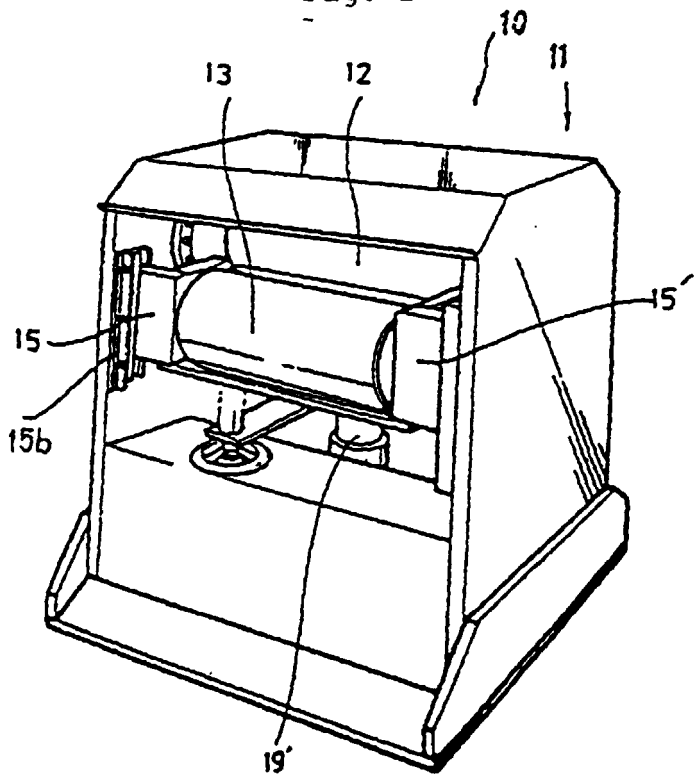

10
13
12
11
15'
15
15b
19'

Fig. 3

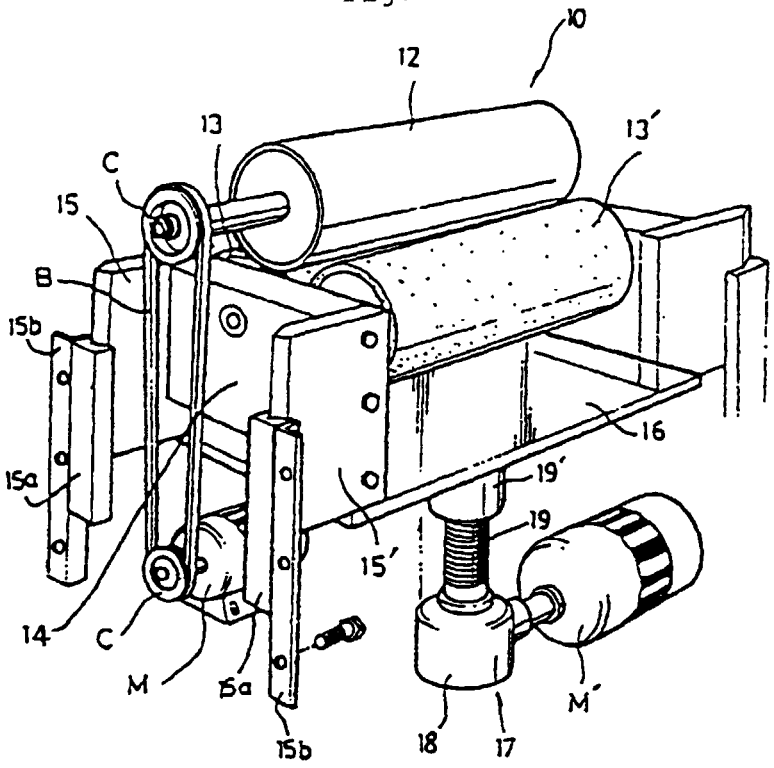


Fig. 4

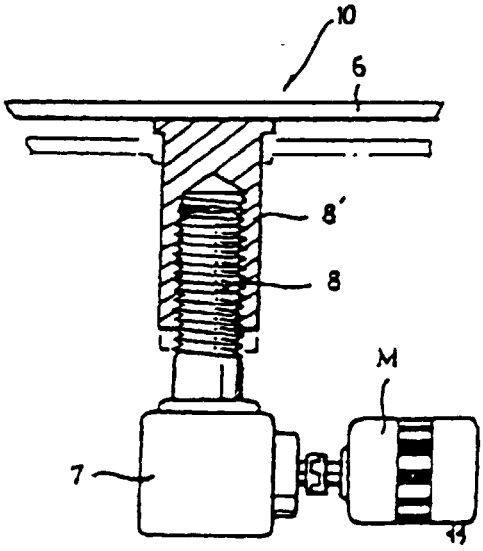


Fig. 5

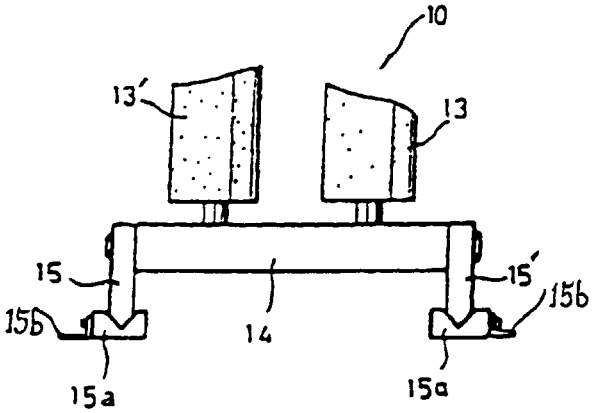


Fig. 6

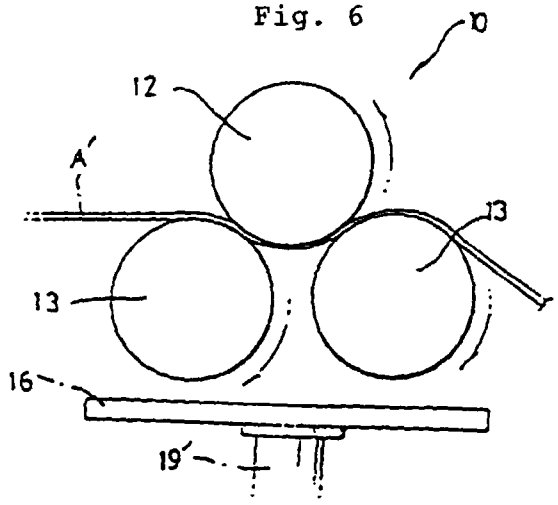


Fig. 7

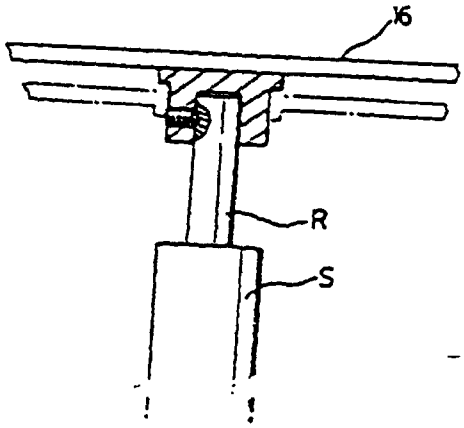


Fig. 8

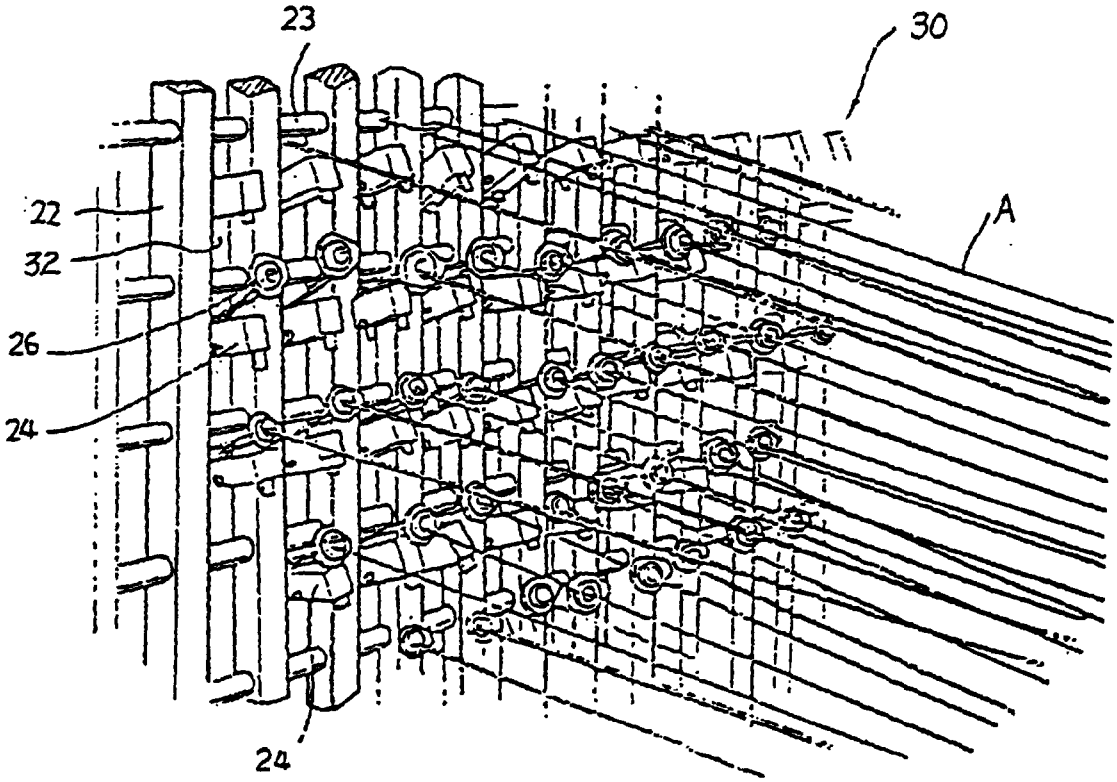


Fig. 9

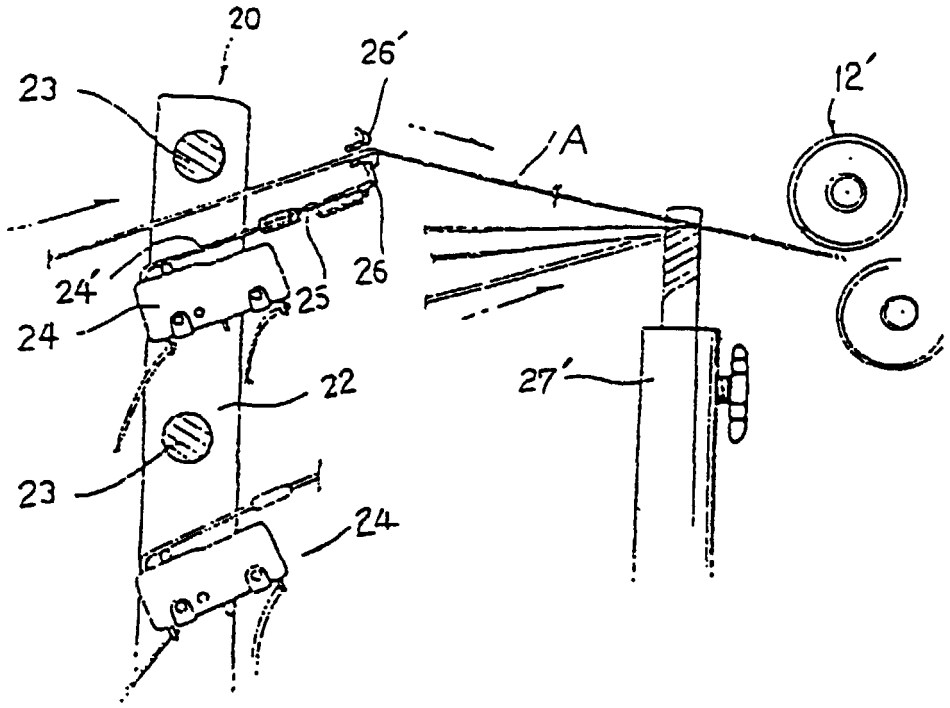
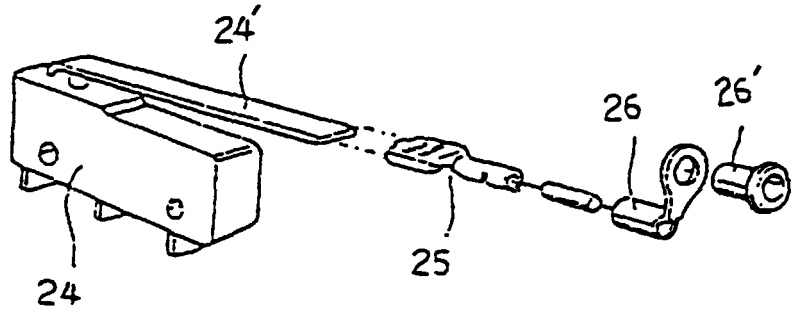


Fig. 10



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EUROPEAN SEARCH REPORT

Application Number
EP 98 11 5326

DOCUMENTS CONSIDERED TO BE RELEVANT

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	26 March 1999	Rebiere, J-L

CATEGORY OF CITED DOCUMENTS

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