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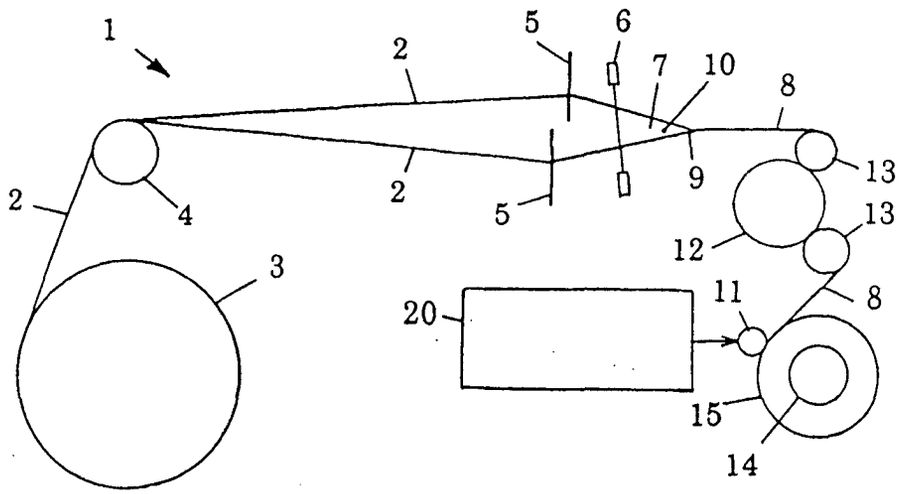
(54) Loom take-up motion

(57) A loom take-up motion (20) comprises a pressing member (pressure roller) (11) with its axis extended in parallel to that of a take-up roller (14) and pressed against a fabric roll (15) of a fabric (8) wound on the take-up roller (14), a variable-speed driving device (16) for driving the pressing member (11) for rotation about the axis thereof in a fabric winding direction, and a take-up controller(17) capable of controlling the driving device (16) by giving a speed signal produced on the basis of take-up speed at which the fabric (8) is wound round the take-up roller (14) to the driving device (16) to control the surface speed of the pressing member (11) properly according to weaving conditions including the type of the fabric (8) and the diameter of the fabric roll (15). The pressing member (11) is rotated positively while the fabric (8) is being wound round the take-up roller (14) to prevent forming folds and creases in the fabric(8) in the fabric roll (15).

FIG.1



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Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a loom take-up motion provided with a pressing member pressed against a fabric roll wound on a take-up roller, and capable of properly controlling the surface speed of the pressing member.

Description of the Related Art

[0002] A technique disclosed in JPY 52-21807 holds a cylindrical member, i.e., a pressure roller, of a length greater than the width of a fabric on a loom so as to be pressed against a fabric roll wound on a take-up roller to prevent wrinkling the fabric roll. The fabric roll is pressed against the fabric roll by its own weight or by the resilience of springs. Therefore, the fabric is wound round the take-up roller after being rubbed between the fabric roll and the pressure roller. According to the prior art, the pressure roller does not rotate while the take-up roller rotates. Therefore, the advancement of the fabric is obstructed by the pressure roller and the fabric is liable to be cause to accumulate and to slackened by the pressing action of the pressure roller in a region behind the pressure roller, the slackened fabric is creased and the creased fabric is wound in the fabric roll.

[0003] A technique disclosed in JPY No. 63-186786 makes a pressure roller rotate passively with the rotation of a take-up roller. However, the fabric is wrinkled before the same is wound in a fabric roll, and hence the fabric wound in the fabric roll is creased.

SUMMARY OF THE INVENTION

[0004] Accordingly, it is an object of the present invention to prevent wrinkling a fabric before taking up the fabric on a take-up roller and creasing the fabric wound in a fabric roll.

[0005] In pressing a long, cylindrical pressing member against a fabric roll wound on a take-up roller, and driving the pressing member for rotation in a winding direction, i.e., a take-up direction, by a variable-speed driving device, the present invention gives a speed control signal to the driving device on the basis of the moving speed of the fabric to control the surface speed of the pressing member properly according to weaving conditions.

[0006] According to one aspect of the present invention, a loom take-up motion comprises: a pressing member with its axis extended in parallel to that of a take-up roller and pressed against a fabric roll (15) of a fabric (8) wound on the take-up roller; a variable-speed driving device for driving the pressing member for rotation about the axis thereof in a fabric winding direction; and a take-up controller capable of controlling the driving device by giving a speed signal produced on the basis of take-up speed at which the fabric is wound round the take-up roller to the driving device to control the surface speed of the pressing member properly according to weaving conditions including the type of the fabric and the diameter of the fabric roll.

[0007] Thus, the pressing member is driven positively for rotation to prevent creasing the fabric wound in the fabric roll. The pressing member is a long, cylindrical member, such as a pressure roller, and the driving device includes a motor. The pressing member may be disposed at any position, provided that the pressing member is on the surface of the take-up roller. The pressing member may be longitudinally divided into a plurality of sectional rollers.

[0008] In the loom take-up motion according to the present invention, the pressing member may be rotated at a surface speed higher than the moving speed of the fabric being wound round the take-up roller by a proper speed difference.

[0009] In the loom take-up motion according to the present invention, the speed difference may be changed according to the change of the diameter of the fabric roll wound on the take-up roller.

[0010] In the loom take-up motion according to the present invention, the pressing member is disposed immediately in front of a contact line where the fabric comes into contact with the fabric roll to change the hardness of the fabric roll by changing the tension of only a part, immediately behind the fabric roll, of the fabric.

[0011] In the loom take-up motion according to the present invention, surfaces of parts, on the opposite sides of a substantially middle part of the pressing member, of the pressing member may have functions capable of exerting forces respectively acting toward the opposite ends of the fabric roll on the fabric in contact with the pressing member. Thus, the fabric is stretched laterally to smooth down wrinkles formed in the fabric so that creases may not be formed in the fabric wound in the fabric roll.

[0012] The surfaces of the parts of the pressing member can be provided with such functions by forming screw threads in the surface of the pressing member or by helically winding strips of moquette or felt around the pressing member.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The above and other objects, features and advantages of the present invention will become more apparent from the following description taken in connection with the accompanying drawings, in which:

Fig. 1 is schematic side elevation of an essential part of a loom and a loom take-up motion in a preferred embodiment according to the present inven-

tion;

Fig. 2 is a block diagram of the loom take-up motion shown in Fig. 1;

Fig. 3 is a perspective view of a pressure roller support mechanism;

Fig. 4 is a partly sectional front elevation of the pressure roller support mechanism shown in Fig. 3;

Fig. 5 is a schematic side elevation of assistance in explaining a method of measuring the diameter of a fabric roll;

Figs. 6(1) to 6(6) are schematic side elevations of assistance in explaining possible dispositions for a pressure roller;

Fig. 7 is a front elevation of a pressure roller; and

Fig. 8 is a front elevation of another pressure roller.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0014] Referring to Fig. 1 showing an essential part of a general loom 1, warp yarns 2 are released from a warp beam 3 in a warp, are extended through a back roller 4, heddles 5 and a reed 6 to the cloth fell 9 of a fabric 8. The heddles 5 are controlled to form a shed 7 of the warp yarns 2. A weft yarn 10 is inserted in the shed 7 formed by raising and lowering the selected warp yarns 2, and is beaten up into the cloth fell 9 of the fabric 8 by the reed 6. The fabric 8 is guided by first and second pressure rollers 13 so as to be wound round a surface roller 12, and is taken up on a take-up roller 14 in a fabric roll 15. A pressure roller 11 presses the fabric 8 against the surface of the fabric roll 15.

[0015] The pressure roller 11, i.e., a pressing member, is extended with its axis extending parallel with that of the take-up roller 14. The pressure roller 11 moves away from the take-up roller 14 as the diameter of the fabric roll 15 increases. The pressure roller 11 is pressed by its own weight or by the resilience of a spring against the outer surface of the fabric roll 15 and is driven for rotation in the direction of winding the fabric 8 by a loom take-up motion 20 according to the present invention. As shown in Figs. 1 and 2, the pressing member 11 is disposed immediately in front of a contact line where the fabric 8 comes into contact with the fabric roll 15.

[0016] Referring to Fig. 2 showing the loom take-up motion 20, the loom take-up motion 20 has the pressure roller 11, i.e., the pressing member, a driving device 16 and a take-up controller 17. The driving device 16 drives the pressure roller 11 positively for rotation in a take-up direction. The driving device 16 has a driver 18, and a variable-speed motor 19 connected to the shaft of the pressure roller 11. The take-up controller 17 gives a speed command signal corresponding to the moving speed of the fabric being wound round the take-up roller 14 to the driving device 16 to control the surface speed of the pressure roller 11 properly according to weaving conditions including the type of the fabric 8 and the diameter of the fabric roll 15. The moving speed of the fabric 8 is measured directly or is determined by calculation using the rotating speed of the surface roller 12 or using the rotating speed of the take-up roller 14 and the diameter of the fabric roll 15. In this embodiment shown in Fig. 2, the rotating speed of the take-up roller 14 is measured by a rotating speed measuring device 21, and the diameter of the fabric roll 15 is measured by a diameter measuring device 22.

[0017] While the loom is in weaving operation, the take-up controller 17 receive a signal representing the rotating speed of the take-up roller 14 from the rotating speed measuring device 21, a signal representing the diameter of the fabric roll 15 from the diameter measuring device 22, and signals representing set data on weaving conditions including the type of the fabric 8 set by a data setting device 23, and calculates the moving speed of the fabric 8 by using and expression: π(Diameter of the fabric roll)$\times$(Rotating speed of the take-up roller 14). The calculation is executed every picking cycle, i.e., every one full turn of the main shaft 25 of the loom 1, every several picking cycles, i.e., every several full turns of the main shaft 25 of the loom 1, every completion of one complete weave or every completion of several complete weaves. A loom controller 26 receives phase angle signals representing phase angles of the main shaft 25 of the loom 1 from an encoder 24, and sends phase angle signals to the take-up controller 17. The take-up controller 17 times an operation for calculating the moving speed of the fabric 8. The take-up controller 17 gives a rotating speed control signal corresponding to the moving speed of the fabric 8 being wound round the take-up roller 14 to the driver 18 of the driving device 16. Then, the driver 18 drives the motor 19 according to the rotating speed control signal to drive the pressure roller 11 positively for rotation in the take-up direction. Thus, the surface speed of the pressure roller 11 is controlled properly according to the weaving conditions including the type of the fabric 8 and the diameter of the fabric roll 15. The entire width of the fabric 8 is stretched by positively rotating the pressure roller 11 in the take-up direction according to the moving speed of the fabric being wound round the take-up roller 14 to assist the take-up roller 14 in winding the fabric 8 in the fabric roll 15 and to prevent the fabric 8 wound in the fabric roll 15 from being creased and folded.

[0018] Usually, the surface speed of the pressure roller 11 is equal to the moving speed of the fabric 8 being wound round the take-up roller 14. When necessary, the surface speed of the pressure roller 11 may be higher than the moving speed of the fabric 8 being wound round the take-up roller 14 by a set speed difference. If the surface speed of the pressure roller 11 is higher than the moving speed of the fabric 8 by the set speed difference, the pressure roller 11 stretches wrinkles formed in the fabric 8 extending behind the pressure roller 11 to prevent the fabric 8 in the fabric roll 15 from being creased. The set speed difference is changed according to the change of the diameter of the fabric roll 15 wound

on the take-up roller 14. Generally, degree of creasing and folding the fabric 8 changes with the change of the diameter of the fabric roll 15; creases and folds are liable to be formed while the diameter of the fabric roll 15 is small. Therefore, the take-up controller 17 changes the speed difference according to the change of the diameter of the fabric roll 15 to prevent creasing the fabric 8 wound in the fabric roll 15 more effectively. Surface speeds of the pressure roller 11 and speed differences respectively for diameters of the fabric roll 15 are set beforehand by the data setting device 23. The weaving conditions and the surfaces speeds of the pressure roller 11 and the speed differences for diameters of the fabric roll 15 set beforehand by the data setting device 23, and the measured diameter of the fabric roll 15, the rotating speed of the take-up roller 14, a specified rotating speed and such are displayed by a display 27 included in the take-up controller 17 to enable visual recognition of those data. The operator is able to understand the condition of take-up operation from the data displayed by the display 27.

[0019] Referring to Figs. 3 and 4 showing a support mechanism for supporting the pressure roller 11, and another possible diameter measuring device 22, the pressure roller 11 is supported for rotation in bearings 29 on the extremities of a pair of levers 28, and is coupled with the output shaft of the motor 19 by a coupling 30. The motor 19 is fixedly mounted on a bracket 31 attached to the lever 28. The base ends of the pair of levers 28 are supported for turning on a frame or the like of the loom 1 by support shafts 32, respectively. The angular displacement of the pair of levers 28, which corresponds to the diameter of the fabric roll 15, is converted into an electric signal by a potentiometer 33.

[0020] Referring to Fig. 5 showing a third possible diameter measuring device 22, the diameter measuring device 22 is, for example, an acoustic distance measuring device capable of determining the diameter of the fabric roll 15 in a noncontact measuring mode by sensing a sound wave reflected from the surface of the fabric roll 15.

[0021] Figs. 6(1) to 6(6) are schematic side elevations of assistance in explaining possible positions for the pressure roller 11 pressed against the fabric roll 15 wound on the take-up roller 14. In Fig. 6(1), the pressure roller 11 is disposed immediately in front of a contact line where the fabric 8 comes into contact with the fabric roll 15, which is similar to the disposition of the pressure roller 11 shown in Figs. 1 and 2. In Fig. 6(2), the pressure roller 11 is in contact with a part of the surface of the fabric roll 15 at an angular position spaced an angle of about 90° in the counterclockwise direction from the contact line where the fabric 8 comes into contact with the fabric roll 15. In Fig. 6(3), the pressure roller 11 is in contact with a part of the surface of the fabric roll 15 at an angular position spaced an angle of about 200° in the counterclockwise direction from the contact line where the fabric 8 comes into contact with the fabric roll 15. In Fig. 6(4), the pressure roller 11 is in contact with a part of the surface of the fabric roll 15 at an angular position spaced an angle of about 300° in the counterclockwise direction from the contact line where the fabric 8 comes into contact with the fabric roll 15. In Fig. 6(5), three pressure rollers 11 are arranged at equal angular intervals on the surface of the fabric roll 15. In Fig. 6(6), the pressure roller 11 and an auxiliary pressure roller 11a guides the fabric 8 to the fabric roll 15 and rotate in the take-up direction. The possible position of the pressure roller 11 may be other than those shown in Figs. 6 (1) to 6(6). The loom 1 may be provided with any suitable number of pressure rollers.

[0022] A pressure roller 11 shown in Fig. 7 has a surface having functions capable of exerting forces respectively acting toward the opposite ends of the fabric roll 15 on the fabric 8 in contact with the pressure roller 11. Thus, the fabric 8 is stretched laterally to smooth down wrinkles formed in the fabric 8 so that creases and folds may not be formed in the fabric 8 as wound in the fabric roll 15. The surfaces of the parts of the pressing member can be provided with such functions by forming helical grooves 34 respectively of opposite hands in the surfaces of the parts of the pressure roller 11. The helical grooves 34 can be formed also by helically winding strips of moquette or felt around the pressure roller 11.

[0023] In Fig. 8, a pressure roller 11 is divided into two parts, the two parts of the pressure roller 11 is supported in a bearing 35, and the two parts of the pressure roller 11 are driven individually by motors 19, respectively. Normally, the two motors 19 operate at the same operating speed. If wrinkles are formed in different modes in the right and the left half of the fabric 8, the motors 19 may operate at different operating speeds, respectively.

[0024] As apparent from the foregoing description, since the surface speed of the pressure roller is controlled properly according to the weaving conditions on the basis of the moving speed of the fabric being wound in the fabric roll, and the pressure roller is driven positively for rotation while the fabric is being wound in the fabric roll, formation of creases and folds in the fabric wound in the fabric roll can be prevented.

[0025] Since the surface speed of the pressure roller is higher than the take-up speed at which the fabric is wound in the fabric roll by the set speed difference, wrinkles formed in the fabric are stretched before the fabric is wound in the fabric roll and hence creases are not formed in the fabric wound in the fabric roll.

[0026] Since the speed difference is changed according to the change of the diameter of the fabric roll, formation of creases can be surely prevented.

[0027] Since the pressure roller is disposed immediately in front of a contact line where the fabric comes into contact with the fabric roll to change the tension of the fabric immediately before the same is wound round the fabric roll, the hardness of the fabric roll can be changed.

[0028] Since surfaces of parts, on the opposite sides

of a substantially middle part of the pressure roller, of the pressure roller have the functions capable of exerting forces respectively acting toward the opposite ends of the fabric roll on the fabric in contact with the pressing member, the fabric can be stretched laterally to smooth down wrinkles formed therein.

[0029] Although the invention has been described in its preferred embodiments with a certain degree of particularity, obviously many changes and variations are possible therein. It is therefore to be understood that the invention may be practiced otherwise than as specifically described herein without departing from the scope and spirit thereof.

[0030] The features disclosed in the foregoing description, in the claims and/or in the accompanying drawings may, both separately and in any combination thereof, be material for realising the invention in diverse forms thereof.

Claims

1. A loom take-up motion (20) comprising:

a pressing member (11, 11a) with its axis extended in parallel to that of a take-up roller (14) and pressed against a fabric roll (15) of a fabric (8) wound on the take-up roller (14);
a variable-speed driving device (16) for driving the pressing member (11, 11a) for rotation about the axis thereof in a fabric winding direction; and
a take-up controller(17) capable of controlling the driving device (16) by giving a speed signal produced on the basis of take-up speed at which the fabric (8) is wound round the take-up roller (14) to the driving device (16) to control the surface speed of the pressing member (11, 11a) properly according to weaving conditions including the type of the fabric (8) and the diameter of the fabric roll (15).

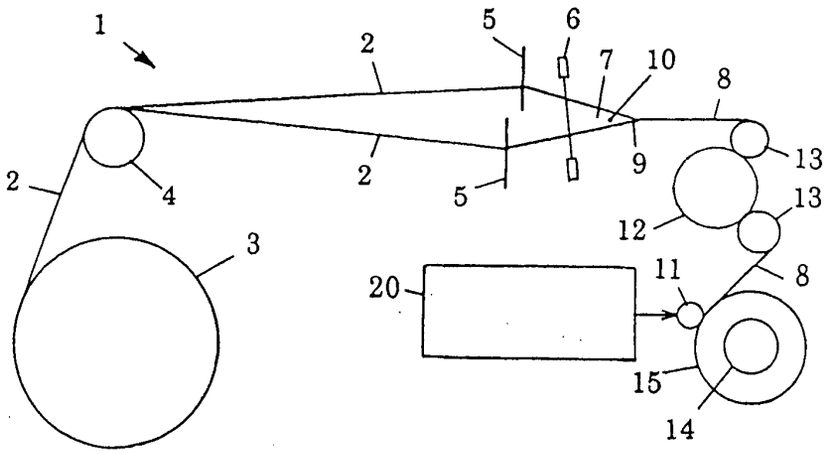
2. The loom take-up motion (20) according to claim 1, wherein the pressing member (11, 11a) is rotated at a surface speed higher than the moving speed of the fabric (8) being wound round the take-up roller (14) by a proper speed difference.

3. The loom take-up motion (20) according to claim 2, wherein the speed difference is changed according to the change of the diameter of the fabric roll (15) wound on the take-up roller (14).

4. The loom take-up motion (20) according to any one of claims 1 to 3, wherein the pressing member (11, 11a) is disposed immediately in front of a contact line where the fabric (8) comes into contact with the fabric roll (15).

5. The loom take-up motion (20) according to any one of claims 1 to 4, wherein the surfaces of parts, on the opposite sides of a substantially middle part of the pressing member (11, 11a), of the pressing member (11, 11a) have functions capable of exerting forces respectively acting toward the opposite ends of the fabric roll (15) on the fabric (8) in contact with the pressing member (11, 11a).

FIG.1


1
2
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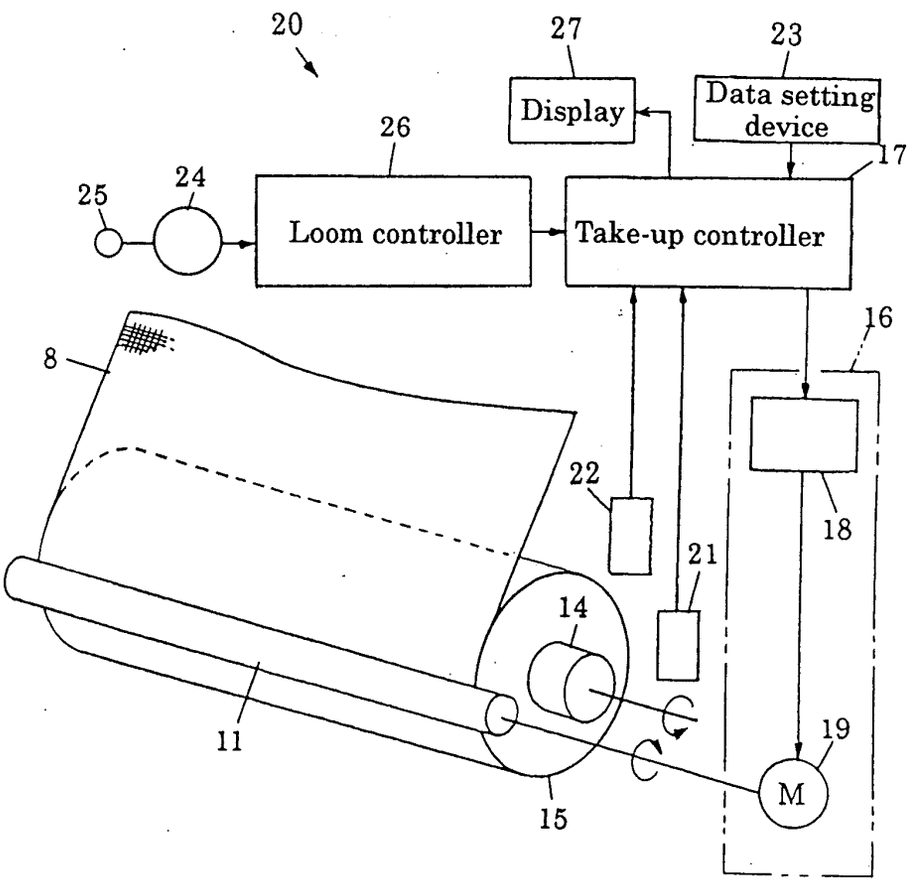
14

FIG.2


20
27
Display
23
Data setting device
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17
25
24
Loom controller
Take-up controller
16
8
22
18
21
14
11
19
M
15

FIG. 3

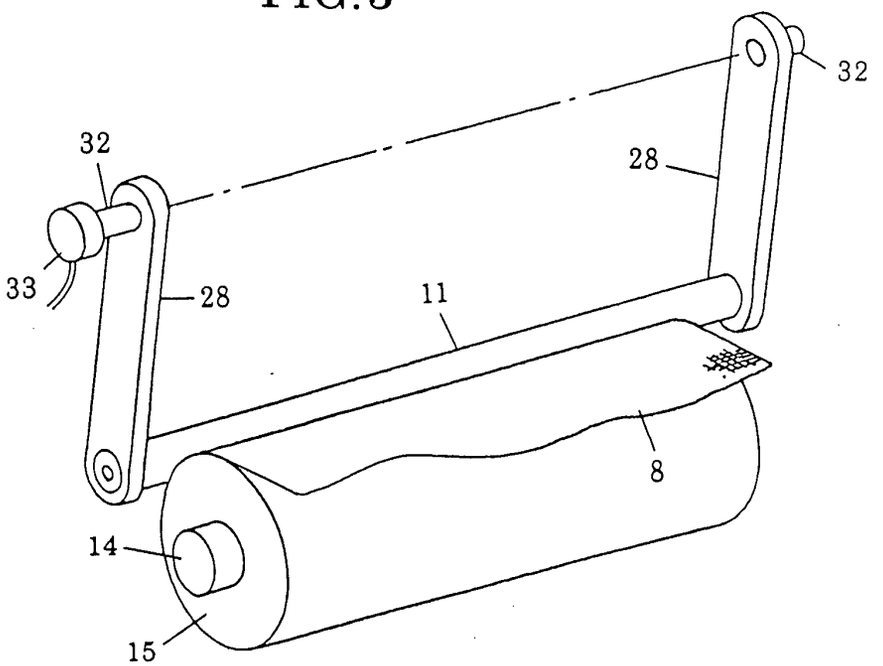


FIG. 4

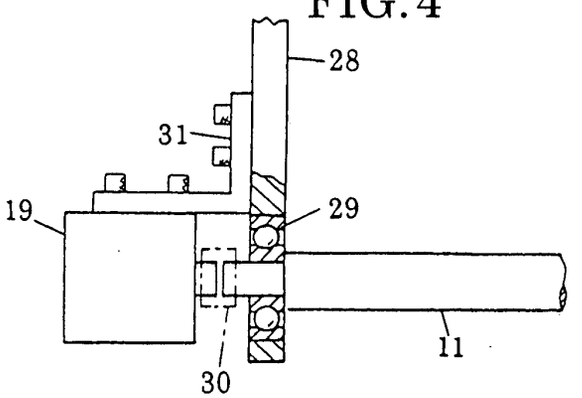


FIG. 5

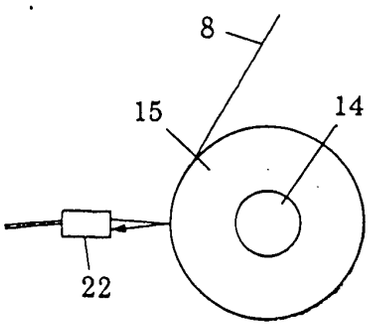


FIG.6

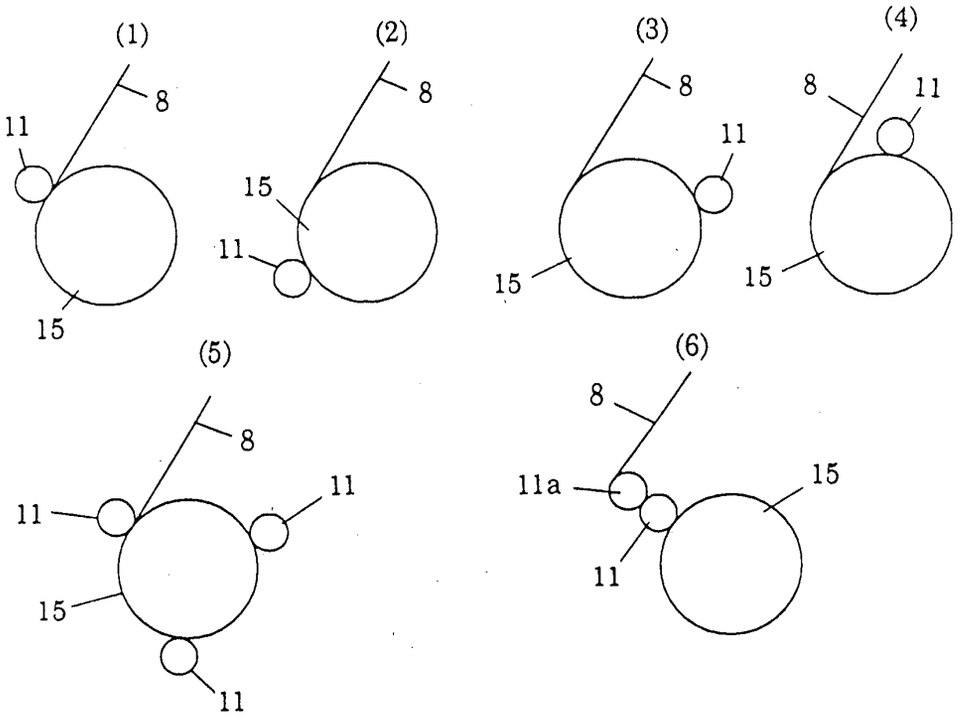


FIG.7

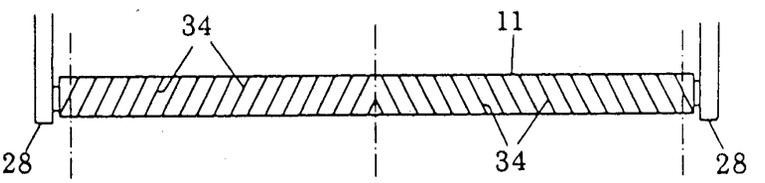
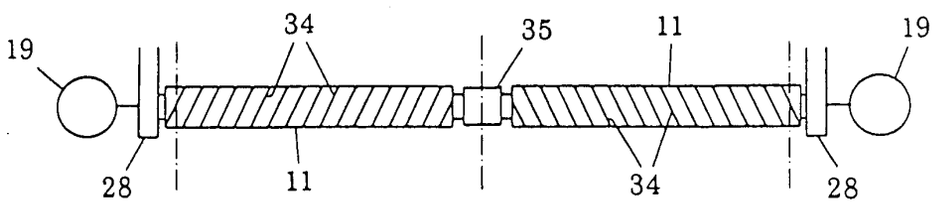


FIG.8



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EUROPEAN SEARCH REPORT

Application Number
EP 03 00 1534

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.7)
X	PATENT ABSTRACTS OF JAPAN vol. 1998, no. 06, 30 April 1998 (1998-04-30) & JP 10 035969 A (TOSHIBA MACH CO LTD), 10 February 1998 (1998-02-10) * abstract; figure 1 * ---	1,4	D03D49/20 B65H18/26
X	PATENT ABSTRACTS OF JAPAN vol. 018, no. 377 (C-1225), 15 July 1994 (1994-07-15) & JP 06 101138 A (KATSUZAWA DENSHI GIJUTSU KK), 12 April 1994 (1994-04-12) * abstract; figure 2 * ---	1,4	
A	PATENT ABSTRACTS OF JAPAN vol. 018, no. 440 (M-1657), 17 August 1994 (1994-08-17) & JP 06 135611 A (KANEBO LTD), 17 May 1994 (1994-05-17) * abstract; figure 1 * -----	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

D03D
B65H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	30 April 2003	Louter, P

CATEGORY OF CITED DOCUMENTS

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30-04-2003

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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