(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number : **0 524 139 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number : **92810478.5**

(51) Int. Cl.[5] : **B65H 23/00,** B65H 18/10

(22) Date of filing : **23.06.92**

(30) Priority : **27.06.91 JP 157076/91**

(43) Date of publication of application :
20.01.93 Bulletin 93/03

(84) Designated Contracting States :
BE DE FR IT

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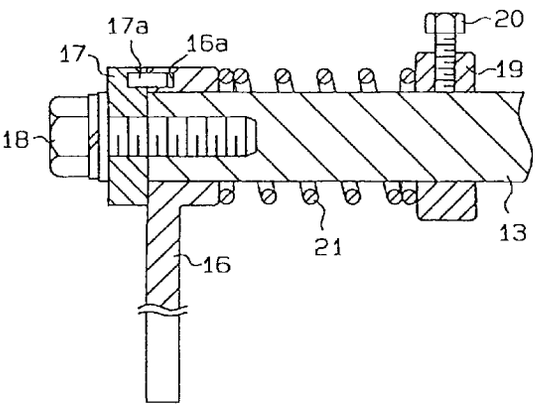
(54) Cloth winding apparatus in a weaving loom.

(57) To facilitate removal of a cloth roll from a weaving loom in an apparatus for maintaining a constant cloth tension during cloth winding operation. A feeler lever (16) is supported on a feeler lever shaft (13) in a slidable relation thereto, and the range of sliding movement of the feeler lever (16) is restricted by a stop plate (17) and a stop ring (19). The feeler lever 16 is urged toward the stop plate (17) by the pressure exerted by a spring (21). The stop plate (17) has attached thereto a pin (17a), while the feeler lever (16) has formed therein a reception hole (16a). The feeler lever (16) is normally positioned where the pin (17a) is engaged with the hole (16a), but it is axially shifted to a position where, the pin (17a) is moved out of the hole 16a when removing the wound-up cloth roll from the loom. This axial shifting of the feeler lever (16) to disengage the pin (17a) from the hole (16a) allows only the feeler lever shaft (13) to rotate by the action of another spring (11) used for maintaining the cloth W at a constant tensi on during winding oparation, whereby rapid rotation of the feeler, lever (16) can be avoided during the removal of the cloth roll from the loom.

Fig. 2



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The present invention relates to a cloth winding apparatus for use in a weaving loom wherein torque of loom drive is transmitted to a cloth roll through a torque limiter comprising a pair of friction clutch plates pressed against each other by pressure of a spring and a cam mechanism is provided which is adepted to change the pressure of the spring according to the motion of a feeler lever which is swingable in response to a change in cloth roll diameter.

A cloth winding apparatus of the above type for use in a weaving loom is disclosed by Publication of the Japanese Patent Application No 55-163241 (1980) In this prior apparatus, an end cam is attached to a rotatable shaft supporting a feeler lever which is swingable with rotation of the shaft, and a cam-operated lever having a cam follower is adapted to rotate in conjunction with the swinging motion of the feeler lever in response to an increase of diameter of a cloth roll of the loom. Torque provided by a loom drive is transmitted to the cloth roll through a pair of friction clutch plates pressed against each other by a spring which is installed between the cam-operated lever and one of the above paired clutch plates.

As the cloth roll diameter is increased, the pressure of the spring is built up thereby to increase the frictional force between the paired clutch plates. Thus, a cloth can be wound round the cloth roll with a substantially constant tension irrespective of the increase in the cloth roll diameter.

In such apparatus for winding a cloth while maintaining its tension substantially constant, the pressure of the spting will act on the feeler lever by way of the cam-operated lever, the cam and the rotatable shaft so as to press the feeler lever against the peripheral surface of the cloth roll. When removing a wound-up cloth roll from the loom, the feeler lever is caused to swing back rapidly under the influence of the spring pressure. Such rapid movement of the feeler lever makes it troublesome to remove the cloth roll from the loom.

Accordingly, an object of the present invention is to provide a cloth winding apparatus that facilitates removal of the cloth roll from the weaving loom.

According to the present invention, there is provided a cloth winding,apparatus for use in a weaving loom including a torque limiter comprising a pair of friction clutch plates pressed against each other by pressure of a spring for transmitting through said clutch plates torque of a loom drive to a cloth roll, a feeler lever swingably supported or a rotatable shaft, said feeler lever being swingable about said shaft in response to a change in cloth roll diameter, and a cam mechanism adapted to change the pressure of said spring according to the swinging motion of said feeler lever, said shaft being adapted to transmit the swinging motion of said feeler lever to said cam machanism, wherein said feeler lever is supported on said shaft rotatably and axially slidably relative to said shaft, and said apparatus further includes a relative rotation preventing mechanism provided between said feeler lever and said shaft fot preventing the rotation of the feeler lever relative to the shaft when the feeler lever is lacated at its cloth roll diameter detecting position, said mechanism being disengageable to allow the relative rotation of said shaft and said feeler lever.

In removing the wound-up cloth toll from the loom, the feeler lever is akially shifted along the shaft, on which it is supported, from its normal cloth roll diameter detecting position. By so shifting the feeler lever, the relative rotation preventing mechanism is disengaged to allow the shaft to be rotated relative to the feeler lever by the action of the spring and the cam mechanism. Because no more spring pressure acts on the feeler lever aftet the above relative rotation, the lever will not be rotated rapidly even if the cloth roll is removed form the loom.

The following will describe an embodiment of cloth winding apparatus conctructed according to the present invention while having reference to FIGS 1 to 3, which show the folowing:

FIG 1 is a perspective view showing an embodiment of the apparatus according to the present invention;

FIG 2 is a longitudinal cross-sectional view showing in detail the relative rotation preventing mechanism in its engaged position to preventing the feeler lever from rotated relative to the shaft;

FIG 3 is a longitudinal cross-sectional.view similar to the mechanism in its disengaged position to release the feeler lever from its engagement with the shaft;

FIG 4 is a longitudinal cross-sectional view similar to FIG 2, but showing a modified embodiment of the apparatus according to the present invention.

Reference numeral 1 designates a surface roller operatively connected to a loom drive (not shown) through a transmission (not shown either) for drawing a cloth W. The surface roller 1 has a shaft 1a extending from one end thereof. An end cam 2 and a driven clutch plate 3 are supported on the surface roller shaft 1a in a rotatable, but not axially slidable relation to that shaft. A drive clutch plate 12 which is interposed between the end cam 2 and the driven clutch plate 3 is supported on the surface roller shaft 1a in an axially slidable, but not rotatable, relative to the shaft. The end cam 2 has formed on its outer surface a pair of cam projections 2a. The driven clutch plate 3 has formed on its peripheral edge a circumferential sprocket 3a. Below the driven clutch plate 3thereof a small-diameter sprocket wheel 5, and the shaft 4 and the driven clutch plate 3 are operatively connected by means of an endless chain 6 trained round and between the sprocket 3a on the clutch plate 3 and the small-diameter sprocket wheel 5. The shaft 4 is operatively connected to a cloth roller shaft 7a for a cloth

roll 7.

A cloth guide bar 22 suspended at its opposite ends by strings 23 is disposed engageably with a cloth W so as to guide the cloth and to simultaneously remove its crease while it is being wound round the shaft 7a.

A bracket 8 is mounted on the surface roller shaft 1a in a rotatable and axially slidable relation thereto, and a pair of cam followers 8a are rotatably supported on opposite sides of the bracket 8 by a shaft extending through the bracket 8 and the cam followers 8a. Though the cam follower bracket 8 is rotatably supported on the shaft 1a, its movement is restricted by a guide pin 9 in such a way that it is slidable along the shaft 1a but not rotatable relative thereto. An adjusting nut 10 is screwed on the free end of the surface roller shaft 1a, and a spring 11 is installed between the adjusting nut 10 and the cam follower bracket 8 for urging the cam 2 and the clutch plate 12 toward the clutch plate 3.

A shaft 13 having a pulley 14 secured at one end thereof is disposed below the end cam 2. The pulley 14 is operatively connected to the end cam 2 by means of an endless belt 15.

As shown in FIG 2, a feeler lever 16 is slidably supported adjacent the other end of the shaft 13. A stop plate 17 is fastened to the other end of the feeler lever shaft 13 by means of a bolt 18 and a stop ring 19 is fixed at an intermediate position on the shaft 13 by means of a set bolt 20, respectively, for restricting axial sliding movement of the feeler lever 16. A spring 21 is installed between the feeler lever 16 and the stop ring 19 on the shaft 13 for urging the lever 16 against the stop plate 17.

The stop plate 17 has on its inner surface a rotation preventing pin 17a, while the feeler lever 16 has formed in its outer surface a reception hole 16a at such a position where the hole can be aligned with the pin 17a so that the latter can be received and fitted snugly in the former. When the pin 17a is received in the hole 16a, as shown in FIG 2, the feeler lever 16 is pressed against the stop plate 17 by the pressure of the spring 21. During normal operation with the pin 17a thus received in the hole 16a, the feeler lever 16 which is set in engagement with the cloth guide bar 22 with portion of the cloth W held therebetween is caused to be swung about the feeler lever shaft 13 with an increase of the diameter of the cloth roll 7. That is, the feeler lever 16 shown in FIG 2 is placed in its operative position for detecting the cloth roll diameter, where the shaft 13 is rotated with the swinging motion of the feeler lever 16 in an integral manner because the relative rotation preventing mechanism, comprising the pin 17a, hole 16a, stop plate 17, stop ring 19 and spring 21, is then in engaged condition.

Progressive displacement of the feeler lever 16 caused by the increasing cloth roll diameter is transmitted to the end cam 2 through the feeler lever shaft 131 pulley 14 and belt 15. Thus, the cam 2 is rotated thereby to axially slide the cam followers 8a along the shaft 1a in the direction that causes the spring 11 to be compressed by the bracket 8 then moved together with the cam followers along the shaft 1a. Accordingly, the pressure of the spring 11 is increased and the friction between the clutch plates 3 and 12 is increased. Thus, torque corresponding to the increased friction is transmitted from the surface roller 1 to the cloth roller shaft 7a, whereby the cloth W is wound round the cloth roll 7 at a substantially constant tension.

Because the pressure of the spring 11 acts on the feeler lever shaft 13 through the cam 2 and the cam followers 8 to rotate the shaft 13 in the direction reverse to the rotation during the normal operation, the feeler lever 16 will be swung back rapidly if the cloth roll 7 is removed from its winding position. To forestall such rapid swinging motion of the lever in removing the cloth roll 7 after completion of winding operation, firstly the feeler lever 16 is shifted away from its operative position of FIG 2 along the shaft 13 to a position shown in FIG. 3 where the pin 17a on the stop plate 17 is completely disengaged from the hole 16a in the lever. By so doing, only the feeler lever shaft 13 is rotated by the pressure exported by the expanding spring 11. Because rapid swinging of the feeler lever 16 can be thus avoided, removal of the cloth roll 7 from the loom dan be performed with ease and smoothness.

It is to be understood that the present invention is not limited to the above-described embodiment, but it can be practiced in other various modifications, as exemplified by an embodiment shown in FIG. 4. In this modification, the feeler lever shaft 13 has a key 24 fixed thereto so that the feeler lever 16 is engaged with the shaft 13 by means of this key 24 during the normal winding operation so as to prevent the lever from rotating relative to its shaft. In removing the cloth roll 7, the feeler lever 16 is shifted axially to be disengaged from the shaf t 13 so as to allow the shaft to be rotated independently of the feeler lever.

As it is apparent from the foregoing, the dis engageable mechanism for preventing the relative rotation between the feeler lever and the feeler lever shaft can allow only the shaft to be rotated independently of the feeler lever by previously disengaging the relative rotation preventing mechanism by axially shifting the lever along its shaft, whereby rapid rotation of the feeler lever together with the shaft can be avoided and, therefore, the cloth roll removal from the laom can be facilitated.

To facilitate removal of a cloth roll from a weaving loom in an apparatus for maintaining a constant cloth tension during cloth winding operation. A feeler lever 16 is supported on a feeler lever shaft 13 in a slidable relation thereto, and the range of sliding movement of the feeler lever 16 is restricted by a stop plate 17 and

a stop ring 19. The feeler lever 16 is urged toward the stop plate 17 by the pressure exerted by a spring 21. The stop plate 17 has attached thereto a pin 17a, while the feeler lever 16 has formed therein a reception hole 16a. The feeler lever 16 is normally positioned where the pin 17a is engaged with the hole 16a, but it is axially shifted to a position where, the pin 17a is moved out of the hole 16a when removing the wound-up cloth roll from the loom. This axial shifting of the feeler lever 16 to disengage the pin 17a from the hole 16a allows only the feeler lever shaft 13 to rotate by the action of another spring 11 used for maintaining the cloth W at a constant tension during winding oparation, whereby rapid rotation of the feeler, lever 16 can be avoided during the removal of the cloth roll from the loom.

DESIGNATION OF REFERENCE NUMERALS

13 ... Feeler lever shaft, 16 ... Feeler lever, 16a ... Pin reception hole comprising part of the relative rotation preventing mechanism, 17a ... Pin comprising part of the relati,ve rotation preventing mechanism, 21 ... Spring comprising part of the relative rotation preventing mechanism.

Claims

1. Cloth winding apparatus in a weaving loom including a torque limiter comprising a pair of friction clutch plates (3, 12) pressed against each other by pressure of a spring (11) for transmitting through said clutch plates (3, 12) torque of a loom drive to a cloth roll (7), a feeler lever (16) swingably supported on a rotatable shaft (4), said feeler lever (16) being swingable about said shaft (4) in response to a change in cloth roll (7) diameter, and a cam mechanism (2, 2a, 8, 8a. 5, 6, 3a) adapted to change the pressure of said spring (11) according to the swinging motion of said feeler lever (16), said shaft (4) being adapted to transmit the swinging motion of said feeler lever (16) to said cam mechanism (2, 2a, 8, 8a), wherein said feeler lever (16) is supported on said shaft (4) rotatably and axially slidable relative to said shaft (4), and said apparatus further includes a relative rotation preventing mechanism (17, 17a, 16a) provided between said feeler lever (16) and said shaft (4) for preventing the rotation of the feeler lever (16) relative to the shaft (4) when the feeler lever (16) is located at its cloth roll (7) diameter detecting position, said mechanism (17, 17a, 16a) being disengageable to allow the relative rotation of said shaft (4) and said feeler lever (16).

2. Cloth winding apparatus in a weaving loom including a torque limiter comprising friction clutch means (3, 12) for transmitting torque of a loom drive to a cloth roll (7), a feeler lever (16) swingably supported on a rotatable shaft (4), said feeler lever (16) being swingable about said shaft (4) in response to a change in cloth roll (7) diameter, and a mechanism (2, 2a, 8, 8a, 11) adapted to change the torque transmission of said clutch means (3, 12) according to the position of said feeler lever (16), said shaft (4) being adapted to transmit the position of said feeler lever (16) to said mechanism (2a, 8, 8a, 11), wherein said feeler lever (16) is supported on said shaft (16) rotatably and axially slidable relative to said shaft (4), and said apparatus further includes a relative rotation preventing mechanism (17, 17a, 16a) provided between said feeler lever (16) and said shaft (4) for preventing.the rotation of the feeler lever (16) relative to the shaft (4) when the feeler lever (16) is located at its cloth roll diameter detecting position, said mechanism (17, 17a, 16a) being disengageable to allow the relative rotation of said shaft (4) and said feeler lever (16).

3. Cloth winding apparatus as claimed in claim 1 or 2 said disengageable mechanism between the feeler lever (16) and said shaft comprising a pin (17a) fixed to a stop plate (17) fastened to said shaft (4) and a reception hole (16) in the feeler lever (16) for releasably taking up said pin (17a).

4. Weaving loom with a cloth winding apparatus as claimed in any of claims 1 to 3

Fig. 1

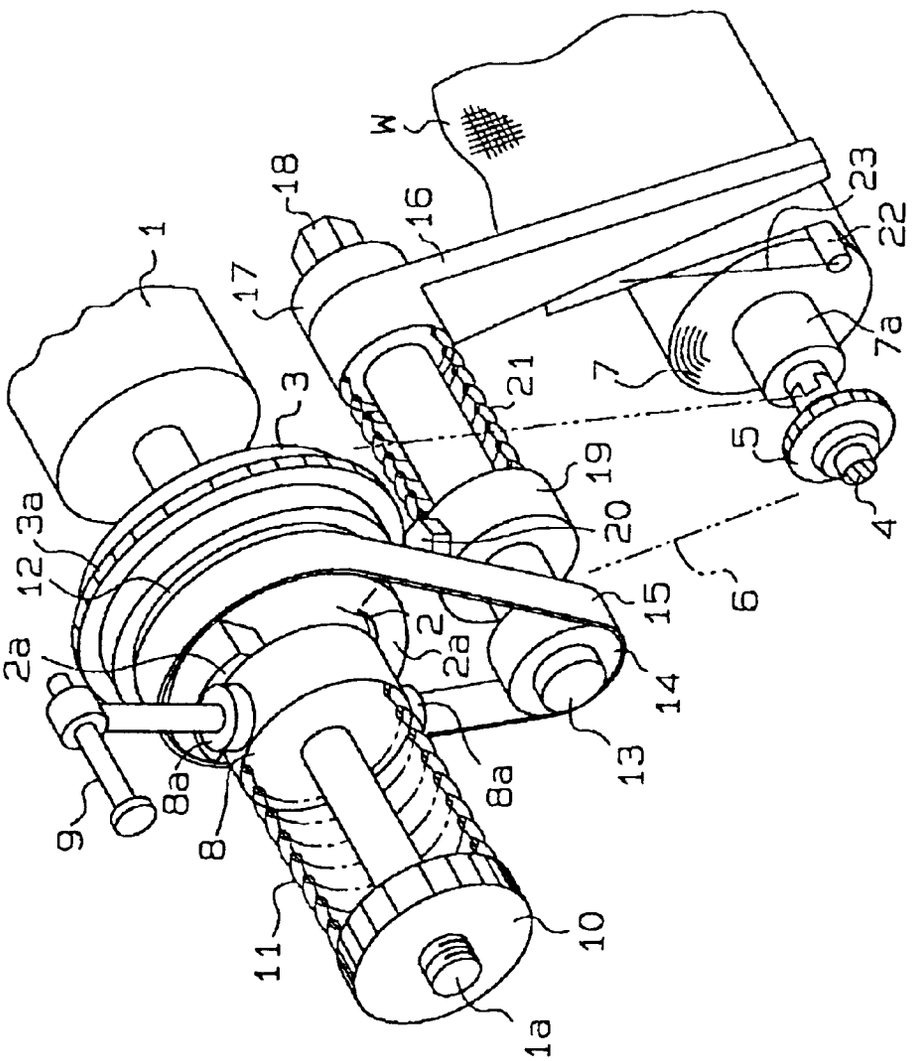
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Fig. 2

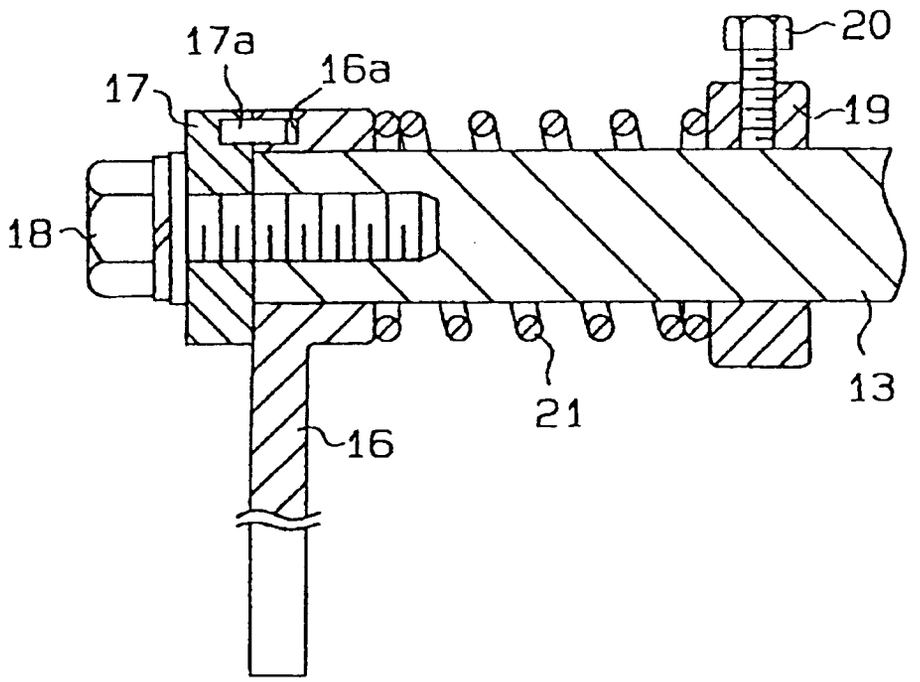


Fig. 3

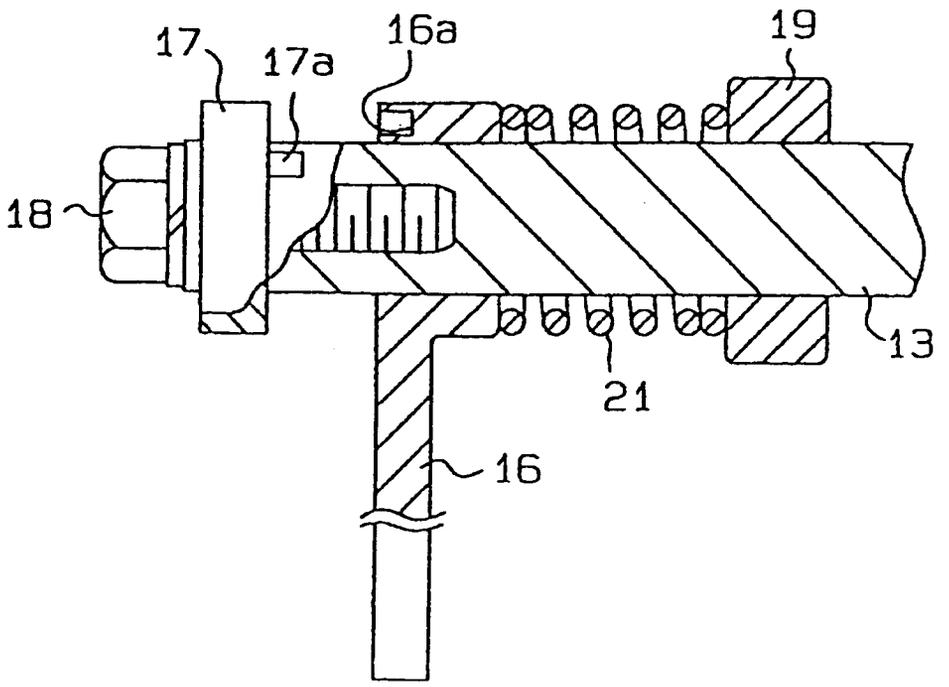
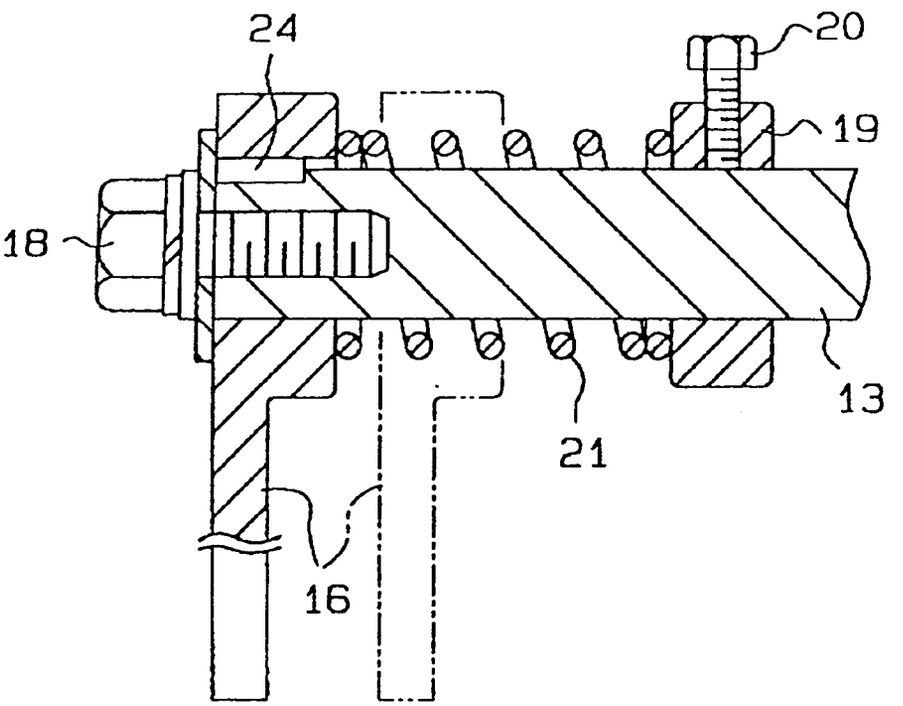


Fig. 4



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EUROPEAN SEARCH REPORT

Application Number
EP 92 81 0478

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.5)
Y	US-A-3 727 856 (KITCH) * the whole document *	1	B65H23/00 B65H18/10
Y	PATENT ABSTRACTS OF JAPAN vol. 6, no. 249 (M-177)(1127) 8 December 1982 & JP-A-57 145 758 (RICOH K. K.) * abstract *	1	
A	FR-A-1 301 885 (JACQUES WOLF) * the whole document *	1	
A	DE-A-2 354 743 (FA. JEAN GÜSKEN) * page 6, line 8 - line 21; figure *	1	
A	DE-C-550 093 (ALLGEMEINE ELEKTRICITÄTS-GESELLSCHAFT IN BERLIN) * the whole document *	1	
A	GB-A-2 071 802 (IAN RENDALL) * the whole document *	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B65H D03D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	14 OCTOBER 1992	MEULEMANS, Jean-Paul

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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