

[54] **DEVICE FOR REGULATING THE TENSION OF A MOVING WEB**

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[58] Field of Search**242/75.2, 75.3; 226/195, 109**

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References Cited

UNITED STATES PATENTS

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Primary Examiner—Allen N. Knowles

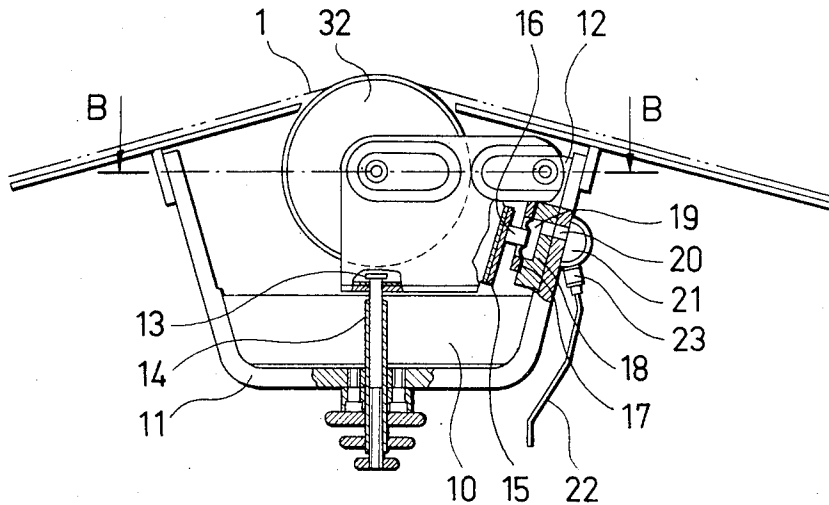
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[57]

ABSTRACT

An equalizer which includes several rollers placed next to each other on one side of the web in the transversal direction of the web, the rollers being attached with bearings between the branches of bearing forks which can be essentially fitted perpendicular and adjusted in relation to the web, and possibly also including a spreader, fitted in front thereof is disclosed.

3 Claims, 3 Drawing Figures



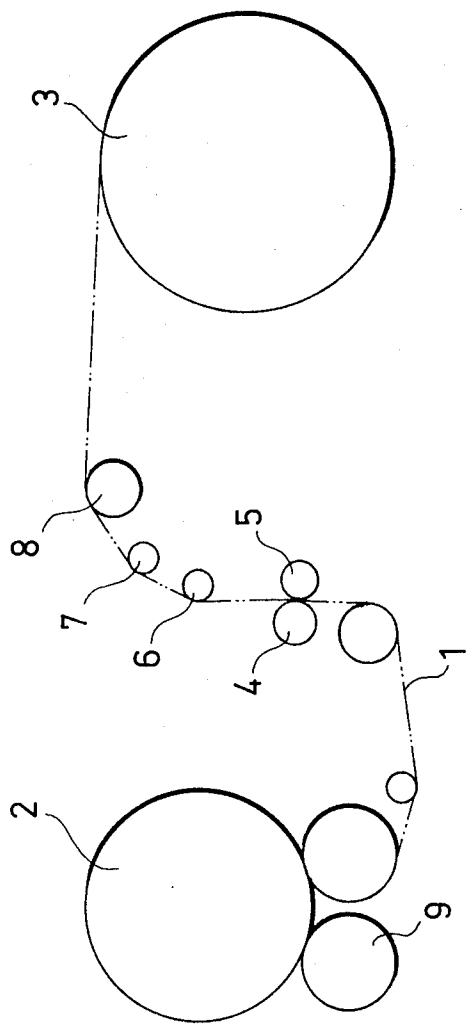


Fig. 1

DEVICE FOR REGULATING THE TENSION OF A MOVING WEB

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a device for regulating the tension of a moving web, such as paper or plastic web or the like, in, for example, reeling machines.

2. Description of the Prior Art

In such machines the moving web is guided by rotating rollers, which are usually cylindrical. The tension of the web is determined by, for example, measuring the load of some roller at its bearings and adjusted to the desired tension on the basis of this value.

Since the guide rollers are cylindrical and the web is not completely homogeneous, the tension (tautness) of the web may not be the same at different points on the web, which easily results in folding of the web. So-called spreaders have been used to eliminate this folding. The spreaders may be rollers, for example, bent into the shape of an arc, over which the web runs touching only part of the circumference of the rollers. A roller like this spreads the web and partly eliminates its tendency to fold, but owing to the stiffness of the roller it is not capable of eliminating local deviations in the tension of the web.

The U.S. Pat. specification Ser. No. 12,355 filed on Feb. 18, 1970, now U.S. Pat. No. 3,648,342 and owned by the assignee of this application, hereby incorporated by reference, introduces a moving roller combination which can be fitted to one side of a moving web as an equalizer or compensator of the differences of tension in the transversal direction of the web. The rollers have been attached with bearings to pivot axes between bearing forks, and an intermediate roller with a smaller diameter has been attached with bearings to the branches of each bearing fork between the rollers in order to create a continuous contact with the rollers; but the shape of the contact can be changed as desired by controls.

The present invention provides a device for regulating the tension of the web over its entire width, with which at the same time it is possible to eliminate local differences of tension in the transversal direction of the web.

SUMMARY OF THE INVENTION

According to the invention there is provided a new and useful combination of equalizing and spreading means. The equalizing means are placed downstream of the spreading means and includes a plurality of transversally aligned rollers on one side of the web, one bearing fork for each roller and being substantially perpendicular and adjustable in relation to the web each roller being mounted in bearings between the furcations of the forks.

In one advantageous embodiment of the invention the controls of each roller have been connected to the same closed pressure system, and a pressure gauge has possibly also been connected to it. A local increase in the tension of the web at one roller makes the roller press the other rollers lower, and a pressure medium flows evenly from this control to the controls of the other rollers. The load of one roller is thus evenly divided amongst the other rollers and no overloading is created. In addition, the pressure gauge always measures the real load of the rollers.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic side view of the paper cutter-reeler provided with a device according to the invention.

FIG. 2 shows a partly cut side view of one application of the invention, and

FIG. 3 is a section along line B—B in FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 shows one typical application of the invention in a paper cutter-reeler (longitudinal cutter), in which 1 is the paper web, 2 is the reels formed in the reeler, 3 is the reel to be unwound, 4 and 5 are the longitudinal cutting blades, 6 and 8 are guide rollers, 7 is an equalizer (the structure of which has been shown in more detail in FIGS. 2 and 3).

Equalizer 7 consists of rollers 32 situated next to each other, which have been attached with bearings so that they are rotatable to supporting plates 10, which have been pivoted to bearing boxes 12 attached to transversal beam 11. The pivoting movement of the supporting plates is limited by an adjustable limiting device, in which spindle 13 limits its movement in one direction and socket 14 in the other. The supporting plates are connected with each other by plate 15, to which has been attached pin 16; pin 16 is supported by elastic membrane 17, for example, a rubber membrane. Membrane housing 18 has been attached to transversal beam 11. The membrane housing is connected through hole 19 to pipe 21 filled with oil or the like through pipe 22, and then closed with valve 23. This arrangement causes the pressure to be the same in each liquid space, which means that each roller loads the web with a similar force and that the rollers may move against the web or in the opposite direction independently of each other.

Since the pressure in liquid space 20 is proportional to the force with which the roller loads the web, that is, proportional to the tension of the web, the liquid pressure can be used as the comparison figure when the tension of the web is regulated.

The equalizer and the rollers on its both sides are situated so in relation to each other that an angle of about 150° is formed between the coming and going directions of the web, in which case the roller of the equalizer moves in the direction of the bisector of this angle. Roller 6, which is after the equalizer in the direction of the movement of the web, along or rollers 6 and 8 are so-called spreaders.

It is advantageous if the width of the rollers of the equalizer is smaller than the diameter of a roller. The spaces between the rollers are as small as possible, for example, less than 10 mm.

What is claimed is:

1. In a device for regulating the tension of a moving web over the entire width of the web comprising the combination of fluid pressure operated equalizing means a plurality of transversally aligned rollers on one side of the web, one bearing fork for each roller and being substantially perpendicular and adjustable in relation to the web each roller being mounted in bearings between the furcations of the forks; and spreading means before the equalizing means in the direction of movement of the web, said equalizer means including an elastic membrane acted upon by fluid pressure to

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regulate the forces exerted on the web by said rollers.

2. The device of claim 1, in which the bearing forks are lever arms the unforked ends of which are pivotable to a horizontal axle mounted in a frame of the device and further comprising control means for regulating the pivoting movement of the arms and placed between

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the bearing fork and the frame to create a contact line of desired contour between the rollers and the web.

3. The device of claim 2, further comprising means for connecting the control means to a common closed pressure system provided with a pressure gauge.

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