

# United States Patent

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[56]

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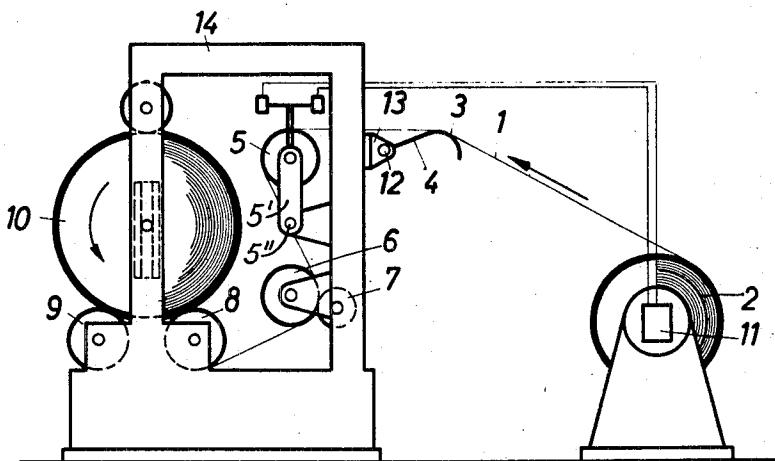
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[54] APPARATUS FOR COMPENSATING FOR THE  
EFFECTS OF NON-CIRCULARITY OF  
UNWINDING ROLLS  
3 Claims, 4 Drawing Figs.

[52] U.S. Cl..... 242/75.43  
[51] Int. Cl..... B65h 77/00  
[50] Field of Search..... 242/75.43,  
75.42, 75.44, 75.3

**ABSTRACT:** An apparatus for compensating for the adverse effects occasioned by noncircularity of unwinding or delivery rolls in paper processing machinery such as roll cutting or slitting machines, rewinding machines and similar machines which operate in dependency upon a delivery roll and in which a measuring or sensing means influenced by the tensile stress of a web fed from a delivery or unwinding roll controls a brake operably associated with the shaft or axis of such delivery roll comprising a low weight guide means interposed in the path of web travel between the unwinding or delivery roll and the measuring or sensing means and acting upon such web in pressure yielding fashion.

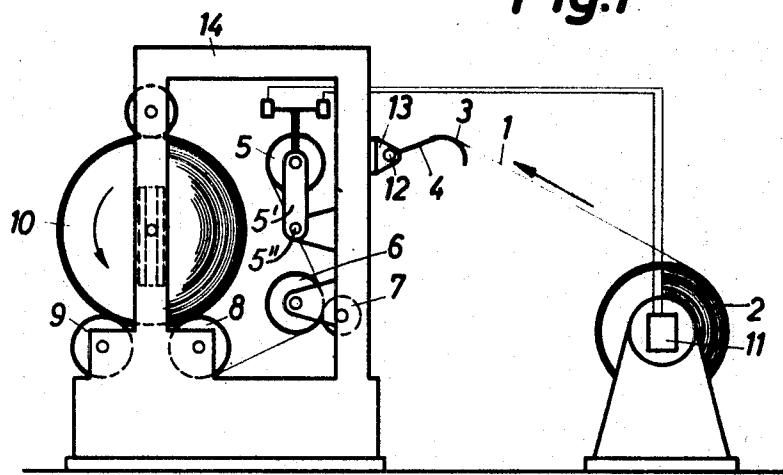


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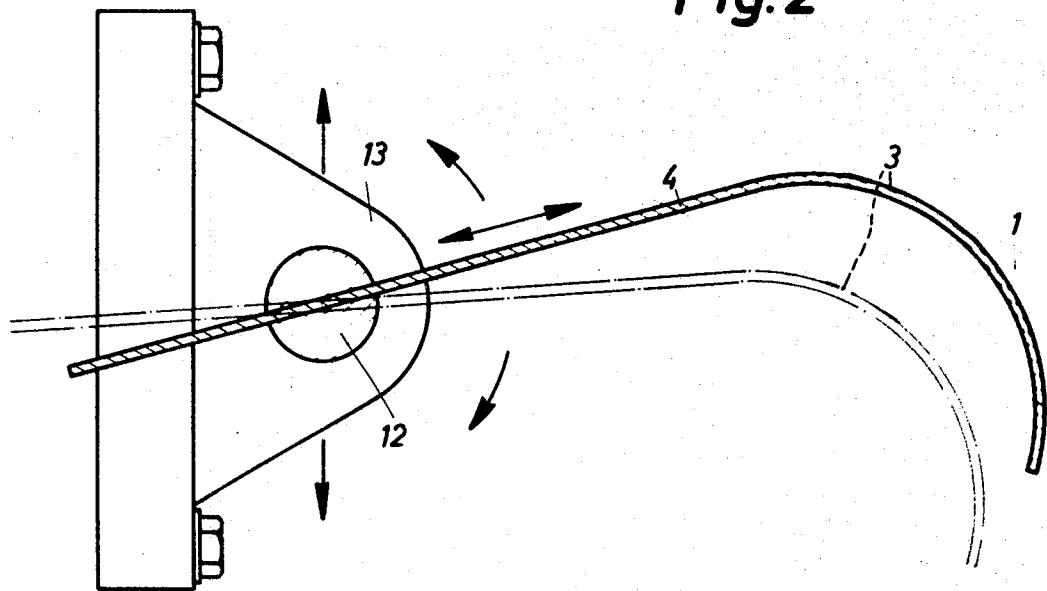
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*Fig.1*



*Fig.2*



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Fig. 3

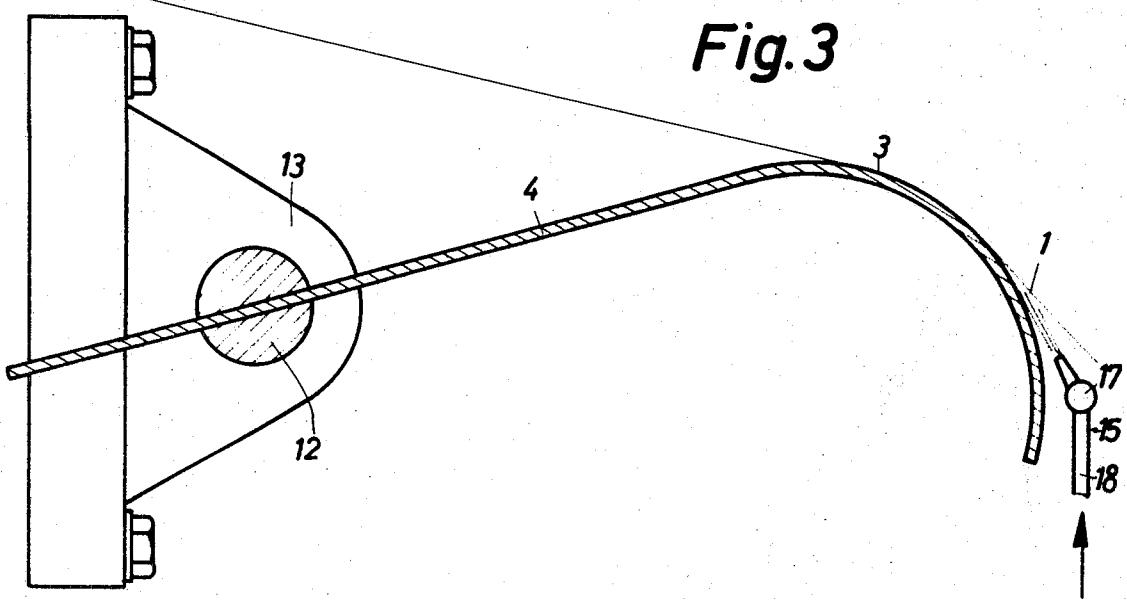
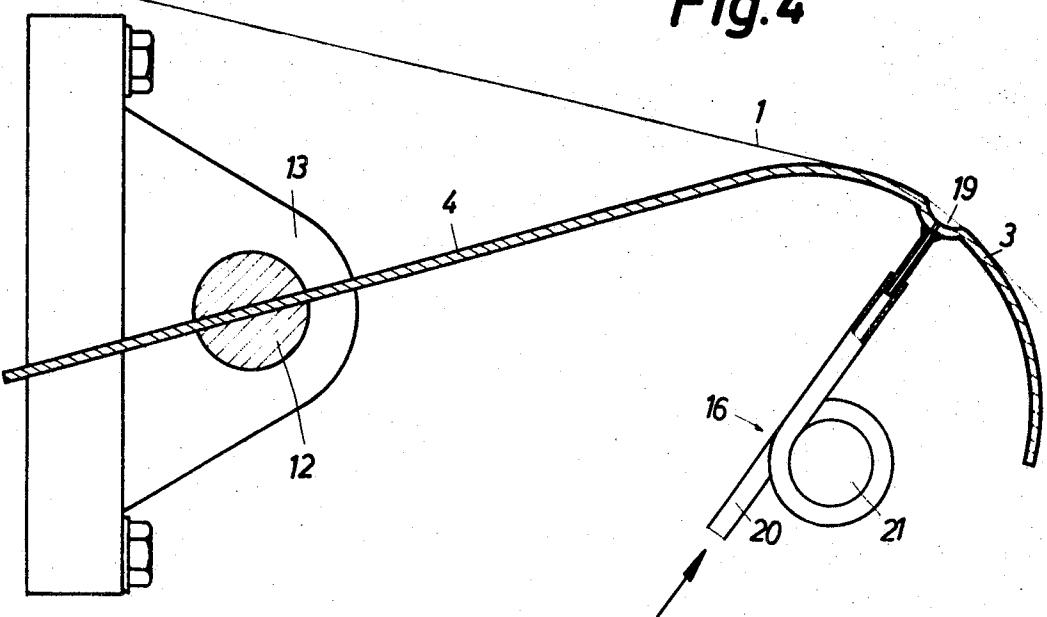


Fig. 4



## APPARATUS FOR COMPENSATING FOR THE EFFECTS OF NON-CIRCULARITY OF UNWINDING ROLLS

The present invention relates broadly to the art of winding and reeling. More particularly, this invention relates to the winding and reeling of paper and the like material.

Specifically this invention relates to an apparatus for compensating for the effects of noncircularity of unwinding rolls in roll cutting machines, rewinder machines or other machines that are fed with continuous webs from a delivery roll and in which a measuring means influenced by the tensile stress in the web controls a brake which is operably related with the axis or shaft of the unwinding roll.

In the processing of continuous webs of paper or the like, as for example in longitudinal cutting or slitting operations, transverse cutting, rewinding, etc. it is of particular importance that the paper web which is being unwound from the delivery roll be fed to the processing location under uniform tensile stress. In order to accomplish this purpose, a web tension regulator compensating for the paper web's tensile stress is generally embodied in the machine subsequent to the unwinding apparatus. The arrangement thereof is such that the paper web is conducted or passes over a pivotally mounted roller which swings out according to each sensing of tensile stress, thereby imparting impulses to a brake which acts upon the unwinding axis or shaft. The primary function of this type of web tension regulator is to adjust the tensile stress of the paper web to a preselected desired value by means of appropriately acting upon the brake as said tensile stress increases due to the decreasing diameter of the unwinding roll.

Quite frequently, however, there occur substantial fluctuations in the paper web on account of noncircular unwinding rolls. The frequency of such paper web fluctuations can become so great as to render impossible any compensation therefor through the web tension regulator for the reason that the entire regulating system is too inert. As a result thereof, the web's tensile stress is not being regulated at all, or if it is, then such regulation occurs too late. The reason for these substantial paper web fluctuations being caused by noncircular unwinding rolls is that as the web unwinds, there are being unwound during that process periodically fluctuating paper lengths per time unit, thus stretching the web rhythmically analogous to said changes in length. The extent of stretch can thereby become so great as to stop just short of the breaking point. However, if in a web stretched thus enormously there appear further tensile stresses, for example in a printing machine, the result may be the much-feared web break, thereby possibly damaging the printing cylinder. Although no damage of the deflector rolls or the like need be feared, if the break occurs already within the rewinding machine, considerable disruptions in the entire operational sequence are caused as a result thereof.

Thus, the primary object of this invention is to produce an apparatus which overcomes and removes the aforesaid drawbacks and difficulties and eliminates the paper stress fluctuations occasioned by noncircular unwinding rolls.

It is a particular object of the invention to provide an apparatus including a mass-deficient, that is low or light weight, and pressure-yielding guide member mounted between the unwinder roll and the measuring or sensing member which is acted upon by the web's stress, said guide member operating counter to the motion of the paper web.

It is a further object to provide such mass-deficient guide member shaped in the form of a spring-suspended arm to which is attached a pressure guide extending across the entire width of the web.

As a still more specific object and for adjusting the contact pressure of the pressure guide against the paper web, the spring-suspended arm is mounted for lateral as well as vertical adjustment and/or the effective lever length of the arm is adjustable. Furthermore, the arrangement can be such as to associate certain implements with the guide member which establish a friction-reducing air cushion between the paper web and the guide member.

Further and more specific objects and advantages will be apparent from the following description taken in connection with the accompanying drawings in which:

FIG. 1 is a diagrammatic side view of a rewinding and longitudinal cutting machine embodying the apparatus of the inventive apparatus;

FIG. 2 is a fragmentary view, partly in section illustrating the guide member of the invention on an enlarged scale, and

FIGS. 3 and 4 are similar views illustrating further embodiments of the inventive apparatus.

As indicated in FIG. 1, a paper web 1 is pulled off from an unwinding roll 2 and conducted to a rewinding roll 10 via a guide member comprising a pressure guide 3 having an arcuate web-contracting surface and an arm 4, a measuring roll 5 is, a longitudinal cutting or slitting mechanism 6, 7 and transportation rollers 8 and 9. The measuring or sensing roller 5 carried by a lever arrangement 5' that is swingably mounted about axis 5" and by responding to the respective tensile stress of the web acts upon brake 11 through means which are well known to the art, said brake in turn acting upon the axis, or shaft of unwinding roll 2. Inasmuch as in noncircular unwinding rolls the frequency of the web's stress fluctuations is so great as to prevent the measuring roller 5 from swinging out, or if it does swing out, then at too late a stage because of its own inertia, the invention teaches mounting of a guide member comprising pressure guide 3 and arm 4 in the path of paper feed between measuring roller 5 and unwinding roll 2. The paper web 1 is thereby acted upon in pressure-yielding fashion by pressure guide 3.

By means of using suitable materials, dimensions and arrangement for the guide means 3, 4, it can follow without effort and almost inertialess the highly frequent web stress fluctuations, so that the latter can be equalized thereby.

As shown particularly in FIG. 2, arm 4 of the guide member is mounted in a slot in an axis or shaft 12 so that it is adjustable and securably held, so that the pressure being exerted upon web 1 can be adjusted as desired by changing the effective length of lever arm 4. Shaft 12 is rotatably and securably mounted in a bearing 13 which is attached to machine frame 14, said bearing itself being adjustable vertically. By reason of such arrangement, the adjustments of guide member 3, 4 are made possible as depicted in dotted line in FIG. 2, said adjustments being required in order to vary the pressure acting upon web 1.

The embodiments depicted in FIGS. 3 and 4 show as a further development of the invention the guide member 3, 4 having associated therewith implements 15, 16 for producing an air pressure cushion between pressure guide 3 and web 1. In the embodiment depicted in FIG. 3 the arrangement is effective to introduce compressed air between the paper web 1 and pressure guide 3 through several air jets 17 distributed across the width of the web for establishing an air cushion. The air jets 17 are connected with an air compressor not otherwise shown in the drawings through conduits 18.

FIG. 4 illustrates another embodiment for producing the air cushion between paper web 1 and pressure guide 3. In this embodiment, pressure guide 3 is provided with a notch 19 extending across the width of the web. Compressed air conduits 20 made of rubber-elastic material communicate with this notch or groove. These conduits 20 have loops 21 therein for relieving pressure guide 3, and are likewise connected with an air compressor or compressed air source not shown in the drawings.

I claim:

1. Apparatus for compensating for the effects of noncircularity of unwinding rolls in roll cutting machines, rewinding rolls or other machines of the type which operate in dependency upon a delivery roll, which machines include an unwinding axis for such an unwinding roll, measuring means influenced by the web's tensile stress, a brake operably associated with said unwinding axis, said measuring means being operably coupled to said brake for controlling the same in accordance with tensile stress variations, a light weight guide

means interposed in the path of web travel between said unwinding roll and said guide, means comprising a resilient arm and means defining a shaped stationary guide surface engaged by said web from above, extending across the entire width of said web, and carried by said resilient arm and means for adjusting the position of said arm including means for swingably adjusting said arm and guide surface relative to said path of web travel about an axis parallel to said unwinding axis and

means for vertically adjusting said arm and guide surface relative to said path of web travel.

2. Apparatus as claimed in claim 1 and means for varying the effective lever arm length of said arm.

3. Apparatus as claimed in claim 1 and means operably associated with said guide surface for establishing a friction-reducing air cushion between said surface and said web.

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