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WEB TENSION REGULATOR

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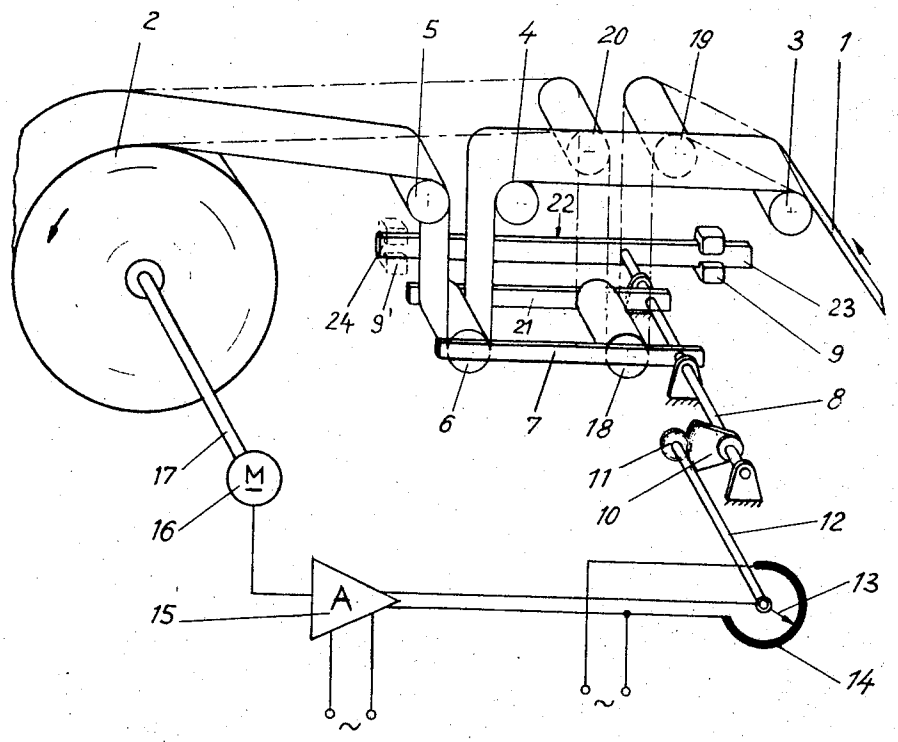

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WEB TENSION REGULATOR

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ABSTRACT OF THE DISCLOSURE

A web tension control mechanism that consists of a pair of rocker levers pivoted from a shaft with a pair of dancer rollers mounted between the rocker levers at different distances from the pivot axis. Pairs of deflecting rollers cooperate with each dancer roller so that a traveling web may alternately engage the two dancer rollers in dependence upon the amount of web tension desired.

The usual web tension regulators comprising as a sensing member a pivoted roller having a certain range of pivotal movement are designed to permit of a satisfactory withdrawing or winding of webs under a tension of 3–50 kg. Lightweight webs of plastics materials, which are used on an increasing scale particularly as packaging material, must be withdrawn and wound with tensions which are much smaller than 3 kg. and may amount to only about 0.5 kg. as a lower limit.

The processors of webs of paper or plastics material are generally neither prepared nor able to provide a plurality of similar machines, as would be required for processing each group of materials on a separate machine, which would enable a use of tensile forces within a relatively small range and consequently a satisfactory processing of specific materials or of materials having a specific thickness.

The idea to use only a single machine while providing, e.g., two web tension regulators, each of which is designed for a specific tension range, is hardly practicable for reasons of design and economy.

For this reason it is an object of the invention to provide a web tension regulator which operates satisfactorily with high and low tensions for withdrawing and/or winding webs of any desired material.

In the endeavor to accomplish this object, care had to be taken to keep the weight of all parts to be deflected by the web as light as possible so as to enable an accurate sensing of small tensions. To enable a convenient incorporation of the regulator in web processing machines, particularly in printing machines, the regulator should be compact and capable of being readjusted from a low tension to a high one without requiring time-consuming and complicated changes.

In a web tension regulator which comprises as a sensing element a pivoted roller mounted in a pair of rocker levers, the position of which controls a variable which determines the web tension, the above object is accomplished according to the invention in that another pivoted roller is mounted in the pair of rocker levers at another distance from the pivotal axis of said levers than the first pivoted roller and serves for an adaptation to tensions of a different order of magnitude.

With reference to the accompanying drawing, an embodiment of the web tension regulator according to the invention will now be described in detail and by way of example. The single figure of the drawing shows the web tension regulator in a web processing machine before the web winding station.

In the embodiment which is shown by way of example, a light-weight web 1 of plastic material has been processed, e.g., by printing, in a processing machine, which is not shown in detail. A winding station provided at the end of the processing machine serves for winding the web to form a roll 2. On its path to the winding station, the web 1 moves around deflecting rollers 3, 4, 5. A web loop is formed between the two deflecting rollers 4 and 5 and accommodates a first sensing roller 6. The sensing roller 6 is freely rotatably mounted at the free ends of a pair of rocker levels 7 and 21. This pair of rocker levers are secured to a pivot shaft 8. Another lever 22 is secured to the pivot shaft 8. A weight 9 slidably mounted on the lever 22 is so designed that it can slide beyond the pivot shaft 8 and can thus be displaced to either of the lever arms 23 and 24 of the lever 22. When the web 1 of plastic material is being wound under a low tension, the weight 9 is disposed on that arm 23 of the lever 22 which is disposed beyond the pivot shaft 8. This position of the weight 9 is shown on the drawing. As a result, the force applied by the sensing roller 6 to the web loop is reduced. The pivot shaft 8 carries also a toothed segment 10, which meshes with a pinion 11 on a shaft 12. The shaft 12 carries a slide contact 13 of a variable transformer 14. The transmission ratio between the pivot shaft 8 and the shaft 12 is selected so that the slide contact can move throughout its adjusting range in response to a pivotal movement of the pair of rocker levers 7, 21 from one end position to the other. The voltage which is tapped from the variable transformer is applied to an electric circuit, e.g., an amplifier 15, and serves for controlling the winding motor 16. The motor drives a winding shaft 17, on which the roll 2 is wound.

A sensing roller 18 is freely rotatably mounted in the rocker levers 7 and 21 and extends parallel to the sensing roller 6. The sensing roller 18 is used only when webs are being wound under a relatively high tension. As is indicated by dash-dot lines, the webs move in this case around the deflecting roller 3 and two further deflecting rollers 19, 20 to the winding station. A web loop is formed between the deflecting rollers 19, 20 and accommodates the sensing roller 18. By a displacement of the weight 9 from the position shown on the drawing beyond the pivot shaft 8 to the lever arm 24, e.g., to the position 9', the force applied by the sensing roller 18 is adjusted to the value which is required for sensing the maximum tension. As the lever arm associated with the sensing roller 18 is much shorter in this case, the loading weight 9 acting in conjunction with the roller 6, which applies also a load, may be relatively light. On the other hand, if the sensing roller 6 is used with very light-weight webs of plastic material, it is contemplated by the invention to remove the sensing roller 18 from its bearings in the rocker levers 7 and 21 in order to reduce the overall weight of the apparatus.

What is claimed is:

1. A web tension control mechanism, comprising a pair of spaced rocker levers pivotable about a common shaft disposed at one end thereof, a first dancer roller rotatably mounted in said pair of rocker levers parallel to and spaced from said shaft, a second dancer roller rotatably mounted in said pair of rocker levers parallel to and spaced from said shaft at a shorter distance than said first dancer roller, spaced deflecting roller means rotatably arranged substantially above said dancer rollers and adapted to cooperate with same, said first dancer roller and said deflecting roller means on the one hand and said second dancer roller and said deflecting roller means on the other hand being alternatively engageable by the material web in dependence on its physical properties so as to form a web loop.

2. A web tension control mechanism according to claim 1 further including adjusting means for controlling a

variable which determines the web tension operatively connected to be correlated with the respective one of said first and second dancer rollers being contacted by the web.

3. A web tension control mechanism according to claim 1 wherein said spaced deflecting roller means includes first and second pairs of rollers cooperating with said first and second dancer rollers, respectively.

4. A web tension control mechanism according to claim 1 wherein said second dancer roller is easily removable from said pair of rocker levers.

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