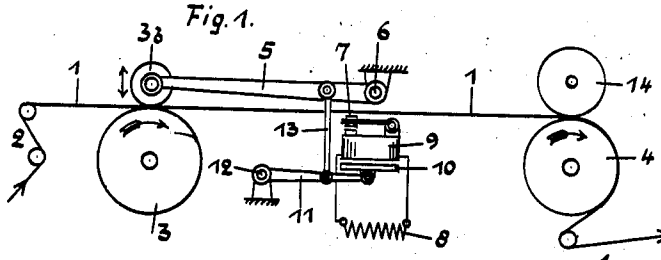
May 3, 1938. J. MENSCHNER 2,115,737

PROCESS AND APPARATUS FOR MEASURING RUNNING WEBS

Filed June 12, 1934 2 Sheets-Sheet 1

Fig. 1.



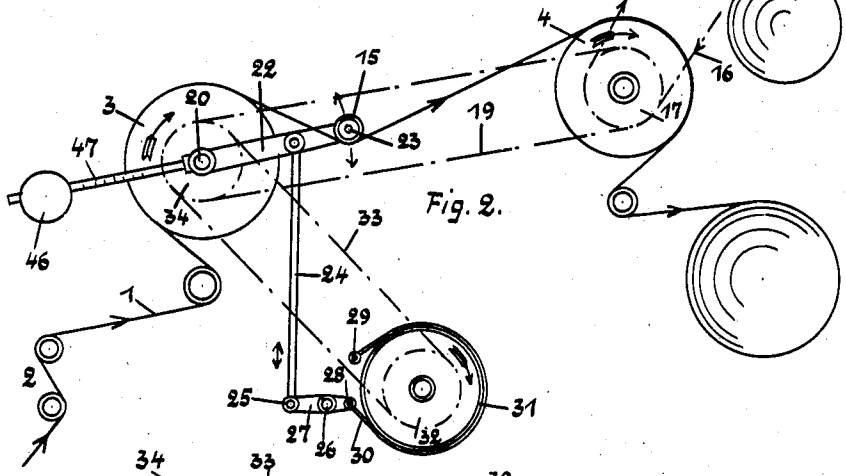


Fig. 2.

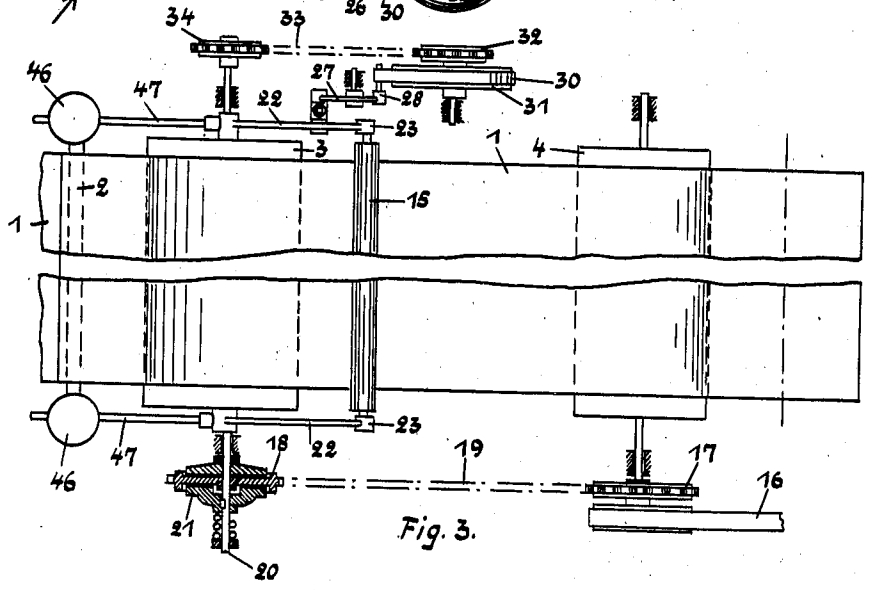


Fig. 3.

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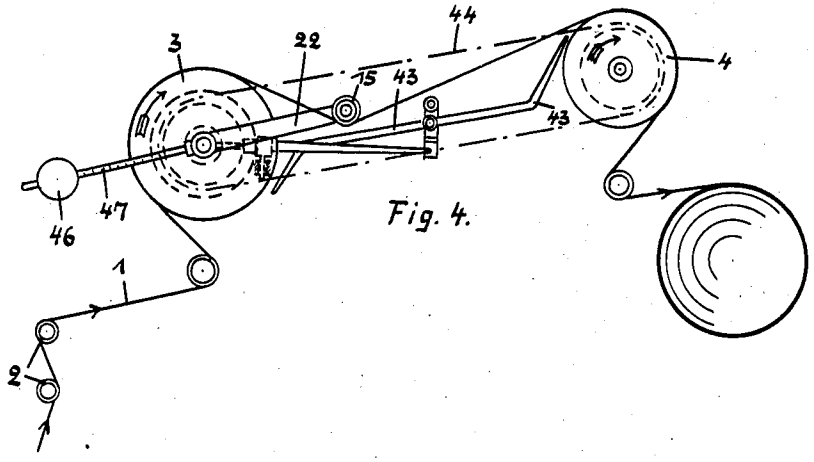
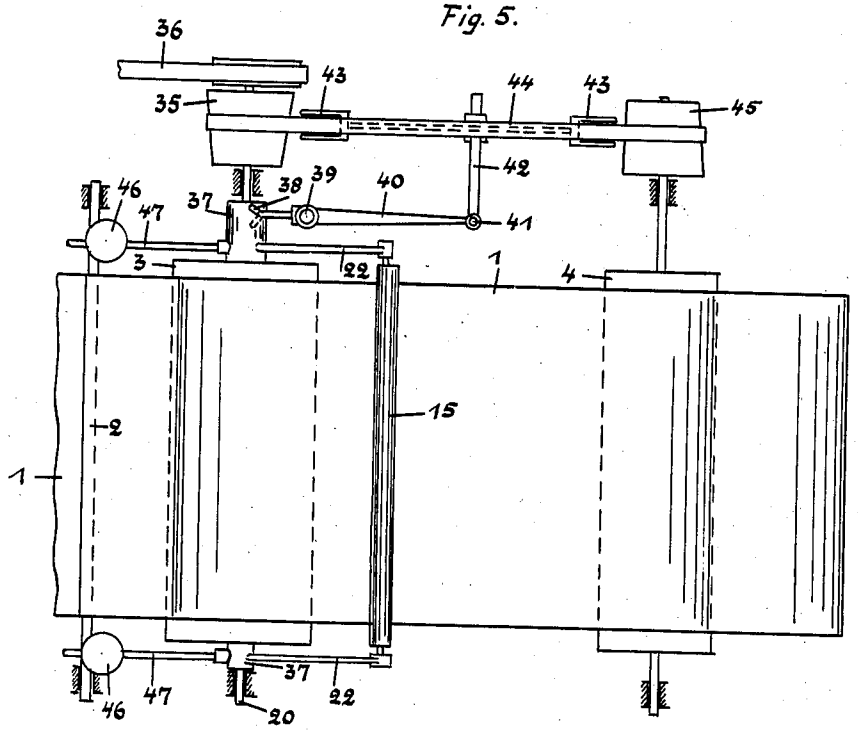


Fig. 4.

Fig. 5.



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UNITED STATES PATENT OFFICE

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PROCESS AND APPARATUS FOR MEASURING RUNNING WEBS

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Application June 12, 1934, Serial No. 730,277
In Germany June 14, 1933

6 Claims. (Cl. 33—129)

The invention refers to a process and apparatus for measuring running webs.

A feature of novelty resides in the fact, that the web is submitted in one continuous procedure to a pre-tension and the so tensioned or drawn web is slackened by making the rapidity of its supply greater than the rapidity with which it is drawn off, whereupon through regulating the rapidity of supply the slackened or sagging web is brought to the suitable state, in which it is used for commerce, held in this state of tension and measured during the same.

Thus the advantage is obtained that by means of the pre-tension any folds, breakages or unevennesses in the web are equalized and the web is made entirely fold-free, to be then again slackened and brought to the suitable state used for commerce. By said pre-tension and slackening the inaccuracies of measurement, which would be caused by folds, breakages or unevennesses within the web, are completely avoided.

In the annexed drawings by way of example and in accordance with this invention different constructions of a measuring device for carrying out the above process are shown diagrammatically.

Fig. 1 represents a side elevation of an apparatus embodying this invention;

Fig. 2 represents a side elevation of a modified form of apparatus;

Fig. 3 represents a top plan view of the apparatus shown in Fig. 2, parts being broken away, and parts being shown in section;

Fig. 4 represents a side elevation of another modified form of the apparatus; and

Fig. 5 represents a top plan view of the apparatus shown in Fig. 4.

As will be seen by Fig. 1 the running web is designated by 1, and is pre-tensioned or stretched by the pre-tension-device 2, consisting for instance of two guiding rods. Two rollers are arranged one behind the other, viz: the supply-roller 3 and the roller 4 for drawing off the web after it has passed the measuring device, the first or supply roller 3 being driven with a greater circumferential speed than the second or draw-roller 4. In the forms shown herein it will be observed that this difference results from the use of a supply roller having a greater diameter than the drawing-off roller and arranged to be driven, basically, at the same axial speed.

The supply-roller 3 coacts with an adjustable pressure-roller 3b. Between the two rollers 3 and 4 there is arranged below the running web 1 an electric contact-device 7, 9, 10. The iron core of this device 10 is connected to a lever 11, pivotally disposed on a pin 12, said lever 11 being connected by means of a rod 13 with a lever 5, pivotally disposed on a pin 6. The pressure-roller 3b is mounted to revolve freely at the end of the lever 5.

If thus after nullifying the pre-tension in consequence of the increased amount of web 1 supplied by the roller 3, the web lengthens between the rollers 3 and 4 to such an extent that the web will hang down by its own weight, the web will glide along the contact 7. When the contact 7 is pressed down by the weight of the web the circuit 8 of the electric contact-device is closed and the magnet 9 is energized. Thus the iron core 10 is attracted and the lever 5 carrying the pressure-roller 3b is moved upwards. The pressure-roller 3b is consequently somewhat lifted from the supply-roller 3, whereby there will result a slip between the supply-roller 3 and the running web 1, which slip effects a slight reduction in the forward movement of the web and thus produces between the rollers 3, 4 a lack of material to be measured, and consequently a tension which allows the contact 7 to break, whereby the rollers 3, 3b will again be allowed to co-act.

Thus owing to the running web 1 hanging loose to a greater or less extent between the rollers 3, 4, the supply is automatically regulated by the supply-roller 3, and the running web 1 is held tensioned or stretched between the supply-roller 3 and the draw-roller 4 in a normal state suitable for use in commerce.

Said roller 4, for pulling or drawing off the web, forms part of a measuring device, either by said roller 4 being constructed to form a measuring device itself, or by mounting a special measuring roller 14 or measuring wheel co-acting with the roller 4. It is naturally also possible to effect the measuring of the web immediately after the roller 4 by means of a special measuring device.

In order to avoid a disturbed run, viz: fluttering movements of the web between the supply-roller 3 and the draw-roller 4, which would produce the accumulation of folds within the web on passing the measuring device and thus unfavourably influence the result of measurement, the modified constructions shown in Figs. 2 to 5 may be provided, wherein, a weight-roller 15 is mounted on the web 1 which consequently slackens or sags between the supply-roller 3 and the pulling-off roller 4. The weight of the same is so selected that the slackened or sagged web

1 is held in the usual state ready for use, which is to say, that said web 1 has the internal tension of the fabric as it is sold. At the same time said weight-roller 15 avoids any disturbance in the movement of the running web during its entrance into the measuring device, and consequently an absolutely even run of the web without the formation of any folds is ensured. The said weight-roller 15 is connected either with the driving means of the supply-roller or with that of the draw-roller 4 in such a manner that according to the sagging or slackening of the web and the adjustment of the weight-roller higher or lower the number of revolutions of the supply-roller 3 or the draw-roller 4 is regulated.

As will be seen from Figs. 2 and 3, the supply-roller 3 is driven from the draw-roller 4, (itself driven by the belt 16) by means of the toothed wheels 17, 18 and the chain 19. Between the chain 19 and the shaft 20 carrying the supply-roller 3, there is interposed a friction clutch 21. On the shaft 20 of the supply-roller 3 there are arranged two freely rotatable levers 22, which carry at their free ends the weight-roller 15, extending across the web, the said roller 15 being freely rotatable in the bearings 23 disposed in the lever-arms 22. To the one lever-arm 22 there is linked a rod 24 connected at its end 25 to a double-armed lever 21, pivotally disposed on the pin 26. The free end 28 of the double-armed lever 27 is secured to the end of a brake-band 30 fixed at its other end to a bolt or pin 29, the said brake-band being disposed on the brake-drum 31. The said drum 31 is connected with the shaft 20 of the supply-roller 3 by means of the sprocket-wheel 32, the chain 33 and the sprocket-wheel 34.

According as the web sags more or less between the supply-roller 3 and the draw-roller 4 the weight-roller 15 will adjust itself higher or lower. If the sagging of the web increases, the weight-roller 15 will descend and in consequence of the lever-arm 22 also descending, the brake-band 30 will be drawn tight by the double-armed lever 27 by means of the rod 24. Thus the brake-drum 31 will be retarded, whereby a braking of the supply-roller 3 will also take place. The braking of the roller 3 is possible because between this roller and the driving chain 19 there is interposed the friction clutch 21. By the braking of the supply-roller 3 the supply of the web is retarded and thus are regulated the sagging and consequently also the tension of the web 1 between the supply-roller 3 and the draw-roller 4.

As will be seen from Figs. 4 and 5, the machine may be altered in such a manner, that the speed of the supply-roller 3 remains constant while the relative speed of the draw-roller 4, is adjusted and regulated.

On the shaft 20 of the supply-roller 3 there is fixed, as will be seen from Figs. 4 and 5, a driving cone 35, which is rotated by the driving means 36. On the shaft 20 of the supply-roller 3 there are arranged two freely rotatable hubs 37, to which are fixed the arms 22 carrying the weight-roller 15. One hub 37 is provided with a curved groove 38, which is engaged by one end of a double-armed lever 40 rotatable around the pin 39. By means of the pin 41 and the rod 42 the double-armed lever 40 is connected to a belt-fork 43, which, according to the construction shown, is arranged to form a double belt-fork. The said belt-fork 43 grips the belt 44, which runs over the driving cone-wheels 35, 45 of the supply-roller 3 and the draw-roller 4. The manner of operation of this arrangement is exactly the same as in the examples shown in Figs. 2 and 3, viz: according to the amount the web 1 sags between the supply-roller 3 and the draw-roller 4, the weight-roller 15, following the sagging position of the web, will effect the displacement of the belt-fork 43. Consequently the draw-roller 4 will, because of the displacement of the belt 34, be driven with either more or less velocity, whereby again the tension or stretch of the web 1 between the supply-roller 3 and the draw-roller 4 is regulated.

In order to be able to measure with the same machine running webs or fabrics of different elasticity, viz: to adjust the slackening or sagging of the running web 1 between the supply-roller 3 and the draw-roller 4 in accordance with the different elasticities of the web, either for the weight-roller 15 there may be substituted a roller of larger or smaller weight; or there may be provided, as shown in the figures, on the lever-arms 22 lever-arms 47, having adjustable counter-weights 46, so that according to the adjustment of the weights 46 on the lever-arm 47, the pressure on the web between the supply-roller 3 and the draw-roller 4 may be regulated by the weight-roller 15.

Furthermore the arrangement may be so made that the weight-roller 15 does not lie against the upper but the lower side of the running web 1, so that said web 1 does not sag down, but is held tensioned or stretched upwards in an arc.

Furthermore it is also naturally possible to construct the supply-roller not in the shape of a roller, but in the shape of a reel or winder.

The process above described and the device for carrying out the same can be used for measuring single webs as well as double webs.

What I claim is:

1. The process for measuring running webs which includes submitting the web to a tensioning treatment, supplying and drawing off the web, slackening the tensioned web by making the speed of its supply greater than the speed with which it is drawn off, regulating the speed with which it is supplied in accordance with the extent of the slackened portion of the web, whereby the web is brought to and maintained at that degree of slackness which will be normal for commercial use of the material, and measuring the web while in its slackened condition.

2. An apparatus for measuring a running web comprising, web tensioning means, a supply roller, a drawing-off roller, means for driving said supply roller at a surface speed greater than the surface speed of the drawing-off roller, whereby a slackened portion of the web is formed between said rollers, means bearing against said slack portion of the web and operatively connected with said supply roller for determining the speed with which the web is supplied by said roller, whereby the size and slackness of said loop may be determined, and means for measuring the web while in slackened condition.

3. An apparatus for measuring a running web comprising, web tensioning means, a supply roller, a pressure roller opposite said supply roller, a drawing-off roller, means for driving said supply roller at a surface speed greater than the surface speed of the drawing-off roller, whereby a slackened portion of the web is formed between said rollers, an electric contact device adapted for actuation by contact with the slack portion of the web, means operated by said contact device for controlling the position of said pressure roller, whereby the slippage between said supply roller and said pressure roller is varied and the size and

slackness of said loop is determined, and means for measuring the web while in slackened condition.

4. An apparatus for measuring a running web comprising, web tensioning means, a supply roller, a drawing-off roller, means for driving said supply roller at a surface speed greater than the surface speed of the drawing-off roller, whereby a slackened portion of the web is formed between said rollers, a weight roller mounted in bearings and bearing against the slack portion of the web, means for regulating the surface speed of said supply roller in accordance with the position of said bearings, means operating the regulating means and connecting said bearings carrying the weight roller to said regulating means, and means for measuring the web while in slackened condition.

5. An apparatus for measuring a running web comprising, web tensioning means, a supply roller, a drawing-off roller, a friction clutch for driving said supply roller at a surface speed greater than the surface speed of the drawing-off roller, whereby a slackened portion of the web is formed between said rollers, a weight roller mounted in bearings and bearing against the slack portion of the web, a brake operatively connected with said supply roller, operating means connecting said bearings carrying the weight roller with the brake, whereby the speed with which the web is supplied by said supply roller is determined by the position of said bearings, and means for measuring the web while in slackened condition.

6. An apparatus for measuring a running web comprising, web tensioning means, a supply roller, a drawing-off roller, means for driving said supply roller at a surface speed greater than the surface speed of the drawing-off roller, whereby a slackened portion of the web is formed between said rollers, pivoted lever arms, bearings on the free ends of said lever arms, a weight roller mounted in said bearings and bearing against the slack portion of the web, a cam actuated by said lever arms, means operated by said cam for changing the relative speeds of said supply and drawing-off rollers, and means for measuring the web while in slackened condition.

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