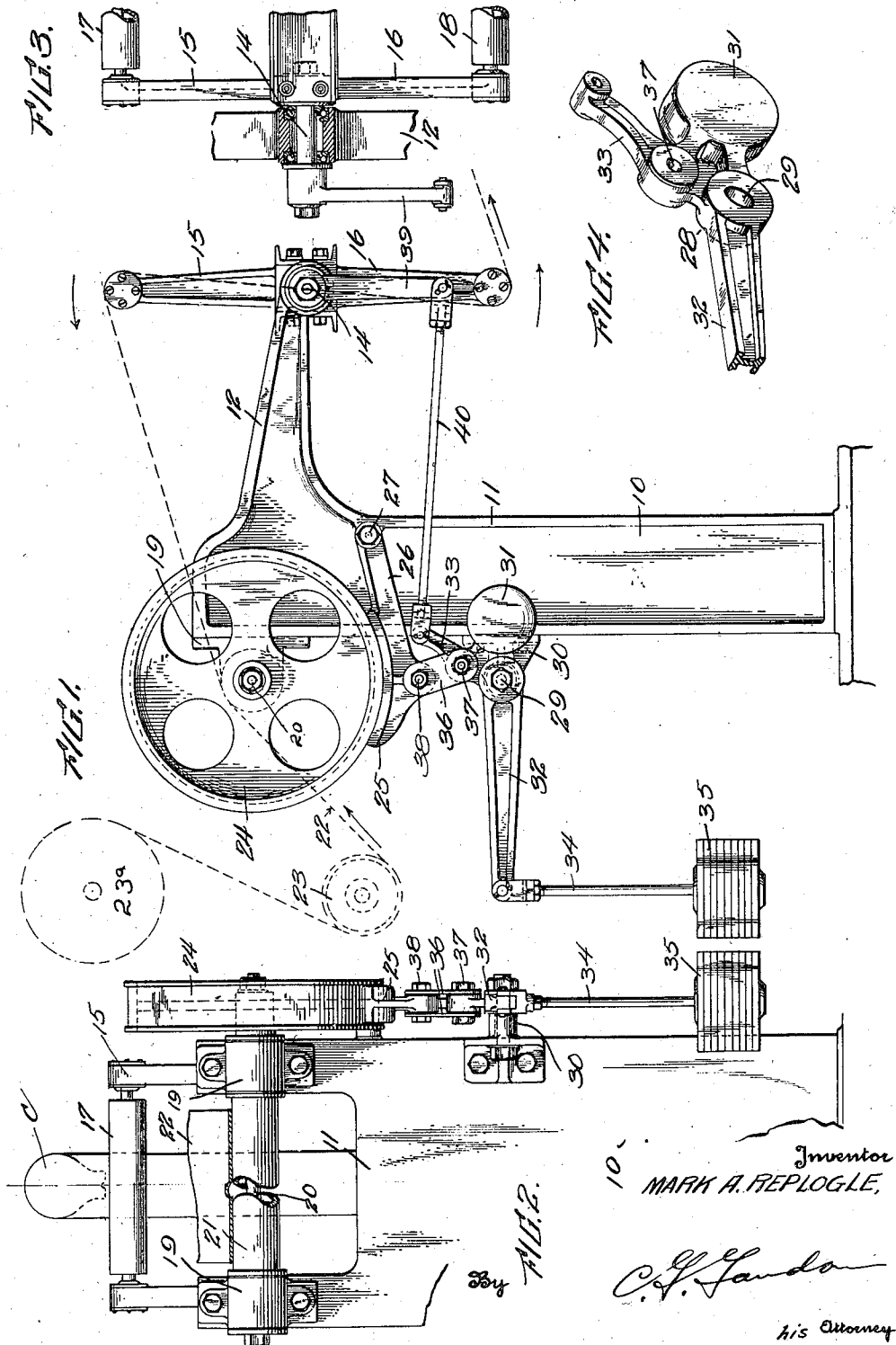


M. A. REPLOGLE.  
TENSION DEVICE.  
APPLICATION FILED JULY 15, 1918.

1,380,837.

Patented June 7, 1921.



Inventor  
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# UNITED STATES PATENT OFFICE.

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## TENSION DEVICE.

1,380,837.

Specification of Letters Patent.

Patented June 7, 1921.

Application filed July 15, 1918. Serial No. 244,990.

*To all whom it may concern:*

Be it known that I, MARK A. REPLOGLE, a citizen of the United States, residing at Akron, in the county of Summit and State of Ohio, have invented new and useful Improvements in Tension Devices, of which the following is a specification.

This invention relates primarily to tensioning or stretching structures and, more especially, to devices employed in coöperative association with tire-building machines, for stretching a strip of fabric longitudinally—and, particularly, along its medial line—to a predetermined, definite and uniform degree.

The principal object of the invention is to provide a structure wherein means are included for producing a uniform stretching of a strand, strip or sheet of material throughout a required length, such means operating automatically, and being self-changing, to conform to variations in the texture of the material, in the degree of pull on any portion thereof, etc.

Another object, of relatively equal importance, is to provide a structure for effecting a predetermined degree of stretch of a strip of material, the stretching thereof being uniform throughout the longitudinal dimensions of any required portion or portions thereof; the components of the structure being self-functioning to vary their action according to changes in the character of the element being treated, etc.

Another object within the contemplation of the invention is to provide a structure of the character referred to, for association with a thread, cord, rope, or with a web or strip of fabric, being fed from one position of support to another; the action and co-action of the parts being such that the element being treated will be maintained under a predetermined and definite tension regardless of fluctuations or changes in the speed at which the element is being moved, and irrespective of variations in the thickness, texture, or other conditions of the element itself; such variations becoming operative to effect proper co-action of the components of the structure so that the tension of the element will remain constant always.

While the structure constituting my invention is not limited in its application to any particular field of use; nevertheless, it has been found especially advantageous

when utilized in connection with tire-making machinery and particularly in delivering tire-fabric to a carcass-forming core in proper condition as to the longitudinal stretch along its medial portion or portions. It is especially desirable in this art to create a uniform and constant resistance to the feeding or pulling of the tire-fabric from a supply roll to the carcass-forming core so that, while being delivered to the core, the fabric may be uniformly elongated along certain lines.

In devices heretofore used, it was quite usual to employ a braking element or the like in connection with a tension drum; but, when the tension had once been set, it remained practically unchangeable; hence, it was practically impossible thereby to obtain a constantly uniform elongation of the fabric along its medial lines if the final character of the fabric, for instance, should change or vary at any point. In consequence, the fabric would either be over-stretched or under-stretched, with the result that a tire-carcass would be produced which presented certain points of weakness at different portions and with consequent limiting of its capacity to withstand load and pressure strains and stresses. In contradistinction to this, my invention contemplates the controlling of the components of the fabric-stretching structure so that the action of the tension-producing instrumentalities thereof will be increased or decreased in direct proportion to such changes as the physical character of the fabric, the speed at which it is being withdrawn, the amount of force applied, and other usage conditions, require.

A still further object of the invention is to provide a tensioning structure which may be easily and quickly adjusted, at the will of the operator, to any predetermined or required degree.

Still another object of the invention is to provide for proper action of the components of the structure in the event that it be desired to reverse the direction of movement of the element under treatment—tire fabric, for instance—for the purpose of re-winding, for example.

The above and additional objects of a similar nature—which will be hereinafter more specifically treated—may be accomplished by such means as are illustrated in the accom-

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panying drawings, described in the following specification, and then more particularly pointed out in the claims hereto appended.

With reference to the drawings, wherein there is illustrated a preferred embodiment of the invention as it is reduced to practice and wherein similar characters designate corresponding parts throughout the several views:

10 Figure 1 is a view in side elevation of the stretching or tensioning structure;

Fig. 2 is a fragmentary view in rear elevation thereof;

Fig. 3 is also a fragmentary view in front elevation of a component of the structure, this being an oscillatory tension-governing member upon which the fabric or other element being treated is disposed to accomplish the functioning of the other components thereof; and

Fig. 4 is a detail view in perspective of another component of the structure and one which is influenced by the tension-governing member.

25 In these drawings, the reference-numeral 10 designates a base or standard comprising, in this instance, an upstanding portion 11, and extending portions or arms 12, the arms being arranged in substantial parallelism and being provided at their extremities with bearings 13 in which are journaled alined stub-axes 14.

Supported on the stub-axes 14 is an oscillatory tension-governing frame or cradle, designated generally by the reference-character 15; this comprising side member 16 in which are journaled idler rolls 17 and 18.

As seen in Fig. 2, the upper part of the upstanding portion 11 is bifurcated to provide supports for brackets 19 in which is journaled a shaft 20 which sustains a friction drum 21, around which a web or strip of fabric 22 is adapted to move from an idler roll 23 (Fig. 1), this fabric coming from a suitably disposed stock-roll 23<sup>a</sup>.

Associated with and fast on one end of the shaft 20 is a brake drum or band-pulley 24.

In the present embodiment of the invention, means are provided for creating a pressure on the drum for thereby transmitting the same to the friction-drum 21. Preferably and as shown, such means comprises a brake or friction-shoe 25 formed as a part of a supporting member 26, this latter being pivoted, as at 27, on the upstanding portion 11 of the upright 10 for vertical movement in relation to the drum 24. The shoe has an upper surface normally in engagement with the periphery of the friction drum.

60 Associated with the friction shoe and its supporting member are means for normally holding the shoe in engagement with the drum. These means are adapted to exert a regulable and predetermined frictional pres-

sure between the shoe and the friction drum. 65 Such means, preferably and as here shown, comprise a bell-crank-lever element 28 which fulcrums on an axis 29 in a bracket 30 outstanding from one side of the standard 10. It is desirable that this lever shall be capable of nice adjustment and balance; and, to this end, it is provided at one extremity with a weighted portion or counter-balance 31, this being located between the two members 32 and 33, respectively of the bell-crank. 75 Suspended from the extremity of the member 32 is a weight-support 34 which sustains weights 35, or the like. Means are provided for connecting the bell-crank with the friction shoe and, in this instance, these means include a pair of links 36, these each being pivotally connected to the bell-crank-lever (as at 37) and to the shoe-supporting member 26 (as at 38), the former pivot being slightly out of alinement with the pivot 29 of the bell-crank and the pivot 38. 85

It will now be apparent that pressure, being exerted by the weights 35, will be transferred, through the links 36, to the friction shoe and, thence, to the friction drum. The instrumentalities just described constitute what may be called a primary means or device for creating a predetermined frictional resistance to the movement of the material 22 over the drum 21 to a juxtaposed carcass-forming core C. 95

In conjunction with the resistance-creating means just described, there is also provided a secondary and automatic means for taking up and accommodating constantly-occurring variations due, for instance, to the character of the material, the speed and force with which it is drawn through the tensioning structure, etc., so that, when the tension is initially set in the primary device, such tension will be constantly maintained under and on account of the varying conditions aforementioned. In other words, it is desirable that the braking element shall be so controlled that the force exerted thereby on the friction-drum shall increase or decrease in direct response to changes or variations, such as the physical character of the material being used and other conditions which may require that the resistance to the movement of the fabric onto the carcass-forming core shall be automatically increased or decreased in order to create and maintain the required and uniform elongation of the fabric along its medial line. 120 Means are, therefore, provided which are responsive to the changes in the resistance of the material set up in the primary tension device for automatically regulating this tension during the movement of the fabric therethrough, such means being influenced and acting directly under the control of the 125

moving fabric, itself. These means, preferably and as here shown, comprise the aforementioned oscillatory tension-governing cradle 15, this being freely oscillable in its bearings; and means are provided for utilizing the oscillation of the cradle as a secondary and automatic control for the friction existing between the shoe 25 and the drum 24. Such means, preferably and as here shown, include a pendant arm 39, this being fast on one of the stub-axes 14. Pivotally connected to its lower end is a connecting rod 40, this being likewise pivotally connected to the member 33 of the bell-crank. It will thus be seen that movement of the cradle 15 will be transmitted through the pendant arm 39 and connecting rod 40, to the bell-crank to rock the same on its axis 29.

Operation: The operation of the structure may be briefly explained as follows: As seen in Fig. 1, the fabric 22 is threaded under the idler-roll 23, thence up over the drum 21, thence up and over the roll 17 of the cradle, thence down and under the roll 18, and thence onto the carcass-forming core. When the core (being rotatable) is thrown into operation, it will immediately exert a pull on the fabric. A predetermined pressure having been established (by means of the weights 35 on the bell-crank) between the friction-shoe 25 and the drum 24, the pull exerted on the fabric, as the core rotates, will have a tendency to oscillate the cradle 15 in its bearings, as in the direction indicated by the arrow, Fig. 1. This movement of the cradle—utilized as a secondary or automatic control of the primary friction—is transmitted through the arm 39 and connecting rod 40 to the bell-crank, and this in turn, by reason of the fact that the links 36 are pivoted to the bell-crank above its fulcrum 29 and out of alinement with the fulcrum 29 and the pivot 38, tends to lower the shoe and decrease the friction between it and the drum. On the other hand, movement of the cradle in a clockwise direction (as seen in Fig. 1) will operate the parts in the opposite direction and tend to raise the shoe against the drum. It will be understood, of course, that the normal tension on the drum 24 will be predetermined before the machine is put into operation. Then, in the event that the pull on the fabric becomes greater than this predetermined tension, the action of the parts of the structure will be such as to relieve the pressure of the shoe 25 on the drum. On the other hand, should the pull on the fabric drop below the predetermined tension, the parts will act under the influence of the weights 35 and thereby cause the brake shoe to increase its frictional contact with the drum and thereby exert an additional ten-

sion thereon which will affect the fabric to the required degree. Obviously, the initial, predetermined tension may be varied by manipulating the weights 35.

By the structure thus described, fabric which passes from the idler roll 23 through the tensioning device and, thence, onto the rotating core, will be elongated or stretched to a predetermined degree which, generally, is approximately fourteen per cent. (14%), in order that the individual threads composing the fabric may be properly laid or disposed about the surface of the periphery of the core. By employing my tensioning structure, the stretching or elongation of the fabric, throughout its various portions, will be effected to the required fourteen-per cent. degree irrespective of the constantly-occurring changes and variations already specified. The action of the friction drum, as controlled by the primary and secondary tension-controlling components, will be such as to stretch or elongate the fabric to this required degree, this being accomplished according to the degree of resistance imposed upon the tension drum.

It will be understood that the primary tension device is constantly active to control the relation between the drum 24 and the shoe to establish a predetermined degree of pressure therebetween; but the secondary controlling means—acting directly under the control of the fabric itself when fluctuations and variations occur, either in the character of the fabric itself or in the speed or force with which it is being moved between its supporting roll and the carcass-forming core—functions to modify the action of the primary tension device so as to maintain the tension constant regardless of these fluctuations, variations, etc. Thus, a uniform degree of elongation and stretch under all conditions may be accomplished.

While the invention has been disclosed in connection with a specific embodiment; nevertheless, it is to be understood that it is not limited thereto, since it is susceptible of a wide range of modification without departing from its spirit or sacrificing any of its salient features or underlying principles.

What I claim is:

1. A tensioning structure comprising a support, a primary pressure-producing device sustained thereby and including a drum, a brake-shoe engageable therewith, a primary pressure-producing device associated with the brake-shoe and including a counterbalanced bell-crank-lever; in combination with a secondary pressure-producing device including an oscillatory instrumentality and a connection between said instrumentality and the bell-crank-lever whereby movement of the instrumentality effects

movement of the bell-crank to change the relation of the brake-shoe with respect to the drum.

2. A tensioning structure including a support, a drum sustained thereby, a brake-shoe engageable therewith, a primary pressure-producing device operatively associated with the brake-shoe and including a counterbalanced bell-crank-lever, and a connection between the lever and the brake-shoe; in combination with a secondary pressure-producing device including an oscillatory cradle, and a connection between the cradle and the bell-crank whereby movement of the cradle actuates the bell-crank to change the relation of the shoe with respect to the drum.

3. A tensioning structure including a support, a drum mounted thereon, a brake-shoe sustained by the support and engageable with the drum, and a primary pressure-producing device operatively associated with the brake-shoe, and including a bell-crank-lever carrying a counterbalancing weight, and a connection between the lever and the shoe; in combination with a secondary pressure-producing device including an oscillatory cradle associated with the support, and a connection between the cradle and the bell-crank including an arm and a connecting-rod, whereby oscillation of the cradle will actuate the arm and rod and be transmitted to the bell-crank-lever, and thereby be transmitted to the brake-shoe to change the relation between it and the drum.

4. A fabric-stretching structure including a support, a friction-drum sustained thereby, a brake-shoe engageable with the drum, an arm pivoted on the support and sustaining the shoe, and a primary pressure-producing device comprising a bell-crank-lever pivoted on the support and formed with a counterbalancing weight at one end and

carrying weights at its opposite end, and a link connecting the bell-crank-lever to the shoe-supporting arm; in combination with a secondary pressure-producing device comprising an oscillatory cradle pivotally sustained by the support, a cradle-actuating arm associated with the cradle, and a connection between the arm and the bell-crank whereby movement of the cradle will be transmitted to the bell-crank to change the relation of the shoe with respect to the drum.

5. A fabric-stretching structure including a support comprising an upstanding portion and an angulated extension, a shaft journaled in the support, a drum encompassing the shaft, a friction-drum fast on the shaft, a brake-shoe engageable with the drum, a shoe-supporting arm pivoted on the support and carrying the shoe, and a primary pressure-producing device associated with the shoe and comprising a bell-crank-lever pivoted on the support and formed with a counterbalancing weight, a weight-support mounted on the extremity of the lever, and a connection between the lever and the shoe-supporting arm; in combination with a secondary pressure-producing device including an oscillatory cradle fulcrumed on the angulated extension of the support, an actuating arm connected to the cradle, and a connection between the arm and the bell-crank-lever, whereby oscillatory movement of the cradle will be transmitted to the bell-crank-lever to change the relation between the shoe and the drum.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

MARK A. REPLOGLE.

Witnesses:

R. S. TROGNER,  
B. J. McDANEL.