

C. T. HENDERSON.
 DEVICE FOR TAKING UP AND PAYING OUT SLACK.
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1,265,328.

Patented May 7, 1918.

Fig. 1.

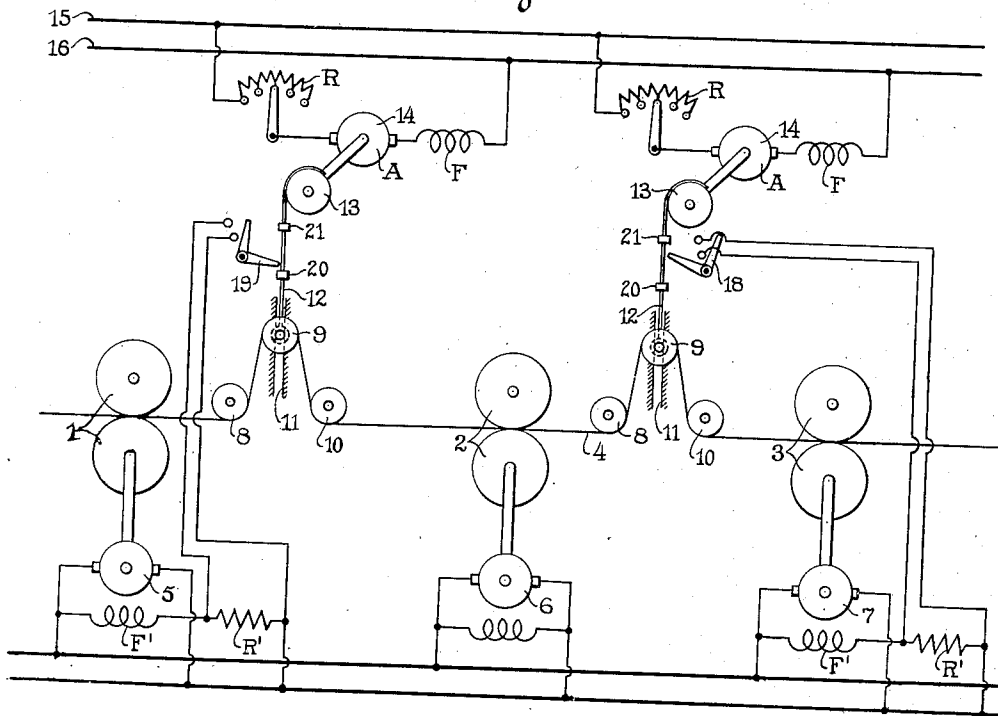
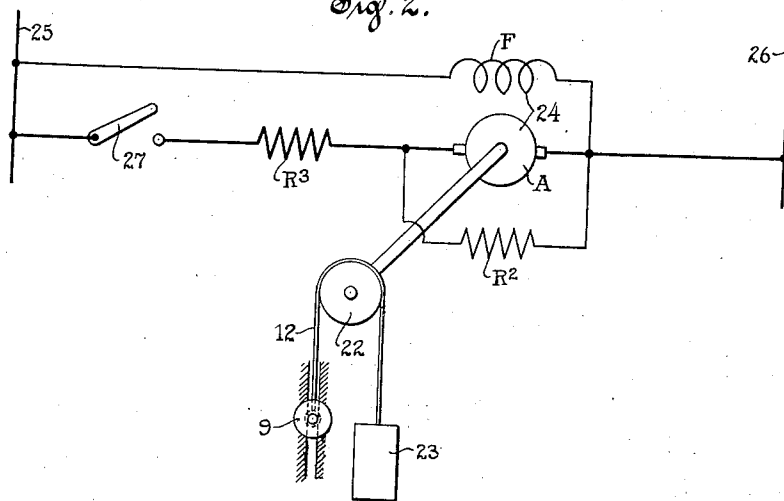


Fig. 2.



Witnesses-

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DEVICE FOR TAKING UP AND PAYING OUT SLACK.

1,265,328.

Specification of Letters Patent.

Patented May 7, 1918.

Application filed April 23, 1914. Serial No. 833,970.

To all whom it may concern:

Be it known that I, CLARK T. HENDERSON, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Devices for Taking Up and Paying Out Slack, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

This invention relates to improvements in devices for taking up and paying out slack and is particularly applicable to machines having a plurality of sets of rolls through which a strip of fabric or other material is passed progressively and wherein a slack in the material is produced between adjacent sets of rolls either through non-uniformity of the peripheral speeds of the rolls or through slippage of the material, etc. Other advantageous uses of the invention will, however, be obvious.

The various objects and advantages of the invention will be apparent from the embodiment thereof schematically illustrated in the accompanying drawing and now to be described.

In the drawing, Figure 1 schematically illustrates one form of the invention used in connection with a mechanism of the aforesaid character; and, Fig. 2 illustrates schematically a modification of the slack mechanism shown in

Fig. 1.

Referring more specifically to Fig. 1 the same schematically illustrates three sets of rolls 1, 2 and 3, acting progressively upon a strip 4 of fabric or the like passing there-through from left to right. The sets of gripping rolls 1, 2 and 3 are provided with individual driving motors 5, 6 and 7 respectively, and it may be assumed that the several sets of rolls normally operate at dissimilar speeds or at uniform speeds with a slippage of the fabric to produce a varying slack in the latter between said several sets of rolls. In addition the drawing schematically illustrates two sets of rollers 8, 9 and 10 arranged in a triangular relation, one set being located between the gripping rolls 1 and 2 and the other between the gripping rolls 2 and 3. The fabric upon leaving the rolls 1 passes beneath the roller 8 over the

roller 9 and thence beneath the roller 10 to the gripping rolls 2. Thereafter the fabric passes in a similar manner around the other set of rollers 8, 9 and 10 to the gripping rolls 3. The rollers 9 are vertically adjustable in suitable guides 11 and by their vertical adjustment compensate for variations in slack, or in other words, upon being raised take in slack and upon being lowered pay out slack.

Each of the rollers 9 is supported by one or more cables 12 connected to a drum 13 operatively connected to the armature of an electric motor 14. The motors 14 are shown as of the series type, each being provided with an armature A and a field winding F. Each is connected across a supply circuit 15—16 through a regulating resistance R and thus exerts a constant torque tending to wind up its cable 12 and thereby raise its roller 9. The resistances R, however, are variable and are so adjusted as to avoid an undue strain on the fabric and to permit the drums to pay out cable as the slack in the fabric decreases.

It will thus be observed that the slack mechanisms are self-adjusting to increases in slack and are automatically adjusted by the tension of the fabric itself to decreases in slack, whereby their action is entirely automatic. Also it will be observed that the slack is always maintained under a uniform tension.

As will now be apparent, the rollers 9 may in practice have only a limited range of adjustment, and under such conditions, should the slack in the fabric exceed a certain amount, said rollers would not adequately compensate therefor. However, in the arrangement illustrated, means are provided to insure against such conditions. In brief, means are provided to automatically decrease the speed of the rolls 1, should the slack in the fabric between the rolls 1 and 2 tend to exceed a predetermined amount and to automatically increase the speed of the rolls 3 should the slack in the fabric between the rolls 2 and 3 tend to exceed a predetermined amount. The decrease in speed of the rolls 1 obviously slackens the feed of the fabric to the rolls 2 and in consequence decreases the slack produced between said sets of rolls. On the other hand, the increase in speed of the rolls 3 accelerates

the passage of the fabric therethrough and in consequence decreases the slack between the same and the rolls 2. Also, means are provided to restore the rolls 1 and 3 to their respective normal speeds after the slack has been restricted to a predetermined degree. This in turn tends to maintain a given amount of slack. With this arrangement it will be observed that the rolls 2 may be permitted to operate at constant speed regardless of slack conditions.

More specifically describing the aforesaid automatic control, the motors 5 and 7 are shown as of the shunt type and are each provided with a resistance R' to be included in circuit with shunt field winding F' thereof. At normal running speed of the motor 5 its resistance R' is included in circuit while at normal running speed of the motor 7 its resistance R' is excluded from circuit by a switch 18. The resistance R' of the motor 5 is also provided with a short-circuiting switch 19 and said switches 18 and 19 are operable by spaced collars 20 and 21 provided on the cables 12 of the two slack mechanisms. The arrangement is such that when the left hand roller 9 rises to a predetermined position the collar 20 on its cable strikes the switch 19 to close the same, whereas upon descent of said roller to a predetermined position the collar 21 strikes the switch 19 to restore the same to open position. This cycle of operation, as will be readily understood, effects slow-down and reacceleration of the motor 5. The cycle of operation of the switch 18 is just the reverse of that of switch 19. When the right hand roller 9 rises to a predetermined position the collar 20 strikes the switch 18 to open the same, thereby including the resistance R' in circuit and accelerating the motor 7. Conversely, when the roller descends the collar 21 strikes the switch 19 to close the same, thereby short-circuiting the resistance R' and slowing down the motor 7. Thus the two motors 5 and 7 are controlled entirely automatically and in such a manner that the speed of either may be varied entirely independently of the other, or both may be regulated simultaneously, in accordance with the slack conditions to be rectified.

The slack mechanism illustrated in Fig. 2 has a similar adjustable roller 9 and supporting cable 12, but in this instance said cable is looped over a drum 22 and has connected to its free end, a weight 23. The weight 23 tends to lift the roller 9 but permits said roller to yield under the tension of the fabric as the slack in the latter falls off. The weight thus acts similarly to the motor 14 of Fig. 1. This arrangement, however, is supplemented by a shunt motor 24 having its armature A operatively connected to the drum 22 and acting under certain conditions to electrically brake said drum and under

other conditions, to operate said drum. More specifically, the motor 24 has its field winding F connected across a supply circuit 25—26 and has its armature connected in a closed loop, including a resistance R^2 , with a line connection for said loop controlled by a switch 27 and including a regulating resistance R^3 .

Thus with the switch 27 open the motor 24 will act as a dynamic brake when its armature is driven by the drum 22. The resistance R^2 , however, is so proportioned as to practically nullify the braking effect of the motor when its armature is rotated at a relatively slow speed. In consequence, the drum 22 may be rotated under the action of the weight 23 to raise the roller 9 gradually without retardation by the motor, but should the weight 23 tend to raise the roller 9 rapidly, as in the case of a sudden increase in slack, then the motor would become effective as an electric brake thus braking the movement of the weight 23 and roller 9.

As will be apparent, when the mechanism is not in use the weight raises the roller 9 to its upper limit so that it is desirable to lower the roller for threading the fabric through the mechanism. As shown, this may be readily accomplished by closing the switch 27. This starts the motor 24 in a direction to turn the drum 22 in a counter-clockwise direction, thereby lifting the weight 23 and allowing the roller 9 to descend. Then when the fabric is threaded through the mechanism the switch 27 is opened, leaving the motor free to act as a dynamic brake, as aforesaid.

Obviously the slack mechanism shown in Fig. 2 might be substituted for that shown in Fig. 1 to cooperate in the same manner with the speed controlling means for the rolls 1 and 3.

What I claim as new and desire to secure by Letters Patent is:—

1. In a device for taking up and paying out slack, in combination, an adjustable member engaged by the controlled material and yieldable in one direction to the pull thereof and means associated with said member to exert a constant pull thereon in an opposite direction and to restrict the speed of its movement in the latter direction.

2. In a device for taking up and paying out slack, in combination, a plurality of rollers, one being adjustable relative to another and automatic adjusting means for said adjustable roller including an electric motor, said motor under certain conditions acting as a dynamic brake.

3. In a device for taking up and paying out slack, in combination; an adjustable member, means associated therewith to exert a constant pull thereon in one direction and an electric motor for operating the same in an opposite direction, said motor also acting

to brake the movement of said member in the first direction when said member tends to adjust too rapidly.

4. In combination, a mechanism including
5 three sets of power-operated rolls feeding material from one to another in progression and at relatively different speeds and means responsive to variations in slack to vary the speed of the end sets of rolls in inverse relation upon corresponding variations in slack
10 between the same and the intermediate set of rolls.

5. In combination, a mechanism including
15 three sets of power-operated rolls feeding material from one to another in progression

and at relatively different speeds and means responsive to variations in slack to vary the speed of the end set of rolls in inverse relation upon corresponding variations in slack between the same and the intermediate set 20 of rolls, said means controlling said end sets of rolls independently of one another.

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

CLARK T. HENDERSON.

Witnesses:

TEKLA BAST,
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