June 10, 1941. H. SCHLICK 2,245,368

DEVICE FOR MAINTAINING A CONSTANT TENSION ON YARNS IN WARPING

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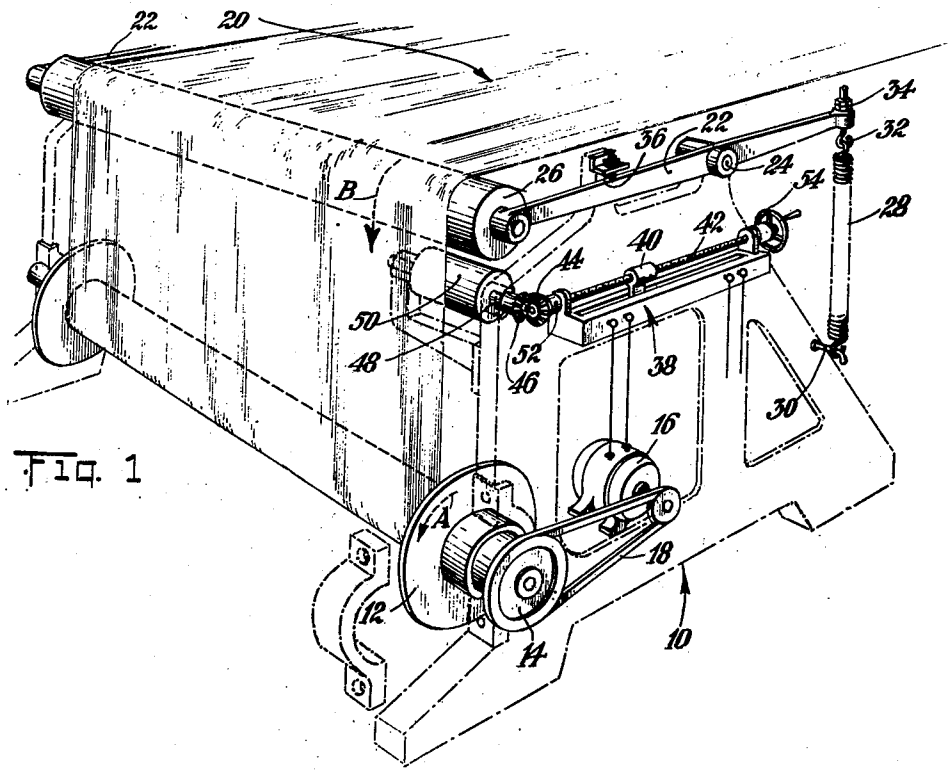


Fig. 1

Fig. 2

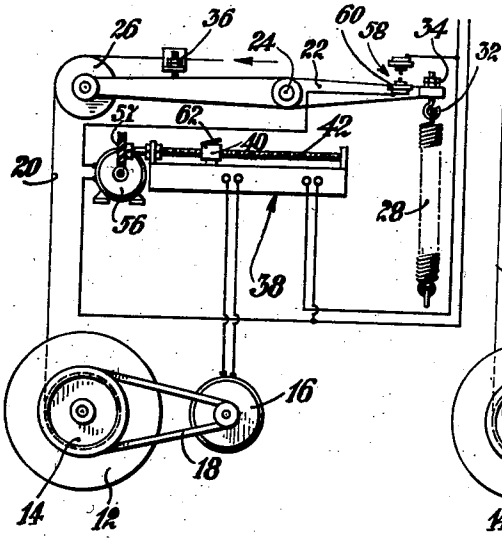
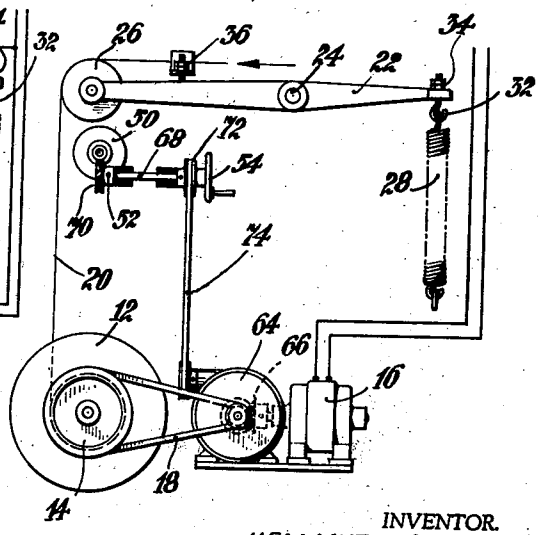


Fig. 3



INVENTOR.
HELLMUT SCHLICK
BY
ATTORNEY.

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DEVICE FOR MAINTAINING A CONSTANT TENSION ON YARNS IN WARPING

Hellmut Schlick, Burgstadt, Saxony, Germany

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4 Claims. (Cl. 28—36)

My invention relates to textile machines, and more particularly to a method of warping yarns and a device for maintaining a constant tension of the yarns in warping or beaming machines or the like.

In order to obtain a uniform winding on a beam, a constant tension of the yarns during the entire warping operation is necessary. As a matter of fact, the tension of the yarns largely depends on the travelling speed of the yarns, and the hitherto usual warping or beaming machines are equipped with automatic devices for maintaining a constant travelling speed of the yarns by reducing the speed of the beam-drive in dependence on the increasing diameter of the winding on the beam. It has been found, however, that the travelling speed of the yarns is not the only factor determining the tension of the yarns. During the progress of the warping operation the diameter of the bobbins in the creel is reduced, and this reduction of the diameter of the bobbins causes an additional increase of the tension of the yarns. The mechanisms of the hitherto usual warping or beaming machines responding only to the increase of the winding on the beam do not respond to the additional increase of the tension of the yarns due to said second factor, so that it is impossible to maintain a constant tension of the yarns during the warping operation.

One object of the present invention is to provide a method of warping yarns, by means of which a uniform winding on a beam may be produced.

Another object of my invention is to provide a method of warping yarns, by means of which a constant tension of the yarns is maintained.

A further object of my invention is to provide a device for maintaining a constant tension of the yarns in warping or beaming machines or the like.

Still a further object of my invention is to provide a warping or beaming machine, in which a constant tension of the yarns is maintained during the entire warping operation.

In order to carry out my invention into practice, I control the tension of the yarns by using the tension of the yarns for the control of the tension of the yarns. In a preferred embodiment of my invention I vary the travelling speed of the yarns in dependence on the tension of the yarns and maintain a constant tension of the yarns by the variation of said travelling speed. A preferred warping or beaming machine for carrying out this method comprises a drive adapted to rotate a beam for warping yarns, adjusting means associated with said drive for regulating the speed of the drive, and a guide roller for guiding the yarns, said guide roller being resiliently mounted in said machine, said guide roller being associated with said adjusting means for controlling same, and said guide roller being adapted to yield under increased tension of the yarns and to control said adjusting means for varying the speed of the drive.

The above mentioned objects and advantages as well as other objects and advantages will be more fully disclosed in the following specification reference being had to the accompanying drawing forming a part of this specification, in which:

Fig. 1 is a diagrammatic perspective view of a warping machine, illustrating only the elements forming a part of the invention;

Fig. 2 is a diagrammatic side elevation of another embodiment of the automatic tension control of a warping machine, and

Fig. 3 is a diagrammatic side elevation of still another embodiment of the automatic tension control of a warping machine.

Referring now to Fig. 1, 10 generally indicates the frame of the warping machine. 12 indicates a beam inserted into the warping machine and operatively connected to the driving mechanism 14, which in turn is rotated by the driving motor 16 through the medium of a belt 18.

20 generally indicates the yarns, which are drawn from bobbins mounted in a creel (not shown) and are wound on the beam 12 rotating in the direction of the arrow A. A support comprising two double-armed levers 22, one at each side of the machine, is swingably mounted in the frame 10 at 24. A feeler or guide roller 26 is journalled in the front end of the levers 22 and contacts the yarns 20. A tension spring 28 stretched between a point 30 of the frame and a hook 32 arranged on the rear end of the lever 22 serves to hold the assembly of support 22 and guide roller 26 in equilibrium under the normal and desired tension of the yarns acting on the guide roller in the direction of the arrow B. The hook 32 is adjustably mounted on the rear end of the lever 22 by means of nuts 34, so that the tension of the spring 28 may be adjusted in accordance with the normal tension of the yarns, which may act on the front end of the lever 22. Instead of varying the tension of the spring 28 for holding the swingably mounted support 22 in equilibrium when a different normal tension of the yarns is selected, the spring 28 could be replaced by a stronger or weaker spring as the

case may be. Obviously a counterweight adjustably mounted on the rear end of the lever 22 could be used instead of a spring 28. An adjustable stop 36 arranged on the frame 10 limits the movement of the lever 22 under the action of the spring 28 when the yarns are not yet under tension or the warping machine is arrested.

38 generally indicates an adjustable rheostat arranged in the circuit of the motor 16. The adjustable member 40 of said rheostat is engaged with a threaded spindle 42 journalled in the frame of the rheostat 38. One end of said spindle 42 carries a bevel gear 44 meshing with a bevel gear 46 mounted on one end of the shaft 48 carrying a friction roller 50 arranged near the guide roller 26. The shaft 48 is journalled in suitable bearings of the frame 10 of the warping machine. When the yarns 20 are under normal tension, the friction roller 50 is spaced from the guide roller 26 as shown in the drawing. Preferably, the bevel gear 44 is disengageably mounted on the spindle 42 by means of a clutch pin 52 or the like, so that the member 40 may be easily returned into its starting position by means of a rotation of the hand wheel 54 secured to the end of the spindle 42 when the clutch pin 52 is brought into disengaging position. When the clutch pin 52 is in engaging position and the guide roller 26 contacts the friction roller 50, the spindle 42 is rotated by means of the bevel gears 44, 46 and the member 40 is displaced for a variation of the resistance.

The operation of the warping machine is as follows:

The bevel gear 44 is disengaged from the spindle 42 and the member 40 is adjusted in a certain starting position by a rotation of the hand wheel, so that the motor 16 may rotate at a certain speed adapted to cause the normal tension of the yarns. Then, the bevel gear 44 is engaged with the spindle 42. The spring 28 is adjusted in such a manner, that it may hold the support 22 in equilibrium under the normal tension of the yarns. Then, the motor 16 is started causing a rotation of the beam 12. Now, when for any reason the tension of the yarns is increased and exceeds the normal tension which shall be constantly maintained, the increased tension disturbs the equilibrium and the assembly of support 22 and guide roller 26 yields and swings about the pivot 24 until the guide roller 26 rotating by means of the travelling yarns contacts the friction roller 50 and drives same. The friction roller, in turn, rotates the spindle 42 and displaces the member 40 whereby the electric resistance is varied and the speed of the motor 16 is reduced. The reduction of the motor speed causes a reduction of the speed of the beam 12, which, in turn, causes a decrease of the travelling speed of the yarns resulting in a decrease of the tension of the yarns 20 to the normal value. As soon as the yarns are again under the normal tension, the spring 28 returns the support 22 into its normal position, in which the guide roller 26 is spaced from the friction roller 50 and does not drive the latter. The member 40 remains in its new position, until a second increase of the tension of the yarns causes a new quick adjustment of the resistance as described above, etc. Thus, a constant normal tension of the yarns is automatically obtained during the entire warping operation, and the tension of the yarns is directly controlled by the tension of the yarns. When the warping operation is terminated and the warping machine is arrested, the member 40 may be returned into its starting position by a rotation of the hand wheel 54 after disengagement of the bevel gear 44 from the spindle 42, so that the warping machine is ready for the next warping operation when the bevel gear 44 is again engaged with the spindle 42.

Fig. 2 illustrates another embodiment of my invention. The friction roller is omitted and an auxiliary motor 56 is connected by a worm gear 57 with the spindle 42 of the rheostat 38 for controlling same. 58 generally indicates a switch arranged in the circuit of said auxiliary motor 56. One terminal 60 of said switch is secured to the rear end of the lever 22. Each time the assembly of support 22 and guide roller 26 is swung about the pivot 24 by an increased tension of the yarns 20, the switch is closed and the auxiliary motor 56 is rotated for a displacement of the member 40, until the normal tension of the yarn is reinstated by a suitable reduction of the speed of the motor 16 by the variation of the resistance, whereupon the spring 28 returns the support 22 into its normal position and the switch 58 is opened and the auxiliary motor 56 is arrested. In order to return the member 40 into the starting position after the termination of a warping operation, the member 40 is provided with a clamping device or the like, which may be released from the spindle 42 by a depression of the spring pressed lever 62, so that the member 40 may be shifted along the spindle 42.

In the embodiment of my invention shown in Fig. 3, a stepless change speed drive 64 of any type, which permits a gradual variation of the speed of its driven member, is arranged between the motor 16 and the beam-drive 14. The motor drives the driving member of the change speed drive 64 by means of a gearing 66, and the driven member of the change speed drive rotates the beam-drive 14 by means of the belt 18. Each time, the support 22 is swung about the pivot 24 owing to an increased tension of the yarns 20 running over the guide roller 26, the latter contacts the friction roller 50 and rotates same. The friction roller 50, in turn, rotates the shaft 68 by means of a worm gear 70 disengageably mounted on the shaft 68 by a clutch pin 52, and the pulley 72 keyed to the shaft 68 causes an adjustment of the change speed drive 64 by means of the belt drive 74, so that the speed of the beam 12 is reduced although the motor 16 rotates at the original speed. As soon as the normal tension of the yarns is reinstated, the support 22 is returned into its normal position and the guide roller 26 is disengaged from the friction roller 50. When the warping operation is terminated, the worm gear 70 may be disengaged from the shaft 68 and the adjusting member of the stepless change speed drive may be readjusted in its normal position by a rotation of the hand wheel 54 secured to the free end of the shaft 68.

I have described preferred embodiments of my invention, but it is clear that numerous changes and omissions may be made without departing from the spirit of my invention. If desired, the guide roller or feeler 26 may be resiliently mounted in the machine in any other suitable manner; for example, the ends of the shaft of the guide roller could be slidably arranged in suitable slots of the frame of the machine and could be under the action of springs holding the guide roller in a certain position above the friction roller, when the normal tension of the yarns acts on the guide roller. Furthermore, a

three-phase-shunt motor could be used for the drive of the beam, and in such a case the feeler or guide roller would cause a rotation of the brush holder yoke for a control of the speed of the motor and the tension of the yarns. Moreover, if a change speed drive is used, the feeler or guide roller could control said change speed drive by any suitable mechanism other than that shown in Fig. 3. Furthermore, while in the drawing the device for maintaining a constant tension of the yarns is incorporated in the mechanism of a warping machine, the device for maintaining a constant tension of the yarns could be an independent device attached to the warping machine. In such a case the feeler controlling the adjusting means for varying the travelling speed of the yarns would not form a guide roller of the warping machine but would be a part of the separate device attached to the warping machine. Furthermore, the device for maintaining a constant tension of the yarns may be applied to textile machines other than warping or beaming machines, in which yarns are drawn from a source of supply by the drive of the textile machine.

What I claim is:

1. In a warping or beaming machine, a mechanism adapted to rotate a beam for warping yarns, a driving motor, a stepless change speed drive arranged between said driving motor and said mechanism for regulating the speed of said mechanism, a support swingably mounted in said machine, a guide roller for guiding the yarns, said guide roller being journalled in said support, means connected to said support for holding said assembly of support and guide roller in equilibrium under normal tension of the yarns, and a friction roller journalled in said machine, said friction roller being arranged near to said guide roller and being connected to said stepless change speed drive for controlling same, said assembly of support and guide roller being adapted to yield under increased tension of the yarns whereby said guide roller contacts said friction roller for driving same so as to control said stepless change speed drive for varying the speed of the mechanism.

2. A device for the automatic control of the tension of the yarns in a textile machine, wherein the yarns are drawn from bobbins or the like by driving means equipped with a stepless change speed drive for regulating the speed of the driving means, said device comprising a guide roller for guiding the yarns drawn by the drive, a movable support, said guide roller being journalled in said support, said support being movable from a normal position into a controlling position, balancing means for balancing said movable support in its normal position when said guide roller is subjected to a predetermined normal tension of the yarns drawn by the driving means, and a friction roller journalled in said device, said friction roller being arranged near to said guide roller and being connected to said stepless change speed drive for controlling same, and said support being adapted to yield into said controlling position under increased tension of the yarns drawn by the driving means whereby said guide roller contacts said friction roller for driving same so as to control said stepless change speed drive for gradually reducing the speed of the driving means.

3. In a warping or beaming machine or the like, a mechanism adapted to rotate a beam for warping yarns, a driving motor, a stepless change speed drive arranged between said driving motor and said mechanism for regulating the speed of said mechanism, a rotatable guide roller for guiding and supporting the yarns in its normal position, said guide roller being resiliently mounted in said machine and being movable from said normal position into a controlling position, and a friction roller journalled in said machine, said friction roller being arranged near to said guide roller and being connected to said stepless change speed drive for controlling same, and said guide roller being adapted to yield into said controlling position under increased tension of the yarns whereby said guide roller contacts said friction roller for driving same so as to control said stepless change speed drive for gradually reducing the speed of said mechanism.

4. A device for the automatic control of the tension of the yarns in a warping or beaming machine equipped with driving means for the rotation of the beam and adjusting means for regulating the speed of the driving means, comprising a movable feeler carrying a guide roller for contacting the yarns travelling to the beam, said feeler being movable from a normal position into a controlling position, balancing means for balancing said movable feeler in its normal position when said feeler is subjected to a predetermined normal tension of the travelling yarns, and a friction roller journalled in said device, said friction roller being arranged near to said guide roller and being connected to said adjusting means for controlling same, the guide roller of said feeler being normally out of contact with said friction roller, and said feeler being adapted to yield into said controlling position under increased tension of the travelling yarns whereby said guide roller contacts said friction roller for driving same so as to control said adjusting means for gradually reducing the speed of the driving means.

HELLMUT SCHLICK.