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WARPER.

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This invention relates to machines known as warpers. Such machines are commonly used in the textile industry for winding a multitude of individual strands of thread or yarn on a beam or ball.

It is the chief object of the invention to improve such machines with a view to reducing the attention required by them, and enabling the attendant to care for a greater number of machines. The invention aims especially to provide means whereby such a machine may be brought up to normal speed, after being stopped, more rapidly than has been possible heretofore.

These and other objects of the invention will be readily understood from the following description when read in connection with the accompanying drawings, and the novel features will be particularly pointed out in the appended claims.

In the accompanying drawings,

Figure 1 is a side elevation of a machine embodying the present invention, certain of the parts being broken away to illustrate the construction more clearly;

Fig. 2 is a view, partly in front elevation and partly in vertical cross section, showing the driving mechanism of the machine;

Fig. 3 is a cross sectional view on the line 3-3, Fig. 1;

Fig. 4 is an enlarged cross sectional view of a portion of the belt shipper bar and the stop which cooperates therewith; and

Fig. 5 is an end view of a portion of the stop.

In a typical arrangement for using a warper the strands of thread S, Fig. 1, are drawn from bobbins mounted on a creel (not shown) and are guided through a rear comb 2, over and under the usual guide rolls to a front comb 3, and thence are wound on the beam 4. The beam of the machine shown is driven by a drum 5 which is connected through gears 6 and 7 with the main shaft 8. Power is transmitted to the machine by a belt 10 arranged to run on either a high speed pulley 12, a low speed pulley 13, or an idle pulley 14. The high speed pulley 12 is secured fast on the shaft 8, but the low speed pulley 13 is mounted on a sleeve 15, Fig. 2. This sleeve encircles the shaft 8 and carries a pinion 16 which meshes with a gear 17 fast on a counter-shaft 18. A gear 19 secured on the shaft 18 meshes with another gear 20 which is loosely mounted on the end

of the shaft 8 but is connected therewith through the usual one-way pawl and ratchet mechanism 21. Consequently, when the belt 10 is on the intermediate pulley 13 the beam 4 will be driven through the gear connections just described but at a very much lower speed than when the belt is on the high speed pulley 12. The idle pulley 14 is mounted to rotate freely on the sleeve 15.

For the purpose of moving the belt 10 from one pulley to another, a belt shifter is provided comprising a fork 22 that straddles the belt and is fixed in the outer end of a sliding bar 24. This bar is supported in a bracket 25 and has teeth on its lower surface meshing with a sector 26 secured on a rock shaft 27. Another sector 28, also secured on this rock shaft, meshes with a rack 30 which is pivotally connected to a treadle 31. A weight 32 is arranged to operate through the treadle and the connections just described to move the belt on to the idle pulley 14, this movement being normally restrained when the machine is running, however, by a latch 33, Fig. 1, which is pivoted to the treadle 31 and engages at its upper end with a fixed piece 34. The parts are shown in Figs. 1, 2 and 3 in their normal positions with the latch 33 holding the belt shipper in position to keep the belt on the high speed pulley 12.

This latch and the belt shifting apparatus above described form parts of an automatic stop motion for stopping the machine whenever a thread breaks, the action of this mechanism being arranged to be initiated by the dropping of detectors or drop wires 35-35, Fig. 1. The connections for enabling these wires to cause the tripping of the latch 33 are not illustrated since they are not essential to an understanding of the present invention, are well known, and form a part of a well known commercial beam warper. It will be understood, however, that whenever a thread breaks the detector 35 which it supports immediately drops, and this results in the tripping of the latch 33 and the consequent shifting of the belt 10 on to the idle pulley 14. The beam stops almost immediately thereafter.

Between the front and rear combs 3 and 2 the threads run over a takeup roll or "rise roll" 36. This roll is supported at its opposite ends in the upper forked ends of two rack bars, one of which is shown at 37. Rolls 38 guide the bars 37 for up and down

movement. The bar is urged upwardly by a weight 42 secured to one end of a chain 41 which is partly coiled around and is secured to a grooved roll 40 secured on a rock shaft 43, this shaft also having secured thereto a pinion 44 which meshes with the teeth of the rack bar 37. Similar parts cooperate with the other rack bar at the opposite end of the roll 36. This arrangement, therefore, operates to take up any slack that occurs in the threads as they travel to the beam 4.

The mechanism so far described is substantially like that of the usual commercial beam warper. When such a machine is running and is suddenly stopped due to the breaking of a thread, or any other reason, the spools from which the supply of thread is being drawn do not stop rotating as quickly as the beam. Considerable slack in the thread, therefore, is produced at this instant and consequently the roll 36 rises to take up this slack. In starting the machine again the attendant or operator first depresses the treadle 31 far enough to shift the belt 10 on to the intermediate or low speed pulley 13 thus causing the beam 4 to rotate slowly. The treadle must be held in this position until the rise roll 36 has been depressed or lowered to its normal running position before it is safe for the operator to shift the belt on to the high speed pulley and cause the machine to resume its normal running speed. The operator must keep her foot on the treadle during all this time and until the treadle has been depressed far enough to engage the latch 33 with the fixed part 34. Furthermore, this operation must be repeated every time that a warper is started. Consequently, a substantial part of a warp tender's time is occupied in starting up machines after they have stopped due to the breaking of a thread.

The present invention provides a mechanism which ensures the stopping of the machine with the rise roll in its normal or running position so that the delay in bringing the machine up to speed when it is started again is eliminated, it being simply necessary for the attendant to step on the treadle 31 and shift the belt immediately from the idle to the high speed pulley.

The additional mechanism provided for this purpose, as embodied in the machine shown, comprises a stop 46 pinned to a rod 47 which is supported in a bracket 48 for both rocking movement about its axis and also for sliding movement longitudinally of said axis. A spring 50 tends to hold the stop 46 at the left-hand extremity, Fig. 3, of its range of movement. One end 51 of this stop is weighted so that so long as the stop is free, this end will rest in contact with the shipper 24, the latter part being grooved, as shown at 52, Fig. 4, to receive the weighted end of the stop. When the

latch 33 is tripped by the automatic stop mechanism of the warper and the belt shipper 24 consequently is moved toward the right, Figs. 2 to 4, due to the action of the weight 32, the sliding movement of the belt shipper will be interrupted due to the left-hand end wall of the groove 52, Fig. 4, striking the weighted end 51 of the stop 46 and carrying this stop backwardly against the bracket 48. This movement is so proportioned that it stops the belt shipper with the belt on the low speed pulley 13. The motion of the beam, therefore, is not stopped but its speed is simply reduced. The parts remain in this condition until the rise roll has been moved into a predetermined position. That is, as soon as the reduction in speed of the beam occurs, slack is introduced into the threads S due to the overrun of the spools, as above explained, and consequently the rise roll 36 is moved upwardly by the weights 42 to take up this slack. The bobbins in the creel lose their momentum very quickly so that as the beam 4 continues to rotate slowly, it gradually re-establishes normal tension on the strands of thread and thus lowers the rise roll 36 to its normal running position. As the rise roll is depressed the bar 37 is correspondingly lowered, and during this movement a pin 54, which is secured in the bar, strikes the tail 55 of the stop 46 and swings this stop on its pivot, thus carrying the part 51 out of contact with the shipper 24. As soon as his tripping of the stop occurs, the weight 32 immediately acts through the connections with the shipper to move the belt 10 on to the idle pulley 14 and the beam thereupon stops.

It will thus be seen that the operation of the detector controlled stop motion is interrupted by the stop 51 when the belt has been shifted on to the slow speed pulley, and the stop motion is not allowed to complete its action until the rise roll has been lowered to substantially its normal running position.

This entire action occurs in ample time to prevent the broken "end", which has caused the stopping of the machine, from being wound on the beam. The operator, therefore, can piece up the broken thread and then shift the belt immediately on to the high speed pulley 12 where it will be held by the latch 33. The pause or wait which has been necessary heretofore to bring the rise roll down into normal position thus is eliminated.

As soon as the stop is swung out of engagement with the shipper 24, the spring 50 slides the stop forward; or to the left, Fig. 3, carrying the part 55 out of contact with the pin 54. In order to avoid any possibility of breaking the stop due to engagement of the pin 54 with the part 55 when the rise roll is moving upwardly, the tail piece 55 is

made in the form of a knee lever and is pivoted at 56 to the body of the stop 46, as best shown in Fig. 5. The end of this tail piece is bevelled and normally underlies a bevelled shoulder on the body part of the stop so that when the tail piece is in the position shown in the drawings, any downward movement of it is transmitted directly to the stop, but if it should be engaged by the pin 54 as the latter moves upwardly it would simply move the tail piece idly.

It will now be appreciated that this invention substantially reduces the time required of a machine tender to put the machine into normal operation again after it has been stopped. Consequently, an operator can tend more machines than otherwise would be possible. Furthermore, the parts added to the machine by the present invention are very simple in construction and can be manufactured and installed on a machine very economically. This is an important advantage from a practical standpoint.

Inasmuch as the strands of thread or yarn handled by the warper may be wound on either a beam or a ball, the term "beam" is used herein to include a ball. Also, in some warpers a drop roll is used to take up slack instead of a rise roll. The term "rise roll", therefore, should be understood to include a drop roll or equivalent device for taking up the slack, and where reference is made to the rise and fall of the rise roll, it should be understood to include the operative movement of the device that takes up the slack.

While I have herein shown and described the best embodiment of my invention that I have so far devised, it will be understood that the invention may be embodied in other forms without departing from the spirit or scope thereof.

Having thus described my invention, what I desire to claim as new is:

1. In a warper having an automatic, detector-controlled stop motion, the combination of a rise roll, and mechanism under control of said rise roll for interrupting the operation of said stop motion after its action has been initiated and preventing the completion of said operation until the rise roll has been lowered to substantially its normal running position.

2. In a warper having an automatic, detector-controlled stop motion, the combination of a rise roll mounted for up and down movement, mechanism for interrupting the operation of said stop motion after its action has been initiated, said mechanism including a stop, and means arranged to be operated by the depression of said rise roll to trip said stop.

3. In a warper having an automatic, detector-controlled stop motion, the combination of a rise roll mounted for up and down movement, and mechanism cooperating with

said stop motion to prevent the complete stopping of the machine after the action of said stop motion has been initiated until the rise roll has been moved down to substantially a predetermined position.

4. In a warper having an automatic, detector-controlled stop motion, the combination of a rise roll mounted for up and down movement, mechanism for interrupting the operation of said stop motion after its action has been initiated, and means for utilizing the downward movement of said rise roll to cause the operation of said stop motion to be resumed.

5. In a warper, the combination of a beam for holding a multitude of individual threads, mechanism for revolving said beam, automatic means for stopping the rotation of the beam under predetermined conditions, a roll mounted to rise and fall and over which the threads are guided as they travel to or from the beam, automatic means for raising said roll to keep the threads under tension, and means cooperating with said stopping mechanism to cause the beam to be driven at a slow speed during the stopping operation and until the tension on said threads has forced said roll into substantially its normal running position.

6. In a warper, the combination of a beam for holding a multitude of individual threads, mechanism for revolving said beam, a rise roll for taking up the slack in the threads as they travel to or from the beam, mechanism for automatically stopping the rotation of the beam under predetermined conditions, and means cooperating with said mechanism to ensure the driving of the beam for such a length of time after the stopping operation has been initiated to apply sufficient tension to said threads to lower said roll before the beam is stopped.

7. In a warper, the combination of a beam for holding a multitude of individual threads, mechanism for driving said beam including high speed, low speed, and idle pulleys, a driving belt cooperating with said pulleys, a belt shifter for moving said belt from one of said pulleys to another, mechanism including a latch for holding said belt shifter normally with the belt on the high speed pulley, automatic means for moving said shifter when the latch is released to carry said belt across the low speed pulley on to the idle pulley, a stop for interrupting said movement when the belt is on the low speed pulley, a roll mounted to rise and fall and over which the threads are guided as they travel to or from said beam, and means operated by the downward movement of said roll to release said stop.

8. In a warper, the combination of a beam for holding a multitude of individual threads, mechanism for driving said beam including high speed, low speed, and idle

pulleys, a driving belt cooperating with  
 said pulleys, a belt shifter for moving said  
 belt from one of said pulleys to another,  
 mechanism including a latch for holding  
 5 said belt shifter normally with the belt on  
 the high speed pulley, automatic means for  
 moving said shifter when the latch is re-  
 leased to carry said belt across the low  
 speed pulley on to the idle pulley, a stop  
 10 arranged to engage said shifter and inter-  
 rupt said movement when the belt is on the  
 low speed pulley, a rise roll over which  
 the threads are guided as they travel to or  
 from the beam, bars supporting said roll  
 15 for up and down movement, automatic  
 means for raising said roll to keep the  
 threads under tension, and a pin carried by  
 one of said bars and arranged to trip said  
 stop.

20 9. In a warper, the combination of a beam  
 for holding a multitude of individual  
 threads, mechanism for driving said beam  
 including high speed, low speed, and idle  
 pulleys, a driving belt cooperating with  
 25 said pulleys, a belt shifter for moving said  
 belt from one of said pulleys to another,  
 mechanism including a latch for holding  
 said belt shifter normally with the belt on  
 the high speed pulley, automatic means for  
 30 moving said shifter when the latch is re-  
 leased to carry said belt across the low speed  
 pulley on to the idle pulley; a swinging stop  
 arranged to engage said shifter and inter-  
 rupt said movement when the belt is on the  
 35 low speed pulley, a rise roll over which the  
 threads are guided as they travel to or from  
 said beam, bars supporting said rise roll for  
 up and down movement, automatic means  
 for raising said roll to keep the threads  
 40 under tension, and a pin carried by one of  
 said bars and arranged to trip said stop,  
 said stop having a pivoted tail piece posi-  
 tioned for engagement with said pin and  
 arranged to be moved idly by the pin as  
 45 the latter moves up, but operative to cause  
 movement of the entire stop when the pin  
 engages it upon moving down.

50 10. In a warper, the combination of a beam  
 for holding a multitude of individual  
 threads, mechanism for driving said beam  
 including high speed, low speed, and idle  
 pulleys, a driving belt cooperating with  
 said pulleys, a slidable belt shifter for mov-

ing said belt from one of said pulleys to  
 another, mechanism including a latch for  
 55 holding said belt shifter normally with the  
 belt on the high speed pulley, automatic  
 means for moving said shifter when the  
 latch is released to carry said belt across the  
 low speed pulley on to the idle pulley, a  
 60 stop mounted to swing into and out of en-  
 gagement with said shifter and to slide par-  
 allel to the shifter, said stop being weight-  
 ed to cause it to swing into engagement with  
 the shifter and to stop said movement of the  
 65 shifter when the belt is on the low speed  
 pulley, a rise roll over which the threads  
 are guided as they travel to or from said  
 beam, bars supporting said rise roll for up  
 and down movement, automatic means for  
 70 raising said roll to keep the threads under  
 tension, a pin carried by one of said bars  
 and arranged to trip said stop, and a spring  
 tending to slide said stop out of cooperative  
 relationship to said pin.

75 11. In a warper, the combination of a  
 beam, mechanism for revolving said beam  
 at either a high or a low speed, means for  
 automatically stopping the rotation of said  
 beam under predetermined conditions, and  
 80 automatic means cooperating with said  
 mechanism for ensuring the driving of the  
 beam at its low speed for a sufficient length  
 of time immediately preceding the stopping  
 of the beam to enable the rise roll to move  
 85 down to substantially its normal running  
 position.

90 12. In a warper, the combination of a  
 beam for holding a multitude of individual  
 threads, means for driving said beam at  
 high or low speeds, a rise roll mounted  
 for up and down movement and over which  
 the threads are guided as they travel to or  
 from said beam, a stop mechanism arranged  
 to have its action initiated automatically  
 95 under predetermined conditions, and ad-  
 ditional means cooperating with said stop  
 mechanism to cause the stop mechanism to  
 change the driving of the beam from a  
 high to a low speed immediately following  
 100 such initiation, and then to complete the  
 stopping of the beam after said roll has  
 been lowered following its rise due to the  
 reduction in speed of the beam.

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