Oct. 8, 1935. H. J. LONCTEAUX ET AL 2,017,008

DIRECT WARPING

Filed June 8, 1933 5 Sheets-Sheet 1

Fig. 1

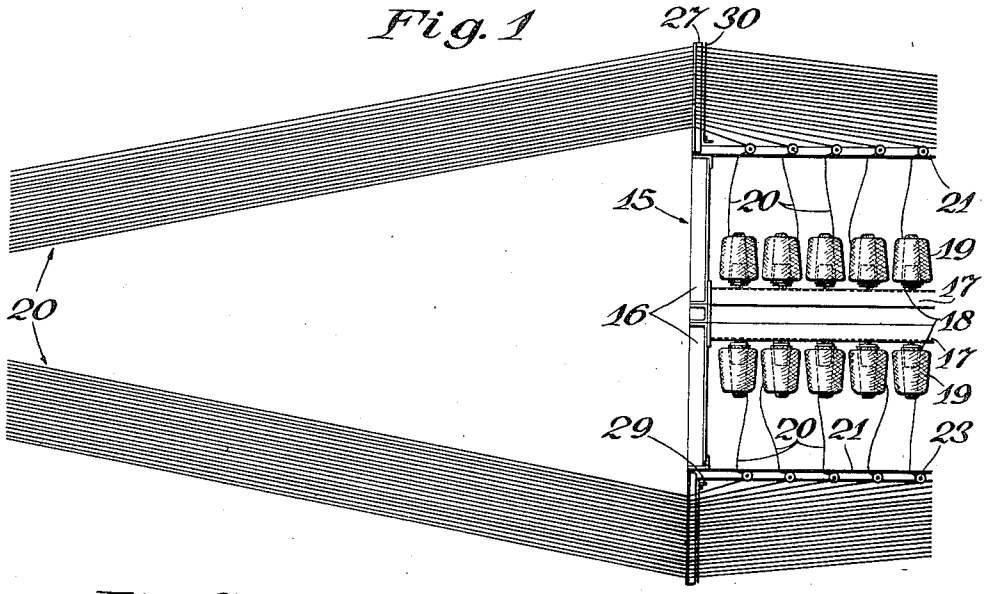


Fig. 5

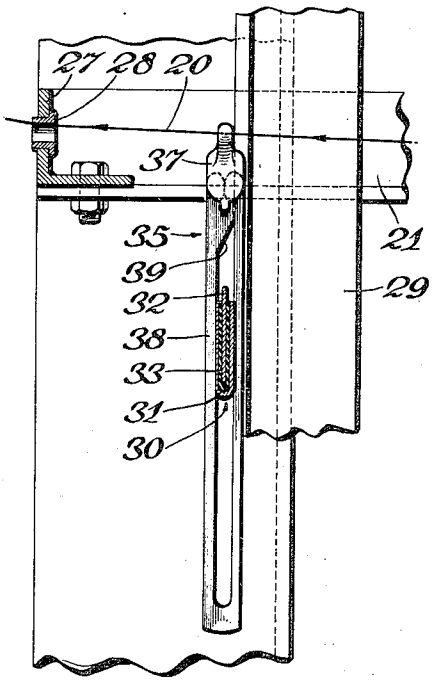
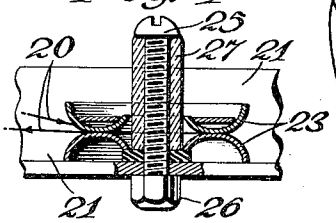


Fig. 4

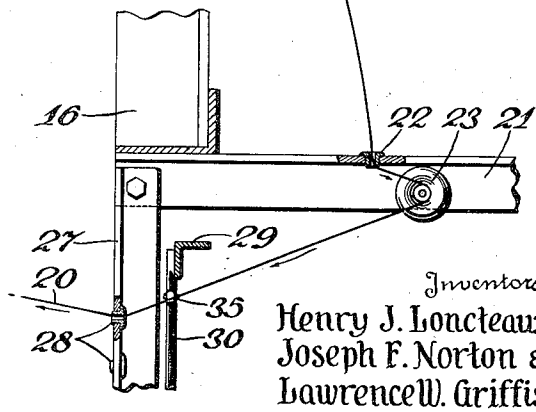


27 30

19

Fig. 3

20



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DIRECT WARPING

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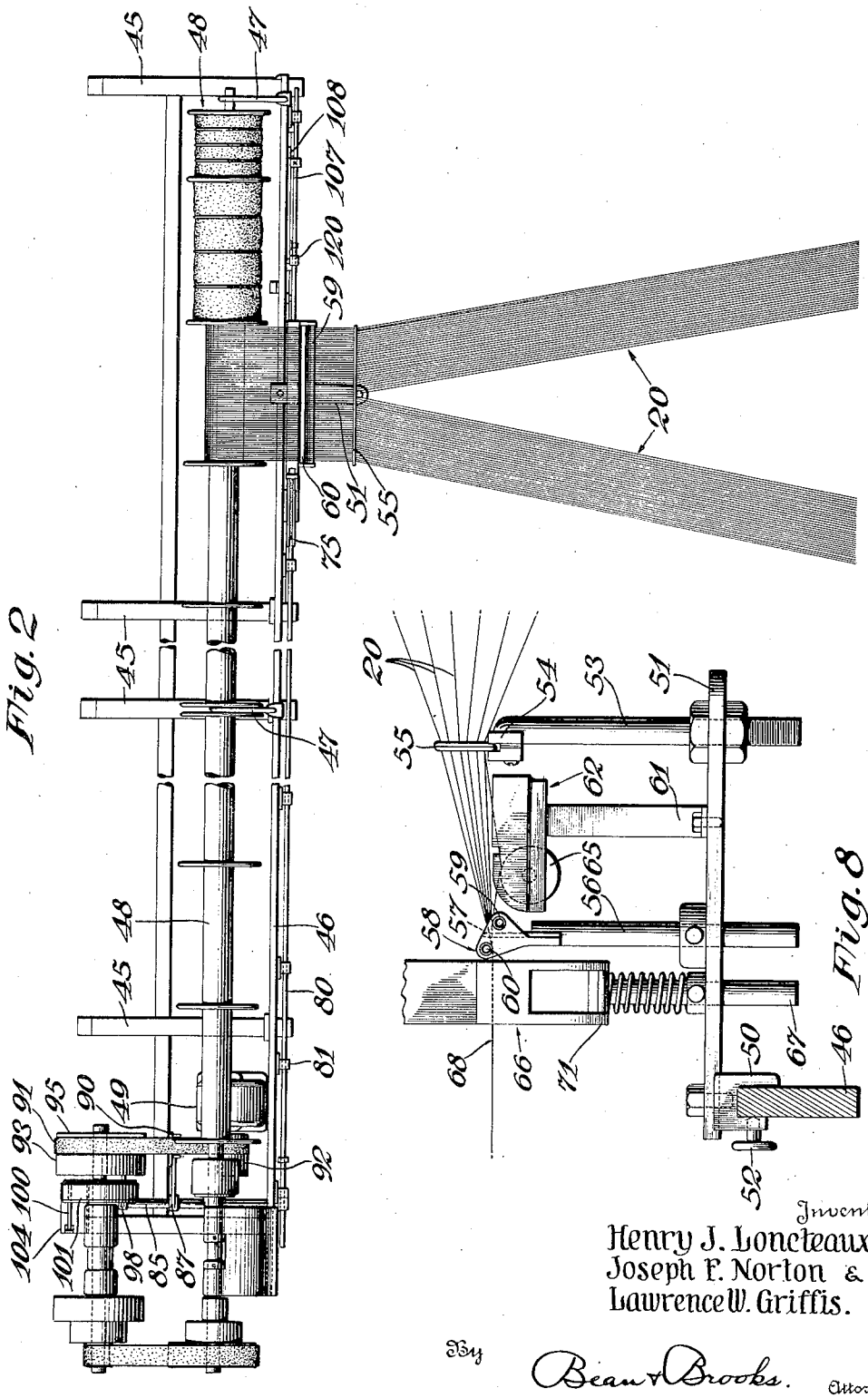

Fig. 2

Fig. 8

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DIRECT WARPING

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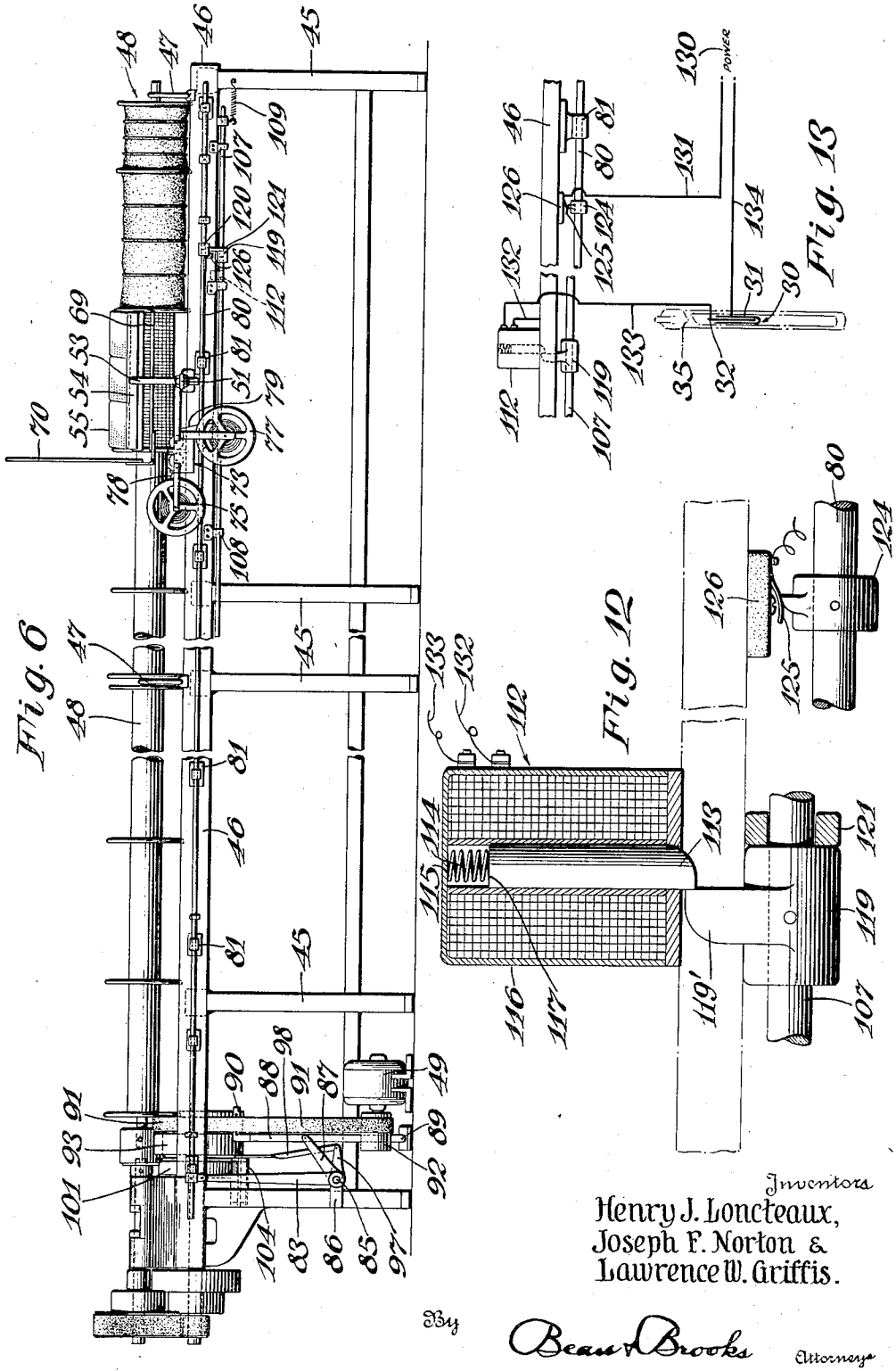

Fig. 6

Fig. 13

Fig. 12

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DIRECT WARPING

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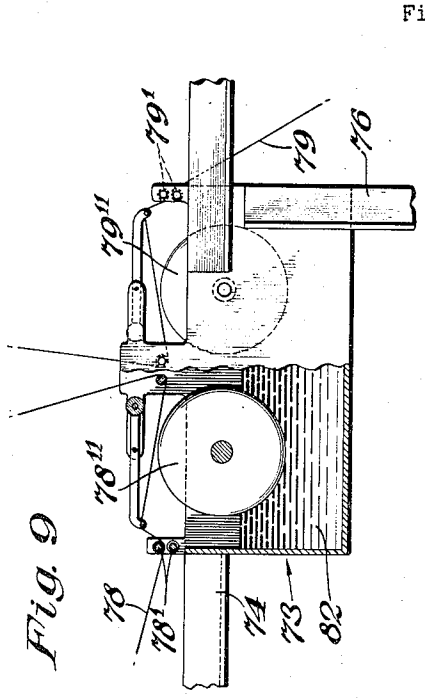

Fig. 9

Fig. 7

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DIRECT WARPING

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Fig. 10

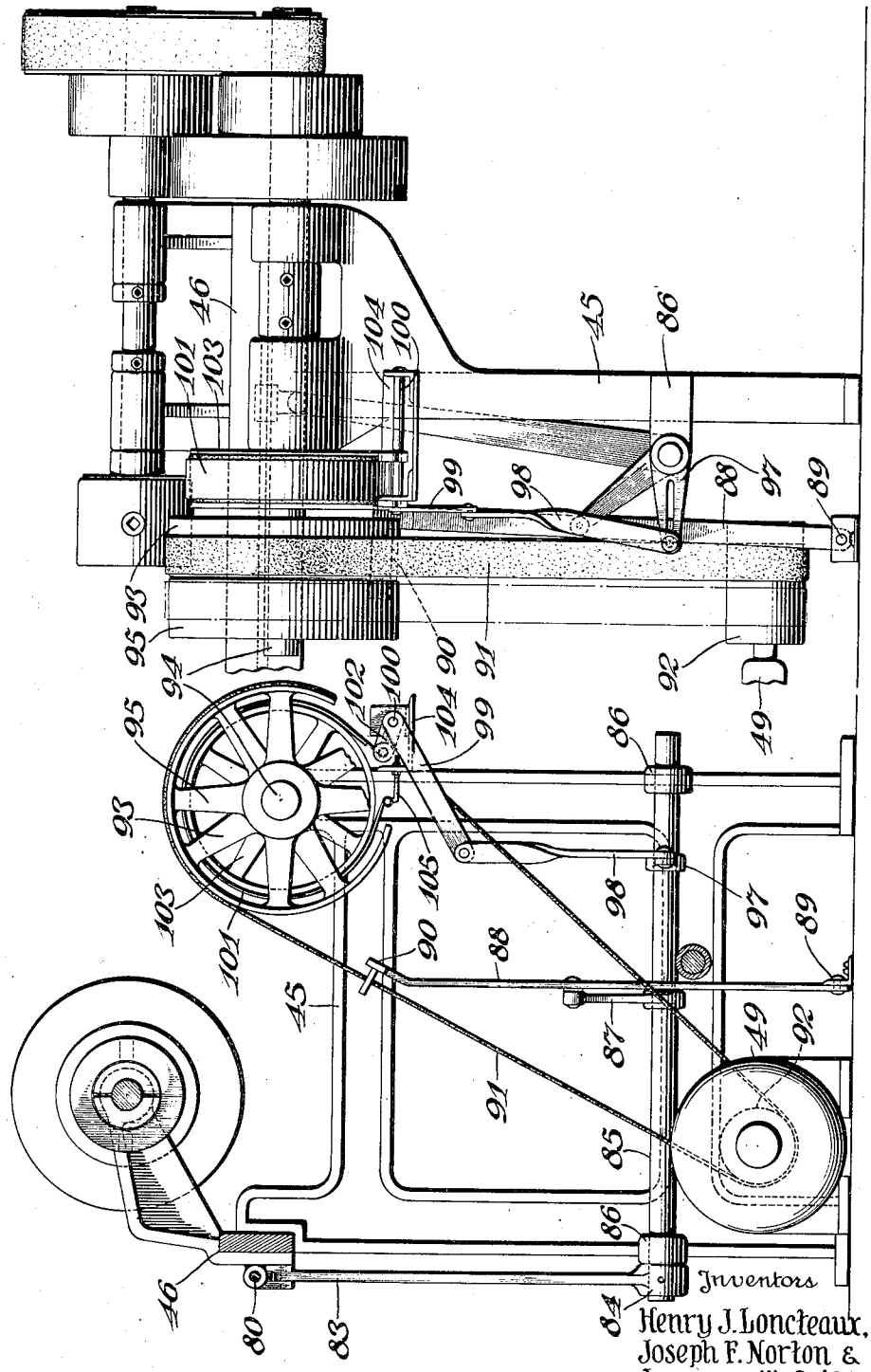

Fig. 11

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UNITED STATES PATENT OFFICE

2,017,008

DIRECT WARPING

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Application June 8, 1933, Serial No. 674,938

6 Claims. (Cl. 28—51)

The present invention relates to a direct warping mechanism and more particularly to a mechanism whereby a series of threads may be wound in courses longitudinally upon a warp beam directly from a series of cones, the rotation of the beam being controlled by an automatic stop mechanism actuated by the tension of the thread.

In the methods of winding a series of warp threads upon a beam used heretofore, the threads were wound from spools upon a mill and thence upon the beam. In both of these operations, one operator could watch only a small and circumscribed number of threads and the speed of winding was regulated at a low rate determined by the amount of thread upon the spools, the type of thread, and the expedition with which the winding mechanism could be stopped. In such methods of winding, if high winding speeds were used, threads would run loose or would be lost with subsequent difficulties in the knitting and dying operations.

The present invention permits of a direct winding of threads from cones to a beam; permits of thread speeds or winding speeds in excess of that permissible in the warp winding operations heretofore used; provides a mechanism whereby rotation of the beam may be quickly and positively stopped; provides a direct beam winding mechanism controlled by automatic means; provides a mechanism for suddenly and abruptly stopping the rotation of the beam preventing threads from running loose and eliminating the possibility of lost thread ends; provides a stopping mechanism for the beam which permits of warp winding speeds far in excess of those currently in use; provides a mechanism for winding a warp upon a beam whereby the tension of the individual threads is maintained at a substantially constant figure; provides a mechanism whereby a plurality of sections of a warp beam may be wound simultaneously with the production of a beam carrying a series of warp threads possessing substantially the same tension.

The invention further provides an automatically controlled direct warp winding mechanism which is substantially more economical in operation than the methods currently in use since the thread speeds are substantially twice those which can be used in other methods of winding and since the method permits of the supervision of a greater number of threads by a given number of operators than has been possible heretofore, the method of winding a warp beam as disclosed in the present invention producing a completed warp beam in about one third of the time required for the usual mill winding operation.

In the drawings:

Fig. 1 is a plan view of a creel carrying spools thereon and having attached thereto an eyelet bar and an electrode bar of the present invention and showing threads being unwound from the spools for extension to a beam.

Fig. 2 is a plan view of a warping machine carrying a beam thereon and showing threads being wound upon the beam;

Fig. 3 is an enlarged fragmentary showing illustrating a thread passing from a spool through an eyelet of a drop wire and through an eyelet of the eyelet bar;

Fig. 4 is an enlarged fragmentary showing of a tension disc;

Fig. 5 is an enlarged fragmentary showing in side elevation of the electrode bar and drop wire attached thereto showing a thread passing through the eyelet of the drop wire;

Fig. 6 is a front elevation of a warping machine showing a beam thereon and showing the automatic stop attachment, the beam being in the inoperative position;

Fig. 7 is a fragmentary front elevation of the warping machine showing a beam attached thereto and showing a portion of the automatic stop mechanism and the improved table of the present invention.

Fig. 8 shows an enlarged fragmentary side elevation showing the table, counter, and leaders as attached to the front rail of the warping machine;

Fig. 9 is an enlarged fragmentary showing of the taping mechanism attached to the table for holding the loose ends of the threads completely wound upon the beam.

Fig. 10 is a fragmentary front elevation showing the means for actuating the warping machine and the automatic stopping mechanism;

Fig. 11 is a side elevation of the automatic stopping mechanism;

Fig. 12 is an enlarged plan view partly in section of release means attached to the automatic stop mechanism; and

Fig. 13 is a diagrammatic showing of the method of wiring.

Referring more particularly to the drawings, creel 15 is shown in Fig. 1 having front frame portions 16, longitudinally extending portions 17 carrying spindles 18 upon which are mounted spools 19 of thread 20. Creel 15 is provided with

outer rail portions 21 placed adjacent the spools so that thread 20 from the spools is led through an eyelet 22 in rail 21 in contact with and between tensioning discs 23 mounted upon side rail 21 by any convenient means, as for instance by means of the bolt and nut 25 and 26 and provided with a smooth operating surface such as the porcelain sleeve 24.

Creel 15 is provided with an eyelet bar 27 extending laterally from side rails 21 and adapted to receive threads 20 from the several spools passing through eyelets 22 in the side rails. Eyelet bar 27 is provided with a plurality of eyelets 28 sufficient in number to accommodate the individual threads from a given row of spools, as for instance twenty-one eyelets, to accommodate the threads from that number of spools carried upon one row of a standard size creel. In the form shown in Fig. 5, the eyelet bar is bolted to side rail 21 at the front of the creel and extends outwardly and horizontally from the side rails of the creel, the creel being provided with an eyelet bar for each series of spindles or side rails. Threads 20 are passed from the eyelet bar to the beam and are wound thereupon in a manner to be hereafter described.

A vertically extending supporting member 29 is spaced from the side rails 21 of the creel and extends vertically thereof having attached thereto an electrode bar 30 positioned adjacent but spaced from the eyelet bar at a point below the eyelet bar for a purpose which will become apparent. An electrode bar is provided for each eyelet bar and course of spools.

The electrode bar 30 comprises an outer U-shaped member 31 formed of electrically conducting material and having placed therein an electrically conducting member 32 between the legs of the U-shaped member and insulated therefrom by means of the insulated material 33. The U-shaped member 31 and strip member 32 form opposite ends of an open electrical circuit, which circuit when closed actuates a stopping mechanism for preventing further rotation of the warping machine carrying the beam as will be described hereafter.

Drop wires or heddles 35 are carried upon electrode bars 30, each bar being provided with a number of drop wires sufficient to carry all the threads from the number of spools upon a given series, as for instance twenty-one spools as mentioned above, for a normal sized creel. The thread from the spool adjacent the front end of the creel, as shown in Fig. 3, is normally passed through the eyelet adjacent side rail 21 while the thread from the next adjacent spool is passed through the next adjacent eyelet and so on until all the threads from all the spools in the various courses have been arranged. Interposed between the eyelets 22 in the side rails and the eyelets 28 in the eyelet bar are the heddles 35, the threads 20 being passed through the electrically non-conducting threading member 37, or eyelets 37, detachably attached to the upper portion of the drop wire, the lower electrically conducting portion 38 being slotted to slide over the electrode bar 30, as shown in Fig. 5. Threads 20 pass from eyelet bar 27 to the beam and are wound to a sufficient tension to raise drop wires or heddles 35 to a height where no contact is had between the electrically conducting strip member 32 and the upper edge 39 of the slotted portion of the electrically conducting portion 38 of the drop wire. Since all of the threads carry and support a drop wire thereon, each thread, as it is wound upon the beam is wound under substantially the same tension thereby permitting the formation of a beam of threads in desirable condition for use in the preparation of a warp fabric since loose or lost ends are diminished and difficulties in dyeing from the production of various shades in the fabric due to difference in tension of the threads on the beam, is substantially eliminated.

It will be seen that upon the slackening tension of the threads, or upon breakage thereof, a drop wire 35, slidably positioned over the electrode bar 30 will be pulled downwardly by the force of gravity and make electrical contact between the upper edge of strip member 32 and the upper edge 39 defining the slotted portion of the drop wire. This contact closes an electrical circuit which actuates a positive stopping mechanism attached to the beam as described more in detail hereinafter.

The warping machine, Figs. 2, 6 and 7, comprises a supporting frame 45 having a front rail 46, upright beam supporting members 47 carried by frame 45 for receiving and bearing a beam 48 adapted to be actuated by means of the motor 49, and appropriate power transmitting means for communicating power from the motor to the beam. The beam is divided into a plurality of sections of which one or more may be wound simultaneously by employing an appropriate number of spools or creels.

A sliding bracket member 50 (Figs. 6, 7 and 8), adapted to be clamped to the front rail 46 by means of turn screws 52 carries the outwardly extending supporting member 51, attached to the clamping bracket 50 for supporting leaders, counters and the like, the whole bracket and support member being movable to any desired position along the beam.

A vertically adjustable clamping member 53 extends upwardly from the support member 51 and is provided with a clamping member 54 at its upper portion for clamping and carrying the perforated leader or brass 55 through which the various threads being laid upon the warp beam are passed to position the threads upon the beam.

A guide support 56 is adjustably mounted upon supporting member 51 and extends upwardly therefrom carrying upon its upper end guide bar 57, a bracket 58 being attached to guide support 56 for carrying and supporting the forward tension bar 59 and the rear tension bar 60. Another supporting member 61 is attached to member 51 for carrying a counting mechanism shown generally at 62. In operation threads 20 pass through the perforated leaders 55 over the forward tensioning bar 59 through the guide bar 57 and under the rearward bar 60 and from thence to beam 48 upon which the threads are wound in side by side relation to form a warp beam. The counter 62 for determining the yardage or amount of thread wound upon the beam, is of the general or usual type and is actuated by the rotation of the guide wheel member 65 over which a thread is carried in loop form whereby the wheel is turned as a pulley for actuating counter 62.

A finishing table 66 is carried by the supporting bar 67 for clamping and retaining the ends of the threads upon completion of the winding of the warp beam. The finishing table is adjustably clamped to supporting member 51 and may be raised or lowered in height with respect thereto so as not to interfere with the warping operation and be moved upwardly to the thread line 68

at those periods when it is desired to use the table for holding and retaining the ends of the warp thread.

Table 66 comprises a horizontally extending member 69 of sufficient length to extend longitudinally of a complete section of the machine and is provided with a flat table surface adapted to engage a similar flat surface upon the companion table piece 70 hingedly attached to the horizontally extending table portion 69 at 71, the upwardly extending portion 70 being adapted for pressure upon the horizontally extending portion 69 when lowered therein. A liquid container 73 is attached to the supporting member 51 and is provided with an outwardly extending bracket 74 carrying a reel 75 and a downwardly extending bracket 76 carrying another reel 77 which are provided with paper or other fabric carrying mucilage or paste upon one side thereof, the paste strips 78 and 79 passing from the reels 75 and 77 between the guide spools 78', 79' attached to the upper portion of the tank, and over rotatable pulleys 78'', 79'' supported at the upper portion of the tank and having their lower portions immersed in a moistening liquid or fluid 82 contained in the tank and adapted to make the glue or mucilage attached to the under side of the strips responsive to pressure. Thus, when the threads are completely wound from the spools upon the beam, all the threads pass above the lower portion or leg 69 of table 66 and the glued tape or strip 79 is spread upon the lower leg of the table with the moistened glued portion upward. The whole table is then moved upwardly so that the threads are in contact with the moistened or gummed portion of the strip. Strip 78, from the other reel 75 is guided upon the upwardly extending leg 70 of the table in such fashion that the moistened gummed portion of the plate is exposed and when the strip and leg 70 are moved downwardly contact with the horizontally extending portion 69 is had on all of the thread ends passing over the lower leg 69 whereby the tapes or strips 78 and 79 retain all of the threads between the gummed portions thereof of the tape and hold the threads tightly so that none of the threads run loose or are lost in the process and the beam may be moved and used in the usual warp knitting machine.

The warping machine (Figs. 6, 7, 10 and 11) is provided with a hand rod 80 which is supported upon front rail 46 of the machine by means of brackets 81. The hand rail is movable longitudinally of the brackets and makes engagement with the actuating lever 83 attached at its lower end 84 to a rotatable shaft end 85 extending laterally of the warping machine and supported in the brackets 86. Thus, movement of hand rod 80 toward the right or front of the machine produces clockwise rotation in the shaft 85. A link 87 is attached to shaft 85 and has operative connection with the belt moving mechanism or lever 88 centrally thereof, the belt lever being pivotally attached at its lower end 89 and being provided with the belt guide and shifter 90 at its upper end which retains and guides belt 91 extending from pulley 92 of motor 49 to pulley 93 attached to the beam actuating shaft 94. Thus, upon movement of hand rod 80 to the left as seen in Fig. 6 and to the right as seen in Fig. 10 toward the rear end of the machine, actuating lever 83 causes rotation of shaft 85 in a counter-clockwise direction producing movement of the belt guide 88 thereby moving belt 91 from idler pulley 95 to the operating pulley 93.

Actuating shaft 85 is also provided with an additional link mechanism composed of lever 97 extending outwardly from the shaft and the upwardly extending link 98 to which link 99 is attached. Link 99 is anchored to rod 100 rotatably supported in bracket 104, the rod having attached thereto one end of the braking mechanism 101 by means of the arm 102, the brake 101 extending over pulley 103 attached to shaft 94, the other end of the brake being anchored on the pin 105. Upon movement of the hand rod to the right as in Fig. 7, that is, toward the front end of the machine, movement of shaft 85 is induced in a clockwise (counter-clockwise in Fig. 10) direction as noted from the front of the machine thereby causing movement of the belt guide 88, Fig. 10, to the left thereby moving belt 91 from actuating pulley 93 to the idler pulley 95, that is, to the phantom position, Fig. 10, while at the same time counter-clockwise movement of the rod 100 (Fig. 11) to which one end of brake 101 is attached through the lever arm 102 is induced thereby causing an immediate tightening of the brake band and stopping the rotation of the beam actuating shaft 94 and beam 48 within substantially one rotation thereof thus preventing lost threads or threads running loose on the beam.

In order to induce automatic stopping of the machine switch rod 107, Fig. 7, is provided extending longitudinally of the machine and slidably supported adjacent the bottom of the front rail in brackets 108 attached to front rail 46, one end of the rod being attached to spring 109, the other end of the spring being anchored upon a convenient portion of the frame, as by means of stud 110, so that during the operation of the warping machine spring 109 is under tension and tends to move switch rod 107 to the right, that is, toward the front end of the machine.

A solenoid 112 (Figs. 7 and 12) is attached adjacent the lower portion of front rail 46 provided with a retractible latch member 113 (Fig. 12), urged to the protruding position by means of a resilient member or spring 114, one end 115 of the spring being attached to the casing 116 of the solenoid while the other end of the spring is attached to the latch member 113 at 117. Collar 119 attached to switch rail 107 is provided with detent 119' for engagement with the latch member 113 so that during such engagement the switch rod 107 is maintained in the limit of its movement toward the rear end of the machine, that is, toward the left as shown in Fig. 7. By energizing solenoid 112 latch member 113 is retracted into the solenoid permitting automatic movement of switch rod 107 toward the front end of the machine due to the urge of tensioned spring 109. In order to effect automatic operation of the machine collar 120 is attached to hand rod 80 and is provided with a downwardly extending fork 121 for engagement with collar 119 upon the switch rod so that movement of the switch rod toward the front end of the machine automatically actuates the hand rod, causing movement thereof toward the front end of the machine thus moving the operating belt 91 to the idler pulley 95 and at the same time producing braking action in the brake 101 as heretofore described.

When in the operative position, as shown in Fig. 7, a collar 124, attached to hand rod 80, makes electrical contact with an electrically conducting spring member 125 (Fig. 12) attached to an insulated plate 126 mounted upon front rail 46.

Thus, in Fig. 13 electrical attachment is made from a source of current 130 to the resilient spring member 125 through suitable conducting means 131, which in turn by means of contact with collar 124 produces a ground in the front rail 46 and frame of the warping machine. One side of solenoid 112 is grounded to the machine through the line 132 and the other side of the solenoid makes electrical contact with conducting member 32 of the electrode bar through the line 133, while the other side of the power line 134 makes electrical contact with the conducting U-shaped member 31 of the electrode bar 30. It is thus seen that upon decrease in tension of any thread permitting a drop wire 35 to make electrical contact with the electrode bar 30, closed circuit is produced energizing the solenoid 112 producing retraction of latch member 113. Upon escapement of detent 119' automatic movement of the switch bar 107 toward the front end of the machine is induced by spring 109 which movement in turn produces automatic movement of hand rod 80. However, movement of hand rod 80 toward the front end of the machine causes disengagement of collar 124 with the electrically conducting spring member 125 which in turn causes the circuit to be opened, deenergizing solenoid 112 and permitting protrusion of latch 113. Upon clearing up any broken thread or taking up the slack and increasing the tension in any loose thread any drop wire contacting with both sides of electrode bar 30 is raised from contact therewith and movement of hand rod and switch rod to the left will again cause engagement of latch 113 and detent 119' and the maintenance of these rods in a position where operation of the warping machine may occur.

It will thus be seen that the present invention provides a device for automatically stopping a warping machine in a short period of time without the danger of losing threads or of thread ends running loose and provides a mechanism in which a warp beam may be produced directly from spools without the usual mill winding.

What we claim is:

1. In a direct warping mechanism a creel, cones of thread mounted upon the creel, a frame structure, a beam mounted on the frame, means for rotating the beam, threads extending from the cones to the beam and being wound thereon to form a warp upon rotation of the beam, an electrode bar extending outwardly from said creel and comprising the open ends of an electrical circuit, drop wires surrounding said electrode bar and each supported by one of said threads, manually operable means for starting and stopping the beam rotation mounted on said frame and a switch bar mounted on said frame extending longitudinally thereof having operative engagement with said manually operable means for automatically operating the same to stop rotation of the beam, and electrical means normally preventing the operation of said manually operable means by said switch bar and energizable by electrical contact of said wire and said electrode bar to release the switch bar for operating said manual means.

2. In a direct warping mechanism a creel carrying rows of spools of thread, a warping machine, a beam and means for rotating the beam, spaced eyelet bars each extending outwardly from the creel, and each for carrying threads from a row of spools, electrode bars each extending outwardly from the creel and each spaced from an eyelet bar, drop wires surrounding the electrode bars and each supported by a thread, the series of threads passing to a beam for winding thereon to form a warp, a bar extending longitudinally of the warping machine and manually operable by movement longitudinally thereof, a rotatable shaft at one end of the warping machine, a connection between the manually operable bar and the shaft, a brake mechanism attached to the beam rotating means, a link mechanism connecting the shaft and brake for tightening the brake upon the beam operating means, and a switch bar adjacent said manually operable bar for automatically operating the same when automatic operation is induced by contact of a drop wire with said electrode bar upon decrease in tension of a thread.

3. In a direct warping mechanism a beam, a creel, an electrode bar, drop wires supported by threads surrounding said electrode bar, a bar adjacent the top and extending longitudinally of the machine, manually operable longitudinally of the machine, a shaft adjacent the bottom and extending laterally of the machine, connecting means extending from one end of the bar to one end of the shaft, a pulley connected to the beam for rotating the same, a brake controlling the rotation of the pulley, links extending from the shaft to the brake, a switch bar adjacent said manually operable bar and in contact therewith for automatically operating the same, means for automatically inducing operation of said switch bar when electrical contact is made between a drop wire and an electrode bar upon decrease in tension of a thread, said automatic operation of said manually operable bar causing said brake to stop the rotation of said beam before the thread is lost.

4. In a direct warping mechanism, a creel, cones of thread mounted upon the creel, a frame structure, a beam mounted on the frame, means for rotating the beam, threads extending from the cones to the beam for winding thereon to form a warp upon rotation of the beam, electrically conducting means adjacent the creel comprising the open ends of an electrical circuit, contact members in contact with one end of said electric circuit each supported by one of said threads, manually operable means for starting and stopping the rotation of the beam mounted upon said frame and extending longitudinally thereof, a switch bar having operative engagement with said manually operable means for automatically operating the same to stop rotation of the beam and automatic means normally preventing the operation of said manually operable means by said switch bar and energizable by electrical contact of a contact member with said ends of said electrical circuit.

5. In a direct warping mechanism, a creel, cones of thread mounted upon the creel, a frame structure, a beam mounted on the frame, means for rotating the beam, threads extending from the cone to the beam for winding thereon to form a warp upon rotation of the beam, electrically conducting means adjacent the creel comprising the open ends of an electrical circuit, contact members in contact with one end of said electrical circuit each supported by one of said threads, manually operable means freely movable in at least two directions mounted on said frame for manually controlling the rotation of the beam, a switch bar having operative engagement with said manually operable means for automatically moving the same in one direction of movement, and automatic means energizable

and rendering the switch bar operable by electrical contact of a contact member with said ends of said electrical circuit.

6. In a direct warping mechanism, a frame structure, a beam carried by the frame, means for rotating the beam, manually operable means freely movable in at least two directions for manually starting and stopping the beam rotating means, a switch bar having operative engagement with said manually operable means for automatically moving the same in one direction of movement to stop rotation of the beam, and automatic means electrically energizable normally preventing operation of said manually operable means by said switch bar but permitting such operation when electrically energized.

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