Aug. 13, 1940. H. M. HILL 2,210,925

WEAVE CONTROL MECHANISM

Filed May 17, 1938

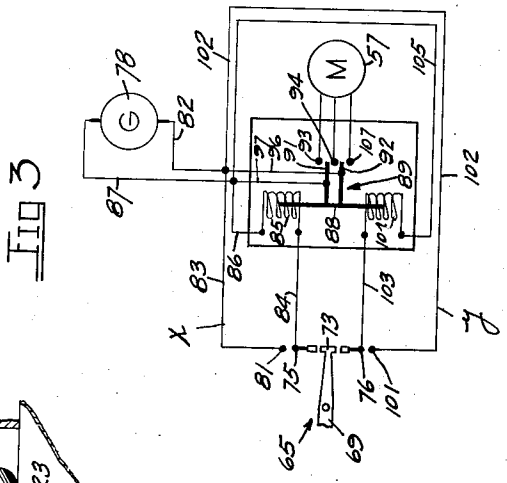


Fig 3

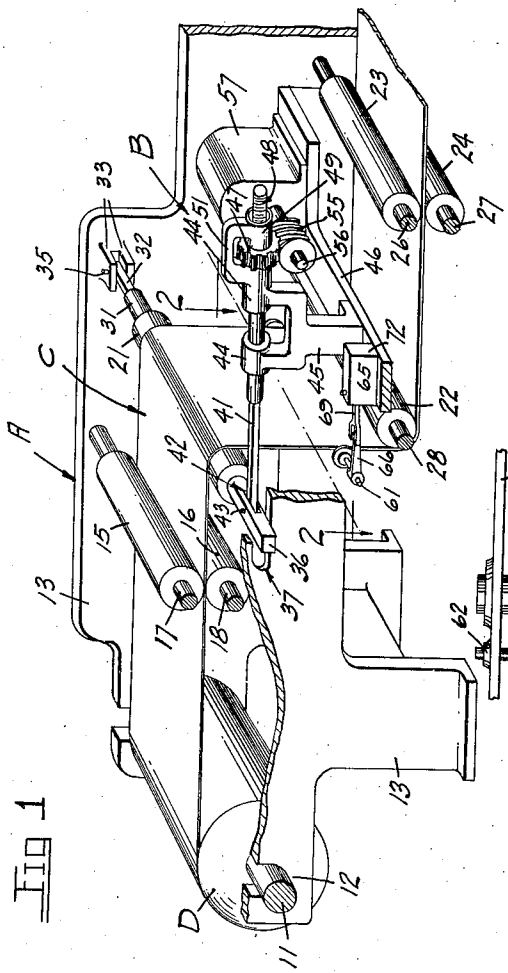


Fig 1

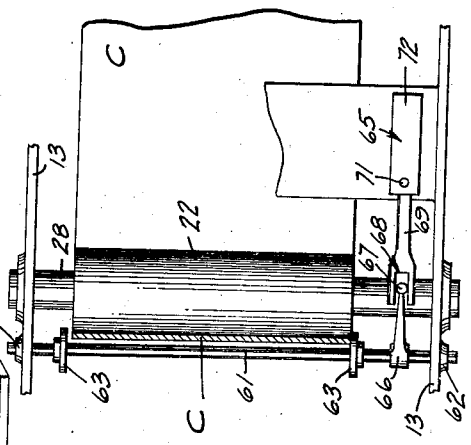


Fig 2

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Patented Aug. 13, 1940 2,210,925

UNITED STATES PATENT OFFICE

2,210,925

WEAVE CONTROL MECHANISM

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Application May 17, 1938, Serial No. 208,458

2 Claims. (Cl. 271—2.6)

The present invention relates to a weave control mechanism for a strip or web feeding or other machine and has particular reference to controlling the path of travel of a web of material in its passage through such machine so that weaving of the web is prevented.

An object of the invention is the provision of a control mechanism for a web feeding machine which functions to maintain the web in a straight line path of travel and to prevent it from weaving or running off to one side or the other to the end that desired operations may be more easily performed on the web.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawing, discloses a preferred embodiment thereof.

Referring to the drawing:

Figure 1 is a perspective view of a web feeding machine including a control mechanism embodying the instant invention, parts being broken away;

Fig. 2 is an enlarged transverse section taken substantially along a horizontal plane indicated by the line 2—2 in Fig. 1, with parts broken away; and

Fig. 3 is a wiring diagram of the electric apparatus used in connection with the control mechanism.

As a preferred embodiment of the present invention the drawing illustrates sufficient of a web feeding machine A to clearly show the operation of a web control mechanism indicated by the letter B. The web to be operated on may be of any desired material and is indicated by the letter C. It may be substantially continuous and may be unrolled from a supply roll D and may be fed forward for desired operations.

The roll D of supply material is preferably supported on a bar 11 which is carried in U-shaped bearings 12 formed in suitable side frames 13 which may constitute the main frame of the web feeding machine A. The web C is preferably pulled from off the roll D by a pair of coacting feed rollers 15, 16 between which the web is threaded. These feed rollers are mounted on cross-shafts 17, 18 which are carried in suitable bearings formed in the side frames 13. The rollers are rotated in unison in any suitable manner in time with the other moving parts of the machine.

The web C advanced by the feed rollers 15, 16 is also preferably threaded over a tension roller 21, thence under an idler roller 22, and is further fed forward by a pair of coacting auxiliary feed rollers 23, 24. It is this train of rollers which direct and feed the web along a predetermined path of travel through the feeding machine and toward its destination where subsequent operations may be performed upon it. The particular form of operation is immaterial for the present invention.

The auxliiary feed rollers 23, 24 are mounted on cross shafts 26, 27 which are carried in suitable bearings formed in the side frames 13. These rollers are preferably rotated in unison in any suitable manner in time with the feed rollers 15, 16 and with the other moving parts of the machine. Idler roller 22 is rotated by frictional engagement with the web C and is therefore loosely mounted on a cross-shaft 28 which is carried in suitable bearings formed in the side frames 13.

Maintenance of the web C in a straight line path of travel to prevent weaving as it passes over the various rollers in the machine is effected by the tension roller 21. This roller is rotated by frictional engagement with the web C passing over it and is therefore loosely mounted on a non-rotatable cross shaft 31.

One end of the shaft 31 is formed with a squared shank 32 which is pivotally disposed between a pair of horizontal lugs 33 formed on the inside face of one of the side frames 13. This end of the shaft is anchored on a pivot pin 35 which extends through the shank 32 and is secured in the lugs 33. The opposite or free end of the shaft is also provided with a squared shank 36 which rests in a horizontal slot 37 formed in the adjacent side frame 13.

This constitutes a floatable mounting for the tension roller and permits shifting of the roller by movement of one end either backward or forward in relation to the direction of travel of the web over the roller. At the same time the roller is maintained in a horizontal plane. Thus by shifting the free end of the roller forward (toward the right as in Fig. 1) the adjacent edge of the web remains taut while the other edge of the web is loosened. This causes a transverse shifting of the web on the roller the web riding over toward the loose edge.

In a similar manner by shifting the roller backward as its shaft is rocked on the pivot pin 35, the edge of the web adjacent the free end of the roller is loosened and the opposite edge remains taut.

The said rollers 15, 16 have the same lineal

surface travel at the web as the rollers 23, 24 and this tends at all times to keep the web moving evenly as long as it is feeding correctly in the center of the rollers. There is some distance between the first feed rollers 15, 16 and the second set of rollers and as is always done when handling long sections of a web, the web itself must needs be under some stretch. In any change of movement of the roller 21, therefore, which results in loosening one side of the web, the opposite side of the web will still be held taut even though the over-all lineal distance along that edge of the web and between the sets of feed rollers is lessened a small amount.

This reverse action will transversely shift the web toward the free end of the roller. In this manner the tension roller may be shifted as desired to maintain the web in a straight line path of travel by quickly realigning the web if it weaves out of such a path of travel.

Shifting of the free end of the tension roller 21 is effected by the control device B which includes an actuating rod 41 connecting with the free or shifting end of the tension roller shaft 31. The connecting end of the rod is preferably rectangular in shape and fits within a slot 42 formed in the tension roller shank 36. The connection is made by a pivot pin 43. The opposite end of the rod may be round and is slidably mounted in a pair of spaced bearings 44 formed on a bracket 45 which in turn is mounted on a transverse truss 46 of the side frames 13.

Actuating rod 41 carries a worm wheel 47 adjacent its outer bearing 44. The worm wheel has an internal screw thread which engages with a screw thread 48 formed on the rod. The worm wheel is held against tthe bearing by a collar section 49. This collar section surrounds the threaded portion of the rod and is connected with the outer bearing 44 by a bridge 51 these parts being integral with the bracket 45. The worm wheel 47 meshes with and is rotated by a worm 55 mounted on a shaft 56 of a reversible electric motor 57 which is bolted to the frame truss 46.

Thus when the electric motor 57 is rotated its worm 55 rotates the worm wheel 47 on the rod 41 and through the screw thread connection between the worm wheel and the rod, the revolving worm wheel effects a longitudinal movement of the rod. It is this movement which shifts the tension roller 21 as hereinbefore explained.

The electric motor 57 being of the reversible type, may be rotated in either direction by passing its actuating electric energy in the proper direction. This provides a simple yet effective control for shifting the tension roller 21 and for keeping the web in the desired path as it passes over the roller.

Actuation of the electric motor 57 and its direction of rotation is controlled automatically by the web itself. This is accomplished through the medium of a detector bar 61 (see also Fig. 2) which is located adjacent the idler roller 22. The detector bar 61 extends transversely of the machine adjacent the path of travel of the web C and is carried in bearings 62 formed in the side frames 13. The bar carries a pair of detector discs 63 a disc being located adjacent each edge of the moving web. The two discs are spaced apart a distance slightly in excess of the width of the web.

Under normal travel of the web, as when it is moving in a straight line, there will be a slight clearance between each edge of the web and the face of the adjacent detector disc 63. If for any reason the web begins to weave, i. e., shift to one side, the edge of the moving web will engage against the face of its adjacent detector disc and thereby push it and the detector bar 61 transversely of the machine.

Movement of the detector bar 61 actuates an electric control switch 65 which governs the action of the electric motor 57. This is effected by an arm 66 which is carried on the detector bar. The outer end of the arm is provided with a ball 67 which operates within a groove 68 formed in one end of a switch lever 69. The switch lever is mounted near its center on a pivot pin 71 secured in a housing 72 of the switch 65. The opposite end of the switch lever is formed with a double hammer head 73 (see Fig. 3) which is normally disposed between a pair of movable switch contacts 75, 76.

Referring now to the wiring diagram in Fig. 3 It will be observed that the control switch 65 and its movable contacts 75, 76 form part of a pair of normally open motor control circuits *x*, *y* which are arranged to direct electric energy from a suitable source of power such as a generator 78, through the electric motor 57, one circuit being for the forward, the other for the reverse motor movement. This flow of electric energy turns the motor in the right direction so that the proper shifting actuation will be applied to the tension roller 21 to correct any weaving of the web as hereinbefore explained.

When the web C shifts the detector bar 61 toward the left, as viewed in Fig. 1, the control switch lever 69 is rocked so that its hammer head 73 engages and moves the switch contact 75. This moves contact 75 into engagement with an adjacent contact 81 (Fig. 3) of the motor circuit X. This closes the circuit X, which will be termed a forward circuit, and electric energy from generator 78 passes through the circuit along wires 82, 83, contacts 81, 75, a wire 84, a solenoid 85, and returns to the generator by way of wires 86, 87.

Current passing through the forward circuit energizes the solenoid 85. The energized solenoid acts on a movable core 88 of a conventional double acting motor switch 89 and shifts the core into a position where contacts 91, 92 carried on the core engage with other contacts 93, 94 which are wired to the motor 57. This establishes an auxiliary circuit which includes the motor and the generator.

Electric energy from the generator 78 then also passes from wire 82 along a wire 96, contacts 92, 94 through the motor 57 returning by way of contacts 93, 91, a wire 97, and wire 87 back to the generator. Current passed through the motor in this direction rotates it forward, i. e., in the proper direction to pull the tension roller 21 forward so that the web C will shift over toward the right as viewed in Fig. 1. This brings it into its straight line position, as hereinbefore mentioned.

In this shifting of the web back into its normal or straight line position the web strikes against one of the discs 63 and also shifts the detector bar 61. This in turn rocks the control switch lever 69 of switch 65 into its central position and its hammer head 73 is then midway between the switch contacts 75, 76. The motor circuit X is thus broken and the solenoid 85 is deenergized.

Deenergizing of the solenoid 85 also opens the motor switch 89 and separates contacts 91, 92 from contacts 93, 94. This breaks the auxiliary circuit and the motor thus stops operating. As

long as the web C remains in its normal straight line position, the control switch lever 69 will remain in a central position and its hammer head will be midway between but not touching the switch contacts 75, 76. The motor will then remain at rest as long as the web is central or until the web again begins to weave.

If the web C weaves toward the right as viewed in Fig. 1 the detector bar 61 moving with the web will rock the control switch lever 69 in a reverse direction to that just described. The lever hammer head 73 will thus push the switch contact 76 into engagement with a contact 101 of the circuit Y. This completes the reverse circuit Y. Current from the generator 78 then passes along wire 82, a wire 102, contacts 101, 76, a wire 103, a solenoid 104, and returns by way of a wire 105 and wire 87.

Current passing through this circuit energizes the solenoid 104. The energized solenoid thereupon acts on the motor switch core 88 and thus shifts the contacts 91, 92 carried thereon which now come into engagement with contact 94 and with a contact 107 both contacts being wired to the motor 57. This re-establishes the auxiliary circuit comprising the generator, motor and connecting wires 82, 96, 87 but transmits the current through the motor in the reverse direction than that before described.

Thus the motor 57 rotates in reverse and the tension roller 21 is pushed backward (Fig. 1). This action effects a shifting of the web C toward the left and it thus returns to its proper straight line position. The returning web striking the other disc 63 shifts the detector bar 61 and the connecting control switch lever 69 is again positioned so that the lever hammer head 73 is again brought into a midway non-contacting position between the switch contacts 75, 76. This breaks the reverse circuit Y and the solenoid 104 is deenergized. The switch motor 89 is thereby opened and all current from generator 78 is cut off from the motor. The motor thus stops operating until again started in either direction as herein described by a subsequent weaving of the web C.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. A weave control mechanism for web feeding machines, comprising in combination: feeding devices for advancing a web of material through the machine, a tension roller disposed in the path of travel of the web and over which said web passes, detector instrumentalities including an axially movable detector bar having spaced portions thereon respectively engageable by opposite edges of the advancing web and an electric control switch connected to and adapted to be closed by axial movement of said detector bar in one direction, a motor controlled by said switch and having an armature shaft, and an actuating bar member secured at one end to the axis of said tension roller and having a direct gear connection at its opposite end with said armature shaft, said motor being responsive to the closing of said switch by the axial movement of said detector bar when the latter is engaged by said web for moving through said gear connection said actuating rod for shifting said tension roller horizontally and at an angle to said web to return the web to a straight line position in its travel through the machine when the web runs out of line.

2. A weave control mechanism for web feeding machines, comprising in combination: feeding devices for advancing a web of material through the machine, a tension roller disposed in the path of travel of the web and over which said web passes, detector instrumentalities including an axially movable detector bar having spaced disk members thereon respectively engageable by opposite edges of the advancing web and a double acting electric control switch connected to and adapted to be closed by axial movement of said detector bar in opposite directions, a reversible motor controlled by said switch and having an armature shaft, and a threaded actuating bar member secured at one end to the axis of said tension roller and having a direct gear connection at its opposite end with said armature shaft, said motor being responsive to the closing of said switch by the axial movement of said detector bar in either direction when the latter is engaged by said web for axially moving through said gear connection said threaded actuating rod in either direction for shifting said tension roller horizontally and at an angle to said web to return the web to a straight line position in its travel through the machine when the web runs out of line.

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