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REVERSING MECHANISM FOR LOOMS

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This invention relates to reversing controls for looms and it is the general object of the invention to provide means for limiting the amount of reversal.

In certain types of heavy looms such as used in the manufacture of carpets it is desirable to be able to reverse the loom by power in the event the shuttle is trapped in the warp shed when the loom protects. Under this condition it is necessary to move the lay backwardly away from the cloth to permit removal of the shuttle, but reversal should be arrested before damage can be done to the picking mechanism.

Many picking mechanisms are made to operate when the actuator moves in one direction only, and there is likelihood of damage if the actuator and the picking cam engage each other in reverse order. It is accordingly a further object of the invention to provide reversing means under control of a part which moves with the loom and is timed to open the reversing circuit prior to engagement of the picking parts in the reverse cycle of the loom.

With these and other objects in view which will appear as the description proceeds, our invention resides in the combination and arrangement of parts hereinafter described and set forth.

In the accompanying drawings, wherein a convenient embodiment of our invention is set forth, Fig. 1 is a front elevation of a loom having our invention applied thereto,

Fig. 2 is an enlarged side elevation of one of the picking mechanisms looking in the direction of arrow 2, Fig. 1,

Fig. 3 is an enlarged side elevation looking in the direction of arrow 3, Fig. 1, and

Fig. 4 is a diagrammatic view of the electric circuit used with the invention.

Referring to Fig. 1, the loom frame 10 supports a lay 11 which swings backwardly and forwardly in the loom during loom operation. Top and bottom shafts 12 and 13 are connected by gears 14 and 15, respectively, which are so proportioned as to cause one rotation of the bottom shaft for two rotations of the top shaft. The lay has two shuttle boxes 16 and 17 and located respectively at the right and left hand ends of the lay and two picker sticks 18 and 19 are provided to pick shuttle S.

The bottom shaft has secured thereto picking arms 20 and 21 extending in opposite directions from the center of the shaft. Each arm has a picking roll 22 for engagement with a cam 23 on a picking shaft 24 extending backwardly and forwardly in the loom. As shown in Fig. 2 the

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cam 23 has a low side 25 and a high side 26, and when the picking arm turns in the direction of arrow a the roll 22 first engages the low part of the cam and moves along the latter to depress the cam and thereby rock the picker shaft. The roll 22 then leaves the high part of the cam and the latter returns to its normal position. Each picking shaft has a power arm 27 connected in usual manner by a sweep stick 28 to the associated picker stick. As the bottom shaft rotates the picker sticks alternate in their periods of activity to pick the shuttle across the loom first to one box and then to the other.

In order to drive the loom the bottom shaft has secured thereto a grooved pulley 30 around which is trained several belts 31 driven by a motor M. The present invention is intended for use on that type of loom which is not provided with the usual clutch, the motor being directly connected to the bottom shaft and causing operation of the loom whenever turning.

The controls forming an important part of the invention are shown more particularly in Figs. 1 and 3. A disk 35 secured in adjusted angular position on the bottom shaft 13 is provided with two notches 36 and 37 on opposite sides of the axis of shaft 13. A stationary stand 40 which may be supported from the floor is provided with a pivot stud 41 on which is pivotally mounted a carrier 42. A dagger rod 43 is slidably mounted in the carrier and has secured thereto a conical collar 44 engaged by one end of a compression spring 45 the other end of which engages the carrier. Ordinarily the spring holds the rod and collar yieldingly in the position shown in Fig. 3, and rod 43 by its weight rests on disk 35.

Carrier 42 has secured thereto a switch 46 operated by a plunger 47 which is normally up to enable the switch to be closed. An arm 48 is pivoted at 49 with respect to the carrier and carries a roll 50 which is normally in high position and preferably in engagement with collar 44 as shown in Fig. 3. A second arm 51 moving with arm 48 extends over the top of plunger 47.

During normal running of the loom the disk 35 turns in the direction of arrow b, Fig. 3, and the two notches 36 and 37 slide under the left end of dagger rod 43 without imparting longitudinal movement thereto. The carrier and parts on it constitute a unit having a slight pivotal movement around its pivotal support 41 as the notched parts of disk 35 pass under the disk engaging end of the rod 43. This small angular motion does not change the relation between the collar 44 and the roll 50, and switch 46 remains closed as the

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loom runs. If the loom should stop as the result of protection and require reversal, the disk 35 will then turn in a reverse direction and dagger rod 43 will enter one or the other of the notches 36 or 37 and be moved to the right, Fig. 3, against the action of spring 45, thereby depressing roll 50 and the arms 48 and 51 to push the switch plunger 47 downwardly to open switch 46.

The notches 36 and 37 are so located that in the reverse motion of the loom one or the other of them will engage rod 43 to open switch 46 before either picking arm 20 can by reverse motion engage the high part 26 of the associated cam 23. It will be understood that this disk 35 rotates every second pick of the loom and it is for this reason that it is provided with two notches, one for each pick.

The electric controls for the motor are illustrated diagrammatically in Fig. 4 which shows three power lines 55, 56 and 57 of a three-phase alternating current electric supply customary in the operation of textile motors. Three wires 58, 59 and 60 lead from a switch FS to the motor and when the switch is closed the motor runs forwardly. At the time of protection the switch is opened and the motor and loom are brought to rest suddenly as set forth in our co-pending application Serial No. 735,710 filed March 19, 1947.

In order to reverse the motor we provide a second switch RS the leads of which from the power wires 55—57 are reversed so far as their connections to wires 58—60 are concerned. Resistances 61 may be desired to cause the motor to run at reduced speed when switch RS is closed.

As shown in Fig. 4 a transformer 62 has a secondary 63 one side of which is connected to a relay 64 which when energized closes reverse switch RS, but which when deenergized effects opening of the reverse switch. A manually operated switch 65 is normally open, and the previously described normally closed switch 46 is connected between switch 65 and the secondary. Under normal loom operations relay 64 remains deenergized so that switch RS is open. After the loom has been stopped it can be reversed by closure of manual switch 65, whereupon current will flow from the transformer through the circuit indicated in the right hand part of Fig. 4 to energize relay 64. This causes reverse motion of the motor and loom and disk 35 will turn in the direction of arrow c, Fig. 4, until it pushes dagger rod 43 to the right to open switch 46. The relay circuit thereupon opens to deenergize the relay and switch RS opens to arrest further reverse motion of the loom.

In order to effect prompt stoppage of the loom as soon as switch RS opens we may use a magnetic brake which is off when either of switches FS or RS is closed but is applied when both switches are open. This brake has a shoe 66 to engage a loom part, such as shaft 13, under action of spring 67 when solenoid 68 is deenergized. The solenoid is connected to wires 58 and 59 and will be energized to move shoe 66 to non-braking position whenever these wires are alive. When switch RS opens as described wires 58—60 are dead, and deenergization of the solenoid permits spring 67 to set the brake.

From the foregoing it will be seen that we have provided simple means by which a loom can be reversed under power by controls which limit the amount of reversal. The notches 36 and 37 act during reversal to open switch 46 before either picking arm 20 can engage the high side of the corresponding cam 23.

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Having thus described our invention it will be seen that changes and modifications may be made therein by those skilled in the art without departing from the spirit and scope of the invention and we do not wish to be limited to the details herein disclosed, but what we claim is:

1. In electric reverse means for the driving motor of a loom having two parts which cooperate to pick a shuttle when the loom is running forwardly, a normally closed electric switch, electric circuit means including the switch effective when closed to cause reverse motion of the motor and loom, and means operated by the loom effective during reverse motion of the loom to open said switch before said picking parts engage each other.

2. In electric reverse means for the driving motor of a loom having two parts which cooperate to pick a shuttle when the loom is running forwardly, a disk rotating in one direction when the loom is running forwardly and rotating in the opposite direction when the loom is reversed, a normally closed electric switch, electric circuit means including said switch and effective when closed to cause reversal of the motor and loom, and means operated by said disk when the latter moves in said opposite direction to open said circuit means before said picking parts can engage each other.

3. In electric reverse means for the driving motor of a loom having two parts which cooperate to pick a shuttle when the loom is running forwardly, a member moving regularly in one direction during loom operation and moving in the opposite direction when the loom is reversed, a normally closed switch, electric circuit means including the switch effective when closed to cause reverse motion of the motor and loom and cause said member to move in said opposite direction, and a second member operated by the first member during reverse motion of the loom and before said picking parts can engage each other to open said switch and thereby stop reverse motion of the loom and motor.

4. In electric reverse means for the driving motor of a loom having two parts which cooperate to pick a shuttle when the loom is running forwardly, a normally closed electric switch, electric circuit means including said switch effective when closed to cause reverse motion of the motor and loom, a rotary member moving in one direction when the motor and loom are running forwardly and moving in the opposite direction when the motor and loom are reversed, and a second member controlling said switch cooperating with said rotary member when the loom is reversed to open said switch and thereby stop the motor at a point in the reverse cycle of the loom occurring before said picking parts can engage each other, said members being so constructed that when the loom is running forwardly the rotary member is ineffective to move the second member.

5. In electric reverse means for the driving motor of a loom, a normally closed electric switch, electric means including the switch effective when closed to cause reverse motion of the motor and loom, a rotary actuator having a notch in the periphery thereof and rotating forwardly when the loom is running forwardly and rotating reversely when the loom is reversed, and a pivotally mounted carrier unit having mounted thereon said switch, operating mechanism to open the switch, and movable means normally engaging said actuator and capable of entering said notch when said actuator is rotating reversely to be

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moved thereby to cause said mechanism to open said switch.

6. In electric reverse means for the driving motor of a loom, a normally closed electric switch, electric means including the switch effective when closed to cause reverse motion of the motor and loom, a pivoted carrier on which the switch is mounted, a rotary actuator rotating with the loom and having a notch therein, means slidably mounted on the carrier engaging the actuator, and operating mechanism on the carrier between the slidably mounted means and the switch effective when the slidably mounted means is moved relatively to the carrier to open said switch, said actuator turning forwardly when the loom is running forwardly and engaging said slidably mounted means without causing relative movement of the latter with respect to the carrier, said actuator turning reversely when the loom is reversed and cooperating with said slidably mounted means by reason of said notch to cause relative movement of the slidably mounted means with respect to the carrier to effect movement of said operating mechanism to open the switch.

7. In electric reverse means for the driving motor of a loom, a normally closed electric switch, electric means including the switch effective when closed to cause reverse motion of the motor

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and loom, a disk rotating with the loom and having a notch therein, a pivotally mounted carrier on which said switch is mounted, a dagger slidably mounted on said carrier and normally engaging said disk, a collar on said dagger normally engaging part of the carrier, resilient means engaging said collar and another part of said carrier holding said dagger in normal position but yielding to enable the dagger to slide relatively to the carrier, and operating mechanism on the carrier operatively engaging the collar and switch and effective when moved by the collar to open said switch, said disk operative when the loom is reversed and because of said notch to cause sliding movement of the dagger relatively to the carrier and cause said collar to operate the mechanism to open the switch.

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