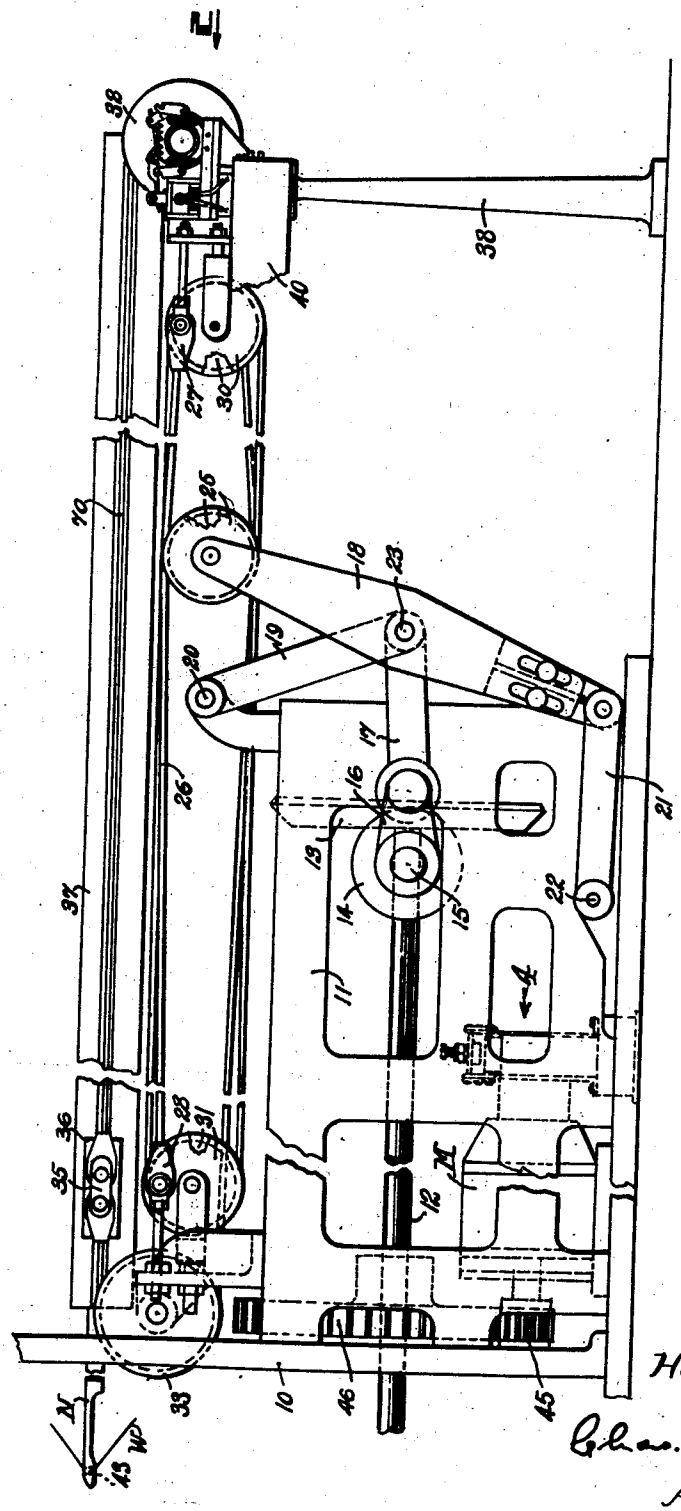
Oct. 14, 1947. H. A. WHITIN 2,429,006

BRAKE FOR AXMINSTER LOOM WEFT NEEDLES

Filed Nov. 13, 1945 3 Sheets-Sheet 1

FIG. 1



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Filed Nov. 13, 1945 3 Sheets-Sheet 2

FIG. 2

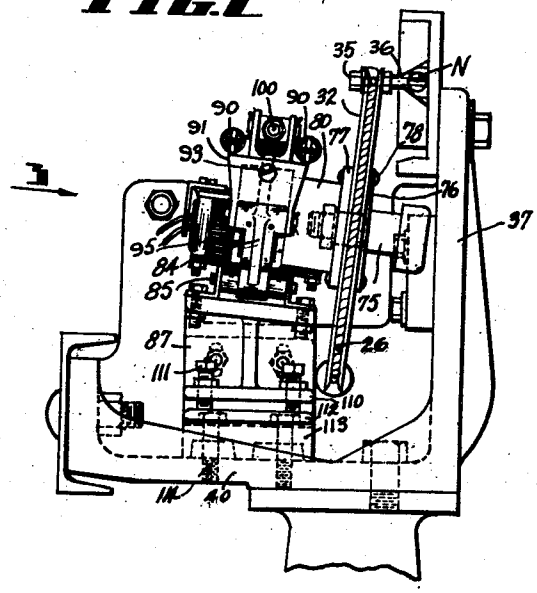
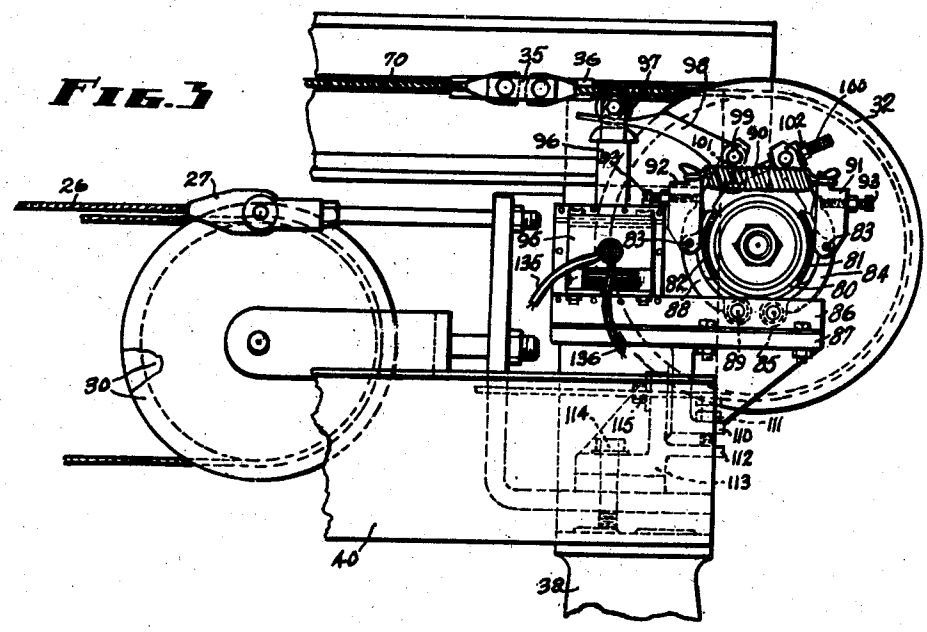


FIG. 3



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BRAKE FOR AXMINSTER LOOM WEFT NEEDLES

Filed Nov. 13, 1945 3 Sheets-Sheet 3

FIG. 4

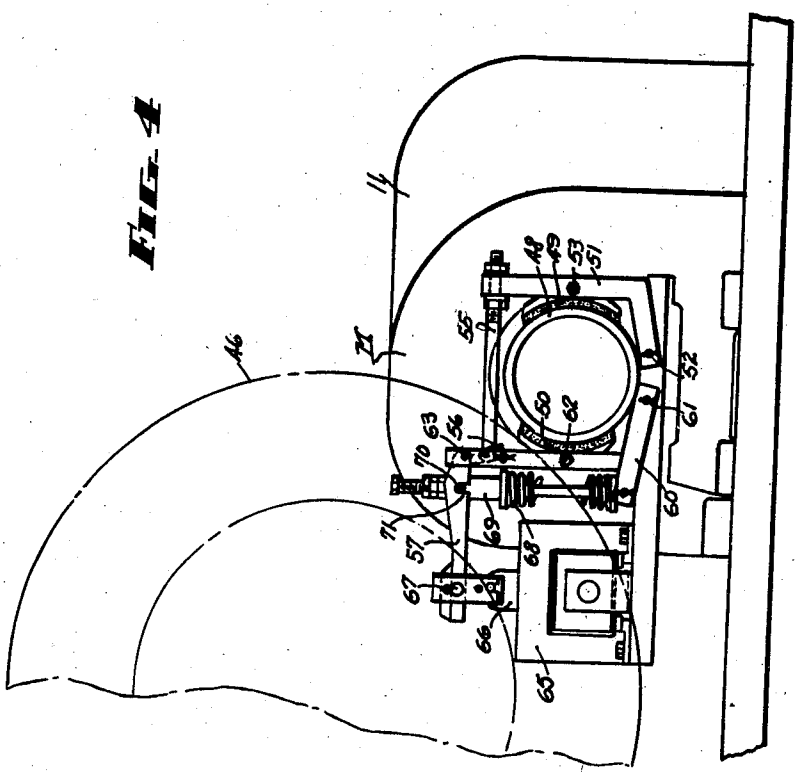
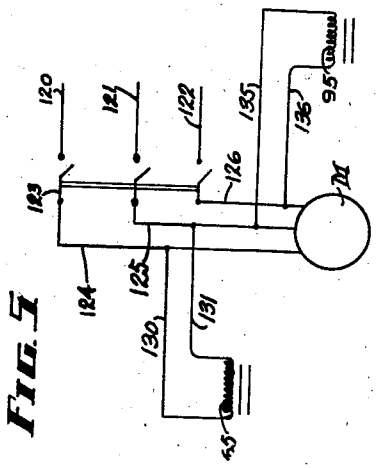


FIG. 5



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BRAKE FOR AXMINSTER LOOM WEFT NEEDLES

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1

This invention relates to brakes for the weft needle of Axminster looms and it is the general object of the invention to provide means for bringing the brake to rest as soon as the loom has stopped to prevent the needle from drawing off excess weft.

Axminster looms employ a long weft needle which moves along a rail into and out of the warp shed for the purpose of laying the weft or filling which is threaded through the free end of the needle. As the needle is inserted into the shed weft is drawn from the stationary package of yarn to form a loop through which the selvage shuttle moves when the needle is fully inserted into the shed. If the loom should stop with the needle partly inserted into the shed it has been found that the needle when driven by mechanisms heretofore used does not come to rest instantaneously but tends to continue its motion due to stretch and bending of certain parts of the driving mechanism, after which the needle recovers itself and has a reverse motion so that ultimately the needle comes to rest at a point corresponding to the point at which the loom stops. The forward motion of the needle due to its momentum, however, draws off a short length of weft which is likely to become looped around the free end of the needle with resultant breakage of the weft when the loom is again started.

It is an important object of my present invention to apply a braking force to the needle at a point close to the needle as soon as the loom is stopped so that the stretching and bending of parts will be reduced to a minimum.

Certain types of Axminster looms employ a so-called multiple sheave needle motion made after the principle set forth in Payne Patent No. 2,258,191 employing a long cable the ends of which are fixed with respect to each other and the intermediate portions of which are trained around sheaves some of which are stationary and others of which move during loom operation. The cable is connected to the needle carriage and motion of the movable sheaves imparts motion to the needle carriage and the needle. In needle operating mechanism of this type it is found that the cable is subject to sufficient stretch to permit the aforesaid undesirable motion of the needle when the loom is stopped. The cable extends from the needle carriage along the needle rail to one of the stationary sheaves and it is an important object of my present invention to apply braking means to this last named sheave whenever the loom is stopped. By this construction only a short part of the cable is under tension

2

at the time of loom stoppage and the excess travel of the needle due to its momentum is greatly reduced.

It is another object of my present invention to provide an electric solenoid control for the brake so constructed that the solenoid is energized during loom operation to disable the brake, but as soon as the loom is stopped the circuit of the solenoid is broken and the brake spring immediately sets the brake shoes against a drum moving with the aforesaid stationary sheave. The loom motor is also provided with a brake normally disabled by a solenoid during loom operation, and it is a further object of my invention to provide electric circuit means for the solenoids of both the needle brake and the loom motor effective to deenergize the solenoids at the same instant. By this construction both of the brakes are applied at the same time with the result that the needle comes to rest when the loom is stopped or very shortly thereafter with insufficient excess motion to draw off an objectionable amount of weft.

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

In the accompanying drawings, wherein a convenient embodiment of my invention is set forth,

Fig. 1 shows a front elevation of an Axminster loom needle motion or operating mechanism having my invention applied thereto,

Fig. 2 is an enlarged end elevation looking in the direction of arrow 2, Fig. 1,

Fig. 3 is a front elevation looking in the direction of arrow 3, Fig. 2,

Fig. 4 is an enlarged view looking in the direction of arrow 4, Fig. 1, setting forth the brake for the loom motor, and

Fig. 5 is a diagrammatic view of an electric circuit for controlling the solenoids at both the needle brake and the loom motor.

Referring particularly to Fig. 1, I have shown a loom frame 10 from the right end of which extends an auxiliary frame 11 supporting the right end of a driving shaft 12 on which is mounted a bevel gear 13. The latter gear meshes with a bevel pinion 14 secured to a shaft 15 rotatable in the auxiliary frame and provided with a crank 16. A connector 17 is operatively interposed between the crank 16 and a lever 18 which is supported on two links the upper of which indicated at 19 is pivoted at 20 with respect to the auxiliary frame and the lower of which indicated at 21 is pivoted as at 22 on the frame 11. A common pivot 23 connects link 17, lever 18 and

link 19, and as crank 16 rotates during loom operation lever 18 is rocked toward and from the frame 10.

The upper end of lever 18 has rotatably mounted thereon movable sheaves 25 around which are trained certain portions of a flexible cable designated generally at 26. One end of this cable is fixed with respect to the auxiliary frame as at 27, while the other end thereof is fixed as at 28. Right and left sheaves 30 and 31, respectively, are rotatable with respect to the auxiliary frame. A single sheave 32 is mounted on the right hand part of auxiliary frame 11 and a second single sheave 33 is mounted at the left end of the auxiliary frame. The cable 26 is trained around the movable and stationary sheaves and is connected as at 35 to a needle carriage 36 slidable backwardly and forwardly on a needle rail 37 supported in part by the auxiliary frame and in part by an upright 38. Frame 11 has an outer extension 40 on which is mounted the sheave 32, this extension lying under and being substantially parallel to the needle rail 37. A weft needle N is secured to the carriage 36 and has an eye 43 through which the weft W is threaded.

A motor M is fixed to the bottom of the auxiliary frame and is provided with a pinion 45 meshing with a gear 46 secured to the shaft 12. As shown in Fig. 4 the motor is provided with a brake drum 48 for cooperation with brake shoes 49 and 50. A lever 51 pivoted at 52 to the auxiliary frame 11 has shoe 49 pivoted thereon as at 53, and the upper end of lever 51 is attached to a rod 55 which extends to the left and is connected to the short arm 56 of a brake controlling lever 57. A second shoe lever 60 is pivoted as at 61 to the auxiliary frame and has the shoe 50 pivoted thereon as at 62. Levers 57 and 60 are pivoted to each other at 63.

A solenoid 65 has a core 66 connected as at 67 to the left end of lever 57. A compression spring 68 is interposed between an extension on lever 60 and a bar 69 having a pin 70 which is received by a slot 71 on the under side of lever 57.

Under normal running conditions solenoid 65 is energized so that the core 66 is pulled down and lever 57 exerts a downward force on pin 70 to compress spring 68. Pin 70 acts as a pivot for lever 57 and arm 56 is to the right as viewed in Fig. 4. The brake levers 51 and 60 are separated and the brake is off. When the solenoid 65 is deenergized the spring expands, lifting the lever 57 and moving the arm 56 to the left, see Fig. 4, as the brake shoes are set to stop the loom motor.

During loom operation the sheave lever 18 is rocked back and forth and the cable 26 causes movement of the needle carriage 36 along the rail 37, moving the needle N into the warp shed not shown to lay a double pick of weft, and then retracting the needle. It is not thought necessary to describe the details of the operation of the sheaves and cable since they are the same as set forth in the aforesaid Payne patent. That part of the cable extending from the outer single sheave 32 to the needle carriage is designated at 70 and is the part which effects removal of the needle from the warp shed and is also the part which follows the needle carriage when the needle is being inserted into the warp shed.

The matter thus far described is of usual construction and operates in the ordinary manner and of itself forms no part of my present invention except as noted hereinafter.

In carrying my present invention into effect I provide brake means for the sheave 32 operative through the section 70 of the cable 26 to arrest movement of the needle more particularly when it is being inserted into the warp shed. Referring more particularly to Figs. 2 and 3, it will be seen that the needle rail 37 is provided with a stud 75 on which the sheave 32 rotates. The sheave is made of flat material such as a phenol condensation product and has a rear plate 76 and a front flange 77 between which the sheave is tightly clamped by means of screws or bolts 78. Flange 77 has formed integral therein a hollow drum 80 rotating with the sheave 32 between right and left brake shoes 81 and 82, see Fig. 3. Shoe 81 is pivoted as at 83 to a brake lever 84 pivoted as at 85 to a stationary support 86 on stand 87 fixed to extension 40. In similar manner shoe 82 is pivoted to a lever 88 pivoted at 89 to the bearing part 86.

Tension springs 90 have the right and left ends thereof connected respectively to hooked heads 91 and 92 pivoted at 83 to levers 84 and 88, respectively. Adjusting screws 93 in each head engage the associated lever for the purpose of varying the tension of springs 90.

Mounted on support 86 is a solenoid 95 having a core 96 the upper part of which has rotatable thereon a roll 97. A lever 98 has the left end thereof extending under roll 97 while the right hand thereof is pivoted as at 99 to lever 88. A link 100 is pivoted as at 101 to a part of lever 98 and has the other end thereof adjustably connected to the upper end of lever 84 as at 102.

In order to provide for vertical adjustment of the solenoid, the brake shoes and their levers the support 87 is provided with a foot 110 through which passes a vertical adjusting screw 111 bearing against a shelf 112 formed on a bracket 113 held as at 114 to the extension 40 of the auxiliary frame 11. A bolt 115 connects the stand 87 with the bracket 113 and cooperates with vertical adjusting screw 111 to hold the support 87 in adjusted vertical position.

Solenoids 65 and 95 are so connected electrically that they are both energized and deenergized simultaneously. A circuit for effecting this result is set forth in Fig. 6 wherein the wires of a three-phase power line which supplies electric power for the motor M are indicated at 120, 121 and 122. A three-pole switch 123 is provided to connect the power line wires with wires 124, 125 and 126 which run to the motor M. The motor brake solenoid 65 is connected by wires 130 and 131 to switch controlled wires 124 and 125, while the sheave brake solenoid 95 is connected by wires 135 and 136 to wires 125 and 126. It will thus be seen that whenever switch 123 is closed both the solenoids 65 and 95 are energized and their associated brakes are moved to non-braking position. Whenever switch 123 is open both of the solenoids become deenergized, whereupon their associated springs set the corresponding brake shoes to effect stoppage of the motor and rotation of sheave 32.

Under normal condition of operation the brake shoes 81 and 82 are in non-braking position and sheave 32 is free to rotate first in one direction and then in the other as the needle is inserted into and removed from the warp shed. If for any reason the loom should be stopped by opening of switch 123, solenoid 95 will become deenergized, whereupon springs 90 will apply the brake shoes 81 and 82 against the hollow drum 80 which is secured to and turns with the sheave 32. This application of the brake at sheave 32 occurs simultaneously with application of the

brake to the motor. The short section 70 of the cable 26 between sheave 32 and the needle carriage 36 undergoes very little stretch during the stopping operation, hence the needle is brought to rest at substantially the same time the loom is stopped. The cable is under sufficient tension to have close frictional contact with the several sheaves around which it is trained and stopping of sheave 32 will act through the frictional engagement between the cable and this sheave to stop the needle carriage.

As previously indicated the reason for using the brake at the sheave 32 is to prevent excess movement of the needle after the loom has been stopped for the purpose of preventing the needle from drawing off an objectionable amount of weft W. This drawing off is particularly objectionable while the needle is being inserted into the shed and it will be noted that the brake is applied to that sheave of system of sheaves, namely sheave 32, from which the short section 70 of the cable leads to the needle carriage. Application of the brake to sheave 32 when the needle is being moved out of the warp shed will operate through the remaining length of the cable in which there may be some appreciable stretch, but there is no likelihood that excess weft will be drawn off if the needle is stopped when being retracted from the warp shed and such stretch as may occur in that part of the cable other than the section 70 will not be accompanied by harmful results or entanglement of excess weft with the eye end of the needle.

From the foregoing it will be seen that I have provided simple means for stopping the needle of an Axminster loom simultaneously with stoppage of the loom. I accomplish this result by use of a brake which is applied to one of the sheaves in the so-called multiple sheave needle operating mechanism. It will also be seen that the brake is applied to that part of the system of sheaves set forth particularly in Fig. 1 from which the cable leads by a short section 70 the stretch of which is negligible. It will also be seen that the brake is controlled through a solenoid which is normally energized during loom operation to disable the brake but which becomes deenergized whenever the loom motor circuit opens to permit application of brake shoes 81 and 82 by means of spring 90. It will further be noted that both the motor and sheave 32 are provided with the same general character of brake mechanism, that is, each employs a spring normally disabled by a solenoid during loom operation, and it is for this reason that the two brakes become effective at substantially the same time.

Having thus described my 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 I do not wish to be limited to the details herein disclosed, but what I claim is:

1. In an Axminster loom having a needle for laying weft, an operating cable for the needle, attaching means operatively connecting the cable to the needle, sheave means for said cable including a sheave from which the cable leads directly to said attaching means when the needle is being inserted into the warp shed, actuating means effective to move said cable in a direction to cause said attaching means and needle to move away from said sheave, and a brake for said sheave operative to stop rotation of the latter when said actuating means stops operating.

2. In an Axminster loom having a weft laying needle and operated by an electric motor, a weft laying needle actuating mechanism for the needle operated by power derived from the motor, electromagnetic brake means for the actuating means and needle normally inoperative to stop the needle during loom operation, and means causing the electro-magnetic brake means to stop the actuating means and needle when said actuating mechanism stops due to stoppage of said motor.

3. In an Axminster loom having an electric driving motor therefor, electromagnetic brake means for the motor, a weft laying needle, driving mechanism operatively connecting the motor to the needle and causing movement of the needle into the warp shed by power derived from the motor, another electro-magnetic brake means in non-braking position during loom operation but capable when in braking position to cause stoppage of the needle, and control means causing simultaneous operation of both of said electro-magnetic brake means to stop the needle by the brake means corresponding thereto whenever the motor is stopped by the brake means corresponding therefor.

4. In an Axminster loom having a weft laying needle movable along a needle rail, the loom having provision for being stopped at any point of travel of the needle along the rail, an electromagnetic brake for the needle normally in non-braking position, and means causing said electromagnetic brake to move to braking position to stop the needle whenever the loom is stopped.

5. In an Axminster loom having a weft laying needle, a flexible operating cable connected to the needle, actuating mechanism to move the cable and cause the latter to give the needle a weft laying stroke, brake means normally in inoperative position during loom operation but moving to operative position when the actuating mechanism stops, and means moving with the cable and having motion thereof stopped by the brake means when the latter moves to operative position.

6. In an Axminster loom having a weft laying needle, a carriage for the needle, a flexible operating cable connected to the carriage, actuating means moving during loom operation and causing the cable to give the needle a weft laying stroke, a sheave around which the cable is trained and from which the cable extends tangentially directly to the needle carriage when the needle is having a weft laying stroke, a brake for said sheave, and means to cause said brake to stop rotation of said sheave upon stoppage of said actuating means.

7. In an Axminster loom having a weft laying needle, a carriage for the needle, an actuating cable operatively connected to the carriage, driving mechanism moving the cable during loom operation and causing the cable to give the needle a weft laying stroke, a guide sheave for the cable having tight frictional engagement with the cable during the weft laying stroke and from which the cable leads directly to the carriage, brake mechanism for the sheave, and means causing said brake mechanism to stop the sheave upon stoppage of the driving mechanism and thereby stop the cable and needle.

8. In an Axminster loom having a driving motor therefor and a weft laying needle which is given an operating weft laying stroke by a force derived from the motor, two electro-magnetic brakes, and means causing simultaneous operation of said brakes and capable of causing said

simultaneous operation at any time during the weft laying stroke of the needle, one of said brakes acting to stop the motor and the other of said brakes acting to stop movement of the needle.

9. In an Axminster loom having a weft laying needle and weft threaded through the eye of the needle, actuating mechanism for the needle, a flexible member operatively connecting the needle to the actuating mechanism, said needle due to the flexibility of said member tending to continue traveling during a weft laying stroke thereof subsequent to stoppage of the actuating mechanism, and means operatively connected to the flexible member along a length thereof between the needle and said actuating mechanism to apply a braking force to the flexible member and needle and reduce said tendency upon stoppage of said actuating mechanism.

10. In weft needle operating mechanism for an Axminster loom having a driving motor, a brake for the motor normally in off position during loom operation and moving to on position to stop the motor when loom operation stops, an oscillating lever, driving connections between the motor and the lever to oscillate the latter when the motor is operating, a weft needle, a flexible cable operatively connecting the lever and needle to cause movement of the latter due to oscillation of the lever, a guide sheave for the cable engaging part of the cable along a length thereof between the lever and needle, a brake for said sheave, and means causing operation of the brake for the sheave whenever the brake for the motor operates to stop the latter.

11. In weft needle operating mechanism for an Axminster loom having a driving motor and a weft needle, an oscillating lever operatively interposed between the motor and the needle, operating connections between the motor and the lever causing oscillation of the latter during loom operation, flexible cable operating connections between the lever and the needle causing movement of the latter when the lever oscillates, said lever when moving in one direction placing part of the cable under tension to move the needle in one direction and cause the needle to draw the other part of the cable along therewith, said lever when moving in the opposite direction placing said other part of the cable under tension to move the needle in the opposite direction and causing the needle to draw said first part of the cable along therewith, a sheave engaging one of said parts of the cable, a brake for said sheave normally in non-braking position during loom operation, and means causing the brake for the sheave to arrest motion of the latter when the motor stops during movement of said lever in either of said directions of movement thereof.

12. In an Axminster loom operating with a driving motor and having a weft needle, a train of driving connections between the motor and needle including an oscillating lever and driving connections between the motor and the lever to oscillate the latter when the motor runs, said train including also flexible cable means connecting the lever to the needle to cause movement of the latter when the lever oscillates, two brake means, one for the motor adjacent to one end of said train and the other for the cable means adjacent to the other end of said train, said brake means both being in off position during loom operation, and means causing both of said brakes to move to on position simultaneously whenever the loom is stopped at any point in the loom cycle, the brake for the motor arresting the latter and the connections between the motor and the lever, and the other brake arresting the cable connections between the lever and the needle.

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