Dec. 7, 1948. C. R. KRONOFF ET AL 2,455,504

DRIVING CONTROL FOR AXMINSTER LOOMS

Filed May 1, 1947 3 Sheets-Sheet 1

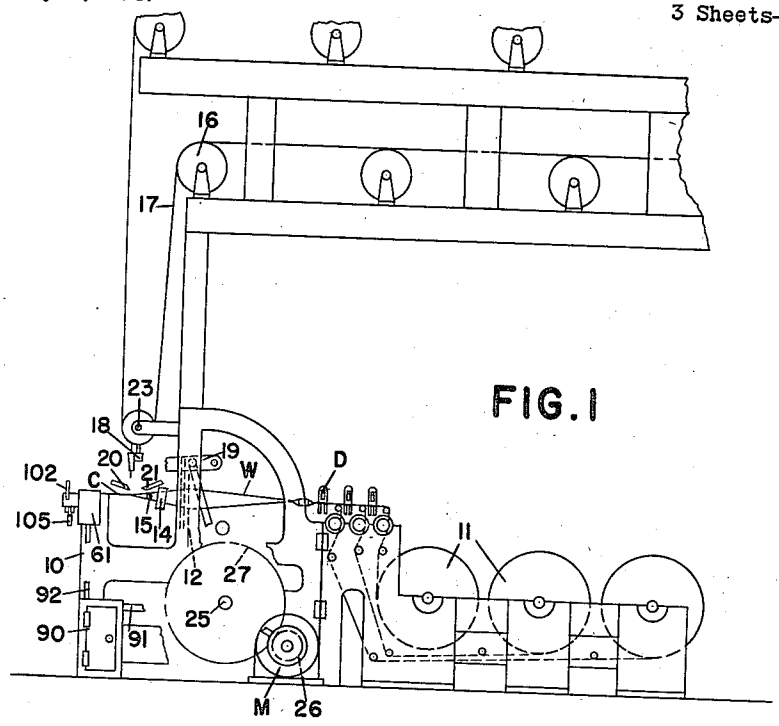


FIG. I

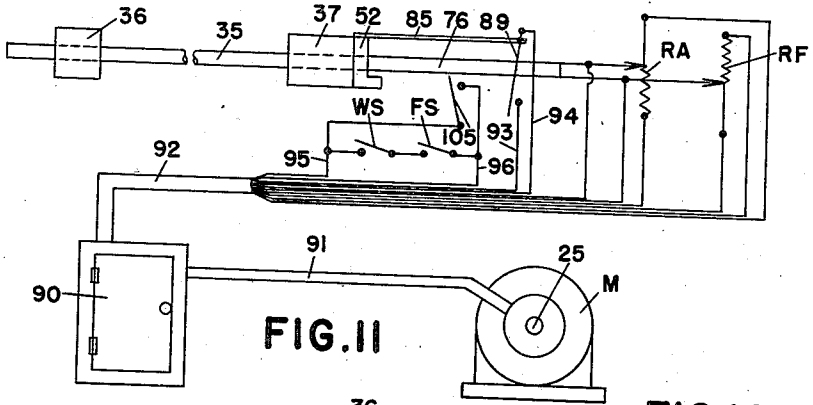


FIG. II

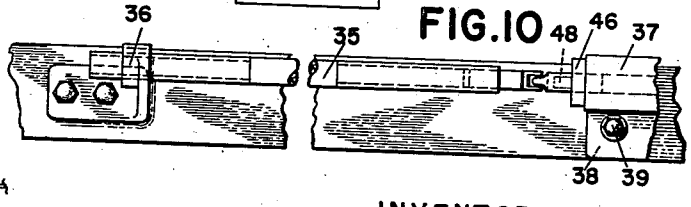


FIG. 10

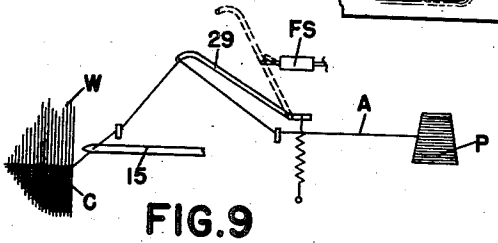


FIG. 9

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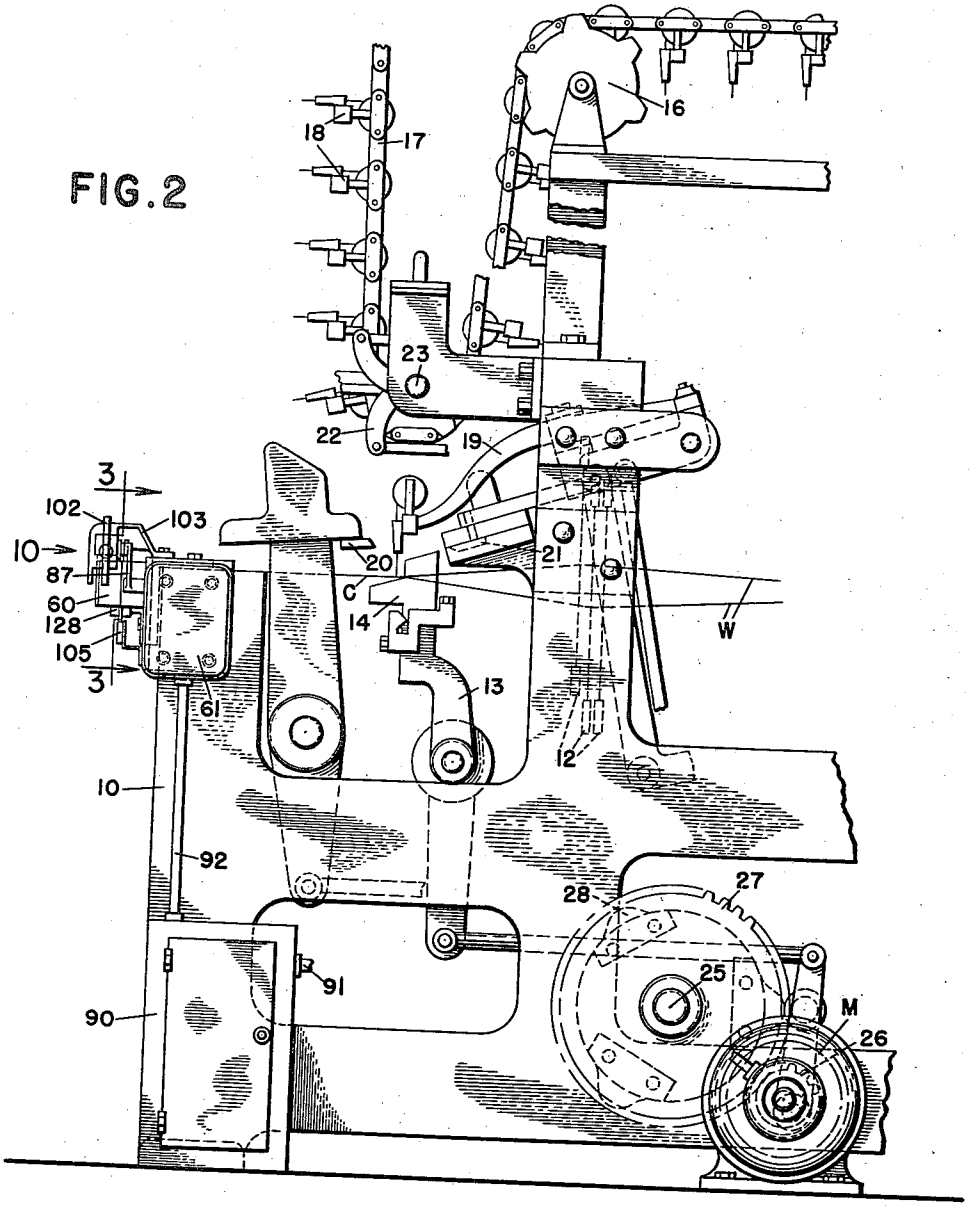
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FIG.2



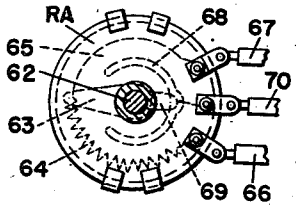


FIG.7

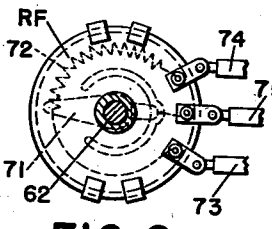


FIG.8

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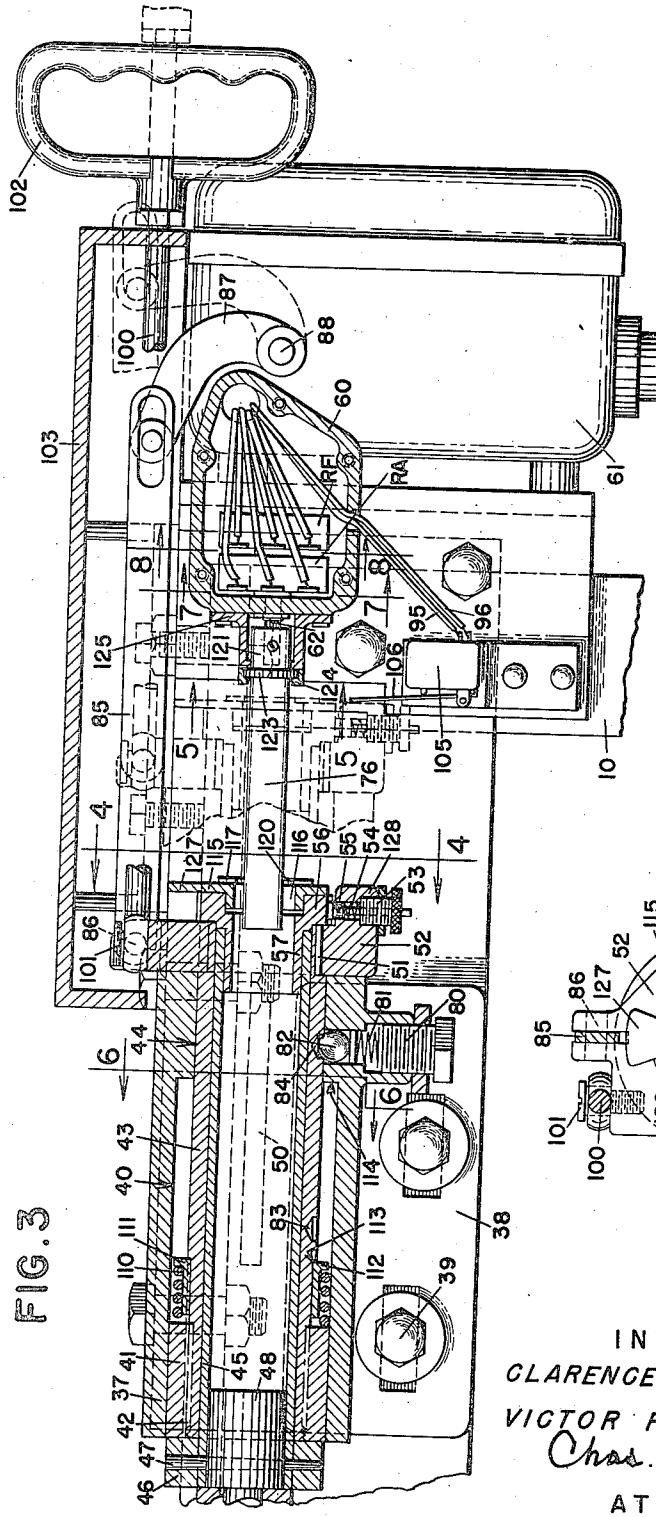


FIG. 3

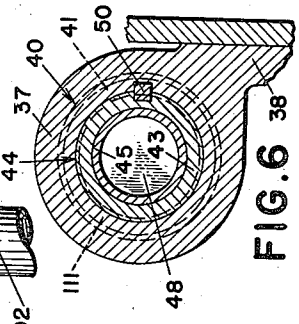


FIG. 6

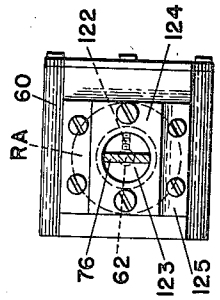


FIG. 5

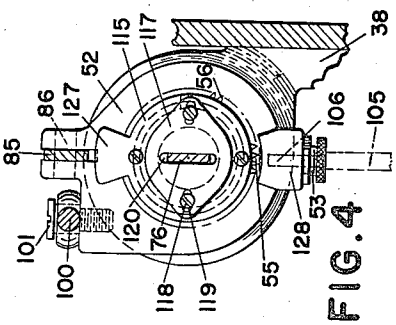


FIG. 4

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DRIVING CONTROL FOR AXMINSTER LOOMS

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Application May 1, 1947, Serial No. 745,350

8 Claims. (Cl. 139—1)

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This invention relates to Axminster looms and it is the general object of the invention to improve the shipping and speed control mechanism shown in our copending application Ser. No. 689,405, filed August 8, 1946.

Axminster looms ordinarily operate with a weft laying needle located at one side of the loom and cooperating with a weft tension arm which in some instances is several feet from the shipper mechanism. Whenever the weft breaks it is customary for the weaver to rethread the weft from the stationary supply through the tension arm and then start the loom while holding the thread. This operation is inconvenient with the structure shown in the aforesaid application because of the distance between the shipper mechanism and the tension arm, particularly when applied to wide looms, and it is an important object of the present invention to provide means by which the shipper bar can be operated from a position near the weft tension arm.

In the aforesaid application provision is made for stopping the loom motor by any one of several stop motions on the loom, and when the loom stops the shipper bar remains in its running position. It may be that correction of the fault which causes stopping will involve momentary running of the loom, but this cannot be readily accomplished by the shipper mechanism shown in said application. It is another object of our present invention to provide means by which an additional endwise movement of the shipper bar in the direction in which it is ordinarily moved to start the loom will permit so-called jogging or inching. This additional movement is against the action of a spring which immediately returns the shipper handle to its normal running position when released by the weaver.

The aforesaid application sets forth a torque bar square in cross section for connecting the shipper bar to the variable resistances which control motor speed, but this bar is expensive and requires close fitting. It is another object of the present invention to simplify the construction of this bar so that it may be made more cheaply and not require accurate alignment with the axis of the shipper bar.

It is also desirable to protect the sweep arms of the resistance devices against excess motion when the shipper bar is turned rapidly to effect a change in motor speed. It is still another object of the present invention to provide a stop operating preferably in connection with the aforesaid torque bar to limit angular movement thereof and thus protect the sweep arms.

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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 diagrammatic side elevation of an Axminster loom having our invention applied thereto,

Fig. 2 is an enlarged side elevation of the forward part of the loom showing the shipper mechanism in running position, parts, such as the needle motion, being omitted,

Fig. 3 is an enlarged vertical section on line 3—3 of Fig. 2,

Figs. 4, 5 and 6 are vertical sections on lines 4—4, 5—5 and 6—6, respectively, of Fig. 3,

Figs. 7 and 8 are vertical sections of the motor controlling resistances on lines 7—7 and 8—8, respectively, of Fig. 3,

Fig. 9 is a diagrammatic view showing a weft tension arm and the relation which it sustains to the stationary weft supply, the weft needle, and the fabric,

Fig. 10 is a front view of the shipper bar extending across the loom looking in the direction of arrow 10, Fig. 2, and

Fig. 11 is a diagrammatic view showing electric circuits employed with the invention.

Referring particularly to Figs. 1 and 2, a loom frame 10 supports warp beams 11 supplying warp W which passes through harness frames 12. An electric warp stop motion D acts to open switch WS, Fig. 11, when a warp thread breaks. A lay 13 has a reed 14 through which the warp passes and by which the weft is beaten up after being laid by a weft needle 15, see Fig. 9. The overhead mechanism 16 includes a tube frame transporting chain 17 to which are detachably connected a series of tube frames 18. A transfer arm 19 is provided at each end of the loom for the purpose of disconnecting the tube frames one at a time from the chain 17 and moving them down to tuft forming position. After the tufts have been formed in the fabric C the tube frame is raised a short distance and the tufts are cut by means of front and back knives or pile cutters 20 and 21, respectively. The tube frame is then returned to the chain and the latter is advanced to bring the next tube frame into transfer position by means of feed mechanism 22 which rocks a pull-over shaft 23. All of thees parts vibrate more or less during loom operation, as set forth more fully in the aforesaid application.

Power for driving the loom is derived from a

direct current shunt wound motor M geared directly to the bottom shaft 25 by a pinion 26 and a gear 27. In the present instance only one cam 28 is shown on shaft 25, namely, the one for operating the lay. It is to be understood, however, that other cams operate the tuft cutting knives 20 and 21, the transferrer arms 19, the chain advancing mechanisms 22, as well as other parts of the loom not specifically set forth herein. The loom operates whenever the motor runs, and the usual clutch is omitted.

The weft needle 15 is generally operated by a mechanism not shown located at one side of the loom and deriving its power from shaft 25. The weft system includes a tension arm 29 for the weft or filling A drawn from a stationary weft package P.

The motor is controlled by a shipper bar 35, see Fig. 10, the left end of which is guided in a slide bearing 36 secured to the loom frame. The right end of bar 35 is connected to a mechanism designated generally at 37, see Figs. 3 to 6, including a bearing 38 secured as at 39 to the loom frame. The bearing 38 has a bore 40 in which is slidably mounted a short cylinder 41 threaded at 42 to a longer cylinder 43 the right end of which slides in bearing 44 of less diameter than bore 40, see Fig. 3.

Rotatable within the cylinder 43 is a still smaller cylinder or sleeve 45 the left end of which projects beyond the cylinder 43 and has a collar 46 secured thereto by a pin 47. The latter passes through a plug 48 within sleeve 45 the left end of which is connected as indicated in Fig. 10 to shipper bar 35. A key 50 prevents angular movement of cylinder 43 with respect to the bearing 38 but allows it to slide longitudinally in bearing 44.

The right end of cylinder 43 is keyed as at 51 to a collar 52 in which is threaded an adjusting screw 53 which forces a spring 54 against a lock plunger 55. The plunger cooperates with a notched locked wheel 56 having a hollow hub 57 secured to sleeve 45 in any approved manner, as by welding.

A stationary housing 60 secured to switch box 61 contains resistances designated at RA and RF to control the armature and field coil, respectively, of the motor. A stub shaft 62 is rotatable on housing 60 and has secured thereto but insulated therefrom sweep arm 63 of unit RA, see Fig. 7, to engage a resistor element 64 mounted on a disk 65 made of insulating material and fixed to housing 60. The lower part of element 64 is the variable resistance part thereof and is connected to wire 66. The upper part of element 64 is a conductor and is connected to wire 67. An arcuate conductor 68 on disk 65 engages the tail 69 of arm 63 and is connected to wire 70.

In similar manner, unit RF has an arm 71 operated by stub shaft 62 and a resistor element 72 inverted relatively to element 64. Wires 73, 74 and 75 lead from unit RF. A torque bar 76 to be described in detail hereinafter turns with sleeve 45 and is connected to stub shaft 62 to permit turning of sweep arms 63 and 71 by angular movement of shipper bar 35.

With both arms 63 and 71 in their lower right hand positions all the armature resistance between wires 66 and 70 is cut out, and all the field resistance between wires 74 and 75 is cut in. Under these conditions the motor runs at a maximum speed. As the arms turn in a clockwise direction, Figs. 7 and 8, due to a similar motion of the shipper bar 35, the resistance between

wires 66 and 70 increases to reduce armature current, but the field resistance remains unchanged. When the arms reach the position shown in Figs. 7 and 8 maximum armature resistance is effective as well as maximum field resistance, and the motor runs at a reduced or intermediate speed. Further clockwise turning of the arms leaves the armature resistance unchanged, but there will be a reduction in the field resistance with further reduction in the motor speed. When the arms reach their extreme upper right position all the armature resistance will be in and all of the field resistance will be out, and the motor will be running at its slowest speed.

The bearing 38 has threaded thereinto a screw 80 which holds a spring 81 against a ball lock 82. The latter can enter one or the other of two lock notches 83 and 84 in cylinder 43 to hold the latter and sleeve 45 yieldingly locked in either the full line or dotted line position of Fig. 3.

A link 85 is pivoted as at 86, Figs. 3 and 4, to collar 52 and extends to the right to have connection with an arm 87 attached to a small shaft 88 carried by switch box 61. The latter contains a switch 89, see Fig. 11, which will be open when link 85 is to the left, full lines Fig. 3, but will be closed when the link is in the right hand position indicated in dotted lines.

The lower left hand part of Figs. 1 and 2 show a cabinet or box 90 which contains the electric devices for changing the speed of the motor when the shipper bar 35 is moved angularly. These devices of themselves form no part of our present invention, but are under control of the resistances RA and RF. A cable 91 runs from the cabinet to the motor M and will ordinarily contain wires leading to the motor armature and its field coil. A second cable 92 leads from cabinet 90 and has wires 93 and 94 leading to the switch 89, and also the wires connected to the resistances RA and RF. Stop motion switches WS and FS are in series with wires 95 and 96 and are normally closed to permit completion of the motor circuit when switch 89 is closed. If either stop motion switch opens the motor stops with the shipper bar remaining in its angular position.

When it is desired to stop the loom the shipper bar 35 will be moved to the left to return the parts on bearing 38 to the full line position shown in Fig. 3 the effect of which will be to open switch 89 to stop the motor. This movement of the shipper bar to the left does not disturb the setting of the resistances RA and RF, since these settings are held by the lock wheel 56, and the loom can therefore be restarted at its former speed.

Except for certain changes which will be pointed out hereinafter, such as cylinder 41, the matter thus far described may be substantially the same as that set forth in our aforesaid pending application.

Our present invention relates to an auxiliary handle by which the shipper bar may be moved when the weaver is near the weft tension arm 29, a jogging switch to cause running of the motor when the loom has been stopped by a stop motion switch, improvements relative to the previously mentioned bar 76, and a stop to protect the sweep arms 63 and 71 of the resistances.

In carrying the first feature of the invention into effect we provide a rod 100 pivoted as at 101 to the collar 52 and provide the right end of it as viewed in Fig. 3 with a handle 102. This han-

dle may be guided in a housing 103 secured to or at least fixed with respect to the bearing 38 and switch box 61. The rod 100 is made of such length that the handle 102 will be readily accessible to the weaver when he is standing in front of the weft tension arm 29 and holding a weft thread incident to repair of a weft break. Since collar 52 is keyed to the cylinder 43 and the latter in turn is keyed at 50 to the bearing 38, an endwise pull to the right, Fig. 3, on handle 102 will not change the angular setting of the sweep arms and the weaver can resume weaving after having mended the broken weft thread without a change in motor speed. Handle 102 is not connected directly to the shipper bar 35 or sleeve 45, and therefore does not interfere with their turning.

The second feature of the invention includes an electric switch 105 having an arm 106 positioned fo rengagement with collar 52. Ordinarily, arm 106 will not be engaged by collar 52 when the loom is running, but if for any reason the loom should be stopped by one or another of its stop motions there will be an electric break in the connections between wires 95 and 96, Fig. 11, by opening of one or another of the stop switches. This stopping of the loom will occur with the shipper bar in its right hand position, where it will remain with lock ball 82 in pocket 83. If the weaver desires to jog or inch the loom incident to repair of a thread breakage he will give the shipper bar an additional movement to the right as viewed in Fig. 3, thereby closing switch 105. It will be apparent from Fig. 11 that this results in electric connection of wires 95 and 96 which will cause the motor to run. Obviously, pulling on handle 102 will have the same effect.

It is desirable that the shipper bar 35 return to its normal running position after a jogging operation, and we insure this result by means of a compression spring 110 surrounding a small sleeve 111 on cylinder 43. The left end of this spring as viewed in Fig. 3 will normally bear against the cylinder 41, while its right end bears against a flange 112 on sleeve 111 to move the latter against a shoulder 113 on cylinder 43. When the shipper bar is in normal running position the flange 112 will be close to or in contact with a wall 114 between the bores 40 and 44 formed on the bearing 38. There is a slight space between the left end of sleeve 111 and cylinder 41 permitting a small amount of endwise movement of cylinder 43 and therefore collar 52 to the right of normal driving position. Such movement places the spring 110 under compression, and as soon as the weaver releases the shipper bar the spring expands to move the cylinder 43 to the left by a force transmitted through collar 46, thereby moving the collar 52 away from arm 106 to permit switch 105 to return to its normal open position.

The third feature of the invention relates more particularly to the bar 76 which is preferably of rectangular cross section so that it may possess some flexibility. As shown in Fig. 4, the lock wheel 56 has secured thereto a fitting 115 formed with a bore or opening 116 across which extends a holding plate 117 held in place by set screws 118 tapped into lock wheel 56. Plate 117 has horizontal slots 119 for screws 118 to permit horizontal adjustment of the plate 117. Plate 117 also has a vertical slot 120 through which the left end of bar 76 extends as viewed in Fig. 3. Rotation of sleeve 45 therefore causes the left end of bar 76 to move angularly.

The right end of the bar 76 has formed there-

with a cylindrical hub 121 secured to the previously mentioned stub shaft 62 by a set screw 122. A flange 123 on the hub is located between a plate 124 and a small hollow stand 125 supporting it and fastened to the housing 60. Flange 123 prevents substantial endwise movement of bar 76, but fits loosely between the plate and stand 125.

By reason of the adjustment of plate 117 and slot 120, bar 76 need not be set as accurately as is necessary in the arrangement shown in the aforesaid application, and it is not necessary that the axis of stub shaft 62 coincide with the axis of sleeve 45.

In the fourth feature of the invention a stop lug 127, see Fig. 4, is formed integral with the fitting 115, and the collar 52 is formed with a stop boss 128. When the shipper bar is turned the stop lug 127 will turn with it but will engage the boss 128 before the sweep arms 63 and 71 of the resistance units come to the ends of their respective resistance elements. These sweep arms are therefore protected and will not be damaged even though the shipper bar be rotated abruptly.

From the foregoing it will be seen that we have provided a convenient auxiliary handle for the shipper bar accessible from a position adjacent to the weft arm 29 and connected to the shipper bar in such manner as not to cause angular movement of the resistance sweep arms when rod 100 is pulled. This condition is true whether the handle 102 be pulled for the purpose of starting the loom, or for jogging. When the loom motor is jogged either by the shipper bar or handle 102, spring 110 will be compressed as switch 105 is closed, but upon release the spring will move the collar 52 back to its normal running position, and switch 105 will open. It will also be seen that the jogging switch 105 can be operated with the shipper bar in any of its angular positions. It will further be seen that the bar 76 is made and mounted in such manner that it can be cheaply constructed and fitted to the sleeve 45 by means affording slight vertical movement relative to the axis of sleeve 45 and also horizontal adjustment. Furthermore, the stop lug 127 serves as a protection for the sweep arms 63 and 71.

The rotary features for the speed control shown in the foregoing description are not claimed herein but are the subject of a divisional application filed by us on January 24, 1948, Serial No. 4098.

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 shipper control mechanism for the driving motor of an Axminster loom, fixed bearing means, a member slidable in said means but held against rotation relatively thereto, a cylinder moving longitudinally with and rotatable within the member, a shipper bar operatively connected to the cylinder capable of longitudinal and rotary movements to cause longitudinal and rotary movements of the cylinder, rotary electric speed control means for the motor controlled by the cylinder, and an auxiliary handle connected to the member to cause longitudinal movement of the latter and the shipper bar for any angular position of the cylinder with respect to the member.

2. In shipper control mechanism for the driving motor of an Axminster loom, a stationary bearing, a sliding member capable of longitudinal sliding movement only with respect to the bearing,

a rotary member movable angularly with respect to the bearing and moving longitudinally with the member, rotary electric motor speed control means operatively connected to and turning angularly with said rotary member, an elongated shipper bar on one side of the bearing and operatively connected to the members, and handle means connected to said sliding member and extending on the opposite side of said bearing by which said sliding member may be moved longitudinally with respect to the bearing for any angular position of said rotary member and speed control means.

3. In shipper control means for the driving motor of an Axminster loom, a stationary bearing, a member slidable longitudinally in said bearing but held against angular movement relatively thereto, a sleeve rotatable within said member and moving longitudinally therewith, rotary electric speed controlled means for the motor operatively connected to and turning with the sleeve, a longitudinally and rotary elongated shipper bar on one side of the bearing operatively connected to the sleeve and member, a collar fixed to said member, and handle means connected to said collar to move said member and sleeve longitudinally of the bearing means for any angular position of said sleeve with respect to the member.

4. In shipper control means for an Axminster loom having a driving motor and a tension arm, a stationary bearing, a member slidable longitudinally in the bearing but held against rotation therein, a sleeve rotatable within the member and moving longitudinally with the member, rotary electric speed control means for the motor operatively connected to the sleeve, a shipper bar operatively connected to the member to cause longitudinal movements thereof and operatively connected to the sleeve and rotating therewith and extending from said bearing in a direction away from the tension arm, and handle means operatively connected to said member and extending in a direction from the bearing toward said tension arm.

5. In shipper control means for an Axminster loom having a driving motor and a weft tension arm, a rotary and longitudinally movable shipper bar, a bearing intermediate the bar and the tension arm, a member slidable longitudinally in the bearing but held against rotation relatively thereto, a second member moving longitudinally with the first member and rotatable with respect to the bearing, said shipper bar connected to both of said members and moving longitudinally with both of them and angularly with the second member, rotary electric speed control means for the motor turning with the second member, a motor controlling switch operatively connected to the first member, and handle means operatively connected to the first member and extending from the latter toward the tension arm to cause longitudinal movement of both members for any angular position of the second member relatively to the bearing.

6. In shipper control mechanism for an Axminster loom operating with a driving motor, a stationary bearing, a member slidable longitudinally in the bearing but held against rotation therein, a sleeve rotatable within the member, a shipper bar operatively connected to the member and sleeve to cause longitudinal movement of the member and rotary movement of the sleeve, said bar and member capable of assuming non-running, normal running and abnormal running positions, rotary electric motor speed control means operatively connected to and turning with the sleeve, a motor controlling electric switch closed when the bar and member are in either of said running positions, and a second motor controlling switch closed by the member when the latter is in an abnormal running position only and regardless of the angular position of the sleeve.

7. In shipper mechanism for an Axminster loom having a variable speed driving motor, an electric switch normally open during normal running of the loom but effective when closed to cause running of the motor, rotary electric speed control means for the motor, a rotary and longitudinally movable shipper bar capable of assuming normal and abnormal running positions, and means operatively connecting the bar to said rotary speed control means to cause angular movement of the latter when the bar is moved angularly in either of said running positions and effective when the bar is moved to said abnormal position only to close said switch.

8. In shipper mechanism for an Axminster loom having a variable speed driving motor and operating with electric stop switches which when closed permit motor operation but which when open prevent motor operation, a switch electrically in parallel with said stop means effective when closed to cause running of the motor whether said stop electric means are open or closed, a longitudinally and rotarily mounted shipper bar capable of assuming normal and abnormal running positions, rotary motor speed control means operatively connected to the bar and turning therewith when the bar is in either of said running position, and means effective when the bar moves to abnormal running position only to close said switch.

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