Dec. 22, 1942. E. J. DACEY 2,306,303

STOP MOTION FOR AXMINSTER LOOMS

Filed Dec. 26, 1941 3 Sheets-Sheet 1

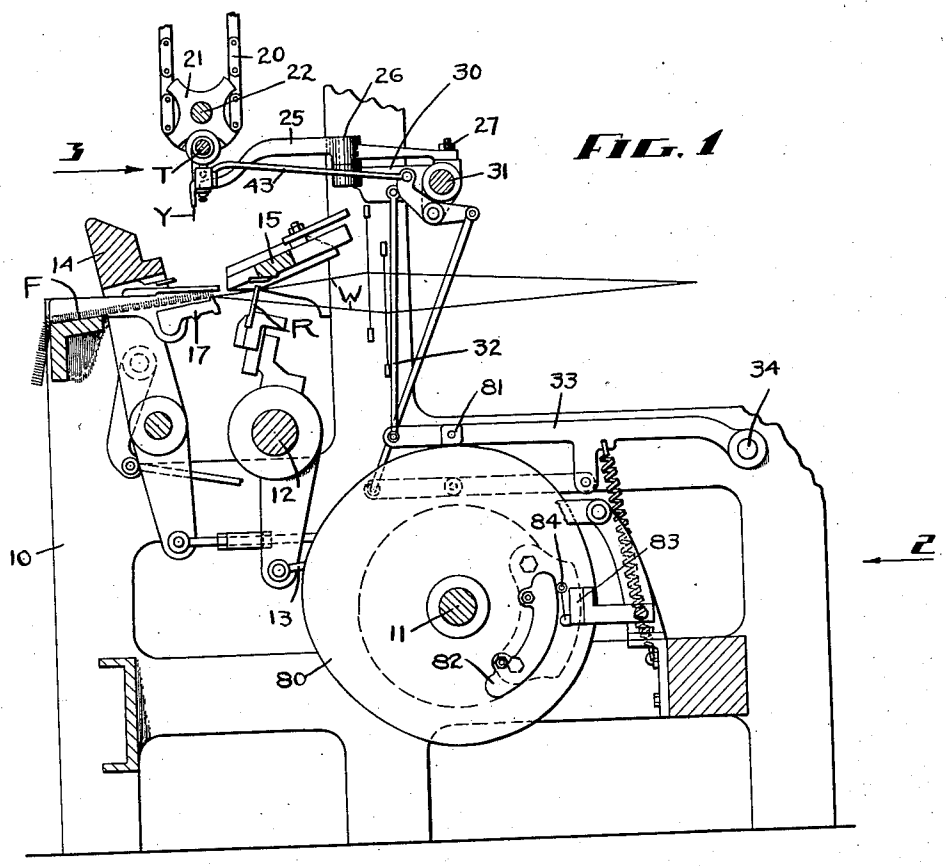


FIG. 1

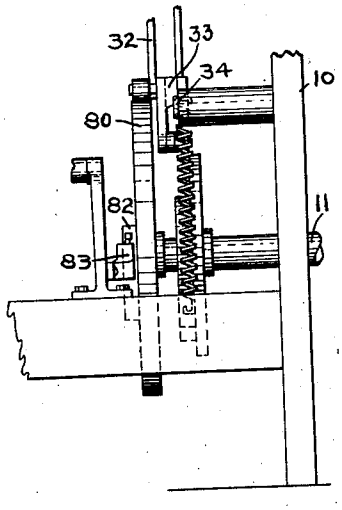


FIG. 2

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Filed Dec. 26, 1941 3 Sheets-Sheet 2

Fig. 4

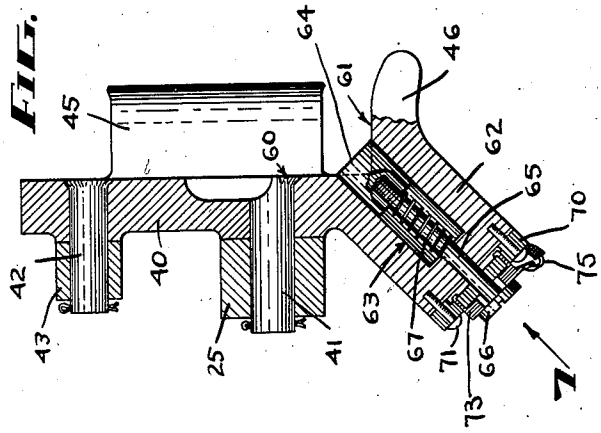
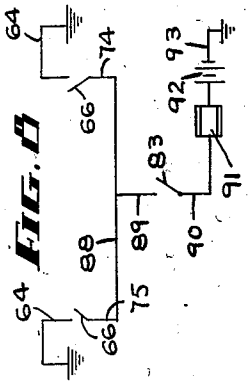


Fig. 8



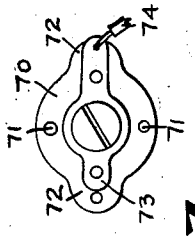
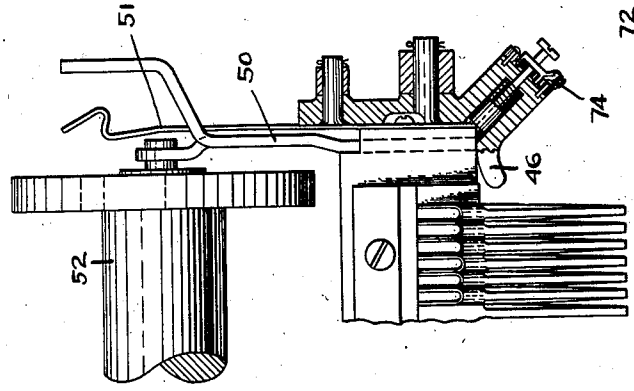


Fig. 7



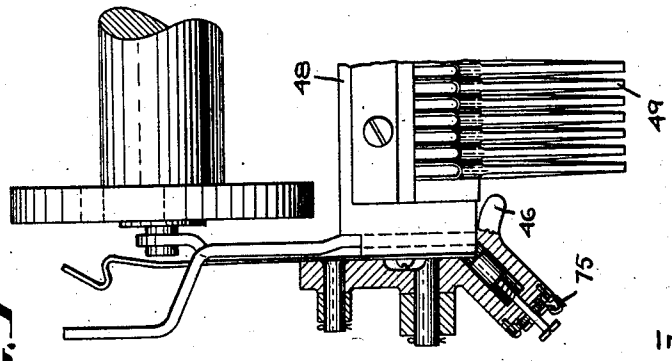


Fig. 3

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Filed Dec. 26, 1941 3 Sheets-Sheet 3

FIG. 5

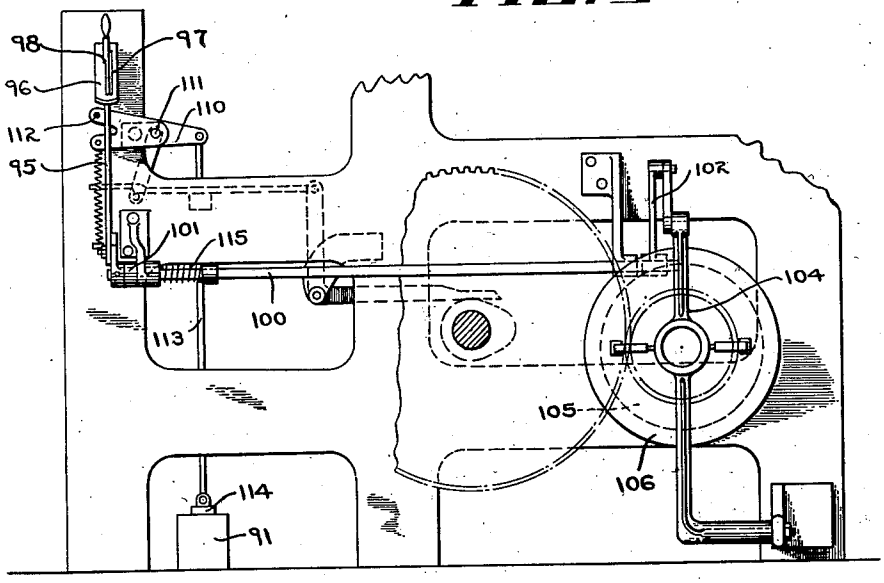
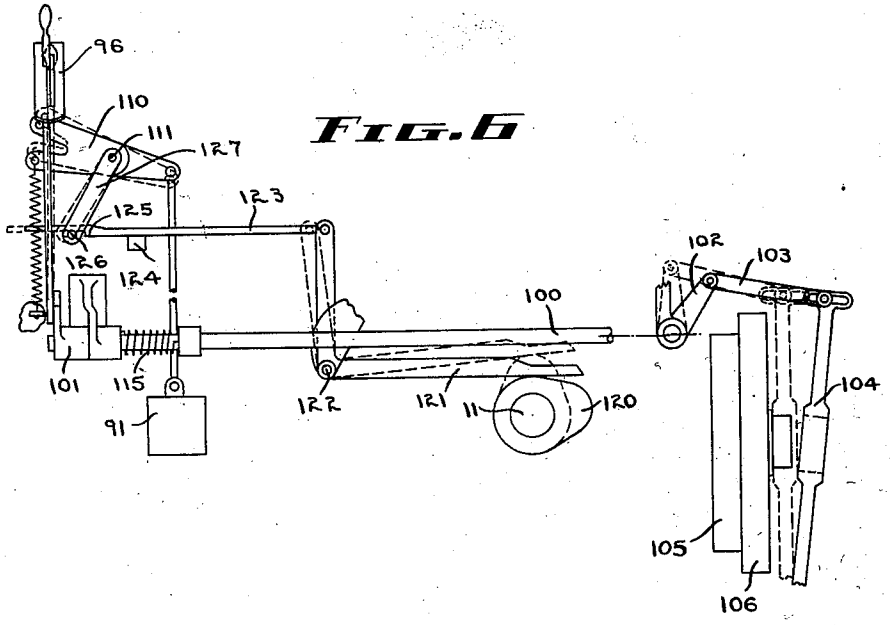


FIG. 6



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STOP MOTION FOR AXMINSTER LOOMS

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Application December 26, 1941, Serial No. 424,457

12 Claims. (Cl. 139—336)

This invention relates to improvements in Axminster looms and it is the general object of the invention to provide means for stopping the loom if the tube frame is improperly positioned for transfer.

Axminster looms operate with a series of tube frames moved to and from active position by transporting chains. The tube frames move one by one to active position and are detached by means of clutches mounted on transfer arms and are then lowered to tuft forming position where they are given a rolling-in motion to form the tufts. The tube frame is then lifted and replaced on the chains and the latter advance to place the next tube frame in active position.

When Axminster looms operate at high speeds there is a tendency for the tube frames to be improperly released from the chains, in which event the transferrer arms descend as usual but one end of the tube frame will be held up until released from its chain by descent of the other end, whereupon the tube frame falls with damage to itself and other operating mechanism of the loom. It is an important object of my present invention to equip the transfer clutches with indicators for a stopping mechanism which will operate to stop the loom if the tube frame is not properly seated in the clutches, thereby arresting the transfer arms before the tube frame has an opportunity to fall.

It is a further object of my present invention to provide each clutch with an electric switch connected to an external loom controlling circuit in such a way that if the tube frame fails to be properly released from the transporting chains the circuit will effect loom stoppage. This result I may accomplish by using normally closed switches in the clutches which are in circuit with a master switch which is closed at that point in the loom cycle corresponding to the start of downward motion of the transfer arm. The switches will be in circuit with a solenoid or the like which controls stopping mechanism for the loom. Inasmuch as it is desirable to stop the loom if either end of the tube frame fails to be disconnected from its transporting chain the switches in the clutches are connected in parallel with the master switch so that if either of the clutch switches fails to be opened the loom will be stopped. In the description to follow I set forth a form of knock-off mechanism which has been used heretofore in other types of looms, particularly in connection with warp stop mechanisms. It is to be understood that this type of mechanism is illustrative of but one means of carrying my invention into effect and I do not wish necessarily to be limited to the type of knock-off mechanism set forth herein.

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 is a vertical section through a loom of the Axminster type having my invention applied thereto,

Fig. 2 is a detailed rear elevation looking in the direction of arrow 2, Fig. 1,

Fig. 3 is a front elevation looking in the direction of arrow 3, Fig. 1 on an enlarged scale, parts being in section,

Fig. 4 is a view similar to a portion of Fig. 3 on an enlarged scale showing the clutch prior to reception of the tube frame,

Fig. 5 is a view similar to a portion of Fig. 1 but showing the stop mechanism,

Fig. 6 is a diagrammatic view similar to a portion of Fig. 5 showing the operation of the stopping mechanism.

Fig. 7 is a detail end view looking in the direction of arrow 7, Fig. 4, and

Fig. 8 shows the circuit used with my invention.

Referring particularly to Fig. 1, I have shown a loom frame 10 having a bottom shaft 11 which in the present instance rotates once for each three picks or beats of the loom. The loom is also provided with a lay shaft 12 carrying a reed R which is given a forward beating-up motion to the left as viewed in Fig. 1 each pick of the loom by a force derived from shaft 11 and transmitted through a rod 13. Front and back knife bars 14 and 15, respectively, are operated in the usual manner to sever the yarn Y from the tube frame T when the latter is in tuft forming position. A cloth board 17 supports the fabric F which extends forwardly from the warp shed W.

The tube frame transporting chains are indicated at 20 in Fig. 1 and are advanced by sprockets one of which is set forth at 21. The sprockets are mounted on a pull-over shaft 22 operated in any approved manner to have intermittent feeding motions either to the right or left for the purpose of advancing the tube frames one at a time to active position from which they are moved to tuft forming position and then returned to active position. The shaft 22 has an angular motion for each tuft forming operation of the

loom and the tube frame when in active position will be under the shaft 22 as shown in Fig. 1.

Transfer arms 25 are mounted on vertical pivots 26 and are actuated by a link 27 to have a motion laterally of the loom first toward the tube frame and then downward to move the latter to tuft forming position. The lever 25 is mounted on the second lever 30 secured to a shaft 31 which is given an angular motion in a left hand direction as viewed in Fig. 1 to lower the tube frame. The lever 30 is controlled by a link 32 and lever 33 pivoted as at 34. Lever 33 is operated by the usual cam mechanism not shown to give the aforesaid angular motions to the shaft 31 and dipping motion of the lever 25.

The forward end of each lever 25 is provided with a clutch 40 having a stud 41 received by the lever 25. Each clutch is also provided with a second stud 42 to receive a link 43 operated as suggested in Fig. 1 to cause rocking of the clutch about the stud 41 to effect a so-called rolling-in movement of the tube frame when the latter is in tuft forming position. Each clutch may have a pair of lateral wings 45 one of which is shown in Fig. 4 for engagement with the side walls of the tube frame and may also have a tongue 46 on which the tube frame rests.

The tube frame comprises an elongated body 48 as shown in Fig. 3 from which project the tuft guiding tubes 49. Each end of bar 48 is provided with a bracket 50 with which is associated a hook 51 for cooperation with the corresponding transporting chain 20. A yarn spool 52 is mounted for rotation on the brackets 50 and supplies the tuft forming yarn which passes through the tubes 49.

Under normal conditions as the tube frame moves to the active position shown in Fig. 1 the hook 51 will be supported by the transporting chains and the arms 25 will be spaced from the ends of the tube frame. By means of well-known mechanism the arms 25 are then moved inwardly to the position shown in Fig. 3, the upper part of the clutches engaging the hooks 51 to move them to disengaging position with respect to the transporting chains, after which the tube frame is supported on the tongues 46. The tube frame remains supported by the clutches and arms 25 throughout the tuft forming operation at the conclusion of which the arms 25 rise and the clutches move away from the tube frame to permit the hooks 51 to become reengaged with the transporting chains.

The matter thus far described is of common construction and except as pointed out hereinafter forms no part of my present invention. The operation of the transporting chain, the arms 25, levers 30, the reed R and the cutting knives are as usual.

In carrying my invention into effect I provide electrically controlled mechanism to stop the loom should the tube frame fail to be released from its transporting chains as the arms 25 descend. Referring particularly to Figs. 3, 4 and 7, it will be seen that each of the clutches 40 has an inside surface 60 which leads to the upwardly facing surface 61 of the tongue 46 to define therewith a seat for the reception of the lower end corner of the tube frame. The clutch is provided with a diagonally disposed housing or casing 62 provided with a bore 63 in which is mounted a plunger 64 secured to a screw 65 having at its lower end a head 66. A spring 67 surrounds that part of the screw 65 between the plunger 64 and that part of the extension 62 forming the lower wall of the bore 63 and serves normally to hold the plunger 64 projecting beyond the corner defined by surfaces 60 and 61 and in the path of the tube frame, as shown in Fig. 4.

The lower end of each extension 62 is provided with an insulated plate 70 secured to the extension by screws 71, and having lateral ears 72 to which are secured the opposite ends of a contact plate 73. The screw 65 passes through the plate 73 without touching it, but the head 66 is adapted for engagement with the contact 73 when the parts are in the normal position shown in Fig. 4. An electric wire 74 leads from the plate at the right end of the tube frame, as shown in Fig. 3, while the second similar wire 75 leads from the contact plate 73 at the left end of the loom.

When the arms 25 move in to release the tube frame heads 66 are in contact with plates 73. If the tube frame is properly released as indicated in Fig. 3 the lower corners of its opposite ends will depress the corresponding plungers 64 and move the screw heads 66 outwardly to break contact with their plates 73, as indicated in Fig. 3. If for any reason one or both ends of the tube frame should fail to be disconnected from the tube frame one or another of the plungers 64 will remain as shown in Fig. 4 and the corresponding screw head 66 will maintain its contact with the associated plate 73. From this it will be understood that the electric contact is broken at both clutches if the tube frame is properly released, but if either end is held up so that it cannot descend to tuft forming position, the corresponding contact will remain closed.

As shown in Fig. 1 cam 11 has secured thereto a cam plate 80 the periphery of which engages the cam follower 81 on lever 33 to give the latter its rising and falling motions to effect movement of the transfer arms 25. Plate 80 also has secured thereto a cam tappet 82 positioned for engagement with an electric switch designated generally at 83 and having a movable contact arm 84 positioned for engagement with the tappet. Under normal conditions the switch 83 is open, but when tappet 82 engages the arm 84 the switch is closed temporarily during that portion of the loom cycle starting immediately after the beginning of descent of the transfer arms 25.

The electric connections between the switches is shown in Fig. 8 where it will be seen that the wires 74 and 75 are connected to a wire 88 from which extends a second wire 89 to one side of the switch 83. The other side of switch 83 is connected by wire 90 to an electric solenoid 91 and the latter in turn is connected to one side of a source of electric power conventionally indicated at 92. By means of wire 93 the other side of the source of power is grounded. The plungers 64 and the screws 65 on which they are mounted are grounded to the casings 62 and these casings in turn are grounded through their metallic connections with other loom parts.

It will be apparent from Fig. 8 that if both contacts are broken at the clutches no current can flow throughthe solenoid 91 when switch 83 is closed, but if either clutch contact remains closed current will flow through that part of the circuit including the closed clutch contact to energize solenoid 91.

Energization of the solenoid 91 is rendered effective to stop the loom by the mechanism shown in Figs. 5 and 6. A side pull shipper handle 95 on the loomside moves in a guide 96 having a slot 97 the upper end of which is notched as at

98 to receive the shipper handle. When the loom is operating the handle is in the notch and held thereby in driving position. The lower end of the shipper handle is secured to a rearwardly extending shipper shaft 100 journaled at 101 and secured to an arm 102 linked as at 103 to a drive controlling lever 104. A driving gear 105 connected to any suitable source of driving power is adjacent to a disk clutch 106 which is moved into driving relation with respect to the gear 105 when the lever 104 moves from the full to the dotted line position in Fig. 6. When the loom is to be stopped lever 104 is moved to the right from the dotted line position of Fig. 6 simultaneously with unseating of the shipper handle from the notch 98.

The mechanism for unseating the shipper handle includes a lever 110 movable about a fixed pivot 111 and having a pin 112 which can be moved against the shipper handle in a direction to move the latter to the right as viewed in Fig. 5. The lever 110 is connected to a descending link 113 which is attached to the core 114 of the solenoid 91. When the solenoid is energized lever 110 moves from the full to the dotted line position of Fig. 6.

Shaft 11 has secured thereto a cam 120 to rock a lever 121 on a fixed pivot 122. A knock-off link 123 on the lever slides along a fixed support 124 and has a notch 125 to receive a pin 126 on an arm 127 of lever 110. Pin 126 is normally below link 123 and the latter has a motion to the left, Fig. 6, from the full to the dotted line position every third pick of the loom during the first part of the descent of the tube frame arms 25.

In the operation of my invention the clutches 40 are presented at regular intervals to the actively placed tube frame to disconnect it from the chains and move it toward tuft forming position. If the tube frame is properly released the circuit shown in Fig. 8 will be broken at each clutch switch and closure of switch 83 will fail to energize solenoid 91 and the loom will continue to operate. If, however, either end of the tube frame should remain connected to its chain the corresponding plunger 64 will not be depressed during the first part of the down motion of the transfer arm and the associated contact will therefore remain closed. Current will then flow from ground over wire 93, source of electric power 92, solenoid 91, wire 90, switch 83, and wire 88 through whichever clutch switch happens to be closed and back to the ground. This circuit is closed by the tappet 82 when it moves arm 84 to the right as viewed in Fig. 1, and this occurs very shortly after the point in the loom cycle when the transferrer arms 25 have started their downward motion.

Energization of solenoid 91, as seen in Fig. 6, will result in rocking lever 110 from the full to the dotted line position and result in raising pin 126 into the path of notch or shoulder 125 on link 123. The cam 120 is set in such position on shaft 11 that the link 123 will be moved to the left immediately after the time for energization of the solenoid 91, and during left hand motion of the link 123 the lever 110 will be given an additional angular motion by engagement of shoulder 125 with pin 126 to move pin 112 against the shipper handle 95 and unseat the latter from the notch 98. Thereupon spring 115 which surrounds a portion of shipper shaft 100 acts to move lever 104 from the dotted to the full line position in Fig. 6 to effect loom stoppage.

Tappet 82 is long enough to insure actuation of the solenoid 91 until notch 125 can engage pin 126, and may be long enough if desired to maintain the circuit through the solenoid closed throughout the whole stroke of link 123 to the left as seen in Fig. 6. The tappet then leaves arm 84 and the previously closed circuit is open. The tappet 82 is disengaged from arm 84 throughout the greater part of the three-pick cycle and it is for this reason that closure of the clutch switches will not cause current to flow through the solenoid except at that point in the three-pick cycle when stopping should occur.

When the transferrer arms 26 move into the positions shown in Fig. 3 the clutch switches will be open even though one end of the tube frame will eventually be held up by its chain. The tappet 82 therefore acts to close switch 83 at the time when the transfer arms would be lowered a short distance from their high starting position. By that time the clutch switch corresponding to the end of the tube frame which is held up will have had opportunity to be reclosed.

From the foregoing it will be seen that I have provided means for stopping the loom if either end of the tube frame fails to be dislodged from its transporting chain. Loom stoppage preferably occurs early enough in the loom cycle to prevent substantial descent of the transfer arms after indication of stoppage is given, thereby providing for supporting the tube frame and preventing it from falling. It will also be seen that I have provided each clutch with a normally closed electric switch which must be opened by presence of the tube frame before weaving can continue. The clutch switches are preferably in parallel circuits so that each is in series with the master switch which in turn controls the stopping mechanism. While I have shown a master switch which is closed at a given point in the loom cycle, I do not wish necessarily to be limited to such a switch, inasmuch as the cam which operates the actuator for the knock-off mechanism can be timed to give a stopping stroke to the actuator at that point in the loom cycle at which the master switch would be closed. It will further be seen that I have provided an improved form of tube frame releasing clutch so constructed as to have a built-in electric switch.

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 transporting chains to move a tube frame to active position, transfer arms to disconnect the tube frame from said chains and thereafter descend to move the tube frame to tuft forming position, an electric switch on each transfer arm to be engaged by a tube frame properly related with respect to the transfer arms during descent of the latter and move said switches from normal to abnormal position, electro-magnetically controlled loom stopping mechanism for the loom capable of effecting loom stoppage during descent of said arms, and means controlled by said switches to cause said stopping mechanism to stop the loom if said tube frame fails to move said switches

from normal to abnormal position during descent of said transfer arms.

2. In an Axminster loom operating with transporting chains to move a tube frame to active position, a pair of transferrer arms to release the tube frame from the chains, stopping mechanism for the loom, an electric switch on each transferrer arm, electro-magnetic control means for the stopping mechanism, and an electric circuit including said switches and electro-magnetic means rendered effective on failure of the tube frame to be released from the chains to energize the electro-magnetic means to cause the stopping mechanism to stop the loom.

3. In an Axminster loom having transporting chains to move a tube frame to active position, transfer arms to disconnect the tube frame from the chains and thereafter move said tube frame to tuft forming position, a normally closed electric switch on each transfer arm positioned for engagement with the tube frame to be opened thereby when said tube frame is in proper position with respect to the given transfer arm, electrically controlled stopping mechanism for the loom, and means to cause said stopping mechanism to stop the loom when the tube frame fails to open both switches in said transfer arms preparatory to movement of the tube frame to tuft forming position by said transfer arm.

4. In an Axminster loom having transporting chains to move a tube frame to active position, a pair of transfer arms to disconnect the tube frame from said chains and move the tube frame to tuft forming position, loom stopping mechanism, electro-magnetic control means for the mechanism, a normally closed switch on each transfer arm positioned to be opened by the tube frame when the latter is properly related to the transfer arm preparatory to movement thereof by said transfer arm to tuft forming position, and electrical connections between said switches on said transfer arms and said electro-magnetic means to effect loom stoppage when the tube frame fails to open said switches on the transfer arms preparatory to movement by the latter to tuft forming position.

5. In an Axminster loom having transporting chains to move a tube frame to active position, transfer arms to engage and disconnect the tube frame from the chains and thereafter lower the tube frame to tuft forming position, a normally closed switch on each transfer arm in position to be opened by the tube frame when the latter is properly related with respect to the transfer arm preparatory to movement thereof to tuft forming position, mechanism capable of stopping the loom during the time that the tube frame is normally disconnected from said chains, and an electro-magnetic control for said stopping mechanism controlled in part by said switches to cause said stopping mechanism to stop the loom if the tube frame fails to open the switches in said transfer arms preparatory to movement of the tube frame to tuft forming position.

6. In an Axminster loom having transporting chains to move a tube frame to active position, transfer arms to disconnect the tube frame from the chains and thereafter descend to move the tube frame to tuft forming position, a normally closed electric switch on each transfer arm positioned for engagement with the tube frame to be opened thereby when said tube frame is properly related with respect to the transfer arm during descent of the latter, and electro-magnetic controlled stopping mechanism for the loom controlled in part by said switches and effective to stop the loom during descent of said transfer arms if the tube frame fails to open each of said switches.

7. In an Axminster loom having transporting chains to move a tube frame to active position, a pair of transfer arms to engage and disconnect the tube frame from said transporting chains and thereafter descend to move the tube frame to tuft forming position, an electric switch on each transfer arm positioned to be engaged by the tube frame and be held in abnormal position by the latter when the tube frame is properly related with respect to the transfer arms during descent of the latter, electro-magnetically controlled loom stopping mechanism including parallel circuits, one for each switch, and means controlled by said switches and circuits to cause said stopping mechanism to stop the loom if either switch fails to be held in abnormal position by the tube frame during descent of said transfer arm.

8. In an Axminster loom having transporting chains to move a tube frame to active position, a pair of transfer arms to engage and disconnect the tube frame from said chains and thereafter descend to move the tube frame to tuft forming position, a switch on each transfer arm in position to be engaged by the tube frame and be moved from normal to abnormal position when the tube frame is properly related to said transfer arms during descent of the latter, a master switch closed during that part of the loom cycle during which the transfer arms descend, loom stopping mechanism, an electro-magnetic controller for said mechanism, and circuits including said master switch, said electro-magnetic controller and said switches on the transfer arms effective to cause the controller to effect loom stoppage through said stopping mechanism if the switch on either arm fails to be in abnormal position during descent of said transfer arms.

9. An Axminster loom tube frame transfer clutch having a pocket to receive a tube frame, a plunger resiliently mounted on the clutch and normally projecting into said pocket in position to be engaged by a tube frame which is properly seated in said pocket, and an electric contact on said clutch to be closed by said plunger and opened by the tube frame when the latter engages the plunger.

10. The structure set forth in claim 9 wherein the plunger is disposed diagonally on the clutch with respect to the portions of the latter which form said pocket.

11. The structure set forth in claim 9 wherein the plunger is positioned for engagement with a tube frame extending to the bottom of said pocket but out of position for engagement of a tube frame which extends into the upper part only of said pocket.

12. A transfer clutch for an Axminster loom tube frame transfer arm, said clutch having a vertical wall and a tube frame supporting lip extending horizontally therefrom, a casing formed on the clutch and having a bore therein opening through said wall and lip, a resiliently mounted plunger member in said bore, an electric contact closed normally by said plunger member and carried by said clutch, said plunger member projecting normally into the space occupied by the tube frame when the latter is in normal engagement with said clutch and being depressed by the tube frame to open said contact.

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