Aug. 2, 1949. E. G. MASCARENHAS 2,477,996

LOOM

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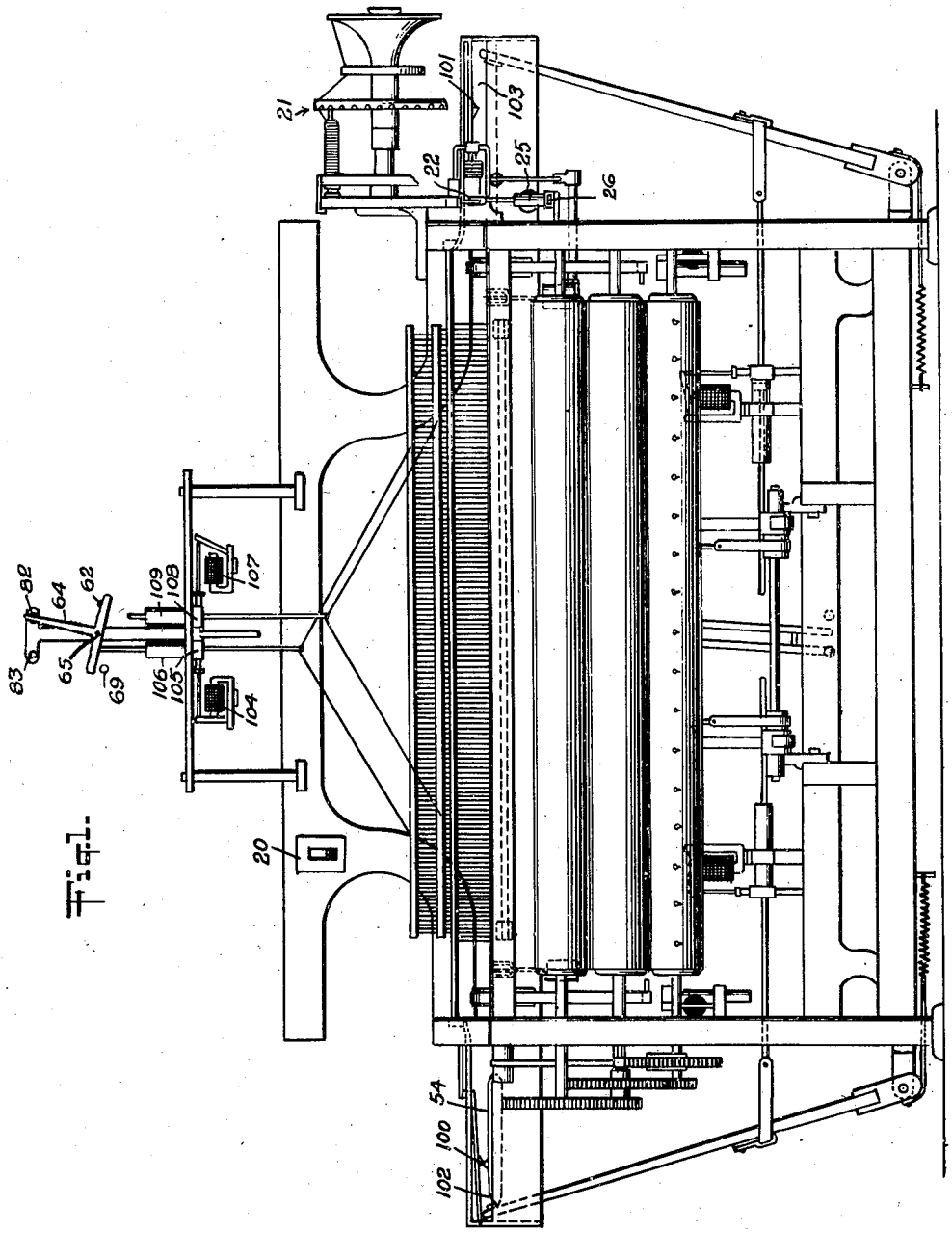

Fig. 1.

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Fig.2.

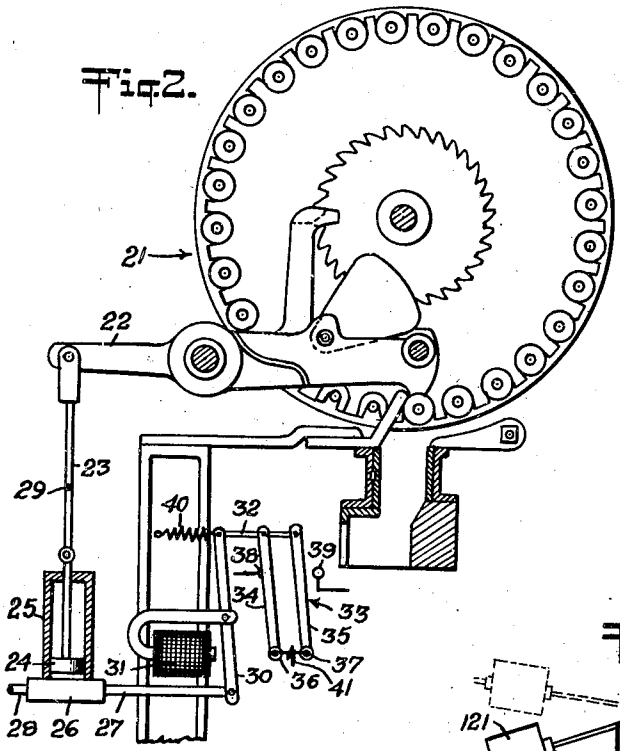


Fig.3.

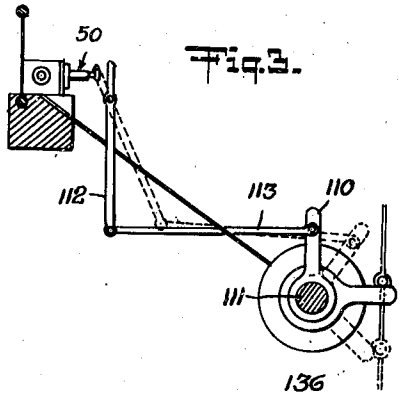


Fig.8.

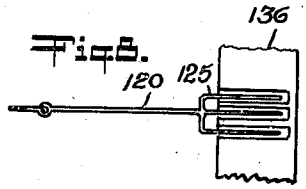


Fig.7.

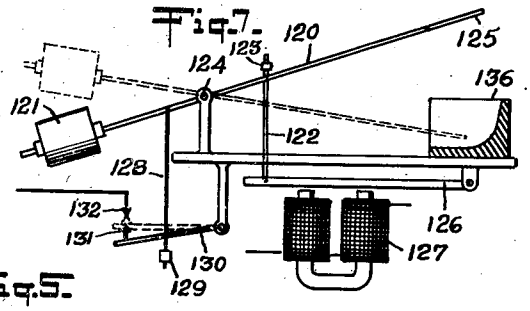


Fig.4.

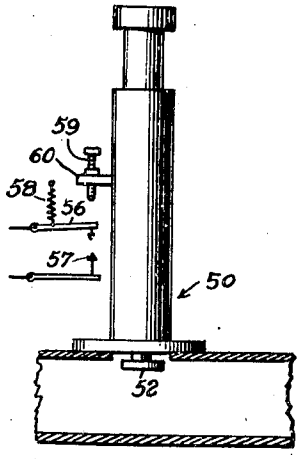


Fig.5.

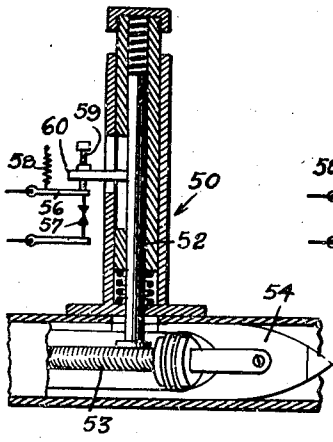
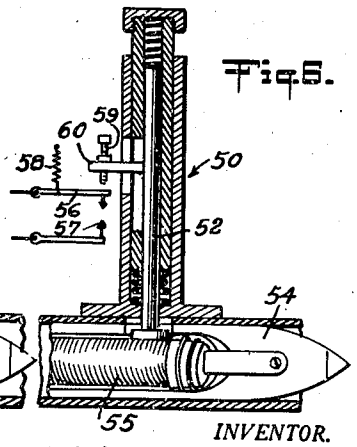


Fig.6.



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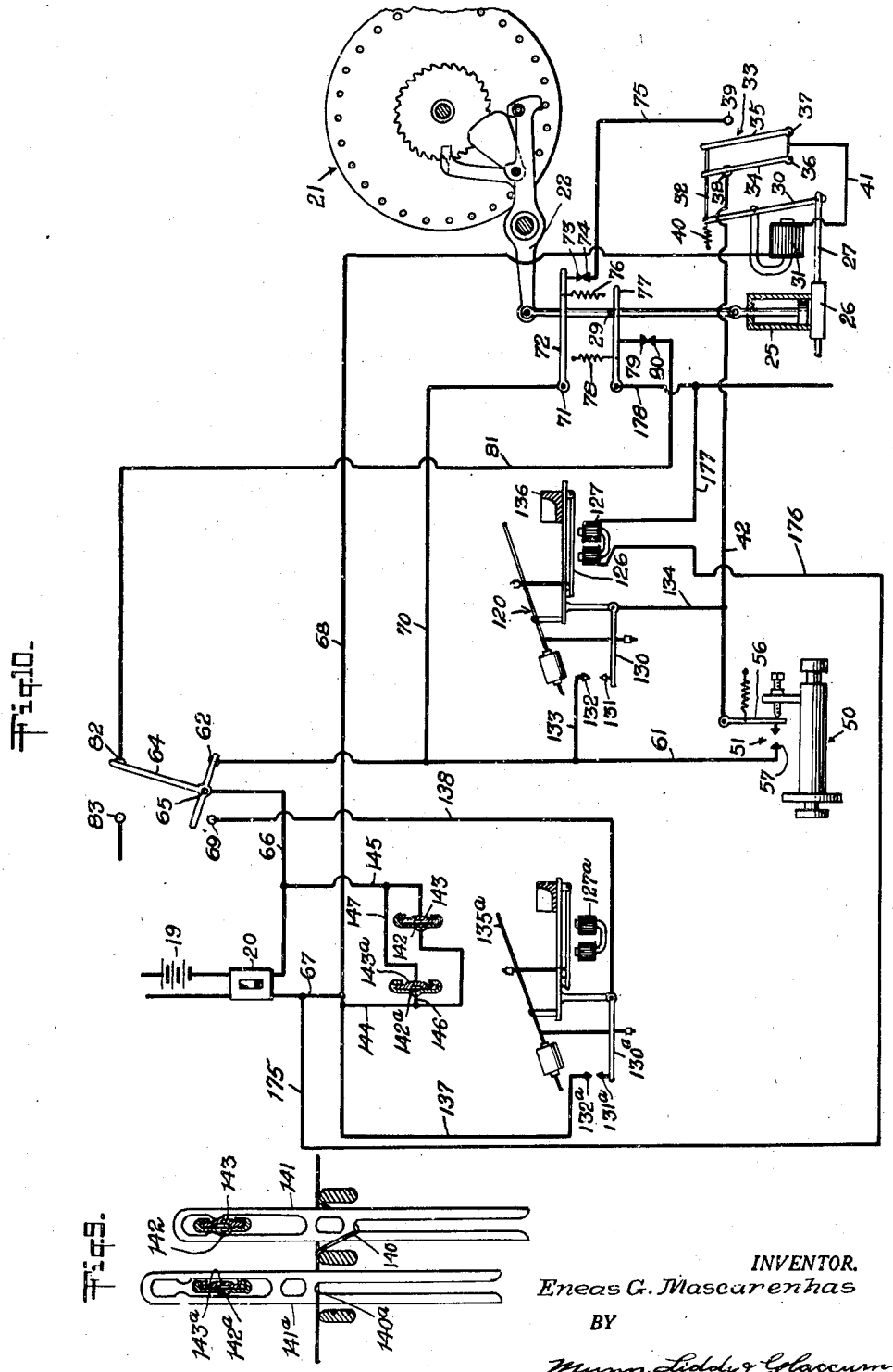

Fig. 10.

Fig. 9.

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LOOM

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Application April 25, 1945, Serial No. 590,163

6 Claims. (Cl. 139—242)

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The present invention relates to a cop changing mechanism and war stop-motion for looms.

The principal object of the invention is to provide an automatic cop changing and loom stopping mechanism and warp stop-motion of very simple construction, capable of extremely efficient operation in conjunction with high speed looms.

A further object is to reduce the number of parts comprising these mechanisms and to simplify their connections with the loom and loom circuit.

These and other objects are attained by mechanism illustrated in the accompanying drawing in which—

Fig. 1 is a view in front elevation of a loom embodying the principles of the subject invention, and more particularly, a loom shown and described in my co-pending application, Serial No. 426,963, filed January 16, 1942, now Patent No. 2,377,800;

Fig. 2 is an end view of the cop changing mechanism;

Fig. 3 is a vertical section, somewhat diagrammatic, of the weft cop feeler mechanism;

Fig. 4 is an enlarged view in side elevation of the weft cop feeler shown in Fig. 3, showing the electric switch which it actuates, diagrammatically;

Fig. 5 is a longitudinal section of the cop feeler shown in Fig. 4, showing it in contact with an exhausted cop, its diagrammatically represented switch being shown closed;

Fig. 6 is a view similar to that of Fig. 5 showing the cop feeler in contact with a cop which is not exhausted, the switch being shown open;

Fig. 7 is a somewhat diagrammatic view in side elevation of the weft fork and the mechanism immediately controlled thereby;

Fig. 8 is a fragmentary view of said weft fork, showing the grid and recess of the lay;

Fig. 9 is a view in side elevation of two of the warp drop wires showing a taut thread engaged by one and a slack thread engaged by the other; and

Fig. 10 is a diagrammatic layout of the electrical system of the entire mechanism herein described and claimed.

The loom switch 20 shown in Figs. 1 and 10 is a standard overload switch which automatically cuts off the current whenever a short circuit occurs in the electrical system. It controls the flow of electric current from conventional source 19. Its place and function in the mechanism as a whole will hereinafter be described.

The cop changing mechanism 21 shown in

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Figs. 2 and 10 is conventional. The controls, however, and more particularly the system of which they form a part, are of applicant's invention. Rocking arm 22 which directly actuates the mechanism 21 is a conventional member in said mechanism. It is pivotally connected to a compressed air actuated piston rod 23 whose piston member 24 is slidably mounted in cylinder 25 in the usual manner. Valve 26 actuated by rod 27 controls the supply of fluid from the source of supply thereof (not shown) through pipe 28 to cylinder 25. Piston rod 23 is provided with stud member 29 whose function will hereafter appear.

Rod 27 is pivotally connected to one end of armature 30 of electromagnet 31, and another rod 32 is pivotally connected to the opposite end of said armature, said armature comprising a lever which is pivotally mounted with respect to electromagnet 31 adjacent the center of the armature. It will be noted that rod 32 actuates a switch 33 comprising parallel rocking arms 34 and 35 permanently pivoted, respectively, to terminals 36 and 37, and engaging respectively, contact points 38 and 39. A tension spring 40 normally maintains said armature out of contact with the electromagnet. It will be seen that when the armature is in such normal position, arm 34 closes the circuit between terminal 36 and contact point 38. When the armature is attracted to the electromagnet, this circuit is opened and the circuit between terminal 37 and contact point 39 closed through rocking arm 35. It will also be seen that when the electromagnet is energized, rod 27 will open valve 26 and fluid will enter cylinder 25, thereby causing piston rod 23 to actuate rocking arm 22 of the cop changing mechanism, and hence the mechanism itself.

Figure 10 shows that terminal 36 is connected by means of electric conductor 41 to electromagnet 31 and that contact point 38 is connected to weft cop feeler 50 and more particularly to key 56 of switch 51 thereof, by means of electric conductor 42. Weft cop feeler 50 is of standard construction. Its feeling rod 52 is shown in Fig. 5 in contact with an exhausted cop 53 in shuttle 54 and in Fig. 6 in contact with cop 55 which is not exhausted. Weft cop feeler 50 is affixed to the right hand shuttle box hereinafter described.

Key 56 of switch 51 is normally held out of contact with terminal 57 by means of tension spring 58. An adjustable screw 59 carried by arm 60 on feeling rod 52 actuates said key and closes the circuit when the cop which the feeling rod engages becomes exhausted. An electric conductor 61 con-

nects terminal 57 of switch 51 with contact point 62 of rocking switch 64.

It will be seen in Fig. 10 that rocking switch 64 comprises an inverted T-shaped member 64 which is pivoted at the contact point 65 where its vertical and horizontal parts meet. An electric conductor 66 connects the pivot point with switch 20. Electric conductors 67 and 68 connect switch 20 and electro-magnet 31. It thus becomes apparent that when the appropriate switches are actuated, a complete circuit, which will be designated as circuit A, is set up in which the cop changing mechanism and the weft cop feeler are in series with each other. Specifically, the circuit comprises the following: source of current 19, loom switch 20, conductor 66, contact point 65, T-shaped member 64, contact point 62, conductor 61, switch 51, conductor 42, contact point 38, rocking arm 34, terminal 36, conductor 41, electromagnet 31, conductor 68, conductor 67, and back to loom switch 20 and current source 19.

It will be noted that when circuit A is closed, electromagnet 31 becomes energized, thereby attracting armature 30, and actuating switch 33. This causes a breaking of the contact between arm 34 and contact point 38, but at the same time it causes arm 35 to engage contact point 39. A second circuit, circuit B is now closed which is comprised of the following elements: source of current 19, loom switch 20, conductor 66, contact point 65, T-shaped member 64, contact point 62, conductor 61, conductor 70, terminal 71, arm 72 pivoted to said terminal 71, contact point 73 mounted on said pivoted arm, fixed contact point 74, conductor 75, contact point 39, arm 35, terminal 37, conductor 41, electromagnet 31, conductor 68, conductor 67, and back to loom switch 20 and source of current 19.

It is apparent that when either circuit A or circuit B is closed, the cop changing mechanism 21 will be caused to operate.

Stud 29 carried by piston rod 23 now comes into play. When electromagnet 31 is energized, it causes valve 26 to open, thereby admitting fluid into cylinder 25 and causing piston rod 23 to move upwardly, actuating cop changing mechanism 21. The entire cop changing operation ends at the same time that stud 29 on the rising piston rod engages pivoted arm 72 and raises it against the tension of spring 76 (or against the attraction of gravity). This upward movement of arm 72 breaks the contact between contact points 73 and 74, thereby opening circuit B.

Stud 29 controls a third circuit, circuit C, which is not completely shown in the drawing. In Fig. 10 piston rod 23 is shown in its lowermost position, as is stud 29. In this position stud 29 engages pivoted arm 77 against the tension of spring 78, thereby effecting contact between contact point 79 on arm 77 and fixed contact point 80 and closing circuit C. Included in circuit C are the following elements: contact points 79 and 80, conductor 81, terminal 82, T-shaped member 64, contact point 65, conductor 66, loom switch 20, source of electric current 19, conductors 175 and 176, electromagnet 127, conductors 177 and 178, arm 77 and back to contact point 79. The rest of circuit C is shown in my co-pending application above identified, as is fourth circuit, circuit D, which is made when T-shaped member 64 pivots and engages contact point 69 and terminal 83. Stud 29 also controls circuit D.

Neither circuit C nor circuit D forms any part of the present invention except as shown in the drawing and herein described and claimed. It suffices to describe these circuits as the general loom circuits; breaking them stops the loom. Hence when stud 29 engages arm 77 and causes contact between contact points 79 and 80, these circuits may be made, and when stud 29 releases arm 77 and spring 78 causes contact points 79 and 80 to separate, these circuits must be broken and operation of the loom stopped.

It will be understood that contact points 79 and 80 are normally in contact with each other. It is only when the cop is exhausted and the cop changing mechanism goes into operation that these points become separated.

During the operation of the loom, switches 100 and 101 are alternately closed and opened according to whether the shuttle which actuates them enters the left hand box 102 or the right hand box 103. In Fig. 1 the shuttle is shown in the left hand box. In consequence switch 100 is closed, electromagnet 104 is energized, valve 105 is opened, fluid motor 106 is actuated, T-shaped member 64 is caused to pivot to the right and to make contact with contact point 62 an instant before it makes contact with terminal 82. Circuit C is now closed. If the shuttle had been situated in the right hand box 103, switch 101 would have been closed, electromagnet 107 energized, valve 108 opened, fluid motor 109 actuated, T-shaped member 64 caused to pivot to the left and to make contact with contact point 69 an instant before making contact with terminal 83. Circuit D would now be closed.

If at this time weft cop feeler 50 is brought into contact with an exhausted cop in said shuttle, switch 51 is caused to close and circuit A is made. The mechanism that performs this service is shown in Fig. 3. It operates integrally with the loom. When the transfer mechanism of the beat up motion of the loom (speaking now particularly of the loom described in the aforementioned co-pending application) is made to oscillate, an arm 110 on the drum shaft 111 actuates lever 112 through the instrumentality of pivotally connected rod 113. The lever engages the axially movable parts of weft cop feeler 50 and causes feeding rod 52 to move into shuttle box and in the direction of the cop. If the cop should be exhausted, the previously described cop changing operation is performed. The weft cop feeler is made to work every time a beating up operation takes place, but unless the shuttle is located in the right hand box 103 circuit A will not be closed and the cop changing operation will not take place. The reason is clear. Only when the shuttle closes switch 101 in the right hand box will T-shaped arm 64 be in contact with contact point 62 and unless there is such contact, circuit A cannot close.

In Fig. 7 one of the two weft feeling forks shown in Fig. 10 is shown in detail. It comprises a pivoted weft fork 120 having a counterweight 121 adjustably fixed to its rear end to maintain its tined end in its normally raised position. A vertically movable rod 122 is adjustably fixed at its upper end by means of nut 123 to the weft fork at a point between the fulcrum 124 and the tines 125. At its lower end, rod 122 is pivotally fixed to pivoted armature 126 which is actuated by electromagnet 127. A second rod 128 is pivotally fixed at its upper end to the weft fork between its fulcrum and its counterweight. At its lower end rod 128 is adjustably fixed by means of nut 129 to pivoted arm 130. A contact point 131 on pivoted arm 130 engages a fixed contact point 132 when said pivoted arm 130 is raised. This occurs

when electromagnet 127 is energized attracting armature 126. The tined end of the weft fork is brought down and the weighted end raised. This causes arm 130 to pivot upwardly and to bring contact point 131 into engagement with contact point 132.

The place of the two weft forks in the general operation of the loom is shown in Fig. 10. It will be seen that a conductor 133 connects fixed contact point 132 to conductor 61 at a point between contact points 62 and 57. Another conductor 134 connects pivoted arm 130 to conductor 42 at a point between key 56 and contact point 38. It thus becomes clear that when contact points 131 and 132 are brought into engagement with each other, a circuit is closed which starts the cop changing operation above described. This new circuit, circuit E, performs the same function as circuit A above mentioned and, indeed, it is that circuit with the weft cop feeler's key 56 and contact point 57 omitted.

Let us assume that the shuttle enters the right hand box with the weft end broken. The electromagnet 127 is energized through circuit C. It attracts armature 126 and brings down the tined end 125 of fork 120. Normally, the tines would meet the weft across the grid and further downward movement of said tined end would be prevented. But inasmuch as in the assumed case the weft is absent, the tines of the fork will sink into the recess of the lay 136 and the weighted end of the fork will rise sufficiently to effect contact between contact points 131 and 132. Circuit E is now closed and the aforesaid cop changing operation begins.

If it be further assumed that the cop changing operation was not properly performed and that the shuttle is thrown across to the left hand box without leaving the weft end in the shed, the second weft fork 135*a* which is identical with weft fork 120 comes into play. It constitutes the weft stop motion analogous to the warp stop motion herein referred to. Circuit D energizes electromagnet 127*a* and the tined end of weft fork 135*a* is brought down and the weighted end raised until contact is made between contact points 131*a* and 132*a*. It will be seen that a conductor 137 connects contact point 132*a* with conductor 67, and that a conductor 138 connects pivoted arm 130*a* which carries contact point 131*a* with contact point 69. A circuit F is now closed which includes the following elements: source of current 19, loom switch 20, conductor 67, conductor 137, contact points 132*a* and 131*a*, pivoted arm 130*a*, conductor 138, contact point 69, T-shaped member 64, conductor 66 and back to loom switch 20 and current source 19. Circuit F is literally a short circuit. Since loom switch 20 is an overload switch which automatically cuts off the current whenever a short circuit occurs, switch 20 will now break not only circuit F but also circuit D and the operation of the loom will stop.

Referring now to Fig. 9 as well as to Fig. 10, the warp drop wire elements shown are conventional and need not here be described in detail. When warp thread 140 breaks or becomes slack, the drop wire 141 drops and contact is made between it and drop wire bar elements 142 and 143 which are insulated from each other. It will be seen in Fig. 10 that a conductor 144 connects element 142 to conductor 68 and that conductor 145 connects element 143 to conductor 66. Thus, when drop wire 141 connects elements 142 and 143 a circuit G is made which comprises the following elements: source of current 19, loom switch 20, conductors 67, 68 and 144, element 142, drop wire 141, element 143, conductors 145 and 66 and back to loom switch 20 and current source 19. Like circuit F, circuit G is literally a short circuit and it causes loom switch 20 to stop all current from the source.

A taut thread 140*a* maintains drop wire 141*a* in elevated position, thus preventing contact from being made between elements 142*a* and 143*a* through said drop wire 141*a*. Should thread 140*a* break or become slack then drop wire 141*a* would fall and engage elements 142*a* and 143*a*. A circuit H would thereupon be made including the following elements: source of current 19, loom switch 20, conductors 67, 68, 144, 146, element 142*a*, drop wire 141*a*, element 143*a*, conductors 147, 145, 66 and back to loom switch 20 and source of current 19. Again the circuit is a short circuit and all current is shut off at the loom switch.

It is clear that only a preferred embodiment of my invention has been shown and described. Variations may be had therein without departing from the broad principles of the invention. Thus, instead of using compressed air to actuate the cop changing mechanism other means may be used, such as hydraulic means, or mechanical or electrical means. The invention has been shown as applied to a loom of my own invention. It may be applied to any loom.

I claim:

1. In a loom control system including an electric circuit operating said loom, a cop changing mechanism, a normally open electric circuit controlling said cop changing mechanism, circuit breaking means controlled by said cop changing mechanism which breaks the loom circuit when the cop changing operation begins, a cop feeler, and circuit closing means controlled by said cop feeler which closes the cop changing circuit to start the cop changing operation when contact is made with an exhausted cop.

2. In a loom control system including an electric circuit operating said loom, a cop changing mechanism, a fluid motor operating said cop changing mechanism, an electromagnet actuating said fluid motor, a normally open electric circuit controlling said electromagnet, circuit breaking means controlled by said cop changing mechanism which opens the loom circuit to stop the loom when the cop changing operation begins, a cop feeler, and circuit closing means controlled by said cop feeler which closes the circuit controlling the electromagnet to start the cop changing operation when contact is made with an exhausted cop.

3. In a loom control system including an electric circuit operating said loom, a cop changing mechanism, a fluid motor operating said cop changing mechanism, an electromagnet actuating said fluid motor, a normally open electric circuit controlling said electromagnet, circuit breaking means controlled by said cop changing mechanism which opens the loom circuit to stop the loom when the cop changing operation begins, a cop feeler, and circuit closing means controlled by said cop feeler which closes the circuit controlling the electromagnet to start the cop changing operation when contact is made with an exhausted cop, a switch actuated by said electromagnet, an electric circuit controlled by said switch, said switch being adapted to switch the electromagnet from the first mentioned circuit which energizes it to start the cop changing operation, to said switch controlled circuit to con-

tinue to energize said electromagnet until the cop changing operation is concluded.

4. A cop changing mechanism in accordance with claim 1, a second circuit closing means which is adapted to close said cop changing circuit, and a weft fork actuating said second circuit closing means to close said cop changing circuit and to start the cop changing operation when the weft fork fails to encounter the weft in its normal location.

5. A cop changing mechanism in accordance with claim 2, a second circuit connected to said electromagnet, a switch controlling said second circuit, and a weft fork which actuates said switch to close said second circuit when the weft fork fails to encounter the weft in its normal location.

6. A cop changing mechanism in accordance with claim 3, a second circuit connected to said electromagnet, a switch controlling said second circuit, and a weft fork which actuates said switch to close said second circuit when the weft fork fails to encounter the weft in its normal location.

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