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DETECTION ELEMENT FOR THE SUPERVISION OF A LOOM

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Fig. 3.

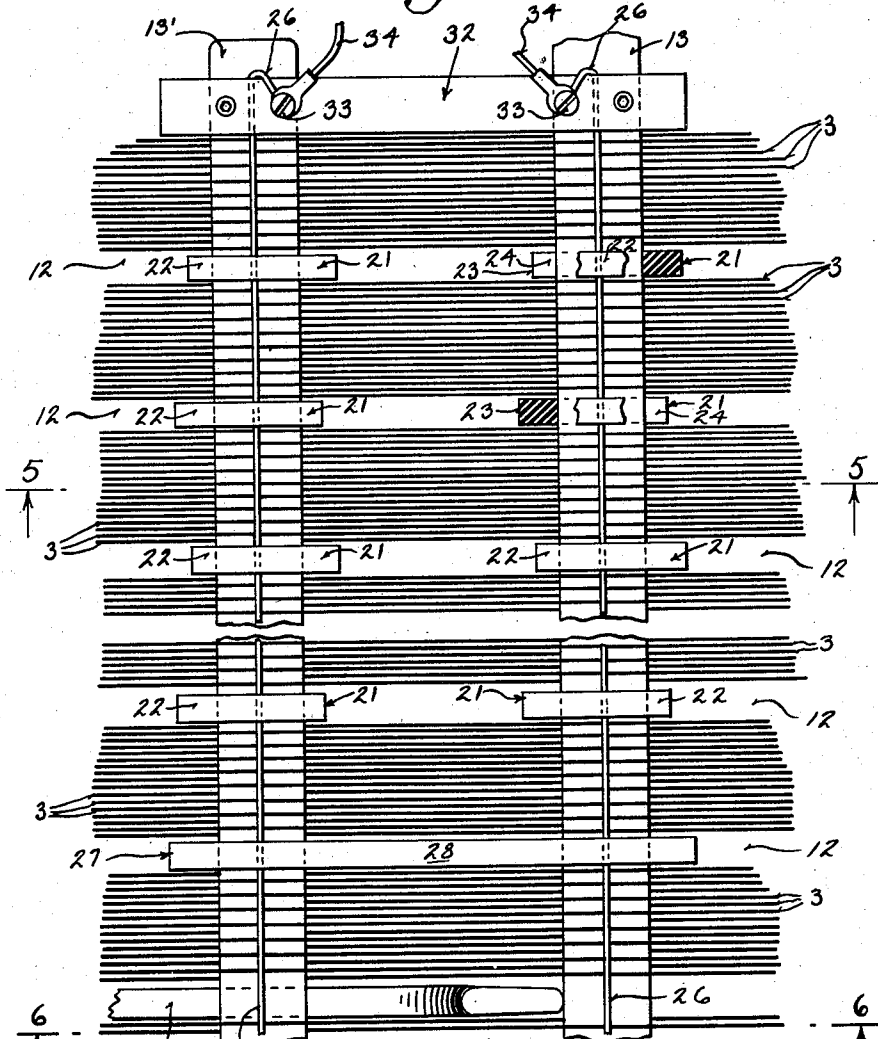
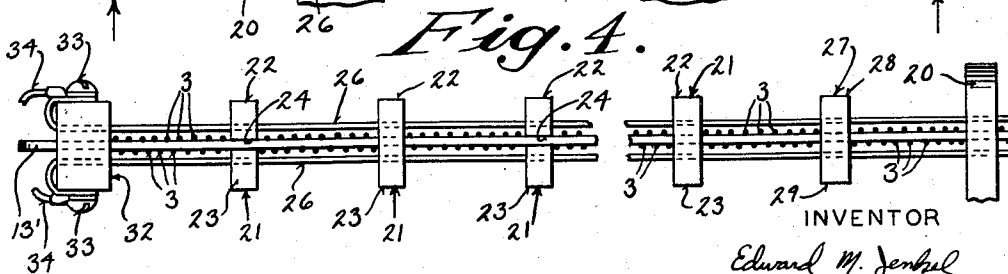


Fig. 4.



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Fig. 5.

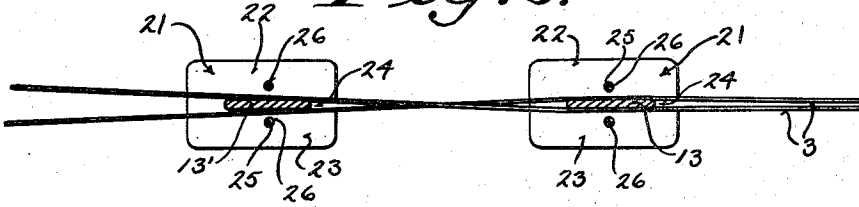


Fig. 6.

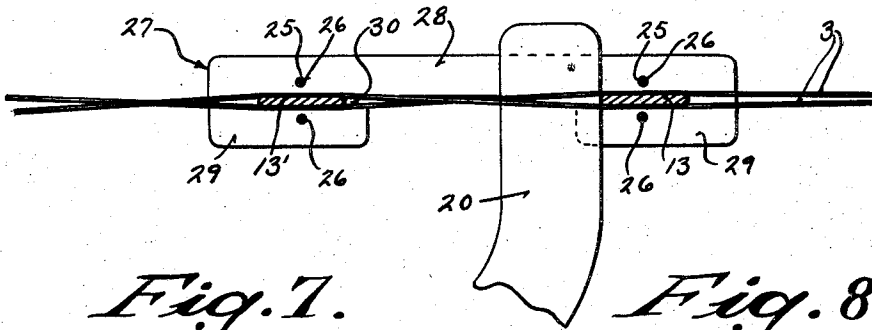


Fig. 7.

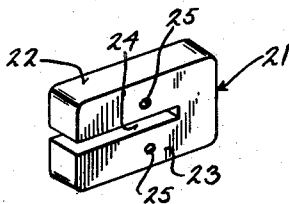


Fig. 8.

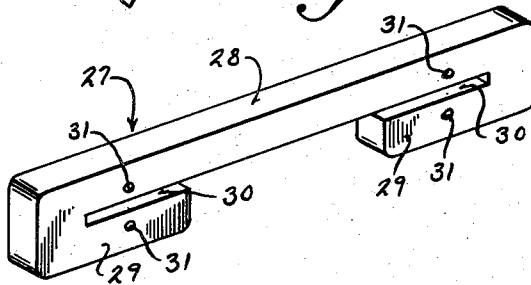
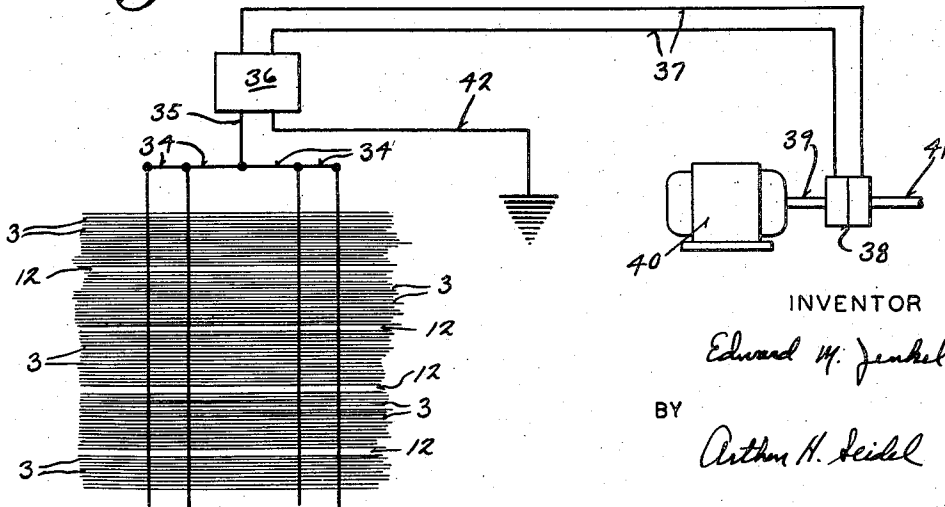


Fig. 9.



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Fig. 10.

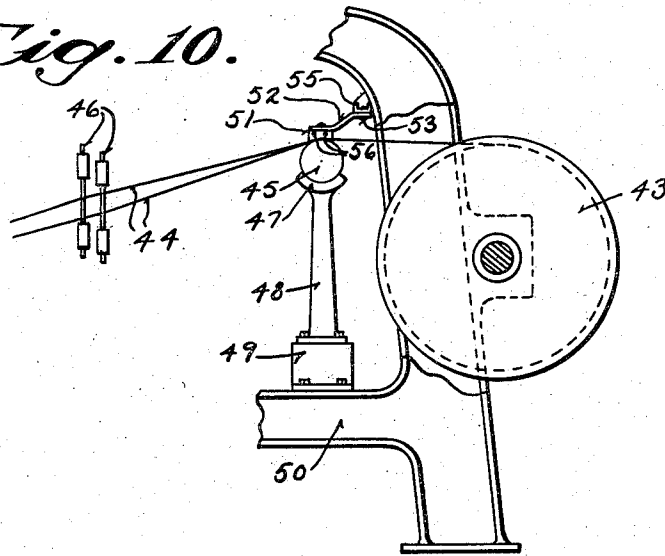


Fig. 12.

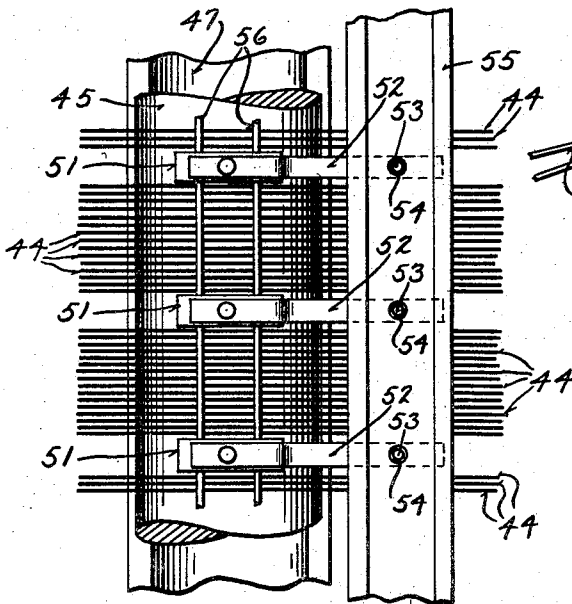
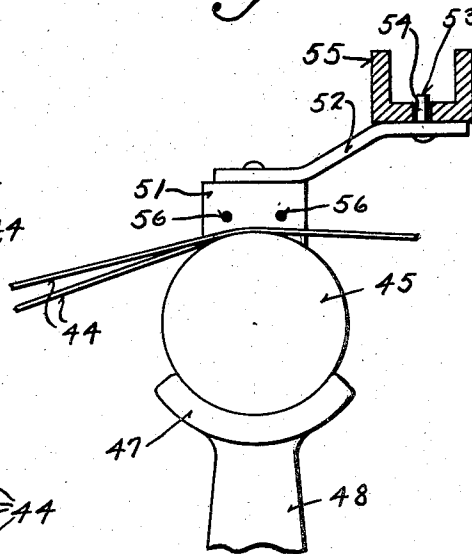


Fig. 11.



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DETECTION ELEMENT FOR THE SUPERVISION OF A LOOM

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Application September 2, 1955, Serial No. 532,181

12 Claims. (Cl. 139—350)

This invention relates to control apparatus for a loom adapted to detect abnormal movements of threads, such as may occur upon the breaking of a thread, the loss of tension in a thread, or the like, and further adapted to govern loom operation in response to the detection, and it more specifically resides in the disposing of insulating members across an array of threads in spaced relation thereto, and supporting a conductive detecting element upon the members in close proximity to the threads so as to be contacted thereby upon occurrence of an abnormal thread movement.

In weaving Fourdrinier wires from metallic threads, wherein extreme uniformity of product is a necessary requisite, the occurrence of the breakage of a thread being woven into the wire must be immediately detected. A failure to secure immediate detection will allow the loom to continue weaving with attendant heddle changes, and such continued weaving may readily result in irreparable damage to the threads. For example, a warp thread running from the warp beam through the heddles and reed to the beat line is under considerable tension, such that upon breakage the warp may move rapidly about within the shed, and any shift of the heddles will create an entanglement capable of severely damaging the threads.

In order to obtain a timely detection of broken warp threads, or other abnormal thread movement, various means have heretofore been devised. A common expedient in the weaving of natural and synthetic fibres is the use of "drops." They are, however, expensive and cumbersome, and have not proven entirely satisfactory for use in weaving with metallic threads.

For use with metallic threads electrically conductive detection wires have been suspended transversely of the warp threads, extending between the warp roll and the heddles and also along finished cloth, with the expectancy that an abnormal movement or wrinkle will contact a detection wire. Such a contact of a metallic thread with a conductive detection wire is then sufficient to initiate a circuit response, which in turn causes shutdown of the loom. Various means have been employed for suspending detecting wires in close proximity to the threads, but heretofore the means of suspension have proven unsatisfactory.

Normal vibrations encountered in loom operation and shifts in the normal positions of the threads, have caused detection apparatus to function without the requisite precision and certainty necessary for adequate supervision of a loom. A goodly number of faults, therefore, have not been detected by devices heretofore employed. In the present invention conductive detecting elements are arranged along the threads at positions where variations in thread positions are at a minimum with respect to a given reference. The detecting elements are accordingly positioned with respect to the given reference and may be spaced closely to the threads. With the enhanced precision in the closeness of the spacing between the threads and the detecting elements that is possible in the employment of this invention a broken thread, or one which has taken

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an abnormal shift, upon a loss of tension, will invariably move into contact with a detecting element. Desired certainty in the supervision of a loom is thereby obtained.

5 It is an object of this invention to provide means for detecting unwanted abnormal movements of threads upon a loom, for obtaining reliable supervision of the loom.

10 It is another object of this invention to provide means for the detection of unwanted thread movements with an enhanced degree of reliability, whereby such unwanted movements are detected in timely fashion to ensure prompt shut down of the loom.

15 It is another object of this invention to provide a mounting for detection elements in which the detection elements are held within close limits to the threads with a degree of rigidity that ensures maintenance of such limits.

20 It is another object of this invention to provide a mounting for detection elements that is not adversely affected by vibration, shock and impact encountered during the weaving operation of a loom.

25 It is another object of this invention to provide a detection element assembly for a loom which may be easily and quickly attached thereto as a part of the setup operation for the loom.

30 It is another object of this invention to provide detection elements for a loom which are disposed alongside the lease rods in fixed relation thereto.

35 It is another object of this invention to provide detection elements which may be disposed along a leveling roll, if such is employed in the loom, in a fixed relation thereto along the entire length of the roll.

40 It is another object of this invention to provide detection apparatus for a loom having a conductive element that is stiff and unyielding, but which nevertheless follows the general contour of the shed formed by the warp threads running from the warp beam to the heddles.

45 It is another object of this invention to provide a detection element to be contacted by unwanted thread movements which is disposed at a highly advantageous point for the detection of movements of the threads that are indicative of a lack of tension in such threads.

50 The foregoing and other objects and advantages of this invention will appear in the description to follow. In the description reference is made to the accompanying drawings, which form a part hereof, and in which there is shown by way of illustration and not of limitation specific forms in which the invention may be embodied.

In the drawings:

55 Fig. 1 is a side view in elevation of a loom embodying the invention,

Fig. 2 is a fragmentary plan view of the loom of Fig. 1, on a larger scale, showing a portion of the warp roll and the warp threads leading therefrom as they pass across the lease rods,

Fig. 3 is a fragmentary plan view of the lease rods and apparatus associated therewith,

Fig. 4 is a fragmentary front view in elevation of the apparatus shown in Fig. 3,

60 Fig. 5 is a side view in elevation and in section taken on the plane 5—5 shown in Fig. 3,

Fig. 6 is a side view in elevation and in section taken on the plane 6—6 shown in Fig. 3 with the warp threads shown for a heddle position differing from that for Fig. 5,

65 Fig. 7 is a view in perspective of an insulating block forming a part of the invention as illustrated herein,

Fig. 8 is a view in perspective of another insulating block forming a part of the invention as illustrated herein,

70 Fig. 9 is a wiring diagram of a control circuit for the loom,

Fig. 10 is a fragmentary side view in elevation of

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another loom embodying another form of the invention in conjunction with a leveling roll,

Fig. 11 is a fragmentary side view in elevation of a portion of the loom shown in Fig. 10, and

Fig. 12 is a fragmentary view in plan of the portions of the loom shown in Fig. 11.

Referring now to the drawings, and more particularly Fig. 1, there is shown a loom 1 with a warp roll 2 at the rear upon which is wound a supply of warp threads 3. The warp threads 3 run forwardly from the warp roll 2 through a pair of heddles 4, and hence through the reed 5 of a lay 6 to the beat line 7. From the beat line 7 finished cloth 8 extends around the breast beam 9 and to the finished cloth roll 10.

As is more clearly shown in Fig. 2 the warp roll 2 is formed with a plurality of lands or stirrings 11 which divide the warp roll 2 into a number of closely adjacent circumferentially extending channels. Between the stirrings 11 is wrapped the supply of warp threads 3, which is consumed as required in the weaving operation. A substantial number of warp threads 3 are wound between each pair of adjacent stirrings 11, and as the warp threads 3 depart from the warp roll 2 forwardly toward the heddles 4 the stirrings 11 create a series of gaps 12 in the shed of warp threads 3.

As the warp threads 3 leave the warp roll 2 they pass across a rear lease rod 13 and a front lease rod 13'. Each of the lease rods 13, 13' extends across the entire length of the loom 1 and comprises a metal bar substantially rectangular in cross-section, that is relatively thin in height and broad in width, as clearly shown in Figs. 3-6. The upper and lower faces of the lease rods 13, 13' present smooth surfaces across which the warp threads 3 pass without hindrance, it being a purpose of the lease rods 13, 13' to guide the warp threads 3 and to position them relative to one another.

As is more clearly shown in Figs. 3, 5 and 6, the warp threads 3, shown in the particular illustration of the invention set forth in Figs. 1-8, alternate in passing above and below the lease rods 13, 13'. Thus, with respect to the rear lease rod 13, every other warp thread 3 passes over the rod and the threads therebetween pass beneath the rod. With respect to the front lease rod 13', those warp threads 3 which have passed above the rod 13 pass beneath the rod 13', and those warp threads 3 which passed under rod 13 pass above the rod 13'. This mode of operation is in accordance with well-known practices. In such practices, when the loom 1 is first made ready for weaving, by stringing the warp threads 3 forwardly from the warp roll 2 and through the heddles 4 and the reed 5, the lease rods 13, 13' are inserted from the side of the loom 1, and are advanced through the warp threads 3 as the threads 3 are progressively threaded through the heddles 4 and the reed 5.

To retain the rear lease rod 13 in position a bracket 14, as shown in Fig. 2, is attached to each side frame 15 of the loom 1, and a support strap 16 is bolted to the bracket 14 in a position extending above the lease rod 13. A pinned connection 17 is then made between each end of the lease rod 13 and the associated strap 16. The weight of the lease rod 13 is partially borne through the pinned connection 17, and the remaining support for the rod 13 is the warp threads themselves.

Beneath and to the front of the warp roll 2 there extends a box member 18 that forms a part of the framework of the loom 1. Spaced, at intervals, along the box member 18 is a plurality of upwardly extending brackets 19. To the top of each bracket 19 is firmly secured a retaining arm 20 of elongated configuration that extends upwardly and to the front of the lease rod 13, so that the forward edge of the lease rod 13 bears against the arms 20 to be prohibited from moving forwardly. Thus, the retaining arms 20 supplement the pinned connections 17, to retain the lease rod 13 in position.

Borne by and uniformly spaced along each of the lease

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rods 13, 13' is a plurality of blocks 21, preferably formed of an insulating material such as a fibre or synthetic material. Each block 21 is relatively thin so that it may be aligned with a stirring 11, and disposed in one of the gaps 12 appearing in the warp threads 3 without disturbing the threads 3 as they travel toward the heddles 4. As shown in Figs. 5 and 7, the side view of a block 21 presents a substantially rectangular configuration with an upper portion 22 and a lower portion 23 that are defined in part by a slot 24. The slot 24 of each block 21 extends through the thickness of the block and enters from one edge and the length of a slot 24 is approximately two-thirds that of the block 21. The width of a slot 24 complements the thickness of the associated lease rod 13, 13' to permit the block 21 to be slipped onto the lease rod 13 or 13', with a snug, firm fit.

Openings 25 are provided in both the upper and lower portions 22, 23 of each block 21 and extending through the openings 25 are conductive strands in the form of stiff conductive detecting rods 26 preferably of a non-corrosive material such as copper or brass. By precisely locating the openings 25 in the blocks 21 the detecting rods 26 are spaced at a selected predetermined distance from the surfaces of the lease rods 13, 13'. In turn, the spacing between the detecting rods 26 and the warp threads 3, passing over the surfaces of the lease rods 13, 13', is also a dimension controlled within narrow limits.

As will be observed from Fig. 3, adjacent blocks 21 are preferably placed on the lease rods 13, 13' from alternate directions. For example, the blocks 21 adjacent one that is slipped over a lease rod from the rear are, in turn, slipped over the rod from the front. With the blocks slipped over the respective lease rod 13, 13' to the fullest extent the openings 25 are located in alignment to permit insertion of the detecting rods 26 without bending or other distortion. Also, upon placing the detecting rods 26 through the openings 25 the blocks 21 are held firmly in place resulting in an assembly presenting a unitary whole, in which the conductive detecting rods 26 are held in fixed position with respect to the lease rods 13, 13'. The detecting rods 26 will not be subject to uncontrolled random movement when subjected to vibrations and other impacts that normally occur during the weaving operation.

In the illustration of the invention shown in Figs. 1-8 the blocks 21 are supplanted, at intervals, by supplementary lease connecting blocks 27, of a material like that of the blocks 21. Also, each connecting block 27 is of a thickness substantially the same as that of a block 21, for alignment with a stirring 11 in a gap 12 without displacement of the warp threads 3. From Figs. 6 and 8 it is seen that a connecting block 27 is similar to a pair of facing blocks 21 with a connecting portion therebetween. Thus, each connecting block 27 has an upper rib portion 28 and a pair of lower portions 29, one at each end. A pair of slots 30 are formed between the upper rib 28 and the lower portions 29. The slots 30 face inwardly toward one another, so as to prohibit the lease rods 13, 13' from separating. By reason of this construction the forward lease rod 13' is maintained in proper position by the rear lease rod 13, which in turn has been positioned at its ends by the pinned connections 17 and the retaining arms 20. Openings 31 for the detecting rods 26 are provided in the upper rib portion 28, above the slots 30, and in the lower portions 29, beneath the slots 30. The openings 31 are in alignment with the openings 25 of the blocks 21 to permit insertion of the rods 26.

At the ends of the lease rods 13, 13' are end connecting blocks 32, that are of configuration like that of the connecting blocks 27, with the exception of an increased thickness to provide additional strength. The end connecting blocks 32 are disposed outwardly of the outermost warp threads 3, so that the increased thickness may be accommodated without disturbance to the threads 3. One end connecting block 32 is provided with terminal

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screws 33 to which are attached the ends of the detecting rods 26, and the terminal screws 33 are joined to one another electrically by appropriate lead wires 34.

Referring now to Fig. 9, there is represented a plurality of warp threads 3 and extending transversely thereof are four detecting rods 26, tied together by the lead wires 34. A lead 35 is connected at one end to the wires 34 and is joined at its opposite end to the signal input of a relay circuit schematically shown at 36. The relay circuit 36 includes relay means that electrically influence the output leads 37 to operate a clutch-brake unit 38. The clutch-brake unit 38 connects and disconnects the output shaft 39 of a motor 40 with the main drive shaft 41 of the loom 1. Thus, should one of the warp threads 3, which is at ground potential like that of the entire frame of the loom 1, touch or momentarily contact a detecting rod 26 a circuit is completed through the ground connection 42 of the relay circuit 36 to activate a relay, not shown, to cause a declutching and a braking in the unit 38, for obtaining immediate shutdown of the loom 1.

In utilizing the apparatus of Figs. 1-8 the blocks 21 are fitted upon the lease rods 13, 13' as a part of the set-up operation of the loom. The connecting blocks 27 are placed in position as the lease rods 13, 13' are being inserted through the warp threads 3, and as the lease rods 13, 13' are advanced the connecting blocks 27 are held in position. Thus, the lease rods 13, 13' are slid through the openings 31 of the connecting blocks 27. Then, after the warp threads 3 are strung and the lease rods 13, 13' have been fully inserted therebetween it is a simple manipulation to place the blocks 21 in position. Next, the detecting rods 26 are extended through the respective openings 25, 31 of the blocks 21, 27, to tie the elements into a unitary assembly. In this manner of assembly detecting elements are assembled in place after the warp threads 3 are fully strung. This insertion of the detecting rods 26 as a final operation in the setting-up of the loom 1 precludes bending or otherwise deforming the same during the set-up operation.

The detecting rods 26 are selected of a material having sufficient stiffness, in the absence of abusive handling, to retain an extended straight configuration during the weaving operation. Also, the blocks 21, 27 are spaced at close intervals to minimize the lengths of the detecting rods 26 extending between supports. In this manner the rods 26 will retain a given position with respect to the lease rods 13, 13', to provide requisite dimensional stability necessary for close spacing of the detecting rods 26 from the warp threads 3. In the use of the invention the dimensional stability obtained is of such improved order that the rods 26 may be spaced closely to the lease rods 13, 13', and in turn to the warp threads 3, so that small displacements of the threads 3 from the surfaces of the lease rods 13, 13' will be detected.

It has been found that upon a breakage of a warp thread, or upon a slackening of a thread due to loss of tension, that such thread will move away from its normal path across the lease rods. In the present invention these characteristics are availed of by placing the detecting elements, in the form of the rods 26, close to the lease rods 13, 13' in a position whereby a broken or slackened warp thread 3 will most readily contact a detecting element.

In Figs. 10-12 there is shown another form of the invention, wherein warp threads are guided by means other than lease rods, as they pass from the warp roll to the heddles. Referring first to Fig. 10, there is shown a warp roll 43 from which there is drawn a plurality of warp threads 44. The threads 44 are led over a leveling roll 45, and hence to a pair of heddles 46. The leveling roll 45 rests in a plurality of cradles 47, one of which is shown.

Each cradle 47 includes a pedestal 48 secured at the lower end to a box frame 49, which comprises a part of the framework 50 of the loom. During operation of the

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loom the leveling roll 45 turns clockwise, as viewed in Figs. 10 and 11, against the principal direction of movement of the warp threads 44. This movement is brought about by the action of the threads 44. Upon completion of a beat the threads 44 are tensioned to a degree that upon retreat of the lay, which is not shown in Fig. 10, the threads 44 contract in an amount to move the leveling roll 45 clockwise. This action is in accordance with usual practices.

A plurality of spaced insulating blocks 51 are borne by the leveling roll 45. These blocks 51 are aligned with the stirrs of the warp roll 43, similarly as the blocks 21 and 27 are aligned with the warp roll stirrs 11. Each block 51 is urged against the cylindrical surface of the roll 45, across which the warp threads 44 pass, by a spring 52. One end of each spring 52 is attached to the associated block 51, and the opposite end carries a pin 53 that fits in an appropriate opening 54 in a channel shaped mounting beam 55. The mounting beam 55 extends for the length of the loom and is supported by the framework 50. It is to be understood that Fig. 12 shows but a portion of the leveling roll 45, and that the blocks 51 are spaced along the entire length of the roll 45 over which warp threads 44 pass.

As is shown in Figs. 11 and 12 a pair of conductive detecting rods 56 extend between the spaced blocks 51 and are supported thereby by insertion in appropriate openings in the blocks 51. In this manner the detecting rods 56 are closely spaced from the leveling roll 45, and hence are spaced with respect to the warp threads 44, similarly as the rods 26 are spaced from the threads 3 in the apparatus of Figs. 1-8.

In the event of a breakage of a warp thread 44 its immediate movement away from the surface of the leveling roll 45 will cause contact to be made with a detecting rod 56. The rods 56 and the threads 44 form a part of a circuit similar to that of Fig. 9, whereby contact between a thread 44 and a rod 56 will close a circuit to cause shutdown of the loom.

For setting-up a loom for weaving the blocks 51 and rods 56 may be removed and the warp threads are then placed over the leveling roll 45 without hindrance from apparatus of the invention. The blocks 51 are then easily and quickly placed in position upon the leveling roll 45 by insertion of the pins 53 in the openings 54. The rods 56 are inserted, for close spacing from the roll 45, and hence the warp threads 44.

As is seen from the foregoing illustrations it is a purpose of this invention to fix a detecting element with respect to a guide for the warp threads so as to be fixed, in turn, with respect to the normal warp thread path. In this manner the detecting element may be disposed closely adjacent the warp threads along the entire length of the shed to ensure proper detection of a fault. Furthermore, in the practice of this invention vibrations and shock impacts encountered in weaving are not disruptive of the close spacing maintained between the warp threads and the detecting elements, thereby permitting a close spacing not heretofore had.

I claim:

1. In a detection apparatus for the control of a loom the combination comprising means disposed in position to have the warp threads extend forwardly across a surface thereof to position the threads, a plurality of insulation members each having a mounting face and which are closely spaced along and borne by said means with the mounting face of each in engagement with said surface, and a conductive member extending transverse of said warp threads supported by said insulation members to bridge between the insulation members in a plurality of short spans that are each in closely spaced relation to said surface, the member being in a position that is between the forward and rearward extent of the surface as measured in the direction of travel of the warp threads

and with the warp threads disposed between said surface and said conductive member.

2. In a detection apparatus for the control of a loom having a warp roll from which warp threads are to be drawn forwardly the combination of a member extending longitudinally of the warp roll and spaced therefrom with a surface against which warp threads drawn from the warp roll bear to be guided thereby, a plurality of spaced blocks bearing upon said member to be positioned with respect to said surface, the blocks being disposed at repeated close intervals with warp threads to each side of a block thereby having a small group of threads lying between each successive pair of said blocks, and an elongated conductor extending between and supported by said blocks to bridge between the blocks in a plurality of short spans each in closely spaced relation to said surface in a position directly facing the same, such position being between the forward and rearward extent of the surface as measured in the direction of travel of the warp threads and having the warp threads pass between said conductor and said surface.

3. In detection apparatus for the control of a loom the combination comprising a rod extending transversely of the warp threads of the loom and having a smooth warp thread guiding surface across which the warp threads pass in a forward direction, a plurality of blocks each having an open ended slot extending inwardly from one face to fit snugly on said rod and in engagement with said guiding surface upon being moved onto the same by a movement transverse thereof, each of said blocks having an opening spaced from its slot in a position that lies between the forward and rearward extent of the guiding surface as measured in the direction of travel of the warp threads when the block is on said rod, and a conductive member extending through the openings of said blocks to be supported by said blocks in closely spaced relation to said guiding surface with the warp threads running between the conductive member and said guiding surface.

4. An apparatus like that set forth in claim 3 in which the blocks are placed on the rod in alternate positions, one being moved onto the rod from one direction and those adjacent thereto being moved onto the rod from an opposite direction, whereby the conductive member extending between the blocks retains the same in locked relation with the rod.

5. In a detection apparatus for the operation of a loom the combination comprising a lease rod of uniform width and depth with smooth upper and lower warp thread guiding surfaces substantially parallel to one another for insertion between warp threads as the loom is readied for weaving by an inserting movement transverse of the threads; a plurality of insulating members each of relatively thin width and extended height and length with a slot cut therein from one edge passing through the width thereof, the slot permitting the member to be slid upon the lease rod with a snug fit with said guiding surfaces and each member having an opening likewise passing through the width thereof that is spaced from the slot in a position directly opposite from a warp thread guiding surface that is between the edges of the surface when the insulating member is slid upon the lease rod; and a conductive strand to pass through the openings of the members subsequent to sliding the members upon the lease rod thereby joining the members and being in turn held by the members in spaced relation to the warp threads which pass between the conductive strand and the lease rod.

6. An apparatus like that set forth in claim 5 with some of said members slid onto the lease rod from one side of the rod and others slid onto the lease rod from the opposite side.

7. In a detection apparatus for the control of a loom having a warp roll from which warp threads are to be drawn forwardly the combination of a leveling roll ex-

tending longitudinally of the warp roll presenting a surface against which warp threads drawn from the warp roll bear to be guided thereby, a plurality of spaced blocks along said roll, spring means urging the blocks against the roll to bear thereupon to be positioned with respect thereto, and a conductor extending between and supported by said blocks in closely spaced relation to said surface, said conductor being disposed by said blocks in a position which places the warp threads between the conductor and said surface and which position is between the forward and rearward extent of the leveling roll surface as measured in the direction of warp travel.

8. In a loom having a warp supply roll with a plurality of stirrs along the length thereof which divide warp threads carried thereon into groupings with spacing between the groupings the combination of a member to the front of the roll extending longitudinally thereof with a surface against which warp threads drawn forwardly from the warp roll bear to be guided thereby, a plurality of spaced blocks bearing upon said surface of said member to be positioned with respect thereto which are aligned with said stirrs and disposed in the spaces between the warp thread groupings, and an elongated conductor extending between and supported by said blocks in a position closely spaced from said surface which lies between the forward and rearward extent of the surface as measured in the direction of warp thread travel to extend along said member in a series of short spans whereby the conductor conforms to the contour of said member to be held within a set distance from the member along the entire length thereof whereby the warp threads pass between said surface and said conductor.

9. In a detection apparatus for the control of a loom the combination comprising a lease rod having a face over which warp threads are to pass; a plurality of insulation block spaced along and supported by said lease rod which subdivide the rod into short segments each being a minor portion of the length of the rod, each of said blocks having a surface bearing upon said lease rod to be fixed with respect to said face and having an opening disposed in a position which is located between the boundaries of said face; and a conductive strand extending through the openings of said blocks that is supported longitudinally along said lease rod in fixed spaced relation to said lease rod face in a direct facing relation thereto, whereby the strand follows the contour of the lease rod and warp threads pass between the strand and said face of the rod.

10. In a detection apparatus for the control of a loom the combination comprising a rod extending transversely of the warp threads of the loom in a position that the warp threads pass above and below the same; a plurality of blocks each having an open ended slot extending inwardly from one face to fit on said rod with a snug fit upon being moved onto the same by a movement transverse thereof, each of said blocks having a major portion above and below the slot and an opening in each portion spaced from the slot, such that there is an opening above and below said rod when the block is fitted therein; a first conductive member extending through the openings beneath the rod; and a second conductive member extending through the openings above the rod, said conductive members extending transverse of said warp threads and disposed in closely spaced relation to the threads passing across both the top and bottom of the rod.

11. In a detection apparatus for the operation of a loom the combination comprising a lease rod of uniform width and depth with smooth upper and lower surfaces substantially parallel to one another for insertion between warp threads as the loom is readied for weaving by an inserting movement transverse of the threads; a plurality of insulating members each of relatively thin width and extended height and length with a slot cut therein from one edge passing through the width thereof, the

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slot permitting the member to be slid upon the lease rod with a snug fit and each member having an opening likewise passing through the width thereof that is spaced from the slot; a conductive strand to pass through the openings of the members subsequent to sliding the members upon the lease rod thereby joining the members and being in turn held by the members in spaced relation to the warp threads; a second lease rod with like insulating members thereon; and a plurality of supplementary insulating members extending between and mounted on both of the lease rods, each of said supplementary insulating members being of relatively thin width with a pair of slots passing through the width thereof and being slid upon said lease rods thereby retaining the rods in spaced relation to one another.

12. In a detection apparatus for the control of a loom the combination comprising a lease rod having upper and lower faces across which warp threads are to be drawn; a plurality of blocks spaced along and supported by said lease rod with a portion of each extending above the rod and a portion of each extending below the rod, each block engaging said rod to be in predetermined

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position therewith and having an opening in each portion which is closely spaced from a face of the rod and is confined to a position within the normals of the edges of the rod when the block is in position upon the rod; a first conductive member extending through the openings beneath the rod; and a second conductive member extending through the openings above the rod, whereby said conductive members extending transverse of the warp threads in spaced relation thereto and are directly opposite said upper and lower faces.

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