

April 6, 1948.

S. S. WILSON

2,439,031

STOP MOTION FOR PILE WIRE LOOMS

Filed May 15, 1947

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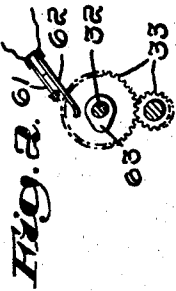
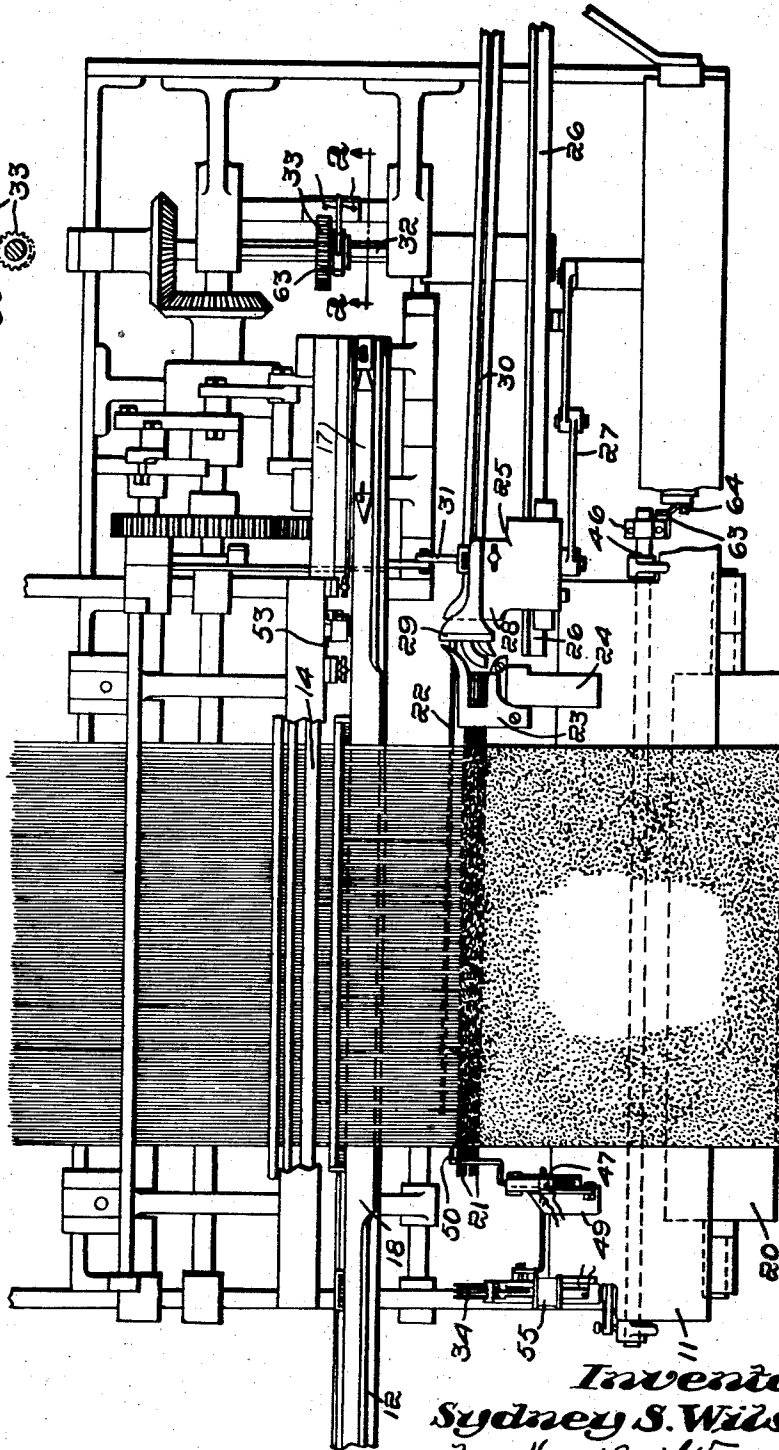


Fig. 1.



Inventor:
Sydney S. Wilson,
by **Heard Smith & Tennant**
Attorneys

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S. S. WILSON

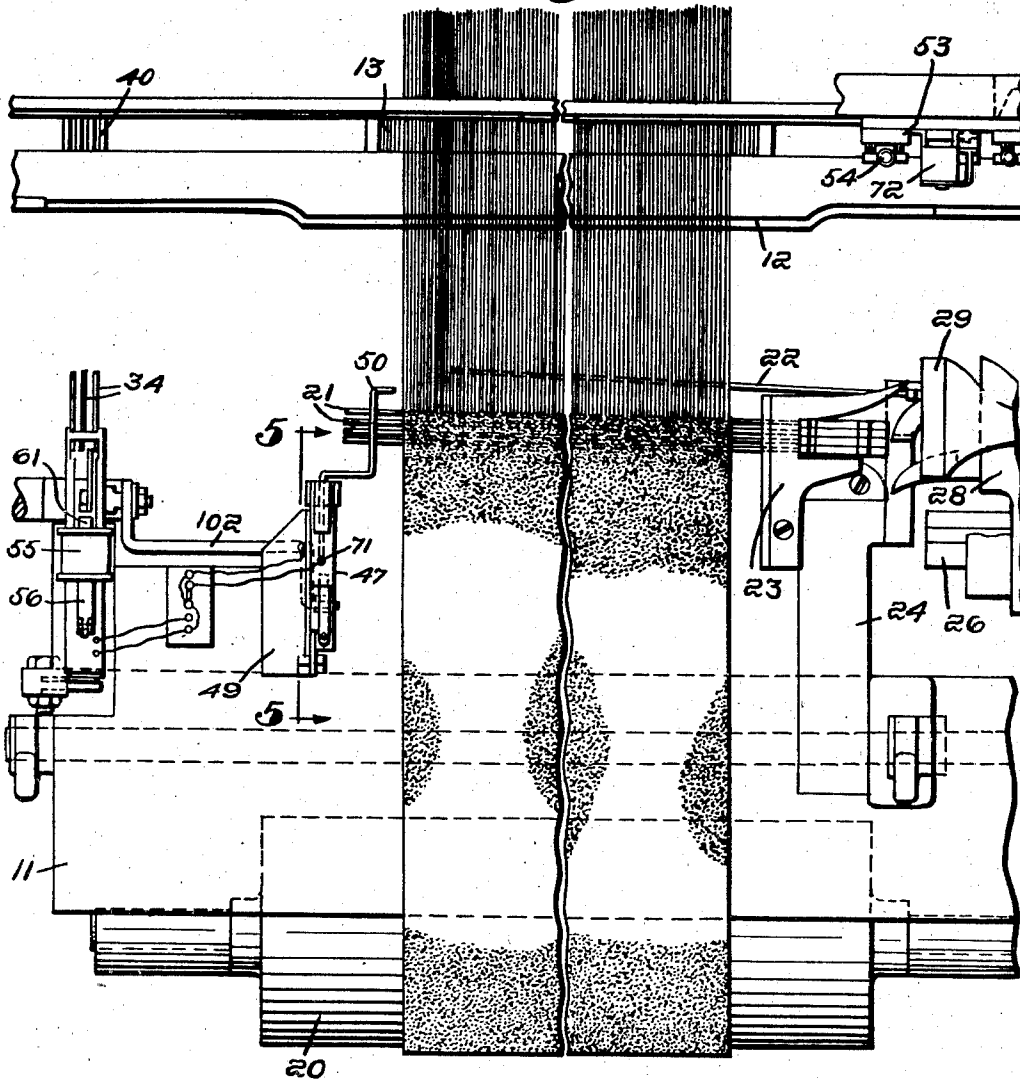
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Fig. 3.



Inventor:
Sydney S. Wilson,
by *Heard Smith & Tennant*
Attorneys

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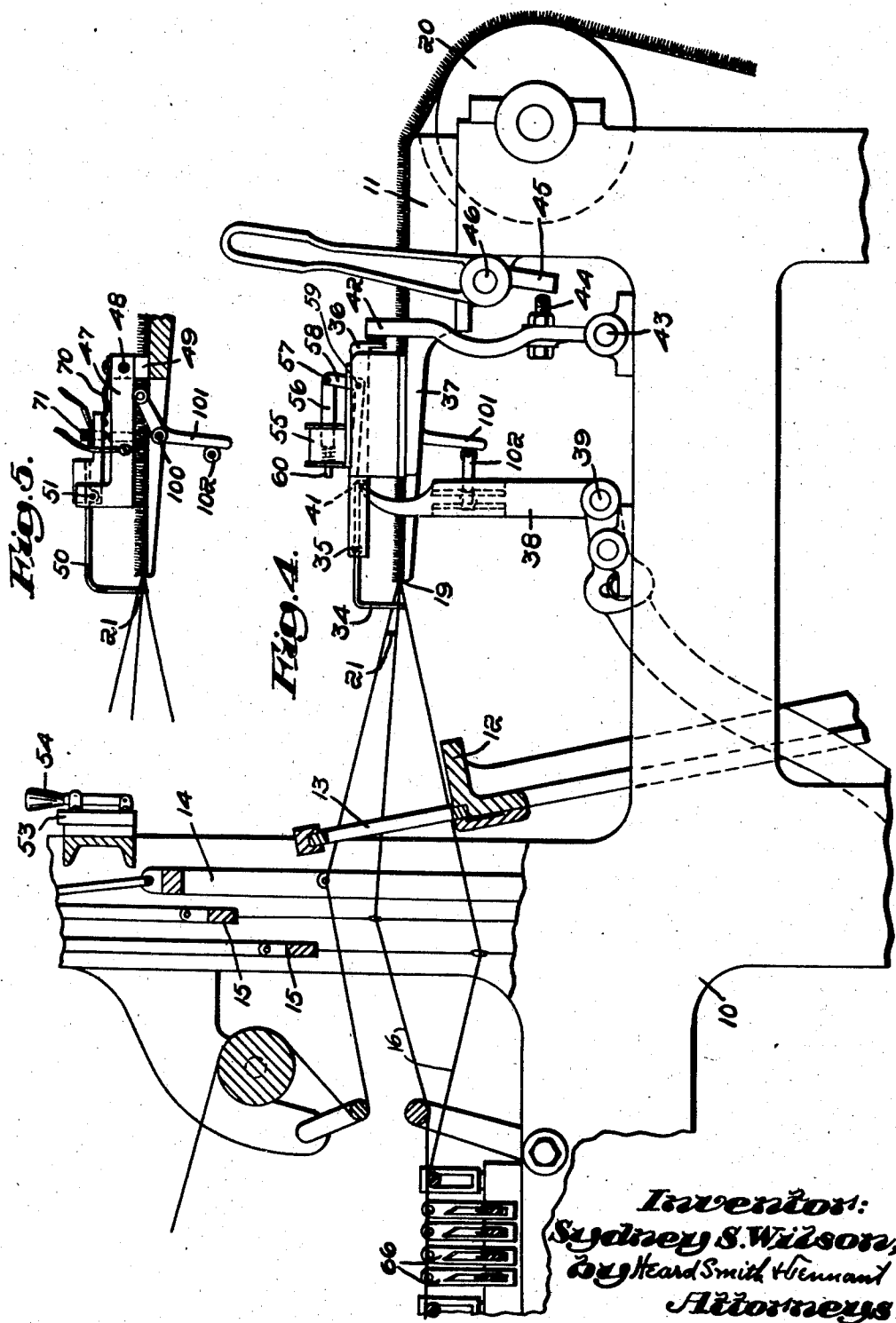
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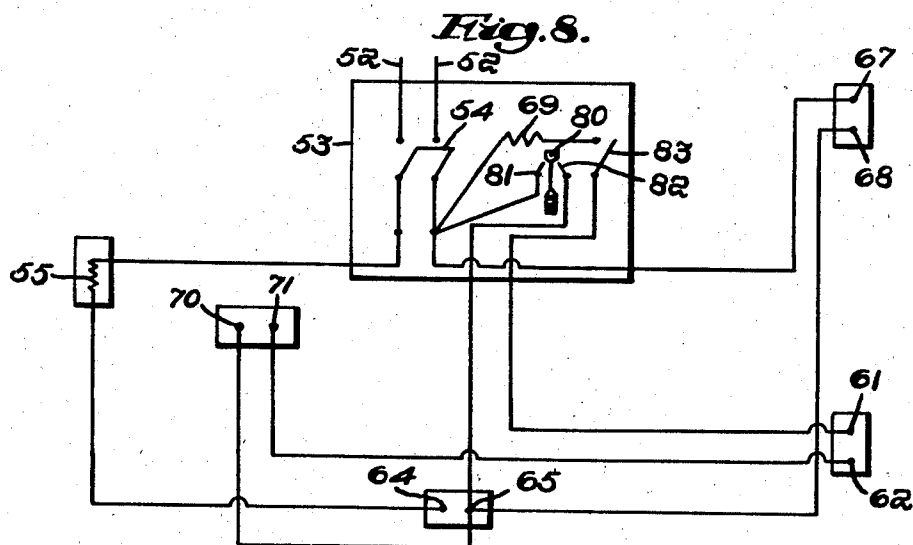
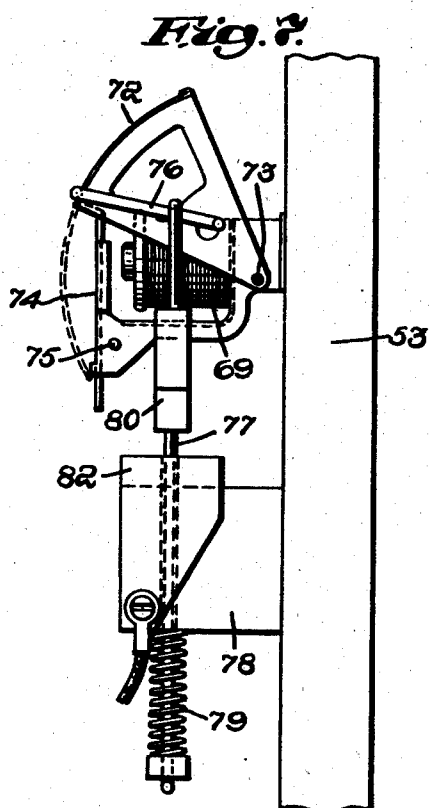
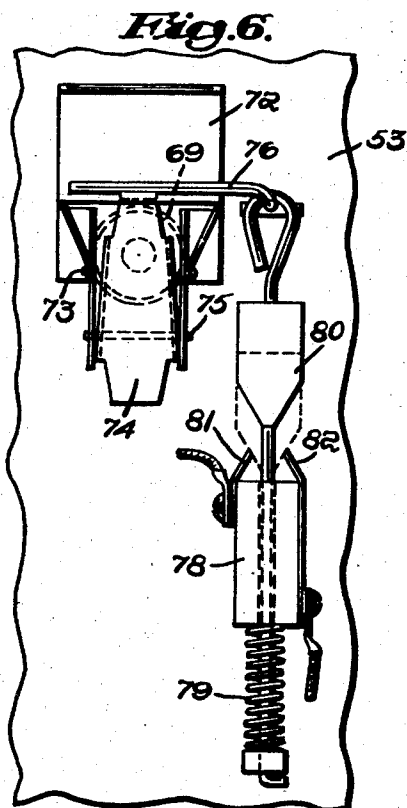
S. S. WILSON

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STOP MOTION FOR PILE WIRE LOOMS

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4 Sheets-Sheet 4



Inventor:
Sydney S. Wilson,
by **Heard Smith & Tennant**
Attorneys

UNITED STATES PATENT OFFICE

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STOP MOTION FOR PILE WIRE LOOMS

Sydney S. Wilson, Sanford, Maine, assignor to
Goodall-Sanford, Inc., Sanford, Maine, a cor-
poration of Maine

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11 Claims. (Cl. 139—336)

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This invention relates to a pile wire loom for the weaving of warp pile fabrics and in which the pile loops are formed over wires inserted into the shed and withdrawn from the fabric at pre-determined intervals.

One of the main objects of the invention is to provide for the stopping of the loom whenever a pile wire fails properly to function. While various means have been provided for stopping the loom upon particular happenings such as the breaking of a pile wire, the detachment of its head, the projection of the pile wire on top of the shed, etc., the present invention effects the stopping of the loom whatever may be the happening or the cause for the failure of a pile wire properly to function at the required time.

The invention has for a further object to provide a coordinated means for stopping the loom either upon a failure of the weft, the failure of a warp, or the failure of a pile wire properly to function.

These and other objects of the invention will appear more fully from the accompanying description and drawings and will be particularly pointed out in the claims.

Looms of the general type to which this invention relates have long been in use and are well known to those skilled in the art so that it is sufficient here to illustrate and describe only so much of such a loom as is necessary to a disclosure of the present invention.

In the drawings:

Fig. 1 is a top plan view of the main portion of a pile wire loom, partially broken away and with many of the elements of a preferred construction embodying the invention included therein;

Fig. 2 is a detail in cross section elevation taken on the line 2—2 of Fig. 1;

Fig. 3 is a top plan view enlarged corresponding to a portion of Fig. 1 and broken away in the center;

Fig. 4 is a side elevation of the loom, partially in vertical cross section and partially broken away, and looking toward the left of Figs. 1 and 3;

Fig. 5 is a detail in side elevation and cross section taken on the line 5—5 of Fig. 3;

Fig. 6 is a front elevation of a telltale construction and associated parts shown in plan in Fig. 3;

Fig. 7 is a side elevation of the construction shown in Fig. 6; and

Fig. 8 is a diagram illustrating the preferred arrangement of electric circuits employed.

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The loom illustrated is of a familiar type having a frame 10 with its breast beam 11, lay 12 with its reed 13, heddles 14 for the pile warps and 15 for the ground warps. Suitable drop wires 5 for the warps are employed, those for the ground warps being shown at 16 and those for the pile warps not being illustrated. The weft as usual is carried by the shuttle 17 traveling on the race-way 18 of the lay 12. The warps as usual lead 10 from the heddles through the reed to the fell 19 of the cloth behind the breast beam and the woven cloth winds over the cloth roll 20 at the front or in the usual manner.

The pile wire withdrawing and inserting mechanism is illustrated particularly in Figs. 1 and 3 of a familiar type. The pile wires as usual are woven into the fabric to form the pile loops from the pile warps. A plurality of the pile wires remain in the fabric adjacent the fell and as the 15 weaving proceeds the foremost pile wire is withdrawn from the fabric and inserted into the shed as required by the pattern of the pile. The pile wires 21 are provided with the apertured heads 22 and when the pile wires have been woven in 20 they stand with their heads supported in the magazine 23 in turn supported by the bracket 24 from the breast beam 11. The mechanism for successively withdrawing the pile wires from the woven fabric and the magazine 23 and inserting them in the shed is also of a familiar type. It is shown as comprising the carriage 25 mounted to slide on the guideway 26 and given its movement by link and crank connections 27 to one of the 25 operating shafts of the loom. This carriage, as usual, carries a hook 28 adapted to engage in the aperture of the head 22 of the foremost pile wire in the magazine when the carriage is at its innermost position and to withdraw the wire from the cloth as the carriage travels to the right. 30 The carriage also has the usual latch member 29 which acts to insert the pile wire into the shed and its head into the magazine in the rear of the previously inserted wires. The wire, while being withdrawn from the magazine and inserted 35 into the shed, is guided in a grooved track 30 pivoted at its right hand end and swung between withdrawing and inserting positions by the usual connections 31 operated in properly timed relation with the cycle of loom operation. The withdrawing and inserting movement of the car- 40 riage is timed, as usual, to take place at pre-determined times by the mechanism of the loom as required by the pattern of the pile fabric being woven and the shaft 32 is here assumed to be 45 driven by the interchangeable gears 33 in the re-

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quired timed relation for that purpose. Since all of the foregoing mechanism is of a familiar type operating in the usual manner for withdrawal and insertion of the pile wires, no further description is necessary. In the operation of this mechanism if it functions properly and withdraws a pile wire from the fabric and inserts it in the shed the end of the pile wire will be left projecting from the selvage of the fabric at the left or the side opposite to the magazine 23 and upon the succeeding beat-up of the lay the pile wire will be driven up to the fell. Now if in any way this mechanism fails to function, either by the pile wire failing to be withdrawn, by the head breaking off from the body of the wire, by the pile wire riding over or under the shed or failing to enter the shed or failing to pass entirely through the shed into its proper position, or by the happening of any other failure, then the pile wire will not be in the shed with its end projecting beyond the selvage so as to be carried forward by the lay in proper position. In the present invention the failure of this requirement for a properly positioned pile wire to exist, after an inserting movement of the pile wire withdrawing and inserting means takes place, is employed to effect stopping of the loom, and thus prevent any damage to the fabric or the loom mechanism which might result from improper functioning of the mechanism. In the preferred embodiment of this important feature of the invention a portion of the usual mechanism for stopping the loom upon failure of the weft is conveniently employed.

The mechanism for stopping the loom upon failure of the weft is shown as of the usual filling fork type and is illustrated somewhat in detail in Fig. 4. The filling fork 34 is pivoted at 35 on the filling fork slide 36 mounted in the bracket 37 supported on the breast beam 11. A weft hammer 38, pivoted at 39 on the loom frame, is given its usual vibrating movement in timed relation to the cycle of loom operation in the usual manner. In this type of mechanism if the weft for any reason fails or is absent from in front of the filling fork and the opposed gate 40 between the reed 13 and the shuttle box, the fork will not be tilted on its pivot 35, but will remain in the position shown in Fig. 4 and the weft hammer will engage the tail 41 of the fork and move the fork slide 36 forward engaging and rocking the lever 42 pivoted at 43 on the loom frame and the adjustable stop 44 on this lever will engage the projection 45 depending from the controller rock shaft 46 journaled on and extending across the loom frame beneath the breast beam and thus effect the stopping of the loom by any of the usual means operated by this movement of the controller shaft 46. This mechanism for stopping the loom is also well known and familiar and needs no further description.

In the preferred embodiment of the invention for stopping the loom upon the failure of a pile wire properly to function means controlled by an electric circuit are provided. For this purpose a feeler support 47 is pivoted at its forward end at 48 on a bracket 49 carried by the breast beam and a feeler 50 is pivoted at 51 on the rearward end of the feeler support. These parts are so mounted that the feeler extends adjacent the path of the selvage slightly rearward of the fell so that it lies across the path of the projecting end of a properly positioned pile wire when that pile wire is beaten up to the fell by the reed. If the pile wire is thus properly positioned after an inserting

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movement of the pile wire withdrawing and inserting means this feeler 50 will be rocked on its pivot opening an electric circuit, while if the pile wire is not so present the feeler will not be rocked, the electric circuit will remain closed and will act to effect stopping of the loom.

The electric circuits employed are as shown diagrammatically in Fig. 8. The electric current employed may be taken from any suitable source through the wires 52 connected to a switchboard 53 conveniently mounted upon the front of the loom frame, as shown in Fig. 4. This circuit is provided with a suitable switch 54 for connecting and disconnecting the source of current.

The circuit, the closing of which effects the stopping of the loom upon the failure of the pile wire properly to function, is shown as including a solenoid 55 mounted on the fork slide 36. The core 56 of this solenoid is pivoted at 57 to a bell crank lever 58 fulcrumed at 59 on the fork slide 36 and the core is pressed yieldingly forward by a light spring 60 holding the rearward end of the bell crank lever out of the path of the weft hammer 38. When the circuit is closed by the failure of the filling fork 34 to rock on its pivot the solenoid 55 is energized drawing the core 56 rearward and bringing the bell crank lever 58 into the path of the weft hammer with the result that the fork slide 36 is moved forward and acts to effect stopping of the loom through the mechanism already described.

After the feeler 50 has been rocked by the projecting end of a properly positioned pile wire on the beat-up it is necessary that the feeler shall be lifted over the wire so as to drop into position behind the fell for the next operation. This is effected in the construction illustrated by rocking the feeler support 47 upwardly about its pivot 48 and then allowing it to drop down. For this purpose a bell crank lever is fulcrumed at 100 on the breast beam with the end of one arm engaging the feeler support 47 and with the other arm 101 depending into the path of an arm 102 connected to and extending laterally from the weft hammer 38. Consequently every time the weft hammer vibrates the feeler 50 is raised out of engagement with the pile wire and allowed to drop into position in the rear of the fell.

As already pointed out a pile wire withdrawing and inserting movement takes place in certain timed relation to the cycle of loom operation and consequently the controlling circuit must be kept open excepting when such a movement takes place. For this purpose a pair of contacts 61 and 62, see Fig. 2, are included in the circuit and conveniently operated by the cam 63 on the shaft 32 so as to close the circuit only at the required times.

It is also desirable that any of the electric circuits employed shall be opened whenever the loom is stopped for any reason and for that purpose another pair of contacts are illustrated at 64 and 65 which are normally closed but which are opened by the controller shaft 46 when rocked to loom-stopping position.

The invention also coordinates with the means for stopping the loom upon the failure of the weft and the means for stopping the loom upon the failure of the pile wire withdrawing and inserting mechanism properly to function means for stopping the loom upon failure of a warp. This latter means is shown of a familiar type and effecting the stopping of the loom under the control of an electric circuit. An ordinary form of drop wire mechanism is indicated at the left of

Fig. 4. Upon the failure of a warp a drop wire 66 supported thereby falls closing the contacts 67 and 68 in an electric circuit which also includes the solenoid 55 with the result that the loom is stopped by the engagement of the weft hammer with the bell crank lever 58 in the same manner as already described.

The invention also provides a telltale device operated by the circuit closed by the feeler 50 to enable the operator readily to determine whether the loom has stopped by warp failure or by failure of the pile wire withdrawing and inserting mechanism properly to function. To avoid any possibility of the circuit energizing the solenoid 55 opening before the controller shaft 46 has been rocked to loom-stopping position, the operation of the telltale mechanism is employed simultaneously to close another circuit including the solenoid 55.

The telltale mechanism is mounted on the switchboard 53 and in its preferred form is shown in detail in Figs. 6 and 7. In the form illustrated it comprises a solenoid 69 included in the same circuit as the solenoid 55 and the contacts 70 and 71 opened and closed by the feeler 50. A shield 72 is pivoted at 73 on the switchboard and held in raised position by a trip 74 pivoted at 75. An arm 76, connected to the shield 72, extends laterally therefrom and is engaged by a plunger 77 mounted for vertical movement in a bracket 78 and yieldingly pressed downward by a spring 79. This plunger carries a contact member 80 acting when the plunger moves downward to engage and close a pair of contacts 81 and 82. It will thus be seen that when the circuit is closed by the feeler 50 at the contacts 70 and 71 the solenoid 69 in the circuit will be energized causing its core to attract the trip 74, release the shield 72 which drops to indicating position shown in dotted lines in Fig. 7. This action opens the circuit at 83 and immediately the spring 79 causes the contact member 80 to close the circuit through the contacts 81 and 82, thus maintaining the solenoid 55 energized.

The operation of the electric circuits will be better understood from the diagram in Fig. 8. With the loom in operation the contacts 64 and 65 under the control of the rock shaft 46 are closed, the switch 83 is closed, and the contacts 81 and 82 are open. If now a pile wire withdrawing and inserting movement takes place the circuit, running from the contact 71 through the contacts 62, 61, through the switch 83, the solenoid 69, through the solenoid 55, to the contact 65 and back to the contact 70, is closed by the cam 63 through the contacts 61 and 62. If the pile wire has been properly inserted and the mechanism is functioning properly the contacts 70 and 71 are opened by the wire and nothing happens, but if the pile wire withdrawing and inserting mechanism has failed properly to function the feeler 50 is not moved as the lay beats up, the contacts 70 and 71 remain closed, the entire circuit is closed, and the solenoids 55 and 69 are simultaneously energized. Immediately the telltale drops, an electric circuit is closed through the contacts 81 and 82 through the solenoid 55, through the contacts 64—65, thus cutting out the contacts 61—62 and 70—71, maintaining the solenoid 55 energized and the loom stops when the circuit is opened at 64—65. If a warp fails a circuit is closed at the contacts 67—68 directly through the solenoid 55 and through the contacts 64—68, energizing the solenoid 55, effecting the stopping of the loom, and

opening of the contacts 64—65, but not effecting the telltale.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is:

1. In a loom the combination of pile wire withdrawing and inserting means at one side of the loom, a feeler support pivotally mounted on the breast beam at the opposite side of the loom, a feeler movably mounted on the support and extending adjacent the path of the selvage rearward of the fell, means acting to stop the loom, unless, after an inserting movement of the pile wire withdrawing and inserting means, a pile wire is in the shed projecting from the selvage and is carried forward by the lay on the beat-up to engage and move the feeler, and means acting after each wire inserting movement and subsequent beat-up of the lay to raise the feeler support on its pivot and allow the feeler to drop into normal position rearward of the fell.

2. In a loom the combination of a weft hammer vibrating in timed relation to the cycle of loom operation, an actuator mounted for movement into and out of the path of the weft hammer and acting when in the path of the weft hammer to be struck thereby and effect the stopping of the loom, pile wire withdrawing and inserting means at one side of the loom, a feeler mounted on the breast beam at the opposite side of the loom and extending adjacent to the path of the selvage rearward of the fell, means, controlled by the failure of the feeler, after an inserting movement of said withdrawing and inserting means, to be moved forward by a pile wire in the shed with its end projecting from the selvage and carried forward by the lay on the beat-up, to cause the actuator to move into the path of the weft hammer.

3. In a loom the combination of a weft hammer vibrating in timed relation to the cycle of loom operation, an actuator mounted for movement into and out of the path of the weft hammer and acting when in the path of the weft hammer to be struck thereby and effect the stopping of the loom, pile wire withdrawing and inserting means at one side of the loom, a feeler mounted on the breast beam at the opposite side of the loom and extending adjacent to the path of the selvage rearward of the fell, a solenoid acting when energized to cause the actuator to move into the path of the weft hammer, an electric circuit containing the solenoid and a pair of contacts normally closed by the feeler and a second pair of contacts normally open, means for closing the second pair of contacts upon an inserting movement of the pile wire withdrawing and inserting means, the feeler thereupon acting to maintain the first pair of contacts closed and thus effect the stopping of the loom unless it is moved by a pile wire in the shed projecting from the selvage and carried forward by the lay on the beat-up.

4. In a loom the combination of pile wire withdrawing and inserting means at one side of the loom, a feeler mounted on the breast beam at the opposite side and extending adjacent the path of the selvage rearward of the fell, an electric circuit containing a solenoid, means controlled by the solenoid when energized acting to effect the stopping of the loom, a pair of contacts in the circuit normally closed by the feeler, a second pair of contacts in the circuit normally open, means for closing the second pair of contacts upon an inserting movement of the pile wire

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withdrawing and inserting means, a second solenoid in the circuit, a telltale device, and means for effecting the operation of the telltale device through the energization of the second solenoid, the circuit thus acting to stop the loom and operate the telltale unless, after an inserting movement of the pile wire withdrawing and inserting means, a pile wire in the shed with its end projecting from the selvage and carried forward by the lay engages and moves the feeler to open the first pair of contacts.

5. In a loom the combination of pile wire withdrawing and inserting means at one side of the loom, a feeler mounted on the breast beam at the opposite side and extending adjacent the path of the selvage rearward of the fell, an electric circuit opened by the feeler when struck, after an inserting movement of the pile wire withdrawing and inserting means, by a pile wire in the shed with its end projecting from the selvage and carried forward by the lay, and means controlled by the circuit when not thus opened by the feeler acting to stop the loom.

6. In a loom described and operated as in claim 5 together with a second electric circuit including the first solenoid and means acting upon the operation of the telltale to close the second circuit and thus continue energization of the first solenoid if the second pair of contacts opens before stopping of the loom.

7. In a loom the combination of pile wire withdrawing and inserting means at one side of the loom, a feeler mounted on the breast beam at the opposite side and extending adjacent the path of the selvage rearward of the fell, an electric circuit controlled by the failure of the feeler, after an inserting movement of said withdrawing and inserting means, to be moved by a pile wire in the shed with its end projecting from the selvage and carried forward by the lay upon beat-up acting to control the stopping of the loom, warp drop wire mechanism, a second electric circuit controlled by the drop wire mechanism upon failure of a warp acting to effect stopping of the loom, a telltale, and means controlled by one of the circuits to operate the telltale.

8. In a loom the combination of pile wire withdrawing and inserting means at one side of the loom, a feeler mounted on the breast beam at

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the opposite side and extending adjacent the path of the selvage rearward of the fell, an electric circuit controlled by the failure of the feeler, after an inserting movement of said withdrawing and inserting means, to be moved by a pile wire in the shed with its end projecting from the selvage and carried forward by the lay upon beat-up acting to control the stopping of the loom, warp drop wire mechanism, a second electric circuit controlled by the drop wire mechanism upon failure of a warp acting to effect stopping of the loom, a telltale, and means controlled by the first circuit to operate the telltale.

9. In a loom the combination with a weft hammer vibrating in timed relation to the cycle of loom operation, means actuated by the weft hammer for stopping the loom either upon failure of the weft or upon failure of a warp or upon failure of a pile wire in the shed with its end projecting from the selvage to be carried forward by the lay on the beat-up after an inserting movement of a pile wire withdrawing and inserting means.

10. In a loom the combination as set forth in claim 9, in which the said means actuated by the weft hammer is controlled upon the said failure of a warp by a closed electric circuit and upon the said failure of a pile wire by a second closed electric circuit.

11. In a loom the combination as set forth in claim 9, in which the said means actuated by the weft hammer is controlled upon the said failure of a warp by a closed electric circuit and upon the said failure of a pile wire by a second closed electric circuit, together with means acting to open both circuits upon the stopping of the loom.

SYDNEY S. WILSON.

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Patent No. 2,439,031.

April 6, 1948.

SYDNEY S. WILSON

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Column 7, line 25, for the claim reference number "5" read 4; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 25th day of May, A. D. 1948.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.