

May 27, 1952

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2,598,353

FILLING DETECTING DEVICE FOR LOOMS

Filed March 10, 1951

2 SHEETS—SHEET 1

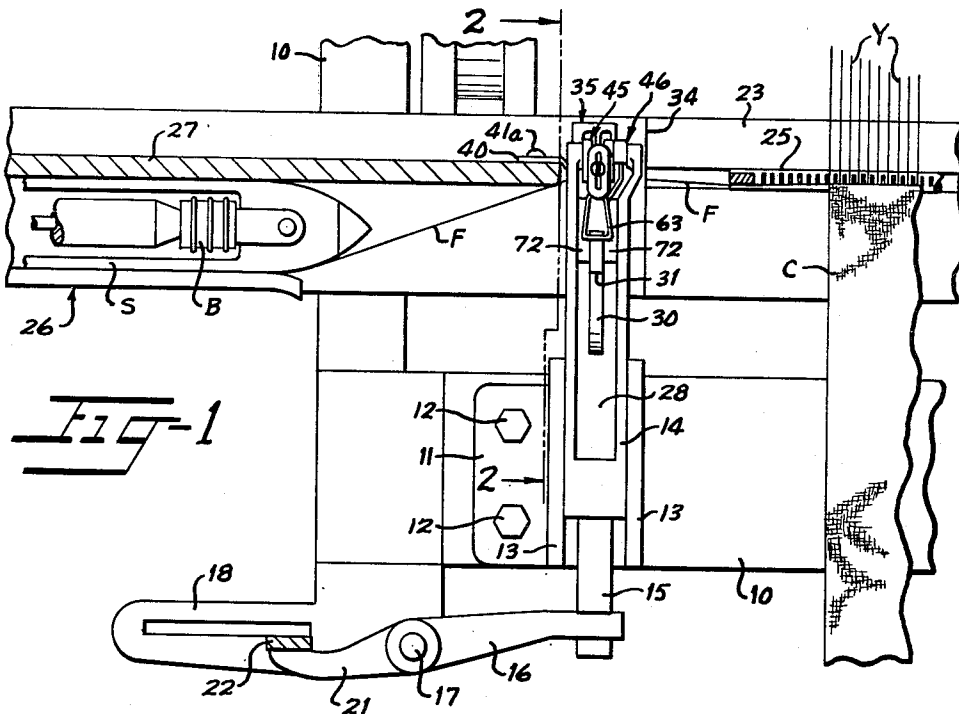


FIG-1

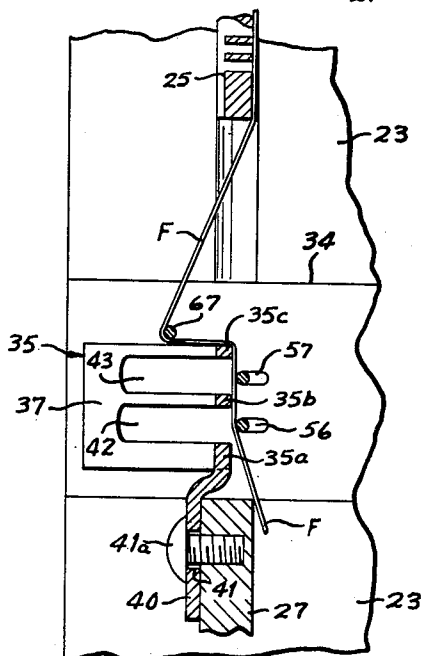


FIG-3

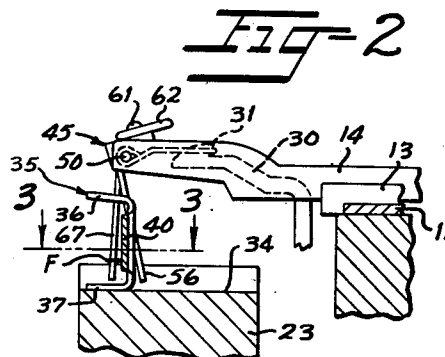


FIG-2

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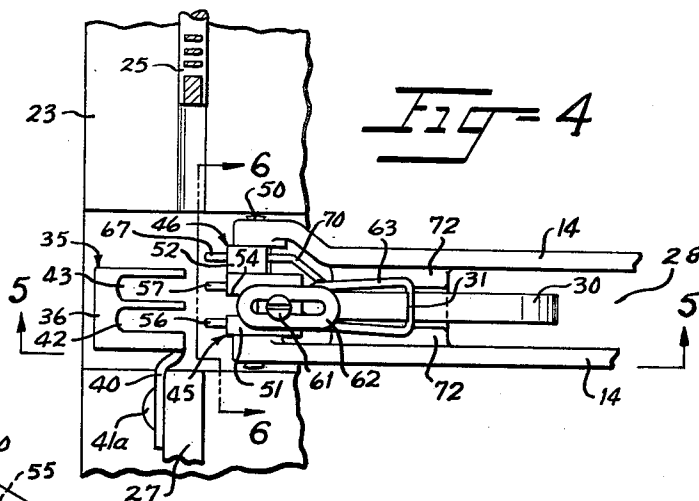
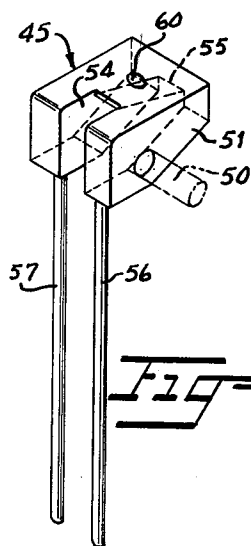
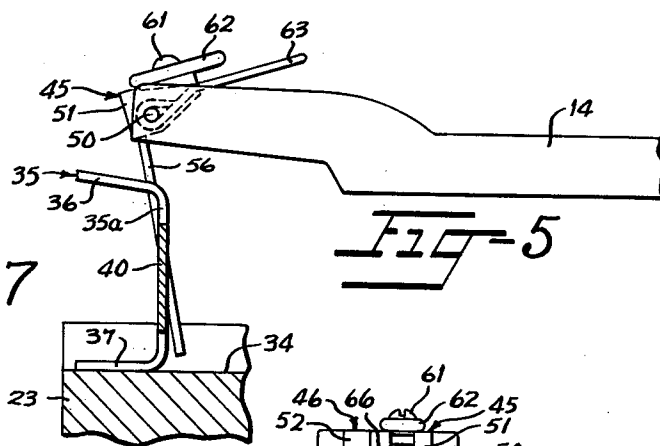
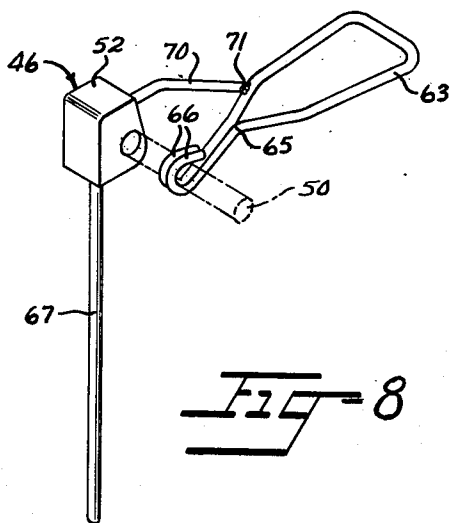
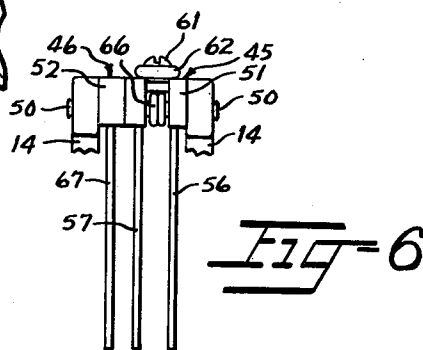
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2 SHEETS—SHEET 2



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FILLING DETECTING DEVICE FOR LOOMS

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Application March 10, 1951, Serial No. 214,865

4 Claims. (Cl. 139-377)

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This invention relates to automatic looms and more especially to an improved filling detecting device of the type having a pivoted fork thereon which is adapted to be displaced by the filling yarn upon beat-up strokes of the lay and which will, upon absence of a filling yarn, result in the failure of the filling fork being displaced and will, in turn, effect operation of usual devices for stopping the loom or effecting a bobbin transfer operation.

The present invention is particularly concerned with the filling fork which pivotally depends from the rear end of the usual filling fork slide and the grate which cooperates therewith. It is well known to those familiar with the art that, with continued operation of a loom, a considerable amount of lint and/or foreign matter will collect in the openings defined by the vertically disposed bars or wires in the usual grid or fork grate of a loom or the tines of the fork may become bent so as to be struck by the grate upon a detecting beat of the lay.

Now, in normal operation, upon alternate beat-up strokes of the lay, the filling which usually extends from the selvage of the cloth being woven to a boxed shuttle will become broken and, although, the filling will then not extend across the front face of the usual grate or grid, the accumulations of lint and the like in the openings of the grid will suffice to tilt the usual type of filling fork and will thereby permit the loom to continue its normal operation until the absence of filling in the cloth is detected by the operator. It is evident that, in the event of an operator having a large number of looms to operate, the loom heretofore described may operate for a considerable length of time without the filling being cast across the lay before it is discovered by the operator and which would thus require considerable time in pulling back the warp and the woven cloth or may cause thin places in the cloth so that the last properly interwoven pick of filling yarn which was beat-up by the lay must be positioned properly so a subsequent pick may be beat-up in proper relation to the previously beat-up pick of filling yarn.

It is, therefore, an object of this invention to overcome such difficulties by providing an improved grate and an improved filling fork mechanism adapted to cooperate therewith and wherein at least one of the tines or prongs of the filling fork operates independently of the other tines or prongs of the filling fork. In this instance, the filling detecting mechanism includes a primary filling fork assembly and an auxiliary or

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secondary filling fork assembly, the primary filling fork assembly having at least two tines or prongs depending therefrom and the grate being provided with two slots therein defined by wires or bars spaced from each other, the bars being adapted to straddle the tines of the primary filling fork assembly upon each beat-up stroke of the lay. The auxiliary filling fork assembly has at least one tine or prong depending therefrom past which the grate moves upon each beat-up stroke of the lay but, in which instance, the last-named tine is not straddled by the bars or wires of the grate since this tine is disposed to one side of the path of travel of the grate as the lay moves in a beat-up stroke.

The tine of the auxiliary or secondary filling fork assembly has a means connecting the same to the usual type of loop which is adapted to, at times, engage the usual filling motion hook or goose neck of the loom. On the other hand, the primary filling fork assembly is not connected to the loop heretofore described but, instead, the primary filling fork has a suitable counterbalancing weight member thereon which is normally disposed in engagement with the upper surface of said loop. Therefore, upon each beat-up stroke of the lay, all of the tines of the primary and secondary filling fork assemblies will be engaged by the filling yarn which extends from the selvage of the cloth being woven to a boxed shuttle and, thus, both of the filling fork assemblies will be tilted to move the loop out of the path of travel of the filling motion hook.

On the other hand, in the event of lint or other matter accumulating between the bars or wires of the grate, the tines of the primary filling fork assembly will be caused to move with the grate upon a beat-up stroke of the lay although a filling yarn may not be extended across the front face of the grate but, in this event, the auxiliary filling fork assembly which has the loop associated therewith, will not be caused to move since the tine of the auxiliary filling fork assembly is disposed to one side of the path of travel of the grate and, therefore, the loop would remain in a lowered position at the front end thereof to be engaged by the usual filling motion hook or goose neck and to thereby stop the loom or effect a bobbin transfer operation.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds when taken in connection with the accompanying drawings, in which—

Figure 1 is a top plan view of a portion of a loom showing the improved filling detecting

mechanism and grate applied thereto and showing the lay in an extreme forward or beat-up position and the shuttle in such a position as it might assume after rebounding;

Figure 2 is a fragmentary vertical sectional view taken substantially along the line 2—2 in Figure 1 showing the tine or prong of the auxiliary filling fork assembly disposed behind the reed line and showing the tines of the primary and auxiliary filling fork assemblies in the positions that they might assume upon the occurrence of an accumulation of lint or the like between the bars or wires of the grate or in the event of the filling yarn being unduly slack;

Figure 3 is an enlarged fragmentary top plan view, with parts in section, looking substantially along the line 3—3 in Figure 2;

Figure 4 is an enlarged fragmentary top plan view of the structure shown in Figure 2 but showing the lay and the grate in a different position relative to the filling detecting mechanism;

Figure 5 is a fragmentary elevation, with parts in section, looking substantially along the line 5—5 in Figure 4, but showing the grate and the filling detecting mechanism in different relative positions from that shown in Figures 2 and 4;

Figure 6 is a fragmentary elevation looking at the rear end of the improved filling fork assemblies associated with the filling fork slide;

Figure 7 is an enlarged isometric view of the primary filling fork assembly disassociated from the rest of the filling detecting mechanism;

Figure 8 is an enlarged isometric view of the improved auxiliary filling fork assembly showing the loop in association therewith but showing the same disassociated from the rest of the filling detecting mechanism.

Referring more specifically to the drawings, there is shown a loom frame 10 on which the base 11 of the filling detecting mechanism at one side of the loom is secured, as by screws 12. This base 11 is a part of the usual filling motion stand, which has upstanding therefrom two parallel spaced walls 13 between which a conventional filling fork slide 14 has longitudinal sliding movement. The filling fork slide has a forward extension 15 operatively connected to the right-hand end of a conventional knock-off lever 16 as shown in Figure 1. The knock-off lever is pivoted, as at 17, to a shipper handle stand 18 of the loom frame 10 and has an arm 21 extending to the left of the pivot 17 and being disposed in front of the usual shipper handle 22.

The loom is also provided with a conventional lay 23 which is oscillatable to and fro with respect to the base 11 of the filling motion stand by conventional means well known and which means is omitted from the drawings. The lay is provided with a reed 25 of usual construction and a shuttle box 26 having a back 27, the front surface of which is positioned in substantial alinement with the front surface of the reed 25 and which shuttle box back assists in positioning a shuttle indicated at S.

The filling fork slide 14 is bifurcated to form a longitudinally extending slot 28 therein in which the upper portion of a conventional actuator head or goose neck 30 has longitudinal movement and the rear end of which is provided with a filling motion hook 31. The actuator head 30 is moved forwardly by well known mechanism, not shown, every second pick of the loom when the active shuttle is on that side of the lay adjacent the base 11 of the filling motion stand. The reed 25 has the usual warp yarns Y extending therethrough

from a suitable source, not shown, and which are beat-up with a filling yarn F, upon each beat-up stroke of the lay 23, to form the fabric or cloth C.

The lay 23 is provided with the usual well or groove 34 in which an improved fork grate or grid, designated broadly at 35, is partially disposed and, also, in which the lower ends of the tines of the improved filling fork assemblies to be later described, have swinging movement. The filling yarn F is shown in the drawings extending from the selvage of the cloth C to the shuttle S adjacent the shuttle box back 27 and this filling is withdrawn from a conventional bobbin B disposed within the shuttle S.

The grate 35 is similar to grates which have heretofore been in use in that it comprises a plurality of upstanding bars or wires, three of which are shown in the drawings, indicated at 35a, 35b and 35c. The upper and lower ends of the bars 35a, 35b and 35c extend rearwardly and are bridged by respective portions 36 and 37.

In this instance, the bar 35a has a lateral extension 40 integral therewith which is provided with an aperture 41 and this aperture 41 is penetrated by a screw 41a for securing the grate 35 to the rear surface of the shuttle box back 27. This grate 35 differs from grates heretofore in use in that the usual upstanding bar or wire which is disposed nearest the reed 25 is omitted and the bars 35a, 35b and 35c define a pair of openings 42 and 43 whereas the bars of the types of grates heretofore in use usually define three openings, such as the openings 42 and 43. The number of openings in the grate 35, of course, is determined by the number of prongs or tines on the primary filling fork assembly to be presently described.

Now, a primary or first filling fork assembly, broadly designated at 45, and a second or auxiliary filling fork assembly, broadly designated at 46, are adapted to cooperate with the grate 35 in detecting the presence of a filling yarn F extending across the front faces of the bars 35a, 35b and 35c and the openings 42 and 43 in the grate 35. The improved grate 35 and the primary and auxiliary filling fork assemblies 45 and 46 constitute the preferred embodiment of the present invention.

These filling fork assemblies 45 and 46 are supported by the filling fork slide 14 in the usual manner in which filling forks of this type are supported. In this instance, the bifurcated rear end of the filling fork slide 14 has a pivot pin 50, extending across the slot 28, on which the fork holders or blocks 51 and 52 of the respective primary and auxiliary filling fork assemblies 45 and 46 are pivotally mounted. These filling fork assemblies 45 and 46 may be respectively termed as a yarn tensioning element and a yarn detecting element. The block 51 of the primary filling fork assembly 45 has a slot 54 in the rear end thereof and is also provided with a groove 55 in the lower surface thereof which coincides with the slot 54. The purpose of the slot 54 and the groove 55 will be later described.

The block 51 has the upper ends of a pair of spaced downwardly projecting tines or prongs 56 and 57 secured therein, as by a pressed fit, the lower portions of which are adapted to be disposed, at times, within the respective openings 42 and 43 in the grate 35 upon beat-up strokes of the lay 23. These tines 56 and 57 are disposed adjacent the rear end of the block 51 and adjacent opposed sides of the slot 54. It is evident that a greater number of tines, such as the tines 56 and 57, may be provided if so desired and, in

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which event, there would be a greater number of openings, such as the openings 42 and 43, provided in the grid or grate 35.

The block 51 has a threaded bore 60 therein which is disposed forwardly of the slot 54 and which is adapted to threadably receive a screw 61 for adjustably securing a slotted counter-balancing weight member 62 to the upper surface of the block 51. It will be observed in Figures 2, 4 and 5 that this weight member 62 extends forwardly beyond the front edge of the block 51 so as to project above a loop 63 which is a part of the auxiliary filling fork assembly 46 (Figure 3).

In this instance, the loop 63 is formed from a piece of wire which is bent in a substantially U-shape and the legs of which extend rearwardly and are then bent inwardly in close proximity to each other, as at 65. The legs of the U-shaped loop 63 are then bent downwardly and rearwardly at an angle and then bent upwardly and forwardly upon themselves to form loop portions 66 which are slidably penetrated by the pin 50 so the loop 63 may oscillate on the pivot pin 50 with the block 52. Since the legs of the U-shaped member forming the loop 63 are disposed in close proximity to each other at their free ends as heretofore described, the free ends of the legs of the U-shaped member 63 have freedom of movement within the groove 55 and the slot 54 independently of the block 51 of the primary filling fork assembly 45.

The block 52 of the auxiliary filling fork assembly 46, like the block 51 of the primary filling fork assembly 45, has at least one prong or tine 67 depending therefrom, the upper end of which is suitably secured, as by a pressed fit, in the block 52 and the lower end of which is adapted to be disposed in the groove 34 in the lay 23 upon a beat-up stroke of the lay 23. This tine 67 is also disposed to one side of the path of travel of the grid 35 and a connecting member, formed from a wire 70, extends forwardly of the front surface of the block 52, in which it may be secured, as by a pressed fit, and then this connecting member extends inwardly at an angle towards the loop 63 and is suitably secured thereto, as by welding at 71. If so desired, the connecting member 70 may be an extension of the prong or tine 67 and the block 52 may be molded therearound. The prong or tine 67 should be made of a material which will not bend or which, when bent, will return to its original state. This prong may be of a larger diameter than the prongs 56 and 57, if desired.

The loop 63 normally rests against the upper surfaces of projections 72 which project inwardly from the proximate walls of the slot 28 in the filling fork slide 14 and the proximate surfaces thereof are spaced apart from each other to permit the actuator head or goose neck 30 to move back and forth therebetween. Since the loop 63 extends in a substantially horizontal plane forwardly of the pivot pin 50 and the tine 67 extends downwardly substantially below the pivot pin 50, the loop 63 will tend to move downwardly by gravity and, therefore, upon failure of the prong or tine 67 being moved in a counter-clockwise direction, from the position shown in Figure 2 to the position shown in Figure 5, in the course of a beat-up stroke of the lay 23, the filling motion hook 31 on the rear end of the actuator head 30 will move beneath and in engagement with the bridging front portion of the loop 63 after which the loop will move downwardly by gravity and will thus be engaged by the hook 31 on the

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actuator head 30 as the actuator head subsequently moves in a forward direction.

Now, as the actuator head 30 moves forwardly, it is evident that the filling fork slide 14 will be caused to move therewith thus moving the knock-off lever 16 in a clockwise direction in Figure 1 to unseat the shipper handle 22, whereupon the loom will be stopped. This is the usual manner in which a filling detecting mechanism operates.

Now, during normal operation of the loom, the parts are in substantially the position shown in Figure 1 with the shipper handle 22 in the running position indicated and with the filling fork slide 14 in a rearward position. When the filling yarn F extends from the shuttle S to the selvage of the cloth C, it then extends in front of the wires or bars 35a, 35b and 35c. The shuttle S is thrown into the shuttle box 26 against the shuttle box back 27 in the course of alternate beat-up strokes of the lay 23 and, if the filling yarn F is under normal tension, it will be taut enough to cause all three of the tines 56, 57 and 67 to move therewith as the lay completes its beat-up stroke and to thus move the tines 56, 57 and 67 therewith to substantially the position shown in Figure 5. Thus, the loop 63 will be elevated out of the path of travel of the hook 31 on the rear end of the goose neck or actuator head 30 and the loom will be permitted to continue its operation.

On the other hand, if the filling yarn F is unduly slack as the shuttle S is thrown into the corresponding shuttle box 26, the filling yarn F would normally be stretched tautly enough across the openings 42 and 43 in the grate 35 (Figure 3) to impart movement in a counter-clockwise direction to the tines 56 and 57 to thus permit the weight member 62 to move upwardly at its front end. However, the tine 67 of the second or auxiliary filling fork assembly 46 would remain substantially stationary until the yarn extended relatively taut between the adjacent end of the reed 25 and the bar 35c of the grate 35, which would cause the loop 63 to also be elevated. However, if the portion of the filling yarn extending between the proximate edges of the reed 25 and the grate 35 is not placed under sufficient tension by the prong 67 as the lay 23 moves forwardly, the prong 67 might not be moved sufficiently to elevate the front end of the loop 63 sufficiently to clear the hook portion 31 of the actuator head 30, or the tine 67 may not be moved at all.

In the latter event, the loop 63 would remain in a lowered position and the loom would be stopped in the manner heretofore described. This is also true in the event of the filling yarn F being broken although, normally, all three of the tines 56, 57 and 67 would remain substantially stationary so their lower portions would be disposed rearwardly of the reed line upon the corresponding beat-up stroke of the lay 23 and the loom would again be stopped in the manner heretofore described.

Now, the present invention is particularly effective in causing the loom to stop in the event of there being an accumulation of lint or other foreign matter in the openings 42 and 43 defined by the wires or bars 35a, 35b and 35c and while the filling yarn F may be broken or may not be extending in front of the wires or bars 35a, 35b and 35c.

It is extremely unlikely that lint or other foreign matter could accumulate between the proximate surfaces of the reed 25 and the grate 35. Thus, in the latter instance, upon a corresponding beat-up stroke of the lay 23, the ac-

cumulations of lint or the like may cause the prongs 56 and 57 of the primary filling fork assembly 45 to be moved with the grate 35 as the lay 23 moves in a beat-up stroke, thus tilting the primary filling fork assembly 45 about the pivot pin 50 to substantially the position shown in Figure 2. Wherein the usual types of filling forks are employed, this would cause the loom to continue its operation although a length of filling yarn may not be extended in front of the grate 35.

However, since the auxiliary filling fork assembly 46 is provided, the accumulations of lint on the grate 35 will not engage the prong or tine 67 of the auxiliary filling fork assembly 46, because of the tine 67 being disposed to one side of the path of travel of the grate 35 and, therefore, the loop 63 would tend to remain in engagement with the projections 72 on the filling fork slide 14 and would thus be engaged by the hook portion 31 of the goose neck or actuator head 30 as it subsequently moves forwardly and to thereby stop the loom in the manner heretofore described.

With a filling fork assembly, such as the auxiliary filling fork assembly 46 arranged in the manner described and, which operates independently of the grate 35, it would normally be assumed that the primary filling fork assembly 45 could be omitted. However, the tines 56 and 57 assist in tensioning the yarn by urging the yarn slightly into the openings 42 and 43 in the grate 35 and to thus cause the filling yarn F to be held under a normal tension as the grate 35 moves forwardly with the beat-up stroke of the lay 23 to thus insure that the loop 63 will be elevated as the portion of the yarn extending between the grate 35 and the reed 25 engages and imparts movement to the tine or prong 67 associated with the auxiliary filling fork assembly 46.

The slotted weight member 62 is provided for the well known purpose of determining the amount of tension under which the portions of filling yarn F, which extend between the respective wires or bars 35a, 35b and 35c of the grate 35, are placed, upon alternate beat-up strokes of the lay 23, to thus effect an optimum of efficiency in the operation of the device.

Although, the loop 63 is shown in Figure 8 as being made from wire, it is to be understood that this loop 63 may be formed of a solid block of material so shaped as to provide a thin portion extending within the groove 55 and the slot 54 and being slidably penetrated by the pivot pin 50. This would, of course, be the mechanical equivalent of the loop 63 as shown in Figure 8, and a detailed description and illustration thereof is deemed unnecessary.

It is thus seen that I have provided an improved means for detecting the presence of filling yarn extending between the selvage of the cloth C and the shuttle S and the detecting mechanism being so arranged as to also cause the loom to stop operation or effect a bobbin transfer operation in the event of the grate 35 being encased by lint or other foreign matter or the openings 42 and 43 in the grate 35 being spanned by lint or other matter, or the tines 56 and 57 being bent so as to be struck by the grate 35.

In the drawings and specification, there has been set forth a preferred embodiment of the invention and although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation,

the scope of the invention being defined in the claims.

I claim:

1. An improvement in a filling detecting mechanism for a loom having a lay and a shuttle box and a grate carried by the lay and said grate having openings therein past which a filling yarn normally extends upon a detecting beat of the lay, said loom also having a movable actuator head, said improvement comprising a tiltable tensioning element carried by the filling detecting mechanism, means on the tensioning element registering with the openings in said grate upon a detecting beat of the lay, a tiltable detecting element carried by the filling detecting mechanism adjacent the tensioning element, means operatively connecting the detecting element to the actuator head, and means on the detecting element past and to one side of which said grate moves upon a detecting beat of the lay whereby, upon a filling yarn extending past the grate, the filling tensioning element will tension the filling yarn as the filling yarn is detected by the tiltable detecting element to thus cause both the tensioning and the detecting element to be tilted to inoperative position relative to the actuator head and whereby, upon failure of the filling yarn being extended past the opening in the grate and said openings being abnormally restricted during a detecting beat of the lay, the grate will cause the tensioning element to be tilted but will permit the detecting element to remain substantially stationary and in operative position relative to the actuator head.

2. In a structure according to claim 1, said loom also having a slidably mounted member disposed forwardly of the lay and adjacent the movable actuator head, said tiltable tensioning element comprising a first block pivotally mounted on the slidably mounted member forwardly of the lay and having at least one tine extending downwardly therefrom in the horizontal plane of a corresponding opening in said grate, said tiltable detecting element comprising a second block pivotally mounted on substantially the same axis as the first block and on the slidably mounted member, at least one tine depending from the second block and being disposed in a vertical plane adjacent to one side of the grate, a loop member pivotally mounted on the slidably mounted member on substantially the same axis as the first and second blocks, a connecting means between the second block associated with the tiltable detecting element and the loop member to cause like movement to be imparted to the loop member upon movement being imparted to the tine depending from the second block, and said actuator head having a hook member thereon movable to and fro past the loop member whereby, upon a detecting beat of the lay in which filling yarn is disposed across the front face of said grate, the tines extending from both the tiltable tensioning element and the tiltable detecting element will be tilted thereby to move the loop member out of the path of travel of the hook member on the actuator head and, upon said opening in said grate being restricted by lint and the like and also, upon absence of a filling yarn across the face of the grate during a corresponding detecting beat of the lay, the tiltable tensioning element will be tilted while the tine of the tiltable detecting element will remain substantially stationary with respect to the slidably mounted member thus permitting the looped member connected to the tiltable detecting ele-

ment to be engaged by the hook member on the actuator head upon movement thereof to thereby impart movement to the slidably mounted member.

3. An improvement in a filling detecting mechanism for looms, said loom having a lay and also having a shuttle from which filling yarn normally extends to the selvage of the cloth being woven when said shuttle is boxed, said loom also having a member carried thereby defining a pivotal support disposed forwardly of the lay, said improvement comprising a primary filling fork assembly pivotally mounted on the support and having at least one tine extending therefrom, a grate on the lay having an opening therein which coincides with the tine on the primary filling fork assembly, an auxiliary filling fork assembly also pivotally mounted on said support and also having at least one tine extending therefrom, the tine extending from the auxiliary filling fork assembly being disposed to one side of the path of travel of the grate upon a beat-up stroke of the lay and means associated with the auxiliary filling fork assembly for stopping the loom in the course of a beat-up stroke of the lay in the event of the tine extending from the auxiliary filling fork assembly remaining in a substantially stationary position in the course of said beat-up stroke of the lay, whereby, upon a filling yarn extending from the shuttle to the selvage of the cloth and past the front surface of the grate, the tine extending from the primary filling fork assembly will engage and effect tension in the filling yarn and said filling yarn will engage and impart movement to the tines from both of the filling fork assemblies and, upon the filling yarn being broken, and the opening in said grid being restricted by an accumulation of lint and the like, the tine extending from the primary filling fork assembly will be caused to move with the grate upon a corresponding beat-up stroke of the lay while the tine extending from the auxiliary filling fork assembly will remain in a substantially stationary position.

4. An improvement in a filling detecting mechanism for a loom, said loom having an oscillatable lay and also having a shuttle from which filling yarn normally extends to the selvage of the cloth being woven when the shuttle is in a boxed position, said loom also having a slidably

mounted member disposed forwardly of the lay and provided with means carried thereby defining a pivotal support and said loom also having an oscillatable hooked member disposed adjacent the slidably mounted member for effecting movement of the slidably mounted member under certain conditions, said improvement comprising a primary filling fork assembly and an auxiliary filling fork assembly, each pivotally mounted on the pivotal support, at least one tine extending downwardly from each of the filling fork assemblies, a grate on the lay provided with bars adapted to move astride each of the tines extending from the primary filling fork assembly upon a beat-up stroke of the lay and upon absence of a filling yarn extending across the front face of the grate, said grate being disposed between the boxed shuttle and the selvage of the cloth being woven, the tine extending from the auxiliary filling fork assembly being disposed to one side of the path of travel of the grate upon a beat-up stroke of the lay and said auxiliary filling fork assembly having a loop operatively associated therewith the loop being disposed in the vertical plane of the hooked member whereby, upon a beat-up stroke of the lay in which the filling yarn is disposed across the face of said grate, the tines extending from both of the filling fork assemblies will be tilted thereby and, upon the space between the bars of said grate being restricted by lint and the like and also upon absence of a filling yarn across the face of the grate during a corresponding beat-up stroke of the lay, the primary filling fork assembly will be tilted while the auxiliary filling fork assembly will remain substantially stationary with respect to the slidably mounted member to thus cause the loop member associated with the auxiliary filling fork assembly to be engaged by the hooked member and to thereby impart movement to the slidably mounted member.

JOHN H. CHAPMAN.

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