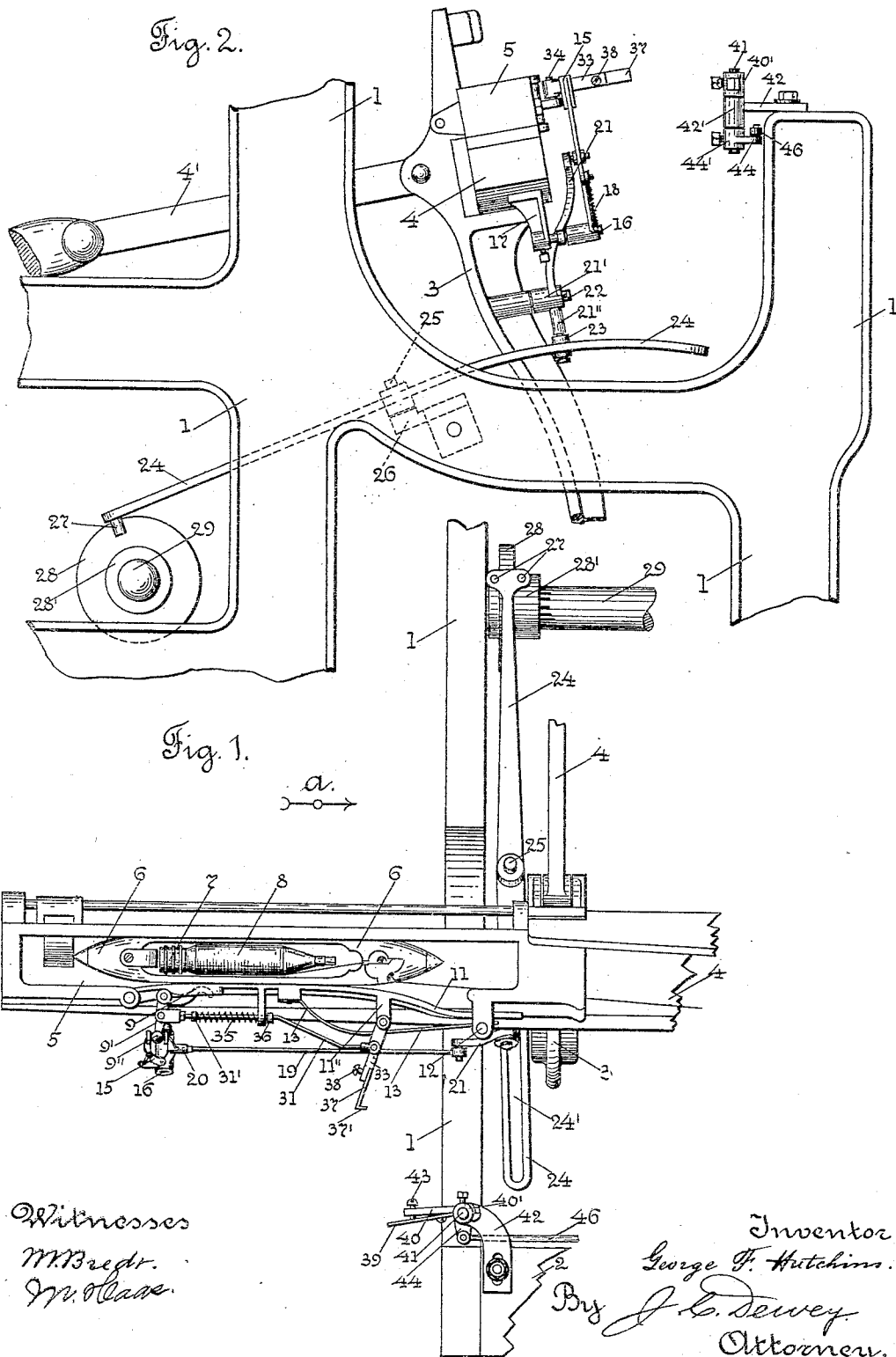


G. F. HUTCHINS.
FILLING DETECTOR MECHANISM FOR LOOMS.
APPLICATION FILED JUNE 21, 1906.

939,696.

Patented Nov. 9, 1909.

4 SHEETS—SHEET 1.



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Fig. 4.

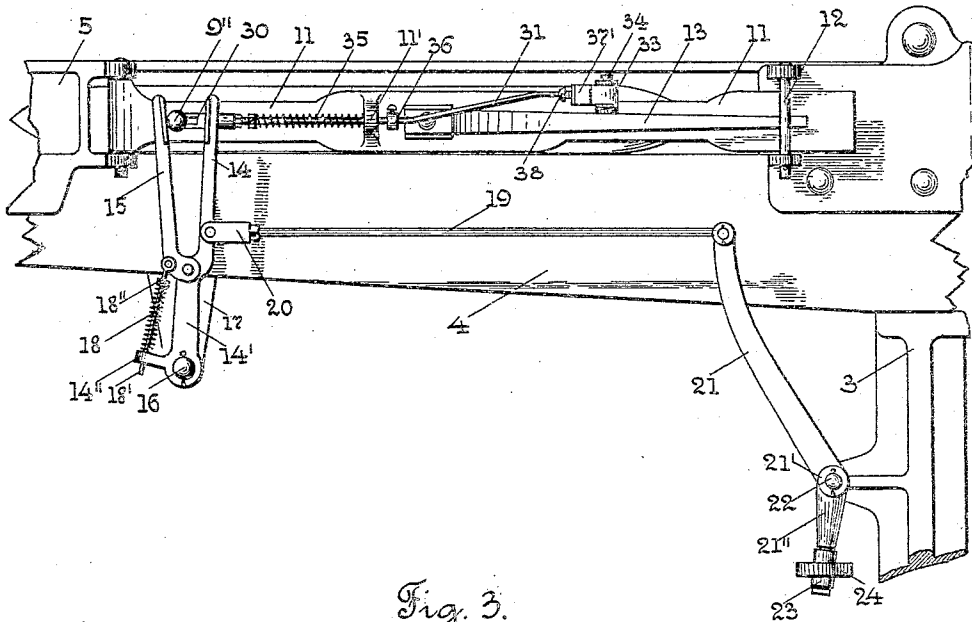
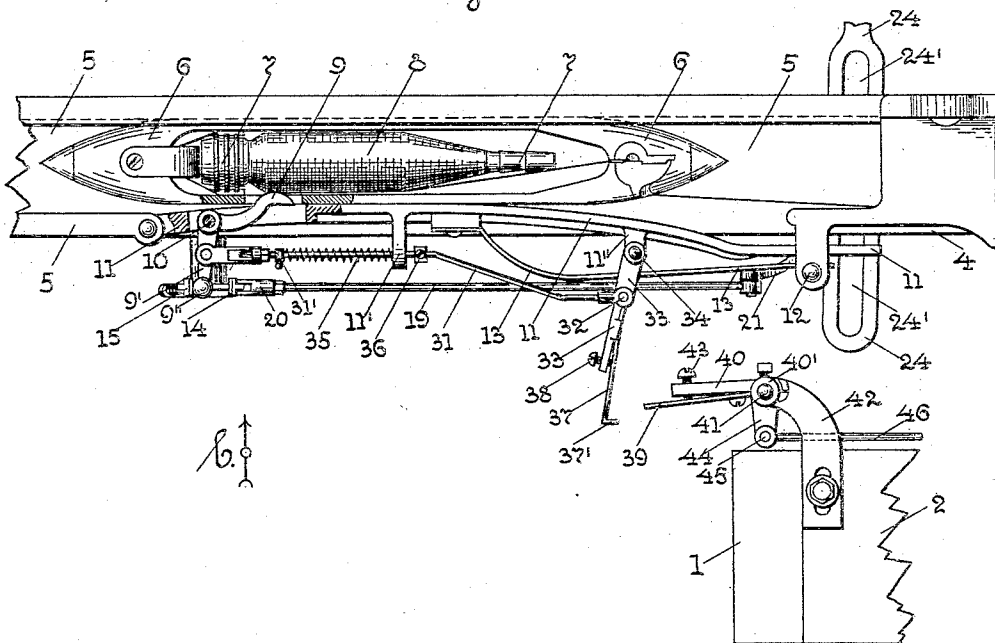


Fig. 3.



Witnesses
M. Bredt.
M. Heas.

Inventor
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By J. C. Dewey
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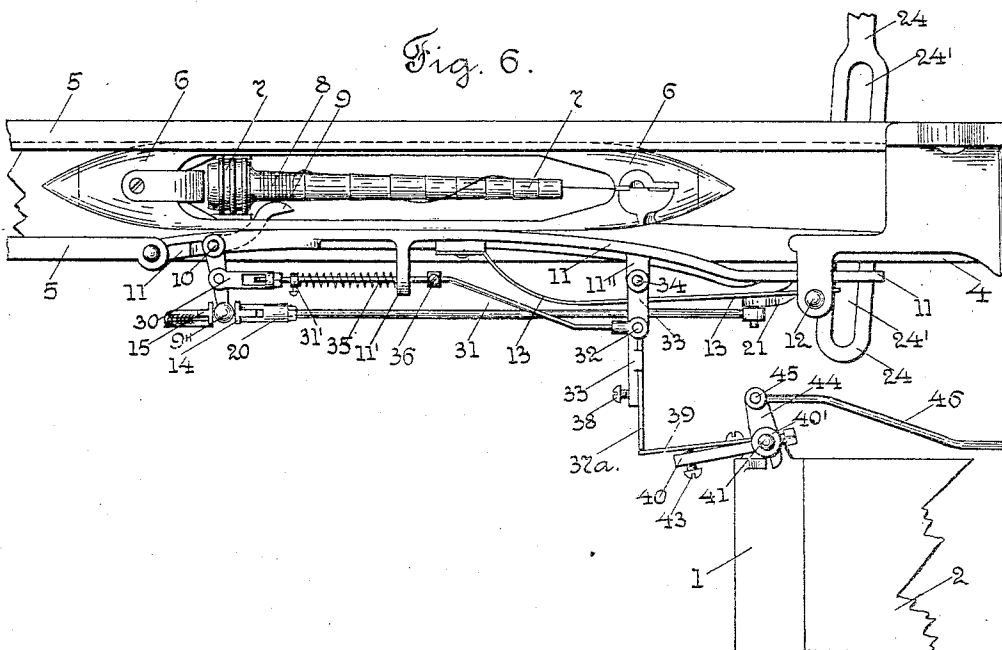
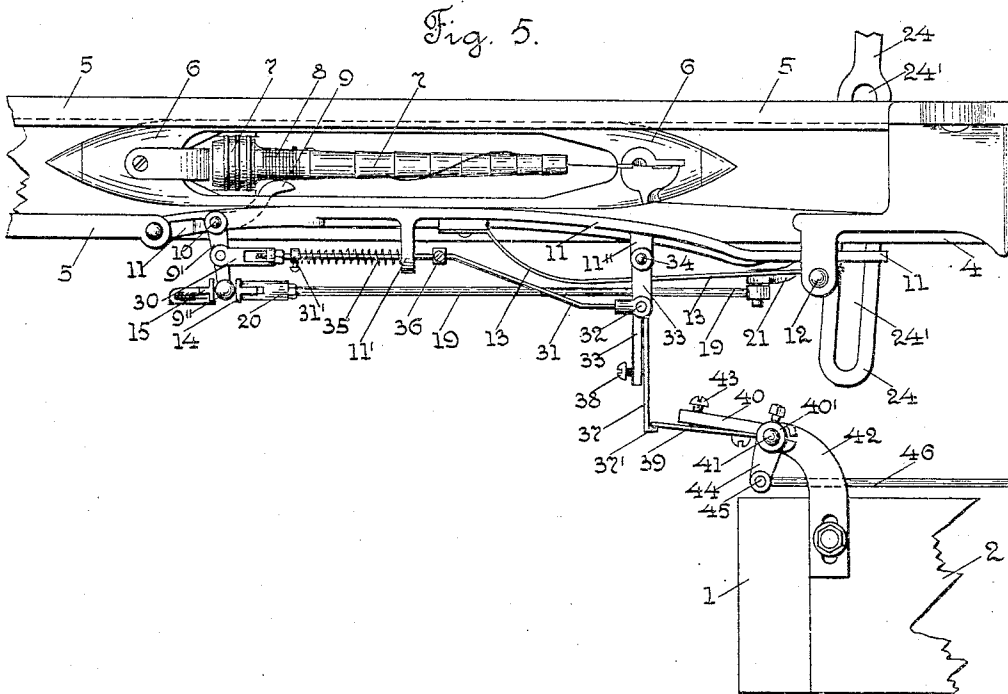
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4 SHEETS—SHEET 3.



Witnesses
M. Brett.
M. Kane.

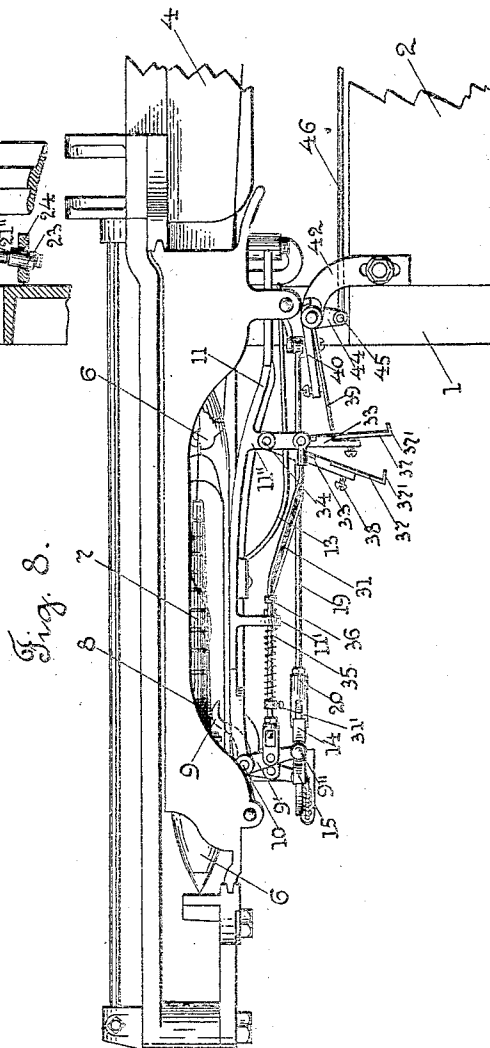
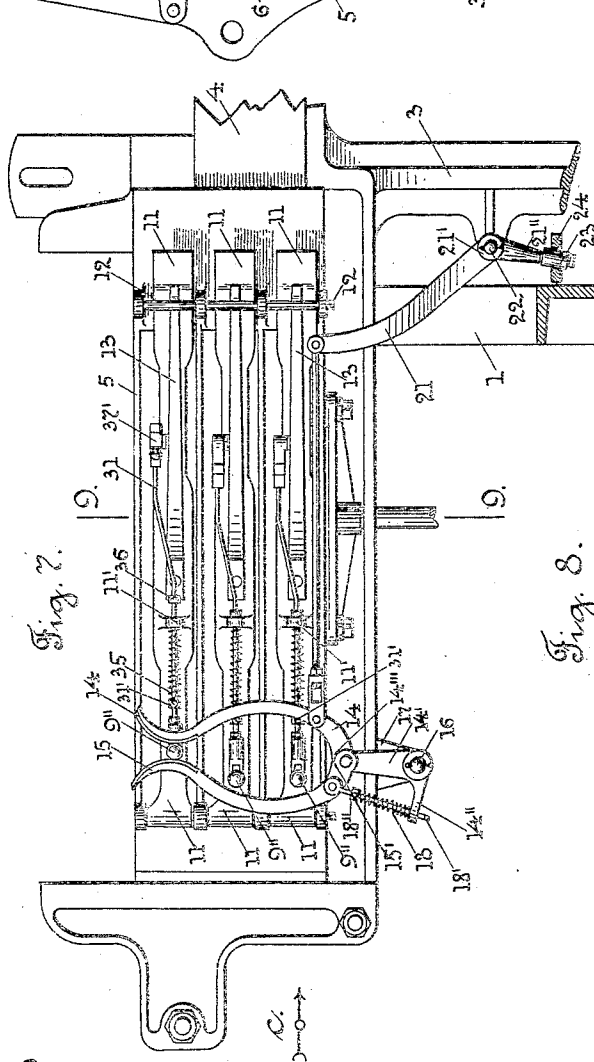
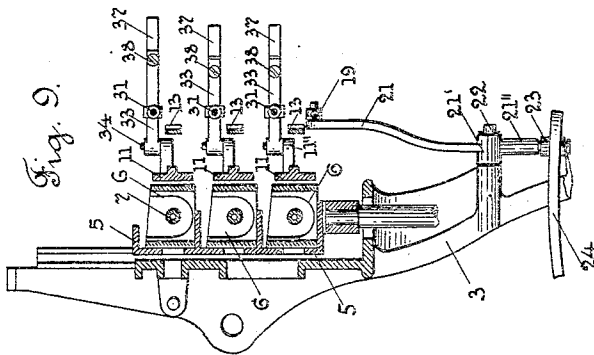
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939,696.

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4 SHEETS—SHEET 4.



Witnesses
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UNITED STATES PATENT OFFICE.

GEORGE F. HUTCHINS, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO CROMPTON & KNOWLES LOOM WORKS, A CORPORATION OF MASSACHUSETTS.

FILLING-DETECTOR MECHANISM FOR LOOMS.

939,696.

Specification of Letters Patent.

Patented Nov. 9, 1909.

Application filed June 21, 1906. Serial No. 322,680.

To all whom it may concern:

Be it known that I, GEORGE F. HUTCHINS, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Filling-Detector Mechanism for Looms, of which the following is a specification.

My invention relates to filling detector mechanism for looms, and to that class of looms ordinarily termed weft replenishing looms, in which a shuttle is automatically provided with a fresh supply of filling upon the substantial or practical exhaustion of filling in the active shuttle.

The object of my invention is to provide an improved mechanical filling detector mechanism which may be used on a weft replenishing loom, either a plain loom using only one color or character of filling and having only one stationary shuttle box or cell at the end of the loom opposite from the magazine, or on a loom using filling of two or more colors or characters of filling and having two or more drop or change shuttle boxes at the end of the loom opposite from the magazine.

My filling detector mechanism may be used in connection with any magazine, and with any transferring mechanism, which transfers a full bobbin or filling carrier from the magazine into the active shuttle, to take the place of a bobbin or filling carrier having the filling thereon substantially or practically exhausted.

My invention consists in certain novel features of construction of my filling detector mechanism as will be hereinafter fully described.

I have only shown in the drawings a detached portion of a loom, and particularly the shuttle box end of the loom opposite from the magazine, with my improvements in filling detector mechanism combined therewith, sufficient to enable those skilled in the art to understand the construction and operation thereof.

Referring to the drawings:—Figure 1 is a plan view of a detached portion of the shuttle box end of a loom opposite from the magazine, and of my improvements combined therewith. Fig. 2 is an end view of the parts shown in Fig. 1, looking in the direction of arrow *a*, same figure. Fig. 3

shows, on an enlarged scale, some of the parts shown in Fig. 1, in a different position, and some of the parts in section. Fig. 4 is a front view of some of the parts shown in Fig. 3, looking in the direction of arrow *b*, same figure. Fig. 5 shows some of the parts shown in Fig. 3, in a different position, and the bobbin practically exhausted. Fig. 6 corresponds to Fig. 5, but shows a modified construction. Fig. 7 corresponds to Fig. 4, but shows three drop or change shuttle boxes instead of one box. Fig. 8 is a plan view of the parts shown in Fig. 7. Fig. 9 is a section, on line 9, 9, Fig. 7, looking in the direction of arrow *c*, same figure.

I will first describe my improvements in filling detector mechanism shown in their preferred form in Figs. 1 to 7 inclusive, in which one stationary shuttle box is shown at the end of the loom opposite from the magazine end of the loom, not shown.

In the accompanying drawings, 1 is the loom side or frame, 2 is the breast-beam, 3 the lay-sword, 4 the lay, 4' the lay connector, 5 a stationary shuttle box or cell on one end of the lay, 6 a self-threading shuttle, 6 a bobbin in the shuttle, and 8 the filling on the bobbin. All of the above mentioned parts may be of the usual and well known construction.

I will now describe my improvements.

A pivotally mounted feeler or detector 9, see Fig. 3, is in this instance mounted on a vertically extending pin 10 secured within a slot or opening within the shuttle binder 11, which in this instance is pivotally attached at its outer end on the front of the shuttle box or cell 5, and at its inner end extends back of a retaining pin 12. The feeler 9 in this instance extends within a slot in the binder 11, and its inner end is adapted to enter and extend into an opening in the shuttle 6 to engage the filling 8, see Fig. 3.

The binder spring 13 is in this instance secured at its outer end upon the middle or central part of the binder 11, and at its inner end extends back of the pin 12, as shown in Fig. 3, and acts to press the binder 11 against the shuttle 6.

The feeler or detector 9 has an outwardly extending portion 9', having in this instance a rounded or ball shaped end 9'', which is adapted to extend between and be engaged by two arms 14 and 15, in this instance made

straight, and preferably of the shape shown, and forming a lever, see Fig. 4. One of the arms, as 14, has a downward extension 14' thereon, which is pivotally mounted, in this instance at its lower end on a stud 16 fast in a bracket 17 secured to the lay end. The other arm, as 15, is in this instance pivotally attached at its lower end to the upper end of the extension 14', see Fig. 4.

A light helically coiled expansion spring 18 in this instance encircles a rod or pin 18' pivotally attached in this instance at its upper end to the arm 15 and extending at its lower end through a hole in a lug or projection 14'' on the arm 14. The spring 18 bears at one end against the lug 14'', and at its other end against a collar 18'' on the pin 18', and acts to move the arm 15 toward the arm 14, and yieldingly holds the arm 15 in engagement with the end 9'' of the feeler 9.

A connector or rod 19 is in this instance adjustably connected at one end, through a rod head 20, with one arm, as 14; the other end of the connector 19 is in this instance connected with the upper end of an arm 21, see Fig. 2, the hub 21' of which is loosely mounted on a stud 22 secured to the lay-sword 3. The hub 21' has a downward extension 21'' thereon which carries loosely mounted thereon a roll 23, which in this instance extends into and is adapted to move in a longitudinally extending slot 24' in one end of a lever 24, which in this instance is centrally mounted on a stud 25 carried on a bracket 26 secured to the loom side or end, see Fig. 2. The opposite end of the lever 24 has in this instance two pins 27 extending down therefrom, and adapted to be engaged in this instance by a peripheral cam 28, the hub 28' of which is in this instance fast on the bottom shaft 29, see Figs. 1 and 2.

The rotary motion of the cam 28 with the shaft 29, will communicate a swinging or pivotal movement to the lever 24, at regular intervals, and through the roll 23 extending into the slot 24' in said lever, an inward rocking movement will be communicated to the arm 21, at regular intervals, and at predetermined times according to the shape of the cam 28, and through connector 19 a positive rocking or swinging inward movement will be communicated to the arm 14 and to the arm 15, and through the spring 18, the arm 15 will yieldingly engage the rounded end 9'' on the arm 9' of the feeler 9 to yieldingly move inwardly said feeler at every other pick, to cause it to engage the filling on the bobbin, see Fig. 3. The inward movement of the feeler 9 is controlled by the amount of filling 8 on the bobbin 7.

The outward movement of the arm 14, at regular intervals, and at predetermined times, according to the shape of the cam 28 will cause the arm 14, at every other pick,

to engage the rounded end 9'' on the arm 9' of the feeler 9, and positively move out the feeler 9 away from the filling on the bobbin and out of the opening in the shuttle to withdraw it from the path of the shuttle, see Fig. 1, and allow of the shuttle being thrown across the lay at the next pick.

I will now describe the mechanism, connected with the feeler 9, for putting into operation, through intermediate connections, the transferring mechanism, not shown, on the opposite end of the loom, and to supply fresh filling on the practical or substantial exhaustion of filling in the active shuttle.

Pivotally connected, in this instance to the extension 9' on the feeler 9, is a rod head 30 having adjustably secured thereto one end of a wire or rod 31. The wire or rod 31 has a bearing in an ear or extension 11' on the front of the binder 11. The inner end of said wire or rod 31 is pivotally connected to a pin 32 on an arm or lever 33, which is pivotally mounted at its inner end on a stud 34 secured in an ear or projection 11'' on the front side of the binder 11, near its inner end. The wire or rod 31 has in this instance a helically coiled expansion spring 35 thereon, which bears at one end against the projection 11' on the binder 11, and at its other end against an adjustable collar 31'. The spring 35 acts to move outwardly the rod 31, and through its connection with the extension 9' on the feeler 9, is normally operative to hold said feeler 9 out of engagement with the filling on the bobbin.

The springs 18 and 35 are both light springs, and act against each other, so that a very light and yielding touch or engagement of the feeler 9 with the filling 8 on the shuttle is obtained. The pressure of the feeler 9 on the filling may be regulated as desired, by varying the size or power of the springs 18 and 35.

An adjustable collar 36 on the rod 31, in this instance limits the outward movement of the rod 31, through the engagement of said collar with the projection 11' on the binder 11. The lever 33 with which the rod 31 is connected, carries on its outer end, in this instance an arm or blade 37, which is attached at its inner end to the lever 33, and is preferably adjustable in a horizontal plane at its outer end, in this instance by means of a screw 38 which turns in a threaded hole in the lever 33, and engages at its inner end the blade 37. The blade 37 preferably has a hook end 37' as shown.

The blade 37, when the filling on the bobbin is practically exhausted, as shown in Fig. 5, is moved into the path of, and is adapted to engage, on the rearward movement of the lay, in this instance a second arm or blade 39, which is in this instance attached at its inner end to an arm 40, the hub 40' of which is fast on a vertically extend-

ing rock shaft 41, which is mounted in a bearing 42' on a stand 42 adjustably secured in this instance to the front of the breast-beam 2, see Figs. 1 and 2. A screw 43, which turns in a threaded hole in the outer end of the arm 40, and engages at its inner end the blade 39, is preferably used to adjust the position of the blade 39 in a horizontal place.

Fast on the rock shaft 41 is in this instance the hub 44' of an arm 44, which carries a stud 45 which in this instance is connected with a rod 46, which preferably extends transversely across the loom at the rear of the breast-beam 2, and is connected with mechanism, not shown, for operating the transferring mechanism in any usual and well known way, to cause the transfer of fresh filling from the magazine to the active shuttle.

In Fig. 6 of the drawings is shown a modified construction of the blade 37. Instead of having a hook 37' on the end of the blade, to catch over the end of the blade 39, as shown in Fig. 5, to move said blade on the rearward movement of the lay and put into operation the transferring mechanism, the blade in Fig. 6, marked 37^a, is made straight, and is adapted to engage the blade 39 on the forward movement of the lay, and put into operation the transferring mechanism.

In Figs. 7, 8, and 9, I have shown my improvements applied to three drop or change shuttle boxes or cells, instead of a single stationary shuttle box or cell shown in the other drawings. The construction and operation of my filling detecting mechanism, shown in Figs. 7, 8, and 9, are the same as above described in connection with the mechanism shown in the other figures. The filling detecting mechanism for the single stationary shuttle box is duplicated in the case of two or more shuttle boxes or cells. As the shuttle boxes are raised and lowered in the operation of the loom, the blade 37 on the shuttle box in line with the race and carrying the active shuttle, is in alinement with and in position to engage the blade 39, and put into operation, through intermediate mechanism, the transferring mechanism on the rearward movement of the lay. The arms 14, and 15, see Fig. 7, are in this instance made of curved shape, so that the ends 9' of the feelers 9 will extend between said arms, and not pass out from between said arms. The upper inner edges of the arms 14 and 15 are preferably made wider and grooved, as shown in Fig. 8, to act as a guide for the knobs or ball shaped ends 9'' on the projections 9' of the feelers 9. A notch 15' in the arm 15 is, in this instance adapted to engage a shoulder 14''' on the arm 14, to limit the movement of the upper ends of the arms 14 and 15 toward each other. If preferred the engaging arms 14

and 15, shown in Fig. 4, with an offset in the supporting end 14', may be used for two or more shuttle boxes.

From the above description in connection with the drawings, the operation of my improvements in filling detecting mechanism will be readily understood by those skilled in the art. In the normal operation of the loom, through the rotation of the bottom shaft 29 and the cam 28 thereon, a pivotal or swinging movement is communicated to the lever 24, and through the roll 23 extending into the slot 24' in said lever, a rocking movement is communicated to the arm 21 at regular intervals, preferably at every other pick, to cause, through the connector 19, the inward movement of the arm 14, and the inward movement of the arm 15, yieldingly connected by the spring 18 with the arm 14, to cause, through the engagement of the arm 15 with the extension 9' on the feeler 9, the inward movement of the feeler against the filling on the bobbin on the rearward movement of the lay, or in case of the construction of the blade 37^a, shown in Fig. 6, as the lay beats up. The outward movement of the arm 14 will cause the outward movement of the feeler 9, such movement being completed just before the pick.

The inward movement of the feeler 9 is controlled by the amount of filling on the bobbin. The relative position of the feeler 9 and the blade 37 is such, that as long as the filling on the bobbin is not substantially or practically exhausted, the blade 37 will be out of the path of, and will not engage with the blade 39, connected through intermediate mechanism with the transferring mechanism at the opposite end of the loom, either on the backward movement of the lay, or upon the forward movement of the lay in the modified construction shown in Fig. 6, and the loom will continue to operate in the normal way. But when the filling on the bobbin is substantially or practically exhausted, as shown in Figs. 5, and 6, the movement of the feeler 9 to its inner position, will cause the movement of the blade 37 into the path of the blade 39, and the blade 37 will engage the blade 39 on the rearward movement of the lay, and move said blade, and through intermediate mechanism operate the transferring mechanism to supply fresh filling to the active shuttle, or on the forward movement of the lay in the construction shown in Fig. 6, move the blade 39 to put into operation, through intermediate connections, the transferring mechanism to supply fresh filling.

It is well known, that the box motion in drop or change shuttle box looms on all quick running looms, requires all the time it can possibly have to properly make the changes of the boxes. The shuttle running time is usually about one-third, but may be

extended to about one-half of a revolution of the crank shaft; this will give one-half of a revolution of the crank shaft in which to move the shuttle boxes. A little allowance is to be made to give time for the filling protector to operate, but nearly one-half of a revolution of the crank shaft is available to move the drop or change shuttle boxes, and this one-half revolution is practically while the lay is making the last one-half of its forward movement toward the fell of the fabric, and the first one-half of its backward movement, and at this instant the picker begins to engage the shuttle, to pick it across the lay. In my improvements, the feeler or detector preferably begins to feel for the filling in the shuttle at the time the lay starts on its backward movement, and while the shuttle boxes are moving into position, and in case of practical or substantial exhaustion of filling in the active shuttle, makes connection with the weft replenishing mechanism, to put the same into operation, before the shuttle box has entirely finished moving into position, and on the completion of the movement of the shuttle box, the detector or feeler is moved away from the shuttle.

The advantages of my improvements will be readily appreciated by those skilled in the art. They may be used on plain looms having weft replenishing means, or on drop or change shuttle box looms having weft replenishing means, and in the latter case the movement of the boxes, and the time of movement, is, and may be the same as in ordinary drop or change shuttle box looms which have no filling detecting mechanism.

My improvements in filling detecting mechanism for weft replenishing looms, to detect substantial or practical exhaustion of filling in the active shuttle, may be used with any type of weft replenishing loom, said loom having a magazine or holder for the extra bobbins or filling carriers, and transferring mechanism to transfer a bobbin or filling carrier from the magazine into the active shuttle, and having a weft fork feeler, to detect breakage or entire exhaustion of filling, and stop the loom, and will have the other mechanisms ordinarily used in weft replenishing plain looms, or drop box looms. The rod or connector 46 shown in the drawings and above described, may be connected with the transferring mechanism in any suitable manner, for example, as shown and described in U. S. Letters Patent No. 805,109.

It will be understood that the details of construction of my improvements may be varied if desired, and they may be applied to plain looms, having weft replenishing means, or to drop or change shuttle box looms, with two or more boxes having weft replenishing means.

Having thus described my invention, what

I claim as new and desire to secure by Letters Patent is:—

1. In a filling detector mechanism for a weft replenishing loom, a detector or feeler, a spring normally operative to hold said detector out of engagement with the filling, and yielding means, positively actuated to move said detector to engage the filling.

2. In a filling detector mechanism for a weft replenishing loom, a detector or feeler carried on and movable with the lay, a spring normally operative to hold said detector out of engagement with the filling, and yielding means, positively actuated to move said detector to engage the filling.

3. In a filling detector mechanism for a weft replenishing loom, a detector or feeler carried on the end of the lay, opposite from the magazine, a spring normally operative to hold said detector out of engagement with the filling, and yielding means, positively actuated to move said detector to engage the filling.

4. In a weft replenishing loom, the combination with a shuttle binder, of a detector or feeler carried on the binder, and means to operate the detector or feeler, to cause it to engage with, and be disengaged from the filling in the shuttle.

5. In a weft replenishing loom, having two or more drop or change shuttle boxes, the combination with the shuttle binder of each box, of a detector or feeler carried on the binder, and means to operate the detector or feeler, to cause it to engage with, and be disengaged from the filling in the shuttle.

6. In a filling detector mechanism for a weft replenishing loom, having two or more drop or change shuttle boxes, a mechanical detector or feeler for each shuttle box, carried on and movable with the boxes, and means to operate each detector or feeler, and cause the detector or feeler for the shuttle box of the active shuttle, or the shuttle in line with the race-way of the lay, to engage with, and be disengaged from the filling in the shuttle.

7. In a filling detector mechanism for a weft replenishing loom, a mechanical detector or feeler on the end of the loom opposite from the magazine, adapted to engage the filling in the shuttle, connections from said feeler to a movable arm or blade, and said blade, adapted to be moved into the path of and engage an arm or blade on a stationary part of the loom on the rearward movement of the lay, to move said arm or blade and put into operation the transferring mechanism, and means for yieldingly moving said feeler into engagement with the filling, and for moving it out of engagement with the filling.

8. In a filling detector mechanism for a weft replenishing loom, a mechanical detector or feeler on the end of the loom oppo-

site from the magazine, adapted to engage the filling in the shuttle, connections from said feeler to a movable arm or blade, and said blade, adapted to be moved into the path of and engage an arm or blade on a stationary part of the loom on the rearward movement of the lay, to move said arm or blade and put into operation the transferring mechanism, and means positively operated for yieldingly moving said feeler into engagement with the filling, and means for moving it out of engagement with the filling.

9. In a weft replenishing loom, the combination with a shuttle box binder, of a mechanical detector or feeler carried on the binder, and adapted to feel through an opening in the shuttle and engage the filling in the shuttle, a connection from said feeler to a movable arm or blade, said connection and arm carried on the binder, and said arm, adapted to be moved into engagement with an arm or blade on a stationary part of the loom to move said arm and put into operation the transferring mechanism, a spring normally operative to hold the detector out of engagement with the filling, and means, positively operated to yieldingly move the detector into engagement with the filling.

10. In a weft replenishing loom, the combination with a shuttle box binder, of a mechanical detector or feeler carried on the binder, and adapted to feel through an opening in the shuttle and engage the filling in the shuttle, a connection from said feeler to a movable arm or blade, said connection and arm carried on the binder, and said arm, adapted to be moved into engagement with an arm or blade on a stationary part of the loom to move said arm and put into operation the transferring mechanism, a spring normally operative to hold the detector out of engagement with the filling, and means, positively operated to yieldingly move the detector into engagement with the filling, said means comprising a pivotally mounted arm or lever, having a second arm or lever pivoted thereon, and a spring yieldingly drawing said second arm toward the first arm, and into engagement with a projection on the detector, said projection extending between said arms, and connections from said arms to a driven mechanism for communicating a movement to said arms at regular intervals.

11. In a filling detector mechanism for a weft replenishing loom, a detector or feeler, a spring normally operative to hold said detector out of engagement with the filling, means to positively move said detector out of engagement with the filling, and yielding means positively actuated to move said detector to engage the filling.

12. In a weft replenishing loom, having two or more drop or change shuttle boxes, a filling detector or feeler to feel for and

detect practical or substantial exhaustion of filling in the running or active shuttle on the rearward movement of the lay.

13. In a weft replenishing loom, having two or more drop or change shuttle boxes, and a filling detector or feeler to feel for and detect practical or substantial exhaustion of filling in the running or active shuttle on the rearward movement of the lay, and mechanism connected with said detector or feeler to put into operation, on the rearward movement of the lay, the transferring mechanism to supply fresh filling.

14. In a weft replenishing loom, a filling detector or feeler, to feel for and detect practical or substantial exhaustion of filling in the running or active shuttle on the rearward movement of the lay, and means for moving the detector or feeler into engagement with the filling in the running or active shuttle on the rearward movement of the lay, and to hold it in engagement with the filling until just before the shuttle is picked.

15. In a weft replenishing loom, having two or more drop or change shuttle boxes, a filling detector or feeler to feel for and detect practical or substantial exhaustion of filling in the running or active shuttle on the rearward movement of the lay, and adapted to be held in engagement with the filling in the active shuttle until just before the shuttle is picked.

16. In a weft replenishing loom having two or more drop or change shuttle boxes, a filling detector or feeler to enter the shuttle and feel for or detect practical or substantial exhaustion of filling in the running or active shuttle on the rearward movement of the lay, and while the drop boxes are moving into position, and on the completion of the movement of the drop boxes to be moved out of the shuttle.

17. In a filling detector mechanism for a weft replenishing loom, a detector or feeler carried on the lay, a spring normally operative to hold said detector out of engagement with the filling, a second spring forming a yielding connection between the detector and the mechanism for moving said detector into engagement with the filling, both of said springs carried on and movable with the lay.

18. In a filling detector mechanism for a weft replenishing loom, a detector or feeler pivotally mounted at the front of a shuttle box, and movable with the lay, and adapted to engage the filling through an opening in the side of the shuttle, and having an outwardly extending projection thereon, a rod or connector attached to said projection at one end, and having a helically coiled expansion spring thereon to normally hold the feeler out of engagement with the filling, and the other end of said rod or connector

attached to an arm or lever, and said arm or lever, pivotally mounted at its inner end and movable with the lay, and adapted to be moved into the path of and engage at
5 its outer end a second arm or lever mounted on the lay, to move said second arm or lever, and through connections to the transferring mechanism to operate the transferring mechanism, and two arms, between which the
10 outer end of the feeler extends, one of said arms pivotally mounted at its lower end on a stud movable with the lay, and the other arm pivotally mounted on said first mentioned arm, and a spring for actuating
15 said arm to yieldingly hold it in engagement with the outwardly extending arm of the feeler; a connector intermediate the other arm and a lever, and said lever, and means for positively actuating said lever, to
20 move said connector and arm, and through the movement of said arm to yieldingly move the feeler or detector into engagement

with the filling, and to positively move it out of engagement with the filling.

19. In a weft replenishing loom, a filling 25 feeler or detector carried on the lay, and adapted to enter an opening in the side of the shuttle and coöperate with the filling, and connections intermediate said feeler and a driven cam, and said driven cam to oper- 30 ate said feeler.

20. In a weft replenishing loom, the combination with the filling feeler or detector carried on and movable with the lay, and adapted to feel through an opening in the 35 side of the shuttle and coöperate with the filling, of a revolving cam, and connections intermediate said feeler and said cam, to operate said feeler.

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Witnesses:

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