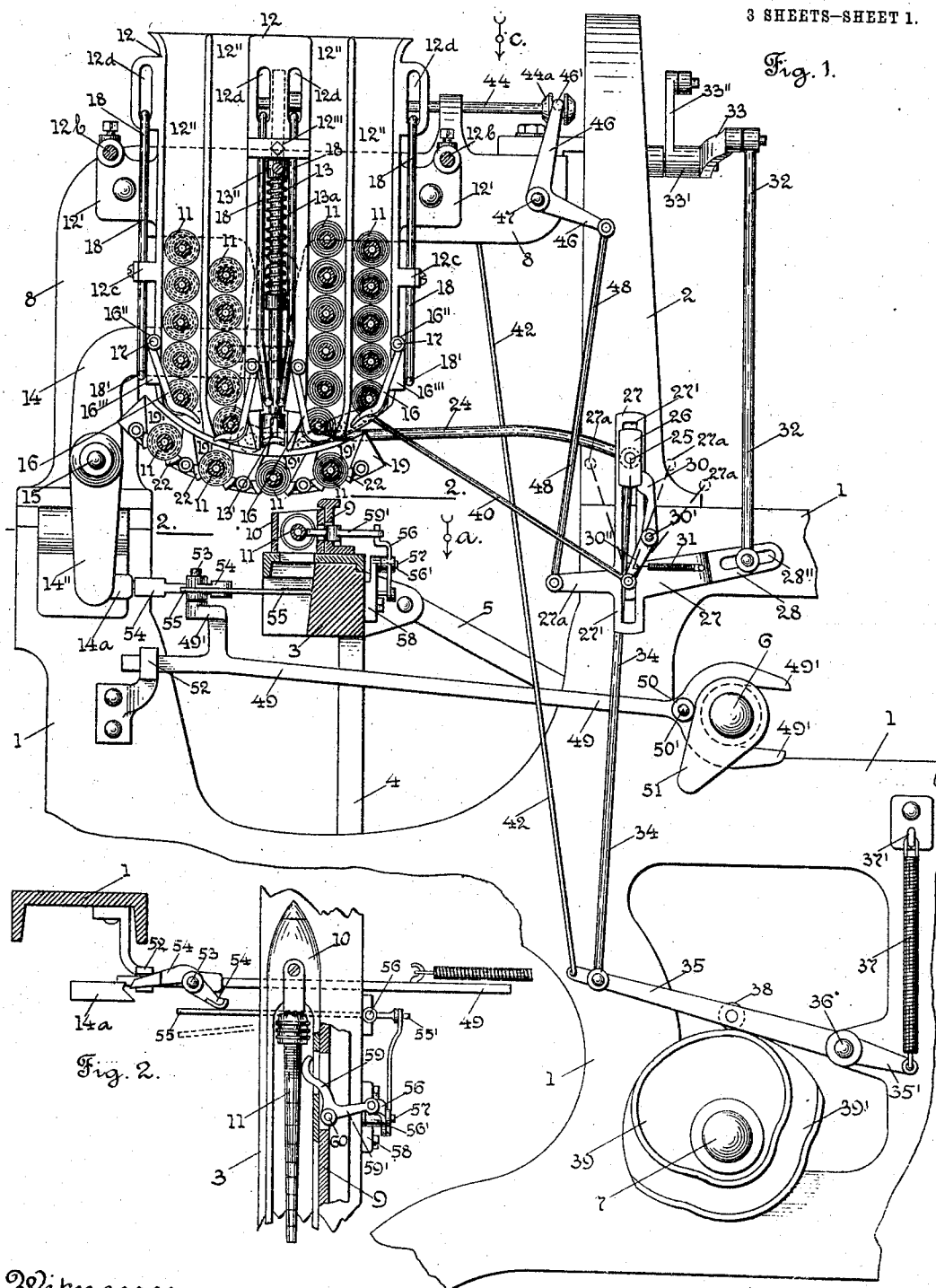


H. WYMAN.
 AUTOMATIC WEFT REPLENISHING LOOM.
 APPLICATION FILED MAY 12, 1908.

1,032,463.

Patented July 16, 1912.

3 SHEETS—SHEET 1.



Witnesses
 M. Brett.
 M. Davis.

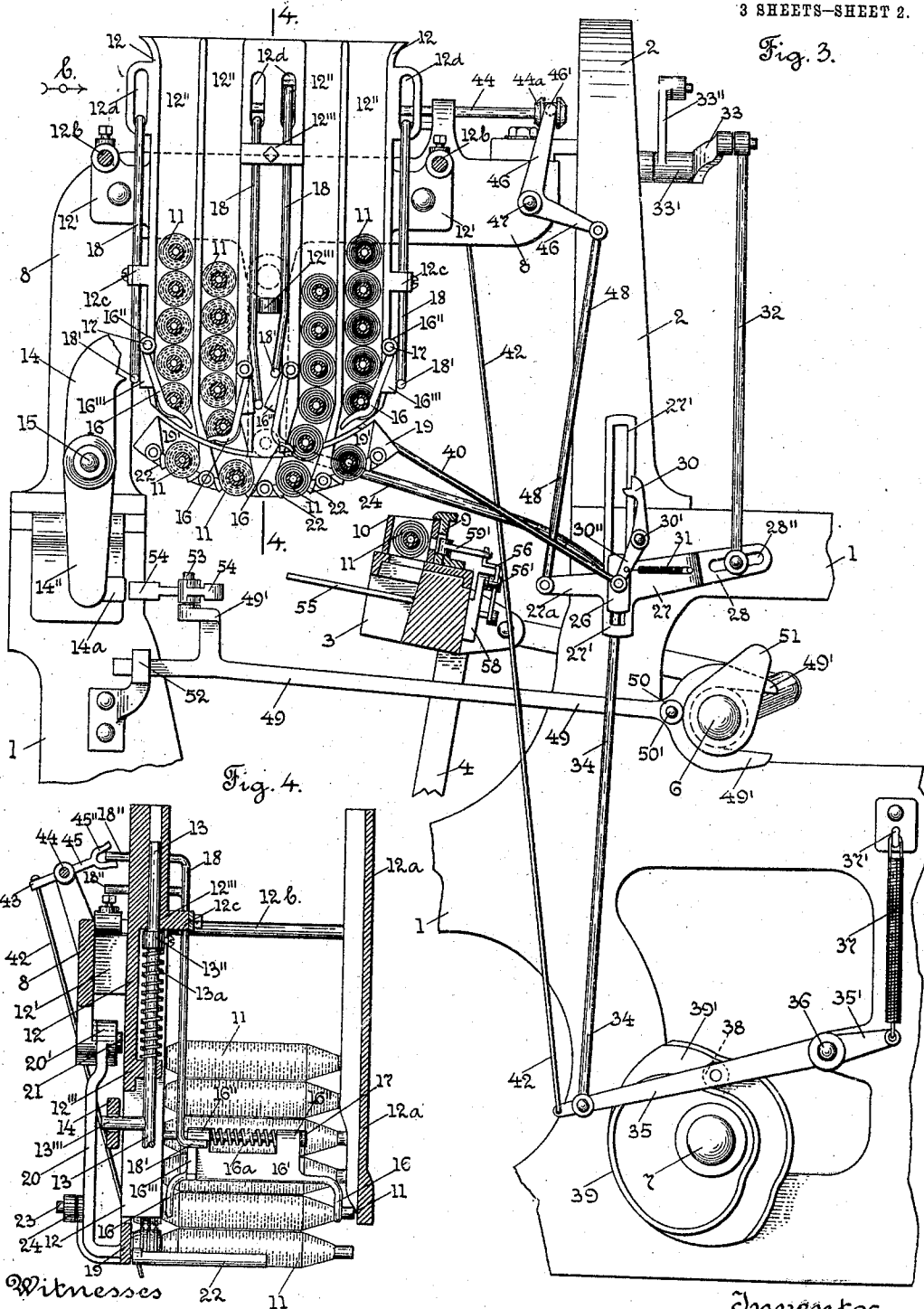
Inventor
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3 SHEETS—SHEET 2.



Witnesses
 M. Bredt.
 W. Cassel.

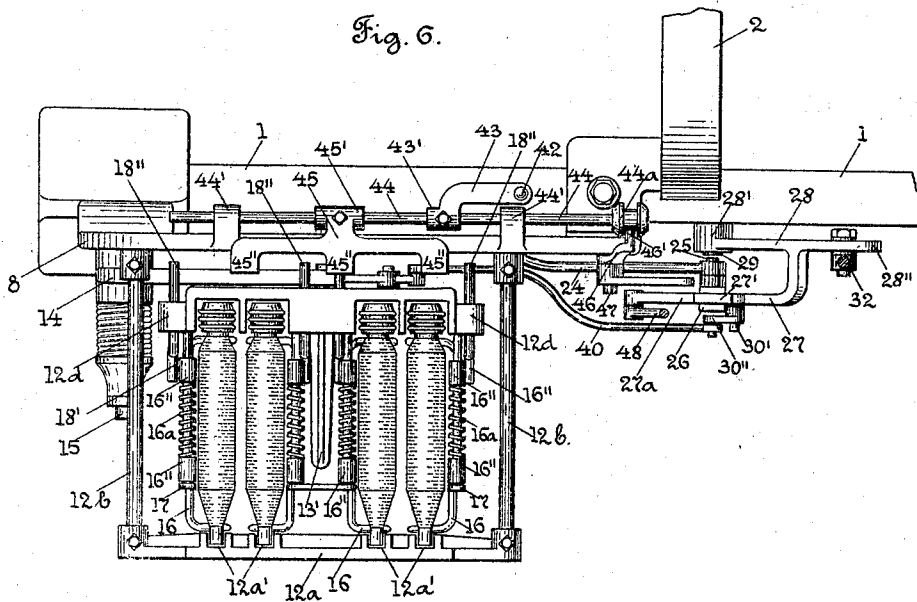
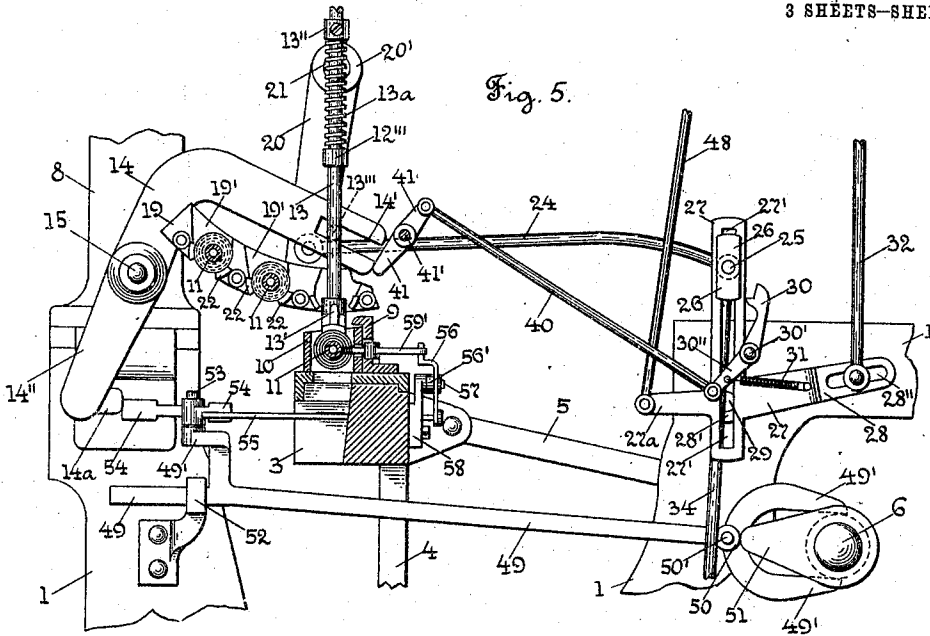
Inventor
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3 SHEETS—SHEET 3.



Witnesses
J. W. Wyman
J. W. Wyman

Inventor
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Attorney.

UNITED STATES PATENT OFFICE.

HORACE WYMAN, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO CROMPTON & KNOWLES LOOM WORKS, A CORPORATION OF MASSACHUSETTS.

AUTOMATIC WEFT-REPLENISHING LOOM.

1,032,463.

Specification of Letters Patent.

Patented July 16, 1912.

Application filed May 12, 1908. Serial No. 432,463.

To all whom it may concern.

Be it known that I, HORACE WYMAN, 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 Automatic Weft-Replenishing Looms, of which the following is a specification.

My invention relates to an automatic weft replenishing loom, and particularly to that class of looms which have a magazine at one end of a loom with a plurality of guide-ways or compartments for bobbins or filling carriers, and shifting or change shuttle boxes at the other end of the loom for shuttles with filling of different colors or characters, corresponding to the filling in the different compartments of the magazine.

The object of my invention is to improve upon the construction of looms of the class referred to, and my invention consists in certain novel features of construction of my improvements as will be hereinafter fully described.

In my improvements I provide a stationary magazine having a plurality of guide-ways or compartments for superposed filling carriers, which drop down by gravity in the magazine. I also provide a movable magazine located below the stationary magazine, and preferably having a rocking or swinging motion in the arc of a circle; said movable magazine is provided with the same number of compartments as the stationary magazine, and each compartment has a discharge opening on its underside, and is adapted to hold only a single bobbin or filling carrier, and each compartment is adapted to register with, or be moved into alignment with a compartment in the stationary magazine having bobbins or filling carriers of the same color or character as the bobbin or filling carrier in the single compartment in the movable magazine, so that the lowest bobbin in a compartment in the stationary magazine may be conveyed into the corresponding compartment in the movable magazine at the proper time. With the stationary magazine and the movable magazine, I combine a transferrer for transferring a bobbin or filling carrier from the movable magazine into the active shuttle, to take the place of a substantially or practically exhausted shuttle, said transferrer is prefer-

ably located at the central part of the stationary magazine, between two pairs of compartments or guide-ways, in case of four compartments or guide-ways in the magazine, and extending over the stationary shuttle box at the magazine end of the loom, when the lay carrying said box is in its forward position. I provide mechanism for operating the transferrer at the proper time. I also provide mechanism to move the movable magazine under the stationary magazine, to bring under the transferrer any one of the compartments in the movable magazine which has a bobbin or filling carrier therein of the same color or character as that in the active shuttle, and to return the movable magazine to its normal position for replenishment from the stationary magazine, after the bobbin or filling carrier has been transferred into the active shuttle.

In the stationary magazine each guide-way or compartment for the bobbins or filling carriers has movable retaining mechanism at its lower end for the lowest bobbin or filling carrier, which mechanism is operated at the proper time to release said bobbin and allow it to drop into the corresponding compartment in the movable magazine, and each compartment of the movable magazine has movable retaining mechanism for its bobbin or filling carrier.

The mechanism for transferring the bobbins or filling carriers from the movable magazine into the active shuttle, is preferably made adjustable, and independent of the movement of the lay, so that the transferrer may be operated when the lay is at its extreme forward position and is commencing its return movement, so as to obtain more time for the detector to act after the shuttle has entered the shuttle box under the magazine.

In my improvements as shown and described herein, the filling detecting mechanism for detecting the practical or substantial exhaustion of filling in the active shuttle, is located at the magazine end of the loom, and is actuated when the shuttle is at the magazine end of the loom, and the transfer of the bobbin or filling carrier takes place immediately upon the operation of the filling detecting mechanism, without the shuttle being thrown to the opposite side of the loom and returned to the magazine end, as is cus-

tomary, and the detection and the transfer of the bobbin or filling carrier occurs on the forward movement of the lay, and during the time the active shuttle is under the transferer.

The filling detecting mechanism shown in the drawings corresponds to the filling detecting mechanism shown and described in the Letters Patent of the United States, No. 939,696. I have only shown in the drawings a detached portion of a loom of the class referred to, with my improvements applied thereto, sufficient to enable those skilled in the art to understand the construction and operation thereof.

Referring to the drawings:—Figure 1 is a detached end view of parts of a loom frame with my improvements applied thereto; the lay and stationary shuttle box are shown in section, and the outer end of the magazine is removed. Fig. 2 is a sectional top or plan view of the lay, and the filling detecting, and transferer operating mechanism, taken on line 2, 2, Fig. 1, looking in the direction of arrow *a*, same figure. Fig. 3 corresponds to Fig. 1, but shows some of the parts in a different position. Fig. 4 is a central vertical section through the magazine, on line 4, 4, Fig. 3, looking in the direction of arrow *b*, same figure. Fig. 5 shows the transferer mechanism, and a part of the movable magazine; the parts are shown in the position they occupy when a bobbin or filling carrier is being transferred. Fig. 6 is a plan view of the stationary magazine, and some parts connected therewith, looking in the direction of arrow *c*, Fig. 1.

In the accompanying drawings, 1 is the loom side or end frame, 2 the loom arch, 3 the lay, 4 the lay sword, pivoted at its lower end, 5 the crank connector to the crank shaft, 6, 7 the bottom shaft, 8 the stand for the stationary magazine, 9 a single shuttle box on the magazine end of the lay, 10 a shuttle in the box, and 11 a bobbin or filling carrier in the shuttle.

All of the above mentioned parts may be of the usual and well known construction.

The stationary magazine in this instance consists of the inner or back plate 12, having side extensions 12' bolted to the stand 8, and having four vertically extending guide-ways or compartments 12'' for the heads of the bobbins 11, and front plates 12^a, connected by rods 12^b with the side ears or extensions 12', and having vertically extending guide-ways or compartments 12' therein for the tips of the bobbins 11. The transferer is located in this instance at the central part of the stationary magazine, and between the two pairs of guide-ways or compartments for the bobbins, and consists in this instance of a vertically extending rod 13, guided in bosses or projections 12''' on the plate 12. The lower end of said rod 13

is provided with a horizontally extending arm 13', which extends over a bobbin or filling carrier 11 in the movable magazine, to be hereinafter described, to transfer said bobbin into the active shuttle. A helically coiled expansion spring 13^a encircles the rod 13, and bears at one end against the lower projection 12''' on the plate 12, see Fig. 4, and at its upper end against a collar 13'' on the rod 13. The spring 13^a acts to raise the transferer 13' and maintain it in its raised position above the filling carriers in the movable magazine. On the rod 13, near its lower end, is a pin 13''', which in this instance extends rearwardly from the rod 13 through an opening in the back plate 12 of the magazine, see Fig. 4, and into an open end slot 14' in the lever 14 for the transferer rod 13. The lever 14 is pivoted at 15 on the stand 8, and has the downwardly extending arm 14'', through which the transferer lever or arm 14 is operated, in the manner to be hereinafter described.

The lowest filling carrier 11 in each compartment or guide-way of the stationary magazine, is retained in position, in this instance at its head and tip end, by two retaining hooks 16, see Fig. 4, on a plate 16' having bosses 16'' loosely mounted on a pin 17, and having in this instance a projection 16''' thereon, see Fig. 3, which extends in the path of and is adapted to be engaged by the lower hooked end 18' of a vertically extending rod 18. The rods 18 have a bearing in a projection 12^c on the back plate 12, see Fig. 4, and are bent inwardly at their upper ends and extend through elongated openings 12^d in the plate 12. The mechanism for operating the rods 18 will be hereinafter described.

I will now describe the movable, or "supplemental" magazine. The movable magazine is located below the stationary magazine, and consists in this instance of a plate 19 having four guide-ways or compartments 19', corresponding to the number of guide-ways or compartments in the stationary magazine, and each guide-way or compartment 19' holds a single bobbin or filling carrier 11. The plate 19 is in this instance of arc shape and of a curvature corresponding to the curvature of the lower end of the stationary magazine, and is supported, to have a rocking or swinging movement under the stationary magazine, by an arm 20 having a hub 20' at its upper end which is loosely mounted on a stud 21, in this instance on the stand 8 of the stationary magazine. Extending out from the front side of the plate 19, at the lower end of the compartments 19', is a series of fingers or supports 22, each pair of which are preferably spring pressed toward each other in any suitable manner, to yieldingly hold a bobbin or filling carrier 11 in each compartment,

preparatory to being transferred by the transferer into the active shuttle. The fingers or supports 22, of which there are two for each discharge opening, one at each side thereof, are pivotally mounted, or fulcrumed on pins, to have a rocking motion, and normally held in operative position by springs, not shown, and having their depending ends inclined toward each other, so that when a filling carrier is pressed downwardly by the transferer, they open with an equal resistance at each side, and guide the filling carrier into the shuttle in the direct line of movement of the transferer. Instead of having the fingers or supports 22 contact with the filling on the carrier, they may be constructed or shaped to contact with the tip and head ends, respectively, of the bobbins.

I will now describe the parts constituting the means for moving the supplementary magazine to and fro under the stationary magazine, to convey a bobbin, which has been received from the stationary magazine, to its transferring position under the transferer. On the arm 20 is a stud 23, see Fig. 4, to which is connected one end of a rod or connector 24; the other end of the connector 24 is connected with a stud 25 on a vertically moving slide 26, which is mounted in a vertically extending slot 27' in an arm 27, which extends out from and forms a part of a lever 28, see Fig. 6, which lever has its hub 28' loosely mounted on a stud 29 on the loom side. The slide 26 is retained at the upper end of the slot 27' in the arm 27, by a latch 30 pivoted on a pin 30' secured to the arm 27. The latch 30 is notched at its upper end to receive the lower end of the slide 26, and has a downwardly extending end 30'', the lower end of which is in substantial alinement with the fulcrum of the lever 28. A spring 31 is attached at one end to the extension 30'', and at its other end to the arm 27, and acts to yieldingly hold the latch 30 in engagement with the slide 26. The lever 28 has a slot 28'' therein, which is adjustably secured to the lower end of a rod or connector 32; the upper end of the connector 32 is connected with a lever 33, see Fig. 1, the hub 33' of said lever 33 is pivotally mounted on a stud on the loom arch 2. An arm 33'', extending out from the hub 33' is connected, through intermediate connections, not shown, with the shuttle box motion on the opposite end of the loom, so that the shifting, or rising and falling of the shuttle boxes, will, through intermediate connections to the lever 33, and through the connector 32, lever 28, arm 27, slide 26, and connector 24 to the movable magazine 19, move said magazine to bring a filling carrier having filling thereon of a color or character corresponding to the filling in the active shuttle, under the trans-

ferer, and maintain it there while the same shuttle is in operation; the arm 27, as it assumes the different positions of the dotted lines 27^a, Fig. 1, moving the magazine to its different positions.

The stud 25 on the slide 26 has connected therewith, the upper end of a second connector or rod 34; the lower end of said rod 34 is pivotally connected to a cam lever 35, which is loosely mounted at one end on a stud 36 on the loom side, and has an extension 35' to which is attached one end of a helically coiled contraction spring 37. The inner end of said spring 37 is attached to a stand 37' on the loom frame. The spring 37 acts, through lever 35 and the rod 34, to move the slide 26 down when it is disengaged from the latch 30, see Fig. 3. The cam lever 35 carries a roll 38 which travels on the periphery of, and in the cam groove 39' in a cam 39, fast on the bottom shaft 7.

A revolution of the bottom shaft 7 and the cam 39, acts to raise the lever 35, the rod 34 and the slide 26 to their normal raised position, shown in Fig. 1, whenever the slide has been lowered, by disengagement of the latch 30 from under it. To the downwardly extending arm 30'' of the latch 30 is connected one end of a rod 40, the other end of said rod 40 is pivotally connected with one arm of a lever 41, centrally mounted on a stud 41' on the rear side of the rear plate 12 of the magazine, see Fig. 5. The other arm of the lever 41 extends in the path of and is adapted to be engaged by the open slotted end 14' on the transferer lever 14, and when the transferer lever 14 is operated to move down the transferer 13 to cause it to transfer a bobbin from the movable magazine into the active shuttle, the lever 41 will be rocked or moved, and through rod or connector 40, will move the latch 30 away from and out of engagement with the slide 26, and allow said slide, through the connector 34 and cam lever 35, to be moved downwardly in the slotted arm 27', to bring the stud 25 in said slide into alinement with the fulcrum stud of the lever 28, as shown in Fig. 3, to move, through connector 24, the supplemental magazine 19 to its central position, shown in Fig. 3, to cause the compartments in said movable magazine to register with the compartment in the stationary magazine.

The downward movement of the lever 35, through the rotation of the cam 39, acts, through rod 42 connected at its lower end to said lever 35, and at its upper end to an arm 43, see Fig. 6, having its hub 43' fast on a rock shaft 44, to raise said shaft and with it a plate or bar 45, having its hub 45' fast on said shaft 44, and having three opened end slotted portions 45'' thereon, see Fig. 4, into which extend the rearwardly extending upper end 18'' on the vertically

moving rod 18, to raise said rod, as shown at the right in Fig. 3, and cause the lower end thereof to move off from the projections 16''' on the plate 16' of the retaining hooks 16, to allow the helically coiled contraction spring 16^a to operate to move the hooks 16 away from the bobbin, as shown in Fig. 3, and allow the lowest bobbin 11 from a compartment in the stationary magazine, to drop down into the compartment registering therewith in the movable magazine, to take the place of the bobbin which has been transferred into the active shuttle.

To select the vertically moving rod 18 which has to be operated to release the hooks 16 which retain the bobbins in the compartments in the stationary magazine, I employ in this instance a rocking rod 44, which also has a longitudinal movement in suitable bearings 44' on the stand 8. The rod 44 has a hub 44^a on one end thereof, with an annular groove therein, into which extends a pin 46' on one arm of a bell crank lever 46, which is pivotally mounted on a stud 47 on the stand 8, see Fig. 1. The other arm of the bell crank lever 46 is connected by a rod 48 to an extension 27^a on the slotted arm 27. The longitudinal movement of the rod 44 will bring the plate 45, having the engaging ends 45'' thereon, in such a position that one of the engaging ends 45'' will be in a position to engage the upper end of the vertically moving rod 18 which is to be operated. The continued rotation of the cam 39 will, after the movable magazine has been replenished from the stationary magazine, as above described, move the lever 35, and through connector 34, raise the slide 26 to its upper position in the slotted arm 27', and allow the latch 30 to engage the slide 26 and hold it in its raised position, and through the connector 24 to move the supplemental magazine 19 back and forth, according to the position of the drop shuttle boxes, through connections intermediate the lever 33 and said shuttle boxes, to place the proper compartment in the supplemental magazine in position under the transferrer.

The mechanism for moving the transferrer arm 14 at the proper time, consists in this instance of a movable lever or bar 49, having a forked end 49' at its inner end to receive the crank shaft 6, and carrying on said end a roll 50 mounted on a stud 50', which roll extends in the path of and is operated by a cam 51 fast on the crank shaft 6, see Figs. 1, 3 and 5, to move said bar with an intermittent movement, substantially coinciding with the forward movement of the lay, when the active shuttle is at the magazine end of the loom. The outer end of the bar 49 is guidingly held and supported in a stand 52 secured to the loom side. The bar 49 has an upward extension 49' thereon carrying a stud 53, on which is pivotally

mounted a two armed lever 54, which has a movement in a horizontal plane, and has its outer arm adapted to engage the dog 14^a on the arm 14'', to move the transferrer arm 14 and to operate the transferrer 13. The other arm of the lever 54 extends in the path of and is adapted to be engaged by a rod 55, which extends forwardly from the front of the lay and is pivotally mounted on a stud 56 at the rear of the lay, to have a movement in a horizontal plane. The lever 55 has a rearward extension 55' thereon which has connected thereto one arm of a lever 56 having a hub 56', which is pivotally mounted on a stud 57 on a stand 58 secured to the back of the lay. The other arm of the lever 56 is pivotally attached to an extension 59' on the filling detector 59, which is pivotally mounted on a pin 60 at the rear of the stationary shuttle box, and is adapted to feel through an opening in the shuttle box and in the shuttle, to engage with the filling on the bobbin.

In case there is a supply of filling on the bobbin, the filling detector 59 is held by the filling in its outward position, and through connections to the lever 55, the lever 55 is held in the position shown by broken lines in Fig. 2, and out of engagement with the lever 54, so that said lever will not be moved into the path of the extension 16^a on the transferrer arm 14, but if the filling on the bobbin is substantially exhausted, as shown in Fig. 2, then the filling detector 59 will be moved inwardly, and through connections to the lever 55, will move said lever into the position shown by full lines in Fig. 2, and cause it to engage the lever 54 to move the end thereof into the path of the extension 14^a on the transferrer arm 14, so that the forward movement of the bar 49, through the engagement of the cam 51 with the roll 50, will operate the transferrer arm 14, and through the movement of said arm will operate the transferrer 13, to transfer a bobbin from the movable magazine into the active shuttle, all as will be fully understood by those skilled in the art. By turning the cam 51, which is adjustably mounted on the shaft 6, the forward movement of the bar 49 can be adjusted so as to operate the transferrer arm during any portion of that movement of the lay, either before, or after its extreme forward movement, in which the magazine may be placed, to transfer a filling carrier into the shuttle on the lay. The arm 14, rod 13, and parts intermediate said arm and rod, may be termed a transferrer.

In my improvements, the movable magazine which receives the bobbins from the stationary magazine and conveys them to a position under the transferrer, may be termed a bobbin conveyer. And the parts, embracing the pivoted lever having an arm movable back and forth responsive to the

movements of the shuttle boxes, the movable slide carried by the arm having a connection to the bobbin conveyer, the cam on the loom shaft having a second connection to the movable slide, all acting when the slide is on said arm to move the bobbin conveyer back and forth under the stationary magazine, and when the slide is moved from any position of said arm to its axis, to cause the bobbin conveyer to remain stationary, may be termed a bobbin conveyer actuator. This bobbin conveying actuator is applicable also to a movable bobbin conveyer under the stationary one, in which there is one compartment only, instead of one for each of the compartments of the stationary one, this one compartment being normally without a bobbin, but registering with one or another of the compartments of the stationary one, as the movements of the shifted shuttle boxes brings a shuttle of one or another color of filling into active operation on the lay, and which, upon an indication for a change of filling, will immediately cause a bobbin to be dropped into the movable compartment under it, and thence conveyed to the transferring position under the transferer, in this instance, the position of the cam 39 on the shaft will be so timed that the transfer of the bobbin will take place when the stud or pin 25 will be at its neutral position, as in Fig. 3, and having the bobbin immediately under the transferer. The retaining hooks or fingers 16 will in this instance act to hold all of the bobbins in their respective compartments, until the indication occurs to release the one to fall into the movable compartment under it.

It will be understood that the details of construction of my improvements may be varied if desired, and my improvements are adapted to be used on looms having warp stop motions, dobby, or jacquard motions, and any other ordinary loom mechanisms. The filling detecting mechanism may be of any ordinary type, and may be mounted on the breast beam instead of on the lay, if preferred.

It will be understood that it is not material as to the exact location of the several parts of the filling detecting mechanism hereinbefore described, the essential feature of my improvements being that the filling detecting mechanism shall operate so as to detect the practical or substantial exhaustion of filling in the active shuttle, when it is at the magazine end of the lay, and fresh filling be transferred into the active shuttle, while it remains under the magazine, by means independent of the lay, whereby the transfer can be made during any part of the movement of the lay, in which the shuttle is in position to receive a filling carrier from the transferer, which position of the lay will be its most forward position, or upon its

approaching, or withdrawing from its most forward position.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a weft replenishing loom, the combination with a stationary magazine having a plurality of compartments for superposed filling carriers, of a movable magazine below said stationary magazine, said movable magazine having the same number of compartments as the stationary magazine, and each compartment for a single filling carrier, and means to move said movable magazine, to place a filling carrier directly under the transferer.

2. In a weft replenishing loom, the combination with a stationary magazine having a plurality of compartments for superposed filling carriers, of a movable magazine below said stationary magazine having the same number of compartments as the stationary magazine, each compartment for a single filling carrier, and the compartments in the movable magazine normally registering with the compartments of the stationary magazine, and a transferer for the filling carriers of the movable magazine directly over a single filling carrier of the movable magazine, and adapted to transfer a filling carrier when said magazine is in an abnormal position with a filling carrier under the transferer.

3. In a weft replenishing loom, the combination with a stationary magazine having a plurality of compartments for superposed filling carriers, of a movable magazine below said stationary magazine, having the same number of compartments as the stationary magazine, each compartment for a single filling carrier, and the compartments in the movable magazine normally registering with the compartments in the stationary magazine, and means to cause the conveying of a filling carrier from any one of the compartments in the stationary magazine into its registering compartment in the movable magazine, and a transferer for the filling carriers of the movable magazine adapted to transfer a filling carrier, when said magazine is in an abnormal position with a filling carrier under the transferer.

4. In a weft replenishing loom, a movable magazine having a plurality of compartments for single filling carriers, a transferer operatively placed above said magazine and extending over the single shuttle box on the lay, when the lay is in its forward position, and a stationary magazine above the movable magazine, and having compartments for superposed filling carriers, said compartments being in registering position with the compartments of the movable magazine, after the transfer of a filling carrier from the movable magazine.

5. In a weft replenishing loom, the combination with a stationary magazine having a plurality of compartments for superposed filling carriers, of a movable magazine below said stationary magazine, and having the same number of compartments as the stationary magazine, each of said compartments being open for the passage of a filling carrier from the stationary magazine, and for the passage of a filling carrier from the movable magazine to the shuttle below it on the lay, and the compartments in the movable magazine normally registering with the compartments in the stationary magazine, and means to cause the conveying of a filling carrier from any one of the compartments in the stationary magazine to its registering compartment in the movable magazine, and retaining means to yieldingly hold the filling carriers in the movable magazine.
6. In a weft replenishing loom, a movable magazine having a plurality of compartments for filling carriers, a transferer operatively located in a fixed position above said magazine, to transfer filling carriers moved into position by said magazine, into the running shuttle on the lay below the magazine, and a stationary magazine having a plurality of compartments for superposed filling carriers, located above the movable magazine, to cooperate with said movable magazine to supply filling carriers thereto.
7. In a weft replenishing loom, the combination with a stationary magazine having a plurality of compartments for filling carriers of different colors or characters therein, a transferer operatively placed between two of said compartments, of cooperating mechanism to maintain directly under the transferer a filling carrier having the same character of filling as that in the active shuttle.
8. In a weft replenishing loom, the combination with a magazine having a plurality of compartments for superposed filling carriers, and a transferer operatively located between two compartments, of a movable magazine, or bobbin conveyer to place directly under the transferer the lowest filling carrier from a compartment, at either side of said transferer.
9. In a weft replenishing loom, the combination with a stationary magazine having a plurality of compartments, and a transferer located between two of said compartments, of a supplemental magazine below the stationary magazine, movable in the arc of a circle about its axis, and provided with receptacles for the single filling carriers, movable directly under the transferer.
10. In a weft replenishing loom, the combination with a stationary magazine having a plurality of compartments for filling carriers, a transferer located between two of said compartments, of a movable magazine having a plurality of compartments, each

adapted to receive only a single filling carrier, yielding means to retain the filling carriers therein, a transferer, and means to move any one of the compartments into an operative position under the transferer.

11. In a weft replenishing loom, a filling transferer operatively placed between two compartments of a stationary magazine, and directly above the shuttle box on the lay, when the lay is in its forward position, a movable magazine below said transferer having a series of compartments for filling carriers, and adapted to receive the filling carriers on the upper side of the magazine, and transfer them from the lower side of said magazine.

12. In a weft replenishing loom, the combination with a stationary magazine having a plurality of compartments for filling carriers, and a transferer operatively placed between two of the compartments, of a supplemental magazine to maintain filling carriers from the stationary magazine directly under the transferer, and filling detector means, operative on the near exhaustion of filling in the active shuttle, to immediately cause the transfer of a filling carrier from the supplemental magazine into the active shuttle.

13. In a weft replenishing loom, a movable magazine having one of its compartments under the transferer, a positioning lever or arm, and a connector therefrom to said magazine, to move said magazine, to bring another compartment under the transferer, and mechanism, which on the transfer of a filling carrier from said magazine, will move said connector to a neutral position of said positioning lever or arm.

14. In a weft replenishing loom, the combination with a stationary magazine having compartments for superposed filling carriers, of a movable magazine below said stationary magazine, having compartments for single filling carriers, and mechanism to transfer a filling carrier from a compartment of the stationary magazine into a compartment of the movable magazine, and from a compartment of the movable magazine into the active shuttle under the movable magazine.

15. In a weft replenishing loom, the combination with a stationary magazine having a plurality of compartments for filling carriers, and a transferer located between two of said compartments, of a bobbin or filling carrier conveyer, and a conveyer actuator, to convey bobbins from the stationary magazine to a position directly under the transferer.

16. In a weft replenishing loom, the combination with a stationary magazine having a plurality of compartments for bobbins or filling carriers, of a conveyer under the stationary magazine, to receive a selected bob-

bin from said magazine, and conveying actuating means to carry it to a position directly under the transferrer.

17. In a weft replenishing loom, the combination with a stationary magazine having a plurality of compartments for bobbins or filling carriers, of a bobbin conveyer under the stationary magazine, and a conveyer actuator, comprising a pivoted movable arm, a movable slide on said arm, a cam to move the slide on the arm, whereby the slide may be placed on the arm to move the bobbin conveyer back and forth, or it may be placed at the axis of the arm, and cause the conveyer to remain stationary.

18. In a weft replenishing loom having a stationary magazine with a plurality of compartments for bobbins or filling carriers, a bobbin conveyer under the stationary magazine, combined with means to move the conveyer having a bobbin of the same color as in the active shuttle, under the transferrer, said means comprising an arm moving in unison with the movement of the shifting shuttle boxes, a slide or carrier carried by said arm, connected to the bobbin conveyer, and means to move the slide upon the arm, to be moved as the arm moves, or be moved down on the arm to its fulcrum point, and remain stationary.

19. In a weft replenishing loom having a plurality of shifting shuttle boxes at one end, and a magazine at the other end, a feeler mounted independently of the shuttle, and operated independently of the movement of the lay, to contact with the filling on the bobbin in the active shuttle, when the shuttle is under the magazine, to detect the practical or substantial exhaustion of filling in said shuttle, and cause the transfer of new filling into said active shuttle at or near the forward movement of the lay, and before the return of said shuttle to the shifting shuttle box end of the loom.

20. In a weft replenishing loom, a transferrer, a lever or bar to operate the transferrer, adjustable mechanism to move said lever independently of the movement of the lay, to operate said transferrer, a feeler mounted independently of the shuttle, to contact with the filling on the bobbin in the active shuttle when the shuttle is under the magazine, and upon the practical exhaustion of filling in said shuttle, to cause said lever or bar to move the transferrer into its operative position.

21. In a weft replenishing loom, a transferrer, a lever or bar to operate the transferrer, a rotary cam adjustably mounted to move said lever independently of the movement of the lay, to operate said transferrer,

a feeler mounted independently of the shuttle, to contact with the filling on the bobbin in the active shuttle, when the shuttle is under the magazine, and upon the practical exhaustion of filling, to cause said lever or bar to move the transferrer into its operative position.

22. In a weft replenishing loom, a transferrer, a lever or bar to operate the transferrer, adjustable mechanism to move said lever, independently of the movement of the lay, to operate said transferrer, a feeler to contact with the filling on the bobbin in the active shuttle when the shuttle is under the magazine, and upon the practical exhaustion of filling cause said lever or bar to move the transferrer into its operative position.

23. In a weft replenishing loom, a transferrer, an engaging dog carried on an arm of said transferrer, and an actuating dog carried on an intermittently moving bar independent of the lay, a feeler to contact with the filling on the bobbin, and having an arm adapted, on the practical or substantial exhaustion of filling in the active shuttle, to cause the actuator dog to engage and operate the transferrer mechanism on the same forward movement of the lay.

24. In a weft replenishing loom, a magazine, a feeler adapted to contact with the filling in the active shuttle under the magazine on the forward movement of the lay, a transferrer, an engaging dog on the arm of said transferrer, an actuator dog on an arm or bar movable independently of the lay, and said arm or bar, and connections from said feeler, which, on the near exhaustion of filling in the active shuttle, will cause one of said dogs to engage with the other, and actuate the transferrer.

25. In a weft replenishing loom, a magazine, a transferrer, a feeler adapted to contact with the filling in the active shuttle under the magazine on the forward movement of the lay, an engaging dog carried on the transferrer arm, an actuator dog carried on an arm or bar independently of the lay, and said arm or bar, and means to move said bar forward on the forward movement of the lay, connections from said feeler to one of said dogs to cause it to engage the other dog on the near exhaustion of the filling in the active shuttle, and cause fresh filling to be supplied to the active shuttle during the same forward movement of the lay.

HORACE WYMAN.

Witnesses:

M. HAAS,

T. L. NELSON.