H. WYMAN.

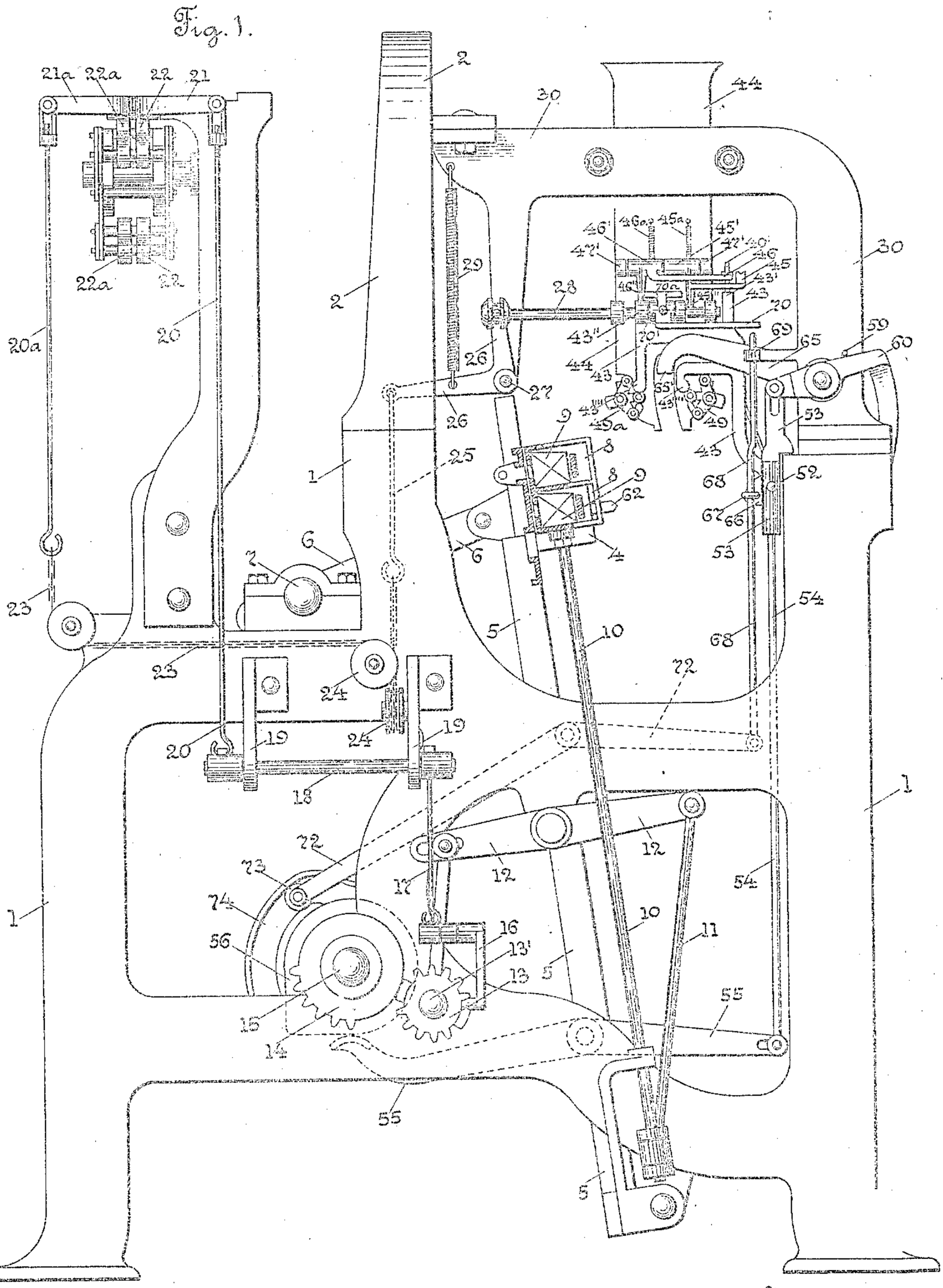
WEFT REPLENISHING LOOM.

APPLICATION FILED FEB. 13, 1908.

948,568. Patented Feb. 8, 1910.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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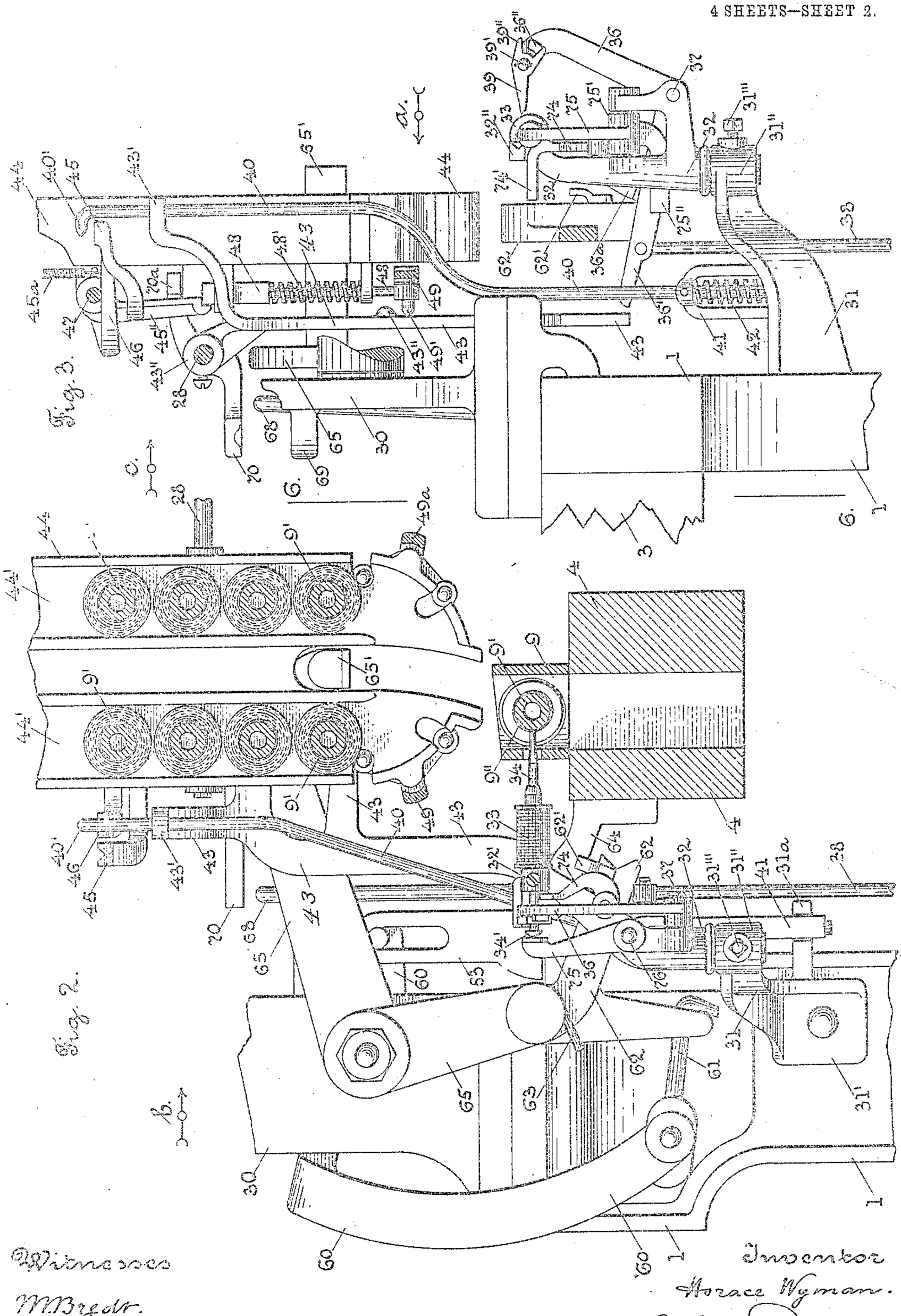
4 SHEETS—SHEET 2.



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4 SHEETS—SHEET 3.

Fig. 4.

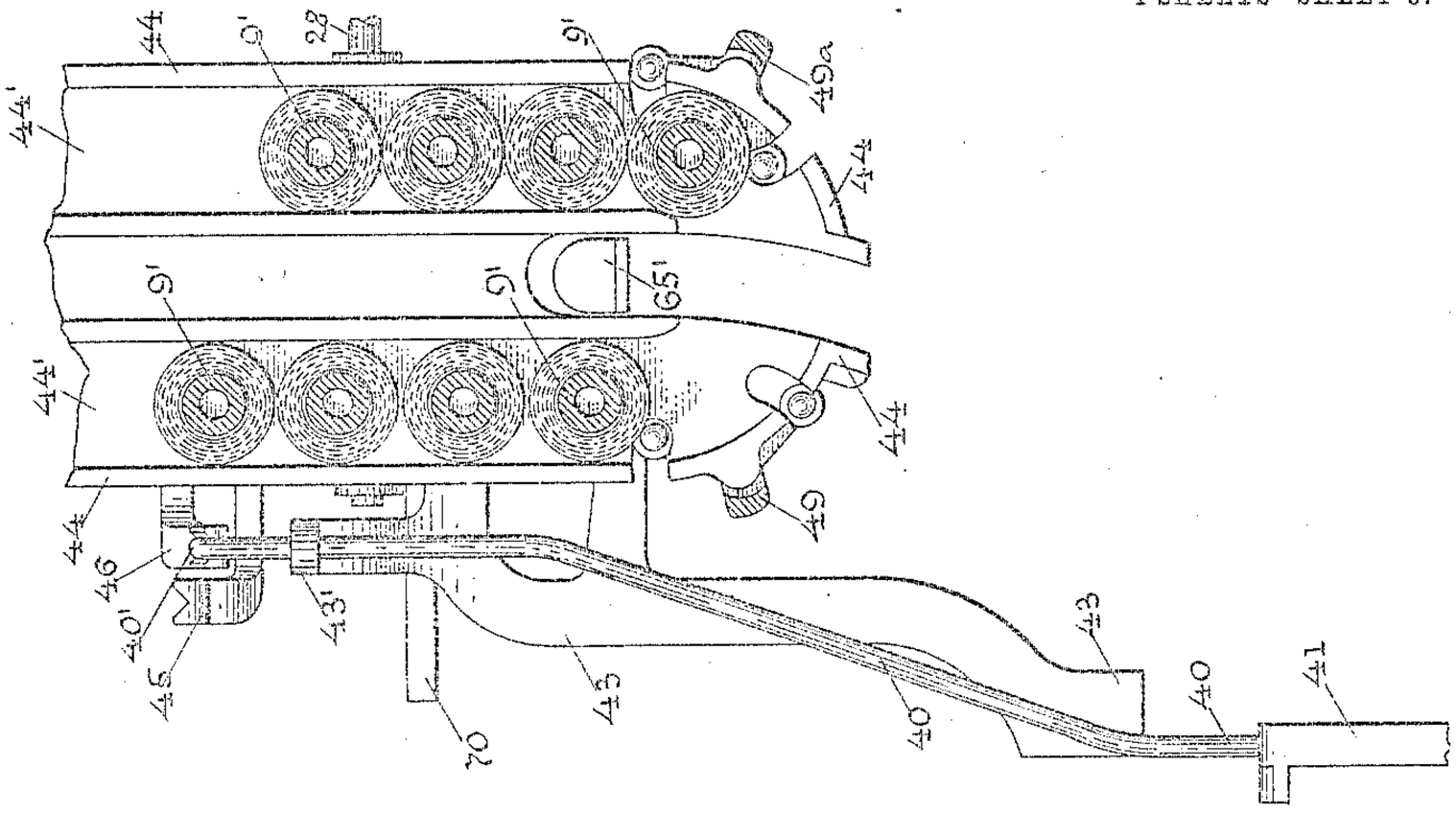
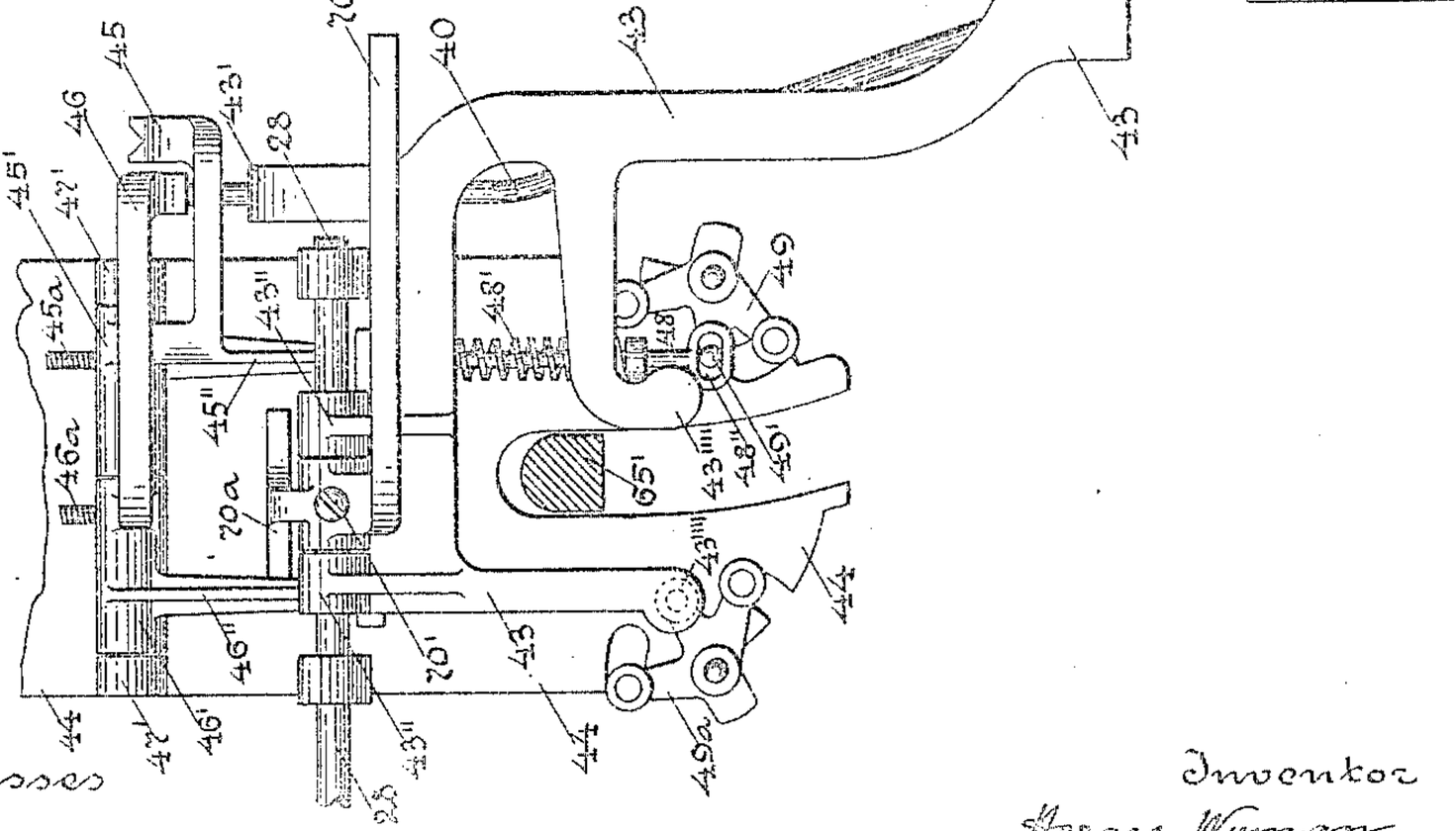


Fig. 5.



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4 SHEETS—SHEET 4.

Fig. 7.

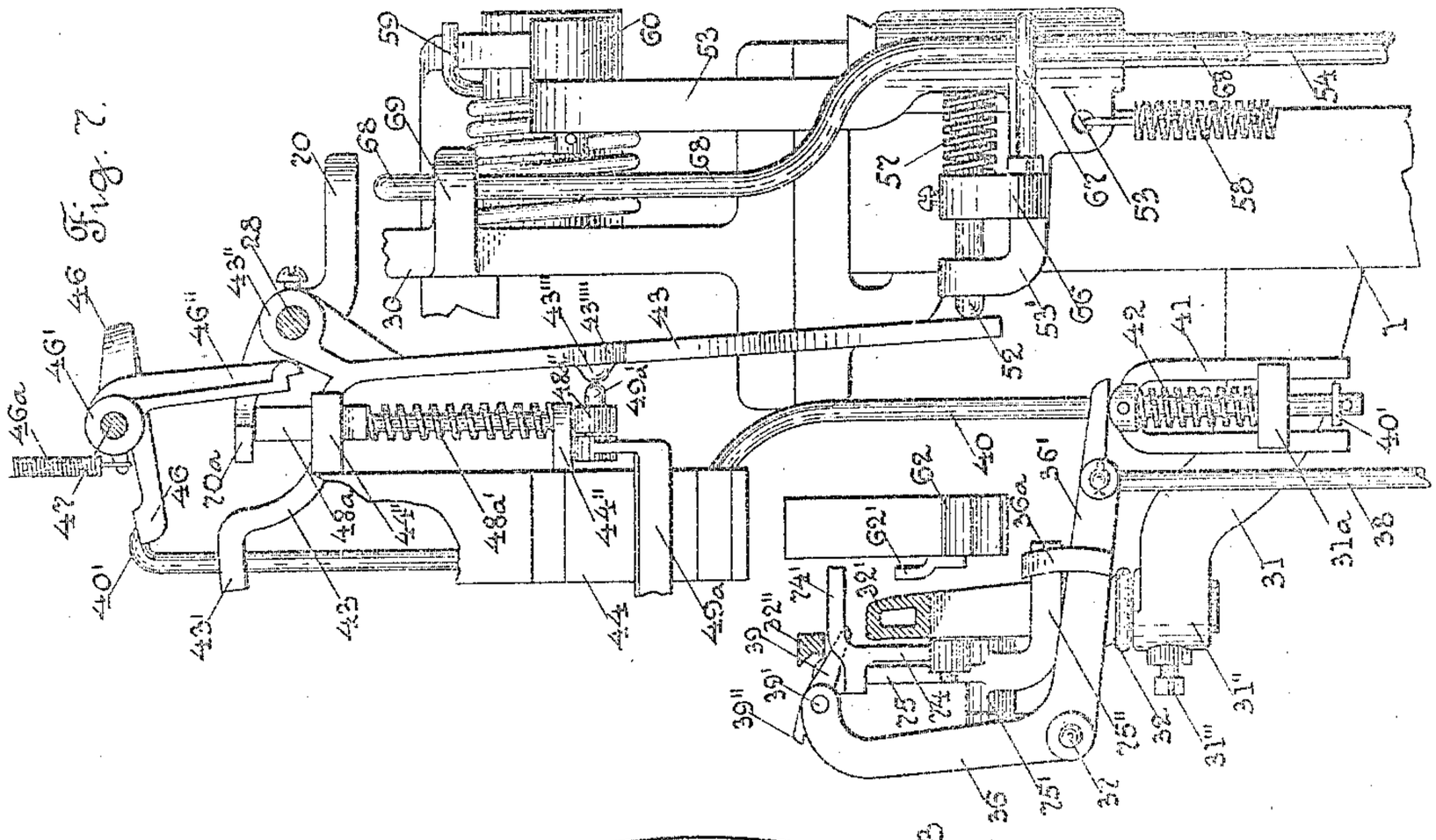

Fig. 6.

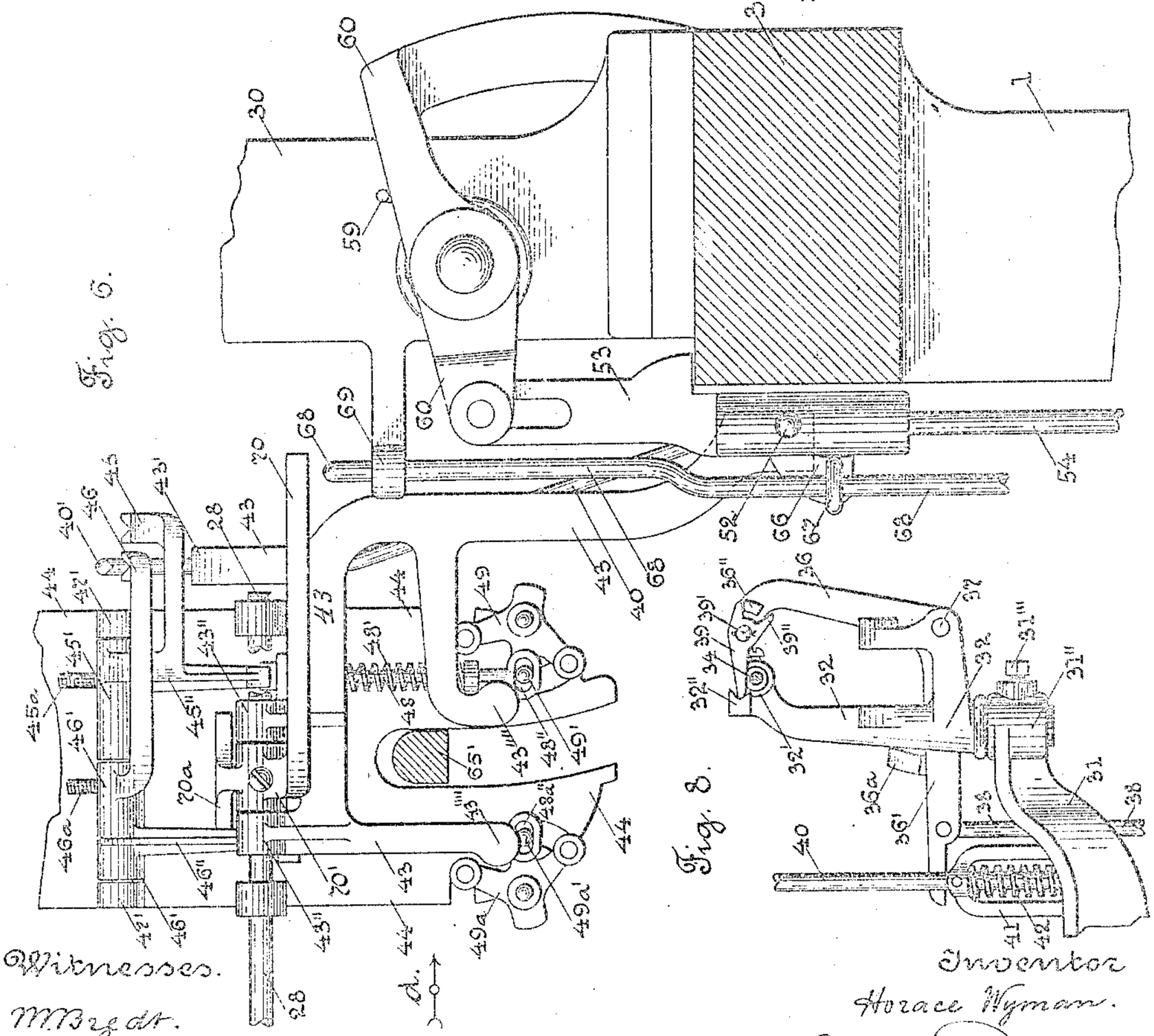

Fig. 8.

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UNITED STATES PATENT OFFICE.

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WEFT-REPLENISHING LOOM.

948,568. Specification of Letters Patent. Patented Feb. 8, 1910.

Application filed February 13, 1908. Serial No. 415,629.

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 Weft-Replenishing Looms, of which the following is a specification.

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

In my present improvements I have located the filling detector on the same end of the loom as the magazine, and when the filling detector acts as it detects the practical or substantial exhaustion of filling in the active shuttle as the lay comes forward, and causes a movement toward conveying the filling carrier under the transferrer, a change of filling then takes place in said shuttle when it next comes under the transferrer, which may occur during the second forward movement of the lay, in case the same shuttle remains active, or if said shuttle is changed when returned to the shifting shuttle box end of the lay, then the movement caused by the action of the filling detector will be incomplete or held partially completed, until said shuttle is brought into action again. This movement, caused by the filling detector, I herein term a "preliminary" movement, and in my improvements as herein shown and described I have caused said preliminary movement to be the movement of the lowest filling carrier in a compartment selected by a pattern indicator of a pattern chain, or other pattern surface, instead of by the movement of the shifting shuttle box mechanism, as customary heretofore. The preliminary movement referred to may be made by other suitable mechanism, coöperating with the conveying of a filling carrier to a position under the transferrer. This preliminary movement separates the lowest filling carrier from a series of filling carriers, and after this separation said filling carrier is under the control of another indication of the pattern surface, to be immediately conveyed to a position under the transferrer, in case the same shuttle remains on the race-way for the following picks of filling, but in case the shuttle box pattern chain determines that another shuttle having a different character of filling, is to become active, then the filling carrier which has had its preliminary movement, is held in abeyance by the pattern indicating surface controlling the movement of said filling carrier, until the continued movement of said pattern surface determines that the same shuttle is to again become active, whereupon said filling carrier is conveyed to its position under the transferrer.

By controlling the conveying of a filling carrier from its compartment, by a pattern indicating surface, instead of the shifting shuttle box mechanism, as customary heretofore, I am enabled to determine in advance, whether the filling carrier is to be conveyed to its position under the transferrer in the same period of the movement of the lay following the indication, which the shifting of the active shuttle, if changed, would occupy, or whether the conveying shall be delayed and the shifting of the active shuttle take place. By the conveying of the filling carrier in this earlier period of the movement of the lay, which was heretofore utilized by an indication by the shifting shuttle box mechanism for the conveying of the filling carrier, more time is taken for the filling carrier to be conveyed, and adjust itself in its transferred position, and the loom can be run at a greater speed than heretofore.

In my present improvements I have shown a filling detecting device of a type comprising a solenoid and magnetized feeler.

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

I have only shown in the drawings detached parts of a weft replenishing loom of the class referred to, with my improvements combined therewith, sufficient to enable those skilled in the art to understand the construction and operation thereof.

Referring to the drawings:—Figure 1 is an end view of parts of a loom of the class

referred to, having my improvements applied thereto; the shuttle boxes are shown in section. Fig. 2 is, on an enlarged scale, an end and sectional view of the magazine end of the loom, looking in the direction of the arrow *a*, Fig. 3. Fig. 3 is a front view of the parts shown in Fig. 2, looking in the direction of arrow *b*, same figure; some parts shown in Fig. 2 are not shown in this figure. Fig. 4 shows the magazine shown in Fig. 2, with a series of bobbins, and some connecting parts of the magazine, in a different position. Fig. 5 is a rear view of the parts shown in Fig. 4. Fig. 6 is a section, on line 6, 6, Fig. 3, looking in the direction of arrow *c*, same figure. Fig. 7 is a view of the parts shown in Fig. 6, looking in the direction of arrow *d*, same figure, and, Fig. 8 shows the detecting lever shown in Fig. 3 in a different position.

In the accompanying drawings, 1 is the loom side, 2 the loom arch, 3 the breast beam, 4 the lay carried on the lay swords 5, which are pivotally mounted at their lower ends and operated through crank connectors 6 to the crank shaft 7, in the usual way.

8 are the drop or shifting shuttle boxes, in this instance two in number, carrying shuttles 9, each of which preferably has a bobbin or filling carrier 9′, of a different color or character. The shifting shuttle boxes 8 are supported on the upper end of a vertically moving rod 10, which, through a link or connector 11, is connected with a box lifter 12 of the well known box motion of the Crompton type, which is shown and described in U. S. Letters Patent, No. 805,109, and comprises a mutilated pinion 13 on a shaft 14, having movable teeth, which are moved into and out of operative position with a master gear 14 on the bottom shaft 15, through arm 16 mounted on a stud, and connected through link 17 with a rock shaft 18, which is mounted in suitable bearings 19, and connected through connector 20 with a pattern indicator lever 21, which extends over the rotary pattern surface 22, made up of rolls and tubes in the usual and well known way.

The pattern indicating surface for selecting the filling carrier to have a preliminary movement, I have shown herein as a part of the ordinary shuttle box pattern surface 22, but it may be an independent pattern surface if preferred. Said pattern surface 22ª in this instance comprises rolls and tubes which operate a second pattern indicator lever 21ª, having a connector 20ª attached thereto, and a flexible chain or cord 23 attached to said connector 20ª, and extending over guide pulleys 24, and connected to a link 25 attached to one arm of an angle lever 26 pivoted on a stud 27. The other arm of the angle lever 26 is connected with a longitudinally moving rod 28, corresponding to the rod 63 in an application for Letters Patent, No. 298,939. A helically coiled contraction spring 29 is attached at one end to said angle lever 26, and at its other end to a stand 30.

To the loom side or frame 1, at the magazine end of the loom, is attached in this instance the foot 31′ of an arm or bracket 31, see Fig. 2, having a boss or hub 31″ on its end, in which is adjustably secured, by a set screw 31‴, the lower end of a stand 32, see Fig. 3. The stand 32 in this instance carries at its upper end 32′, see Fig. 2, a solenoid 33 of the usual construction, having a longitudinally moving magnetic feeler 34, adapted to be moved inwardly toward the lay, by engagement with the metal band 9″ on the bobbin or filling carrier 9′, in the shuttle 9, in the usual way, when said filling carrier is substantially exhausted.

A detecting lever 36, see Fig. 3, for the feeler 34, is pivotally mounted at its lower end on a stud 37 on the stand 32, and is operated or rocked toward and away from the feeler 34 every other pick of the loom, by a cam and cam lever, not shown, through a connector or lever 38, the upper end of which is pivotally attached to an inwardly extending arm 36′ on the lever 36, see Figs. 3, 7, and 8. The upper end of the lever 36 is in this instance provided with a dagger 39, pivotally mounted on a stud 39′ on the lever 36. The dagger 39 has a recess or opening 39″ in its outer end, into which extends a knob or projection 36″ on the lever 36, which acts to limit the pivotal movement of the dagger 39. When the detecting lever 36 is moved toward the feeler 34, and said feeler 34 is not moved out of the path of said lever through its engagement with the ring 9″ on the filling carrier 9′, but remains in the path of the dagger 39, then the beveled end or tip of said dagger will be raised, by engagement with said feeler 34, and pass over said feeler, as shown in Fig. 8, and engage an extension 32″ on the stand 32, said extension having an inclined recess therein, see Fig. 8. The engagement of the tip of the dagger 39 with the recessed extension 32″ on the stand 32, will limit the downward movement of the arm 36′ on the detecting arm 36. When the feeler 34 is drawn inwardly, by its engagement with the magnetic ring 9″ on the filling carrier 9′, the outer end of said feeler will be moved out of the path of the detecting lever 36, and allow the dagger 39 to move farther in, and pass under the extension 32″ on the stand 32, as shown in Fig. 7.

A rod 40 has its lower end provided with a yoke-shaped guide 41, see Fig. 7, guidingly held in position by an extension 31ª on the bracket 31. A helically coiled expansion spring 42 encircles the lower end of the rod 40, and bears at its upper end

against the upper end of the yoke-shaped guide 41, and at its lower end against the extension 31ª, and acts to raise said rod 40 and move it to its highest position, which is limited by the washer 40′ on the lower end of said rod. The upper end of the rod 40 is guidingly held in the upper slotted end of an extension 43′ on a swinging frame 43, having hubs 43″ loosely mounted on the horizontally sliding rod 28, to move with said rod as it is moved longitudinally, see Figs. 1, 6, and 7. The longitudinal movement of said rod 28 is, in this instance, as above described, controlled through connections to the second pattern indicating surface 22ª, see Fig. 1. In this instance as there are only two guide-ways or compartments 44′ in the magazine 44, for two sets of filling carriers 9′, there are only two positions of the longitudinally moving rod 28, said positions caused by the rolls or tubes, or other indicating surface on the pattern chain 22ª.

The upper end 40′ of the rod 40 is made bent or hooked, as shown, and is adapted to engage either one of the two arms 45, and 46, extending out from the hubs 45′, and 46′, respectively, loosely mounted on a transverse shaft 47, having bearings at 47′ on the back of the magazine 44, see Fig. 6. Springs 45ª and 46ª are connected with the hubs 45′ and 46′, respectively, to move said hubs in one direction. The hub 45′ of the arm 45 has a downwardly extending arm 45″ thereon, termed a retaining arm, the lower end of which is notched and adapted to extend over the upper end of a vertically moving rod 48, which moves in guides on the back of the magazine 44, and has a spring 48′ thereon, see Fig. 6. The lower end of the rod 48 has an elongated opening 48″ therein to receive a pin 49′ on a rocking cradle or support 49, see Figs. 6 and 7. The rocking cradle 49 is constructed substantially the same as the rocking cradle or support described in the application for Letters Patent, Serial No. 298,939, above referred to. The hub 46′ of the arm 46 has a downwardly extending arm 46″, termed a retaining arm, which has a notched lower end, see Fig. 7, which is adapted to extend over the vertically moving rod 48ª, having a spring 48ª′ thereon, and moving in guides 44″ on the back of the magazine 44, see Fig. 7; the lower end of said rod 48ª has an elongated opening 48ª″ therein, see Fig. 6, to receive a pin 49ª′ on the rocking cradle 49ª, which corresponds to the cradle 49.

The downward movement of the vertically moving rod 40, through the engagement of the end 36′ of the detecting lever 36, with the yoke shaped end 41 on the rod 40, on the operation of the feeler 34 to detect the substantial exhaustion of filling, above described, will cause the downward movement of said rod 40, against the action of the helically coiled expansion spring 42, see Fig. 7, and will rock one of the arms 45, and 46, according to the position of the upper end 40′ of the rod 40, relatively to the arms 45 and 46, and in case the rod arm 46 is operative, will move the downward extension 46″ away from the vertically moving rod 48ª, see Fig. 7, and allow the helically coiled expansion spring 48ª′, encircling the rod 48ª, to act to raise said rod and rock the cradle 49ª, and allow the lowest bobbin 9′ in a compartment 44′ to have its preliminary movement, and drop down into the hollow part of the cradle 49ª, as shown in Fig. 4, and be held there preparatory to being conveyed to a position under the transferrer. The rocking movement of the cradle 49ª will cause the pin 49ª′ thereon, see Fig. 7, to engage a projection 43‴ on the arm 43‴′ on the swinging frame 43 and move outwardly said frame, and cause the lowest end of the frame 43, see Figs. 6 and 7, to engage a longitudinally moving pin 52, guided in a side projection 53′ on a vertically moving plate 53, which is supported on the inner side of the breast beam. After the detection of the substantial exhaustion of filling in the active shuttle, and the preliminary movement of a filling carrier, above described, the pattern indicating surfaces 22, and 22ª are moved, at about the time the active shuttle is being thrown from the magazine to the shifting shuttle boxes, the pattern surface 22, for the shuttle box shifting mechanism, to determine whether the active shuttle is to remain active or another shuttle is to be substituted for it, and the second pattern surface 22ª to determine whether the preliminary moved filling carrier is to be immediately conveyed under the transferrer or is to be held in abeyance.

When the active shuttle is to remain active, and the filling carrier which has had its preliminary movement is to be conveyed under the transferrer during that period of the movement of the lay which occurs when the active shuttle has arrived in the shifting shuttle box end of the lay at about its extreme forward movement, the following operation takes place. The longitudinally moving pin 52 has a boss 66 fast thereon, see Fig. 7, carrying a wire 67, through which a vertically moving rod 68 passes. The upper end of the rod 68 extends through a guide arm 69, and through the movement of said longitudinally moving pin 52, is adapted to be moved out of, or into alinement with the end of an arm 70, the hub 70′ of which is fast on the longitudinally moving shaft 28, and has the outwardly extending engaging arm 70ª thereon, see Fig. 6, which extends above the vertically moving rods 48, and 48ª, of the rocking cradles or supports 49, and 49ª. The lower end of the vertically

moving rod 68 is connected with one arm of a lever 72, the other arm of said lever 72 carries a roll 73, which engages with and is operated by a cam 74 fast on the bottom shaft 15, see Fig. 1. The upward movement of the rod 68, when it is in alinement with the arm 70, will raise said arm and move down the arm 70^a, and cause it to engage one of the vertically moving rods 48, or 48^a, according to the position of the arm 70^a, and move down said rod, to rock the cradle or support for the filling carrier, and cause the filling carrier to drop down to the discharging end of the magazine, in a position to be engaged by the transferrer 65′. When, however, by the continued movement of the pattern surface 22, the active shuttle is to be changed for another one having a different character of filling, the second indicator on the surface 22 will determine that the preliminary moved filling carrier is to be delayed, by moving the rod 28 and with it the frame 43, with the downwardly extending arm 43′′′′, to one side of the pin 49^a′, which will release the inwardly pressed rod 52, and through the spring 57 and eye 67, move the vertically movable rod 68 out of alinement with the arm 70, so that the filling carrier will not be conveyed to a position under the transferrer 65′, as above described. The movement of the rod 28 and the frame 43 will also move the hook 40′, and arm 70^a into operative position, to coöperate with the now active shuttle having another character of filling, until by the continued movement of the pattern surfaces 22, and 22^a, the shuttle having filling therein the same as the delayed filling carrier, will again become active, and at the same movement of the lay the delayed filling carrier will be conveyed under the transferrer 65′, to be transferred when the shuttle arrives at the magazine end of the loom.

In the transferring of the filling carrier, from the magazine into the active shuttle, by the transferrer 65′, the following operation takes place. The vertically moving plate 53 has a vertically extending opening therein, into which extends the upper end of a vertically moving rod 54, the lower end of said rod 54 is connected with a cam lever 55, which is operated by a cam 56 on the bottom shaft 15, see Fig. 1. When the longitudinally moving pin 52 is moved to the right in Fig. 7, against the action of the helically coiled expansion spring 57, it will extend in the path of the upper end of the rod 54, and the upward movement of said rod will move upwardly the plate 53, against the action of the helically coiled contraction spring 58, see Fig. 7, and allow the spring 59 to operate to move the arm 60 of the transferring mechanism, and allow the hook 61 on said arm to release the dagger 62, to allow the spring 63 to act to move up said dagger into the path of the bunter 64 on the lay, see Fig. 2, in the usual way. The engagement of the bunter 64 with the dagger 62, will move the transferrer arm 65, to cause the transferrer 65′ thereon to be operated to transfer a bobbin 9′ into a shuttle 9, in the usual and well known way. The dagger 62 has in this instance a side plate 62′ thereon and extending up therefrom, and adapted to engage an arm 74′ of a lever 74, which is loosely mounted on a pin on the stand 32. The backward movement of the dagger 62, by its engagement with the bunter 64, causes the extention 62′ on said dagger to engage the lever 74, and move said lever to the left in Fig. 2, and as said lever engages the headed end 34′ of the feeler 34, it causes said feeler 34 to be moved back to its normal position, after the detection of the substantial exhaustion of filling in the active shuttle. Another lever 75, pivoted at its lower end on a stud 76 on the stand 32, see Fig. 2, is in this instance used to engage the head 34′ of the feeler 34, and an arm 75′′ on the hub 75′ of the lever 75, in this instance extends in the path of and is adapted to be engaged by a spring blade 36^a on the lever 36, see Fig. 7, to cause the yielding movement of said lever 75, to move the feeler 34 forward into its normal position, after it has been pushed outwardly by engagement with a full bobbin.

It will be understood that the details of construction of my improvements may be varied if desired.

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

1. In a weft replenishing loom, a magazine with a plurality of compartments for filling carriers, an indicating surface to determine from which compartment of the magazine a filling carrier shall be selected, a filling detector, and means intermediate said indicating surface and the filling detector, to cause a preliminary movement in the conveying of a filling carrier under the transferrer, and means, the operation thereof thereafter determined by a subsequent indication of the pattern surface, to convey said filling carrier under the transferrer.

2. In a weft replenishing loom, a magazine for filling carriers, a transferrer, a filing detector to cause the conveying of a filling carrier, a pattern indicating surface to determine which filling carrier shall be conveyed to a position under the transferrer, and an indicating surface to determine the time of movement of a filling carrier, and an actuator to cause the movement of said filing carrier.

3. In a weft replenishing loom, a magazine for filling carriers, shifting shuttle boxes, an indicating surface to determine the time of movement of said boxes, and an indicating surface and intermediate means

to determine the time of conveying of a filling carrier, both of said surfaces acting in the same period of movement of the lay.

4. In a weft replenishing loom, a magazine for filling carriers, shifting shuttle boxes, and a shifting shuttle box mechanism, filling carrier conveying mechanism, and actuating means for each of said mechanisms, said means operative in like periods of movement of the lay.

5. In a weft replenishing loom, a magazine with a plurality of compartments for filling carriers, an indicating surface to determine the compartment from which the filling carrier shall be discharged, a releasing lever to cause a preliminary movement of said filling carrier, and a filling detector mechanism to operate said releasing lever and means to thereafter convey said filling carrier to a position under the transferrer.

6. In a weft replenishing loom, a magazine with a plurality of compartments for filling carriers, a releasing lever for each compartment, an indicating surface to select the releasing lever to be operated, and means, governed by the filling detector mechanism, to actuate said lever upon the practical or substantial exhaustion of filling in the active shuttle.

7. In a weft replenishing loom, a stationary magazine with a plurality of compartments for filling carriers, a filling detector mechanism, mechanism for each compartment, arranged near said filling detector mechanism, and adapted to release the lowest filling carrier in any of the compartments, said compartments having a transferring position common to all of the compartments, and a transferrer to transfer a released filling carrier from any compartment.

8. In a weft replenishing loom, a magazine with a plurality of compartments for filling carriers, means to suspend or delay the preliminary movement of a filling carrier in any compartment, an indicating surface, and intermediate means to determine the time of movement of said delayed filling carrier.

9. In a weft replenishing loom, a magazine with a plurality of compartments for bobbins or filling carriers, a filling detector mechanism having a movable feeler, and a lever or device to engage said feeler and cause it to be moved outwardly after the detection of substantial exhaustion of filling.

10. In a loom, a magazine with a plurality of compartments for filling carriers, a filling detector mechanism having a movable feeler, and a lever or device adapted to engage said feeler, and means for yieldingly moving said lever, to cause said feeler to be moved forward into its normal position after it has been moved outwardly.

11. In a weft replenishing loom, the combination with a magazine for filling carriers, and means for communicating a preliminary movement to a filling carrier, of means under the control of an indicating surface to determine the time of conveying the filling carrier from its preliminary movement position to its position under the transferrer.

12. In a weft replenishing loom, the combination with a magazine having a plurality of compartments for filling carriers, and means for communicating a preliminary movement to a filling carrier, of a pattern indicating surface, and connections intermediate said surface and the magazine, to cause the selection of a filling carrier of the same character as in the active shuttle, and means to determine as to the immediate conveying of a filling carrier under the transferrer.

13. In a weft replenishing loom, the combination with a magazine having a plurality of compartments for filling carriers, and a filling detecting mechanism under the magazine, of means, upon the substantial exhaustion of filling in the active shuttle, to cause the release of one of the lowest filling carriers having the same character of filling as that in the active shuttle, said means comprising a series of levers having retaining arms, one for each compartment, and an actuating rod to engage one of said levers.

14. In a weft replenishing loom, the combination with a magazine having a plurality of compartments for filling carriers, of a series of supports or levers for said filling carriers, a series of rods to actuate said supports, retaining arms for said rods, and a series of levers by which any one of said supports may be operated.

15. In a weft replenishing loom, the combination with a magazine having a plurality of compartments for filling carriers, of a series of supports for the filling carriers, a series of rods to actuate said supports, a series of levers in front of the magazine having horizontal connections to a series of retaining arms above said rods, and said retaining arms, and a movable rod with its end movable back and forth above said levers, for the purpose stated.

16. In a weft replenishing loom, a magazine for filling carriers, a filling detecting mechanism under the magazine, a movable feeler to enter the shuttle as the lay comes forward and contact with the filling on the filling carrier, and means to withdraw the feeler when the transfer of a filling carrier is about to take place.

17. In a weft replenishing loom, a stationary magazine for filling carriers, a series of levers having retaining arms, a rod having its end movable back and forth over said levers, and an indicating surface to select one of said levers, and means, actuated by the substantial exhaustion of filling in the active shuttle, to move said rod, and to release a filling carrier, and a transferrer, and

means to move it to transfer a filling carrier.

18. In a weft replenishing loom, a stationary magazine having a plurality of compartments for filling carriers, a series of levers having retaining arms, one lever for each compartment, a movable rod, an indicating surface to cause the movement of the end of said rod over any one of said levers, and means to move said rod longitudinally, and actuate one of said retaining arms.

19. In a weft replenishing loom, a magazine having a plurality of compartments for filling carriers, a filling detector under the magazine, intermediate connections to a rod, and said rod moved longitudinally, a series of selecting levers, one for each compartment in the magazine, and an indicating surface to move the end of said rod over a lever for a compartment having filling carriers of the same character as the filling in the active shuttle.

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Witnesses:
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