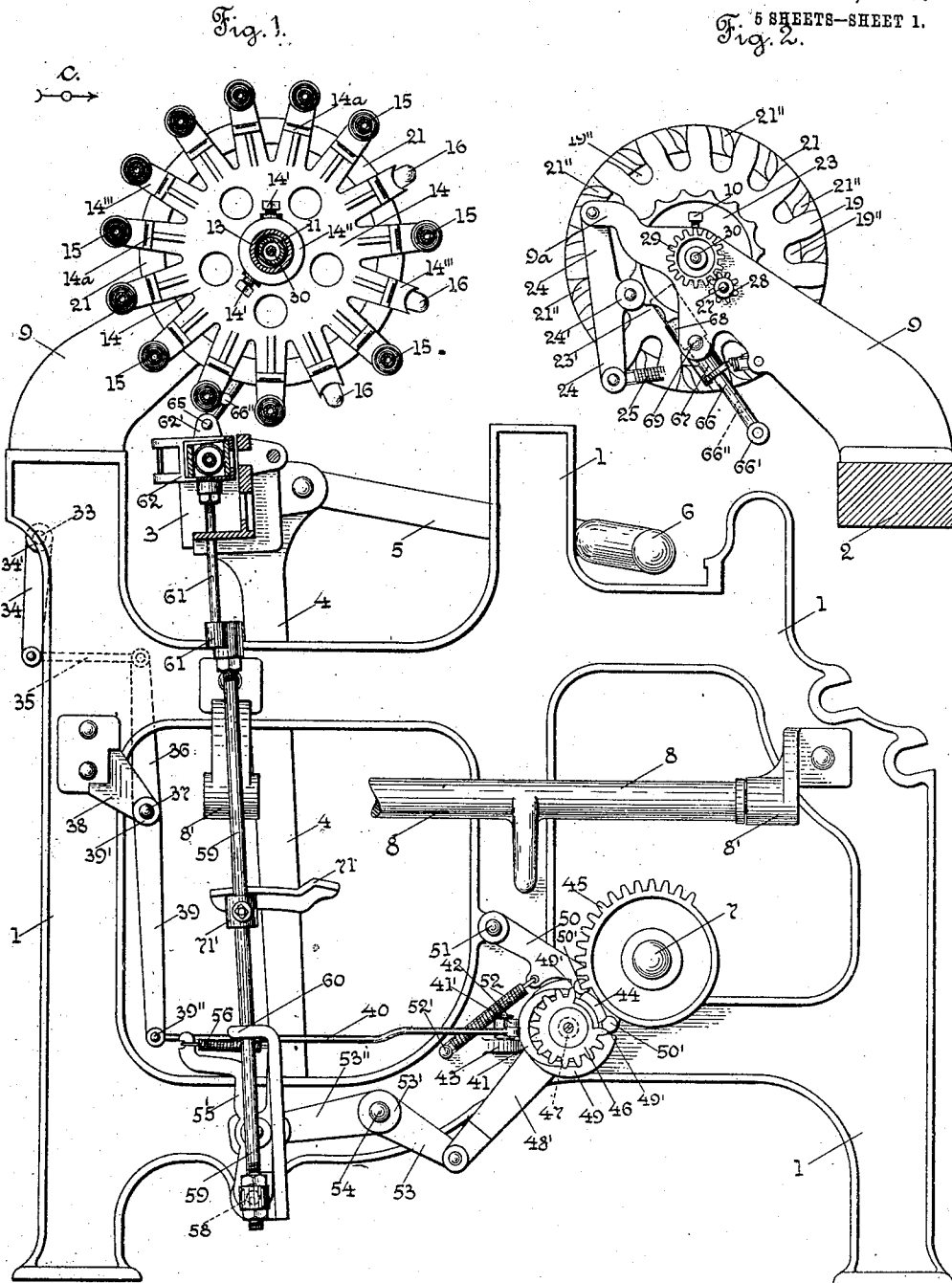


R. CROMPTON.
AUTOMATIC WEFT REPLENISHING LOOM.
APPLICATION FILED NOV. 4, 1907.

935,645.

Patented Oct. 5, 1909.

5 SHEETS—SHEET 1.
Fig. 2.



Witnesses

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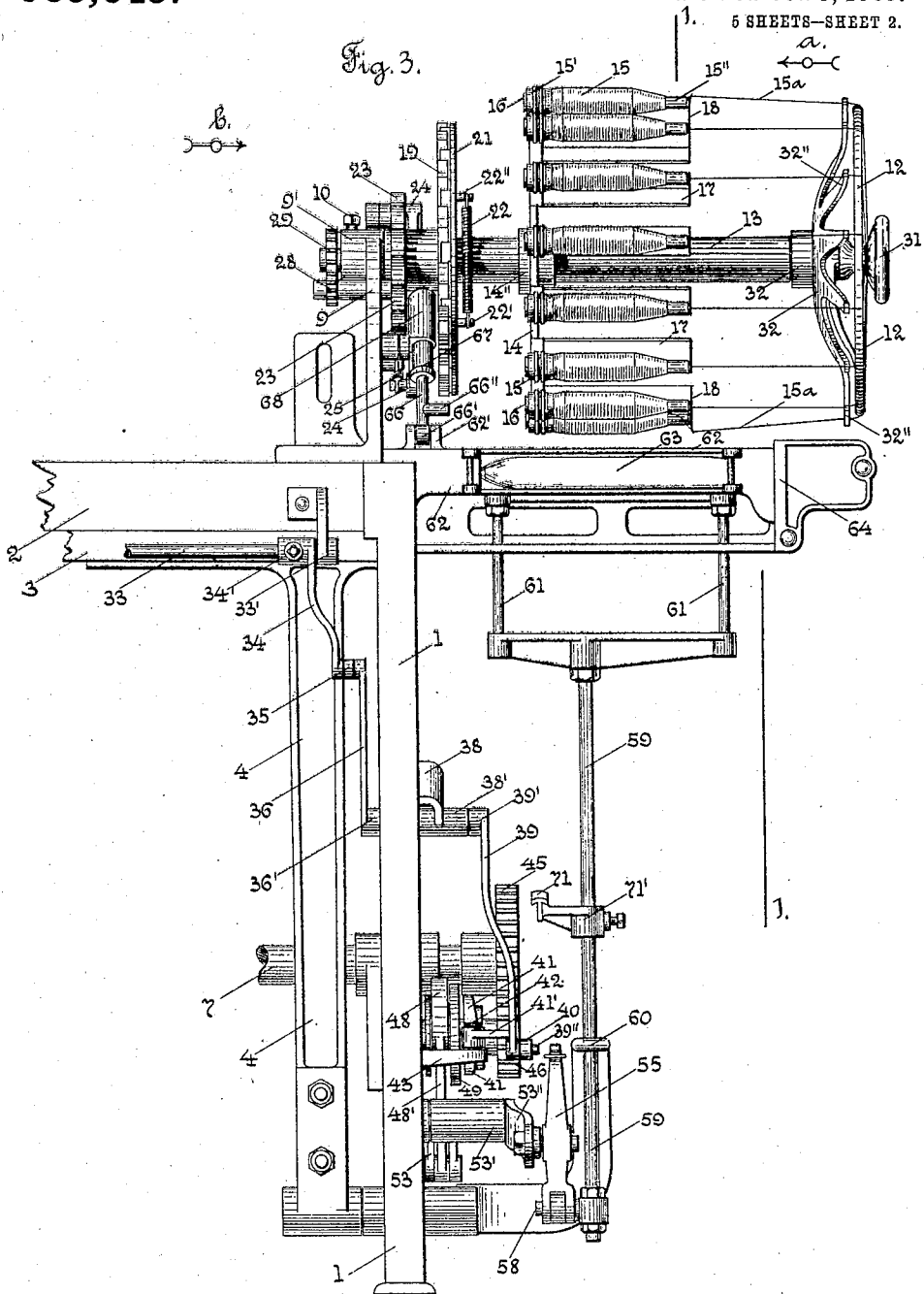
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Witnesses
M. B. Bradt.
W. H. Haas.

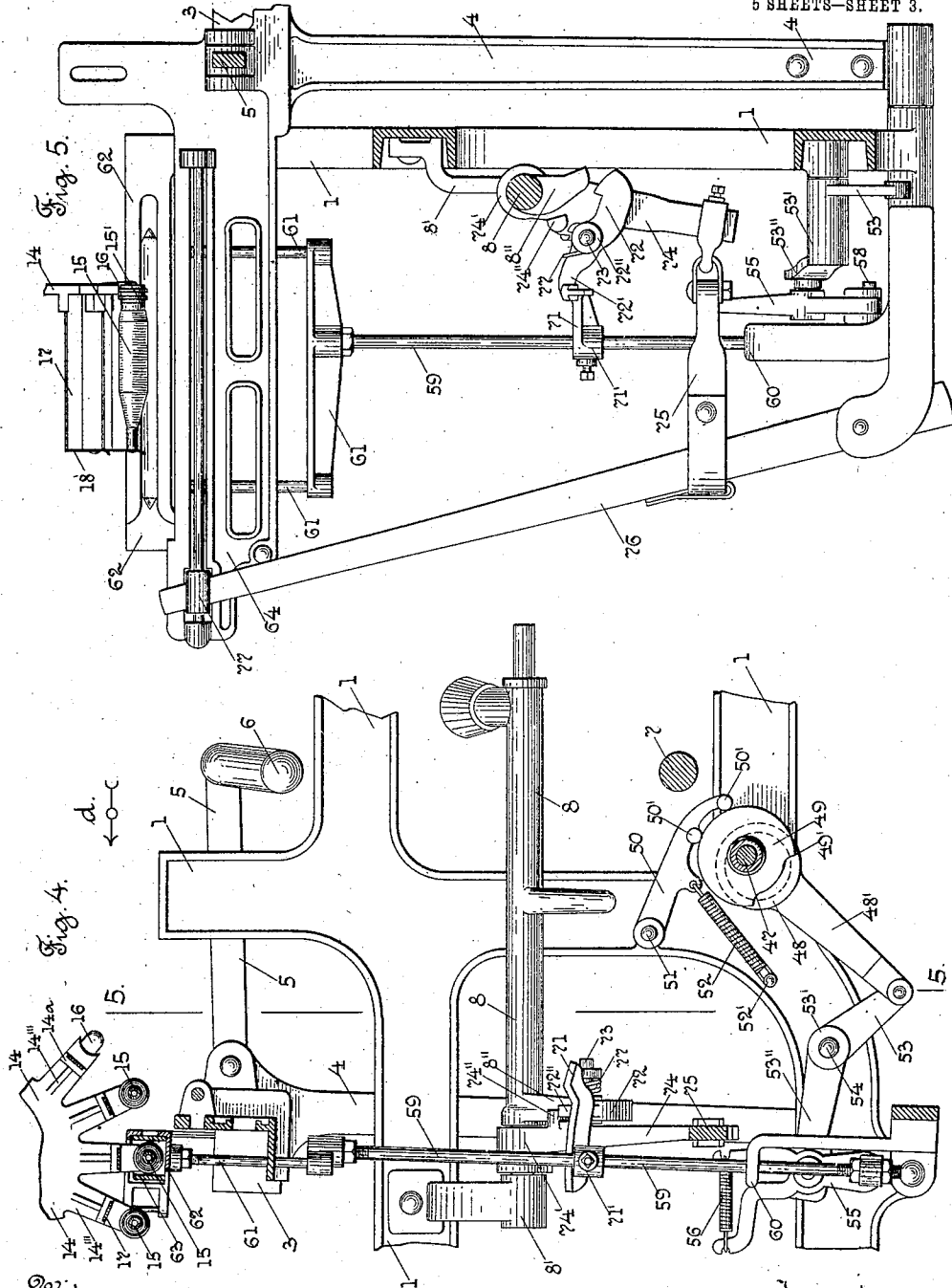
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5 SHEETS—SHEET 3.



Witnesses
 M. Bredt.
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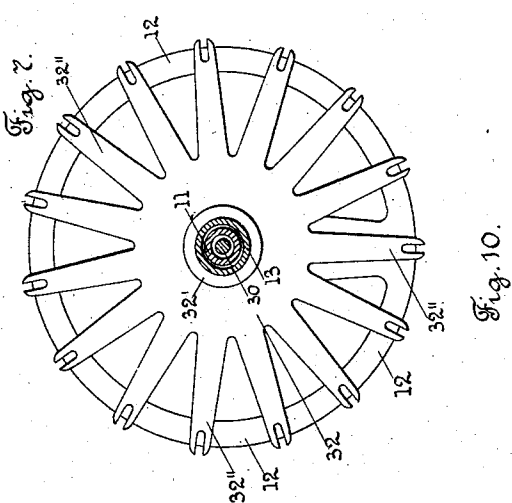
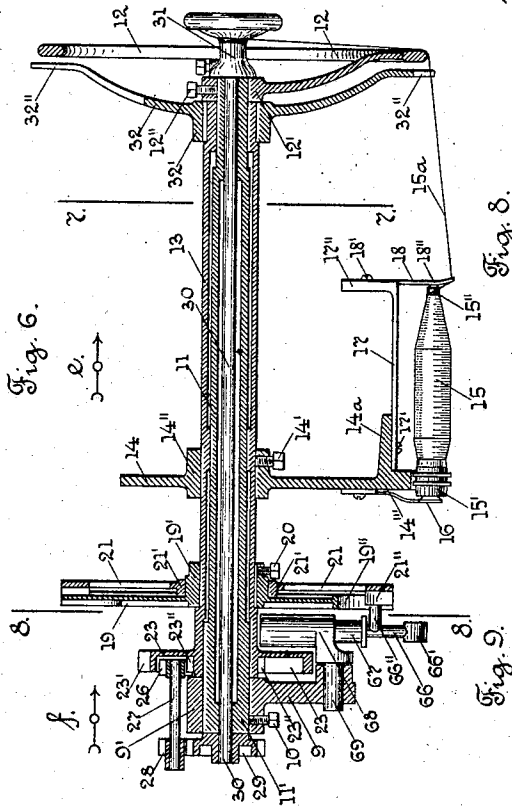
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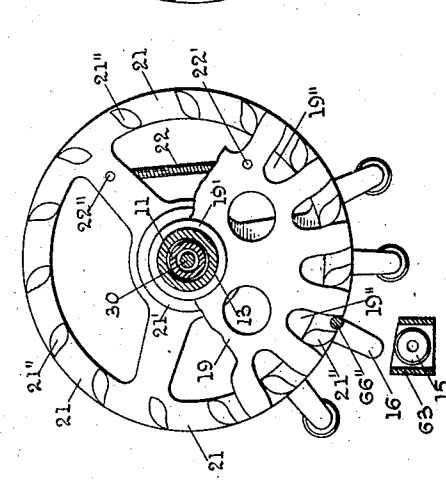
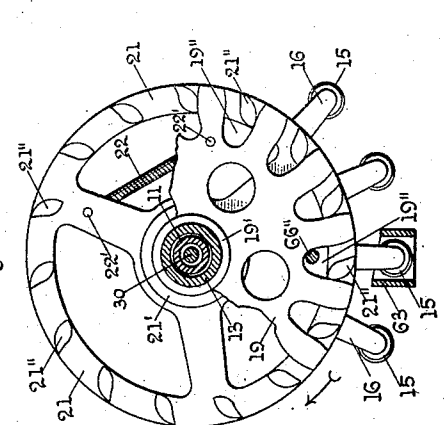
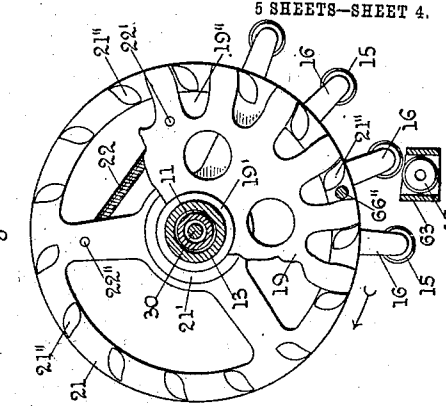
935,645.

Patented Oct. 5, 1909.

5 SHEETS—SHEET 4.



Witnesses
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M. J. Read

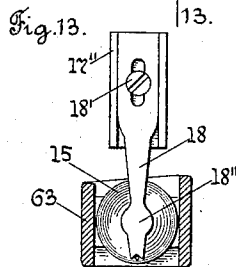
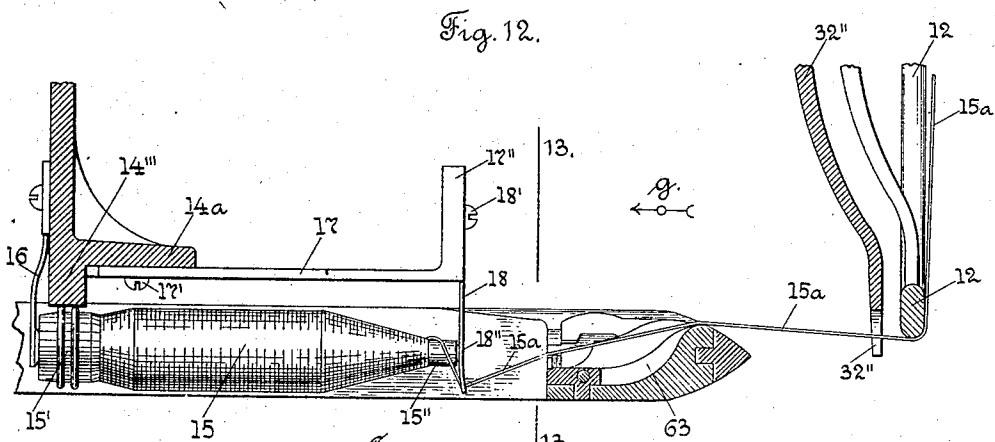
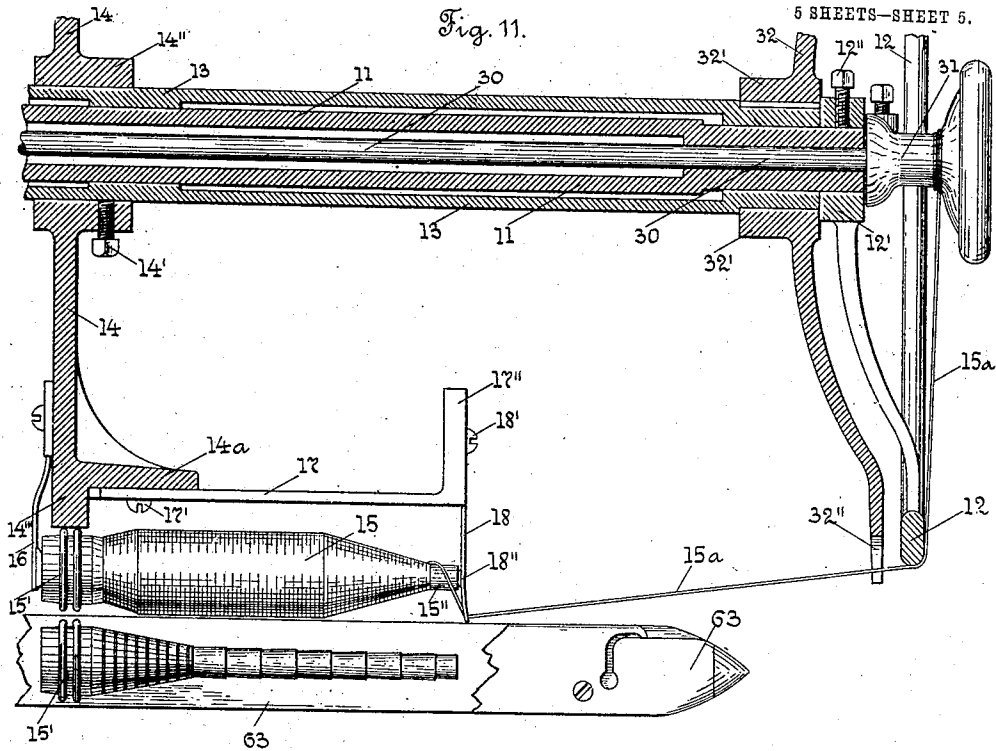


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UNITED STATES PATENT OFFICE.

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

AUTOMATIC WEFT-REPLENISHING LOOM.

935,645.

Specification of Letters Patent.

Patented Oct. 5, 1909.

Application filed November 4, 1907. Serial No. 400,531.

To all whom it may concern:

Be it known that I, RANDOLPH CROMPTON, 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 automatic weft replenishing looms, and particularly to that class of automatic weft replenishing looms which have a single shuttle box or cell at one end of the lay, and a magazine or reservoir at the other end of the lay, to hold bobbins or filling carriers which are automatically supplied to the shuttle at the magazine end of the lay, upon the breaking, or exhaustion of the filling in the shuttle.

The object of my invention is to improve upon the construction of weft replenishing 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.

I have only shown in the drawings detached portions 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 an end view of a loom frame and some parts supported thereon, and also a sectional view, on line 1, 1, Fig. 3, looking in the direction of arrow *a*, same figure, of the magazine and its operating mechanism embodying my improvements. Fig. 2 is a detached inner end view of the magazine and its operating mechanism, looking in the direction of arrow *b*, Fig. 3. Fig. 3 is a front view of the end of the loom shown in Fig. 1, looking in the direction of arrow *c*, same figure, showing the magazine in full. Fig. 4 shows some of the parts shown in Fig. 1, in a different position, and also shows a part of the shuttle picking mechanism combined therewith. Fig. 5 is a section, on line 5, 5, Fig. 4, looking in the direction of arrow *d*, same figure, showing some parts in full lines. Fig. 6 shows, on an enlarged scale, a central longitudinal section, through the magazine and some of the parts connected therewith. Fig. 7 is a section, on line 7, 7, Fig. 6, looking in the direction of arrow *e*, same figure, showing the thread

guide and the stationary thread ring. Fig. 8 shows the star wheel operating mechanism at the rear of the magazine, as a section, on line 8, 8, Fig. 6, looking in the direction of arrow *f*, same figure. Fig. 9 corresponds to Fig. 8, but shows a different position of the star wheel operating mechanism. Fig. 10 corresponds to Fig. 9, but shows another position of the star wheel operating mechanism. Fig. 11 shows, on an enlarged scale, the parts shown at the right in Fig. 6, and also shows a detached portion of a shuttle. Fig. 12 shows the parts shown at the lower part of Fig. 11, with the shuttle moved up to receive the bobbin, and cause the filling on the bobbin to be threaded into the shuttle, and Fig. 13 is a section, on line 13, 13, Fig. 12, looking in the direction of arrow *g*, same figure.

In the accompanying drawings, 1 is a loom side or end frame, 2 is the breast beam, 3 the lay, 4 the lay sword, 5 the connector from the lay to the crank shaft 6; 7 the bottom shaft, and 8 the picking shaft, mounted in bearings 8'. All of the above mentioned parts may be of the usual and well known construction.

I will now describe my improvements.

A stationary stand 9 is attached to the upper side of the breast beam, in this instance at the right hand end of the loom. The stand 9 in connection with the loom arch, not shown, forms a rigid support for the several parts of the rotary filling carrier magazine. The stand 9 has on its upper end a hub or boss 9', see Fig. 3. Within the hub or boss 9' is secured, in this instance by a set screw 10, the inner enlarged end 11' of a stationary sleeve 11, see Fig. 6. The sleeve 11 has secured on its outer reduced end, in this instance by a set screw 12'', the hub 12' of the stationary thread guide ring 12.

Loosely mounted on the stationary sleeve 11, and positioned thereon by the hub or boss 9' and the hub 12', is the sleeve 13 of the rotary magazine. On the rotary sleeve 13 is secured, in this instance by a set screw 14', the hub 14'' of a disk 14, which has a series of radial arms 14''' on its edge, in this instance fifteen in number, each of which at its outer end forms a rest or bearing surface for the head 15' of a bobbin 15. A spring blade 16 is attached near its inner end to each arm 14''', and at its outer end has a lateral

conical shaped projection thereon, to extend into the end of the bobbin head 15'', see Figs. 11, and 12, to yieldingly hold the head of the bobbin in the magazine. On each arm 14 is an outward extension or projection 14^a, see Fig. 6, to which is adjustably secured longitudinally, in this instance by a screw 17', the inner end of an arm 17. The outer end of the arm 17 has an extension 17'' thereon, to which is adjustably secured, in this instance by a screw 18', one end of a spring blade 18, see Fig. 13. The spring blade 18 has a conical shaped projection 18'' thereon to engage the tip 15'' of the bobbin 15. The spring blade 18 has its free end extended beyond the tip of the bobbin, and has a notch therein for engaging the filling 15^a on the bobbin 15, as shown in Fig. 13.

By means of the holding springs 16 and 18, preferably adjustable, the bobbins 15 are yieldingly retained in proper position in the magazine, and are correctly alined for the transfer of the bobbin into the shuttle.

I will now describe the mechanism shown in the drawings for turning or rotating the magazine. Said mechanism consists in this instance of a disk 19 having its hub 19' secured, in this instance by a set screw 20, upon the rotary sleeve 13. The disk 19 has a series of recesses 19'' on its edge, and said disk I term a star wheel. A ring or disk 21 has its hub 21' loosely mounted on the hub 19' of the star wheel 19. The ring 21 has a series of cam shaped projections 21'' thereon corresponding in number to the recesses 19'' in the disk or star wheel 19, and each projection 21'' extends into a recess 19'' and acts as a switch cam. The projections 21'' are yieldingly held at one side of the recesses 19'' in the star wheel 19, in this instance by a contraction spring 22, see Figs. 8, 9, and 10, which is attached at one end to the star wheel 19, by a pin 22', and at its other end to the ring 21 by a pin 22''. On the rotatable sleeve 13, there is, in this instance integral with said sleeve, a disk 23, having its periphery recessed or notched, and forming one member of a locking mechanism. The recesses or notches 23' are adapted to receive a roll 24' carried on a lever 24, which is pivoted at one end on an extension 9^a at the end of the stand 9, see Fig. 2. The other end of the lever 24 has one end of a contraction spring 25 attached thereto; the other end of said spring is attached to the stand 9. The spring 25 acts to yieldingly hold the roll 24' on the lever 24 in contact with the stop wheel or disk 23. The disk 23 has in this instance internal teeth 23'' thereon, see Fig. 6, which mesh with and drive a pinion 26 fast on one end of a shaft 27, said shaft having a bearing on the stand 9. On the other end of said shaft 27 is a pinion 28, which meshes with and drives a gear 29 fast on the inner end of a shaft 30, see Figs.

2, and 6. The shaft 30 extends through the tubular sleeve 11, and has fast on its outer end, in this instance a knob or handle 31 around which the filling may be wound. The rotary sleeve 13 has mounted on its outer end and fast thereon, the hub 32' of the thread guide 32, see Figs. 3, and 7. Said thread guide 32 consists of a disk, having in this instance fifteen radial arms 32'', corresponding to the number of filling carriers in the magazine; said arms have their outer ends recessed to receive the filling leading from the filling carriers. When the magazine revolves, the thread guide 32 and knob or handle 31 revolve in the same direction, and the filling threads slide over the stationary thread ring 12.

I will now describe the mechanism for raising the shuttle box carrying the shuttle, to receive a new bobbin from the magazine, and also describe the operation of the magazine to transfer a bobbin, after the filling breaks, or is exhausted.

The usual filling fork, not shown, indicates the breaking, or exhaustion of the filling, and a shaft 33, see Figs. 1, and 3, mounted at the front of the breast beam in suitable bearings 33', has a partial rotary motion communicated thereto, and moves or rocks a lever 34, having a hub 34' on one end, secured on said shaft 33, see Fig. 3. The other end of the lever 34 is connected by a link 35, shown by broken lines Fig. 1, with the upper end of a lever 36 having a hub 36' fast on a short shaft 37, having a bearing 38' on a stand 38 secured to the loom frame, see Fig. 3. Also fast on the shaft 37 is the hub 39' on one end of a lever 39; the other end of the lever 39 carries a pin 39'', on which is pivotally mounted one end of a connector 40. The other end of the connector 40 is connected with an extension 41' on a yoke shape lever 41, which is pivotally mounted on a stud 42 on an arm 43. The yoke shape lever 41 is adapted to move a sliding starting tooth 44, in or out of mesh with a mutilated gear 45, fast on the bottom shaft 7, to cause the rotation of the mutilated pinion 46.

The mutilated pinion 46 is loosely mounted on a stud 47, and is connected with an eccentric 48, see Fig. 4, to turn said eccentric. Also connected with said pinion 46 is a disk 49 having a recessed portion 49' on its periphery, into which is adapted to extend the two rounded portions 50', in this instance at one end of a lever 50. The other end of the lever 50 is pivotally mounted on a pin 51 on the loom frame 1. A contraction spring 52 is attached at one end to the lever 50, and at its other end to a pin 52' on the frame 1, and acts to yieldingly hold the rounded portions 50' on the lever 50 in the recessed portion 49' on the disk 49, to lock the eccentric 48 in its inoperative position, shown in Fig. 1.

The eccentric 48 has an arm 48' thereon, which is pivotally connected with one arm of a lever 53, which has its hub 53' loosely mounted on a stud 54 on the frame 1, see Fig. 5. The other arm 53'' of the lever 53 is pivotally connected with a give-way device 55, which may be of any ordinary construction and operation, and in this instance consists of two clamp arms or jaws yieldingly held in engagement, by a contraction spring 56, with a stud 57 on the arm 53'' of the lever 53. The clamp arms are pivotally mounted at their lower end on a stud 58 secured to the lower end of the box lifter rod 59, see Fig. 3. The box lifter rod 59 has a bearing in a stand 60, connected with the pivotal shaft of the lay sword in the usual way.

The upper end of the box lifter rod 59 carries a yoke shaped frame 61, which carries at its upper end a shuttle box or cell 62, to contain a shuttle 63. The shuttle box 62 has a vertical movement and is provided with projections which extend into guide ways at the ends of the shuttle box guide frame 64, see Fig. 3. The shuttle 63 has a vertical opening therethrough in the usual way, so that the spent bobbin 15, see Fig. 11, will pass through the shuttle, when a fresh bobbin is inserted to take its place, by the raising of the shuttle box.

The shuttle box 62 has upon its inner end two ears 62', see Fig. 3, carrying a pin 65 on which is pivotally mounted a boss 66' on the lower end of a rod 66. The upper end of the rod 66 extends into a sleeve 67, and the sleeve 67 extends into a sleeve 68, which is pivotally mounted on a stud 69, on the stand 9, see Fig. 2. The rod 66 has a side pin 66'' thereon, see Fig. 3.

When the shuttle box 62 is raised with the rod 59, the rod 66 is raised, and with it the side pin 66'' thereon, and said pin enters one recess 19'' on the star wheel 19, see Fig. 8, and the continued raising of said pin 66'', through the engagement thereof with the side of the recess 19'' on the star wheel 19, turns said star wheel and with it the ring 21, a predetermined distance, and also turns the magazine backward, to conform with the backward movement of the lay, and maintain the bobbin in the magazine in position over the shuttle-box as the lay moves back. At the same time the shuttle box is raised to its upper position, shown in Figs. 4, and 9, and the exhausted bobbin in the shuttle will be engaged by a full bobbin in the magazine, and will be ejected through the lower part of the shuttle, and at the same time the filling 15 will be carried down into the shuttle, by the engagement of the lower grooved end of the spring blade 17 with the filling, and will cause the filling to be properly threaded into the eye of the shuttle before the shuttle is picked, through the ordinary self-thread-

ing means 70 in the shuttle, see Fig. 12. The continued movement of the lay detaches the bobbin 15 from the magazine, and the movement of the shuttle box 62 with the filled bobbin therein, through the continued rotation of the eccentric 48 and connections to the lifter rod 59 and to the rod 66, causes the pin 66'' to move in the recess 19'' in the star wheel 19, and to pass up over the switch cam 21'', see Fig. 9, and down the other side of said cam, see Fig. 10, giving an additional movement to the magazine to bring the next bobbin into proper position, and then pass out of the recess 19'', and allow the spring 22 to act to return the ring 21 with the switch cams 21'' thereon to its normal position shown in Fig. 8; and the shuttle box 62, with the shuttle containing the new bobbin is lowered to its normal position, preparatory to being picked across the lay.

During the time the bobbin is being changed, it is necessary for the picking motion to stop. In this instance I stop the picking motion through the mechanism shown in the drawings, and which consists of a cam-shaped finger 71, having a hub 71' adjustably secured on the box lifter rod 59, see Figs. 4 and 5. The cam-shaped finger 71, as the box lifter rod 59 swings with the lay, is adapted to engage an extension 72', see Fig. 4 on the hook-shaped arm 72, which has a hub 72'' mounted on a stud 73 on the picking arm 74, the hub 74' of which is loosely mounted on the picking shaft 8. The picking arm 74 is connected, through a link or connector 75, with the picking stick 76 carrying the picker 77, in the usual way.

On the picking shaft 8 is fast a downward extension 8'', which is adapted to extend into the path of and be engaged by the hooked arm 72, to cause the picking arm 74 to move with the picking shaft 8, and be disengaged, by the engagement of the cam 71 with the extension 72' on the hook arm 72, from the arm 8'' on the picking shaft 8, to leave the picking arm 74 at rest. A coiled contraction spring 77 encircles the pin 73, and acts to normally hold the hook arm 72 in engagement with the arm 8''. A stop or projection 74' on the picking arm 74 limits the pivotal movement of the picking arm 74 on the shaft 8.

From the above description in connection with the drawings, the operation of my improvements will be readily understood by those skilled in the art and briefly is as follows:—In the normal operation of the loom the rotary magazine will remain stationary, but on the breaking, or exhaustion of the filling on the bobbin in the shuttle, the rocking of the shaft 33, through connections to the movable tooth 44 and mutilated pinion 46, will move said tooth into the path of the mutilated gear 45 and cause the rotation of

the mutilated pinion 46 and the eccentric 48 connected therewith, to cause, through intermediate connections, the raising of the shuttle box rod 59 and the shuttle box 62. 5 The raising of the shuttle box 62, through the engagement of the side pin 66" on the rod 66, with a recess 19" in the star wheel 19, will cause a partial rotary movement of said star wheel as the lay moves backward, 10 shown by arrows in Figs. 8 and 9, and a consequent partial rotary movement of the magazine, to cause the filled bobbin therein to maintain its position over the shuttle box as the lay moves backward. The continued 15 raising of the shuttle box will cause the entrance of the filled bobbin into the shuttle box and the ejection of the spent bobbin, and at the same time will cause the actuating pin 66" to pass up over the switch cam 21" 20 on the ring 21, into the recess 19" in the star wheel 19, and then pass down the other side of said cam 21" to give an additional movement to the magazine and bring the next bobbin into proper position, and then pass 25 out of the recess, and allow the contraction spring 22 to act to move the ring 21, and bring the cam 21" against the opposite side of the recess in the star wheel 19, see Fig. 8. The raising of the box lifter rod 59, through 30 the engagement of the cam surface 71 with the extension 72' on the hook arm 72, will disengage said arm 72 from the extension 8" on the picking shaft 8, and leaves the picking arm 74 at rest, until the box lifter 35 rod 59 and the shuttle box move down to their normal position, and allow the spring 76 to act, to cause the hook arm 72 to engage the extension 8" on the picking shaft 8, and allow the picking motion to be operated in 40 the usual way.

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

Having thus described my invention, what 45 I claim as new and desire to secure by Letters Patent is:—

1. In a weft replenishing loom, the combination with a rotary magazine carrying bobbins, of a vertically moving shuttle box 50 extending under said magazine, and carrying a shuttle having an opening therethrough, and means for raising said shuttle box, and means for rotating said magazine, to cause a bobbin in the magazine to engage 55 the bobbin in the shuttle and take the place of the bobbin in the shuttle.

2. In a weft replenishing loom, the combination with a rotary magazine carrying bobbins, of a vertically moving shuttle box 60 extending under said magazine, and carrying a shuttle having an opening therethrough, and means for raising said shuttle box, and means for rotating said magazine, to cause a bobbin in the magazine to engage 65 the bobbin in the shuttle and take the place

of the bobbin in the shuttle, and means for stopping the picking motion during the exchange of bobbins.

3. In a weft replenishing loom, the combination with a rotary magazine carrying 70 bobbins, and movable devices for connecting the head and tip of the bobbin with the magazine, the movable device for connecting the tip of the bobbin with the magazine having an extension thereon with a notch for 75 engaging the filling from the bobbin, to cause the filling to be carried into the shuttle which is raised to receive a bobbin, and be threaded in the threading device in the shuttle before the shuttle is picked. 80

4. In a weft replenishing loom, the combination with a rotary magazine, of means for removably connecting the bobbins to the magazine, said means comprising a spring 85 blade at the head, and a spring blade at the tip of the bobbin, the spring blade at the tip of the bobbin extending beyond the tip and having a notch for engaging the filling from the bobbin, to carry the filling down into the shuttle, which is raised to receive a bobbin, 90 and to cause the threading of the filling into the shuttle before the shuttle is picked.

5. In a weft replenishing loom, the combination with a rotary magazine, of adjustable means for removably connecting the 95 bobbins to the magazine, said means comprising a spring blade at the head, and a spring blade at the tip of the bobbin, the spring blade at the tip of the bobbin extending beyond the tip and having a notch there- 100 in for engaging the filling from the bobbin, to carry the filling down into the shuttle which is raised to receive the bobbin, and to cause the threading of the filling into the shuttle before the shuttle is picked. 105

6. In a weft replenishing loom, the combination with a rotary magazine, and a series of bobbins removably connected to said magazine at their heads and tips, of a vertically 110 moving shuttle box, carrying a shuttle having an opening therethrough, and means for raising the shuttle box on the backward movement of the lay, and means for communicating a backward movement to the magazine, to cause a bobbin in the magazine to 115 enter the shuttle and displace the bobbin in the shuttle.

7. In a weft replenishing loom, the combination with a rotary magazine, and a series 120 of bobbins removably connected to said magazine at their heads and tips, of a vertically moving shuttle box, carrying a shuttle having an opening therethrough, and means for raising the shuttle box on the backward 125 movement of the lay, and means for communicating a backward movement to the magazine, to cause a bobbin in the magazine to enter the shuttle and displace the bobbin in the shuttle, and connections intermediate 130 the shuttle box rod and the picking motion,

to disconnect the picking motion during the upward movement of the shuttle box, and stop the picking motion during the exchange of bobbins.

8. In a weft replenishing loom, the combination with a rotary magazine, and bobbins removably supported thereon, of a vertically moving shuttle box rod, and shuttle box, connections intermediate said shuttle box and the magazine, to rotate the magazine on the backward movement of the lay, and means for raising the shuttle box on the breaking or exhaustion of filling, the operation of said means controlled by the rotary motion of a shaft, and said shaft and connections from said shaft to a mutilated gear and mutilated pinion drive mechanism, and connections from said drive mechanism to the vertically moving shuttle box rod.

9. In a weft replenishing loom, the combination with a rotary magazine, and bobbins removably supported thereon, of a vertically moving shuttle box rod, and shuttle box, and connections intermediate said shuttle box and the magazine, to rotate the magazine on the backward movement of the lay, and means for raising the shuttle box on the breaking or exhaustion of filling, the operation of said means controlled by the rotary motion of a shaft, and said shaft and connections from said shaft to a mutilated gear and mutilated pinion drive mechanism, and connections from said drive mechanism to the vertically moving box rod, and connections from said vertically moving box rod to the picking motion, to stop the picking motion during the raising of the shuttle box.

10. In a loom, a lay, a shuttle box mounted on the lay, a magazine for filling carriers, adjacent to said shuttle box, an actuator operating to rotate said magazine simultaneously with the backward and forward movement of the lay, to place a filling carrier in position to be transferred into the shuttle in said shuttle box, when the latter is in its elevated position, and also bring a fresh filling carrier into operable position simultaneously with the lowering of the shuttle box into its normal position.

11. In a weft replenishing loom, in combination, a stationary stand having a hub or boss thereon, a stationary sleeve secured at its inner end in said boss, and carrying at its outer end a thread guide ring, and said thread guide ring, a rotary sleeve mounted on said first-mentioned sleeve, a disk secured on said rotary sleeve and having radial arms, each of which forms a rest or bearing for the head of a bobbin, and each of said radial arms carrying an arm extending at right angles, and said arm and radial arm each carrying a spring blade or device for holding the head and tip of the bobbin, respectively, and the spring blade at the tip end of the bobbin having its end extended be-

yond the bobbin, and having a notch therein for engaging the filling from the bobbin, a second disk fast on said rotary sleeve and having a series of recesses on its edge, said disk forming a star wheel, a ring loosely mounted on the hub of said star wheel, said ring having a series of cam-shaped projections thereon, each projection extending into a recess in said star wheel to act as a switch cam, means for movably holding said switch cams at one side of the recesses in the star wheel, locking mechanism for holding said rotatable sleeve after each partial rotation thereof, of a shaft loosely mounted in said stationary sleeve, connections intermediate said rotary sleeve and said shaft, to rotate said shaft with said sleeve, a filling thread guide mounted on said rotary sleeve to rotate therewith, and provided with notches to receive the filling from the bobbins in the magazine, and means for communicating a backward rotary movement to said star wheel, and to the rotary sleeve, and to the magazine, said means connected with the shuttle box, and operated by the vertical movement of said box.

12. In a weft replenishing loom, in combination, a stationary stand having a hub or boss thereon, a stationary sleeve secured at its inner end in said boss, and carrying at its outer end a thread guide ring, and said thread guide ring, a rotary sleeve mounted on said first-mentioned sleeve, a disk secured on said rotary sleeve and having radial arms, each of which forms a rest or bearing for the head of a bobbin, and each of said radial arms carrying an arm extending at right angles, and said arm and the radial arm each carrying a spring blade or device for holding the head and tip of the bobbin, respectively, and the spring blade at the tip end of the bobbin having its end extended beyond the bobbin and a notch therein for engaging the filling from the bobbin, and said spring blade being adjustable, a second disk fast upon said rotary sleeve and having a series of recesses on its edge, said disk forming a star wheel, a ring loosely mounted on the hub of said star wheel, said ring having a series of cam-shaped projections thereon, each projection extending into a recess in said star wheel to act as a switch cam, means for movably holding said switch cams at one side of the recesses in the star wheel, locking mechanism for holding said rotatable sleeve after each partial rotation thereof, a shaft loosely mounted in said stationary sleeve, connections intermediate said rotary sleeve and said shaft, to rotate said shaft with said sleeve, a filling thread guide mounted on said rotary sleeve to rotate therewith, and provided with notches to receive the filling from the bobbins in the magazine, and means for communicating a backward rotary movement to said star

wheel, and to the rotary sleeve, and to the magazine, said means connected with the shuttle box, and operated by the vertical movement of said box:

- 5 13. In a weft replenishing loom, in combination, a stationary stand having a hub or boss thereon, a stationary sleeve secured at its inner end in said boss, and carrying at its outer end a thread guide ring, and said
10 thread guide ring, a rotary sleeve mounted on said first-mentioned sleeve, a disk secured on said rotary sleeve and having radial arms, each of which forms a rest or bearing for the head of a bobbin, and each of said radial
15 arms carrying an arm extending at right angles, and said arm and the radial arm, each carrying a spring blade or device for holding the head and tip of the bobbin, respectively, and the spring blade at the tip
20 end of the bobbin having its end extended beyond the bobbin and having a notch therein for engaging the filling from the bobbin, a second disk fast on said rotary sleeve and having a series of recesses on its edge, said
25 disk forming a star wheel, a ring loosely mounted on the hub of said star wheel, said ring having a series of cam-shaped projections thereon, each projection extending into

a recess in said star wheel to act as a switch cam, means for movably holding said switch
30 cams at one side of the recesses in the star wheel, locking mechanism for holding said rotatable sleeve after each partial rotation thereof, a shaft loosely mounted on said stationary sleeve, connections intermediate said
35 rotary sleeve and said shaft, to rotate said shaft with said sleeve, a filling thread guide mounted on said rotary sleeve to rotate therewith, and provided with notches to receive the filling from the bobbins in the
40 magazine, and means for communicating a backward rotary movement to said star wheel, and to the rotary sleeve, and to the magazine, said means connected with the
45 shuttle box and operated by the vertical movement of said box, and comprising a vertically moving rod having a side pin thereon to enter a recess in the star wheel, and engage one side of said recess and pass into
50 said recess on one side of the switch cam extending into said recess, and out of said recess on the other side of said cam.

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Witnesses:

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