M. L. STONE.

AUTOMATIC FILLING REPLENISHING LOOM.

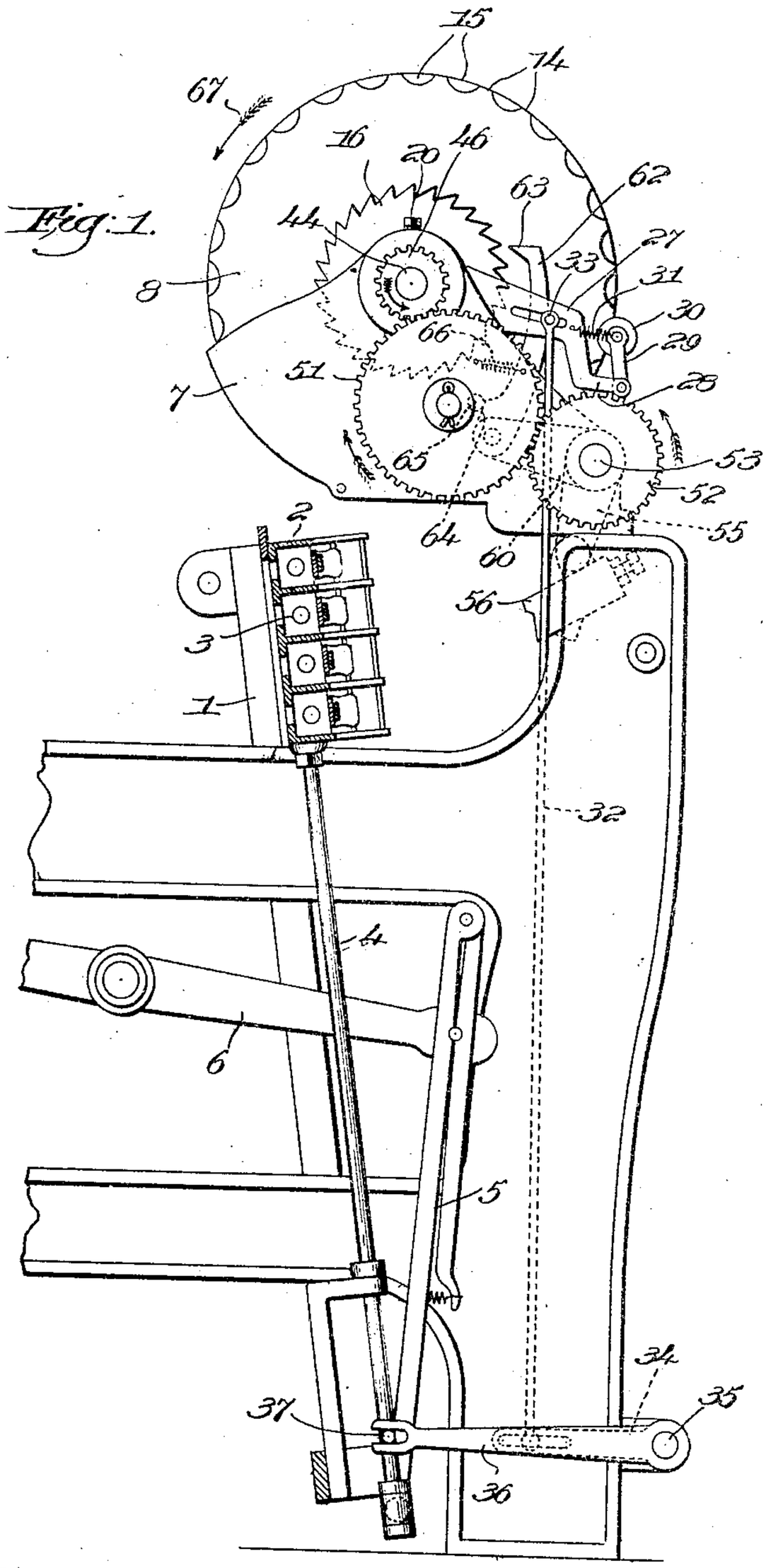
APPLICATION FILED MAR. 13, 1908.

912,435.

Patented Feb. 16, 1909.

3 SHEETS—SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

Fig: 2.

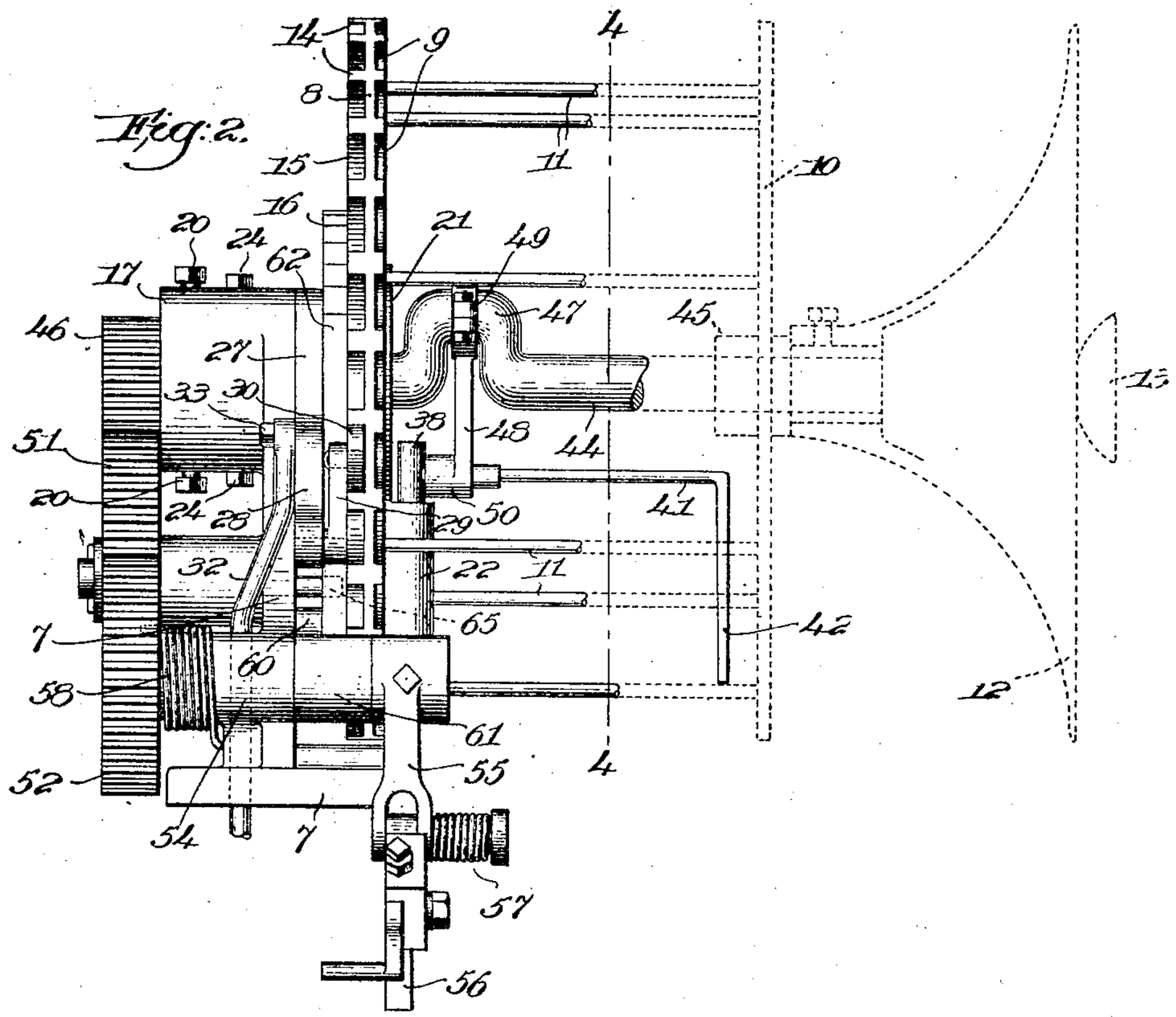
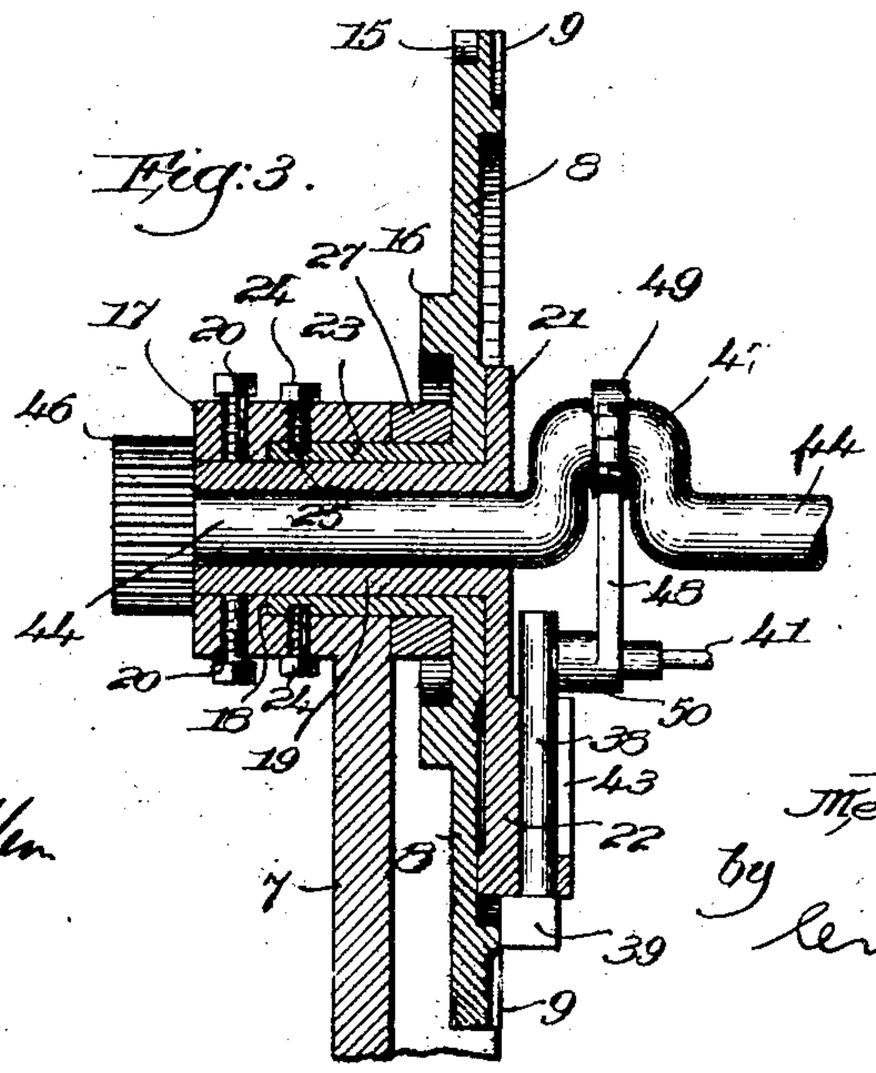


Fig: 3.



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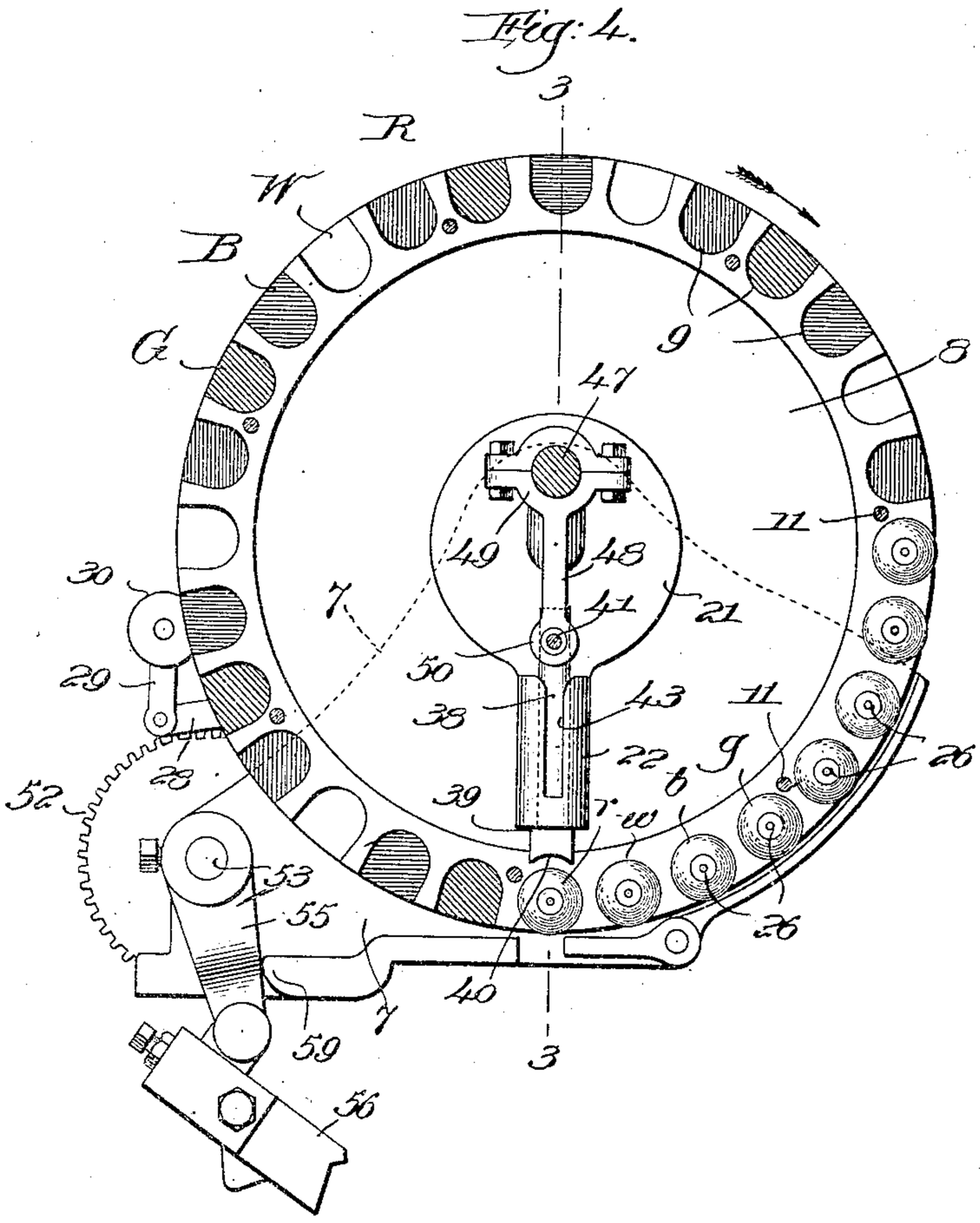
3 SHEETS—SHEET 3.

Fig: 4.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC FILLING-REPLENISHING LOOM.

No. 912,435. Specification of Letters Patent. Patented Feb. 16, 1909.

Application filed March 13, 1908. Serial No. 420,773.

To all whom it may concern:

Be it known that I, MELVIN L. STONE, a citizen of the United States, and a resident of Lewiston, in the county of Androscoggin and State of Maine, have invented an Improvement in Automatic Filling-Replenishing Looms, of which the following, in connection with the accompanying drawing, is a specification, like letters and numerals on the drawing representing like parts.

This invention relates more particularly to automatic filling-replenishing looms of the type wherein a series of drop or shifting shuttle-boxes are located on the lay at the end opposite that at which filling replenishment is effected, and the replenishing mechanism includes a filling-feeder in which are arranged filling-carriers or bobbins the yarn thereon differing in color or character. Such a loom is shown in United States Patent No. 600,053 granted March 1, 1898 to Wyman & Crompton, the construction being such that a bobbin having yarn of the particular character or color required to be supplied to the then running shuttle will be transferred automatically from the feeder when such shuttle is in the single shuttle-box at the replenishing end of the lay. The filling-carriers are arranged in groups in the feeder or hopper, according to a predetermined sequence as to their characteristics, corresponding to the sequence of the shuttles in the shifting shuttle-boxes, and by connections with the box-motion the feeder is arranged to move in synchronism with the shifting boxes, so that the filling-carrier of a group in transferring position will have filling of a character or color corresponding to that in the running shuttle. By this arrangement the running shuttle will be supplied with similar filling whenever the running filling requires replenishment. If, for instance, each group of filling-carriers in the feeder contains a regular sequence of red, white and blue yarn, the red filling-carrier of a group will be positioned for transfer while the shuttle containing red filling is in action, a blue filling-carrier will be positioned when the running filling is blue, and so on.

In my present invention I have provided means for controlling the movement of the feeder from the box motion in order to properly position the filling carrier next to be transferred and I have so constructed the feeder that the arrangement of the filling-carriers in proper groups is facilitated.

The transferring mechanism contains various novel features of construction and operation, the transferrer being so constructed and located that the entire feeder may be filled with bobbins, while the transferrer is wholly contained within the feeder itself.

I have provided novel means for controlling the movement of the feeder by or through the box motion, so that the proper filling-carrier of a group is positioned for transfer according to the particular shuttle of the set which is in use, or active. The advance of the feeder after each transfer is governed by or through the transferring means, and entirely independent of the means governed by the box motion, so that the advance movement will bring the corresponding filling-carrier of the next group into transferring position, and such position will be maintained unless changed by a shift of the drop or shifting shuttle-boxes.

The various novel features of my invention will be fully described in the subjoined specification and particularly pointed out in the following claims.

Figure 1 is a side elevation of a sufficient portion of a loom, with one embodiment of my invention applied thereto, the drop or shifting shuttle-boxes at the nearer side of the loom being shown in section. Fig. 2 is an enlarged front elevation of the novel portion of the filling replenishing mechanism, the outer member of the feeder and the filling-end holder being shown in dotted lines. Fig. 3 is a vertical section through the axis of the feeder, on the line 3—3, Fig. 4. Fig. 4 is a cross section on the line 4—4, Fig. 2, looking toward the left.

Referring to Fig. 1, the lay 1 has mounted thereon at one end drop or shifting shuttle-boxes 2, shown as having four cells each adapted to contain a shuttle 3, of the automatically self-threading type, the shuttle-boxes being mounted on a lifter-rod 4, of usual construction, operatively connected by a link member 5 with the vibrator 6 forming a part of the box motion, all of which parts are of well known construction and operate in usual manner.

In practice the box-motion is controlled by a pattern mechanism, as in the patent hereinbefore referred to, so that any one of

the series of shuttles is operatively positioned to lay filling.

At the opposite side of the loom the filling-replenishing mechanism is mounted to automatically effect a change of filling in the running shuttle when the latter is in the single shuttle-box at the adjacent end of the lay. In the present embodiment of my invention said replenishing mechanism is mounted on a stand 7 fixedly mounted on the loom frame and extended rearwardly therefrom above and near the path of the lay, said mechanism comprising essentially a feeder for the filling-carriers and a transferrer to transfer such filling-carriers one by one to the shuttle. I have herein shown the feeder as a cake-like structure comprising a circular disk or plate 8 having supports for the butts of the filling-carriers, as for instance peripheral pockets 9 open at their outer ends and arranged in a circle concentric with the axis of the feeder, and a tip-supporting plate 10, Fig. 2, shown in dotted lines and connected fixedly with the disk 8 by parallel rods or bars 11, the structure of the disk 10 being of any suitable character to sustain the tips of the filling-carriers, as in the previously-mentioned patent. A bell-shaped guide 12 and a holding-stud 13, see dotted lines Fig. 2, are mounted on the disk 10 to rotate therewith, the filling-ends led over the edge of the guide 12 and thence to the stud 13, around which they are wound in usual manner. The pockets 9 are in the outer face of the disk 8, within the feeder, and the opposite inner face is provided adjacent its edge with a series of teeth 14 and intervening concave spaces 15, constituting a species of escapement-ratchet, for a purpose to be described. A plain toothed ratchet 16 is secured to or formed on the inner face of the disk 8, concentric with its axis but of much less radius than the escapement-ratchet, as shown in Fig. 1, to coöperate with the feed pawl which effects advance movement of the feeder after transfer of a filling-carrier.

The stand 7 has an inwardly extended hub 17 internally shouldered at 18, Fig. 3, and a heavy sleeve 19 is extended through the hub and fixedly held therein, as by set-screws 20, the outer end of the sleeve having an enlarged, circular and flat head 21, a tubular guide 22 extending downward radially from the bottom of the head. Upon the sleeve is rotatably mounted the elongated hub 23 of the disk 8, said hub and the disk being interposed between the sleeve head 21 and the internal shoulder 18, as shown clearly in Fig. 3, to prevent endwise movement of the hub. As an additional positioning device screw-studs 24 in the hub of the stand 7 enter an annular groove 25 in the disk hub 23, permitting it to rotate but preventing endwise movement.

The angular movement of the feeder will bring one filling-carrier after another immediately below the guide 22 into position to be transferred, as shown in Fig. 4, where some of the filling-carriers 26 are shown, it being understood that a complete circle of filling-carriers can be used. In my present invention said filling-carriers are adapted to be arranged in a plurality of groups, the number in each group corresponding to the number of shuttles used, and the filling thereon differing in characteristics, that is, in color or character. Supposing four shuttles are being used, carrying respectively red, white, blue and green filling, counting downward from the topmost shuttle 3 of the set, Fig. 1, then each group of filling-carriers will be arranged in the same recurring sequence, red, white, blue and green, referring to the yarn carried on each, and indicated in Fig. 4, *r*, *w*, *b* and *g*.

In order that the filling of the running shuttle may be replenished by a filling-carrier having filling of the same color it is necessary to so control the movement of the feeder that it will be synchronous with the shifting movement of the shuttle-boxes 2. That is, if the running filling is red then the feeder must operatively position for transfer the filling-carrier in the active group which has red filling, and if the shuttle-boxes shift to render active the shuttle carrying green filling, say, then the feeder must move to position the green filling-carrier of the active group. I will now describe the means for intermittingly moving the feeder synchronously with the movement of the shifting shuttle-boxes. A pawl-carrier 27 is mounted to rock on the hub 23 between the disk 8 and the stand 7 and has its outer end bent down and outward, at 28, Fig. 1, and pivotally connected with a short upturned arm 29 carrying a rotatable roller-pawl 30 normally held in one of the spaces 15 of the escapement-ratchet by a spring 31. The upper end of a link 32 is pivotally connected at 33 with the pawl-carrier, the lower end of the link being jointed to an arm 34, see dotted lines Fig. 1, on a rock-shaft 35 mounted near the base of the loom and extending from side to side, said shaft at the drop-box side of the loom having a second arm 36 extended rearwardly and forked to embrace a stud 37 on the lifter-rod 4. As the top-most shuttle-box is in operative position the pawl-carrier 27 is in its lowest position, but if the shuttle-boxes are raised to operatively position another shuttle the pawl-carrier will be raised by means of the controlling connections between it and the lifter-rod 4, and the pawl will coöperate with the escapement-ratchet to move the feeder angularly the proper amount to operatively position the proper filling-carrier. Lowering of the shuttle-boxes causes the con-

trolling means to turn the feeder correspondingly, but in the opposite direction, so that as the boxes shift the feeder will be oscillated back and forth synchronously for the purpose described. The spring 31 maintains the pawl normally in operative engagement with the peripheral ratchet of the disk 8, and also acts through the pawl to hold the feeder quiescent under normal conditions, but if the feeder is advanced, as it is after each transfer, to bring another group of filling-carriers into active position, the spring 31 yields as the pawl 30 rolls over some of the teeth 14 of the ratchet, as will be manifest.

In order to facilitate the loading of the feeder with filling-carriers in their proper group sequence I have herein provided the butt-supporting disk 8 with visual indicators, arranged in groups, and differing from each other, but in a regular order. Thus, in the present instance, I paint the backs of the pockets or seats 9 to correspond with the color of the filling on the filling-carriers whose butts are to be seated in such supporting pockets, and in Fig. 4 the indicators for a group are lettered R, W, B and G respectively. When the weaver fills the feeder a glance at an empty support will show at once by its indicating color that the filling-carrier to be seated therein must have filling of the same color. This greatly facilitates the filling up of the feeder from time to time, relieving the weaver of considerable care and trouble and always insuring the correct sequence in the groups so long as the visual indicators are observed and their indications followed.

I will now describe the transferrer and the actuating means therefor, and the means for advancing the feeder after each transferring operation. The transferrer is herein made as a preferably cylindrical bar 38 radially movable in the guide 22 and having on its lower end a head 39 with a concaved face 40 to engage the butt of the filling-carrier to be transferred, a laterally extended arm 41 rigidly connected with said bar 38 having a downturned end 42 to constitute a tip-depressor, to engage the tip of the filling-carrier when transferred. It will be noted that the transferrer and its fixed guide 22 are located wholly within the feeder, and inside the circle of filling-carriers, and by means of the novel actuating means for the transferrer the entire circle of filling-carriers can be used. The guide is slotted at 43, Fig. 4, to permit the movement of the arm 41 during transfer. An actuator for the transferrer, shown as a shaft 44, is extended rotatably through the sleeve 19, the latter forming a bearing, and the outer end of the shaft passes loosely through a hub or boss 45 on the outer disk 10 of the feeder, a pinion 46 being secured to the inner end of the actuator adjacent the end of the sleeve 19. Said actuator is provided with a crank 47 near the disk 8 of the feeder, and a link 48 has a box 49 embracing the crank, the other end of the link having a hub 50 loosely embracing the arm 41 adjacent the upper end of the transferrer 38. When the actuator is given a half revolution from the position shown the crank and link will operate the transferrer, depressing it in a radial direction and moving the filling-carrier below it into the shuttle when boxed at that end of the lay adjacent the feeder. The pinion 46 meshes with a large gear 51 mounted on the stand 7, said gear in turn meshing with a smaller gear 52 fast on the inner end of a horizontal rock-shaft 53, mounted in a bearing 54 on the stand and having fast on its outer end the hub of a depending arm 55. Said arm carries a notched dog 56 lifted by a spring 57 into the path of a bunter on the lay (not shown) when filling transfer is to be effected, substantially as in United States Patent No. 529,940, granted November 27, 1894 to J. H. Northrop. When the dog is engaged by the bunter the arm 55 is swung forward, turning the gearing 52, 51, 46 in the direction of the arrows Fig. 1 and imparting the requisite angular movement to the actuator 44 to operate the transferrer. Return of the latter to normal position is effected by a strong spring 58, Fig. 2, attached at one end to the gear 52 and at its other end made fast to the bearing 54, the gearing then turning reversely to the direction arrows in Fig. 1. A stop lug 59 on the stand 7, Fig. 4, limits the return movement of the transferrer and its operating devices by engaging the arm 55 on its spring-actuated stroke.

When any filling-carrier of a group has been removed by the transferrer the feeder must be advanced automatically to bring another group into active position with a filling-carrier thereof beneath the transferrer having filling corresponding in characteristics to the filling-carrier previously removed, and this advance movement is effected by means independent of the feeder oscillating means, previously described, the feeding means being governed by the transferring instrumentality.

A rearwardly extended arm 60 has its hub 61, Fig. 2, fixedly secured to the rock-shaft 53 between the bearing 54 and the arm 55, the said arm 60 having pivotally connected with it an upturned pawl 62, Fig. 1, provided with a tooth 63 to at times cooperate with the ratchet 16, the base of the pawl being shaped to present a cam portion 64 adapted to coöperate with a stud 65 projecting from the stand 7, Figs. 1 and 2, a spring 66 serving to keep the pawl in engagement with the stud. When the transferrer is depressed to remove a filling-car-

rier from the feeder the downward swing of arm 60 draws down the pawl 63 and as the cam part 64 leaves the stud 65 the spring causes the tooth 63 to move into engagement with the ratchet 16, clicking over the teeth thereof until the pawl is in its lowest position. After transfer the arm 60 swings up, moving the pawl 62 and thereby turning the ratchet 16 and the feeder in the direction of arrow 67 until the coöperation of the cam part 64 and the stud 65 disengages the pawl tooth from the ratchet. This cam part is of such length that the pawl will be thrown out when the feeder has been advanced a distance equal to the distance between two similarly characterized filling-carriers in two successive groups. If a carrier having blue filling has been transferred then the advance of the feeder will be sufficient to bring the carrier having blue filling, in the next group, into position under the transferrer. When such feed or advance movement of the feeder is effected, to change groups, the roller pawl 30 will click over the teeth 14 of the peripheral escapement ratchet and permit the advance, its spring 31 drawing it into a concavity 15 when the advance is completed, so that the feeder is then controlled once more by the shuttle box-motion. If a smaller number of filling-carriers makes up a group then the cam portion 64 of the feed pawl is made longer, and if more filling-carriers are used said cam is shortened. As soon as the feed pawl has completed its work it is thrown into inoperative condition, as will be manifest, so that the box-motion immediately assumes control through the means provided for the purpose.

The transferring instrumentality is very direct in its operation, simple, and positive in action, and by mounting the actuator coaxial with the feeder the entire bobbin-holding portion thereof can be utilized, as will be evident. Each of the means which controls movement of the feeder is independent, and coöperates separately with the feeder, so that a simplification of mechanism is effected and at the same time each means has its own function.

I have not shown any means for effecting the movement of the dog 56 into operative position when filling replenishment is required, as such means is common and well known in the art, and is illustrated in the Northrop patent before referred to, replenishment being effected either upon failure of filling through the usual filling-fork devices or by a "feeler" mechanism, equally well known, if the replenishment is to be effected before complete exhaustion of the filling in the running shuttle.

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

1. A filling-feeder having a plurality of groups of two or more filling-carriers differing in the characteristics of their filling, combined with means to intermittently effect angular movement of the feeder to bring one or another filling-carrier in a group into position to be transferred, and independent means separately connected with and to advance the feeder a constant distance equal to the distance between any filling-carrier in one group and a correspondingly characterized filling-carrier in another group.

2. A filling-feeder having a plurality of groups of two or more filling-carriers differing in the characteristics of their filling, combined with means operatively connected with the feeder to move the same back and forth to position one or another filling-carrier in the active group, and separate means independently and directly connected with the feeder to advance the same a constant distance at each operation of such separate means, to bring successive groups into active position.

3. A rotatable filling-feeder having a plurality of circularly-arranged groups of filling-carriers differing in the characteristics of their filling, combined with means coöperating with the feeder adjacent its periphery to intermittingly effect angular movement thereof and thereby position one or another filling-carrier of the active group, and independent means coöperating directly with the feeder near its axis of rotation to move the feeder always in the same direction and for a fixed distance, to bring successive groups of filling-carriers into active position.

4. A rotatable filling-feeder including a disk having a ratchet-like periphery and adapted to contain filling-carriers arranged in a plurality of groups of two or more, the filling-carriers in a group differing in the characteristics of their filling, means, including a yieldingly-controlled pawl to coöperate with the periphery of said feeder disk, to move the feeder angularly and operatively position one or another filling-carrier of a group, and independent means to intermittingly advance the feeder a constant distance to bring one group after another into active position, the pawl yielding when said latter means advances the feeder.

5. A filling-feeder having a plurality of groups of two or more filling-carriers differing in the characteristics of their filling, combined with means coöperating with one part of the feeder to intermittingly effect angular movement of the feeder to bring one or another filling-carrier in a group into position to be transferred, and independent means to intermittingly and directly coöperate with a different part of and advance the feeder a distance equal to the

distance between a filling-carrier in one group and a correspondingly characterized filling-carrier in another group, the first-named means permitting such advance of the feeder and resuming control of the feeder as the advance is completed.

6. A filling-feeder having a plurality of groups of two or more filling-carriers differing in the characteristics of their filling, combined with means in direct and yielding engagement with and to effect oscillatory movement of the feeder to operatively position one or another filling-carrier in the active group, independent means to coöperate directly with a different part of and effect advance movement of the feeder a constant distance after a filling-carrier has been transferred, and a device to automatically disconnect said latter means and the feeder after each advance of the latter is completed.

7. A rotatable filling-feeder having an attached feed-ratchet, and provided with filling-carriers arranged in groups, each group containing a plurality of filling-carriers having filling differing in character or color, and an escapement-ratchet rotatable with the feeder, combined with means coöperating therewith to hold the feeder from movement and also to move it to operatively position any filling-carrier of a group, and separate means coöperating with the feed-ratchet to rotate the feeder a distance equal to the number of filling-carriers in a group.

8. A rotatable filling-feeder having an attached feed-ratchet and a peripherally-arranged escapement-ratchet, a plurality of groups of filling-carriers of two or more having filling differing in color, a transferrer to remove the filling-carriers one by one, and means coöperating with the feed-ratchet and actuated by the transferrer to advance the feeder after each transfer and operatively position the filling-carrier of the next group having filling of the same color, combined with separate means, including a yieldingly-controlled pawl, to coöperate with the escapement-ratchet and intermittingly move the feeder to operatively position for transfer one or another of the filling-carriers in the active group, the pawl normally preventing movement of the feeder but yielding when the feeder is advanced.

9. The combination, with shifting shuttle-boxes, a filling-feeder provided with filling-carriers arranged in groups to present filling of different characteristics, and means controlled by movement of the shuttle-boxes to oscillate the feeder in synchronism therewith, of a transferrer, and means controlled thereby to rotate the feeder after each transfer and bring a new group of filling-carriers into active position, the feeder oscillating and rotating means being independent of each other and coöperating separately with the feeder.

10. The combination, with shifting shuttle-boxes, a filling-feeder provided with filling-carriers arranged in groups to present filling of different characteristics, and means controlled by movement of the shuttle-boxes to oscillate the feeder in synchronism therewith, of a transferrer, and means controlled thereby to rotate the feeder after each transfer a distance equal to the space occupied by a group of filling-carriers, to thereby bring into active position a new group, the oscillating means serving also to normally prevent movement of the feeder and being independent of the feeder-rotating means.

11. A rotatable filling-feeder containing a series of filling-carriers arranged in like groups of recurring sequence as to the different characteristics of the filling on the carriers of each group, a plurality of shuttle-boxes movable to place one or another in operative position, means to move the feeder synchronously with the shuttle-boxes to maintain in position to be transferred a filling-carrier whose filling corresponds to that contained in the then active shuttle, independent means coöperating separately with the feeder to rotate the latter after each transfer and operatively position a similarly characterized filling-carrier in a new group, and a transferrer operatively connected with and to effect the actuation of said feeder rotating means.

12. Shifting shuttle-boxes, a lifter-rod operatively connected with and to effect a change in the position of said boxes, a filling-feeder having a series of filling-carriers, and means connecting said lifting-rod and the feeder to cause synchronous movement of the shuttle-boxes and feeder, combined with a transferrer located wholly within the feeder, an actuator for the transferrer coaxial with the feeder, and means operated by the actuator to effect predetermined advance of the feeder after each transfer.

13. In a loom, a rotatable feeder provided with a plurality of groups of filling supplies, the supplies constituting each group being arranged in a predetermined sequence distinguished by differing characteristics in the filling, a series of shuttles, means to place one or another into active position and to synchronously move the feeder to position a correspondingly characteristic filling supply in readiness to be transferred, independent means separately and directly coöperating with the feeder to bring into active position a fresh group of filling supplies after each transfer, and a transferring instrumentality controlling the operation of said independent means.

14. A filling-feeder, a fixed axis on which it is rotatably mounted, a pawl-carrier fulcrumed coaxially therewith, and a yielding-controlled roller-pawl on said pawl-carrier, an escapement-ratchet on the feeder and with

which the pawl coöperates, to move the feeder in either direction or to normally retain it quiescent, combined with shifting shuttle-boxes, and connections between it and the pawl-carrier, to effect angular movement of the feeder synchronously with shifting movement of the shuttle-boxes.

15. In a filling-feeder, a disk having a hub and a series of circularly-arranged supports for the butts of the filling-carriers, a fixed sleeve on which the hub is rotatably mounted, a radially movable transferrer, a guide therefor rigidly connected with the sleeve, an actuating shaft extended through the sleeve and operatively connected with the transferrer, and means outside the disk and connected with the shaft, to turn the same and operate the transferrer.

16. In a filling-feeder, a rotatable disk having a series of circularly-arranged supports for the butts of the filling-carriers, a shaft extended axially through the disk, means outside the latter to turn said shaft, a transferrer at the opposite side of said disk, a fixed guide therefor sustained wholly within the circle of filling-carriers, and an operating connection between the transferrer and the shaft.

17. In a filling-feeder, a rotatable disk having a series of circularly-arranged supports for the butts of the filling-carriers, an angularly movable actuator extended axially through the disk, a radially movable transferrer wholly within the circle of filling-carriers and operatively connected with the actuator, and means outside the disk to effect angular movement of the actuator.

18. A filling-carrier comprising circular disks to sustain the butts and tips of a circularly-arranged series of filling-carriers, rods rigidly connecting said disks, a transferrer located wholly between the disks and within the circle of filling-carriers, a rotatable actuator axially extended through the disks and operatively connected with the transferrer, and means to rotate the actuator, connected therewith outside the disks.

19. A stand, a horizontal sleeve fixedly mounted thereon, a disk having a hub rotatably mounted on the sleeve and provided with supports for the butts of a series of filling-carriers, a radial guide on the sleeve adjacent the face of the disk, a transferrer slidably mounted in the guide, said guide and transferrer being wholly within the circle of filling-carriers, an actuating shaft extended through the sleeve, a link pivotally connected at one end with the transferrer and at its other end connected eccentrically with the shaft, and means to turn the shaft to actuate the transferrer.

In testimony whereof, I have signed my name to this specification, in the presence o two subscribing witnesses.

MELVIN L. STONE.

Witnesses:

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SETH M. CARTER.