

W. L. HAMILTON.
 RECIPROCATING GEAR MECHANISM.
 APPLICATION FILED MAR. 15, 1913.

1,134,332.

Patented Apr. 6, 1915.

4 SHEETS—SHEET 1.

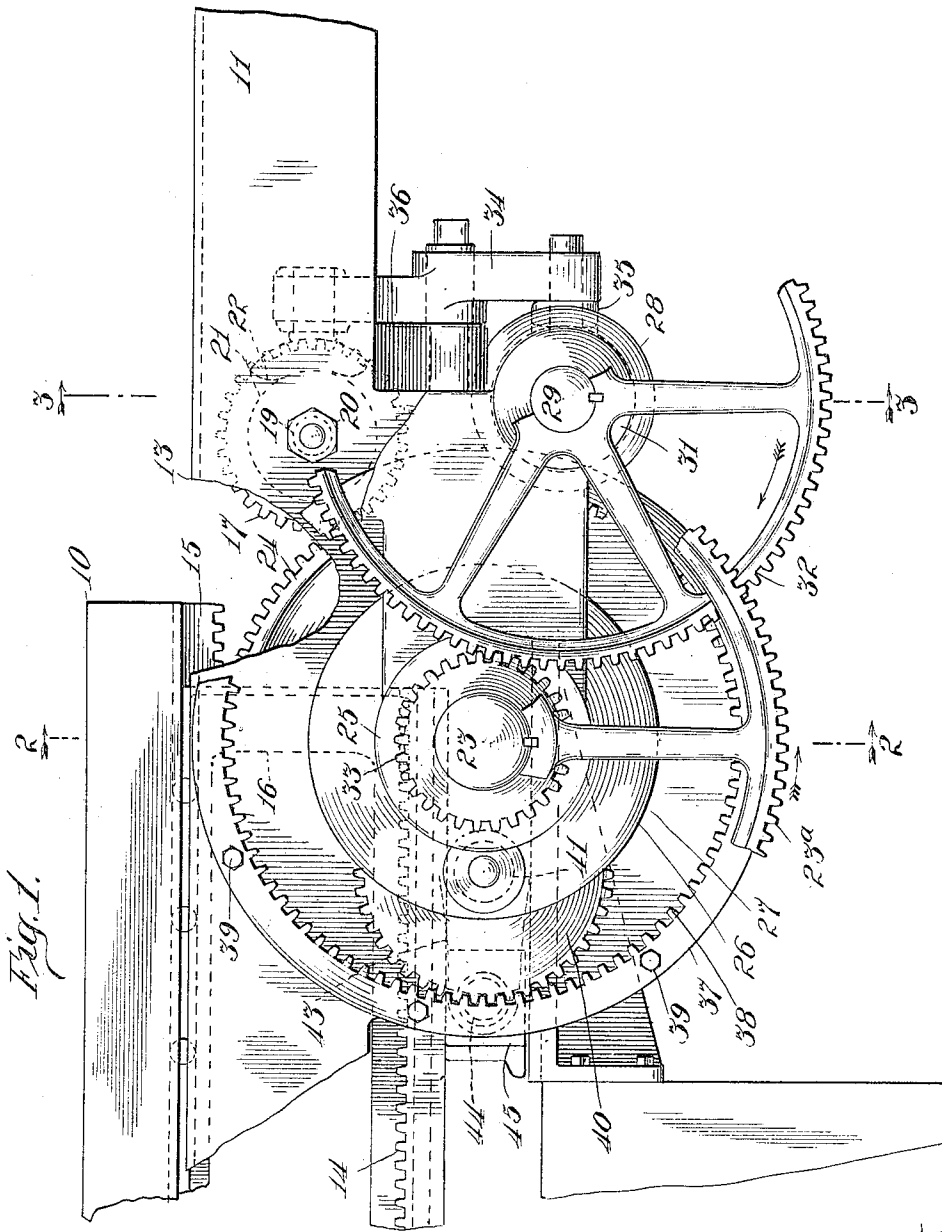


Fig. 1.

Witnesses:
 Milton Lenoir
 E. M. Klatcher

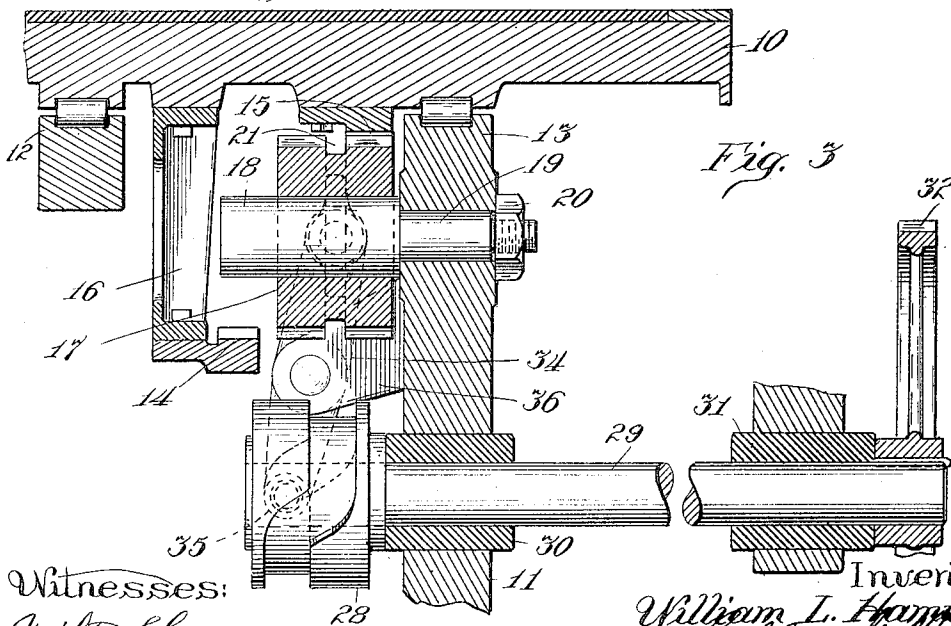
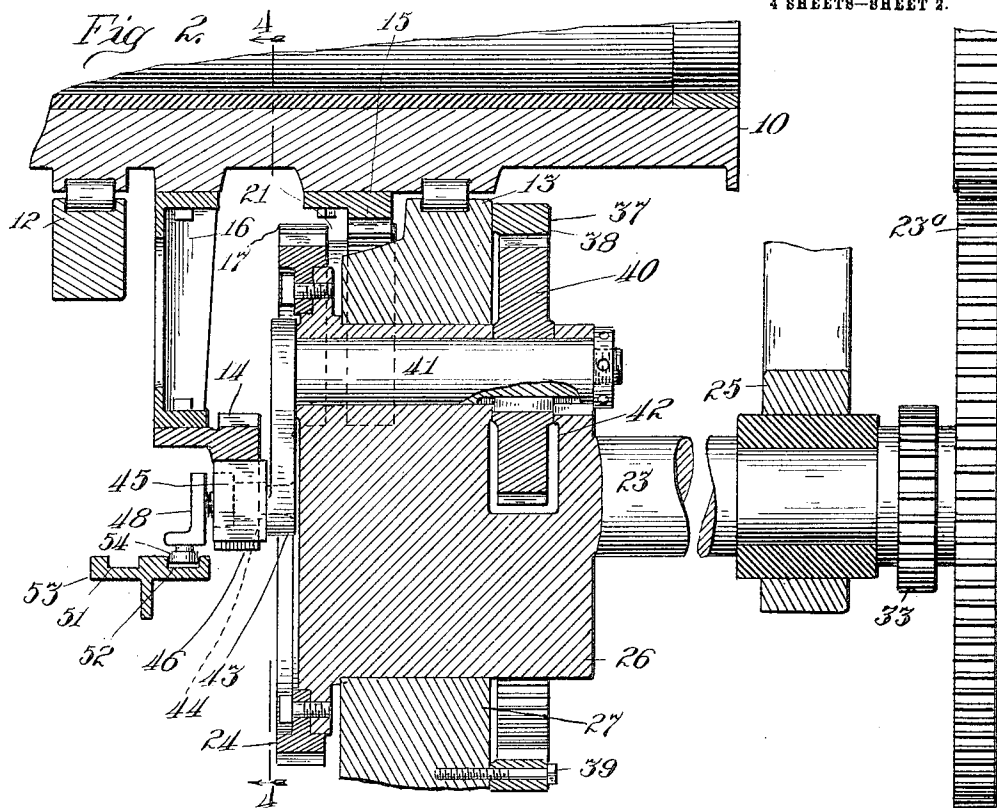
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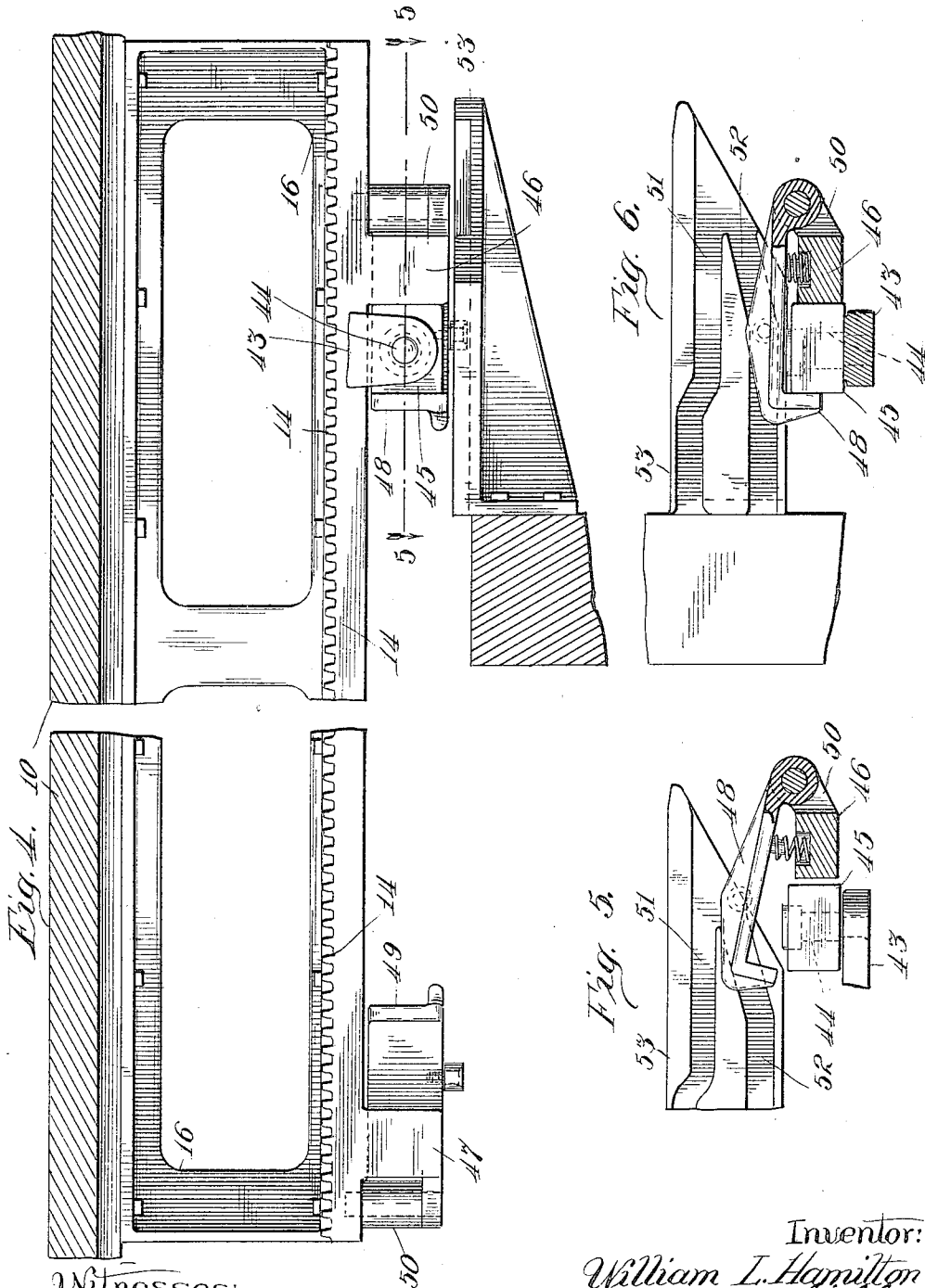
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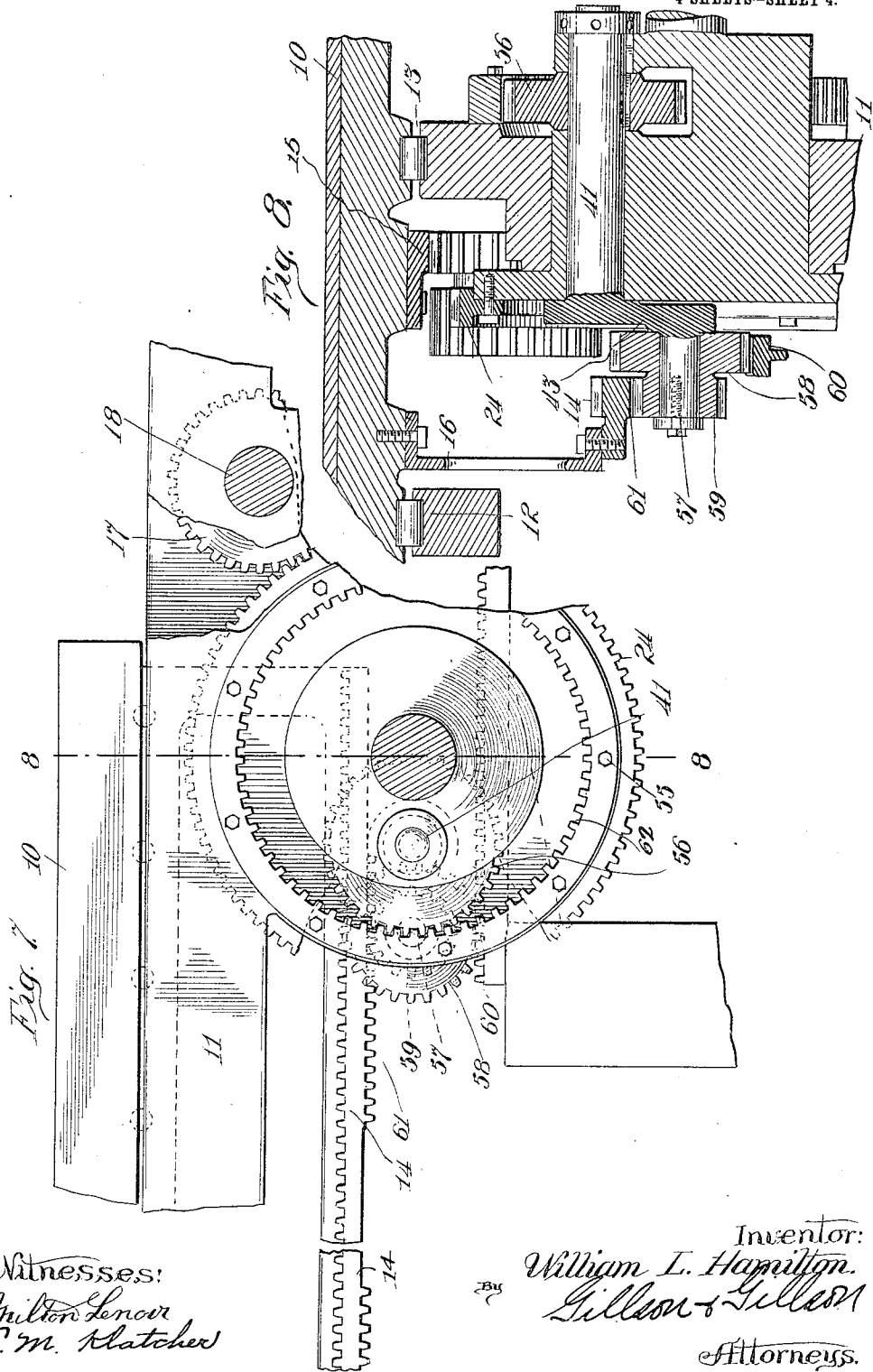
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UNITED STATES PATENT OFFICE.

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RECIPROCATING-GEAR MECHANISM.

1,134,332.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WILLIAM L. HAMILTON, a citizen of the United States, and resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Reciprocating-Gear Mechanism, of which the following is a specification, and which is illustrated in the accompanying drawings, forming a part thereof.

The invention relates to reciprocating gear mechanism and more particularly to improved means for effecting the reversal in the direction of movement of the reciprocable member.

The object of the invention is to provide a reciprocating gear mechanism which shall be of compact and efficient construction.

In the accompanying drawings, Figure 1 is a detail side view of a printing press equipped with a reciprocating gear mechanism of a form provided by the invention, some of the parts being broken away and others being shown in section; Figs. 2 and 3 are transverse sectional views of the same taken on the lines 2—2 and 3—3, respectively of Fig. 1; Fig. 4 is a detail longitudinal sectional view taken on the line 4—4 of Fig. 2; Fig. 5 is a plan sectional view taken on the line 5—5 of Fig. 4; Fig. 6 is similar to Fig. 5 but shows the parts in a different position. Fig. 7 is similar to Fig. 1, but illustrates a modified form of construction, and Fig. 8 is a detail sectional view taken on the line 8—8 of Fig. 7.

The reciprocal type bed of a printing press is illustrated in the drawings at 10.

The bed is movably supported upon a frame, generally designated at 11, and provided with ways, as 12 and 13 for the reciprocation of the bed. A pair of gear racks 14 and 15 are mounted upon and extend longitudinally beneath the bed 10.

The gear racks 14, 15 are shown as being located in different vertical but adjacent planes and are oppositely facing. The gear rack 14 faces upwardly and is carried by a web, 16, in such manner as to be spaced apart from the under side of the bed 10. The gear rack, 15, faces downwardly and is conveniently secured directly to the under side of the bed.

An operating gear 17, is provided for engagement with the gear racks 14 and 15 alternately to drive the bed 10, during the greater part of its movement in both direc-

tions. As shown, the operating gear, 17, is of comparatively small diameter and is rotatably mounted upon a stud, 18. This stud is rigidly supported upon the frame, 11, at one end. Preferably an end portion, 19, of the stud, 18, is of reduced diameter and is extended through the frame, 11, and is held therein by a nut, 20. The operating gear, 17, is continuously rotated in one direction. To permit of its being engaged with the racks, 14, 15, alternately it is slidably mounted upon the stud, 18, and provision is made for shifting the gear upon the stud as the bed, 10, reaches the limit of its movement in each direction. As shown, the operating gear, 17, has a circumferential groove, 21, and a shoe, 22, runs in this groove for sliding the gear upon the stud. As is usual in machines of the kind described, the shifting of the gear, 17, occurs only when it is disengaged from both of the racks, 14, 15.

A main shaft is shown at 23. This shaft will be continuously driven in any convenient manner as by the usual driving piston (not shown) located at one side of the frame 11, and meshing with a large gear 23^a fixed upon the outer end of the shaft. The inner end portion of the main shaft 23 is enlarged, forming a hub or disk, 26. The unenlarged part of the shaft 23 and the hub 26 extend through and are journaled in laterally separated parts of the frame, as 25 and 27, respectively.

A gear ring 24, turning with the main shaft 23, as by being mounted upon the hub, 26 meshes with the operating gear, 17, for rotating the same.

A cam 28 of usual construction serves for moving the shoe 22 to shift the operating gear 17. This cam is conveniently mounted upon one end of a cam shaft shown at 29. The cam shaft 29, extends through and is journaled in parts of the frame 11 as at 30 and 31. For turning the cam, a large gear 32, mounted on the cam shaft 29 beyond the frame 11 meshes with a smaller gear, 33, on the main shaft 23. The shoe, 22, is pivotally supported upon one end of a rock arm, 34. A roller, 35, mounted upon the other end of the rock arm, 34, runs in the groove of the cam, 28. The rock arm, 34, is pivotally supported intermediate its ends as upon a laterally projecting bracket lug, 36, of the frame, 11.

The mechanism provided for reversing the

direction of movement of the bed, 10, preferably includes a stationary internal gear, 37. As shown, this gear takes the form of a ring having an annular series of inwardly facing teeth, 38. In the form of construction illustrated in Figs. 1 to 6 inclusive, the gear ring, 37 has a like number of teeth with the gear 24 and is of such size that its pitch line is of the same diameter as is that of the said gear. The gear ring, 37, is secured to a part of the frame 11, adjacent the journal bearing 27 as by bolts, one of which is shown at 39.

A gear pinion, 40, preferably having half the number of teeth of the gear ring, 37, meshes with the gear teeth, 38, of the said ring. The gear pinion 40 is fixed upon a crank shaft 41. The crank shaft 41 is journaled in the hub, 26 of the main shaft 23. By this means the gear pinion, 40, has a planetary movement about the axis of the shaft, 23. Preferably the gear pinion, 40, is located upon the crank shaft, 41, intermediate its ends. A pocket, 42, formed in the hub, 26 of the shaft, 23, serves for receiving the gear pinion 40.

A crank, 43, is formed upon one end of the crank shaft 41. As shown, this crank turns in a plane beyond the end of the hub, 26, and carries a wrist pin, 44, on which is mounted a block 45. This block normally slides against a horizontal surface of the bed, 10, as the under side of the gear rack, 14. When the direction of movement of the bed, 10, is to be reversed the relative movement of the block, 45, and the bed 10, is prevented. To this end a stop lug as 46, 47, depends from the rack, 14 adjacent each end and a gate, as 48, 49, is closed upon the block 45 to hold it against each of the stop lugs 46, 47 during the reversal of the direction of movement of the bed.

As shown, each of the gates, 48, 49, swings in a horizontal plane. To this end each is pivotally mounted upon a bracket 50, formed upon the corresponding stop lug, 46, 47, and extends from such pivot beyond the side of the stop lug, as 46. A pair of cam grooves, 51 and 52, formed in a fixed part of the machine as the cam block 53 (Fig. 2) serves for swinging the gates 48, 49. A roller, 54, depending from each of the gates 48, 49, cooperates with one of the cam grooves 51, 52. Preferably the gates 48, 49, are so formed that the two rollers 54, normally move in laterally separated planes, whereby each of the rollers enters but one of the grooves 51, 52.

The construction described is of compact arrangement and is operative, irrespective of the slackness of the gears, as from wear. Furthermore, the gear pinion, 17, is of small size whereby but little vertical space between the racks 14, 15, is required. The height of the bed, 10, above the usual support, as the

floor of a room (not shown) may accordingly be small in proportion to the length of travel of the bed. It will be understood that when the block 45 comes into engagement with either of the stop lugs, 46, 47, the operating gear, 17, becomes disengaged with the corresponding rack, 14, 15. Furthermore, during the reversal of the direction of movement of the bed, 10, by the engagement of the block, 45, with either of the stop lugs, 46 or 47, the operating gear 17, is shifted upon the stud, 18, to bring it into alinement with the proper rack, 14, 15, for driving the bed, 10, in the new direction.

Figs. 7 and 8 of the drawings illustrate a form of construction wherein an internal gear, 62, having a pitch line of less diameter than that of the spur gear, 24, may be employed. In this construction the internal gear, 62, takes the form of a ring of like construction with that shown at 37 in Fig. 2, but of less diameter. It is fixed in position by being secured to a part of the frame 11 by bolts, 55. In this instance a pinion, 56, of half the size of the internal gear, 62, is mounted on the crank shaft, 41, and meshes with the internal gear. The crank arm, 43, carries a stud, 57, adjacent its outer end. Gear pinions 58 and 59 are mounted on the stud, 57. These gear pinions are preferably connected as by being formed integral. When the internal gear 62 is of less size than the spur gear, 24, the gear pinions 58 and 59 are preferably of different size.

The gear pinion 58, continuously engages a fixed rack bar, 60. This rack bar is upwardly facing and extends in a horizontal direction adjacent the mid-length of the machine. A short rack formed on the bed, 10, adjacent each of its ends, engages with the gear pinion 59, when the direction of movement of the bed is to be reversed. One of these short racks is shown at 61. The racks are conveniently formed upon the under side of the bar which carries the rack, 14. Preferably the parts are so proportioned that when the bed, 10, has traveled in one direction far enough to bring one of the racks, as 14 out of engagement with the operating gear, 17, one rack 61, comes into engagement with the gear pinion, 59. Similarly, when the bed has been brought to rest, reversed, and moved in the opposite direction far enough to disengage the rack, 61, from the gear pinion, 59, the operating gear, 17, will come into engagement with the other rack, as 15. It will be observed that if the pitch diameter of the internal gear 62, be three fourths that of the spur gear, 24, and the pitch diameter of the gear pinion, 59, be two thirds that of the gear pinion 58, the peripheral speed of the gear pinion 59 will equal that of the operating gear, 17, at the instant that the gear pinion 59, be-

comes engaged with or disengaged from the gear rack, 61. The use of the form of construction illustrated in Figs. 7 and 8 permits of some reduction in the height of the bed, 10, for the annular gear 62, may be of less size than the spur gear, 24, and no part of it need extend above the level of the highest part of the spur gear, 24.

I claim as my invention—

1. In combination, a reciprocable member, a pair of oppositely facing racks mounted on such member, a main shaft, a gear on said main shaft, a pinion meshing with said gear, said pinion being rotatable about a fixed axis and being engageable with the racks in alternation, the racks being movable beyond the pinion in each direction, a crank shaft carried by the main shaft and having a planetary movement around the axis of the same, a crank on the crank shaft, and means acting to operatively connect the said crank and the reciprocable member when the pinion is disengaged from the racks.

2. In combination, a reciprocable member, a pair of oppositely facing racks mounted on such member, a main shaft, a gear on the main shaft, a pinion meshing with the gear and engaging the said racks in alternation, the racks being movable beyond the pinion in each direction, a crank shaft parallel with the main shaft and carried thereby, the axis of the crank shaft being spaced apart from the axis of the main shaft, an internally geared annulus surrounding the main shaft, a pinion on the crank shaft meshing with the annulus, a crank on the crank shaft, and means acting to operatively connect the said crank and the reciprocable member when the first-mentioned pinion is disengaged from the said racks.

3. In combination, a cooperating rack and pinion, the pinion being rotatable about a fixed axis and the rack being movable beyond the pinion, a rotatable shaft having a planetary movement about an axis which is parallel with and spaced apart from the axis of the pinion, and means acting to operatively connect the rack and the said rotatable shaft having the planetary movement when the rack is disengaged from the pinion.

4. In a printing press, in combination, a frame, a type bed reciprocating thereon, a rack secured to the bed, a shaft having a planetary movement, a crank on the shaft, a pinion on the crank meshing with the said rack, and means for controlling the rotation of the pinion.

5. In combination, a pair of racks, one being reciprocable and the other fixed, a shaft having a planetary movement, a crank on said shaft, and a gear member rotatably mounted on the crank and meshing with both of the said racks.

6. In combination, a reciprocable member,

a pair of non-connecting racks mounted on said member, a member having a planetary movement, a gear rotatably mounted on said last-named member engageable with either of the said racks, means for controlling the rotation of the gear, and means for driving the reciprocable member when the gear is disengaged from both of the said racks.

7. In combination, a reciprocable member, a pair of oppositely facing racks, mounted upon said reciprocable member, a frame, an internal gear fixed to the frame, a main shaft, a hub on the main shaft mounted in the frame, a gear mounted upon said main shaft, a laterally movable pinion on the frame engageable with either of said racks and in constant mesh with the last mentioned gear, a crank shaft journaled in said hub, a gear secured to one end of said crank shaft and meshing with the internal gear, a crank arm secured to the opposite end of said crank shaft, and engageable with said reciprocal member.

8. In combination, a reciprocable member, a pair of oppositely facing racks secured to said reciprocable member, a pair of laterally separated frame members, an internal gear fixed upon one of the laterally separated frame members, a main shaft having a hub provided upon one of its ends, the ends of the shaft being journaled in the said two frame members, a gear mounted upon the main shaft, a movable pinion mounted upon one of the frame members and engageable with either of the said reciprocable racks and in constant mesh with said last-mentioned gear, a crank shaft journaled in the hub, a gear secured to one end of the crank shaft at one side of the hub and meshing with the internal gear, a crank arm secured to the opposite end of said crank shaft beyond the said hub from the last-mentioned gear and engageable with said reciprocable member.

9. In combination, a reciprocable type bed, a shaft transverse to the bed and having one of its ends enlarged, means actuated by the shaft for reciprocating the bed during the greater part of its movement in each direction, said means being inactive during the reversals of the bed, a fixed journal bearing receiving the enlarged end of said shaft, the unenlarged parts of the shaft extending at one side of the bearing, an internal gear located on the same side of the bearing with the unenlarged portion of the shaft, a second shaft parallel with the first-mentioned shaft journaled in the enlarged portion of said first-mentioned shaft, the axes of the two shafts being spaced apart and the two ends of the said second shaft being at opposite sides of the said fixed journal bearing, a pinion on one end of the said second shaft meshing with the said internal gear, a crank on the other end of the said second

shaft, and means operatively connecting the said crank and the type bed only when the first-mentioned reciprocating means is inactive.

5 10. In combination, a frame, a reciprocable member sliding on the frame, a disk journaled in the frame, means for turning the disk, a shaft eccentrically journaled in the disk, the two ends of the shaft being at
10 opposite sides of the frame, means at one side of the frame controlling the rotation of the shaft, and means at the other side of the frame operatively connecting the shaft and reciprocable member.

15 11. In combination, a frame, a reciprocable type bed sliding on the frame, means acting to reciprocate the type bed during

the greater part of its movement in each direction, said means being inactive during the reversals of the bed, a disk journaled in the frame, means for turning the disk, a shaft eccentrically journaled in the disk, the two ends of the shaft being at opposite sides of the frame, means at one side of the frame controlling the rotation of the shaft, and
25 means at the other side of the frame operatively connecting the shaft and type bed only when the first-named reciprocating means is inactive.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."