Nov. 11, 1947. F. R. MOLITOR 2,430,644

RECIPROCATING MOTION FOR BED PRESSES

Filed Jan. 22, 1946 4 Sheets-Sheet 1

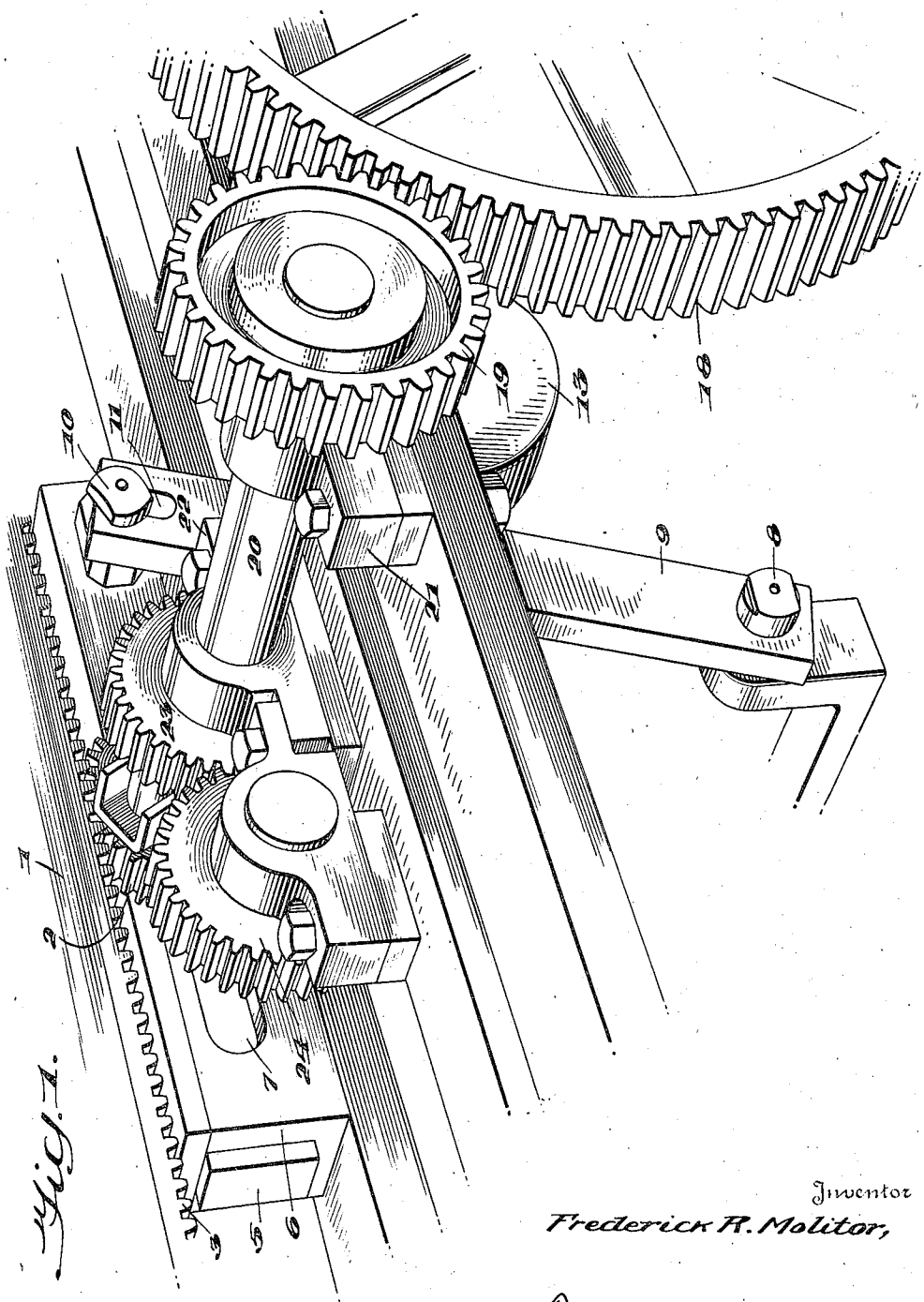

Fig. 1.

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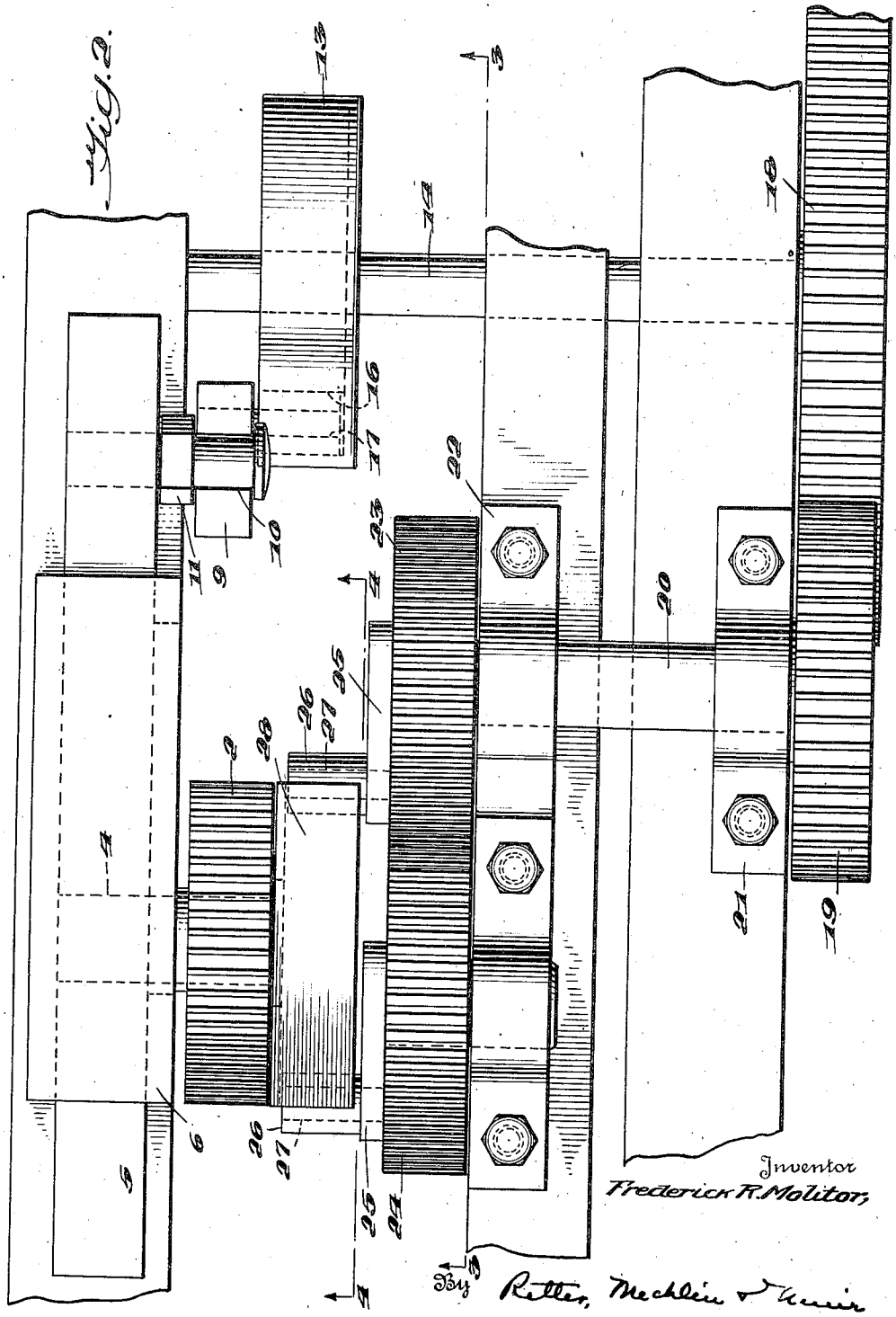
Fig. 2.



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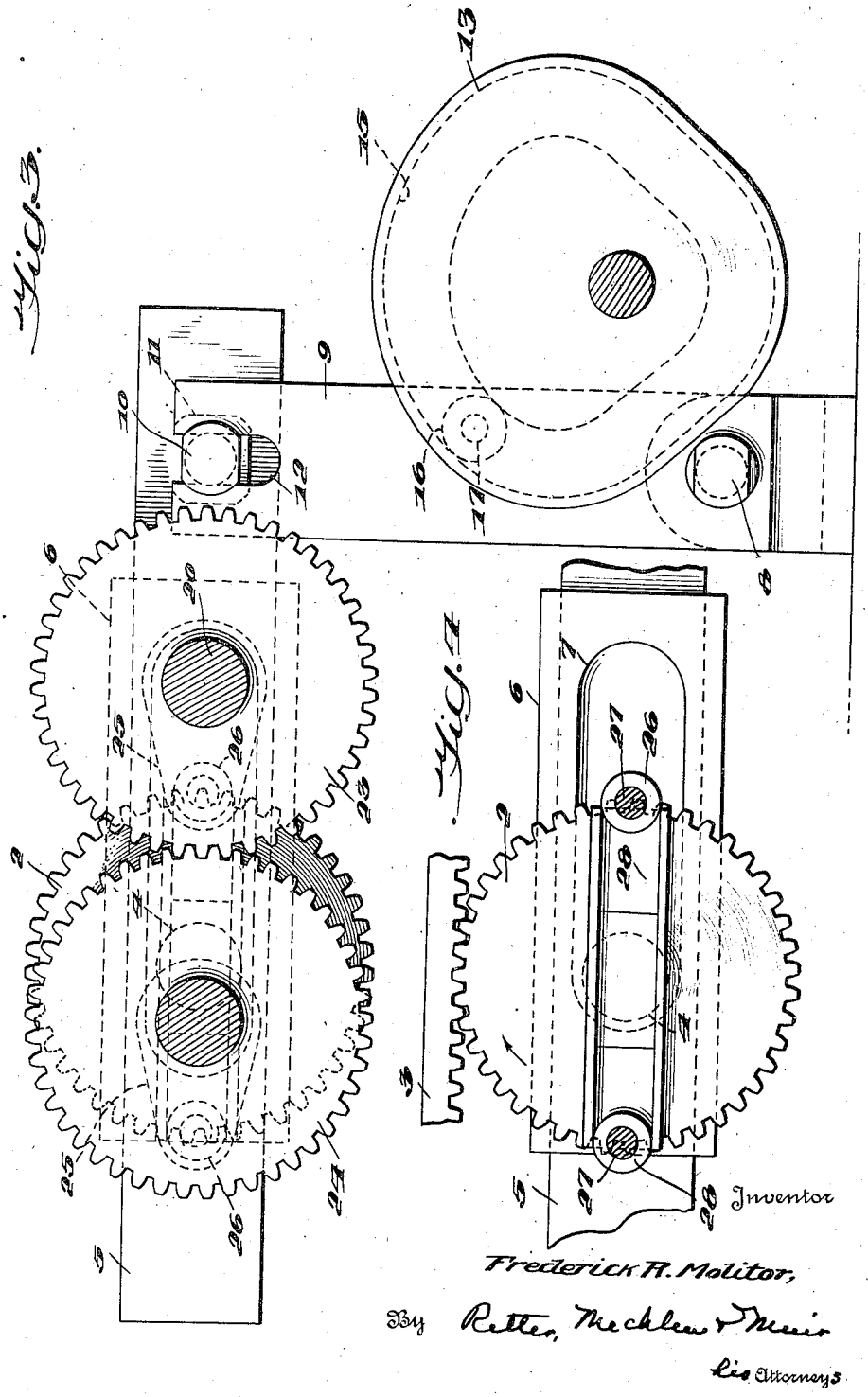
RECIPROCATING MOTION FOR BED PRESSES

Filed Jan. 22, 1946 4 Sheets-Sheet 3



Nov. 11, 1947. F. R. MOLITOR 2,430,644

RECIPROCATING MOTION FOR BED PRESSES

Filed Jan. 22, 1946 4 Sheets-Sheet 4

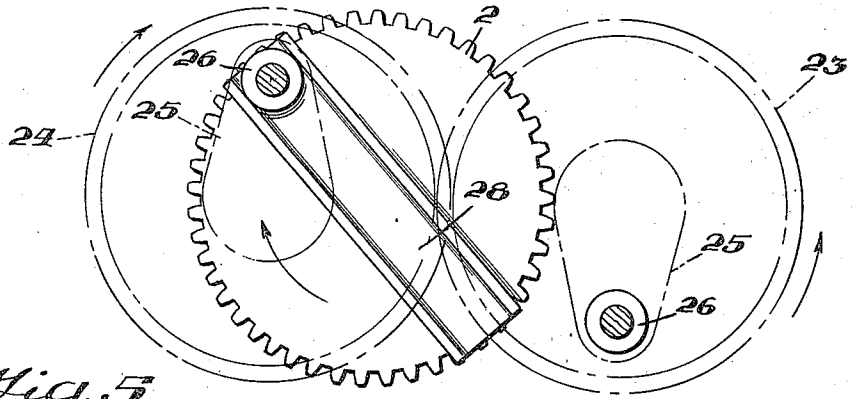


Fig. 5

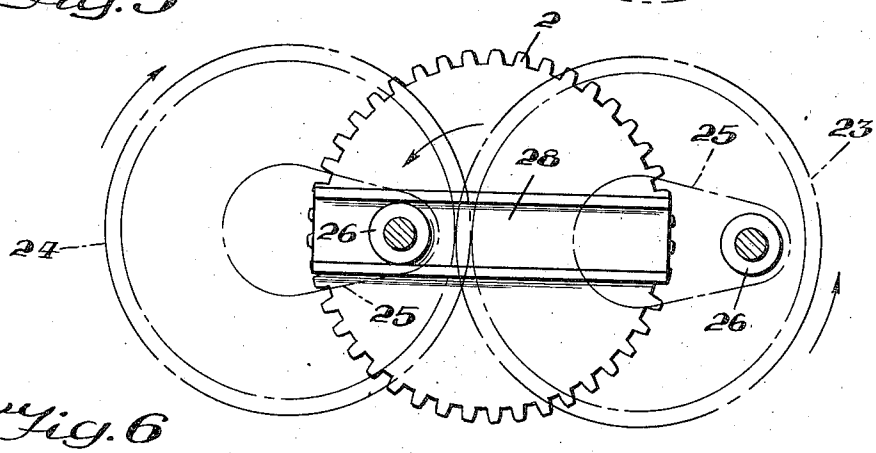


Fig. 6

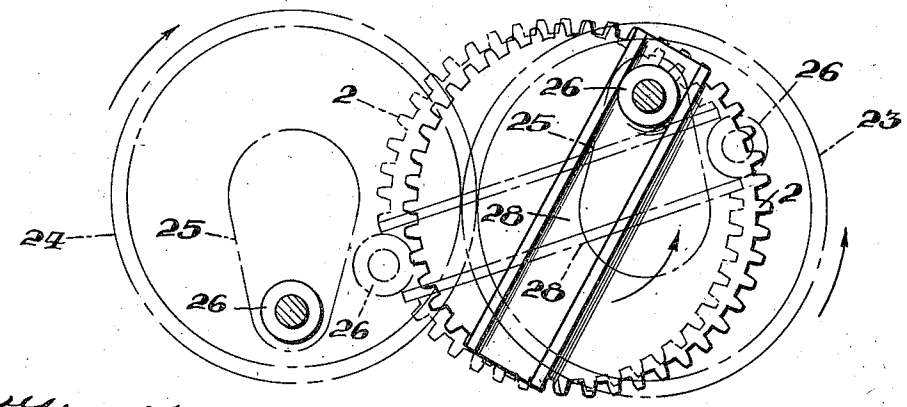


Fig. 7

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RECIPROCATING MOTION FOR BED PRESSES

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Application January 22, 1946, Serial No. 642,685

12 Claims. (Cl. 74—27)

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My invention relates to printing presses as well as to cutting and creasing presses, and more particularly to the reciprocating motion for the beds of such presses.

The principal object of the invention is to provide a reciprocating motion which permits easy reversal of the bed during each stroke of the machine and which, if desired, may be easily applied to existing flat bed printing presses.

A primary feature of the invention consists in mounting a rotatable pinion on a bar which is slidable back and forth, the pinion being in constant mesh with a rack secured to the bed of the press and being consecutively engageable by eccentrically mounted means for reversing rotation of the pinion during each change in direction of movement of the bar.

Another feature of the invention consists in providing a pair of oppositely rotating gears with portions which are consecutively movable into and out of cooperation with the pinion in mesh with a rack secured to the bed so that rotation of the pinion is periodically reversed to effect reciprocation of the bed.

A further feature of the invention consists in providing means for laterally shifting the axis of the pinion which is in constant mesh with a rack on the bed and in having a pair of meshing gears respectively provided with crank arms which, during shifting of said pinion, are caused to consecutively cooperate therewith to drive the pinion and to reverse the direction of rotation thereof during each change in the direction of movement of the axis of the pinion.

Other and more specific features of the invention, residing in advantageous forms, combinations and relations of parts, will hereinafter appear and be pointed out in the claims.

In the drawings,

Figure 1 is a perspective view of my invention as applied to a printing press having a reciprocating flat bed.

Figure 2 is a plan view of my invention, the printing press bed being omitted.

Figure 3 is a sectional view taken on line 3—3 of Figure 2.

Figure 4 is a fragmentary sectional view taken on line 4—4 of Figure 2, a portion of the rack on the bed press being shown.

Figure 5 is a fragmentary view, wherein the reversible pinion and the crank pins are shown in elevation, which illustrates the approximate position of parts after the gears carrying the crank arms have rotated about 90° from the positions shown in Figures 3 and 4 and the bar has shifted to the right by the actuated cam.

Figure 6 is a view similar to Figure 5 showing the position of the parts after the crank arms have rotated 180° from the positions shown in Figures 3 and 4.

Figure 7 is a view similar to Figure 5 showing

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in full lines the pinion in engagement with the other crank arm and showing in dot and dash lines the relative position of the parts at approximately the time that the crank moves into operative engagement with the pinion.

It will be evident to those skilled in the art that the invention may be used with various types of presses having reciprocating beds, such, for example, as the well known single or two revolution cylinder printing press, the single or two revolution cylinder flat bed cutting and creasing press and two revolution cylinder flat bed two color printing press.

Referring more particularly to the drawings, 1 indicates a reciprocating bed press and 2 a pinion which is in constant mesh with a rack 3 secured to the bed. The pinion is rotatably mounted on a shaft 4 which is carried by a support or bar 5 slidably mounted in a box or the like 6 rigid with the frame of the press, the shaft projecting through an elongated slot 7 at one side of the box 6.

Pivotally mounted on a supporting stud or the like 8 is an arm 9 which is preferably bifurcated at its upper end to straddle a stud or boss 10 rigid with the sliding bar 5. This arm is adapted to be moved to and fro about the stud 8 as a center to cause the bar 5 to slide back and forth in box 6. The upper bifurcated end of the arm which may advantageously be spaced from the bar by a spacing block 11 provides a slot 12 enabling stud 10 to slide relatively to the arm when the latter is rocked to and fro.

This desired motion may be imparted to the rotating arm 9 by a cam 13 rigid with a shaft 14 preferably driven in any convenient and well known manner by which the entire press is advantageously driven. The cam is preferably of the type known in the art as a box cam and is provided with a groove or track 15 in the inner face thereof for receiving a roller 16 mounted on a pin or support 17 carried by the arm 9 projecting laterally therefrom. The groove 15 in the cam is so formed with respect to the axis of the shaft 14 as to cause the arm to move to and fro about the supporting stud 8 as a center and thereby cause the bar 5 to which the arm is connected to move back and forth.

In Figure 3 the cam is shown as having been actuated so that the arm has been moved as far as possible toward the left as viewed in the figure, and the bar 5 has been moved correspondingly in the same direction. Continued rotation of the cam by the shaft will cause the arm and the sliding bar to move toward the right, as viewed in Figure 3 until the roller 16 reaches the lower portion of the groove or track 15 which for a limited distance is concentric with the axis of the shaft. After leaving the smaller concentric portion of the groove, the cam then functions to move the arm, and therefore, the bar 5 in the

opposite direction until the roller 16 again enters a relatively longer portion of the groove concentric with the axis of the shaft. And, of course, the cam does not impart movement to the arm while the roller 16 travels in these two portions of the groove which are concentric with the axis of shaft 14.

On the outer end of shaft 14 is a comparatively large gear 18 which may conveniently serve as a fly wheel and is in constant mesh with a bed motion driving gear 19. The ratio between gears 18 and 19 is three to one, that is, gear 19 revolves three times for each single revolution of gear 18. Gear 19 is secured to a shaft 20 which is journaled in suitable bearings 21 and 22, respectively, these elements being standard parts of presses of the type here mentioned.

Because of the lateral shifting of pinion 2 by the bar 5 and the simultaneous rotation of gears 23 and 24 in opposite directions, the crank arms move consecutively into and out of cooperative engagement with the pinion and accordingly, for at least a part of their rotation, the crank arm of one gear will drive or rotate the pinion 2 in one direction and the crank arm of the other gear will drive or rotate it in the reverse direction.

As the slide bar moves to the left, as viewed in Figure 3, the crank arm of gear 23 is disposed within the channel 28 of pinion 2 and thereby causes it to rotate first in one direction and then the other and consequently effect reciprocation of the bed 1. When the sliding bar reaches the limit of its travel, the crank arms are disposed in substantially horizontal positions, as seen in Figure 3, so that the channel 28 may move from operative engagement with the crank arm of gear 23 into cooperative engagement with the crank arm of gear 24.

Crank arm of gear 23 will continue to rotate but without effecting rotation of pinion 2. When the crank arm of gear 24 moves into engagement with the channel 28, the roller 16 of pivoted arm 9 is just entering the concentric part of the groove 15 in the larger end of the cam 13 and during the time the roller moves relatively from one end of this concentric path to the other, slide 5 and therefore the axis of the pinion 2 remains stationary. The gears 23 and 24 continue to revolve however, and the crank arm of gear 24 consequently rotates pinion 2 for approximately one revolution while the slide 5 is stationary.

Upon completion of this revolution of the crank arm, the cam then, acting through lever 9 and roller 16, pulls or moves the shifting bar 5 to the right. In Figure 5 of the drawings showing the relative position of the parts after the gears have rotated 90° from the horizontal and pinion 2 has been shifted by movement of the bar 5, it will be appreciated that the crank arm in moving from the position indicated in Figure 3 to the position shown in Figure 5 is in operative engagement with the under side of the uppermost flange of the channel and has, therefore, caused the pinion 2 to rotate in the same direction as the gear 24, as indicated by the arrows in Figure 5.

As rotation of the crank arm of gear 24 continues the direction of rotation of pinion 2 is reversed because the axis of rotation of pinion 2 continues to shift toward the right and the crank arm, therefore, presses on the upper side of the lower flange of the channel. Thus as crank arm of gear 24 moves from the upright position indicated in Figure 5 to the horizontal position of Figure 6, the direction of rotation of the pinion 2 is reversed. The crank arm of gear 24 continues to rotate the pinion in the direction indicated by the arrow in Figure 6, while the axis of rotation of the pinion is being moved to the right until the shifting bar 5 reaches its extreme right position. The relative positions of the pinion and the crank pins at the time the crank pin of gear 24 moves from engagement with channel 28 of pinion 2 and the crank arm of gear 23 moves into operative engagement therewith is shown approximately in dotted lines in Figure 7. At the time the crank arms respectively move into and out of engagement with the channel of the pinion, they both exert forces on the pinion to rotate it in the same direction. Thus no abrupt shock or sudden change in direction of rotation of the pinion is accomplished when it moves from cooperative engagement with one crank arm into cooperative engagement with the other.

Pinion 2 is moved into the extreme right position shown in full lines in Figure 7 just as the roller 16 on the arm 9 enters the part of the groove 15 of the cam at the smaller end thereof which is concentric with the axis of rotation of the shaft. This concentric portion of the cam, like the concentric portion at the opposite end thereof, affords a dwell whereby the sliding bar 5 is held immovable while the gears 23 and 24 continue to rotate. The dwell in the smaller portion of the cam is such that the pinion 2 may be rotated the desired amount while the axis of the pinion is held stationary.

After rotating with its axis held immovable, the bar carrying the shaft of pinion 2 then shifts toward the left and the cranks operate in the manner described whereby the direction of rotation of the pinion is reversed by the crank arm of gear 23 during the first half revolution of the gear.

By causing the bed to reciprocate in this manner, it is not subjected to sudden or abrupt shocks each time its direction of movement is changed. Reversal of rotation of the pinion 2 takes place slowly and evenly during each stroke of the sliding bar when the turning movement of the pinion is at a minimum. The speed of rotation of the pinion progressively decreases to zero in one-fourth revolution of the crank during initial shifting of the bar 5, then reverses and progressively increases to normal speed in the next quarter revolution of the crank at which time the crank of the other gear is moving into engagement with the channel of the pinion.

Thus simple and reliable means have been provided for successively reversing the direction of movement of the press bed which does not impart sudden or abrupt shocks to the bed or to the reversing mechanism. Various changes may be made in the details of the structural embodiment of the invention here illustrated and described without departing from the spirit of the invention as described in the appended claims.

What I claim is:

1. The combination with a reciprocating member having a rack secured thereto, of mechanism for reciprocating said member involving a pinion in mesh with said rack, a slidable support for said pinion, means for moving said support back and forth, and a plurality of rotatable means consecutively cooperable with said pinion upon each change in the direction of movement of said member for respectively reversing the direction of the pinion.

2. The combination with a reciprocating member having a rack secured thereto, of mechanism for reciprocating said member involving a

pinion in mesh with said rack, means slidable back and forth carrying said pinion, and revoluble members consecutively cooperable with said pinion during sliding movement of said means for rotating said pinion, each of said revoluble members reversing the rotation of the pinion during movement of said means in one direction.

3. The combination with a reciprocating member having a rack secured thereto, of mechanism for reciprocating said member involving a pinion in mesh with said rack, a slidable support for said pinion, means for moving said support back and forth, and a pair of oppositely rotating gears for rotating said pinion, said gears respectively having means consecutively engageable with said pinion upon each change in the direction of movement of said support for respectively reversing the direction of rotation of the pinion.

4. The combination with a reciprocating member having a rack secured thereto, of mechanism for reciprocating said member involving a pinion in mesh with said rack, slidable means on which said pinion is mounted, a pair of meshing gears adjacent said pinion respectively provided with crank arms, and means rigid with said pinion consecutively engageable by said arms upon each change in the direction of movement of said member for rotating the pinion, each of said crank arms being adapted to reverse the direction of rotation of the pinion while in operative engagement with said means.

5. The combination with a reciprocating member having a rack secured thereto, of mechanism for reciprocating said member involving a pinion in mesh with said rack, a slidable support for said pinion, means for moving the support back and forth, a pair of oppositely rotating gears respectively having eccentric portions spaced laterally of said pinion, means on the face of said pinion adjacent said gears engageable by said eccentric portions for rotating the pinion, said eccentric portions moving consecutively into and out of engagement with said means on the pinion for effecting periodic reversal of rotation of said pinion.

6. The combination with a reciprocating member having a rack secured thereto, of mechanism for reciprocating said member involving a pinion in mesh with said rack, a slidable support for said pinion, means for moving the support back and forth, a pair of rotatable devices mounted to one side of said pinion and respectively having eccentrically disposed members for rotating the pinion, the axis of rotation of said devices being substantially parallel with the axis of rotation of said pinion, said eccentric members being consecutively engageable with said pinion and each being adapted to first rotate it in one direction and then in the reverse direction.

7. The combination with a reciprocating member having a rack secured thereto, of mechanism for reciprocating said member involving a pinion in mesh with said rack, a slidable support for said pinion, means for moving the support back and forth, a pair of meshing gears respectively having crank arms for rotating said pinion, and channel-shaped means on the side of said pinion adjacent said gears consecutively engageable by said crank arms, the rotation of said crank arms being timed with respect to the sliding movement of said pinion so that each crank arm will first cause the pinion to rotate in one direction and then in the reverse direction.

8. In a reciprocating bed motion for flat bed printing presses, the combination of a rack secured to the reciprocating bed, of a pinion in mesh with said rack, a sliding bar on which said pinion is rotatably mounted, means for moving said bar back and forth, oppositely rotatable gears adjacent said pinion, each of said gears being provided with a crank arm for rotating the pinion, and means rigid with the pinion engageable by the crank arm of one of said gears to rotate the pinion first in one direction and then in the reverse direction during sliding movement of the bar in one direction and engageable by the crank arm of the other of said gears to similarly rotate the pinion during sliding movement of the bar in the opposite direction.

9. In a reciprocating bed motion for flat bed printing presses, the combination of a rack secured to the reciprocating bed, of a pinion in mesh with said rack, a sliding bar on which said pinion is rotatably journaled, means for moving said bar back and forth, a pair of meshing gears disposed adjacent said pinion respectively having crank arms for rotating the pinion, and means carried by said pinion consecutively engageable by said arms upon each change in the direction of movement of said bar for rotating the pinion, each of said crank arms being adapted to cause the pinion to rotate in opposite directions while said bar is moving in one direction.

10. In a reciprocating bed motion for flat bed printing presses the combination of a rack secured to the reciprocating bed, of a pinion in mesh with said rack, a sliding bar in which said pinion is rotatably carried, a shaft including cam means for moving said bar back and forth, a pair of gears adjacent said pinion respectively provided with crank pins, means rigid with one of said gears and driven in response to rotation of said shaft for rotating said gears, and channel-shaped means rigid with one of the side faces of said pinion consecutively engageable by said crank pins whereby each crank pin is adapted to rotate the pinion first in one direction and then in the reverse direction while said bar is being moved in one direction.

11. The combination with a reciprocating bed having a rack secured thereto, of mechanism for reciprocating said bed involving a pinion in mesh with the rack, means for shifting said pinion laterally to and fro, a pair of oppositely rotating gears adjacent said pinion respectively having crank arms consecutively cooperable with said pinion for rotating it, each of said cranks when initially brought into cooperation with the pinion continuing to rotate it in the same direction as last rotated by the other crank and being adapted to reverse the direction of rotation thereof as the pinion is being shifted laterally.

12. The combination with a reciprocating bed having a rack secured thereto, cam means for shifting said pinion laterally to and fro, a pair of oppositely rotating gears respectively having crank arms consecutively cooperable with said pinion for rotating it, said cam means having concentric portions so that when said pinion is initially engaged by either of said cranks it continues to rotate without shifting laterally for approximately 360° in the same direction as last rotated by the other crank, and each of said cranks being adapted to reverse the direction of rotation of the pinion as it is being shifted laterally.

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