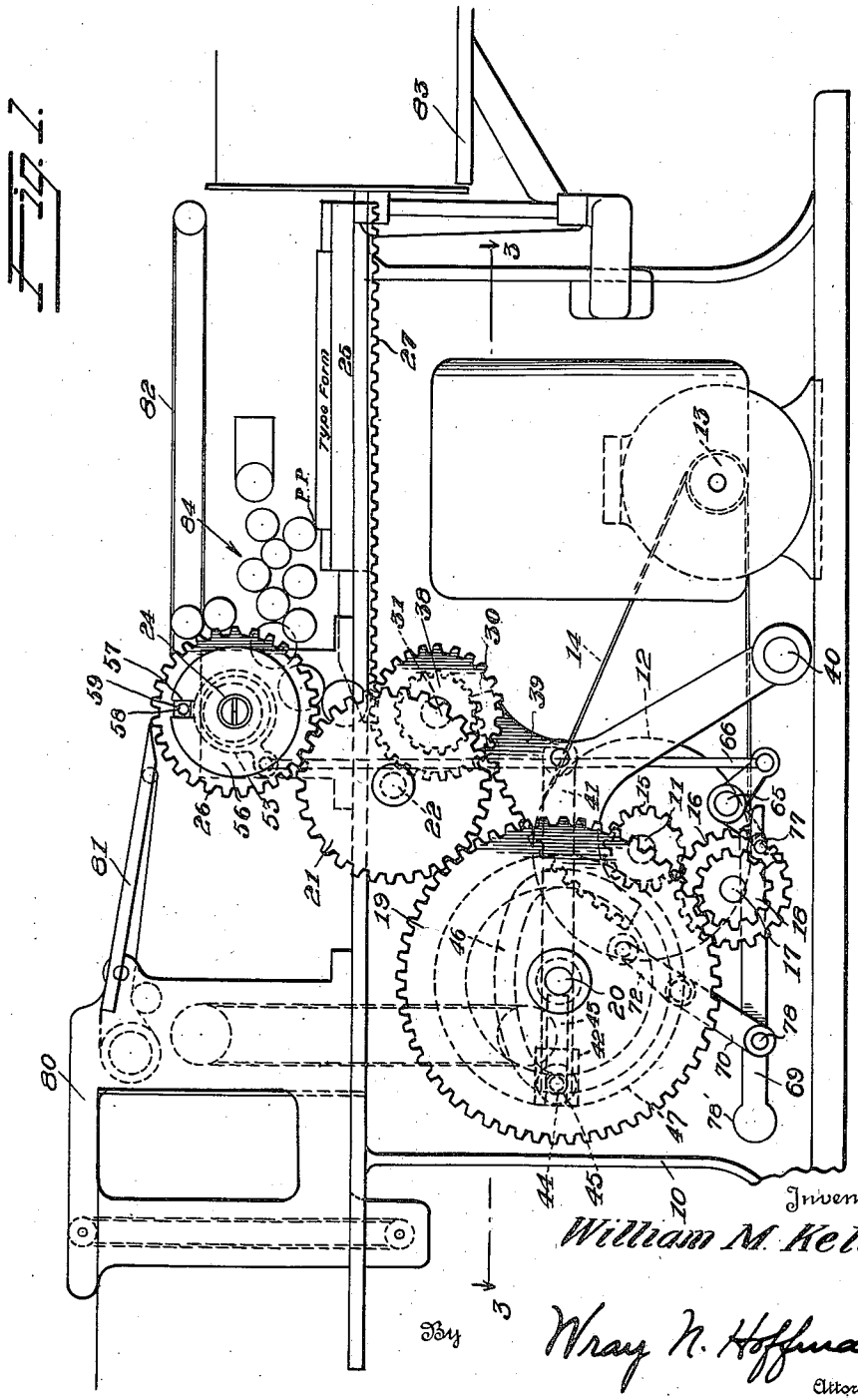
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Fig. 1.



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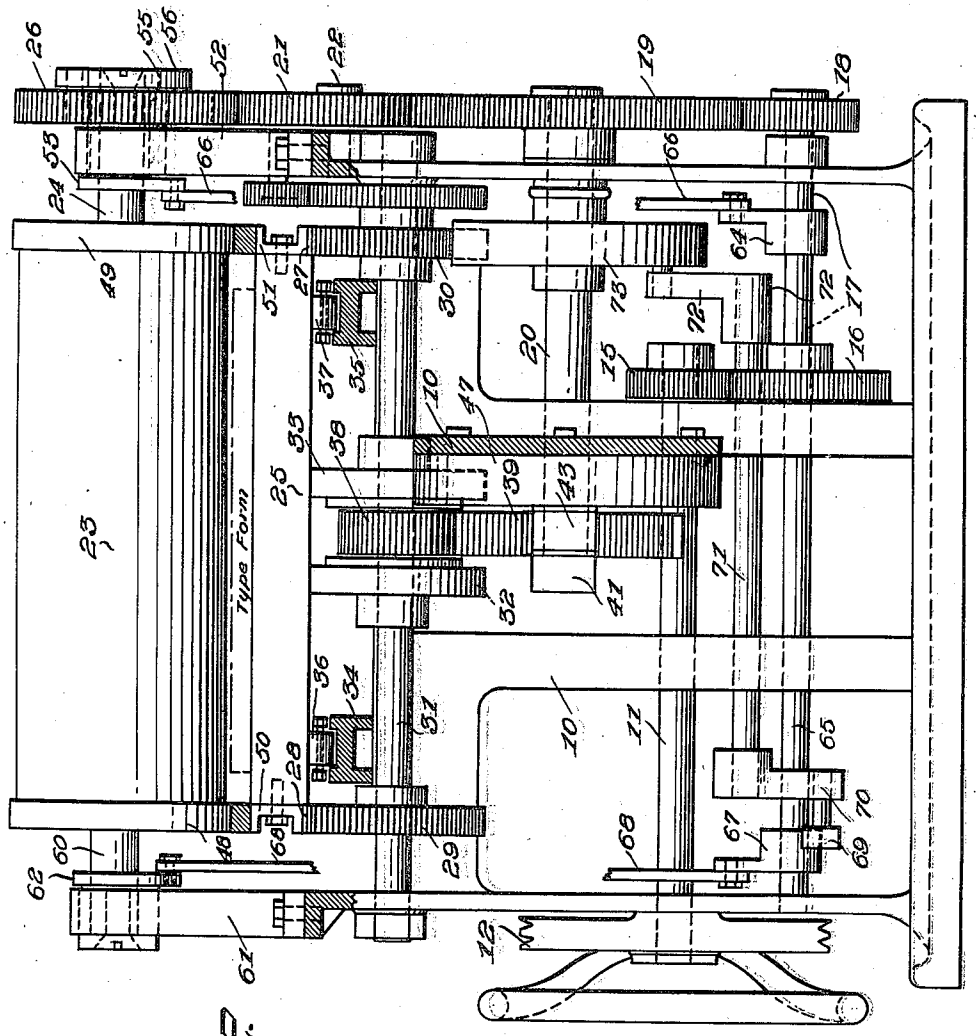


Fig. 2.

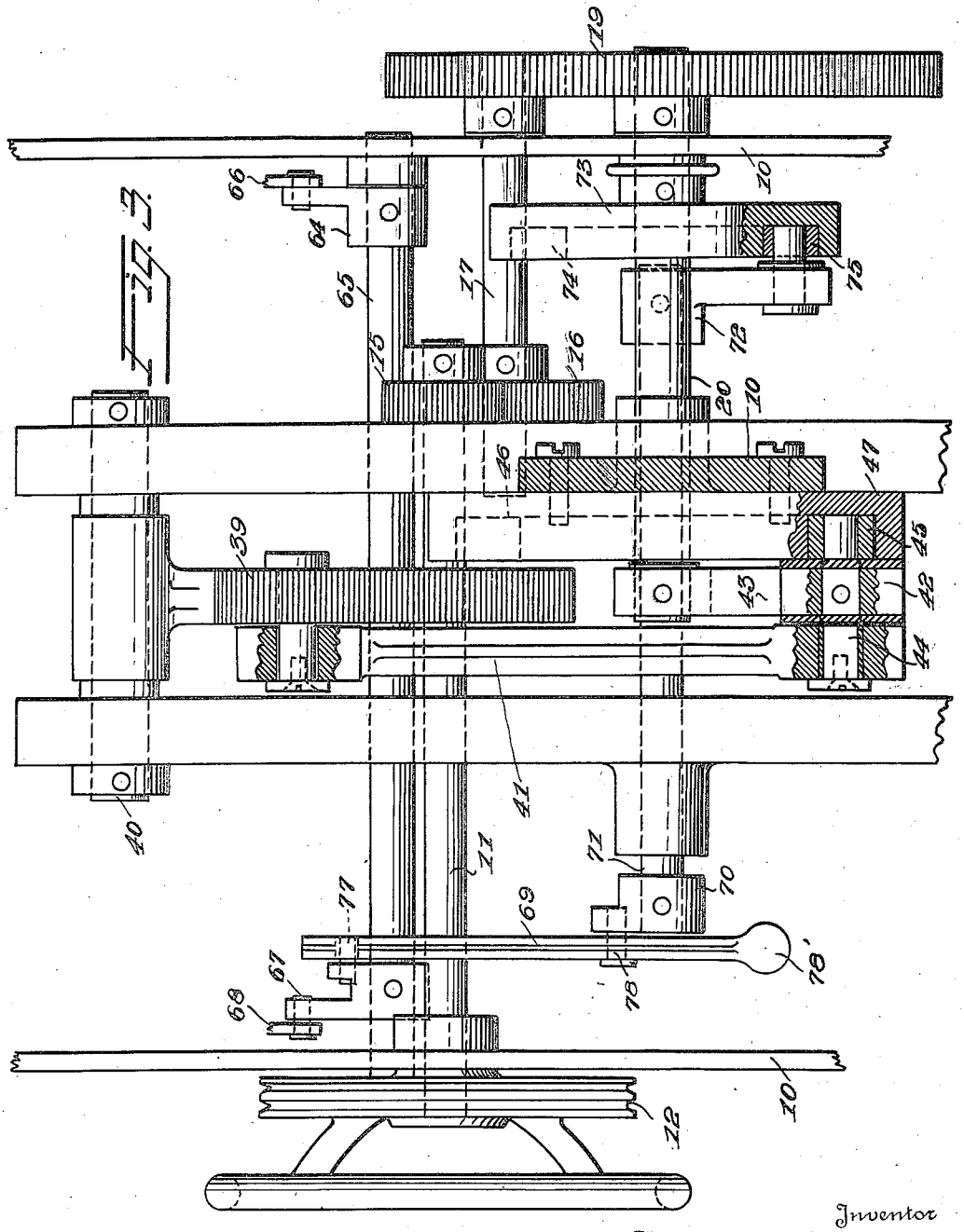
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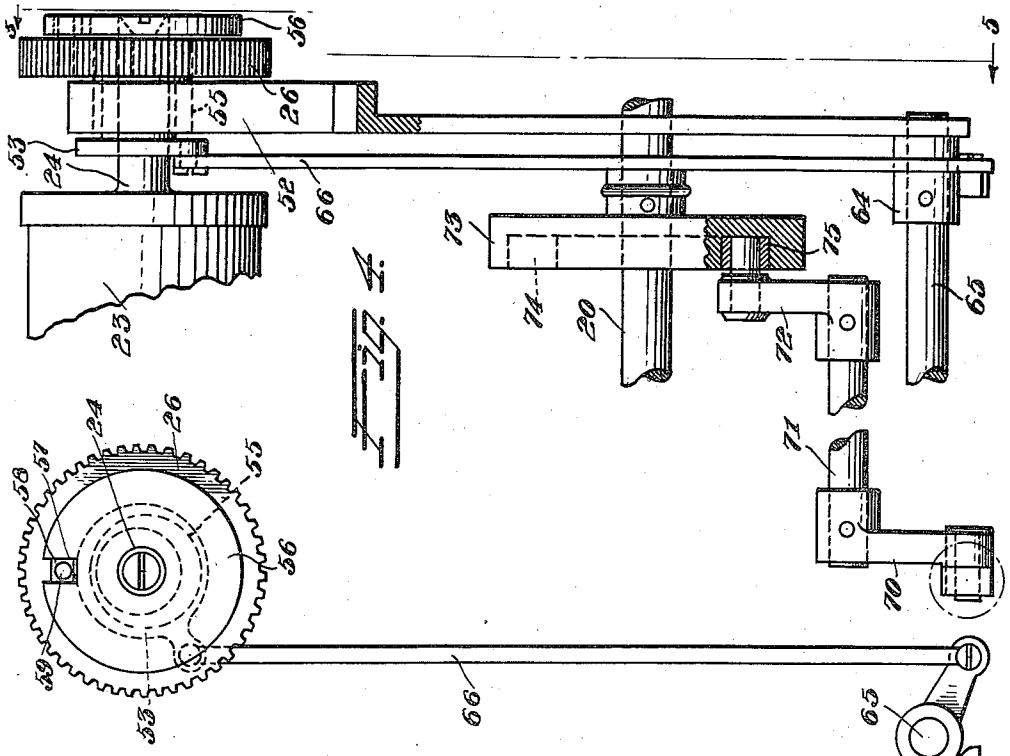


Fig. 4.

Fig. 5.

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PRINTING PRESS

William M. Kelly, Westfield, N. J.

Application July 13, 1939, Serial No. 284,365

9 Claims. (Cl. 74—27)

This invention relates to printing presses. More particularly it has to do with the two-revolution type of press in which there is a reciprocating bed and a continuously rotating impression cylinder which makes two revolutions for each reciprocation of the bed, the cylinder being lowered for the printing stroke of the bed and raised during the return stroke.

Accordingly, an object of the present invention is to provide a driving mechanism for the bed which will impart to it a uniform movement during the impression stroke and a harmonic movement on the reverse and return stroke.

Another object of the present invention is to provide means to rotate the impression cylinder in time with the reciprocations of the bed.

Another object of the present invention is to provide a means for connecting the impression cylinder to the driving gear whereby the gear is maintained concentrically mounted irrespective of the lowering and raising movements of the cylinder with respect to the bed.

A further object of the present invention is to provide a means for automatically lowering the impression cylinder toward the bed for the printing stroke and for raising the impression cylinder from the bed for the return or idle stroke.

Other objects and advantages will be apparent as the invention is described in greater detail in connection with the accompanying drawings wherein:

Figure 1 is a side elevational view of a printing press having the structure of the present invention embodied therein.

Figure 2 is a transverse sectional view through the impression cylinder and bed operating mechanism.

Figure 3 is a sectional view in plan taken on the line 3—3 of Figure 1.

Figure 4 is an enlarged sectional elevational view, showing the means for connecting the driving gear to the impression cylinder and the mechanism for effecting movement of the cylinder toward and from the bed.

Figure 5 is a vertical elevational view taken on the line 5—5 of Figure 4 with parts omitted for the sake of clarity.

Referring to the drawings the numeral 10 designates the frame of the printing press which supports the main driving shaft 11, this shaft having mounted on its outer end a pulley 12. The pulley 12 is driven by the motor pulley 13, Figure 1, through the medium of a belt 14.

As shown in Figures 1 and 2, the inner end of the main driving shaft 11 carries a gear 15 which meshes with a larger gear 16 on a countershaft 17, the countershaft being journaled in bearings in the frame 10 and carrying a pinion gear 18 outside the frame which meshes with a larger gear 19 arranged outside the frame on a driving shaft 20. The gear 19 meshes with an idler gear 21 arranged on a stud 22. The usual impression cylinder 23, which may be of any preferred construction, is arranged on a shaft 24 above the bed 25 and is driven by means of gear 26 which meshes with the gear 21. It is to be noted that the gear train is so selected that the cylinder gear 26 will make two complete revolutions to one of shaft 20.

Attached to the sides of the bed 25, Figures 1 and 2, are toothed racks 27 and 28 which are in meshing engagement with bed-drive gears 29 and 30 respectively arranged on a shaft 31 which is journaled in bearings in the frame 10. By inspection of Figure 2 it will be seen that shaft 31 also carries bed-supporting rolls 32 and 33 suitably spaced from each other and disposed centrally thereon. Arranged at a point adjacent the outer ends of the bed 25 and supported by the top of the frame 10 are tracks 34 and 35 which extend longitudinally of the bed, said tracks supporting anti-friction rollers 36 and 37, preferably of the slider type.

Referring to Figure 2, it will be seen that the impression cylinder 23 is provided with bearers 48 and 49 at the ends thereof which ride upon bed bearers 50 and 51 carried by the tops of racks 27 and 28.

Mounted on the shaft 31, Figures 1, 2, and 3, intermediate the bed-drive gears 29 and 30 is a pinion 38 which is in mesh with a segment gear 39 fulcrumed as at 40. The segment gear 39 carries a link 41 which is connected to a block 42 slidably mounted upon a slotted crank arm 43 secured to the inner end of the driving shaft 20 by means of a wrist pin 44. The inner end of the pin 44 carries a roller 45 rotatably mounted thereon which engages the cam slot 46 of a synchronizing face cam 47 fixedly secured to the inner portion of the frame 10. It is to be noted that the mounting of the gear segment 39 is such that its course of travel is in reverse direction to that of the reciprocations of the bed 25. Such mounting has the advantage of balancing momentum thrust.

As will be observed from Figure 1 approximately one-half of the cam slot 46 is concentric with the axis of the shaft 20 and the other half is of varying curvature and the different portions thereof are arranged at different distances from

the axis of the shaft 20 so that as the slotted arm 43 rotates, the wrist pin 44 will be at a uniform distance from the shaft 20 while traversing the lower half of the cam slot 46 and will, as a consequence, give simple harmonic motion to the gear segment 39. While the roller 45 is traversing the upper part of the cam slot 46 the distance of the wrist pin 44 from the axis of the shaft 20 will vary and consequently the velocity imparted to the gear segment 39 will be in accordance with this varying distance. The upper part of the cam slot 46 is so designed that the gear segment 39 will move at a uniform velocity while the roller 45 is traversing this part of the slot and therefore, the gears 29 and 30 will also travel at a uniform velocity, and these gears and the pinion 38 and gear segment 39 will cooperate to give to the bed 25 the requisite uniform motion on the forward printing stroke. While the roller 45 is traversing the lower half of the cam slot 46, the crank arm 43 and gear segment 39 and pinion 38 will cooperate to give to the bed 25 the harmonic motion on the reverse idle stroke.

By reference to Figures 2 and 4 it will be seen that the shaft 24 of the impression cylinder 23 extends through a housing 52 and is journaled in the concentrically arranged bore in an eccentric 53 mounted within such housing. The eccentric 53 is provided with a sleeve 55, Figure 5, which extends outwardly from the housing 52. It is to be noted that the inner peripheral bore of the sleeve 55 is eccentric while the outer peripheral surface is concentric. Journaled upon the outer concentric surface of the sleeve 55 is the gear 26. Disposed directly beyond the end of the sleeve 55 and keyed to the shaft 24 is a disk 56 provided with a radial slot 57 in which is mounted a slide block 58. A pin 59 passes through the slide block 58 and is screwed into the side of the gear 26. During the course of rotative travel of the eccentric 53, the slot 57 moves up and down about the pin 59. Protruding from the other end of the impression cylinder 23 is a shaft 60 which extends through a housing 61 and is journaled in the concentrically arranged bore in an eccentric 62 mounted within such housing. This mounting of the cylinder shafts 24 and 60 is of particular advantage in that it enables the cylinder gear 26 to be maintained concentrically mounted irrespective of the lowering and raising movements of the cylinder with respect to the bed.

The eccentric 53, Figure 2, is connected to an arm 64 secured to one end of a rock-shaft 65 by means of a link 66. Eccentric 62 is also connected to an arm 67 secured to the opposite end of rock-shaft 65 through the medium of a link 68. The arm 67, Figure 3, carries a pin 77 adapted to be engaged by a hook 79, Figure 5, on one end of a link 69 which is pivoted as at 78 to an arm 70 carried by a shaft 71. As shown in Figures 3 and 5, the other end of the link 69 is provided with a weight 78'. Mounted on the shaft 71 and secured thereto is an arm 72, said arm carrying a roller 75, Figure 4, which engages the cam slot 74 of a cam 73 rotatably mounted on the driving shaft 20. As will be seen from Figure 5, the rotation of the shaft 20 causes the arms 70 and 72 to be rocked back and forth and so long as the hook 79 is in engagement with the pin 77, the impression cylinder 23 through the eccentrics 53 and 62 will be uniformly raised and lowered in accordance with the reciprocations of the bed 25.

As shown in Figure 1, the printing press includes a feed pile table 80 adapted to feed sheets singly from a pile supported thereon to a feed board 81 by which the sheet is conveyed to the impression cylinder 23. The cylinder is provided with the usual grippers but since they form no part of the present invention it is not deemed necessary to make a showing thereof. The sheet upon reaching the cylinder is taken up by the grippers, and when the portion marked P. P. on the right of Figure 1 of the type form carried by the bed 25 has been advanced until it reaches the center of the impression cylinder, the printing begins and continues until a maximum, for example 17 inches, is reached, whereupon the grippers release the printed sheet. With the release of such sheet it is deposited upon the tapes 82 and is conveyed by such tapes to a delivery pile table 83. Upon the reverse idle stroke, the cylinder is raised by the eccentrics 53 and 62 to clear the type form. It is to be noted that to the right of the cylinder is mounted an inking mechanism 84.

It will be apparent from the above description that the present invention offers decided advantages in compactness and simplicity and, while the invention is preferably constructed in accordance with the accompanying drawings, various changes and substitutions may be effected therein as fall within the spirit and scope of the appended claims.

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

1. In a printing press having a reciprocating bed adapted to execute a forward printing stroke and a reverse idle stroke, the combination with a toothed rack secured to said bed, of means for driving said rack and bed in alternately opposite directions, said means including a gear meshing with said rack, a second gear secured for rotation with said first named gear, a rotatable driving element, a fulcrumed segment gear operatively connected to said element and engaging and driving said second gear, and mechanism including a fixed cam associated with said segment gear for imparting substantially harmonic reciprocation thereto.

2. A printing press according to claim 1 wherein the mechanism comprises a fixed synchronizing cam, and a link carried by said gear segment having its free end operatively connected to said cam.

3. A printing press according to claim 1 wherein the mechanism comprises a fixed synchronizing cam provided with a slot, a link carried by said gear segment, and roller means carried by said link mounted for travel in said slot.

4. In a printing press having a reciprocating bed adapted to execute a forward printing stroke and a reverse idle stroke, the combination with a toothed rack secured to said bed, of means for driving said rack and bed in alternately opposite directions, said means including a gear meshing with said rack, a second gear secured for rotation with said first named gear, a rotatable driving element having a slotted arm secured thereto and carried thereby, a block slidably mounted upon said arm, a fulcrumed segment gear positioned to engage and drive said second gear, a link carried by said gear segment, a wrist pin connecting said link to said block, and means associated with said wrist pin for imparting substantially harmonic reciprocation to said gear segment.

5. In a printing press having a reciprocating bed adapted to execute a forward printing stroke and a reverse idle stroke, the combination with a toothed rack secured to said bed, of means for

driving said rack and bed in alternately opposite directions, said means including a gear meshing with said rack, a second gear secured for rotation with said first named gear, a rotatable driving element having a slotted arm secured thereto and carried thereby, a block slidably mounted upon said arm, a fulcrumed segment gear positioned to engage and drive said second gear, a link carried by said gear segment, a wrist pin connecting said link to said block, and means associated with said wrist pin for imparting substantially harmonic reciprocation to said gear segment, said last named means comprising a fixed synchronizing cam provided with a slot, and roller means carried by said wrist pin mounted for travel in said slot.

6. In a printing press having a reciprocating bed adapted to execute a forward printing stroke and a reverse idle stroke, the combination with toothed racks disposed at each side of and secured to said bed and extending longitudinally thereof, of a shaft extending transversely of said racks, a pair of gears carried by said shaft and positioned so they are in meshing engagement with said racks, an intermediate gear disposed between said pair of gears and carried by said shaft, a rotatable driving element embodying a second transversely disposed shaft, a fulcrumed segment gear operatively connected to said last named shaft and engaging and driving said intermediate gear, and mechanism including a fixed cam associated with said segment gear for imparting substantially harmonic reciprocation thereto.

7. A printing press according to claim 6 wherein the mechanism comprises a fixed synchronizing cam, and a link carried by said gear segment having its free end operatively connected to said cam.

8. In a printing press having a reciprocating bed adapted to execute a forward printing stroke and a reverse idle stroke, the combination with racks disposed at each side of and secured to said bed and extending longitudinally thereof, of a shaft extending transversely of said racks, a pair of gears carried by said shaft and positioned so that they are in meshing engagement with said racks, an intermediate gear disposed between said pair of gears and carried by said shaft, a rotatable driving shaft having a slotted arm secured thereto and carried thereby, a block slidably mounted upon said arm, a fulcrumed segment gear positioned to engage and drive said intermediate gear, a link carried by said gear segment, a wrist pin connecting said link to said block, and means asssociated with said pin for imparting substantially harmonic reciprocation to said gear segment.

9. In a printing press having a reciprocating bed adapted to execute a forward printing stroke and a reverse idle stroke, the combination with racks disposed at each side of and secured to said bed and extending longitudinally thereof, of a shaft extending transversely of said racks, a pair of gears carried by said shaft and positioned so that they are in meshing engagement with said racks, an intermediate gear disposed between said pair of gears and carried by said shaft, a rotatable driving shaft having a slotted arm secured thereto and carried thereby, a block slidably mounted upon said arm, a fulcrumed segment gear positioned to engage and drive said intermediate gear, a link carried by said gear segment, a wrist pin connecting said link to said block, and means associated with said pin for imparting substantially harmonic reciprocation to said gear segment, said last named means comprising a fixed synchronizing cam provided with a slot, and roller means carried by said pin mounted for travel in said slot.

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