W. S. HUSON.

FLAT BED PRINTING PRESS.

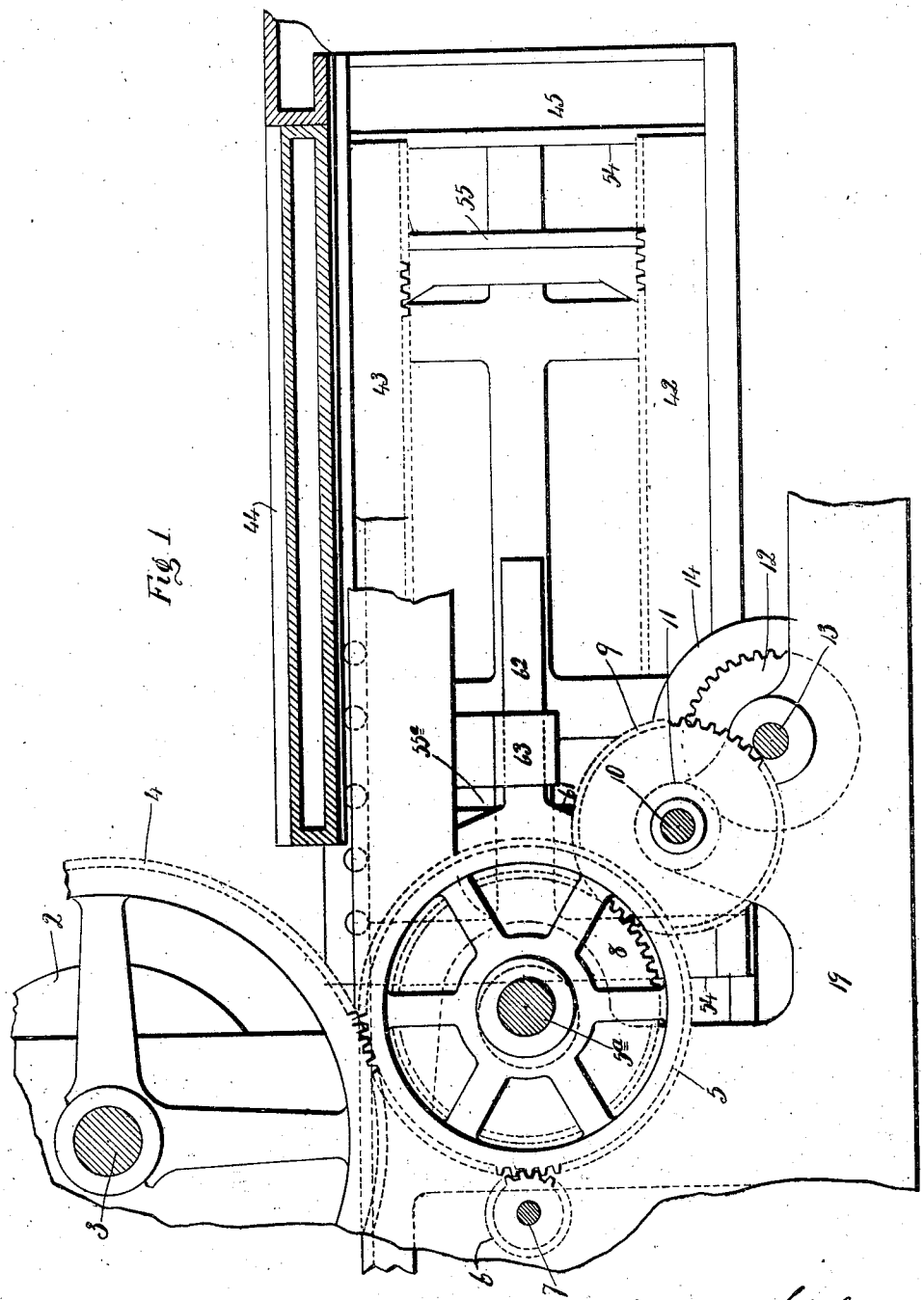
APPLICATION FILED MAY 10, 1909.

950,136.

Patented Feb. 22, 1910.

7 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
C. J. Reed.
C. L. Reed

Winfield S. Huson
Inventor
by Seymour & Earee
Attys

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7 SHEETS—SHEET 2.

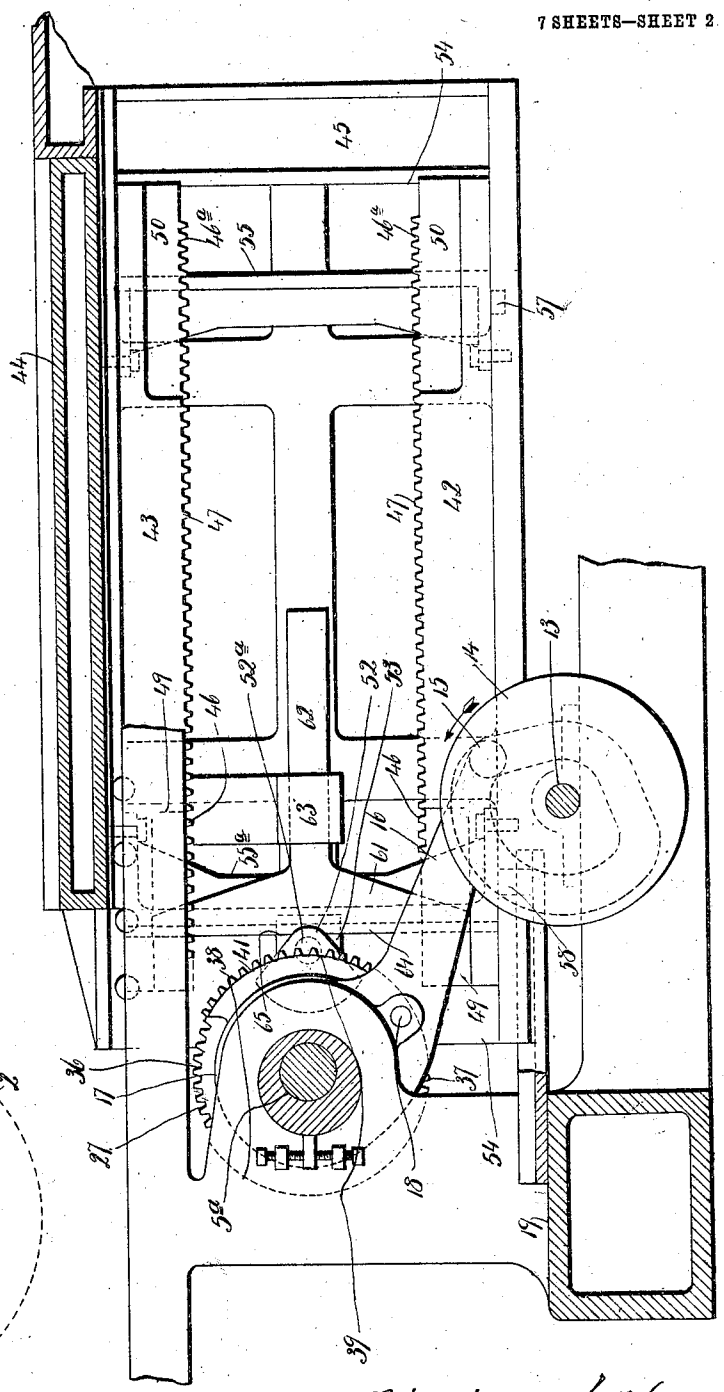

Fig 2.

Witnesses
C. J. Reed.
C. L. Reed

Winfield S. Huson
Inventor
by Seymour & Earle
Attys

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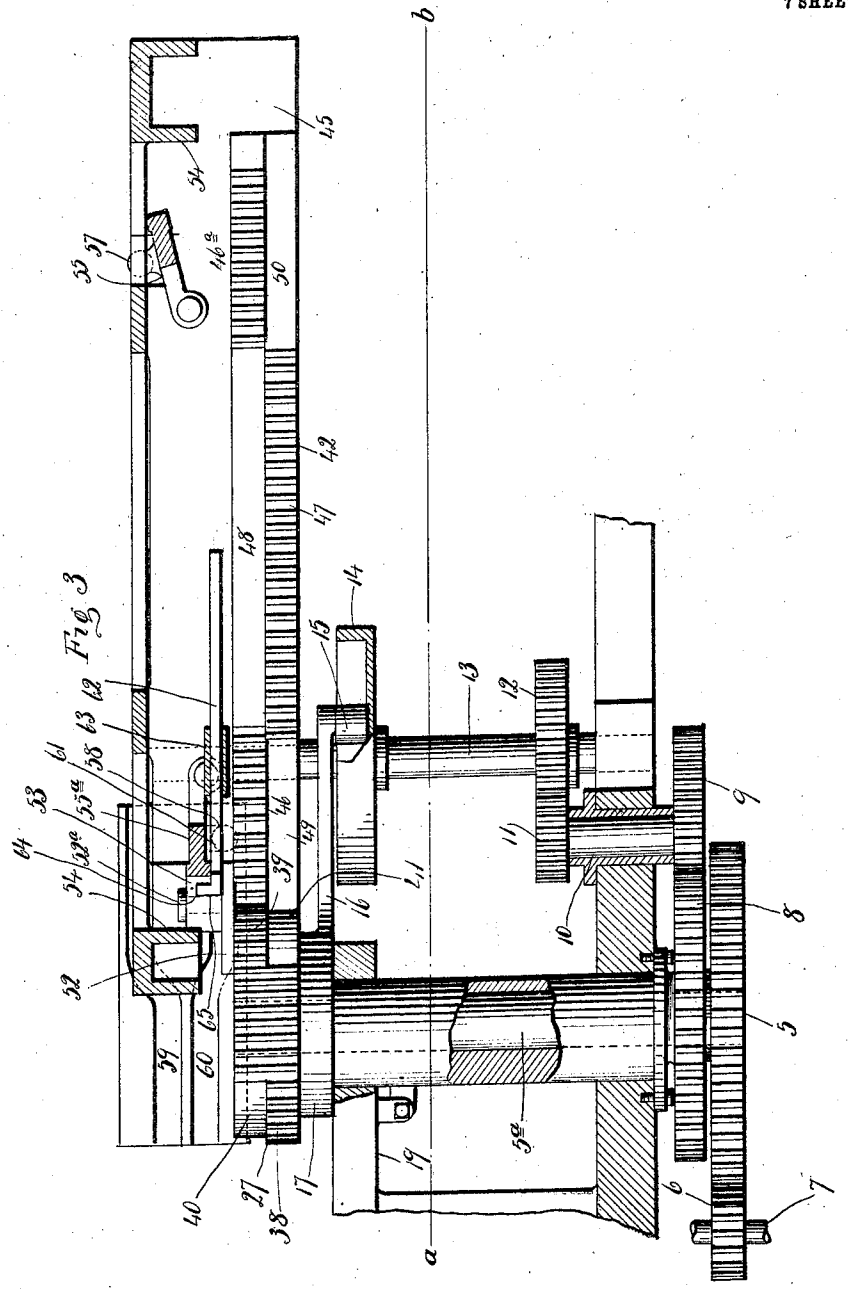
7 SHEETS—SHEET 3.

Fig 3



Witnesses
C. J. Reed.
C. L. Reed

Inventor
Rufield S. Huson
by Seymour & Reed
attys

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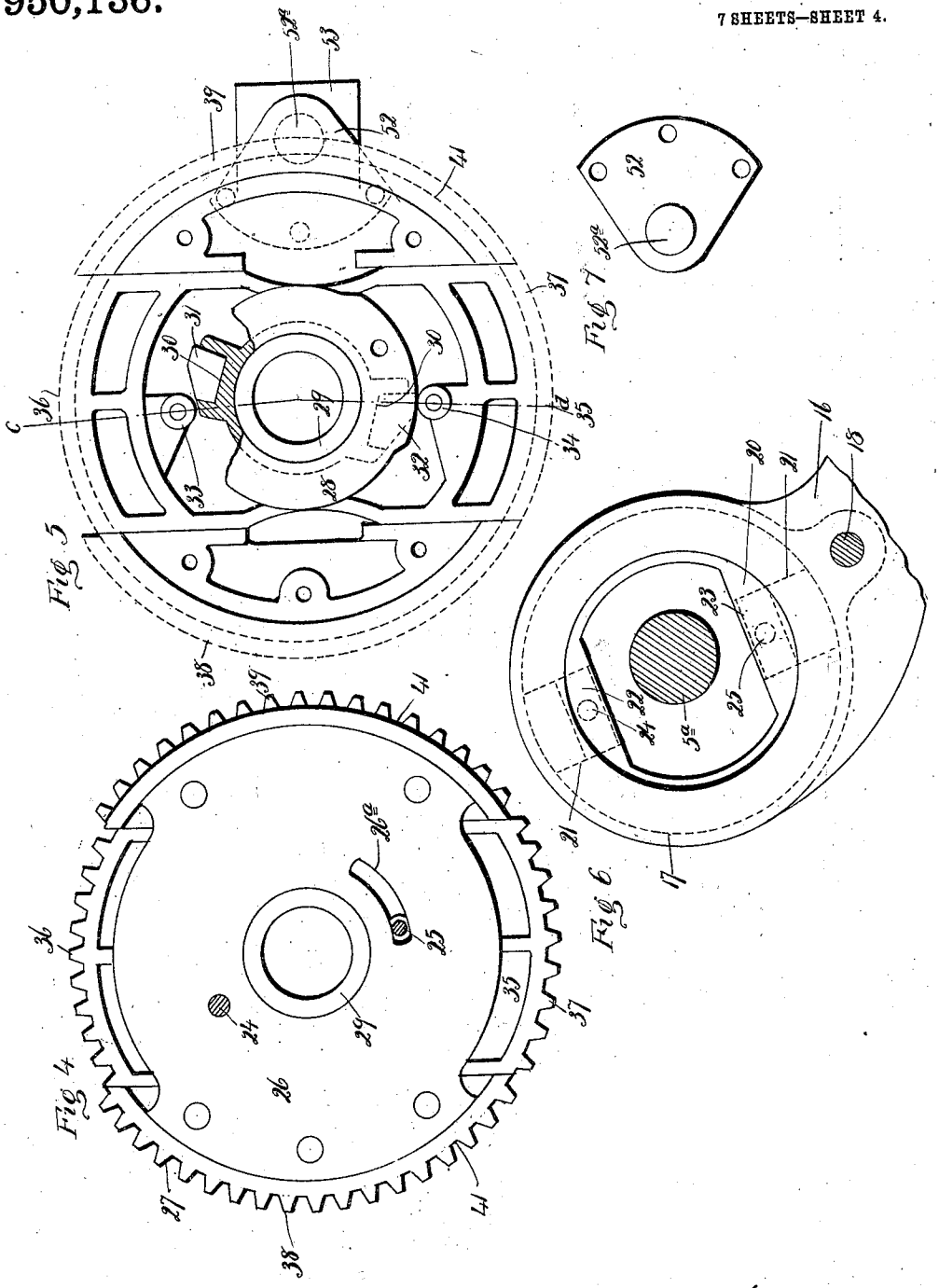

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C. L. Reed

Winfield S. Huson
Inventor
by Seymour & Carey Attys

W. S. HUSON.

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7 SHEETS—SHEET 5.

Fig 10.

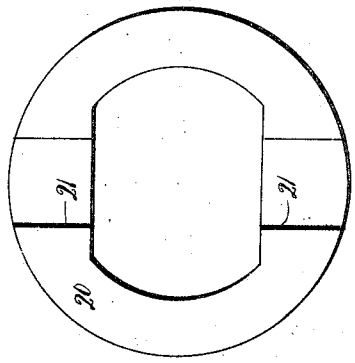


Fig 8.

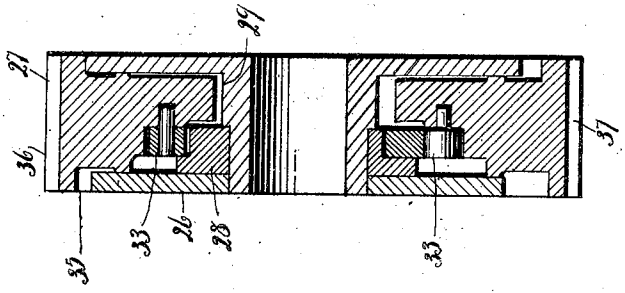
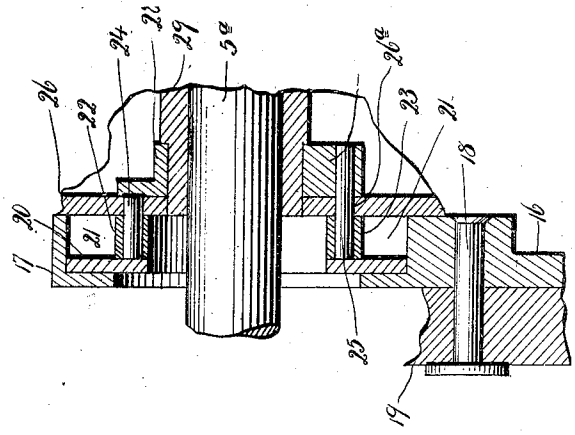


Fig 9.



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C. L. Reed

Winfield S. Huson
Inventor
by Seymour & Earee
Attys

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7 SHEETS—SHEET 6.

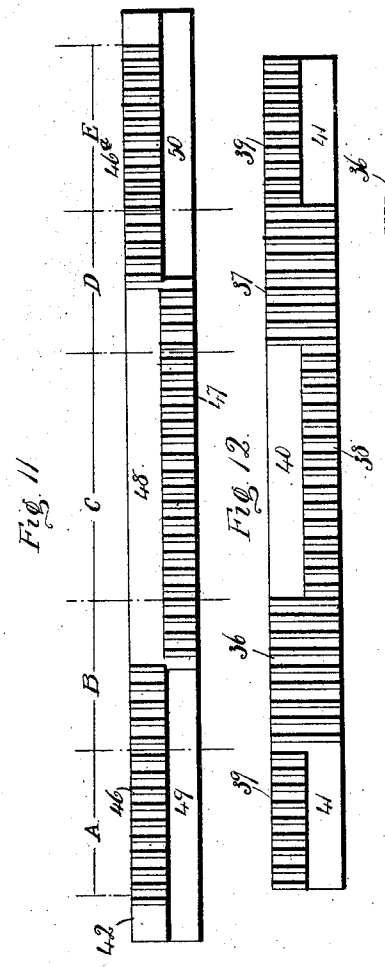

Fig. 11.

Fig. 12.

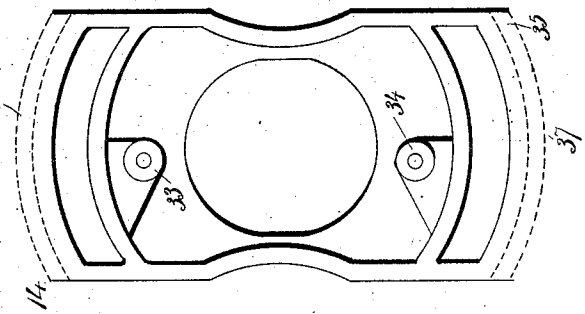

Fig. 14.

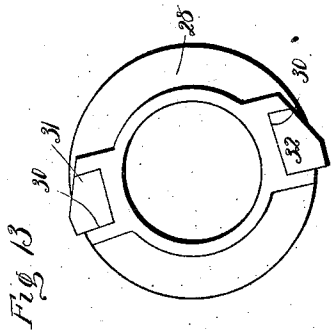

Fig. 13.

Witnesses
C. J. Reed.
C. L. Reed

Inventor
Barfield S. Huson
by Seymour & Earle
Attys

W. S. HUSON.

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APPLICATION FILED MAY 10, 1909.

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Patented Feb. 22, 1910.

7 SHEETS—SHEET 7.

Fig. 16

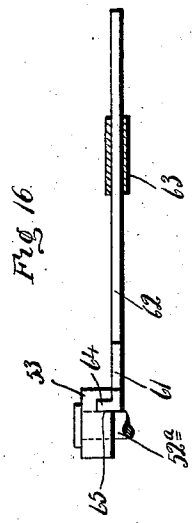


Fig. 19

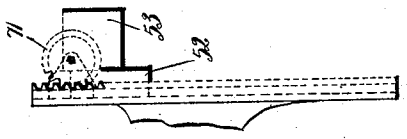


Fig. 15

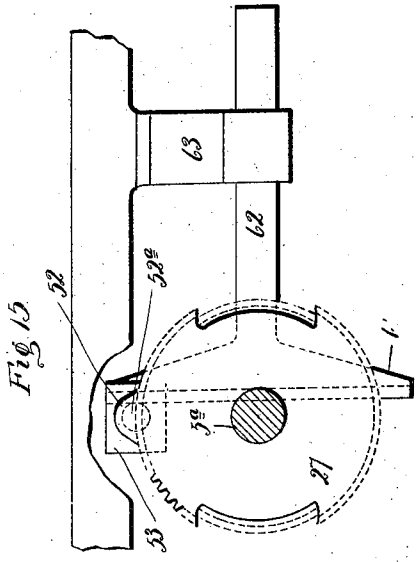


Fig. 18

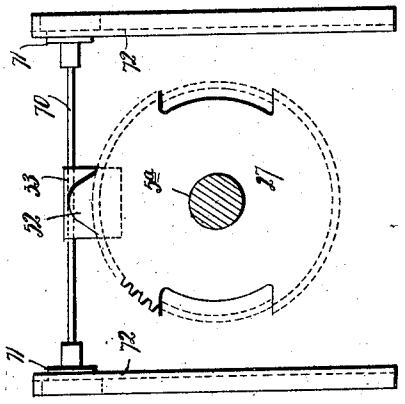
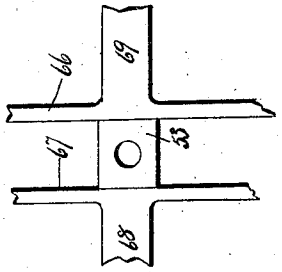


Fig. 17



Witnesses
C. J. Reed.
C. L. Reed

Winfield S. Huson
Inventor
by Seymour & Carey
Attys

UNITED STATES PATENT OFFICE.

WINFIELD S. HUSON, OF DERBY, CONNECTICUT, ASSIGNOR TO THE WHITLOCK PRINTING PRESS MFG. CO., OF DERBY, CONNECTICUT.

FLAT-BED PRINTING-PRESS.

950,136. Specification of Letters Patent. Patented Feb. 22, 1910.

Application filed May 10, 1909. Serial No. 495,151.

To all whom it may concern:

Be it known that I, WINFIELD S. HUSON, a citizen of the United States, residing at Derby, in the county of New Haven and State of Connecticut, have invented a new and useful Improvement in Flat-Bed Printing-Presses; and I do hereby declare the following, when taken in connection with the accompanying drawings, and the numerals of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1 a broken view in vertical longitudinal section of a flat-bed printing press constructed in accordance with my invention and showing the outside gears employed for driving the impression cylinder. Fig. 2 a view of the press in vertical longitudinal section on the line *a*—*b* of Fig. 3, the impression cylinder being shown by broken lines. Fig. 3 a broken plan view of the press partly in horizontal section. Fig. 4 a detached face view of the bed-driving gear, with the wrist-pin and wrist-pin plate removed. Fig. 5 a similar view with the cover removed and the cam-carrier partly in section. Fig. 6 a broken detached view of the converter, so called, by means of which the cams of the bed-driving gear are thrown, the bed-driving gear shaft being shown in section. Fig. 7 a detached face view of the wrist-pin plate and wrist-pin. Fig. 8 a view in transverse section on the line *c*—*d* of Fig. 5 of the bed-driving gear. Fig. 9 a broken sectional view showing the converter in its relation to the bed-driving gear. Fig. 10 a detached view of the recessed block-carrying ring located within the converter. Fig. 11 a plan view of one of the bed-racks, the other being precisely like it. Fig. 12 a view showing the development of the bed-driving gear. Fig. 13 a detached view of the oscillating cam-carrier. Fig. 14 a similar view of the double-ended sector. Fig. 15 a detail view showing the mechanism employed for maintaining the reversing-block in position. Fig. 16 a broken plan view thereof, partly in section. Fig. 17 a broken view in elevation of a modified form of reversing-block positioning mechanism. Fig. 18 a detail view in elevation of still another form of reversing-block positioning mechanism. Fig. 19 a broken end view of the device of Fig. 18.

My invention relates to an improvement in that class of flat-bed cylinder presses in which the cylinder is rotated by gearing outside of the main frame of the press and in which the type-bed is reciprocated by a bed-driving gear alternately engaged with racks connected with the bed which is driven in one direction by the coaction of the gear with one rack, and in the opposite direction by the coaction of the gear with the other rack.

The object of my present invention is to produce a simple, compact, durable and powerful bed-driving mechanism constructed with particular reference to the reciprocation of the type-bed at a high speed and to a superior registration of the bed with the impression cylinder.

With these ends in view my invention consists in certain details of construction and combinations of parts as will be hereinafter described and pointed out in the claims.

In carrying out my invention as herein shown, the press is provided with the usual impression cylinder 2 mounted upon a shaft 3 carrying a gear 4 meshed into by a driving-gear 5 mounted upon the bed-driving gear shaft 5^a. The said gear 5 is meshed into by a driving pinion 6 on the main driving-shaft 7. A gear 8 secured to the gear 5 meshes into a gear 9 on a shaft 10 carrying a pinion 11 meshing into a gear 12 upon a cam-shaft 13, the said gears 8, 9 and 12 and the pinion 11 forming a train for driving the said cam-shaft 13. The parts thus far described are of old and well known construction.

The cam-shaft 13 carries a box-cam 14 receiving a cam-roller 15 mounted upon one end of the arm 16 of a converter, so called, which also comprises a shell 17 and which is mounted so as to swing upon a stud or fulcrum 18 fixed in a part of the frame 19 of the press. The cam 14 I shall hereafter call the converter-cam for convenience of identification. Within the shell 17 I locate a block-carrying ring 20 provided at opposite points in its circumference with radial guide-ways 21, 21, receiving movable connecting blocks 22, 23, respectively mounted

upon studs 24 and 25, the stud 24 being fixed in the removable cover 26 of the bed-driving gear 27 which is mounted upon the bed-driving gear shaft 5a. The stud 25 projects through a segmental clearance slot 26a in the cover 26, and is carried by an annular cam-carrier 28 located within the bed-driving gear 27 so as to have oscillating movement upon the internal hub 29 thereof. The said cam-carrier 28 is provided at opposite points in its periphery with recesses 30 for the reception of block-like cams 31 and 32 respectively co-acting with cam-rollers 33 and 34, the cam-roller 33 being mounted near one end of a double-ended sector 35, while the cam-roller 34 is located in a corresponding position near the other end of the sector 35, the respective ends of which are formed with wide toothed segments 36 and 37 and the radial movement or throw of which is sufficient to bring the teeth of its segment 36 into play, while the teeth of its segment 37 at its opposite end are cut out of action, and vice versa. The sector itself is let into the gear 27 so as to be radially mounted therein, being a trifle shorter than the diameter of the gear.

By reference to Fig. 12 it will be seen that the teeth of the bed-driving gear consist of two fixed segments 38, 39, located out of line with each other or "staggered," and having interposed between them the segmental sections 36 and 37 of the double-ended sector which really forms a part of the bed-driving gear 27. The teeth of the segments 36 and 37 extend across the entire width of the gear so as to join the segments 38 and 39 the teeth of which are only half the width of the gear. In Fig. 12 the segment 39 appears as divided at the ends of the figure, but in reality the segment 39 is like the segment 38 and only appears to be divided in the figure which is a linear development of the gear. Under this construction, the teeth of the gear are separated by clearance spaces 40 and 41, as well as by the clearance spaces temporarily produced by the endwise movement of the double-ended sector 35.

Fig. 11 of the drawings represents the lower bed-driving rack 42. The upper bed-driving rack 43 is identically like it. Both racks are rigidly secured to the hanger 45 of the flat type-bed 44. As the bed-driving racks 42 and 43 are precisely alike, a description of the lower rack will suffice for both. Following the principle on which the teeth of the bed-driving gear 27 are arranged, the teeth of the bed-driving racks are arranged in three sections 46, 46a and 47, the section 47 being out of line with the sections 46 and 46a, and the three sections as thus arranged forming clearance spaces 48, 49 and 50. In the claims, or in some of them, I shall use the generic term "gearing" to designate these bed-driving racks or their equivalents.

It will be seen from the foregoing that the bed-driving gear 27 and the bed-driving racks 42 and 43 are constructed on the principle, as might be said, of solids and voids, so that while the teeth of the gear are coacting with the teeth of one rack, the voids or clearance spaces of the gear are clearing the teeth or solids of the other rack and vice versa, the spaces between the segments 38 and 39 of the gear being bridged by the wide segments 36 and 37 on the opposite ends of the sliding double-ended sector 35, the operation of which is timed by the converter cam 14 so that the void produced by its endwise movement by the virtual retirement or withdrawal from play of one or the other of its wide segments 36 or 37, takes place just at the time the clearance is required to avoid the teeth of the rack out of play, whichever one it may be. In this connection I may say that the bed-driving gear 27 makes one complete revolution in each bed-driving rack for each complete movement of the type-bed 44 in so far as the type-bed is reciprocated by the bed-driving gear 27.

The reversing of the type-bed in direction of movement at the ends of its forward and return movements, is effected independently of the bed-driving racks. For this purpose I employ a wrist-pin plate 52 bolted to the bed-driving gear 27 and carrying a wrist-pin 52a in turn carrying a reversing-block 53 which moves up and down between two pairs of vertical abutments respectively located at the ends of the type-bed 44 and each pair comprising a fixed abutment 54 and pivotal abutments 55 and 55a. The fixed abutments 54 form in reality parts of the bed-hanger 45. The pivotal abutments or "shutters" 55, 55a, are pivotally mounted upon other parts of the bed-hanger 45. The pivotal abutments, or "shutters" as they are commonly called, are provided with cam-rollers 57, 58 for their operation, the cam-roller 57 of the shutter 55 entering a cam-path 59, and the cam-roller 58 of the "shutter" 55a entering a cam-path 60. These cam-paths 59 and 60 are located in the main frame 19 of the machine at a point substantially below the shaft 5a carrying the bed-driving ger 27. The operation of the "shutters" 55, 55a, is timed by the cam-paths 59, 60, so that when in the movement of the type-bed one face of the reversing-block 53 has been brought into engagement with one of the fixed abutments 54, then the shutter forming the fellow of the said abutment will immediately be swung into place and held in engagement with the opposite face of the said block 53 during the

period covered by the reversal of the type bed in direction of movement, this being effected by the vertical movement of the block for which the bed-driving gear 27 makes a half revolution during which time the movement of the type bed through the medium of the reversing-block 53 and the said gear 27 is retarded, stopped, reversed in direction and accelerated in the usual manner not needing more detailed description.

In order that the reversing-block 53 may be prevented from rocking upon the wrist-pin 52^a and so getting out of position for proper presentation to the fixed abutments 54 at the ends of the type-bed, I employ a reversing-block positioning device which may take various forms. As shown in Figs. 1, 2, 3, 15 and 16 my improved positioning-device consists of a vertically arranged guide-plate 61 having a horizontal supporting-arm 62 arranged to reciprocate in a bracket 63 applied to the main frame 19 of the machine. The said plate 61 is formed with a guiding flange 64 entering a vertical slot 65 formed for its reception in the block 53. It will be clear that as the bed-driving gear 27 moves the reversing-block 53 up and down, it will be prevented from rocking by the flange 64 which is allowed to follow the block by the sliding movement of the arm 62 back and forth in the bracket 63. In this way I insure the right presentation of the block to the abutments 54 and the shutters 55, 55^a, when the block is introduced between them to reverse the type-bed in direction of movement.

In the modified form of positioning device shown in Fig. 17, it takes the form of a "Scotch yoke," so called, 66 inclosing a guide-way 67 for the reception of the reversing-block 53 and having horizontal supporting arms 68, 69, reciprocating in brackets similar to 63 but not shown.

In the modified positioning device shown in Figs. 18 and 19, a squaring shaft 70 passes through the reversing block 53 and prevents the same from rocking upon its wrist-pin 52^a. The said squaring shaft 70 is furnished at its ends in the usual manner with corresponding pinions 71, 71, meshing into upright racks 72 secured to the main-frame 19 of the press. As the bed-driving gear 27 revolves with the shaft 5^a, the reversing block 53 slides from one end to the other of the squaring shaft 70 which rises and falls according to the throw of the gear, but in all of this movement, the block 53 itself is preserved in position for right presentation to the abutments 54, 54, at the end of the type-bed.

The operation of the different parts of the press have been so much detailed in conjunction with the foregoing description that it seems unnecessary to describe the operation of the press at length. I will therefore content myself with briefly setting forth the operation of the bed-driving gear 27 in conjunction with the bed-driving racks 42 and 43. In the first place, it will be understood that the path of the converter-cam 14 is shaped so as to effect the oscillation of the annular cam-carrier 28 upon the hub 29 of the bed-driving gear 27, at the moment required for moving the double-ended sector 35 in one direction or the other, the cam-block 31 being moved for coaction with its roller 33 just as the cam-block 32 is moved out of coaction with the roller 34 and vice versa, so that the double-ended sector 35 is always firmly held. Now let it be supposed that the type-bed 44 has been driven to the limit of its outward movement and reversed in direction by the bed-driving gear 27 and the reversing-block 53, and that the latter is just going out of play. Just at this moment the fixed segment 39 of the gear meshes into the section 46 of the upper bed-rack 42, whereby the type-bed is moved through the interval designated A in Fig. 11. During the interval A, the converter-cam 14 operates to bring the wide segment 36 of the double-ended sector 35 into mesh with the section 46 and a portion of the section 47 of the bed-rack 42, whereby the type-bed is moved through the interval designated B. At the end of the interval B, the segment 38 of the gear takes up the section 47 of the rack, so to speak, and carries the type-bed through the interval designated by C. During the interval C, the converter-cam 14 is moving the double-ended sector 35 in the opposite direction so that at the end of the interval C the wide segment 37 at the opposite end of the sector meshes into the unfinished end of the section 47 of the bed-rack and begins on the adjacent end of the section 46^a thereof during the interval D. At the conclusion of the interval D, the wide segment 37 runs out of the section 46^a which is then meshed into by the adjacent end of the segment 39 of the gear which then carries the rack through the interval E, which completes the movement of the bed so far as the rack is concerned. The type-bed having now been returned as far as the upper bed-rack will carry it, is moved still farther inward and reversed in direction by the reversing block 53 as described, after which the bed-driving gear 27 picks up, so to speak, the lower bed-rack 43 with which it coacts in precisely the manner described for the upper bed rack 42 in driving the type bed to that point in its outward movement where the reversing-block 53 takes up the work and completes the throw of the bed and the reversal of its movement. It has already been explained, how the arrange-

ment of the teeth of the bed-driving gear 27 and the racks 42 and 43 provide for the clearance of the teeth of one rack, while the other rack is in play, and vice versa, and that need not again be rehearsed.

It will be noted that by my improvement, I secure the reciprocation of the type-bed without moving the racks except as they are moved therewith, and without moving the bed-driving gear except as the same is rotated; whereby I avoid the vertical or lateral movement of the racks as has sometimes been done, or the vertical or lateral movement of the gear as has sometimes been done. Under my construction, also, I am enabled to mount the reversing block 53 or actuator directly upon the gear. I therefore secure a simple, compact, rigid and very powerful bed-driving mechanism capable of being operated at a high speed and always securing a high degree of perfection of registration between the type-bed and the impression cylinder.

I claim:—

1. In a flat-bed printing press, the combination with the type-bed thereof, of an upper and a lower bed-driving rack carried thereby, each rack having its teeth arranged in sections with intervening clearance spaces, and a bed-driving gear having segments of teeth arranged with reference to the teeth and clearance spaces of the said bed-driving racks, whereby the said type-bed is reciprocated first in one direction and then in the other by the alternate coaction of the gear with the respective racks.

2. In a flat-bed printing press, the combination with the type-bed thereof, of an upper and a lower bed-driving rack carried thereby, and a bed-driving gear fixed against vertical and lateral movement, the racks and gear having their teeth staggered for clearance.

3. In a flat-bed printing press, the combination with the type-bed thereof, of an upper and a lower bed-driving rack carried thereby, each rack having its teeth arranged in sections with intervening clearance spaces, a bed-driving gear having sections of teeth arranged with reference to the teeth and clearance spaces of the said bed-driving racks, the said gear coacting with one rack to move the bed in one direction, and with the other rack to move the bed in the opposite direction, and a bed-reversing mechanism including an actuator mounted upon the gear.

4. In a flat-bed printing press, the combination with the type-bed thereof, of an upper and a lower bed-driving rack rigidly connected with the bed, a gear confined against vertical and lateral movement and alternately coacting with and clearing the said racks, a bed-reversing mechanism including an actuator mounted upon the gear, and means for maintaining the said actuator in operative position.

5. In a flat-bed printing press, the combination with the type bed thereof, of an upper and a lower bed-driving rack rigidly connected with the bed, a gear confined against vertical and lateral movement and alternately coacting with and clearing the said racks, a bed-reversing mechanism including an actuator mounted upon the gear, and means connected with the framing of the machine for maintaining the actuator in operative position.

6. In a flat-bed printing press, the combination with the type-bed thereof, of an upper and a lower bed-driving rack carried thereby, a bed-driving gear meshing into the said racks, the said racks and gear having their teeth staggered so that the teeth of the gear clear one rack while meshing into the other, and vice versa, a double-ended sector mounted in the gear and having toothed segments at its ends of such a width as to cover the staggered teeth, and means for reciprocating the said sector to bring its ends into play alternately.

7. In a flat bed printing press, the combination with the type-bed thereof, of an upper and a lower rack carried thereby and having their teeth arranged in staggered sections, a bed-driving gear having its teeth arranged in staggered segments, a double-ended sector having teeth at its ends, mounted in the said gear, cams located within the gear for moving the said sector in opposite directions to bring the teeth at one end into play and to retire the teeth at its opposite end, and means for periodically operating the said cams.

8. In a flat-bed printing press, the combination with the type-bed thereof, of gearing thereupon, a bed-driving gear for coacting with the gearing of the bed, a double-ended sector having teeth at its ends, carried by the gear, and means for periodically operating the said sector to supplement the teeth of the gear wheel in coacting with the gearing of the type bed.

9. In a flat-bed printing press, the combination with the type-bed thereof, of an upper and a lower rack carried thereby, a bed-driving gear, a double-ended sector mounted in the gear in which it has endwise movement, a cam-carrier concentric with the gear; cams in the said carrier for coaction with the sector to move the same in opposite directions, and means connected with the cam-carrier including a converter cam for oscillating the cam-carrier.

10. In a flat-bed printing press, the combination with the type-bed thereof, of bed-

driving racks carried thereby, a bed-driving gear coacting with the said racks, a wrist-pin mounted directly on the said gear, a reversing-block mounted upon the said wrist-pin, abutments located at the ends of the bed for coaction with the said block for reversing the direction of the bed, and means organized wholly independent of the said bed-driving gear and connected with the frame of the press for maintaining the said block in operative position with respect to the said abutments.

11. In a flat-bed printing press, the combination with the frame and the type-bed thereof, of an upper and a lower rack rigidly connected with the bed, a bed-driving gear coacting with the said racks and confined against vertical and lateral movement, a reversing block carried by the gear, abutments located at the ends of the bed for coaction with the block in reversing the direction of the bed, and means connected with the frame for maintaining the block in operative position.

12. In a flat-bed printing press, the combination with the frame and the type-bed thereof, of gearing carried by the type-bed, a bed-driving gear coacting with the said gearing, bed-reversing mechanism including a reversing-block carried by the gear, and means organized wholly independent of the said gear and slidably connected with the frame of the press for maintaining the said block in operative position.

13. In a flat-bed printing press, the combination with the frame and the type-bed thereof, of gearing carried by the type bed, a bed-driving gear coacting with the gearing, a reversing block carried by the gear and having a vertical groove, and means formed with a vertical flange entering a groove in the block for maintaining the same in operative position, the said means being connected with the frame so as to slide horizontally with respect thereto.

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses.

WINFIELD S. HUSON.

Witnesses:
FREDERIC C. EARL,
CLARA L. WEED.