R. T. JOHNSTON.

BED AND CYLINDER MACHINE.

APPLICATION FILED FEB. 16, 1911.

1,040,208.

Patented Oct. 1, 1912.

4 SHEETS—SHEET 1.

Fig. 1.

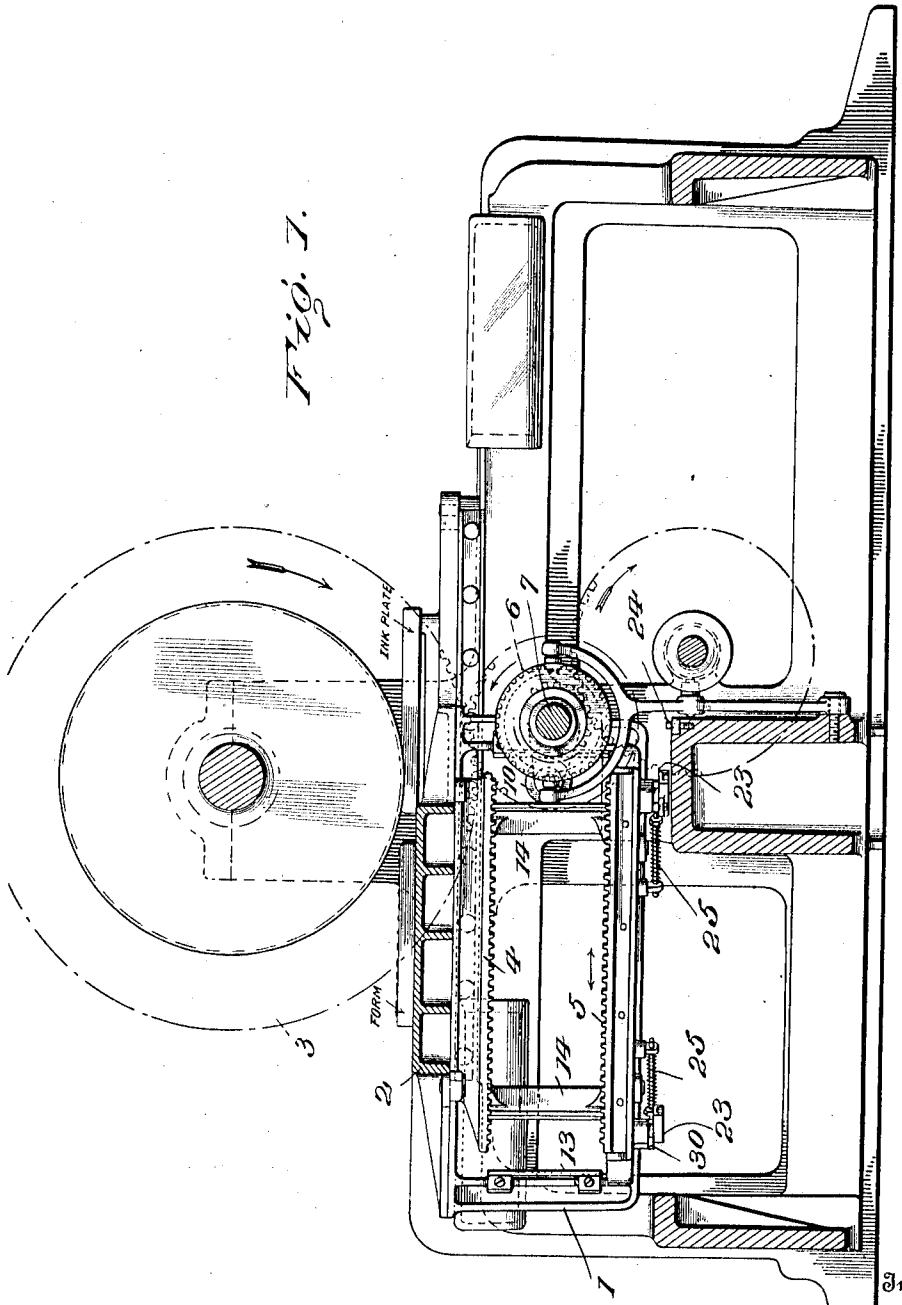

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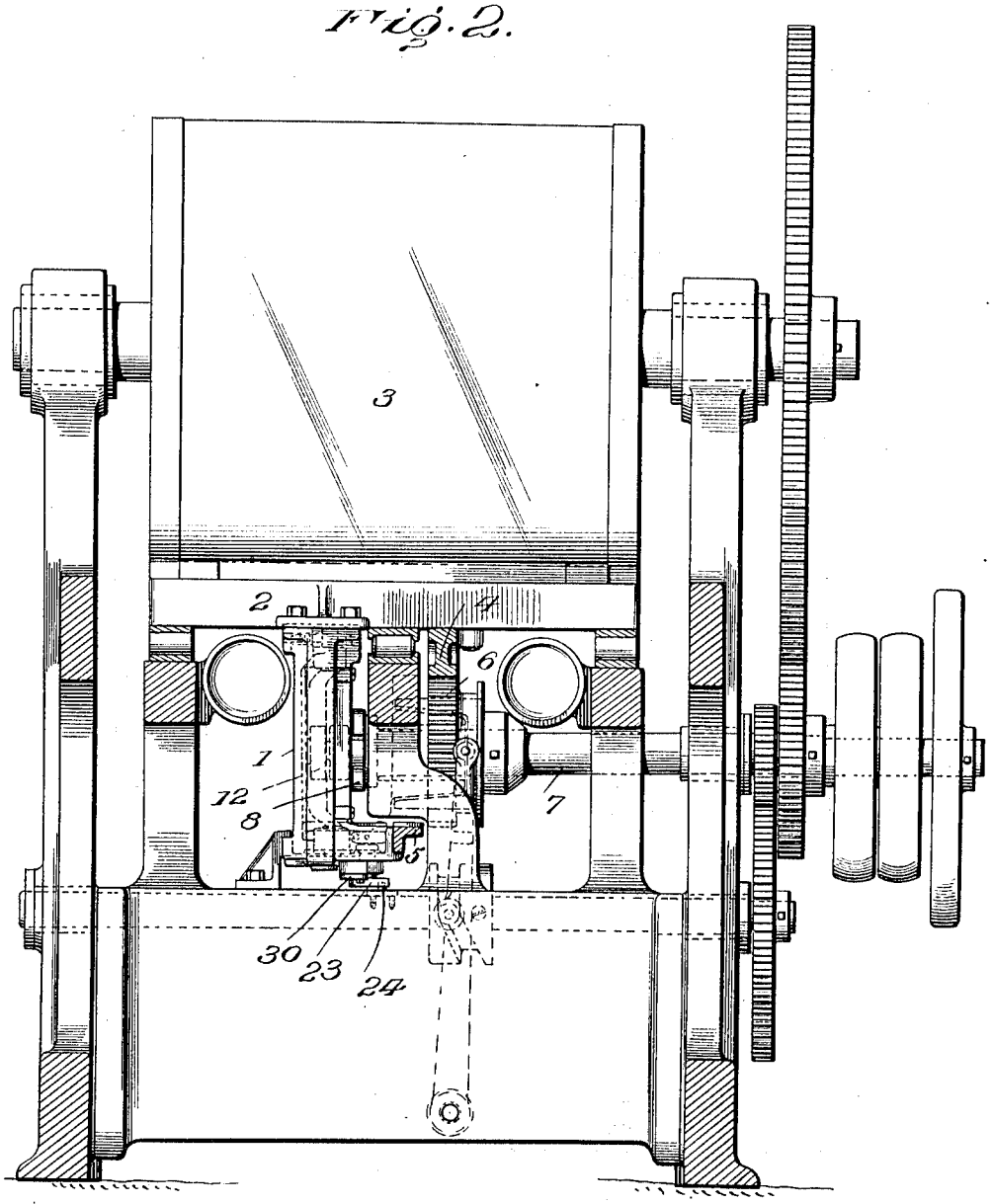
Fig. 2.



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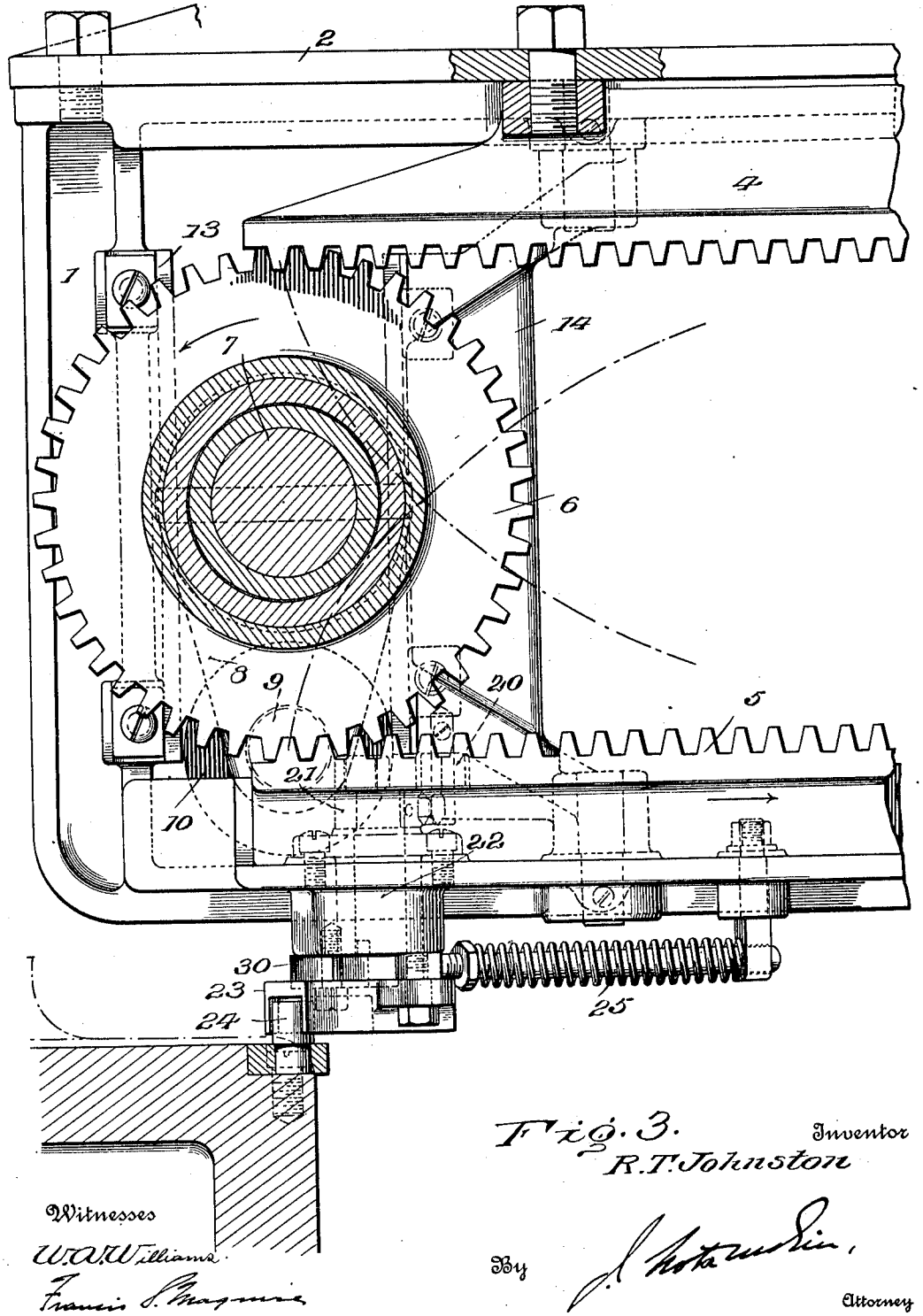

Fig. 3.

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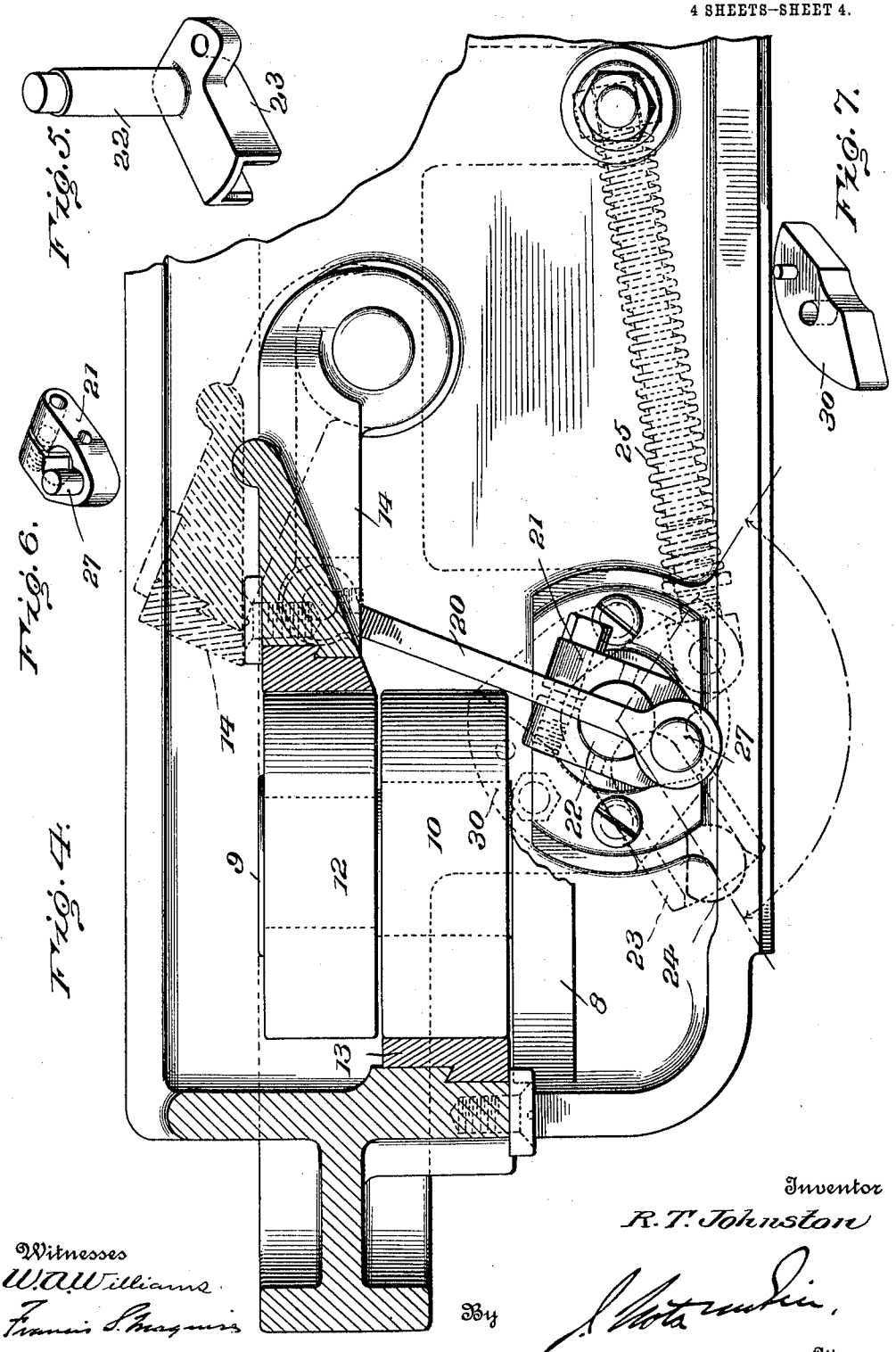

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UNITED STATES PATENT OFFICE.

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BED-AND-CYLINDER MACHINE.

1,040,208. Specification of Letters Patent. Patented Oct. 1, 1912.

Application filed February 16, 1911. Serial No. 609,066.

To all whom it may concern:

Be it known that I, ROBERT T. JOHNSTON, of Scotch Plains, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Bed-and-Cylinder Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention contemplates the production of simple and highly efficient means for operating the latches or shoes of the reversing means in a bed motion.

A further object is to provide means of the character stated whereby a bed and cylinder press may be operated at a higher speed than has heretofore been possible.

As is well known in the art, standard bed motions embody vertical guideways wherein wrist pins carried by the driving media are designed to travel to reverse the travel of the bed while the driving gear by which the bed is reciprocated is being shifted from one rack to another; and such guideways have been provided with shoes which are automatically moved into and out of locking position by means of fixed cam tracks. The two vertical guideways being in the same plane it has heretofore been customary to locate the cam tracks alongside of each other at points near a vertical plane passing through the axis of the driving shaft. This arrangement has not been wholly satisfactory, and instead of employing two cam tracks in different vertical planes I contemplate providing a single fixed element in or near a vertical plane passing through the center of the axis of the driving shaft, for operating tumblers connected with the shoes of the guideways. With this arrangement each shoe is quickly and effectively moved from one position to the other, and securely held in both positions as against accidental displacement.

The invention will be hereinafter fully set forth and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is an elevation of a bed and cylinder press equipped with my present improvement. Fig. 2 is an end view, with parts in section. Fig. 3 is an enlarged fragmentary view showing the parts in position at or near the completion of the return stroke. Fig. 4 is a horizontal section showing the shoe moving means. Fig. 5 is a view of the tumbler. Fig. 6 shows one of the cranks for operating the shoes. Fig. 7 is a view of the stop plate.

Referring to the drawings, 1 designates a frame which is carried by and depends from bed 2 which is designed to be reciprocated beneath cylinder 3 in a known way. The bed carries an upper rack 4 and the frame a lower rack 5 which are preferably in different vertical planes so as to be alternately engaged by a driving gear wheel 6 which is shiftable longitudinally of the driving shaft 7. This latter carries a crank 8 from which extends a wrist pin 9, and on this wrist pin are preferably mounted two rollers 10 and 12. At the opposite ends of the frame 1 are the usual vertical guideways wherein the wrist pin is designed to travel in reversing the bed movements. Each of these guideways is composed of an outer fixed wall 13 and an inner shiftable wall in the form of a shoe 14, which latter is designed to be normally in its opened position, that is, out of parallelism with wall 13, to allow of the entrance and exit of the wrist pin to and from the guideways. For the purpose of quickly shifting the shoes, I connect each of them through link 20 to a crank 21 carried by the shaft 22 of a tumbler 23, which latter is designed to be moved over an arc of a circle to effect the opening or closing of the shoe, such operation being effected by the engagement of the tumbler with a fixed element, which is shown in the form of a lug 24, mounted on a fixed portion of the press frame in the plane of a line drawn centrally through the vertical axis of the driving shaft. The engagement of a tumbler with the lug 24 as the bed is approaching the limit of a stroke will cause such tumbler to turn about 114°, more or less, and in so turning the tumbler effects the partial turning of crank 21 and the movement of the shoe to its closed position. As the bed starts on its return stroke the shoe is opened by the reversal of rotation of the tumbler, which reversal is effected by the lug 24. The tumbler is held in its two positions by a spring-pressed rod 25, and its movements are limited by a suitable stop.

Although the particular construction of the shoe operating mechanism may be varied

without departing from the spirit of my invention, yet I have found the particular formation and arrangement shown in the drawings to be most advantageous in actual practice.

The tumbler 23 is preferably of L-shape, as shown in Fig. 5, and has the shaft 22 projecting upwardly therefrom at the point of conjunction of its two arms. The underside of the longer arm is hollowed out to form a longitudinal groove and opposite parallel walls between which the lug 24 is designed to enter. The shaft 22 has its bearing in the bottom member of the rack frame, and on its upper reduced end is mounted the crank 21, which, as shown in Fig. 6, has a central opening to accommodate the shaft, and is split so that its two sides may be clamped on the shaft by known means. This crank carries a short stud 27 to which one end of link 20 is secured, the other end being pivoted to shoe 14. When the shoe is moved into its closed position the link is drawn directly across the axis of the crank pivot, thus positively locking the shoe in place and so holding it during the time that the tumbler is out of engagement with the fixed lug 24. The spring-held rod 25 is pivoted to the short arm of the tumbler. To the underside of the bearing for the tumbler shaft is secured a stop plate 30, which is clearly shown in Fig. 7, such plate limiting the movements of the tumbler.

It will be understood that the wrist pin rollers are designed to travel at the same speed as the pitch line of the bed rack gear, and while these rollers travel in a circle in relation to the press, they develop a cycloidal curve in relation to the bed racks. As the rollers traveling in this curve approach the pitch line of the racks at the ends of the strokes, the relative difference in the movement of the bed and reversing rollers grows gradually less until the pitch line is reached, where, for an instant, the rollers and bed travel together. The outer roller 12 clears the shoe when the latter is in its opened position, and owing to the location of the center from which the shoe is swung, it can be moved forward and into operative or closed position as the roller passes it in approaching the pitch line of the rack. At the instant the reversing rollers and the bed are traveling together the final movement of the shoe takes place, and at the same time the reversing roller 10 contacts with the opposite wall 13 of the guideway, which wall, together with the shoe, forms the vertical guideway or channel for effecting reversal of the bed. The shoe is firmly held in its locked position during the reversal of the bed and as the latter starts on its return travel, and when roller 12 is no longer exerting a pressure against the shoe, the latter is moved into its opened position by the partial turning of the tumbler on its axis, and will be held in that position by the spring-pressed rod until the tumbler again engages the fixed stud.

It will be noted that I employ a single stud for operating the shoes at the opposite ends of the racks, and I believe best results are thus obtained, since I have been enabled to quickly and effectively open and close both shoes when the press has been operating at a speed of about thirty-three per cent. above the average speed heretofore obtainable with bed and cylinder presses.

In bed movements employing fixed cams for operating arms projecting angularly from the shoes such cams are subjected to great wear, and when the parts are not in proper alinement the rollers carried by the arms do not enter squarely between the cam surfaces and the efficiency of the movement is soon impaired. With my improvements, these difficulties do not exist. The shoes are usually moved into either their opened or closed positions by the rapid and positive intermediate movement brought about by the engagement of the tumblers with the fixed lug which tumblers have only a limited engagement with such lugs. By having the links extend across the axis of the shifting cranks the shoes are positively locked in their closed positions.

I claim as my invention:

1. The combination with a reciprocating bed of a printing press, and means for reciprocating said bed, of a frame carried by the bed having vertically disposed guideways, a shaft having a wrist pin designed to travel through said guideways, each guideway having a fixed wall and a pivoted shoe forming a movable wall, members carried by said frame having vertical axes, means for partially rotating said members in opposite directions during the reciprocation of the bed, and links eccentrically connected to said members and also connected to said shoes for turning the latter on their pivots.

2. The combination with a reciprocating bed of a printing press, and means for reciprocating said bed, of a frame carried by the bed having vertically disposed guideways, a shaft having a wrist pin designed to travel through said guideways, each guideway having a fixed wall and a pivoted shoe forming a movable wall, pivotally mounted cranks carried by the frame, links connecting the cranks to said shoes, and means for shifting the cranks to turn the shoes on their pivots during the reciprocation of the bed.

3. The combination with a reciprocating bed of a printing press, and means for reciprocating said bed, of a frame carried by the bed having vertically disposed guideways, a shaft having a wrist pin designed to travel through said guideways, each guideway having a fixed wall and a pivoted shoe forming

a movable wall, pivotally mounted cranks carried by the frame, links connecting the cranks to said shoes, said links being positioned in direct line across the pivots of the cranks when the shoes are in their closed positions, and means for shifting the cranks to operate the shoes during the reciprocation of the bed.

4. The combination with a reciprocating bed of a printing press, and means for reciprocating said bed, of a frame carried by the bed having vertically disposed guideways, a shaft having a wrist pin designed to travel through said guideways, each guideway having a fixed wall and a pivoted shoe forming a movable wall, pivotally mounted cranks carried by the frame, links connecting the cranks to said shoes, said links being positioned in direct line across the pivots of the cranks when the shoes are in their closed positions, tension devices for holding the cranks and the shoes in their opened positions, and means for shifting the cranks to operate the shoes during the reciprocation of the bed.

5. The combination with a reciprocating bed of a printing press, and means for reciprocating said bed, of a frame carried by the bed having vertically disposed guideways, a shaft having a wrist pin designed to travel through said guideways, each guideway having a fixed wall and a pivoted shoe forming a movable wall, pivotally mounted cranks carried by the frame, links connecting the cranks to said shoes, tension devices for holding the cranks and shoes in their different positions, stops for limiting the movements of the cranks, and means for shifting the cranks to operate the shoes during the reciprocation of the bed.

6. The combination with a reciprocating bed of a printing press, and means for reciprocating said bed, of a frame carried by the bed having vertically disposed guideways, a driving shaft having a wrist pin designed to travel through said guideways, each guideway having a fixed wall and a pivoted shoe forming a movable wall, pivotally mounted cranks carried by the frame and connected to said shoes, tumblers to which said cranks are connected, a fixed element in or near the plane of a vertical line through the axis of the driving shaft with which the tumblers are designed to alternately engage to turn the cranks to move the shoes into different positions, and means for retaining said tumblers and cranks in the positions into which they are moved by the engagement of the tumblers with said fixed element.

7. The combination with a reciprocating bed of a printing press, and means for reciprocating said bed, of a frame carried by the bed having vertically disposed guideways, a shaft having a wrist pin designed to travel through said guideways, each guideway having a fixed wall and a pivoted shoe forming a movable wall, pivotally mounted cranks, links connecting the cranks to said shoes, tumblers carrying said cranks, and a fixed element in or near the plane of a vertical line through the axis of said shaft with which the tumblers are designed to alternately engage to turn the cranks to move the shoes into different positions.

8. The combination with a reciprocating bed of a printing press, and means for reciprocating said bed, of a frame carried by the bed having vertically disposed guideways, a shaft having a wrist pin designed to travel through said guideways, each guideway having a fixed wall and a pivoted shoe forming a movable wall, pivotally mounted cranks carried by the frame and links connecting the cranks to said shoes, said links being positioned in direct line across the pivots of the cranks when the shoes are in their closed positions, tumblers for operating said cranks, said tumblers having oppositely disposed walls, and a fixed element in or near the plane of a vertical line through the axis of said shaft with which the walls of the tumblers are designed to alternately engage to turn the cranks to move the shoes into different positions.

9. The combination with a reciprocating bed of a printing press, and means for reciprocating said bed, of a frame carried by the bed having vertically disposed guideways, a shaft having a wrist pin designed to travel through said guideways, each guideway having a fixed wall and a pivoted shoe forming a movable wall, pivotally mounted cranks carried by the frame and connected to said shoes, tumblers for operating said cranks, said tumblers having oppositely disposed walls, and a fixed element in or near the plane of a vertical line through the axis of the shaft with which the walls of the tumblers are designed to alternately engage to turn the cranks to move the shoes into different positions.

10. The combination with a reciprocating bed of a printing press, and means for reciprocating said bed, of a frame carried by the bed having vertically disposed guideways, a shaft having a wrist pin designed to travel through said guideways, each guideway having a fixed wall and a pivoted shoe forming a movable wall, pivotally mounted cranks connected to said shoes, tumblers having studs carrying said cranks, said tumblers having oppositely disposed walls, tension devices acting on said tumblers for holding them and the cranks in different positions to retain the shoes opened or closed, stops for limiting the axial turning of the tumblers, and a fixed element in or near the plane of a vertical line through the axis of the shaft with which the walls

of the tumblers are designed to alternately engage to turn the cranks to move the shoes into different positions.

11. The combination with a reciprocating bed of a printing press, and means for reciprocating the bed, of a frame carried by the bed having vertically disposed guideways, a shaft having a wrist pin designed to travel through said guideways, each guideway having a fixed wall and a pivoted shoe forming a movable wall, pivotally mounted cranks connected to said shoes, tumblers having studs carrying said cranks, said tumblers having each a horizontal portion formed with a longitudinal groove the opposite walls of which are parallel, a fixed stud with which the grooved portion of each tumbler is designed to engage, stops for limiting the axial turning of the tumblers, and spring-pressed rods for holding the tumblers and the cranks in their different positions against the stops.

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

ROBERT T. JOHNSTON.

Witnesses:
C. G. PRITCHARD,
A. D. LOOP.

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