

F. T. LEILICH.
BED MOTION FOR CYLINDER PRINTING PRESSES.
APPLICATION FILED DEC. 19, 1910.

1,180,593.

Patented Apr. 25, 1916.
4 SHEETS—SHEET 1.

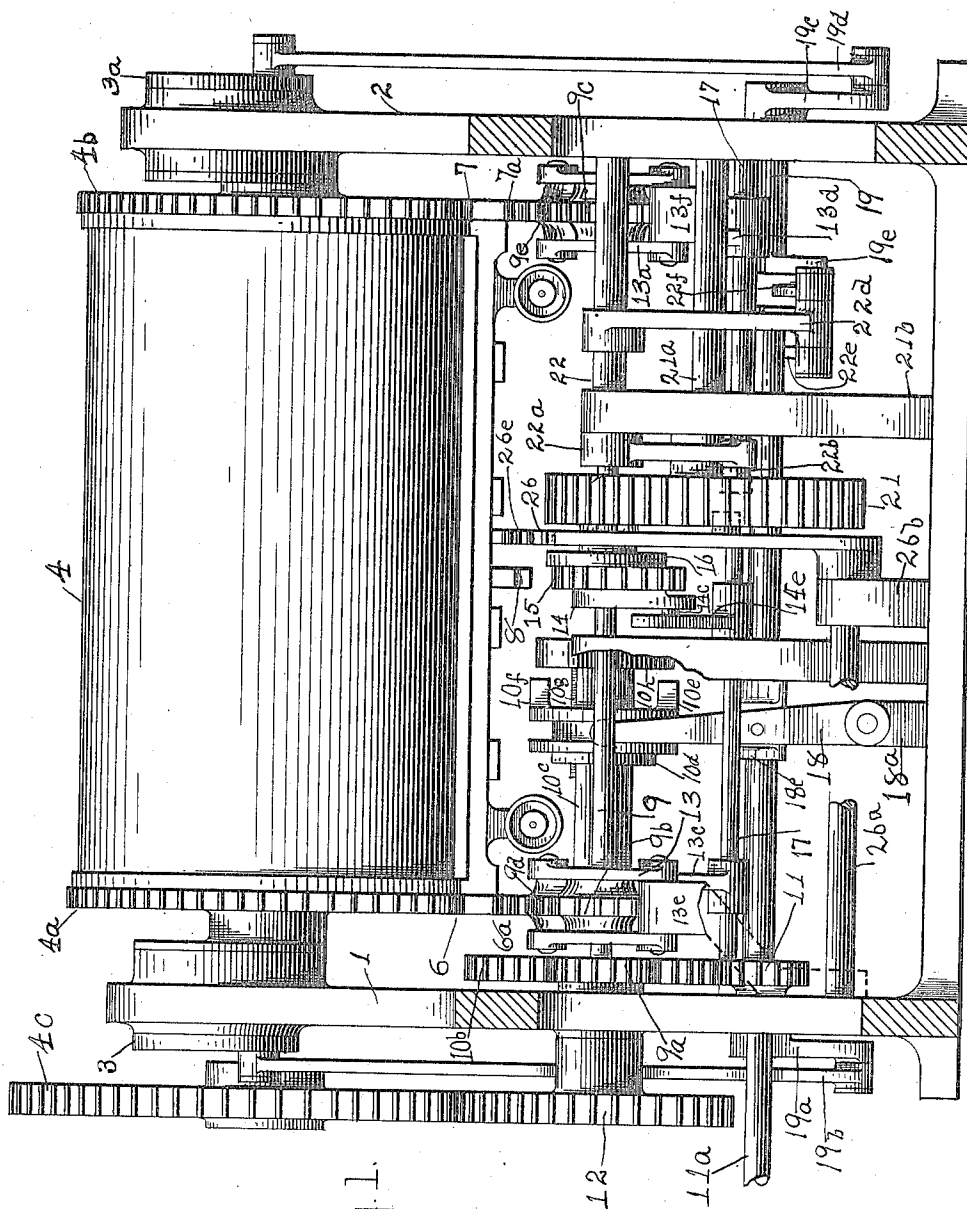


Fig. 1.

Witnesses
Arthur L. Slee.
Arthur White

Inventor
Francis T. Leilich

F. T. LEILICH.
 BED MOTION FOR CYLINDER PRINTING PRESSES.
 APPLICATION FILED DEC. 19, 1910.

1,180,593.

Patented Apr. 25, 1916.
 4 SHEETS—SHEET 2.

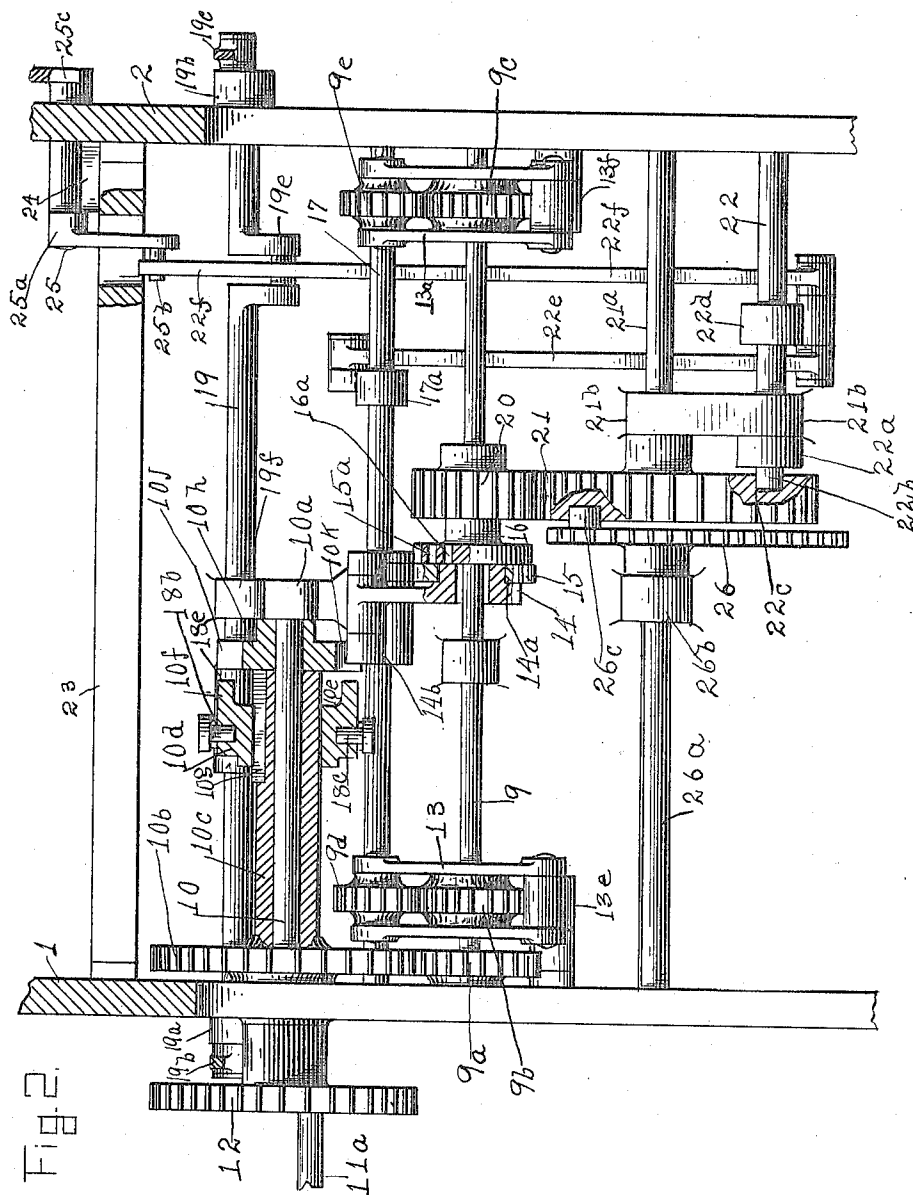


Fig. 2.

WITNESSES

Arthur L. Lee.
 Arthur White.

Inventor
 Francis T. Leilich

F. T. LEILICH.
BED MOTION FOR CYLINDER PRINTING PRESSES.
APPLICATION FILED DEC. 19, 1910.

1,180,593.

Patented Apr. 25, 1916.
4 SHEETS—SHEET 3.

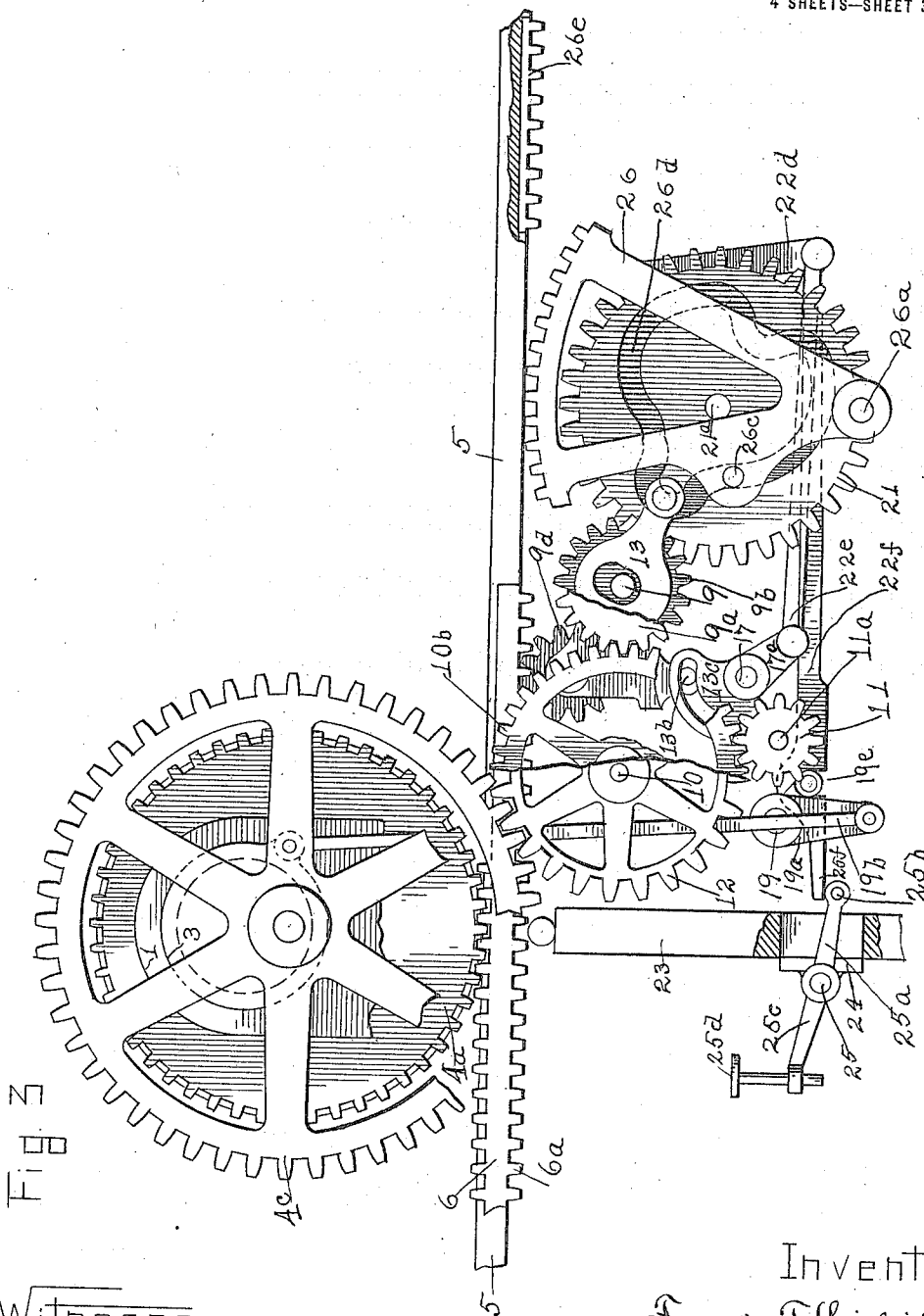


FIG 2

WITNESSES
Arthur L. Slee.
Arthur White

Inventor
Francis T. Leilich

F. T. LEILICH.
BED MOTION FOR CYLINDER PRINTING PRESSES.
APPLICATION FILED DEC. 19, 1910.

1,180,593.

Patented Apr. 25, 1916.
4 SHEETS—SHEET 4.

Fig. 4.

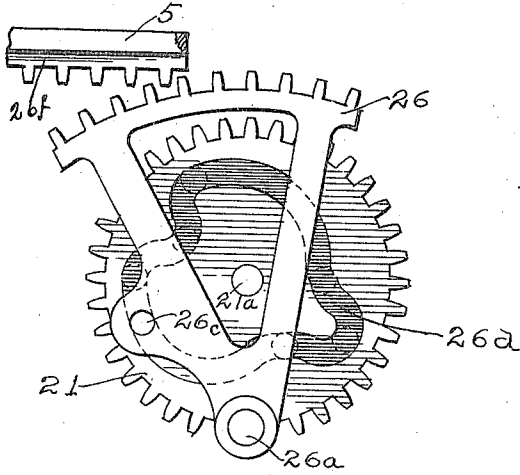


Fig. 5.

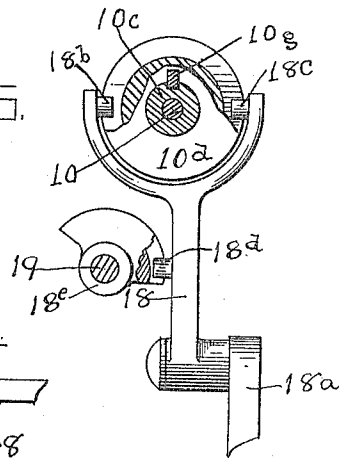


Fig. 6.

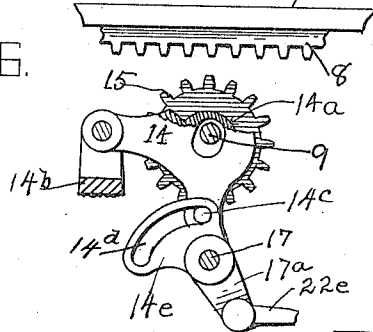


Fig. 8.

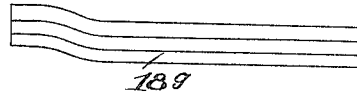
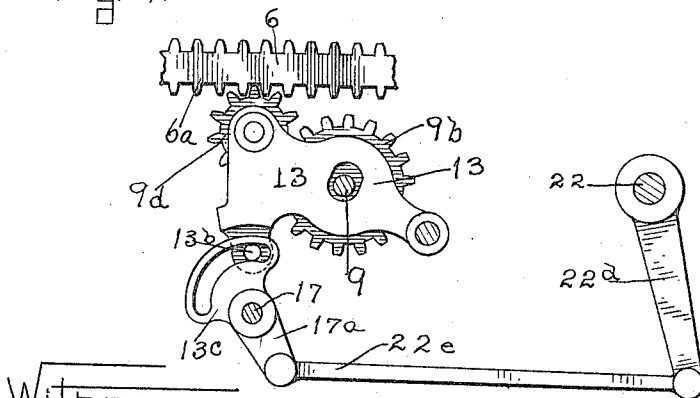


Fig. 7.



Witnesses

Arthur L. Slee.
Arthur White

Inventor

Francis T. Leilich.

UNITED STATES PATENT OFFICE.

FRANCIS T. LEILICH, OF SAN FRANCISCO, CALIFORNIA.

BED-MOTION FOR CYLINDER PRINTING-PRESSES.

1,180,593.

Specification of Letters Patent.

Patented Apr. 25, 1916.

Application filed December 19, 1910. Serial No. 598,070.

To all whom it may concern:

Be it known that I, FRANCIS T. LEILICH, a citizen of the United States, and a resident of the city and county of San Francisco and State of California, have invented certain new and useful Improvements in Bed-Motions for Cylinder Printing-Presses, of which the following is a specification.

My invention relates to that class of printing presses in which a flat bed and type form are reciprocated under a rotated impression cylinder, and my objects are as follows. To provide mechanism by which a more perfect bed register may be obtained and maintained than is now possible in any press in which a reciprocated bed is used in combination with a continuously rotated impression cylinder; in which the cylinder is directly geared with the bed during the printing stroke, and rotated thereby to the exclusion of all other means; in which the bed may be moved in one direction by means which engage with it at, or near, its respective opposite sides, to insure a more perfect parallelism of movement; in which the bed is moved in the opposite direction by means separate from those before named; in which the bed is reversed at each end of its to and fro movement by a single segment gear or member, actuated by a rotating cam and alternately engaged with racks secured to the under side of the bed and in which the weight of the parts carried on the bed is reduced, its kinetic energy decreased, at a given speed, and a higher rate of speed made possible with the same static weight in the press, and a consequent larger output of work of a higher quality thereby secured. All of which advantages I obtain by the construction illustrated in the drawings and fully described and claimed in the following specification.

Figure 1 is an end elevation the gear side being to the left. Fig. 2 is a plan view, with the cylinder and attached parts and bed omitted. Fig. 3 is an elevation of the gear side showing as much of the mechanism as can be clearly illustrated, with the larger part of the frame removed. Fig. 4 is a detail of the reversing segment, the cam for driving it and the rack 26^c attached to the bed and cooperating with it for reversing the latter on the return stroke. Fig. 5 is a

detail of the clutch, its shifting lever and actuating cam. Fig. 6 is a detail of the means for driving the bed on the return stroke, and mechanism for moving it into and out of engagement with the rack cooperating with it attached to the bed. Fig. 7 is a detail of the means for driving the bed on the printing stroke and mechanism for moving it into and out of engagement with the rack, also attached to the bed. Fig. 8 is a development of the path of the rocking cam for actuating the clutch lever.

In the drawings 1, 2 are the side frames of a printing press, partly in broken section, in which the circular hubs 3, 3^a are oscillated. An impression cylinder 4 is provided with two journals fitted to rotate in bearings in the hubs 3, 3^a eccentrically placed therein and to the respective ends of the cylinder 4, gear wheels 4^a, 4^b are rigidly attached and upon one of the cylinder journals is rigidly secured a cylinder driving gear wheel 4^c. A type bed 5 is arranged to be supported in any convenient manner in the frame and has rigidly secured to its respective sides racks, as shown in Figs. 3 and 7. These racks are preferably double and cut in a single body of metal and attached as shown but may be separated and one set placed under the bottom of the bed and near the sides if desired.

That I may be clearly understood I will designate the racks 6, 7 as those with which the cylinder gear wheels 4^a, 4^b engage and the racks 6^a, 7^a those with which the means for driving the bed during the printing stroke engage. Between the printing stroke racks 6^a, 7^a a return rack 8 is secured to the under side of the bed with which the means for driving the bed during the non-printing, or, as hereinafter called, the return stroke is engaged at certain times. Extended under the bed and having its bearings in the side frames, and preferably also about the center of the bed, to steady it, is the main shaft 9 toward the left end of which, as shown in Figs. 1 and 2, a gear wheel 9^a is fixedly secured.

A clutch shaft 10 Figs. 1, 2, 3, is supported near its one end in the side frame 1 and at the other in an upright 10^a, and rotatably mounted on the shaft 10 is a clutch driving gear wheel 10^b which is engaged with, and rotated by a driving pinion 11, which is

tightly secured upon a driving shaft 11^a, rotated from any suitable source of power. On the end of the clutch shaft 10 extending outside of the side frame 1, is rigidly secured an intermediate gear wheel 12, which engages with the cylinder driving gear wheel 4^c. Returning now to the main shaft 9, the gear wheel 9^a, secured thereon, is engaged with the clutch driving gear wheel 10^b which through its engagement with the driving pinion 11 thus communicates motion to the main shaft 9.

Tightly secured to the main shaft 9 are two printing stroke driving gear wheels 9^b, 9^c, engaging with which are the driving gear intermediates 9^d, 9^e which are rotatably mounted on short shafts in the ends of supports 13, 13^a which are in turn fulcrumed around short shafts or studs having bearing in brackets 13^c, 13^f. The brackets 13^c, 13^f are shown in Fig. 1 as attached to the side frames 1, 2 partly in dotted lines on account of the interference with the sight of other parts.

The supports 13, 13^a have each a stud and roller 13^b secured thereto, which engage respectively with the paths of rocking cams 13^c, 13^d by which the supports are reciprocated vertically to move the intermediate gear wheels 9^d, 9^e into and out of engagement with the bed racks 6^a, 7^a. A gap in the support Fig. 7 permits its vertical movement without interfering with the main shaft 9. Surrounding the main shaft 9, toward the center and independently of it is a support 14, constructed with a gap to allow the main shaft 9 to extend through it without contact, as shown in Figs. 2, 6, which carries on an annular bearing 14^a the return stroke driving gear wheel 15, to the side of which is secured a stud and roller or block, 15^a which in turn engages with a slot 16^a in a flange 16 rigidly secured to the main shaft 9, by which arrangement the gear wheel 15 may be vertically reciprocated, to move it into and out of the path of the return stroke rack 8 and rotated in any position. In the relative positions of the parts shown in Fig. 6, the center of the gear wheel 15 is eccentric to that of the shaft 9, the motion of the said gear wheel, when in said position is therefore not isochronous, which is of no importance, as it is not then engaged with the return stroke rack 8, as when so engaged the said centers are concentric and the rotation of the main shaft 9 and the gear wheel 15 is uniform. The support 14 is fulcrumed in a bearing 14^b, Fig. 2 and is provided with a stud and roller 14^c extending within the path 14^d of a rocking cam 14^e by which it is reciprocated vertically. Supported in the side frames 1, 2 is the bed driving gear reciprocating rock shaft 17 to which the aforesaid rocking cams 13^c, 13^d and 14^e are rigidly secured and to which

is also rigidly secured an arm 17^a connected with elements for rocking it as will be hereinafter described.

In Figs. 1, 2 and 5 the clutch driving gear wheel 10^b is shown as provided with a sleeve 10^c, on which a clutch collar 10^d provided with lugs 10^e, 10^f is slidably mounted, being constrained to rotate with the sleeve by any suitable means, as a spline 10^g set therein. Tightly secured to the clutch shaft 10 is a flange 10^h provided with gaps 10ⁱ, 10^j for the reception of the lugs 10^e, 10^f. Fulcrumed on an upright 18^a is a clutch shifting lever 18, bifurcated to embrace the clutch collar 10^d and having means of engagement therewith as two studs 18^b, 18^c extending within the groove 18^f thereof. To the clutch shifting lever 18 Fig. 5 is rigidly secured a stud and roller 18^d, extending within the path of a rocking cam 18^e rigidly secured to a rock shaft 19 by which the shifting of the clutch collar 10^d is accomplished.

Supported in the side frames 1, 2 is the rock shaft 19 upon the ends of which are rigidly secured crank arms 19^a, 19^c to which in turn are attached connections 19^b, 19^d which at their opposite ends are attached to the respective circular hubs 3.3^a in which the impression cylinder 4 is journaled, by which arrangement the cylinder is raised and lowered. The rock shaft 19 is also provided with a crank 19^e and is preferably supported in an upright 19^f, located between the side frames 1, 2.

To the main shaft 9 is rigidly secured the main cam driving pinion 20 Fig. 2 engaging with the geared main cam 21 rigidly secured upon the shaft 21^a, which is supported toward one end in an upright 21^b and at the other in the side frame 2. The main cam rock shaft 22 is also supported toward one end in the upright 21^b and at the other in the side frame 2. Upon one end of the rock shaft 22 a cam lever 22^a is secured having a stud and roller 22^b fixed thereto which extends within a cam path 22^c, of a conventional contour and not illustrated, formed within the body of the main cam gear 21, and upon the rock shaft 22 between its bearings is fixedly secured a rock arm 22^d. To one side of the lower end of the rock arm 22^d is movably secured a connection 22^e which is pivotally secured at its opposite end to the arm 17^a, by which the bed driving gear reciprocating rock shaft 17 is actuated. To the other side of the rock arm 22^d is also movably secured a connection 22^f which is provided with a disconnectible attachment with the crank 19^e.

Under the center of impression the usual girt 23, extends between the side frames 1, 2 to which is secured a bracket 24 in which is journaled a short shaft 25, having at one end an arm 25^a provided with a stud 25^b extending under the end of the connection 22^f

and upon its other end and outside frame 2 a lever 25^c provided with a pad 25^d by which arrangement the connection 22^f may be lifted and the cylinder reciprocation be thereby interrupted at will.

A reversing segment gear 26 is rigidly secured upon one end of a shaft 26^a supported in an upright 26^b and the side frame 1, and has secured to it a stud and roller 26^c extending within a cam path 26^d formed in the body of the main cam gear 21. Rigidly secured to the under side of the type bed 5, toward each end and preferably about its center, are two reversing racks 26^e, 26^f with which the reversing segment gear 26 alternately engages, as is hereinafter described. The rocking of the cam 18^e secured to the shaft 19 also shifts the clutch collar into engagement with the flange 10^b and insures the continued rotation of the cylinder.

In the operation of this mechanism, power being applied to the driving pinion shaft 11^a, with the respective parts in the positions indicated in Figs. 1, 2, 3, 6 movement is imparted to the bed through the engagement of the driving pinion 11 with the clutch driving gear wheel 10^b, rotatably mounted on the clutch shaft 10, the gear wheel 10^b, being directly engaged with the gear wheel 9^a rigidly secured upon the main shaft 9. The two gear wheels 9^b, 9^c which are also rigidly secured upon the main shaft 9, engage with the two intermediate gear wheels 9^d, 9^e, which in turn respectively engage with the under bed racks 6^a, 7^a.

During the printing stroke, the impression cylinder 4 has been rotated solely by the engagement of the gear wheels 4^a, 4^b, attached to its ends, with the respective racks 6, 7 attached to the bed, the means for rotating the cylinder during the return stroke being now disconnected and inoperative, as clearly shown in Fig. 2. During the continued movement of the bed the reversing rack 26^e has moved into engagement with the reversing segment gear 26, the upper bed racks 6, 7 out of engagement with the cylinder gear wheels 4^a, 4^b and the under bed racks 6^a, 6^b out of engagement with the intermediate gear wheels 9^d, 9^e. The bed is now under the control of the reversing mechanism, the stud and roller 26^c secured to the segment gear 26 being engaged with the cam path 26^d formed in the body of the cam gear wheel 21, which is rotated from the top toward the left hand in Fig. 3. The cam path 26^d is somewhat peculiar in its construction, the purpose of which is to effect the reversal of the bed at each end of its to and fro movement by a single geared segment and to allow the use of a smaller amount of throw, or difference between the radii of the higher and lower dwells of the cam path. In reversing the bed, at the end of the printing stroke, the cam gear 21 rotating moves the

roller 26^c from the low dwell of the path 26^d to the high dwell and back again. After the reversing rack 26^e has moved out of engagement with the segment gear 26 the continued rotation of the cam gear moves the roller 26^c from the low dwell, of smaller radius, to the high dwell of larger radius, during which time the bed has been moved in the opposite direction on the return stroke. The reversing mechanism is now in the position illustrated in Fig. 4. Continued movement of the bed to the right hand and rotation of the cam gear 21 then moves the reversing rack 26^f into engagement with the reversing segment gear 26, the roller 26^c, attached thereto, moving from the high dwell to the low dwell, of the path 26^d, and back, after which, during the printing stroke, the roller 26^c is moved from the high dwell to the low dwell of the path 26^d and the segment gear is again in the position illustrated in Fig. 3 ready to reverse the bed at the end of the printing stroke as before described. While the bed is being reversed at the end of the printing stroke the cylinder has been raised to its highest position, by the cooperating elements, illustrated and described, actuated by the cam path 22^e in the cam gear 21. At about the same time, the shaft 17 has been actuated by the cam 21 through the connections described and shown, to move the rocking cams 13^c, 13^d and through the engagement therewith of the studs and rollers 13^b, attached to the respective supports 13, 13^a to lower the latter and thereby move the intermediate gear wheels 9^d, 9^e mounted therein out of the paths of the under bed racks 6^a, 7^a. The return stroke driving gear wheel 15, which during the printing stroke, has been in the position shown in Fig. 6 has been raised in the path of the return stroke rack 8 through the rocking cam 14^e, also rigidly secured to the shaft 17, with which the roller 14^c fixed in the support 14 engages and in which the return stroke gear wheel 15 is journaled. The cam path 26^d is so timed that the segment gear is alternately engaged with each of the reversing racks before the respective racks 6^a, 7^a and 8 attached to the under side of the bed move out of engagement with the intermediates 9^d, 9^e and gear wheel 15 respectively engaged therewith.

As has been already stated the cylinder, during the printing stroke has been directly engaged with the bed and rotated thereby to the exclusion of all other means. Continuous rotation of the cylinder is obtained by the employment of different combinations of elements which include disconnectible members by which the combinations are alternately changed in the following manner; referring to Figs. 1, 2, the clutch collar 10^a is illustrated in the position it occupies during the printing stroke, to-wit, with the lugs 10^e, 130

10^f, disengaged from the gaps 10ⁱ, 10^k in the flange 10^h rigidly secured to the clutch shaft 10.

It is necessary that the moving of the clutch collar 10^d into engagement with the flange 10^h shall take place before the upper bed racks 6, 7 move out of engagement with the cylinder gear wheels 4^a, 4^b, therefore requiring a quick initial movement of the clutch collar 10^d, which is obtained by the relative position of the rocking cam 18^e on the cylinder lifting rock shaft 19 and by the construction of the path of the cam 18^e, an approximative development of which I have illustrated in Fig. 8, the curvilinear part of the path to the left being that which is first engaged with the roller 18^d.

From the foregoing description it will be seen that the cylinder derives its rotation, during the printing stroke, from the driving pinion 11, through a combination of elements comprising the clutch driving gear wheel 10^b, the main gear wheel 9^a, secured to the main shaft 9, the gear wheels 9^b, 9^c also secured to the latter shaft and engaging with the respective intermediate gear wheels 9^d, 9^e, in turn engaged with the under bed rack 6^a, 7^a attached to the bed, to which is also secured the upper bed racks 6, 7 directly engaged with the cylinder gear wheels 4^a, 4^b. On the return stroke, the cylinder having been lifted to its highest position and the clutch collar 10^d having been previously moved into engagement with the flange 10^h, continued rotation of the cylinder is now derived from the driving pinion 11 through a different combination of elements which comprise the clutch driving gear wheel 10^b, the sleeve 10^c, the clutch collar 10^d slidably mounted thereon and now engaged with the flange 10^h, rigidly secured to the clutch shaft 10, and the intermediate gear wheel 12 secured to the latter shaft and engaging with the cylinder driving gear wheel 4^c.

It is necessary, in the operation of printing presses of like character, for reasons well known to interrupt, at will, the reciprocation of the impression cylinder which is done in this invention by the elements, in common use, shown and described. It is obvious however that the type bed, which is, when operatively engaged with the cylinder, the directly engaged element of the means for rotating the latter, cannot be an element thereof when the cylinder reciprocation is suspended. To provide for this contingency I secure the cam 18^e, which actuates the clutch shifting mechanism, to the same rock shaft 19 that actuates the cylinder reciprocating mechanism and as the clutch collar 10^d is always engaged with the flange 10^h when the cylinder is out of the path of the bed racks 6, 7, the disconnection of the clutch collar 10^d from the flange 10^h occurring near the end of the downward

movement of the cylinder and after the gear wheels 4^a, 4^b attached to it are, either partially or wholly, engaged with the bed racks 6, 7, it is obvious therefore that interruption of the cylinder reciprocation also prevents the disconnection of the clutch collar 10^d from the flange 10^h and thereby insures a continuous rotation of the cylinder by one combination of elements.

As it may assist in a clearer comprehension of my invention I will describe the cycle of motion, as follows: Starting on the printing stroke, the cylinder is down, the gear wheels attached to its respective ends are engaged with the upper bed racks and the mechanism for moving the bed on the printing stroke is engaged with the cooperating under bed racks. During the engagement aforesaid of the cylinder and bed the clutching mechanism is disconnected and the cylinder is rotated directly and solely by the bed. At the end of the printing stroke, the bed is reversed in the direction of movement, the cylinder being meanwhile lifted and the clutching mechanism previously connected, the means for moving the bed on the return stroke moved into the path of the cooperating rack attached to the under side of the bed and the bed moved on the return stroke and into engagement with the reversing mechanism and reversed again in the direction of movement, the cylinder meanwhile being lowered and the clutching mechanism disconnected, which completes the cycle.

I have omitted from the drawings and description many of the usual and necessary parts of a complete operative printing press as forming no part of my invention and adding nothing to the disclosure.

While I have illustrated and described my invention in a preferred form of construction, I do not limit myself thereto, as many modifications may be made within its scope and without departing from its spirit.

My invention therefore resides, not only in the novel construction combination and arrangement of the mechanism and its parts shown and described and their equivalents, but broadly and more particularly as follows: In means for continuously rotating the cylinder by different combinations of elements which include disconnectible members. In means for continuously rotating the cylinder by different combinations of elements which include disconnectible members controllable by manually operated devices to prevent the disconnection of said members at will, and thereby cause the cylinder to be rotated by one combination of elements. In the means for moving the type bed of a printing press to and fro and continuously rotating the cylinder, and cooperating mechanism for directly and positively engaging the cylinder with the bed during its movement in one direction, and

disengaging it, during said movement, from the means for rotating it at other times, whereby the cylinder is rotated, directly and solely by the type bed when engaged therewith. In means for moving the type bed in one direction which engage with racks secured to it at or near its respective opposite sides. In means for reversing the type bed at each end of its to and fro movement comprising a single geared member or segment, actuated by a rotating cam to alternately engage with racks secured to the under side of the type bed.

I therefore claim:

1. A type bed, means for moving it to and fro at a uniform velocity, which include a driving pinion, a cylinder, a gear wheel rigidly attached thereto, an intermediate gear wheel confined to rotation in the same plane as that of the former gear wheel and operatively engaged with the driving pinion, mechanism for moving the cylinder into operative engagement with the type bed at the beginning of the movement of the latter in one direction and moving it out of said engagement at the end of said movement, and further means which include said intermediate gear wheel for continuing the rotation of the cylinder after its disengagement from the type bed.

2. A type bed, racks rigidly attached thereto, a driving pinion, means engaged therewith for moving the type bed to and fro at a uniform velocity, a cylinder, a driving gear wheel rigidly attached to the latter, two other gear wheels also rigidly attached to the cylinder, one at each end thereof, a gear wheel, confined to rotation in the same plane as that of the said driving gear wheel, and operatively engaged with the driving pinion, mechanism for moving the said two other gear wheels into engagement with said racks, to rotate the cylinder, at the beginning of the movement of the type bed in one direction and moving it out of said engagement at the end of said movement, and further means, which include said driving gear wheel, for continuing the rotation of the cylinder after its disengagement from the type bed.

3. A type bed, a cylinder, a driving gear wheel rigidly attached thereto, a driving pinion, means for moving the type bed to and fro and rotating the cylinder at a uniform velocity which include a gear wheel operatively engaged with the driving pinion and confined to rotation in the same plane as that of the said driving gear wheel and a disconnectible member interposed between the said driving gear wheel and driving pinion, and mechanism for actuating said member to disengage the cylinder from its operative engagement with the driving pinion and operatively engage it with the type bed, whereby the cylinder is rotated di-

rectly by the type bed, when engaged therewith, to the exclusion of all other means for rotating it.

4. A type bed, means for moving it to and fro at a uniform velocity, a driving pinion, a cylinder, a driving gear wheel rigidly attached thereto, means for rotating the cylinder which include the type bed when engaged therewith during the movement of the latter in one direction, and separate means for continuing the rotation of the cylinder when the type bed is moving in the opposite direction and is disengaged from said cylinder and which include an intermediate gear wheel, confined to rotation in the same plane as that of the said driving gear wheel and operatively engaged with the driving pinion, and mechanism for alternately connecting and disconnecting each of said means for rotating the cylinder with and from the latter.

5. A type bed, means for moving it to and fro at a uniform velocity, a driving pinion, a cylinder, a driving gear wheel rigidly attached thereto, an intermediate gear wheel operatively engaged with the driving pinion and confined to rotation in the same plane as said driving gear wheel, two combinations of elements for rotating the cylinder one combination including among its members said intermediate gear wheel and the other the type bed, when the latter is moving in one direction, and mechanism for alternately changing from one combination to the other.

6. A type bed, means for moving it to and fro, a driving pinion, a cylinder, a gear wheel confined to rotation in a single plane and operatively engaged with the driving pinion and cylinder, two combinations of elements for rotating the cylinder at a uniform velocity, one combination including among its members said gear wheel, and the other the type bed, when the latter is moved in one direction, and mechanism for alternately changing from one combination to the other, and manually operated devices for interrupting at will the operation of said mechanism; whereby the cylinder is then rotated continuously by one combination of elements.

7. A driving pinion, a cylinder, an intermediate gear wheel confined to rotation in a single plane and operatively engaged with both elements, means for rotating the cylinder at a constant and uniform velocity at all times which include the gear wheel, disconnectible members interposed between said gear wheel and driving pinion, and mechanism for connecting and disconnecting one of said members with and from the other to alternately change the combination of the elements of the means for continuously rotating the cylinder.

8. A driving pinion, a cylinder, a gear wheel confined to rotation in a single plane

- and operatively engaged with both elements, means for rotating the cylinder at a uniform velocity, which include the gear wheel, disconnectible members interposed between
- 5 said gear wheel and driving pinion, and mechanism for connecting and disconnecting one of said members with and from the other to alternately change the combination of the elements of the means for continuously rotating the cylinder, and manually
- 10 operated devices for interrupting at will the operation of said mechanism; whereby the cylinder is then continuously rotated by one combination of elements.
- 15 9. A driving pinion, a cylinder, a clutch shaft, independent of the cylinder, operatively engaged therewith, a clutch driving gear wheel provided with a sleeve and rotatably mounted on the clutch shaft, a clutch
- 20 collar, provided with lugs, slidably mounted on the sleeve and rotated therewith, a flange rigidly secured to said shaft and provided with gaps or apertures to receive said lugs, and mechanism for connecting and disconnecting the clutch collar with and from the
- 25 flange; whereby the cylinder is engaged and disengaged with and from the driving pinion at predetermined times.
- 30 10. A driving pinion, a type bed, a main shaft, a plurality of gear wheels rigidly secured thereon, one of which is operatively engaged with the driving pinion, a cylinder, a gear wheel confined to rotation in a single plane and operatively engaged with the
- 35 cylinder and driving pinion, two combinations of elements for rotating the cylinder at a uniform velocity, one of which includes the type bed adapted to be operatively engaged at times with two of the gear wheels
- 40 secured to the main shaft, and mechanism for alternately connecting and disconnecting each of said combinations with and from the cylinder.
- 45 11. A driving pinion rotated at a constant uniform velocity, a clutch shaft operatively engaged therewith and rotated at a constant uniform velocity, a clutch driving gear wheel rotatably mounted thereon and engaging with the driving pinion, disconnectible members interposed between the
- 50 gear wheel and the clutch shaft, an intermediate gear wheel rigidly secured to the clutch shaft, a cylinder provided with two journals to one of which a gear wheel is rigidly
- 55 attached, said gear wheel engaging with the intermediate gear wheel and mechanism for actuating one of said members at predetermined times to connect and disconnect the cylinder with and from the driving pinion.
- 60 12. A driving pinion, a clutch shaft, a clutch driving gear wheel rotatably mounted thereon and engaging with the driving pinion, disconnectible members interposed between the gear wheel and clutch shaft, an
- 65 intermediate gear wheel confined to rotation in a single plane and rigidly secured to the clutch shaft, a cylinder provided with two journals to one of which a gear wheel is rigidly attached and by which it is at a uniform velocity rotated, said gear wheel engaging with the intermediate gear wheel, a type bed, means, operatively engaged with the clutch driving gear wheel, for moving the type bed to and fro, and mechanism for actuating one of said members to disconnect the cylinder from the driving pinion and operatively engage it with the type bed during the movement of the latter in one direction and to connect the cylinder with the driving pinion during the movement of the type bed in the opposite direction; whereby the cylinder is rotated directly by the latter when engaged therewith to the exclusion of all other means.
- 70 13. A driving pinion, a cylinder provided with two journals to one of which a gear wheel is rigidly attached, an intermediate gear wheel confined to rotation in a single plane operatively engaged with the latter and the driving pinion, a type bed, means for moving it to and fro at a uniform velocity, means for rotating the cylinder which include said gear wheels and the type bed when moving in one direction, disconnectible members interposed between the cylinder and driving pinion and mechanism for actuating one of said members to disconnect the cylinder and driving pinion and connect the cylinder with the type bed during its movement in one direction; whereby the former is then rotated solely by the latter.
- 80 14. A type bed, racks with oppositely facing teeth secured thereto, a cylinder, two gear wheels rigidly attached thereto, one at each end thereof, means for rotating the cylinder at a uniform velocity, means, engaging with certain of said racks with teeth projecting downwardly, for moving the type bed to and fro, mechanism for engaging said gear wheels with certain other of said racks attached to the bed with teeth projecting upwardly, during the movement of the latter in one direction and at about the same time disengaging said cylinder from the other elements of the means provided for rotating the latter during the movement of the bed in the opposite direction; whereby the cylinder is rotated solely by the engagement of the gear wheels attached to its respective ends with the two cooperating racks secured to the type bed, during the movement of the latter in one direction.
- 85 15. A type bed, a driving pinion, a cylinder, an intermediate gear wheel confined to rotation in a single plane and operatively engaged with the cylinder and driving pinion, means for continuously rotating the cylinder at a uniform velocity which include said gear wheel, means for moving the type bed to and fro, disconnectible members in-
- 90 95 100 105 110 115 120 125 130

terposed between the cylinder and driving pinion, mechanism for operatively engaging the cylinder with the type bed during the movement of the latter in one direction and
 5 disconnecting one of said members from the other to change the combination of the elements of said means for continuously rotating the cylinder to another combination provided for rotating it during the move-
 10 ment of the type bed in the opposite direction, and manually operated devices for interrupting at will the operation of said mechanism; whereby continuous rotation of the cylinder is effected during the suspension
 15 of its reciprocation.

16. A type bed, a driving pinion, means actuated thereby for moving the type bed in one direction in a single plane and adapted to engage with the type bed beneath its under surface and at, or near, each of its two
 20 opposite sides, separate means for moving the bed in the opposite direction and mechanism for alternately engaging and disengaging each of said means with and from
 25 the type bed.

17. A type bed, racks secured thereon, one at each of the two sides thereof and respectively provided with teeth projecting downwardly and upwardly, a cylinder, two gear
 30 wheels rigidly attached thereto, one at each end thereof, means for moving the bed in one direction and mechanism for engaging and disengaging said gear wheels with the racks projecting upwardly and engaging and dis-
 35 engaging said means with the racks projecting downwardly at predetermined times.

18. A type bed, a driving pinion, a cylinder provided with two journals, a driving gear wheel rigidly attached to one of the
 40 journals, a gear wheel confined to rotation in a single plane and operatively engaged with said driving gear wheel and driving pinion, a disconnectible element interposed between the type bed and driving pinion, a
 45 rock shaft operatively connected with the cylinder, a member rigidly secured to said shaft, a connection between said element and member, and mechanism for rocking said shaft to actuate said disconnectible ele-
 50 ment; whereby the cylinder is moved into and out of operative engagement with the type bed at predetermined times.

19. A driving pinion, a cylinder, a gear wheel confined to rotation in a single plane
 55 and operatively engaged with the cylinder and driving pinion, a rock shaft operatively connected with the cylinder, disconnectible members interposed between the cylinder and driving pinion, a rocking cam secured
 60 to said rock shaft and mechanism for rocking the latter and thereby connecting and disconnecting one of said members with and from the other.

20. A cylinder, a driving pinion, a rock
 65 shaft, connections between the latter and the

cylinder, disconnectible members interposed between the cylinder and driving pinion, a rocking cam secured to said rock shaft, mechanism actuated by said cam for connect-
 70 ing and disconnecting one of said members with and from the other, a detachable connection operatively engaged with the driving pinion for rocking said shaft and manu-
 75 ally operated devices for detaching said connection from the rock shaft and thereby suspending the reciprocation of the cylinder and the operation of said mechanism at will.

21. A type bed, means for moving it to and fro, two reversing racks secured to the under side of the type bed, a single reversing
 80 member, a cam having a path formed as described, means for rotating the cam once during each to and fro movement of the type bed and an operative connection between said cam and member for engaging
 85 and disengaging the latter with and from each one of said racks alternately at each end of the to and fro movement of the type bed.

22. A driving pinion, a main shaft, a plu-
 90 rality of gear wheels rigidly secured thereon, one of which is operatively engaged with the driving pinion, a type bed, racks secured thereon, a cylinder provided with two jour-
 95 nals, two gear wheels rigidly attached to the cylinder, one at each end thereof, a gear wheel rigidly attached to one of the journals, a clutch shaft, a gear wheel rotatably mounted thereon and engaging with the
 100 driving pinion, an intermediate gear wheel rigidly secured to the clutch shaft and engaging with the gear wheel attached to the cylinder journal, clutching members surrounding the clutch shaft one of which is
 105 rigidly secured thereon, means operatively engaged with the main shaft for moving the type bed to and fro and mechanism for engaging and disengaging said means with and from certain of the racks secured to the
 110 type bed, means for moving the gear wheels attached to the cylinder into and out of the path of certain other coöperating racks secured to the bed, and further means for connecting and disconnecting one of the mem-
 115 bers surrounding the clutch shaft with and from the member rigidly secured to said shaft; whereby the cylinder, during the movement of the bed in one direction is directly geared with the bed and rotated
 120 thereby through the operative connection of the latter with the driving pinion and when the bed is moving in the opposite direction and the cylinder is out of operative engagement with its coöperating racks said cylinder
 125 is then rotated from the driving pinion through the clutch shaft and intermediate gear wheel and thus continuous rotation of the cylinder is effected.

23. A type bed, means for moving it to and fro, two reversing racks rigidly secured
 130

to the type bed, means for reversing the latter, which include a sector, an element rotated once during each to and fro movement of the type bed and an operative connection between the sector and said element;
5 whereby said sector is caused to engage and disengage with and from each one of said

racks alternately, to reverse the direction of the to and fro movement of the type bed during a single rotation of said element.

FRANCIS T. LEILICH.

Witnesses:

K. R. LEILICH,
C. A. SEXTON.

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