

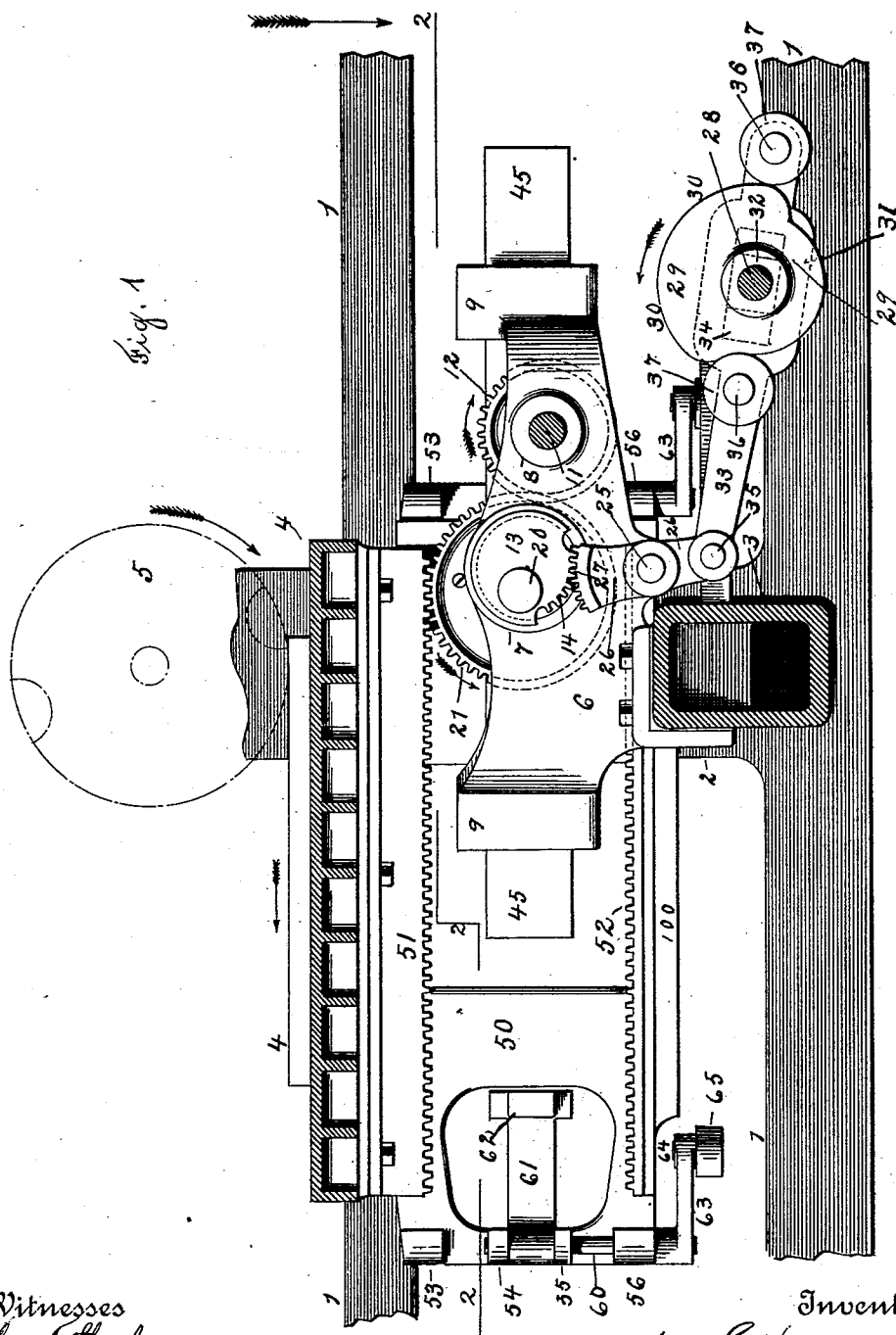
(No Model.)

5 Sheets—Sheet 1.

W. S. HUSON.
MECHANICAL MOVEMENT.

No. 570,597.

Patented Nov. 3, 1896.



Witnesses
Chas. S. French
James J. Rafferty

2 | 54 | 55 | 60 | 56 | Inventor
W. S. Huson
By his Attorney
Louis W. Southgate

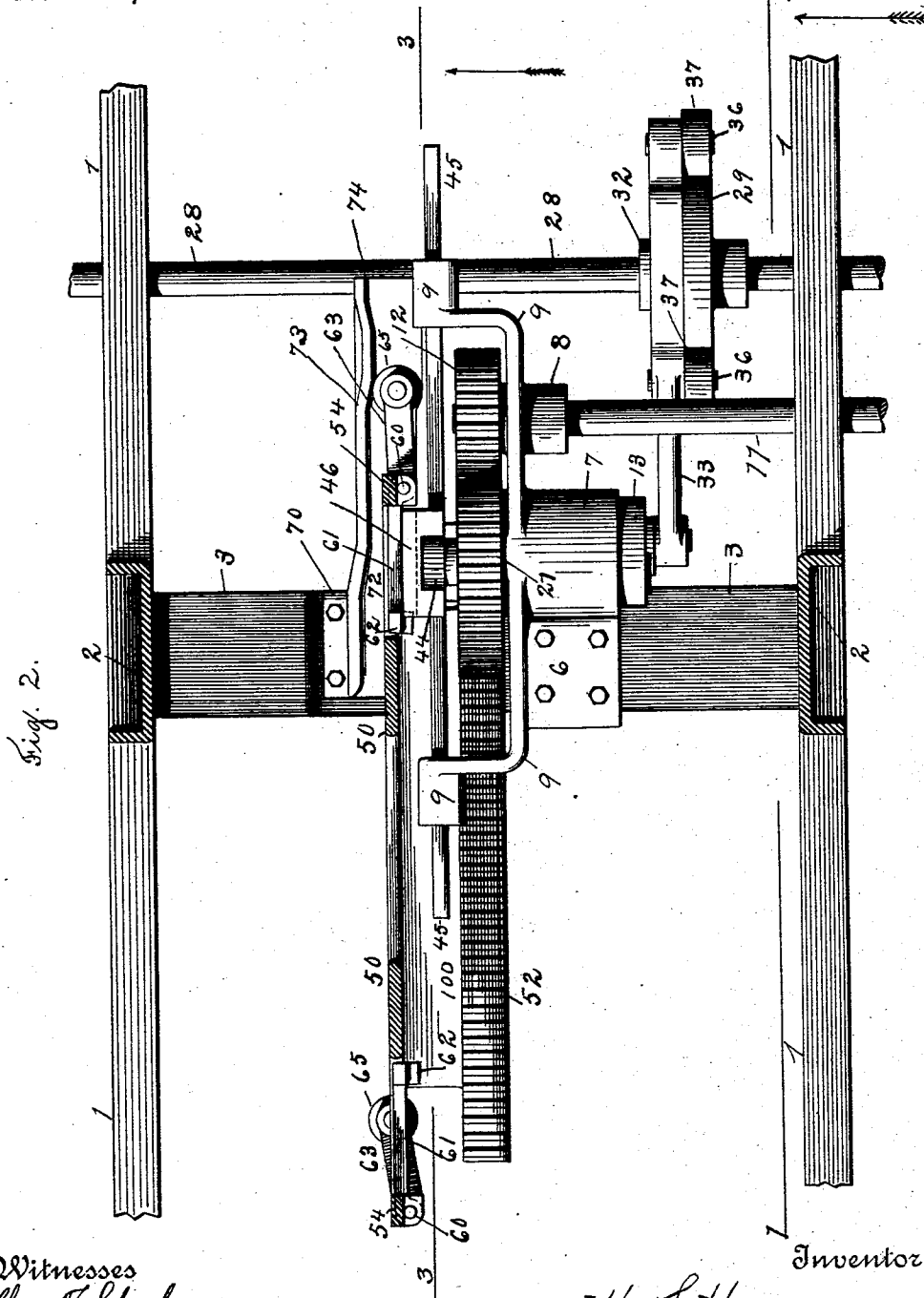
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5 Sheets—Sheet 2.

W. S. HUSON.
MECHANICAL MOVEMENT.

No. 570,597.

Patented Nov. 3, 1896.



Witnesses
Chas. F. Schmidt
James J. Roberts

Inventor
W. S. Huson
By his Attorney
Louis W. Southgate

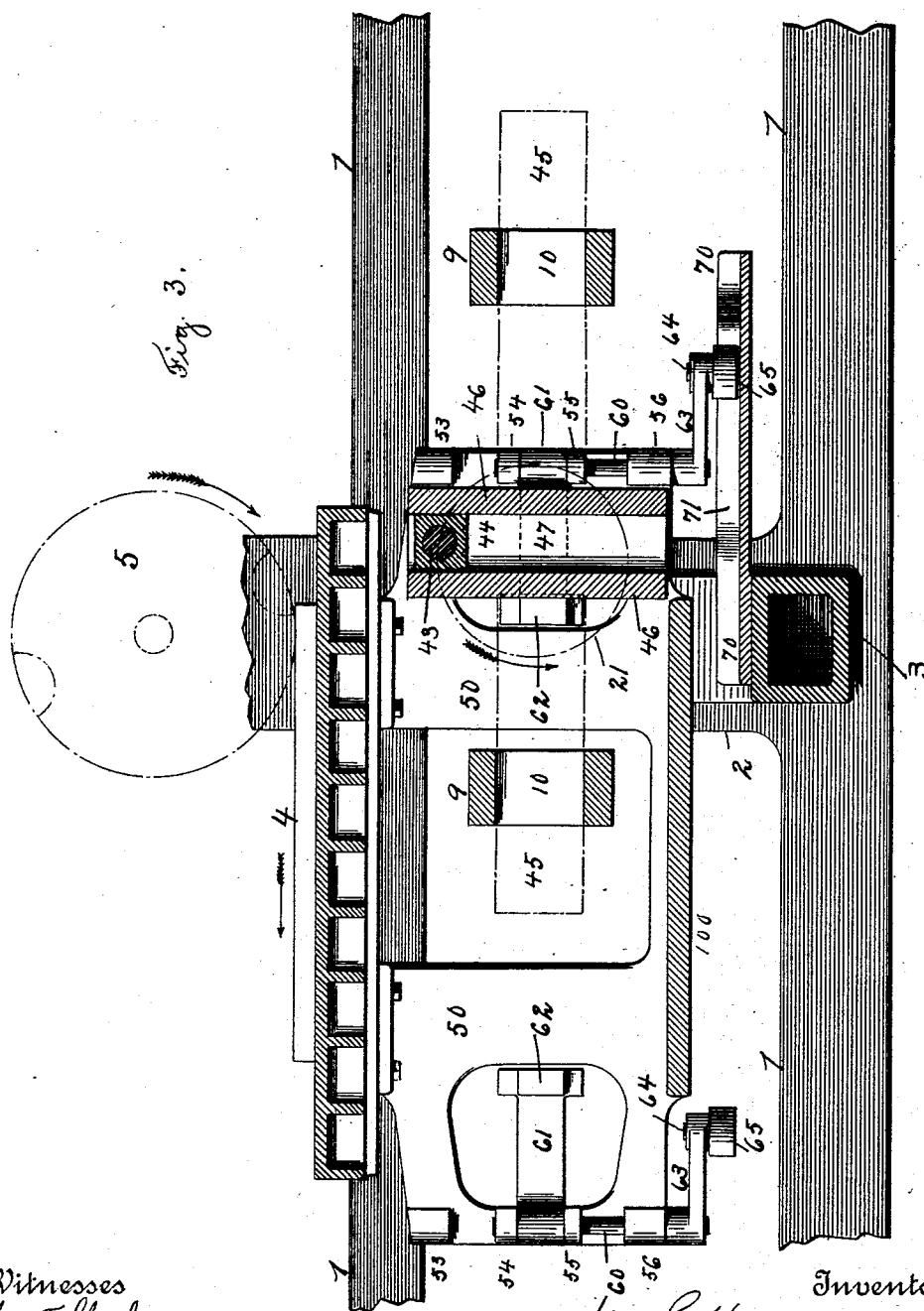
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5 Sheets—Sheet 3.

W. S. HUSON.
MECHANICAL MOVEMENT.

No. 570,597.

Patented Nov. 3, 1896.



Witnesses
Chas. F. Johnson
James J. Rafferty

Inventor
W. S. Huson
By his Attorney
Louis W. Southgate

(No Model.)

5 Sheets—Sheet 4.

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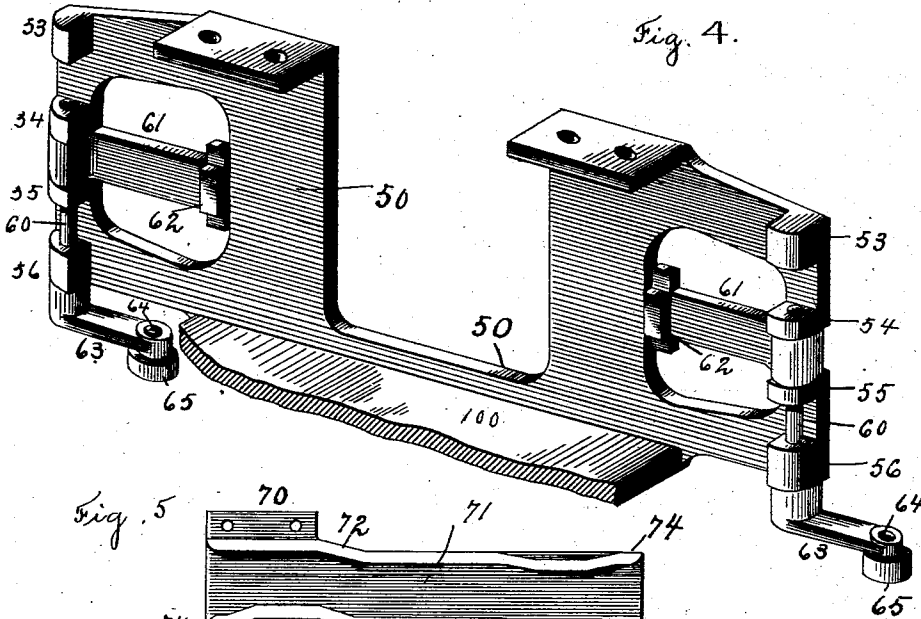


Fig. 4.

Fig. 5.

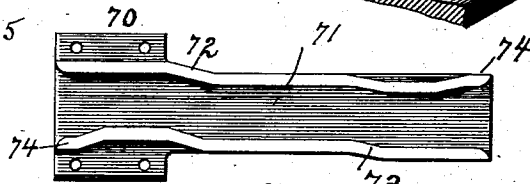


Fig. 7.

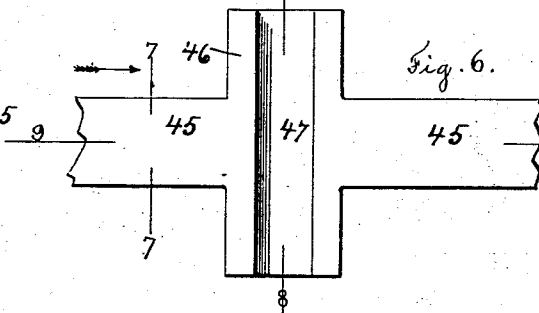
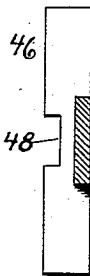


Fig. 8.

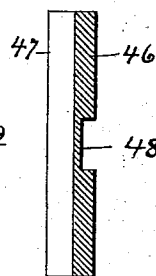


Fig. 9.

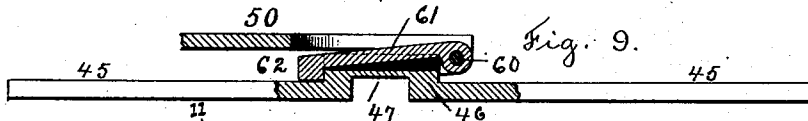
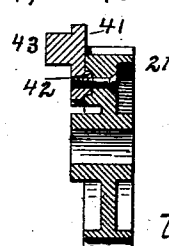


Fig. 11.



Witnesses
Chas. F. Gherke
James J. Rufferty

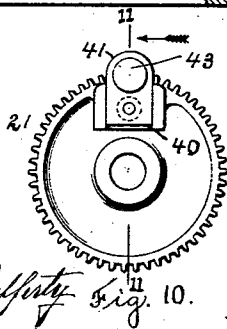


Fig. 10.

Inventor

W. S. Huson

By his Attorney

Louis W. Southgate

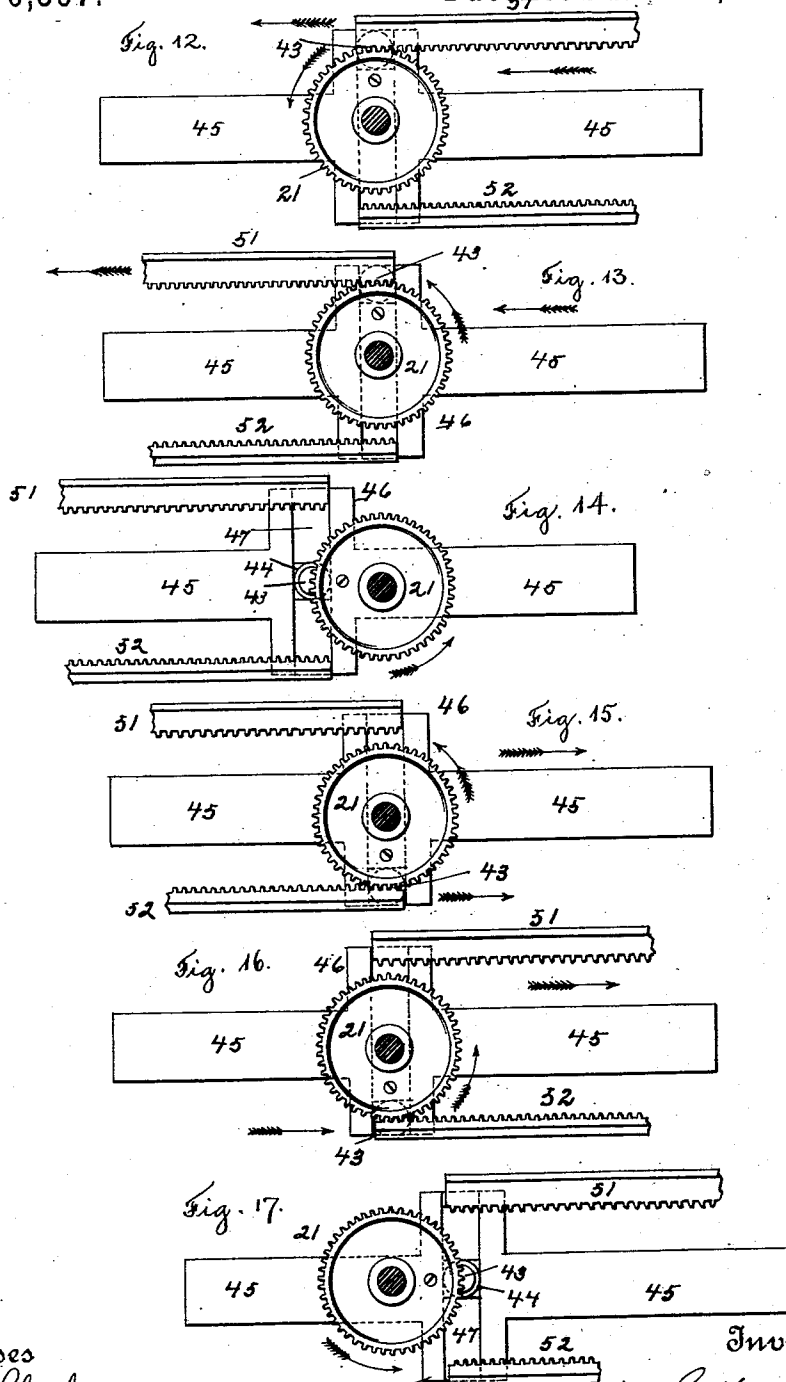
(No Model.)

5 Sheets—Sheet 5.

W. S. HUSON.
MECHANICAL MOVEMENT.

No. 570,597.

Patented Nov. 3, 1896.



Witnesses

Chas. F. G. G. G.
James J. Rafferty

Inventor

W. S. Huson
By the Attorney
Louis W. Southgate

UNITED STATES PATENT OFFICE.

WINFIELD S. HUSON, OF TAUNTON, MASSACHUSETTS, ASSIGNOR TO THE CAMPBELL PRINTING PRESS AND MANUFACTURING COMPANY, OF NEW YORK, N. Y.

MECHANICAL MOVEMENT.

SPECIFICATION forming part of Letters Patent No. 570,597, dated November 3, 1896.

Application filed March 31, 1892. Serial No. 427,151. (No model.)

To all whom it may concern:

Be it known that I, WINFIELD S. HUSON, a citizen of the United States, residing at Taunton, in the county of Bristol and State of Massachusetts, have invented a new and useful Improvement in Mechanical Movements, of which the following is a specification.

The aim of this invention is to produce a new and improved means for converting rotary motion into rectilineally-reciprocating motion; and to this end the invention consists of the device described and claimed in this specification and illustrated in the accompanying drawings, in which—

15 Figure 1 is a sectional elevation of my improved device on line 1 1 of Fig. 2. Fig. 2 is a section in plan taken on line 2 2 of Fig. 1. Fig. 3 is a sectional elevation on line 3 3 of Fig. 2. Fig. 4 is a perspective view of the 20 latch-frame carried by the reciprocating member. Fig. 5 is a plan of the stationary cam which is used to operate the latches. Fig. 6 is a front elevation of part of the piece that I term the "reciprocating" slider or yoke. 25 Fig. 7 is a section of the same, taken on line 7 7 of Fig. 6. Fig. 8 is a similar section taken on line 8 8 of Fig. 6. Fig. 9 is a plan, partly in section, showing how the latches engage the slider. Fig. 10 is a plan of the driving- 30 pinion, showing how the wrist-pin is attached thereto. Fig. 11 is a longitudinal sectional view of the same on line 11 11 of Fig. 10; and Figs. 12 to 17, inclusive, are diagrams, on a reduced scale, illustrating the different positions 35 that the parts assume during the operation.

My invention, strictly speaking, relates to a mechanical movement for converting rotary motion into rectilineally-reciprocating 40 motion, and the same may be applied and adapted to any use or location where it is desired to use such a movement; but with this understanding I will state that my invention has been principally devised for use in connection with the reciprocating beds of printing-presses, and with the understanding that 45 the same may be applied and used in any desired connection without departing from the scope of my invention I will further describe

my invention as applied and used in connection with a printing-press.

A printing-press bed to secure the best results must be run, preferably, at an even speed during the forward-and-return strokes and must be gradually stopped and started 55 again in the reverse direction without jar or vibration. There are many mechanisms well known for giving the bed or reciprocating member its direct forward-and-backward movement, whether the same is at an even 60 speed or not; and my invention consists in the combination, with a bed driven in this manner, of a reversing mechanism which consists of a controlling member adapted to be periodically connected to the bed to control 65 and reverse the motion thereof, and this controlling member preferably has a to-and-fro motion at times different from the bed when the controlling member is not connected to the bed. A crank or similar movement is admirably adapted for the purpose of reversing 70 the movement of the bed, and I therefore preferably actuate this controlling member by a crank, which preferably is continuously rotated, and the parts are so arranged that 75 when it is desired to reverse the bed the controlling member will take the bed at its full speed and will gradually retard the bed and bring the same to a state of rest, and then will gradually accelerate and start the bed in the 80 opposite direction and will give the same back to the driving mechanism moving at the same speed at which it would be moved by the main driving mechanism. This controlling member 85 in the specific description of my device is called the "slider" or "yoke."

My invention, specifically described, consists of a gear rotating in one direction, disposed between two racks placed on opposite 90 sides of the gear, attached to the moving member, and with which the gear alternately engages and thereby gives a reciprocating movement to the moving member. This mechanism will give the desired uniform forward-and-return movement of the moving 95 member. To produce the gradual change of direction beyond this uniform movement, I secure to said gear a wrist-pin, the distance

of which from the center of the gear is equal to the pitch radius of the same, and engaging the wrist-pin and adapted to move only in a direction parallel with the movement of the moving member is a sliding yoke or slider. Thus as the gear revolves this yoke will be given the resultant movement from the wrist-pin, and I provide means whereby the moving member will engage this reciprocating yoke, so that the said member will have its motion reversed at the proper time, as if the same were directly connected to the wrist-pin by a connecting-rod.

Referring now to the drawings, and in detail, 1 represents the framing of the machine, which may be connected by the vertical struts or braces 2 2 and the horizontal box or tie beam 3. A bed or moving member 4 is mounted so as to reciprocate in the usual manner on the framing 1. This mounting is well understood in printing-presses and it is not necessary to show or describe the same at length in this case.

5 represents in dotted lines the position of the usual impression-cylinder.

6 represents a bracket of peculiar shape which is bolted on top of the horizontal beam 3, and this bracket has formed therein the bearings 7 and 8 and the extending arms 9, which have rectangular holes, as 10, formed therein to receive the reciprocating yoke, as hereinafter described.

Journalled in the bearing 8, and also in the framing 1 if so desired, is the shaft 11, which is used as the driving-shaft and which may be driven continuously in the same direction by any suitable means common in printing-presses or other machinery. On the inside end of this shaft 11 I fasten a pinion, as 12. In the bearing 7 is mounted a bushing 13, and on the outside of this bushing I form a series of teeth 14. Eccentrically bored in this bushing is a hole in which is journaled or mounted the short shaft 20, and on the end of this shaft is fastened or secured the gear 21, with which the pinion 12 engages and drives. A stud 25 is secured in the bracket 6, as shown, and on this stud is journaled the vibrating lever 26, which has a series of teeth 27, that are adapted to engage and are in mesh with the teeth 14 on the bushing 13.

28 represents a shaft which may be continuously driven in one direction, preferably opposite to that of shaft 11, and the two shafts may be connected through any of the usual gearing used on the outside of the printing-press. It is not thought necessary to show this gearing between the two shafts 11 and 28, and the same may be varied as desired, and the same can be easily figured by a draftsman who understands printing-press machinery or gearing, so as to adapt the same to any particular press, and the shaft 28 is designed to revolve once for each complete reciprocation of the bed.

The shaft 28 may be mounted in the framing 1, as shown, and secured to the shaft 28

is the cam 29, which has two faces 30 and 31, which are arcs of different radii struck about the center of the shaft, and the surfaces 30 and 31 are connected by easy inclines, as shown.

On the shaft 28 is mounted a square block 32, and fitting on the same is the link 33, which has a slot 34, whereby the link is free to move back and forth on the block 32. The link 33 is connected by pin 35 to the lever 26, and the link 33 has studs 36 secured in the same, upon which are mounted rollers 37, which bear against the opposite sides of the cam 29. Thus as the cam 29 revolves, the link 33 will be moved forward and backward a distance equal to the difference in radii of the two surfaces 30 and 31 of the cam 29, and thus the lever 26 will be vibrated, and thus the eccentric bushing 13 will be oscillated a small distance. This will act to raise and lower the gear 21, and as the movement of the same is very slight the mesh between gear 21 and pinion 12 will not be affected. It will also be noted that this motion only takes place when the inclines between the cam-surfaces 30 and 31 act on the rollers 37 and that at all other times the gear 21 will be held positively in its raised or lowered position. Thus the gear 21 will be quickly raised and held for a long time in its raised position. Then the same will be quickly lowered and held in its lowered position for a considerable length of time. The movement of the gear reduced to a vertical line is made a little more than twice the depth of the teeth of the same.

On the side of the gear 21 is formed a slot, as 40, and fitting into this slot is the piece 41, which has a projection 42 fitting into the gear, and formed integral therewith is the wrist-pin 43, on which is mounted the square or rectangular block 44.

In the holes 10 of the arms 9 are fitted the arms 45 of the sliding yoke 46. This yoke has a vertical slot 47, into which the block 44 fits, and thus as the gear revolves the yoke will be reciprocated back and forth a distance equal to the pitch diameter of the gear 21. The yoke has cut in the back thereof of the slot 48, whereby the sides of the yoke form catches for the latches hereinafter described. Bolted to the under side of the bed is the rack 51.

Formed with or fastened to the reciprocating bed or member, just beyond rack 51, is the frame 50, which has a ledge 100, upon which is fastened the rack 52, so that the latter is in vertical line with rack 51, with which racks the gear 21 alternately engages by reason of its rising-and-falling movement. In the ends of the frame 50 are formed the bumper-lugs 53, 54, 55, and 56, against which the yoke 46 is adapted to bear, and in the lugs 54, 55, and 56 are journaled vertical shafts 60, upon which, between lugs 54 and 55, are fastened the swinging arms 61, having latches or catches 62, and on the ends of shafts 60 are fastened arms 63. In the ends

of these arms are secured pins 64, which carry rollers 65. It will be noticed that the arms 61 and 63 on the left-hand side of the frame are set on the same side of the shaft 60, so that they will move together, and that the arms 61 and 63 on the right-hand shaft 60 are set on opposite sides of the shaft, so that they will move oppositely.

Fastened on the brace 3 is a stationary cam 70, which has a groove 71, which has the two parallel inclines 72 and 73, and the mouths of the same are made tapering, as at 74, so that the rollers 65 will easily engage this groove 71.

The operation of my device is as follows: As shown, the racks 51 and 52 are made the same length as the circumference of the gear 21. When the gear 21 is in mesh with the top rack 51, as indicated in Fig. 1, the bed will be moved a distance equal to the length of said rack to the left. Now as the bed reaches the end of its movement, by reason of the engagement, the right-hand catch 62 on arm 61 will pass through slot 48, and as the roller 65 on the right-hand arm 63 runs up the incline 73 the catch 62 will be swung to engage the yoke 46, and at the same time the right-hand lugs 53, 54, 55, and 56 will come against the yoke 46. This position of the parts is indicated in Figs. 2 and 3. As the wrist-pin 43 is now in its upper position, and as the bed is locked to the yoke or slider, the next quarter-revolution of the gear 21 will move the bed to the left a distance equal to a pitch radius of gear 21, and this movement will commence at the same speed as the bed was moved directly by the gear 21, and will gradually decrease to zero, or the resultant of the crank movement derived from the wrist-pin 43. During the next quarter-revolution of the gear 21 the yoke 46 will bear against the lugs 53, 54, 55, and 56, and will thus move the bed to the right a distance equal to a pitch radius of gear 21. This motion will commence at zero and gradually increase to the full speed, the resultant of the crank connection, and is readily understood. As the bed moves back to the right the right-hand roller 65 runs back through incline 73, and thus the right-hand latch will release the yoke 46. Thus during one-half of a revolution of the gear 21 the bed has been gradually stopped, and started again in the opposite direction at a speed the resultant of a crank movement, and as described. During this said half-revolution of gear 21 the lever 26 is vibrated from cam 29, and thus the gear 21 is lowered to engage the rack 52 when the same is brought up to the gear 21 by the reversing movement before described. The bed will now be moved to the right a distance equal to the length of the rack 52, and then during the next half-revolution of gear 21 the bed will be gradually stopped, and started again in the opposite direction, substantially as described in connection with the other previous half-revolution or reversal. It will be

seen that the vertical rising-and-falling movement of the gear 21 will not affect the motion of the reciprocating slider 46.

The operation at each reversal is practically the same. In one case the right-hand roller 65 engages incline 73, and in the other case the left-hand roller 65 engages incline 72, and the distance between the inclines is so great that the rollers only engage one incline, as described. While the gear 21 is moving the bed the slider 46 simply plays back and forth idly. Thus three revolutions of the gear 21 are translated into one complete reciprocation of the bed.

It is evident that the length of the bed could be increased and the gear 21 make five, seven, nine, or any further odd number of revolutions to each reciprocation. The same result would be obtained by decreasing the size of gear 21 and reversing in a shorter movement of the bed.

It is evident that so far as the broad purpose of my invention is concerned there are many other ways by which the rotary movement of the pinion could be used to give the bed its direct forward-and-backward movement, as, for example, by raising and lowering the racks 51 and 52 instead of moving the gear. It will also be seen that all the movements of the bed are positive and that the gear 21 will be brought easily and nicely without jam into mesh with the racks.

In Figs. 12 to 17, inclusive, I have shown diagrams illustrating one complete reciprocation of the bed. Thus in Fig. 12 the gear 21 has just engaged the top rack 51 to start the bed to the left, and during the first revolution of the gear 21 the bed will be so moved a pitch circumference of gear 21 until the parts assume the position indicated in Fig. 13. Now the slider 46 and bed will be locked together, so that during the next quarter-revolution the bed will be moved to the left a distance equal to a pitch radius of gear 21 at a speed gradually decreasing to zero, or until the parts assume the position indicated in Fig. 14. Now during the next quarter-revolution of gear 21 the bed will be moved to the right a distance equal to the pitch radius of gear 21 at a speed gradually increasing from zero to the full speed derived from gear 21, and during this last half-revolution of gear 21 the same will be, by the means described, lowered, so that the gear 21 can now engage the lower rack 52, as indicated in Fig. 15; and now during the next complete revolution the bed will be moved to the right, or until the parts assume the position shown in Fig. 16. During the next quarter-revolution the bed will be moved still farther to the right a distance equal to a pitch radius at a speed gradually decreasing from full to zero until the parts assume the position indicated in Fig. 17, and then during the next quarter-revolution the bed will be gradually started to the left again and all the parts brought to the original position, as shown in Fig. 12, this last movement being

also a pitch radius. Thus in the device shown the forward-and-backward movement is equal to the pitch circumference of gear 21, plus a pitch diameter. The controlling member instead of being a reciprocating yoke or slider, as before specifically described, may be made in a great many different forms and shapes and may be arranged to move in a great many different ways so far as the broad scope of my invention is concerned, the operation being that this controlling member must be adapted to periodically engage with the bed to reverse its movement, and then, during the main movement of the bed, must not interfere with the movement of the same. Thus it will be seen that I have devised a peculiar mechanical movement which is admirably adapted for the purpose of actuating the bed of a printing-press or for any analogous use.

The device herein shown and described may be varied by a skilled mechanic without departing from the scope of my invention, as expressed in the claims.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a mechanical movement, the combination with a reciprocating bed or member, of a controlling member adapted to be periodically connected to the bed to control the motion thereof, and means for imparting a positive to-and-fro motion to this controlling member, substantially as described.

2. In a mechanical movement, the combination with the reciprocating bed or member, and a mechanism for reciprocating the same, of a controlling member adapted to be periodically connected to the bed to control the motion thereof, and a crank connected to actuate said controlling member, substantially as described.

3. The combination with a reciprocating bed of a controlling member adapted to be periodically connected to the bed to control the motion thereof, and, also, to have a to-and-fro motion at times different from that of the bed, substantially as described.

4. In a mechanical movement, the combination with the reciprocating bed or member, and a mechanism for reciprocating the same operating to drive it during the principal extent of its reciprocation only, of a controlling member, and means acting to connect said controlling member and reciprocating member while the operating mechanism of the reciprocating member is becoming inoperative as the driver, substantially as described.

5. In a mechanical movement, the combination with the bed, and a rack-and-pinion mechanism operating to drive the bed during the principal extent only of its movement in either direction, of a crank-actuated controlling member moved to and fro, periodically engaging with, and operating to rapidly diminish the movement of the bed, arrest the same, then start and accelerate the bed in the reverse direction, together with means acting

to bring said controlling member into operative relation to the bed, while the rack-and-pinion mechanism is becoming inoperative as the driver, substantially as described.

6. In a mechanical movement, the combination with a rack-and-pinion mechanism operating to drive the bed during the principal extent of its run, of an independently-actuated controlling member, periodically engaging with the bed, and operating to slow down and arrest the bed, then to start and accelerate it in the reverse direction, and a locking device for coupling said member to the bed, substantially as described.

7. In a mechanical movement, the combination with the moving bed, and a crank-actuated controlling member that operates to slow down and arrest its movement in one direction, and to start the same in the opposite direction, of a latch and a cam for operating the same, whereby said latch will automatically connect the bed and the crank-actuated member, substantially as described.

8. In a mechanical movement, the combination with a reciprocating member, of means for reciprocating the same, and a stopping and starting mechanism for reversing the reciprocating movement, consisting of a revolving wrist-pin, a slider to which said pin is connected, and means for connecting and disconnecting said slider and said reciprocating member, substantially as described.

9. In a mechanical movement, the combination with a reciprocating member, of means for reciprocating the same, and a stopping and starting mechanism for reversing the movement, consisting of a revolving wrist or crank pin, a slider or yoke, having a slot which said pin engages, and means for connecting and disconnecting the reciprocating member and the yoke, substantially as described.

10. The combination in a mechanical movement of the reciprocating member, the gear driven continuously in one direction, means whereby the gear reciprocates the moving member, and means whereby this reciprocating movement is gradually stopped and reversed, consisting of a wrist-pin mounted on said gear, the slider or yoke, with which said pin engages, and means for connecting and disconnecting said slider and said reciprocating member, substantially as described.

11. The combination in a mechanical movement with the reciprocating bed provided with a frame and upper and lower racks, of a driving-pinion lying between said racks, and adapted to engage them alternately, means for raising and lowering said pinion for the purpose of bringing it into such engagement, a horizontally-reciprocating yoke, a wrist-pin on said driving-pinion engaging said yoke, and imparting a varying reciprocating movement thereto, means for locking said yoke to the respective ends of said rack-supporting frame, and for unlocking the yoke from said ends at predetermined intervals, substantially as described.

12. The combination in a device of the character described, of the bed having the top and bottom racks, the gear disposed between the same, means for rotating said gear, the eccentric bushing which carries said gear, and means for oscillating said bushing, whereby the gear may engage either of the said racks, substantially as described.

13. The combination with bed 4, having top and bottom racks of the gear 21 disposed between the racks and mounted on shaft 20, of the eccentric bushing suitably journaled in a frame or bracket, and carrying the shaft 20, of the cam 29, and connections between said cam and bushing, whereby the same will be oscillated to cause the gear to alternately engage said racks, substantially as described.

14. The combination with the bed 4 having the top and bottom racks, of the gear disposed between said racks, and mounted on a shaft 20, of the eccentric bushing in which said shaft is journaled, of the cam 29, and the link 33, engaging said cam, and connections between said link and bushing, whereby as the cam revolves, the gear will be raised and lowered to alternately engage said racks, substantially as described.

15. In a machine of the class described, the combination with a reciprocating bed provided with a frame and upper and lower racks, of a driving-pinion lying between said racks, means for raising and lowering the pinion to bring it into engagement with said racks alternately, a horizontally-reciprocating yoke provided with catches adapted to engage co-acting latches on the opposite ends of the rack-supporting frame and formed with a vertical slot, a wrist-pin mounted on the driving-pinion and carrying a wrist-pin block seated in said vertical slot, and means, substantially as shown and described, for securing the engagement and disengagement of the catches on said yoke with the coacting parts on the ends of the rack-supporting frame at predetermined intervals in the movement of the machine, substantially as shown and described.

16. The combination of the reciprocating bed, the frame attached to the same and upper and lower racks, of the pinion adapted to engage said racks alternately, of means for raising and lowering said pinion, the horizontally-reciprocating yoke provided with catches and a slot, the wrist-pin on said pinion, and wrist-pin block lying within said slot, and imparting a varying reciprocating motion to the yoke, the latches pivoted to the opposite ends of the rack-frame, and adapted to engage the catches on the yoke, and means for moving the latches out of engagement with said catches at predetermined intervals, substantially as described.

17. The combination with a reciprocating bed provided with a rack-carrying frame and having upper and lower racks, of a driving-pinion lying between said racks, means for raising and lowering the pinion, whereby it

may engage said racks alternately, a horizontally-reciprocating yoke receiving from the pinion a varying reciprocating movement, locking devices on the yoke and the ends of the rack-frame, whereby the yoke may be connected with either end of the rack-frame, and bumper-lugs on the yoke and ends of the rack-frame adapted to lie in close contact when the yoke is locked to either end of the frame, whereby when the yoke is in connection with either end of the rack-frame its movement in either direction is communicated directly to the rack-frame and governs the motion thereof, substantially as shown and described.

18. In a mechanical movement, the combination of the gear, the reciprocating member carrying the racks with which said gear is adapted to engage, of the wrist-pin carried by said gear, the yoke having a slot which said wrist-pin engages, of the lugs or projections carried by the reciprocating member, and latches as 62 and means for bringing the latches into engagement with the yoke, substantially as described.

19. In a mechanical movement, the combination of the reciprocating member, a frame 50 secured to the same, having projections as lugs on the ends of the same, of two racks mounted, so as to be engaged by said gear, the gear 21 disposed between said racks, and means for causing said gear to alternately engage said racks, of a wrist-pin carried by said gear, a slider or yoke, which said wrist-pin engages, and swinging latches as 62 carried by frame 50, and means for causing the latches to properly engage the slider, substantially as described.

20. In a mechanical movement, as described, the combination of the reciprocating member, the gear having a wrist-pin, means whereby the said gear will move said reciprocating member alternately in opposite directions, the stationary bracket, the slider mounted in the same, said slider being connected to the wrist-pin on said gear, whereby as said gear revolves, the slider will be reciprocated, and means for connecting and disconnecting the reciprocating member to the slider, whereby the slider may reverse the movement of the reciprocating member, substantially as described.

21. In a device of the character described, the bracket 6 having arms 9, 9, said arms having holes as 10, 10, said bracket being adapted to carry the slider, substantially as described.

22. In a device of the character described, the bracket 6 having arms 9, 9, said arms having holes as 10, 10, and a bearing as 7, whereby said bracket is adapted to carry both the slider and the driving-gear, substantially as described.

23. The combination with bed 4 having racks 51 and 52, of the gear 21, having wrist-pin 43, of yoke 46 having slot 47 which wrist-pin 43 engages, of lugs as 53, 54, 55, and 56 carried by the bed, and latches as 62 adapted

to engage yoke 46, of the arms 63 adapted to move said latches, and cam 70 which said arms are adapted to engage, substantially as described.

- 5 24. The combination in a device of the character described with the gear 21 having the slot 40, of the piece 41, fitting in said slot, and carrying the wrist-pin 43, and having the projection 42 fitting into gear 21 of means as

a screw for holding said parts together, substantially as described. 10

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WINFIELD S. HUSON.

Witnesses:

LOUIS W. SOUTHGATE,
J. F. HALEY.