

No. 628,220.

Patented July 4, 1899.

R. L. CROSSMAN.
MECHANICAL MOVEMENT.

(Application filed May 2, 1898.)

(No Model.)

3 Sheets—Sheet 1.

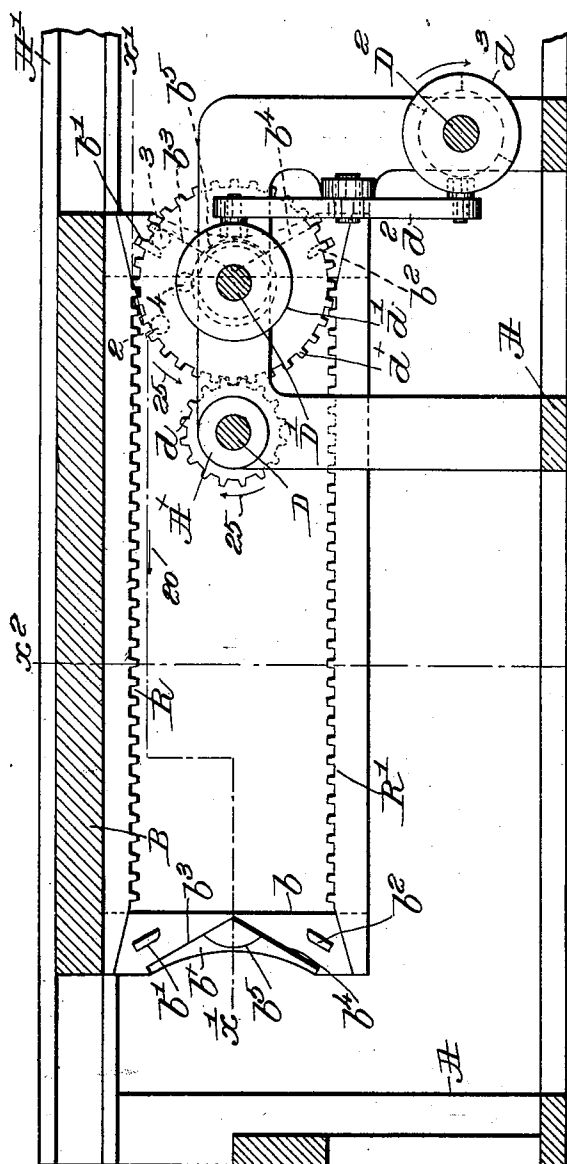


Fig. 1.

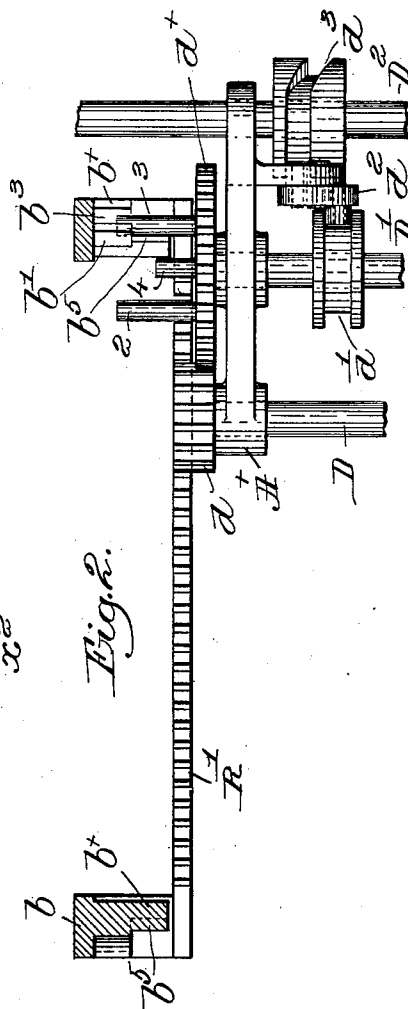


Fig. 2.

Witnesses.

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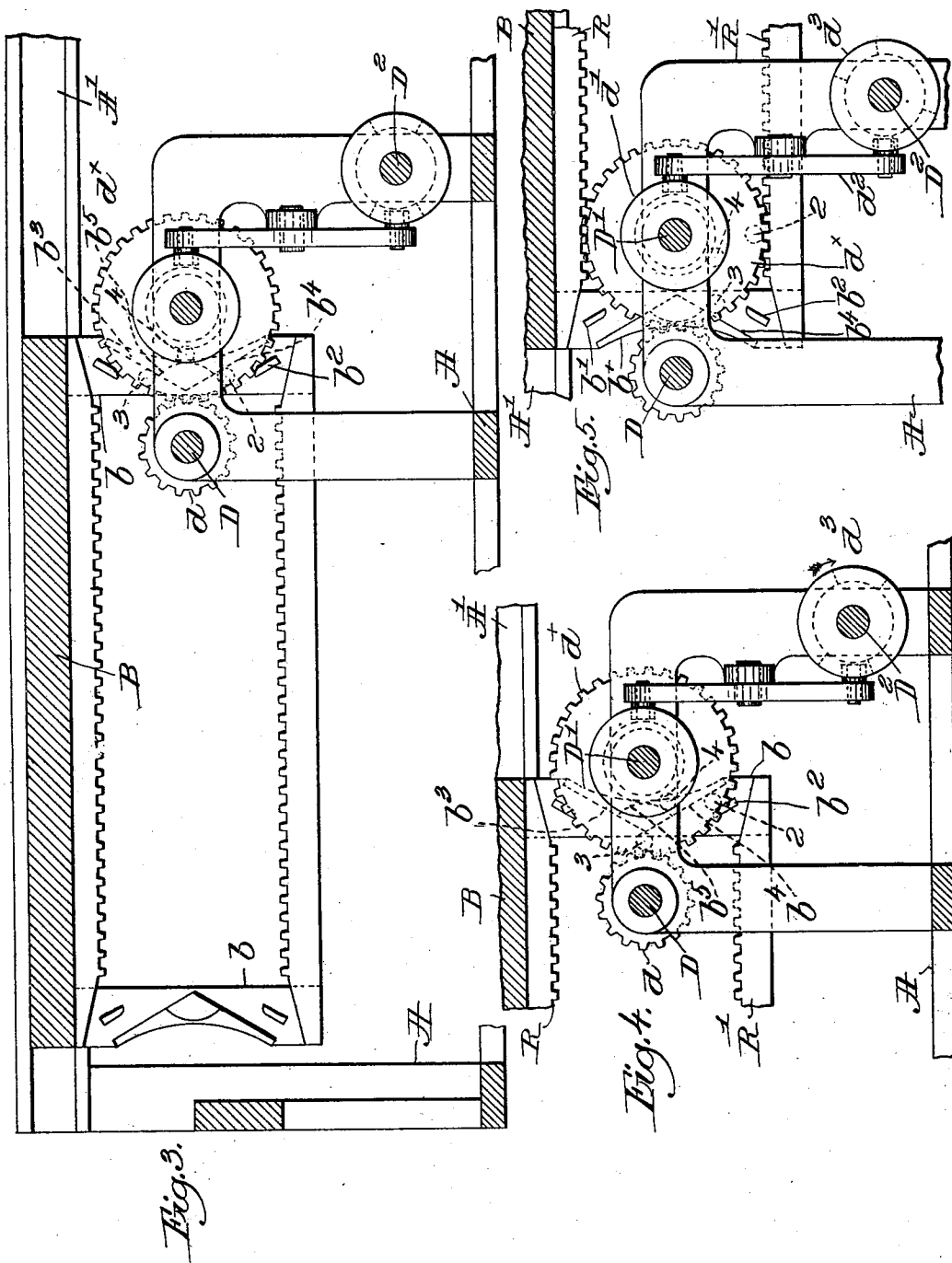
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3 Sheets—Sheet 2.



Witnesses.

And S. G. Smith of
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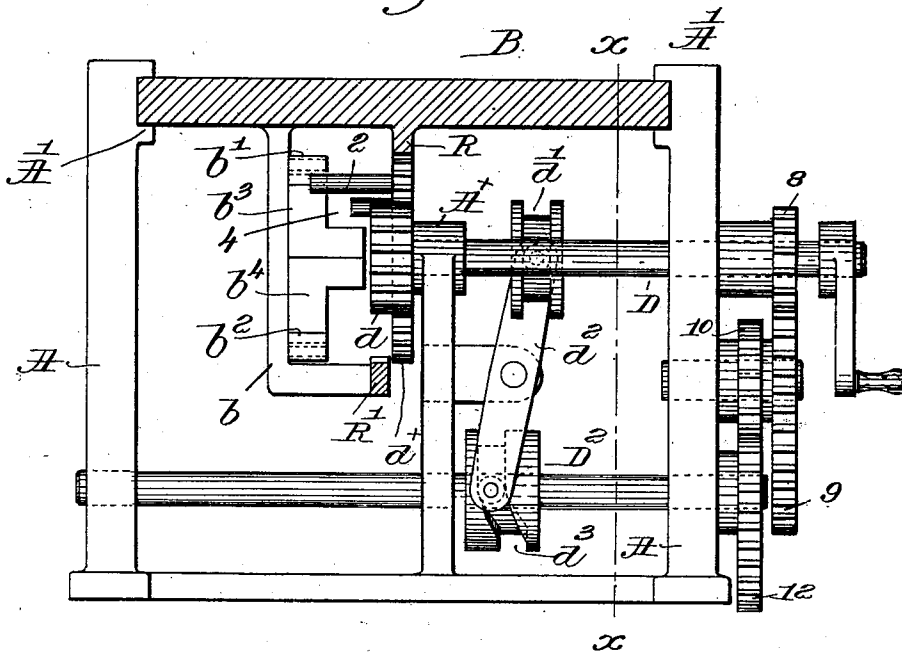
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3 Sheets—Sheet 3.

Fig. 6.



Witnesses.

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UNITED STATES PATENT OFFICE.

ROBERT L. CROSSMAN, OF TAUNTON, MASSACHUSETTS, ASSIGNOR OF ONE-THIRD TO THE HUBER PRINTING PRESS COMPANY, OF SAME PLACE.

MECHANICAL MOVEMENT.

SPECIFICATION forming part of Letters Patent No. 628,220, dated July 4, 1899.

Application filed May 2, 1898. Serial No. 679,411. (No model.)

To all whom it may concern:

Be it known that I, ROBERT L. CROSSMAN, of Taunton, county of Bristol, State of Massachusetts, have invented an Improvement in Mechanical Movements, of which the following description, in connection with the accompanying drawings, is a specification, like letters and numerals on the drawings representing like parts.

10 This invention relates to a mechanical movement whereby a rotary movement is transformed into a rectilinear or reciprocating movement, and is particularly adapted for use in imparting a reciprocating movement to the beds of printing-presses. When
15 used in such connection, my invention has for its object the conversion of the rotary movement of a driving member into rectilinear or reciprocating movement of the part
20 to be reciprocated—such, for instance, as the type-bed—so that the bed shall be moved uniformly throughout the greater part of its travel, and as the limit of its traverse in either direction is approached to gradually
25 decrease the speed to a point of rest and therefrom start and gradually increase the speed of the bed to the maximum speed.

I have herein illustrated my invention in connection with the type-bed of a printing-press wherein the greater part of the stroke or traverse of the bed is effected by the alternate engagement of a rotating gear with two parallel rack-bars attached to or movable with the bed, though it is to be understood
35 that this is only one application of my invention and that my invention is not restricted to such application nor to its application in a printing-press provided with the mechanism herein shown for effecting the greater portion
40 of the stroke of the bed.

The double-rack and coöperating gear mechanism herein shown is of that type wherein the racks are arranged one above the other, but not in the same vertical plane, the
45 driving-gear being located between the racks and being brought into engagement alternately therewith by a relative lateral movement of said racks and gear, the shifting being effected by any suitable means not in
50 itself forming any part of my invention.

Figure 1 is a vertical longitudinal sectional

view of the part to be reciprocated on the line xx , Fig. 6, with one embodiment of my invention applied thereto. Fig. 2 is a plan view thereof below the line $x'x'$, Fig. 1. Fig. 3
55 is a view similar to Fig. 1, the reciprocating member, however, being shown at the extreme limit of its traverse in one direction. Fig. 4 is a like view, partially broken out to save space, showing the position of the various parts after the reciprocating member
60 has been started on its return stroke or movement. Fig. 5 is a similar view showing the position of the parts when the reciprocating member has approached the end of its uniform speed on such return-stroke; and Fig. 6
65 is a transverse sectional view of the mechanism shown in Fig. 1, on the line x^2x^2 thereof, looking to the right.

The supporting-frame A is provided with
70 suitable guideways A', upon which the type-bed or reciprocating member B is mounted and slides, and I have herein shown hangers b depending from the bed to support the lower rack-bar R', the upper and parallel rack-bar
75 R being secured to the under side of the bed in suitable manner, said rack-bars being located in different vertical planes, as clearly shown in Fig. 6.

A transverse main driving-shaft D, supported in bearings A^x on the frame, is provided with a broad pinion d in mesh with an actuating member, shown as a gear d^x , fast on a longitudinally-movable shaft D', supported in the frame, said shaft having an
80 annularly-grooved collar d' thereon, engaged by a pin on a rocker-arm d^2 , said arm being rocked at the proper time by a cam d^3 on a shaft D², which shaft is rotated by means of suitable
85 gears 8, 9, 10, and 12 from the driving-shaft. By means of the mechanism described the bed B is, by the engagement of the actuating member or gear d^x with one of the racks,
90 driven at a uniform speed in one direction until the end of the engaged rack is directly above the vertical diameter of the gear d^x , as in Fig. 1, and at such time the cam d^3 operates by the intervening connections to shift the gear d^x from engagement with such rack, and while
95 the gear makes a half-revolution it is brought into position to engage the other rack, and thereby drive the bed in the reverse direc-
100

tion until the end of the latter rack reaches the point of disengagement with the actuating-gear. Thus the part to be reciprocated will be driven at a uniform speed throughout the greater portion of its stroke. After a rack and the actuating-gear are disengaged the movement of the bed is to be continued with a gradually-retarded speed until the bed is brought to a standstill, and then the bed is started and moved with a gradually-accelerated speed upon its return movement, all while the actuating-gear is moving from engagement with one rack into engagement with the other.

On the inner face of the gear d^x are located three laterally-extended crank pins or studs 2, 3, and 4, which may be provided with rolls, if desired, the pins 2 and 3 being shown as equidistant from the center of rotation of the gear and near the periphery of the latter, while the pin 4 is nearer the center of the gear and equidistant from the pins 2 and 3.

Each hanger b is provided on its inner face with outwardly-diverging guideways formed by short inclined shoes $b^1 b^2$, near the top and bottom of the hanger, and a long double shoe b^x , the inclined faces $b^3 b^4$ thereof being parallel to the outer faces of the short shoes, which latter are at such an angle that they will be radial to the axis of the gear d^x when the shift of the latter from one to the other rack-bar is effected. The pins 2 and 3 are long enough to enter the guideways at the proper times irrespective of the position of the actuating-gear relatively to either rack.

I have herein shown a curved shoe b^5 located on and at the apex of the double shoe b^x , the convex face of the shoe being outwardly turned and having the same curvature as the path of the crank-pin 4, which latter is herein shown as shorter than the crank-pins 2 and 3 in order to clear the double shoe b^x .

Referring to Fig. 1, the reciprocating member B and actuating-gear d^x are moving in the direction of arrows 20 and 25, respectively, and the said gear has reached the point of disengagement with the rack R, while the crank-pin 3 has just moved into the upper guideway into engagement with the shoe b^1 . As the crank-pin 3 continues to move the movement of the bed B in the direction of the arrow 20 will be maintained by or through the pin and at substantially uniform speed until said crank-pin passes over dead-center. From such point the speed of the member B will be gradually decreased, the long face b^3 of the shoe b^x preventing overrunning, and just as the pin 3 moves out of the guideway and is disengaged from the shoe b^1 the pin 4 engages the curved shoe b^5 , the movement of the reciprocating member or bed B being finally stopped when the crank-pin 4 reaches the center of said shoe b^5 , as shown in Fig. 3. At such time the pins 2 and 3 are in engagement with the faces $b^3 b^4$, respectively, of the

shoe b^x , equidistant from its ends, and from this point the crank-pins 2 and 3 effect the movement of the bed B to the right, Fig. 3, with a gradually-accelerated speed, the gradual advance of the pin 4 to the right while moving over the lower half of the shoe b^5 permitting the movement of the bed, while at the same time keeping the shoe b^x in engagement with the crank-pins 2 and 3 until the parts assume the position shown in Fig. 4. When the pin 3 has passed the apex of the double shoe, it ceases to influence the movement of the bed B, which movement is then continued by the pin 2, the inner pin 4 then passing from the shoe b^5 and across the vertical side of the shoe b^x . By this time the crank-pin 2 has entered between the shoes b^2 and b^x , the former preventing overrunning of the mechanism, and said pin retains control of the bed until it passes beyond the shoe b^x just as the gear d^x comes into engagement with the rack R' and completes the major part of the stroke to the right. The crank-pins and cooperating shoes thus constitute reversing means for the reciprocatory member, and the latter is under the complete control of said means from the instant of disengagement of the actuating-gear and one rack to the instant of its engagement with the other rack.

In Fig. 5 the bed has nearly completed its stroke to the right at uniform speed and the crank-pin 3 is about to engage the small shoe b^2 to assume control of the bed after disengagement of the gear d^x and rack R' and continue the stroke while gradually decreasing the speed, the pin 4 meanwhile coming into engagement with the shoe b^5 at its lower corner and passing thence to the center of its curved face, when the movement of the bed is stopped. Meanwhile the crank-pin 2 will have moved into engagement with the face b^3 of the shoe b^x ready to start the movement in the opposite direction, acting in conjunction with the pin 3 on the face b^4 , while the pin 4 will complete its travel over the upper half of the curved shoe b^5 and pass therefrom.

The shoes b^1 and b^2 are made short in order to permit the entrance and exit of the outer crank-pins 2 and 3 from the guideways formed by said shoes and the shoe b^x , and, if desired, the inner ends of the short shoes may be beveled or rounded, as shown, to facilitate the entrance and exit of the crank-pins.

My invention is not restricted to the precise construction and arrangement herein shown, for the same may be varied or modified without departing from the spirit and scope of my invention.

Having thus fully described my invention in a practical embodiment thereof, what I claim, and desire to secure by Letters Patent, is—

1. The combination with the part to be reciprocated and means for reciprocating the same throughout the greater portion of its

movement, of reversing mechanism comprising two rotatable crank-pins, and two oppositely-inclined guideways movable with the reciprocating part, one of said crank-pins co-operating with one of the guideways to institute, and the other crank-pin co-operating with the other guideway to terminate, the reversing, and means to control the part to be reciprocated during the intermediate period of reversing, substantially as described.

2. The combination with the part to be reciprocated and means for reciprocating the same throughout the greater portion of its movement, of reversing mechanism comprising two rotatable crank-pins, and two oppositely-inclined shoes movable with the reciprocating part, said crank-pins each engaging one of said shoes, successively, to respectively institute and terminate the reversing, and means to control the part to be reciprocated during the intermediate period of reversing, substantially as described.

3. The combination with the part to be reciprocated and means for reciprocating the same throughout the greater portion of its movement, of two rotatable crank-pins, and means in connection with said reciprocating part, for engagement by said pins, whereby the speed of said part is gradually decreased, the part stopped, and thereafter started in the opposite direction with a gradually-accelerated speed, substantially as described.

4. The combination with the part to be reciprocated and means for reciprocating the same throughout the greater portion of its movement, of two rotatable crank-pins, and means at each end of the said part to be reciprocated, for engagement by both of said pins, and separate means to control the reciprocating part at the period of reversal of its direction of movement, whereby the speed of said part is gradually decreased, the part stopped, and thereafter started in the opposite direction with a gradually-accelerated speed, substantially as described.

5. The combination with the part to be reciprocated and means for reciprocating the same throughout the greater portion of its movement, of two rotatable crank-pins, means in connection with said reciprocating part, for engagement by said pins, whereby the speed of said part is gradually decreased, the part stopped, and thereafter started in the opposite direction with a gradually-accelerated speed, and separate means to control said reciprocating part at the period of reversal of its direction of movement, substantially as described.

6. The combination with the part to be reciprocated and means for reciprocating the same throughout the greater portion of its movement, of three rotatable crank-pins fixed relatively, and means in connection with said reciprocating part, for engagement by said pins, whereby the speed of said part is gradually decreased, the part stopped, and thereafter started in the opposite direction with a

gradually-accelerated speed, substantially as described.

7. The combination with the part to be reciprocated and means for reciprocating the same throughout the greater portion of its movement, of two controlling members movable in a fixed circular path, and two oppositely-inclined guideways movable with said part to be reciprocated, to be engaged by both of said controlling members at each period of reversal, whereby the direction of movement of the part to be reciprocated is reversed while governed by said controlling members, substantially as described.

8. The part to be reciprocated, and means for effecting the reciprocation of said part throughout the greater portion of its movement, combined with three rotatable relatively-fixed crank members, two inclined guideways movable with the reciprocating part and with which two of the crank members co-operate to respectively institute and terminate the reversal of said part, and means in connection with said part, to co-operate with the third crank member and control the reciprocatory part during the middle period of reversing, substantially as described.

9. The part to be reciprocated, rack-and-pinion mechanism for effecting the reciprocation thereof throughout the greater portion of its movement, two crank members rotatable coincidentally with the gear, and inclined shoes in connection with said reciprocatory part, for engagement by said crank members, to gradually decrease the speed of said reciprocatory part and gradually increase its speed in the opposite direction, respectively, said crank-pin serving to prevent overrunning of said reciprocatory part, substantially as described.

10. The part to be reciprocated, rack-and-pinion mechanism for effecting the reciprocation thereof throughout the greater portion of its movement, two crank-pins on said gear and equidistant from its axis of rotation, a third pin thereon nearer its axis, and means at each end of said part to be reciprocated, to be engaged by said pins, whereby the gradual reduction in speed, of said part, stoppage, and starting thereof in the opposite direction is effected, substantially as described.

11. The part to be reciprocated, means for reciprocating it throughout the greater portion of its movement, two rotatable crank-pins having a single path of movement, two projections or shoes carried by said part to be reciprocated and oppositely inclined to the line of travel thereof, and adapted to be co-operatively engaged by said crank-pins, to institute and terminate the reversing, an intermediate shoe carried by the reciprocatory part, and a separate co-operating crank-pin, substantially as described.

12. The part to be reciprocated, means for reciprocating it throughout the greater portion of its movement, two rotatable crank-pins having a single path of movement, two

projections or shoes at each end of said part to be reciprocated and oppositely inclined to the line of travel thereof, and adapted to be coöperatively engaged by said crank-pins, to
 5 institute and terminate the reversing, an intermediate shoe carried by the reciprocatory part, and a separate coöperating crank-pin, substantially as described.

13. The part to be reciprocated, means to
 10 reciprocate it throughout the greater portion of its movement, two rotatable crank-pins movable in a single path, oppositely-inclined guideways carried by the part to be reciprocated, each guideway formed by a long and a
 15 short shoe in parallelism, an intermediate curved shoe, and a third rotatable crank-pin to coöperate therewith, substantially as described.

14. The part to be reciprocated, means to
 20 reciprocate it throughout the greater portion of its movement, two rotatable crank-pins movable in a single path, oppositely-inclined guideways at each end of the part to be reciprocated, each guideway formed by a long
 25 and a short shoe in parallelism, an intermediate curved shoe, and a third rotatable crank-pin to coöperate therewith, substantially as described.

15. The part to be reciprocated, means to
 30 reciprocate it throughout the greater portion of its movement, two rotatable crank-pins movable in a single path, oppositely-inclined guideways carried by the part to be reciprocated, each guideway formed by a long and a
 35 short shoe in parallelism, an intermediate curved shoe at the apex of the two long shoes and higher than the latter, and a third rotatable crank-pin shorter than the other two,

to coöperate only with the curved shoe, substantially as described.

16. The combination with the part to be reciprocated and means for reciprocating said part throughout the greater portion of its movement, of a plurality of rotatable crank members, inclined shoes in connection with
 45 said part to be reciprocated, to be engaged by all of said crank members at each reversal, and means to retain the latter in engagement with the shoes during the control of the reciprocatory part by the crank members, substantially as described.

17. A part to be reciprocated and means to reciprocate it throughout the greater portion of its movement, said means comprising racks and a rotatable gear, relative lateral movement of said racks and gear effecting disengagement of one of said racks and the gear and bringing the latter into engagement with the other rack, combined with reversing means for the part to be reciprocated, said
 60 reversing means comprising a plurality of crank-pins on said gear, oppositely-inclined guideways carried by the part to be reciprocated, one of said crank-pins instituting and the other terminating the reversal by respective engagement with said guideways, and means to control the reciprocatory part during the middle period, substantially as described.

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

ROBERT L. CROSSMAN.

Witnesses:

BERTHOLD HUBER,
 W. K. HODGMAN.