C. J. ROBERTSON.

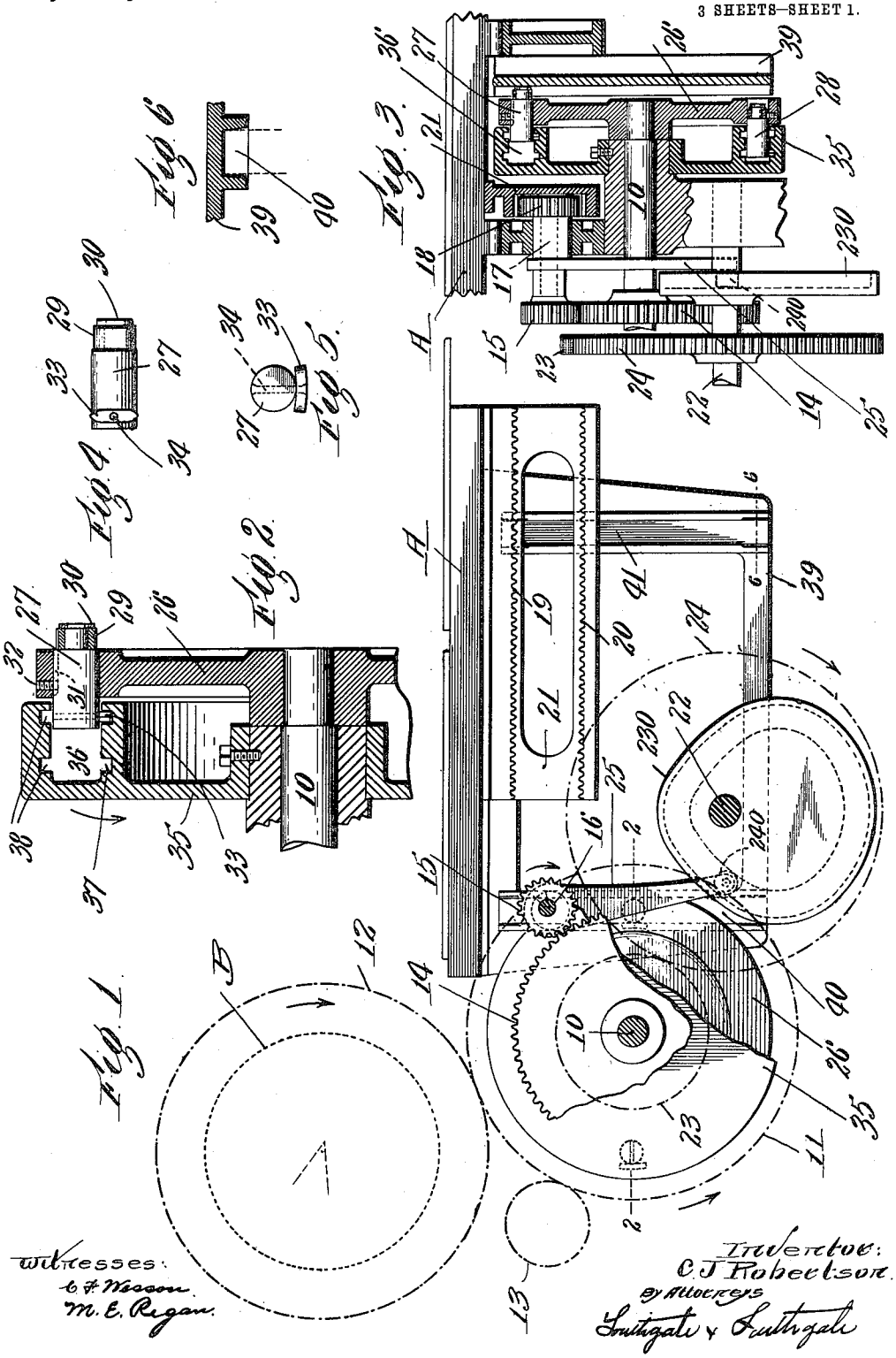
MECHANICAL MOVEMENT.

APPLICATION FILED JULY 11, 1905. RENEWED DEC. 5, 1911.

1,033,941.

Patented July 30, 1912.

3 SHEETS—SHEET 1.



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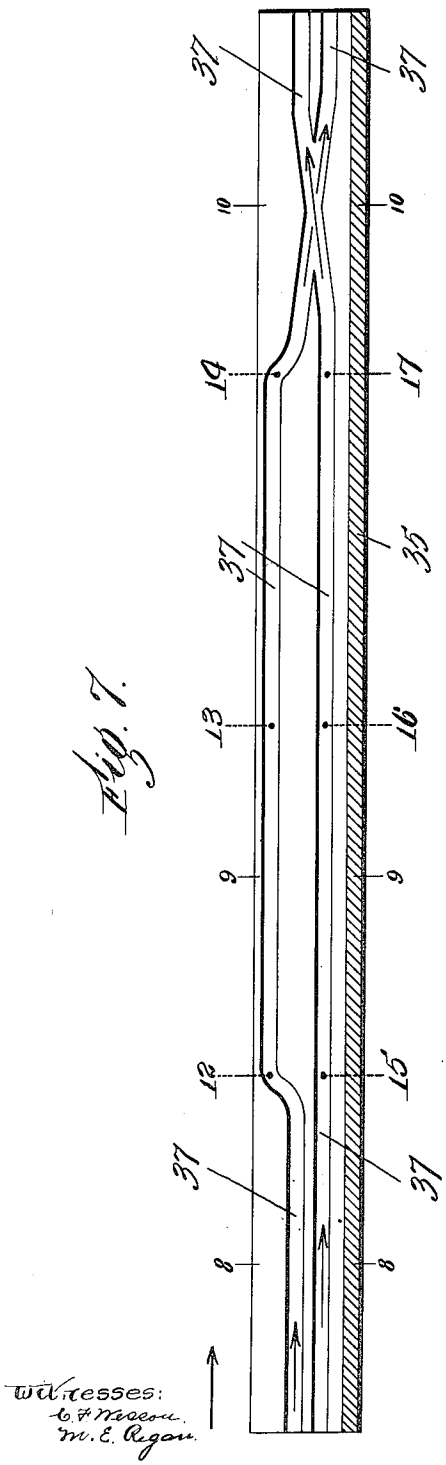

Fig. 7.

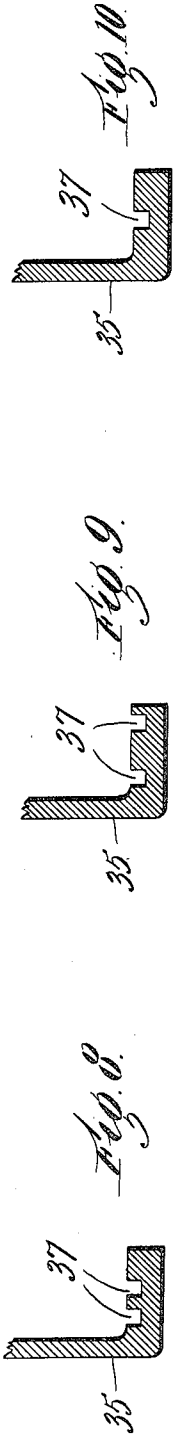

Fig. 10.

Fig. 9.

Fig. 8.

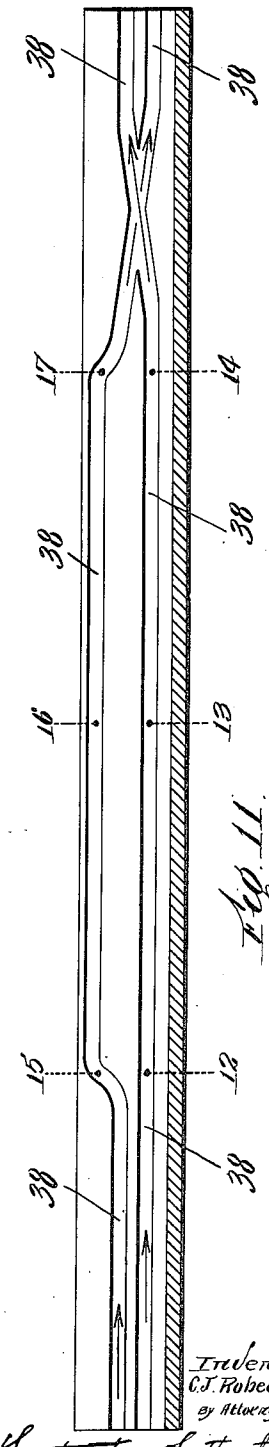

Fig. 11.

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3 SHEETS—SHEET 3.

Fig. 14.

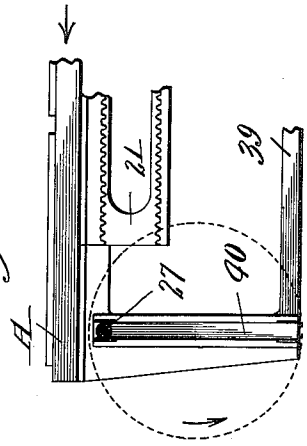


Fig. 17.

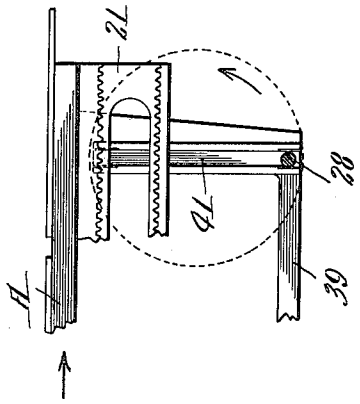


Fig. 13.

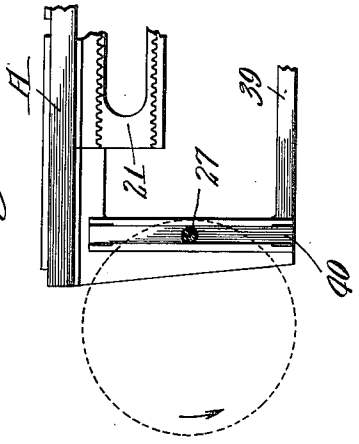


Fig. 16.

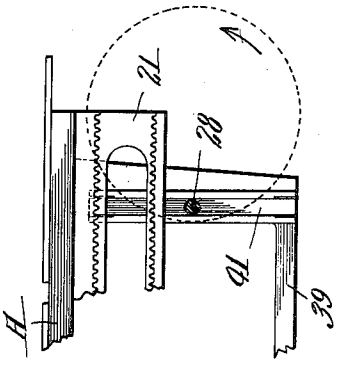


Fig. 12.

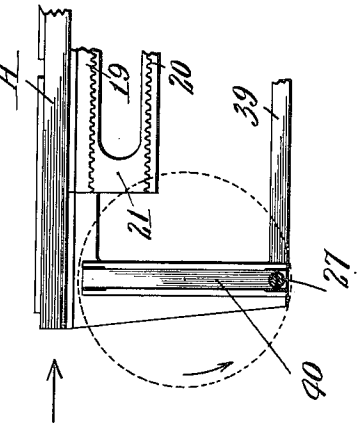
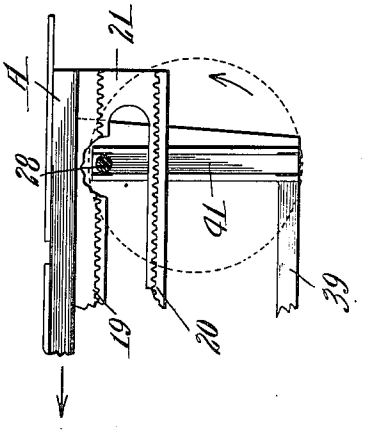


Fig. 15.



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UNITED STATES PATENT OFFICE.

CHARLES J. ROBERTSON, OF TAUNTON, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE AUTOPLATE COMPANY OF AMERICA, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

MECHANICAL MOVEMENT.

1,033,941. Specification of Letters Patent. Patented July 30, 1912.

Application filed July 11, 1905, Serial No. 269,263. Renewed December 5, 1911. Serial No. 664,082.

To all whom it may concern:

Be it known that I, CHARLES J. ROBERTSON, a subject of the King of England, residing at Taunton, in the county of Bristol and State of Massachusetts, have invented a new and useful Mechanical Movement, of which the following is a specification.

The object of this invention is to provide a new and improved mechanical movement for converting rotary motion into reciprocating motion.

The invention has been particularly designed as a means for reciprocating the beds of printing machines.

The especial purpose of the invention is to provide a mechanical movement of this class with few parts, and to provide a movement which is particularly adapted to work correctly on the so-called "two-revolution plan"; that is, on the plan wherein a main or constant speed mechanism is combined with a reversing mechanism, so that each works alternately for a half revolution, or wherein the time of each constant speed movement is equal to the time of each reversing movement.

The mechanism is shown in the accompanying three sheets of drawings.

Referring to the drawings and in detail, Figure 1 is a partial side elevation of enough of the mechanism to illustrate my invention Fig. 2 is a sectional plan view on an enlarged scale, the section being taken on the line 2—2 of Fig. 1. Fig. 3 is a sectional end elevation relatively to Fig. 1, the main shaft having been given a quarter turn forward relatively to the position of the parts shown in Fig. 1. Figs. 4 to 6 inclusive are detail views of one of the wrist-pins. Fig. 7 is a development of one of the cam grooves hereinafter referred to. Fig. 8 is a sectional view taken on the line 8—8 of Fig. 7. Fig. 9 is a central section taken on Fig. 7. Fig. 10 is a section taken on the line 10—10 of Fig. 7. Fig. 11 is a view similar to Fig. 7 illustrating the projection of the other cam grooves. Figs. 12 to 14 are diagrammatic views illustrating one reversing action, and Figs. 15 to 17 inclusive, are diagrammatic views illustrating the other reversing action.

Referring to the drawings and in detail, A designates the reciprocating bed or member, and B the impression cylinder of an ordinary two-revolution impression cylinder printing-machine, which parts may be arranged as common, the bed being mounted so as to be capable of a reciprocating motion to-and-fro under the impression cylinder.

10 designates the main shaft of the machine. A gear 11 is arranged on the end of the shaft 10 and meshes with the gear 12 on the shaft of the impression cylinder. Power may be applied to the gear 11 by a driving pinion 13. A gear 14 is also arranged on the shaft 10, and this gear meshes with a pinion 15 arranged on a shaft 16, which shaft is journaled eccentrically in bushing 17 fitted in the framing. A driving pinion 18 is arranged on the inner end of said shaft 16. Two facing racks 19 and 20 are arranged on a rack-hanger 21 depending from the bed B.

22 designates a cam-shaft which is driven from the shaft 10 by means of a gear 23 mounted thereon, which meshes with a gear 24 secured on the cam-shaft, the reduction between the gears 23 and 24 being two-to-one, so that the cam shaft 22 will make one turn for each two turns of the main shaft 10.

Mounted on the cam-shaft 22 is a cam 230. Engaging the groove of this cam is a roller 240 secured on an arm 25 depending from the bushing 17. This mechanism constitutes a main driving mechanism so arranged that the driving pinion 18 will alternately mesh with each of the driving racks 19 and 20 to give the constant or main speed movement thereto.

If the pinions 15 and 18 are made of the same size, which is preferred, the gear 14 represents the operative timing element of the machine—that is said gear 14 will make two revolutions for each complete reciprocation of the bed.

Secured on the inner end of the main shaft shaft 10 is a revolving crank-disk or crank-element 26. This crank-disk carries two wrist-pins 27 and 28 which are fitted so as to be capable of axial movement in the crank disk, or in the crank element. The detail of one crank-pin 27 is shown in Figs. 2, 4, 5 and 6. The crank-pin is provided with a roller 29 which is held in place by a suitable collar 30. The crank-pin is provided with a groove 31, engaging which is a screw 32 tapped into the crank-disk or crank-element 26 which prevents the crank-pin from turning. The crank-pin carries a shuttle 33 which consists of a piece of hardened steel pointed at its ends. This shuttle

is pivotally held to the crank-pin by a stud 34. The construction of the two crank-pins 27 and 28 is the same, except that one shuttle is turned outwardly from the center of the crank-disk, and the other turned inwardly relatively to the center of the crank-disk.

35 designates the crank-pin controller or cam. This consists of a disk which is rigidly secured on the inner end of the bearing of the main shaft 10 so as to be stationary. The controller has a circular slot 36 cut therein. Cut in the inner periphery of the slot 36, that is, in the surface of the same nearest the axis of the shaft 10, is a double cam groove 37. This double groove 37 forms a pathway twice around the inner periphery of said slot, the development of which pathway is shown in Fig. 7. The outer periphery of said slot 36 is formed with a similar double cam groove 38—38, which the shuttle of the wrist-pin 28 engages, the development of this double cam groove being shown in Fig. 11.

Figs. 7 and 11 are drawn to the same length for the purposes of explanation. In actual development, Fig. 11, would be slightly longer than Fig. 7, as the length of the outer periphery of the slot 36 is longer than that of the inner periphery of the slot which, in operation, is compensated for by the fact that the shuttles are placed on opposite sides of the crank-pins 27 and 28. The double cam grooves previously referred to will act to hold each wrist-pin out practically for a half revolution of the crank-element, and to draw it into inoperative position for a revolution and a half of the crank-element, so that the movement may work as a correct two-revolution movement as hereinafter described. The two double cam grooves 37—37 and 38—38 are set so that one will operate one periphery ahead of the other. Depending from the bed is a frame 39 which has a vertical slot 40 at its front end which the wrist-pin 27 engages, and a vertical slot 41 at its rear end which the wrist-pin 28 engages.

The operation of the mechanism can be followed from the second and third sheets of drawings. Suppose the bed to be just completing its constant speed return movement to the right, and the main driving mechanism just becoming inoperative as the driver. In this position the shuttle of the wrist-pin 27 will be at the point marked 12, in Fig. 7 and the wrist-pin 27 will have been thrust out of the crank-element to engage the bottom of the slot 40 by the shuttle working up the incline of the cam groove. Now during the next quafter turn of the crank element the bed will be brought from full speed gradually to rest at its right-hand extreme, as shown in Fig. 13, by the wrist-pin working in said slot 40. Now during the next quarter revolution of the crank-element the wrist-pin will start the bed from its right-hand extreme up to its constant speed movement to the left at a speed gradually commencing at zero and increasing up to the constant speed movement. This will bring the shuttle of the wrist-pin 27 to the position shown at 14 in Fig. 7, wherein it will be seen that during the next slight movement of the crank element the wrist-pin will be withdrawn from the slot 40. The slots 40 and 41 are slightly eased off as shown in Figs. 1 and 6 at the highest and lowest points, so that the wrist-pins can be shot into and withdrawn from the same without cramping. During the next revolution and a half of the crank-element, the shuttle of the wrist-pin 27 will work in the remaining portion of the cam groove 37—37, crossing to the lowest path at the switch or cross-over at section 10; then running in the lowest part of the groove to the position 17; then going through the cross-over to the intermediate part of the groove until it reaches the position 12, when it again comes into operation. By this path it will be seen that the wrist-pin is in operative position only for a half turn of the crank element. Returning now to position Fig. 14, it will be seen that during the next half turn of the crank element, the main driving mechanism will become operative as the driver, and will give the bed its constant speed forward movement to the left. This will bring the parts to the position shown in Fig. 15. When the parts come to this position, the shuttle on the wrist-pin 28 will be at position marked 15 in Fig. 11, and thereby will shoot the wrist-pin 28 into the rear reversing slot 41. Now during the next quarter revolution of the crank-element the main driving mechanism will become inoperative as the driver, and the crank-pin 28 working in the slot 41 will retard the bed from full speed movement to a state of rest at its left-hand extreme, bringing the parts to the position shown in Fig. 16. Now during the next quarter revolution of the crank-element, the wrist-pin 28 working in the slot 41 will start the bed from its left-hand extreme on its return stroke at a speed commencing at zero and gradually increasing up to constant speed. This will bring the parts to the position shown in Fig. 17. As the parts reach this position, the shuttle on the wrist-pin 28 will reach the position 17 in the cam groove 38—38, and the next slight movement of the crank-element will draw the wrist-pin from the reversing slot 41. As this action takes place, the main driving mechanism becomes operative as the driver, and the bed is given its constant speed return movement for a half turn of the crank element, bringing the parts back to the position shown in

Fig. 12, from which the cycle of operation was first described. Thus it will be seen that the feature of the engagement of the wrist-pins with the reversing slots by a lateral or axial movement of the wrist-pins in the crank-element to engage and disengage the slots greatly simplifies the mechanism. It thus will be seen that a simple mechanism is provided for imparting the described movements.

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

1. In a mechanical movement, the combination of a reciprocating bed or member, a main driving mechanism for giving the same its constant speed movement, and a reversing mechanism comprising a revolving element, two wrist pins mounted to move axially therein, parts forming a reversing means on the bed, and means for moving the wrist pins in the crank element to engage said reversing means, the parts being arranged to form a two revolution movement.

2. In a mechanical movement, the combination of a reciprocating bed or member, a main driving mechanism for giving the same its constant speed movement, and a reversing mechanism comprising a revolving element, two wrist pins mounted to move axially therein, parts forming a reversing means on the bed, and means for moving the wrist pins in the crank element to engage and disengage said reversing means, the parts being combined to form a two revolution movement.

3. In a mechanical movement, the combination of the reciprocating bed or member, a main driving mechanism for giving the same its constant speed movements, and a reversing mechanism comprising a revolving element, two wrist-pins mounted in said element so as to be capable of movement therein, parts carried by the bed forming reversing slots, and means for moving said wrist-pins in the crank element to work with said slots.

4. In a mechanical movement, the combination of the reciprocating bed or member, a main driving mechanism for giving the same its constant speed movements, and a reversing mechanism comprising a revolving element, wrist-pins mounted to move therein, parts forming reversing slots on the bed, and means for moving the wrist-pins in the crank element to engage and disengage the reversing slots.

5. In a mechanical movement, the combination of the reciprocating bed or member, a main driving mechanism for giving the same its constant speed movements, and a reversing mechanism comprising a revolving element, a wrist-pin mounted to slide axially in the element, parts carried by the bed forming a reversing slot, a shuttle carried by the wrist-pin, and a controller having a cam groove which said shuttle engages.

6. In a mechanical movement, the combination of the reciprocating bed or member, a main driving mechanism for giving the same its constant speed movements, and a reversing mechanism comprising a revolving element, two wrist-pins fitted to move axially therein, parts carried by the bed forming reversing slots, shuttles on the wrist-pins, and a controller having two double cam grooves which said shuttles engage to slide the wrist-pins in and out in the crank-element.

7. In a mechanical movement, the combination of a reciprocating bed or member, a main driving mechanism for giving the same its constant speed movements, and a reversing mechanism comprising a revolving element, two wrist-pins fitted to slide axially therein, means for moving the wrist-pins, and parts carried by the bed forming reversing slots, said slots being eased off at the points where the wrist-pins engage and disengage the same.

8. In a mechanical movement, the combination of the reciprocating bed or member, a main driving mechanism for giving the same its constant speed movements, and a reversing mechanism comprising a revolving crank element making two revolutions for each cycle of operation, two wrist-pins fitted to slide axially in said crank element, parts forming two reversing slots carried by the bed, and means for moving the wrist-pins in the crank element to engage said slots.

9. In a mechanical movement, the combination of the reciprocating bed or member, a main driving mechanism for giving the same its constant speed movements, and a reversing mechanism comprising a revolving crank element making two revolutions for each cycle of operation, two wrist-pins fitted to slide axially in said crank element, parts forming two reversing slots carried by the bed, means for moving the wrist-pins in said crank element so that each wrist-pin will work alternately with the main driving mechanism for a half revolution of the crank element.

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

C. J. ROBERTSON.

Witnesses:
ROBERTS JOHNSTON,
M. J. MORRISON.