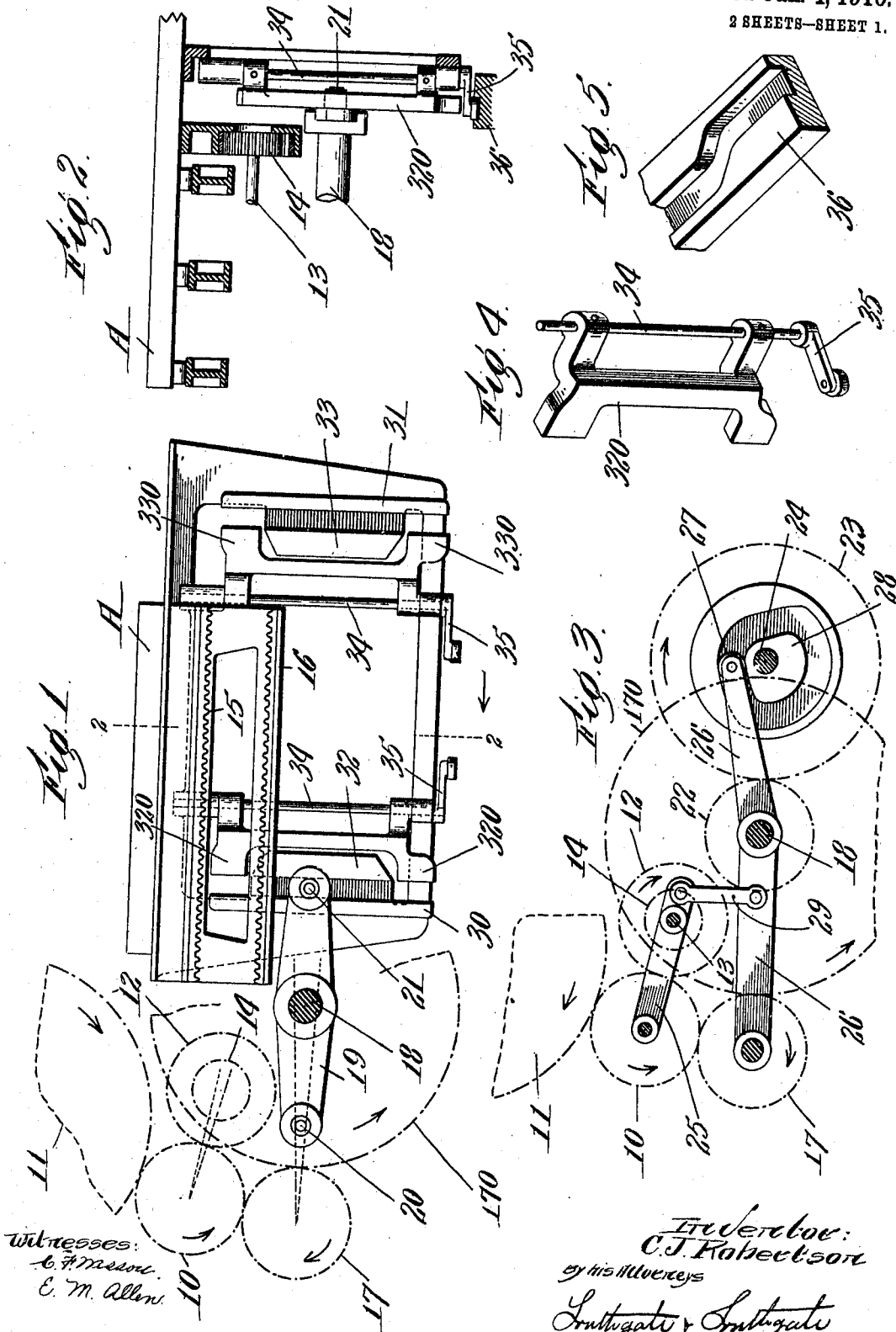


C. J. ROBERTSON.
MECHANICAL MOVEMENT.

APPLICATION FILED MAR. 6, 1905. RENEWED MAY 4, 1909.

945,195.

Patented Jan. 4, 1910.
2 SHEETS—SHEET 1.



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E. M. Allen.

Inventor:
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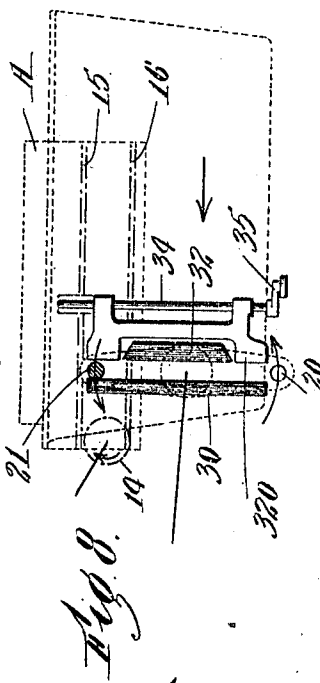
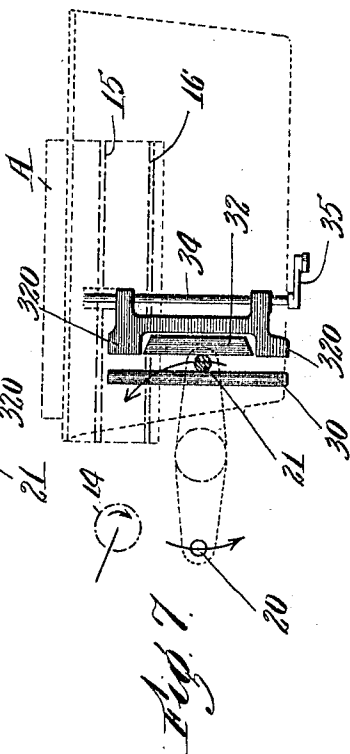
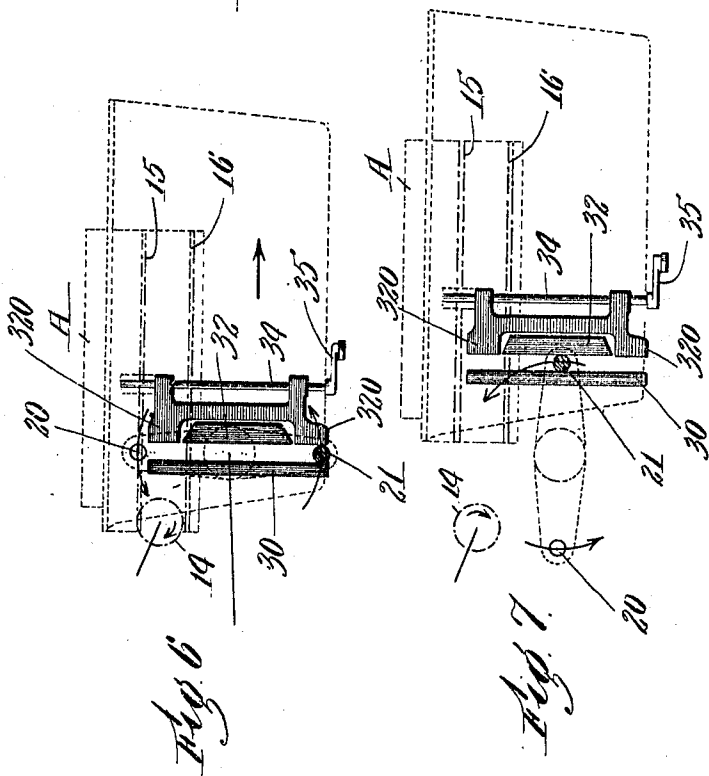
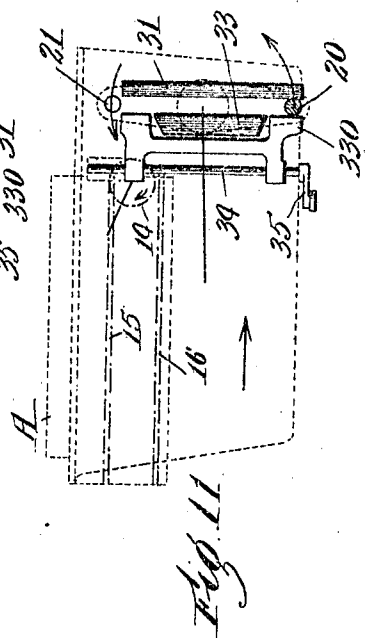
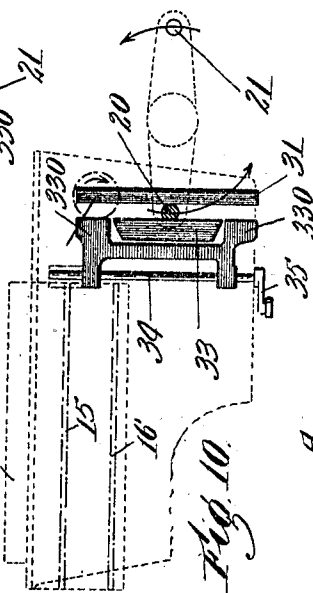
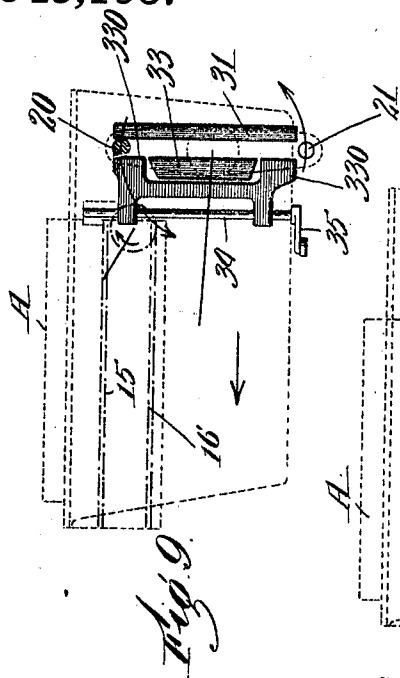
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

CHARLES J. ROBERTSON, OF TAUNTON, MASSACHUSETTS, ASSIGNOR TO THE CAMPBELL PRINTING PRESS & MANUFACTURING COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

MECHANICAL MOVEMENT.

945,195.

Specification of Letters Patent.

Patented Jan. 4, 1910.

Application filed March 6, 1905, Serial No. 248,437. Renewed May 4, 1909. Serial No. 493,932.

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 movement has been particularly designed for reciprocating the beds of printing machines. These printing press movements have been developed to obtain a uniform or constant speed forward and backward movement of the bed combined with a crank reverse at the ends of movement along the lines of the old and well-known Napier movement. A form of this movement in use is that shown in patent to Miehle No. 322,309, dated July 14, 1885. This mechanism comprises a main driving mechanism consisting of a revolving pinion arranged between two racks, and a reversing mechanism comprising a revolving wrist-pin cooperating with vertical shoes at the ends of the bed, the spaces between which shoes form vertical slots. The wrist-pin is carried by the pinion. This mechanism well lends itself to a movement of the three-revolution type; that is to a movement in which the crank operating element makes one revolution for the main forward movement, one revolution for the main backward movement, and a half turn for each crank reverse. It also has been proposed to provide a mechanical movement in which a two-revolution pinion is employed, which pinion carries two wrist-pins, one for reversing the bed at one end of its movement, and the other wrist-pin for reversing the bed at the other end of its movement. But it is impossible with this device to obtain a proper or half-turn crank reverse, because the outside shoes must be cut away to allow the idle-wrist-pin to pass above and below the same. This leads to a continuation of the main working movement at the expense of the reversing movement, and the reversing movement can only take place substantially at the centers of move-

ment of the wrist-pin as distinguished from a true crank reverse which takes practically a half turn of the crank element.

As printing presses have been made heavier, and as the demand has come for higher speeds, it has been found necessary to meet this demand by giving more time to the reversing movements as compared with the main driving movements. This has led to the invention of the two-revolution movement with a true crank reverse; that is, to a mechanical movement in which each main forward and backward movement occupies a half turn of the crank element; while each crank reverse occupies a half turn thereof as before described. By this arrangement the speed can be increased as an easier reverse is obtained.

The object of this present invention is to arrange and improve the prior mechanical movements shown in said patents so that this advantageous method of operation can be obtained. I have discovered that this can well be done by imparting a movement to the idle-wrist-pin supplemental to its revolution to clear the shoe. By doing this a full true crank reverse can be obtained in this style of two-revolution movement. In the preferred form of my device, this supplemental movement is synchronously imparted to both wrist-pins, and this supplemental movement imparted to the wrist-pin is such as not to affect the reciprocating movement imparted therefrom to the bed or moving member. The wrist-pin may be mounted directly on the driving pinion, which itself may be used for the main driving mechanism, or preferably may be mounted on a separate rotating part.

The invention consists of further improved details of construction as hereinafter pointed out and claimed.

Referring to the accompanying two sheets of drawings forming part of this application, Figure 1 is a sectional side elevation partly in diagram illustrating the movement. Fig. 2 is a cross sectional view showing the relative arrangement of parts. Fig. 3 is a diagram illustrating the gearing. Fig. 4 is a view illustrating one of the swinging shoes. Fig. 5 is a detail of one of the cams

which operate the swinging shoes, and Figs. 6 to 11 inclusive are diagrams illustrating the operation.

Referring to the drawings and in detail A designates the bed or moving member which is mounted so as to be capable of reciprocation on the framing of the machine in any of the well understood ways. A gear 10 is mounted on the driving shaft which gear meshes with a gear 11 arranged on the impression cylinder. Meshing with the gear 10 is a gear 12 which is arranged on a shaft 13, which shaft carries the driving pinion, 14 which is arranged between oppositely disposed racks 15 and 16 secured to the bed. Meshing with the gear 10 is an intermediate gear 17 which meshes with a gear 170 arranged on a shaft 18 which may be termed the "main shaft" of the machine. On the inner end of the main shaft is arranged an arm 19, which carries two wrist-pins 20 and 21 set at 180 degrees to each other. Mounted on the shaft 18 is a gear 22 which meshes with a gear 23 on a cam shaft 24. The relation of this gearing is such that the main shaft 18 will make two revolutions and the cam shaft 24 will make one revolution for each cycle or complete reciprocation of the bed. The impression cylinder is geared to make two revolutions for each complete cycle, so that the mechanism is shown as applied to a machine of the well-known two-revolution impression-cylinder type. The driving pinion 14 and the racks 15 and 16 constitute a main driving mechanism. The circumferential pitch speed of the driving pinion 14 is the same as the circumferential speed of the wrist-pins 20 and 21, so that in effect the main driving mechanism is just the same as if a pinion having a pitch radius the same as the radius of revolution of wrist-pins were employed, the present arrangement being selected merely as one of convenient design, and being termed hereafter a reduced main driving mechanism for the reason that the driving pinion 14 is less in radius than the actual working radius of the crank-reverse which is the radius at which the wrist-pins 20 and 21 are set. The shaft 13 is journaled in suitable arms 25 which are pivoted on the same center as intermediate 10. The arms 26—26 carry rollers 27 which engage cams 28 mounted on the cam-shaft 24. The arms 26—26 connect to the arms 25—25 by links 29. By this arrangement, the driving shaft 13 and the main shaft 18 are raised and lowered synchronously, and the raising and lowering movement imparted to the main shaft is a larger movement than that imparted to the shaft 13.

Secured to the ends of the bed are outer shoes 30—31. Also secured to the bed are inner shoes 32 and 33. Partial shoes 320 and 330 supplement the inner shoes 32 and 33.

These supplemental shoes are mounted on vertical shafts 34 carried by the bed, which shafts have arms 35 carrying rollers which cooperate with stationary cams 36 in substantially the same manner shown and described in said Patent No. 322,309. The inner shoes are made in a rigid and supplemental form for purpose of wear, as by this design it is only necessary to swing out the supplemental portions thereof, the inner shoes and supplemental parts corresponding in function to the inner shoes of said Patent No. 322,309.

The operation can be followed by the diagrams Figs. 6 to 11, and is as follows:—In Fig. 6 the bed is supposed to have just completed its main forward or constant speed movement to the right, the shafts 13 and 18 being in their raised positions, and the driving pinion 14 just running out of the rack 15. The position of the main shaft 18 relatively to the shoes is such that as the parts come to this position, the upper wrist-pin 20 will be in position to pass over the top of the outer shoe 30, while the outer shoe 30 will come into engagement with the wrist-pin 21 and as this takes place, the supplemental shoes 320—320 will close and lock the wrist-pin 21 in the left-hand slot. Said wrist-pin 21 now becomes the active controlling member and the wrist-pin 20 which is idle, clears the top of the outer shoe 30. Now as the main shaft 18 makes a quarter revolution the wrist-pin 21 working in the left-hand slot will retard and bring the bed gradually to a state of rest at its right-hand extreme position as shown in Fig. 7. Now, during the next quarter revolution of the main shaft the bed will be started from its extreme right hand position up to full speed on its movement to the left by said wrist-pin 21 working in said slot, bringing the parts to the position shown in Fig. 8. This last half revolution of the wrist pin 21 in the left-hand slot will impart a half turn or true crank reverse to the bed. As the parts move from the position shown in Fig. 6, to the position shown in Fig. 8, the main shaft 18 and the driving shaft 13 will be lowered, whereby when the idle wrist-pin 20 comes around under the outer shoe 30, it will pass under the same and when the active wrist-pin 21 comes to the upper part of the slot it will stay therein as shown in Fig. 8. As the main shaft 18 is lowered the driving shaft 13 will also be lowered so that the driving pinion 14 will take into the lower rack 16. Now during the next half revolution of the wrist-pin, the main driving mechanism will move the bed to the left at a constant speed by reason of the engagement of the driving pinion 14 with said lower rack 16, and will impart the main or constant speed movement to the bed to the left.

This will bring the parts to the position shown in Fig. 9. The right-hand outer shoe 31 will now come into contact with the wrist-pin 20 which now becomes the active operating instrumentality and the swinging inner shoes 330 and 330 will be moved to lock said wrist-pin 20 in the right-hand slot. As this action takes place, it will be seen that the wrist-pin 21 which is now the idle wrist-pin can pass underneath the outer shoe 31 by reason of the lowered position of the main shaft 18. Now during the next quarter revolution of the main shaft the bed will be gradually brought from full speed to rest at its extreme left-hand position by the wrist-pin 20 working in the right-hand slot. This will bring the parts to the position shown in Fig. 10. Now during the next quarter revolution of the main shaft the bed will be started on its movement to the right at a speed commencing from zero and gradually increasing up to full speed by said wrist-pin 20 working in said slot. The last described half revolution of the main shaft 18 will thus impart a true crank or half turn reverse to the bed. During this crank reverse; that is, while the parts move from the position shown in Fig. 9 to the position shown in Fig. 11, the main shaft 18 and the driving shaft 13 will be raised, and by this operation the wrist-pin 21 which is idle will clear the top of the outer shoe 31 and the wrist-pin 20 which has been acting will remain in the slot. The upward movement of the shaft 13 will mesh the driving pinion 14 with the upper rack 15. Now during the next half revolution of the crank-pins, the bed will be moved by the main driving mechanism on its main or constant speed movement to the right. This will bring the parts back to the position shown in Fig. 6. Thus a cycle is completed, the cycle being divided so that the main backward and forward or constant speed movements of the bed each occupy a half turn of the wrist-pins, and so that each reverse occupies a half turn of the wrist-pins, whereby a two revolution movement is produced which has a true or half turn crank reverse at each end. The vertical rising and falling movement of the main shaft 18 will not substantially affect the movement of the bed as the same is substantially a movement parallel with the slots which are vertical.

As previously stated the invention can be applied to the structure in Patent No. 317,663, wherein the two wrist-pins are carried on the main driving pinion; but the construction previously described; that is, one with a reduced main driving mechanism, is preferred, as it gives a stronger construction of wrist-pins. The invention is also well adapted to a four revolution movement in which the main working movement oc-

cupies one and a half revolutions in each direction and a half revolution for each reverse.

The details herein shown and described may be greatly 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 of the bed, a main driving mechanism therefor, shoes carried by the bed, the space between the same forming reversing slots, two revolving wrist-pins, and connections whereby one wrist-pin will engage one slot for a half revolution for one reverse, and the other wrist-pin the other slot for a half revolution for the other reverse, and operating connections whereby each main speed movement will occupy a half revolution of the wrist-pins so that a two-revolution movement is obtained with a half revolution crank reverse at each end.

2. In a mechanical movement, the combination of the bed, a reduced main driving mechanism therefor, shoes carried by the bed, the space between the same forming reversing slots, two-revolving wrist-pins, and connections whereby one wrist-pin will engage one slot for a half revolution for one reverse, and the other wrist-pin the other slot for a half revolution for the other reverse, and whereby each main speed movement will occupy a half revolution of the wrist-pins so that a two-revolution movement is obtained with a half revolution crank reverse at each end.

3. In a mechanical movement, the combination of the bed, a main driving mechanism therefor, shoes carried by the bed, the space between the same forming a reversing slot, two revolving wrist-pins, and means for imparting a movement to the idle wrist-pin supplemental to its revolution to clear the outer shoe.

4. In a mechanical movement, the combination of the bed, a main driving mechanism therefor, shoes carried by the bed, the space between the same forming a reversing slot at each end of the bed, two revolving wrist-pins, and means for imparting movements to the two wrist-pins supplemental to their revolution, so that one wrist-pin will clear the outer shoe at one end of the bed, and the other wrist-pin will clear the outer shoe at the other end of the bed by reason of such supplemental movement.

5. In a mechanical movement, the combination of the bed, a main driving mechanism therefor, shoes carried by the bed, the space between the same forming a vertical or straight slot at each end of the bed, two wrist-pins mounted on a revolving part, and

means for imparting movements to the two wrist-pins supplemental to their revolution, so that one wrist-pin will clear the outer shoe at one end of the bed, and the other wrist-pin will clear the outer shoe at the other end of the bed.

6. In a mechanical movement, the combination of the bed, a main driving mechanism therefor, outer shoes carried by the bed, swinging inner shoes carried by the bed, two revolving wrist-pins, and means for imparting movements to the wrist-pins so that the idle wrist-pin at each reverse will clear the operative outer shoe.

7. In a mechanical movement, the combination of the bed, a main driving mechanism therefor, shoes carried by the bed, the space between the same forming slots, a two-revolution main driving shaft, two wrist-pins carried thereby, and cam mechanism for raising and lowering the main shaft so that the idle wrist-pin will clear the outer shoe.

8. In a mechanical movement, the combination of the bed, a main driving mechanism therefor, shoes carried by the bed, the space between the same forming a reversing slot at each end of the bed, two revolving wrist-pins, one of which reverses the bed at one end of its movement, and the other at the other end of its movement, and means for moving the wrist-pins supplemental to their revolution so that as the active wrist-pin engages between the ends of the shoes, the idle wrist-pin will clear and so that this relative position will be changed, whereby when the active wrist-pin has run through the slot and engages the other end of the shoes, the idle wrist pin also will clear.

9. In a mechanical movement, the combination of a bed, a main driving mechanism therefor, consisting of racks and a driving pinion, shoes carried by the bed, a main driving shaft carrying two wrist-pins, and means for raising and lowering the driving pinion and the main shaft.

10. In a mechanical movement, the combination of a bed, a main driving mechanism therefor, consisting of racks and a driving pinion, shoes carried by the bed, a main driving shaft carrying two wrist-pins, and a cam mechanism for raising and lowering both the driving pinion and the main shaft, this movement of the main shaft being larger than that of the driving shaft.

11. In a mechanical movement, the combination of a bed, a main driving mechanism therefor consisting of racks and a driving pinion, shoes carried by the bed, a main driving shaft carrying two wrist-pins, and a cam mechanism for raising and lowering the driving pinion and the main shaft, this movement of the main shaft being larger than that of the driving pinion.

12. In a reversing mechanism in a mechanical movement, an outer shoe and a partial inner shoe rigidly attached to the bed, shoes supplementing the inner shoe to make up the full inner shoe, and means for operating the supplemental shoe.

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

C. J. ROBERTSON.

Witnesses:

ROBERT T. JOHNSTONE,
FRED J. VIEWEG.