C. J. ROBERTSON.

MECHANICAL MOVEMENT.

APPLICATION FILED JULY 11, 1905. RENEWED NOV. 10, 1909.

965,942. Patented Aug. 2, 1910.

4 SHEETS—SHEET 1.

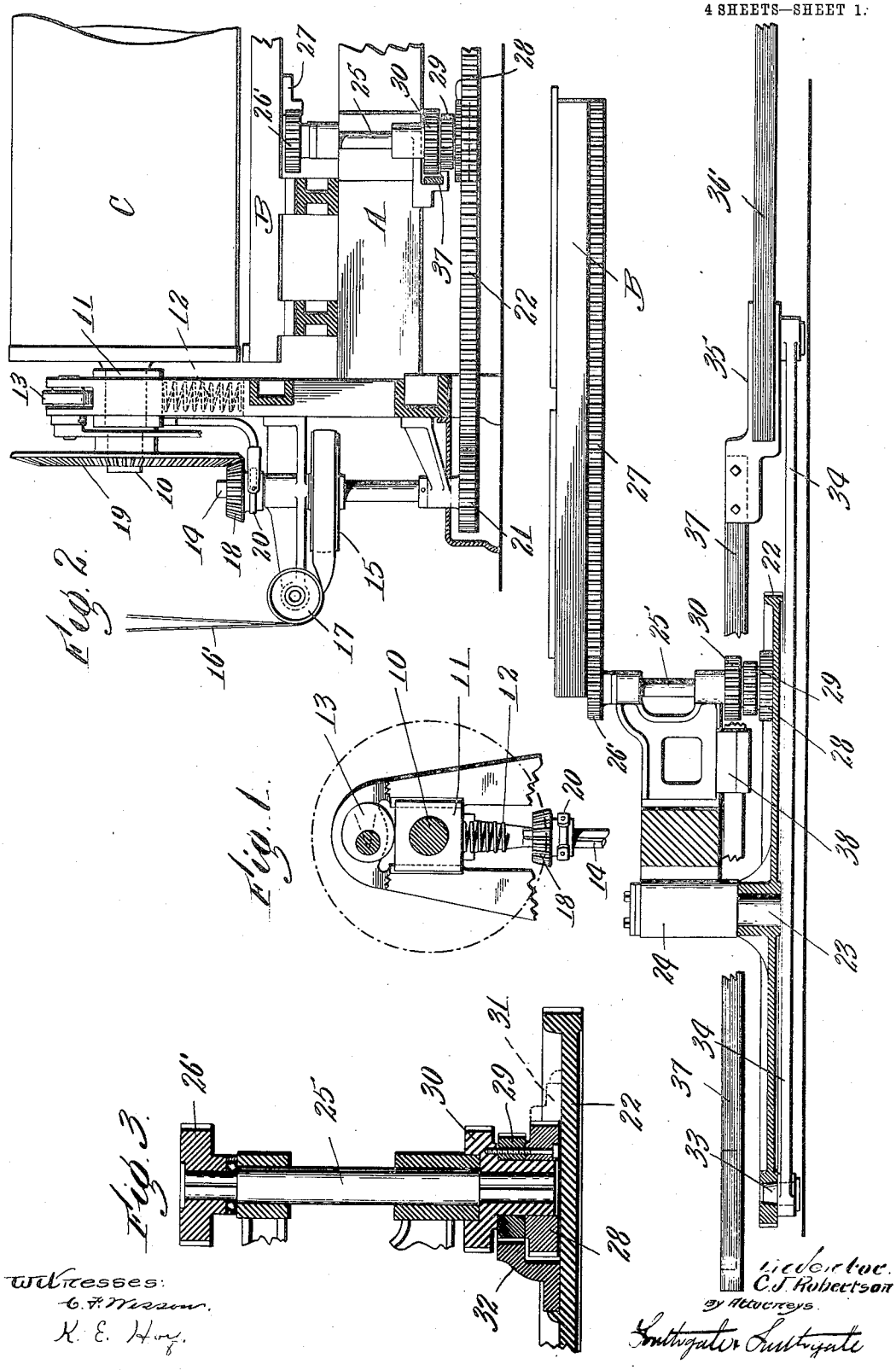

Fig. 2.

Fig. 1.

Fig. 3.

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C. F. Myers.
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4 SHEETS—SHEET 2.

Fig. 5.

Fig. 6.

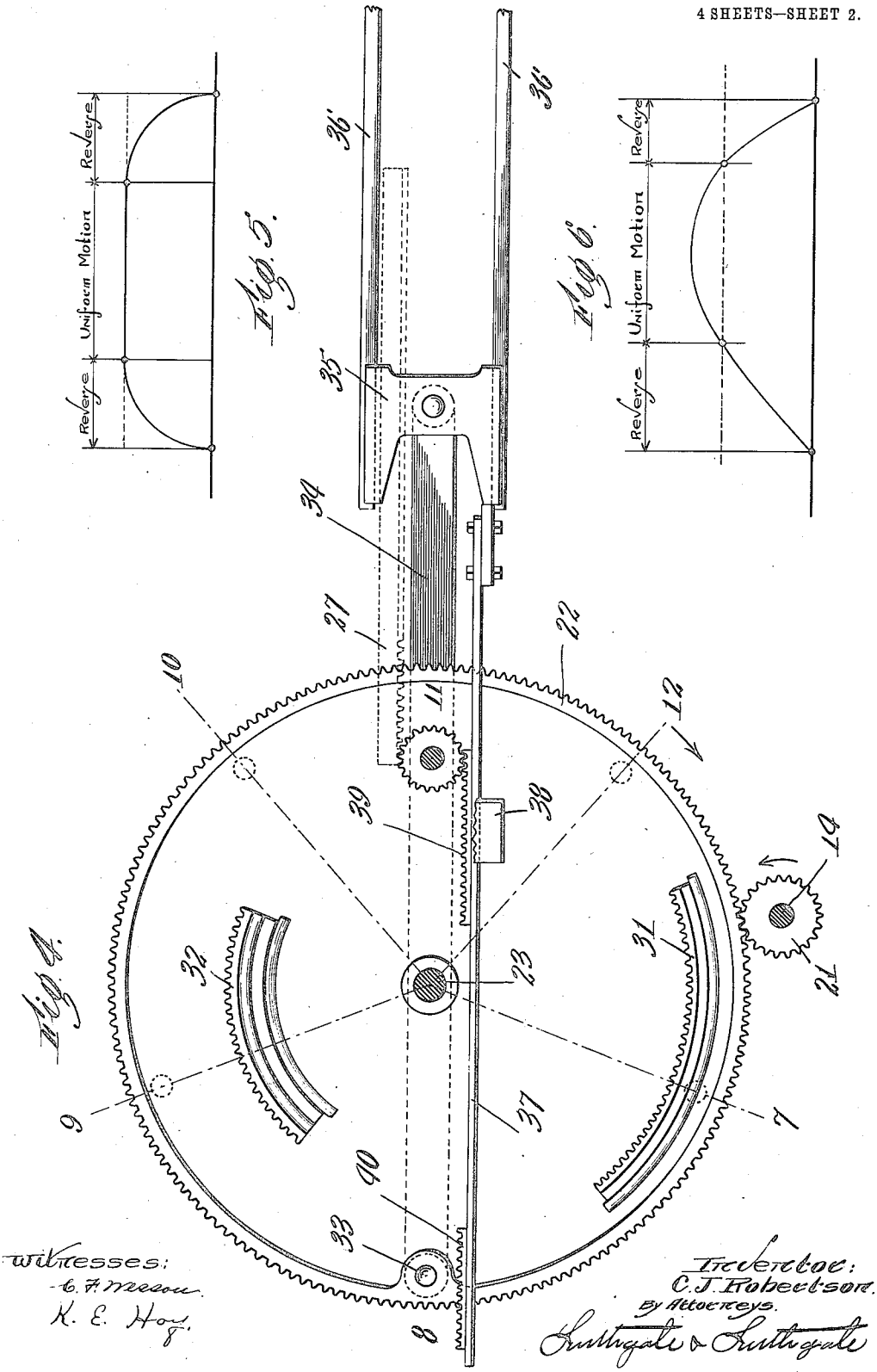

Fig. 4.

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4 SHEETS—SHEET 3.

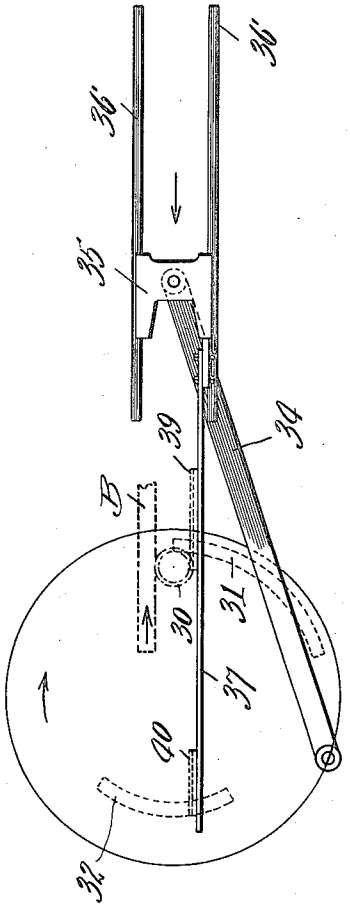

Fig. 7.

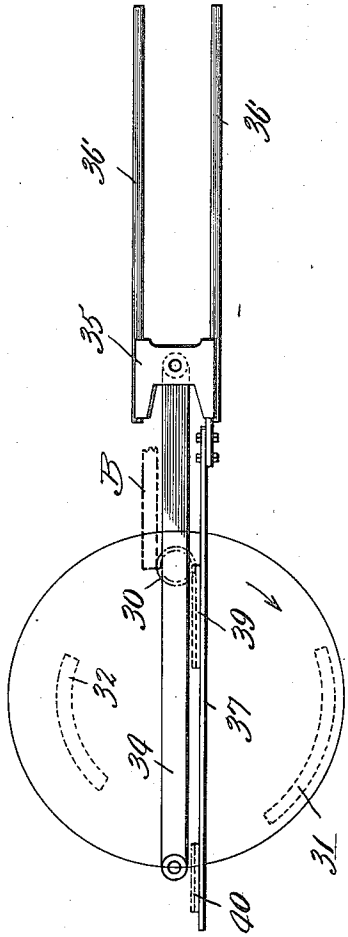

Fig. 8.

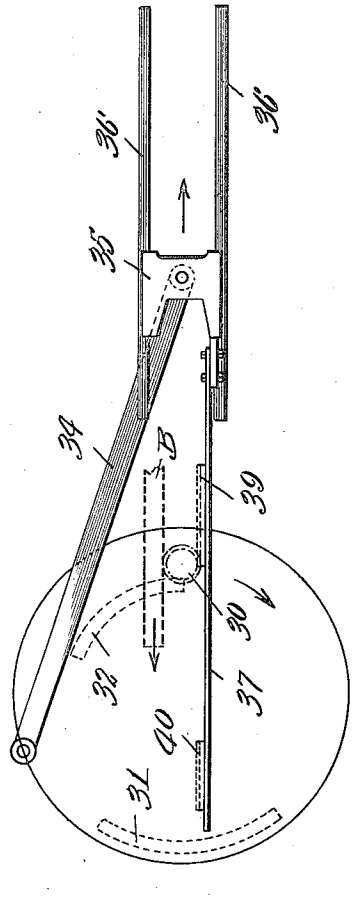

Fig. 9.

Witnesses:
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4 SHEETS—SHEET 4.

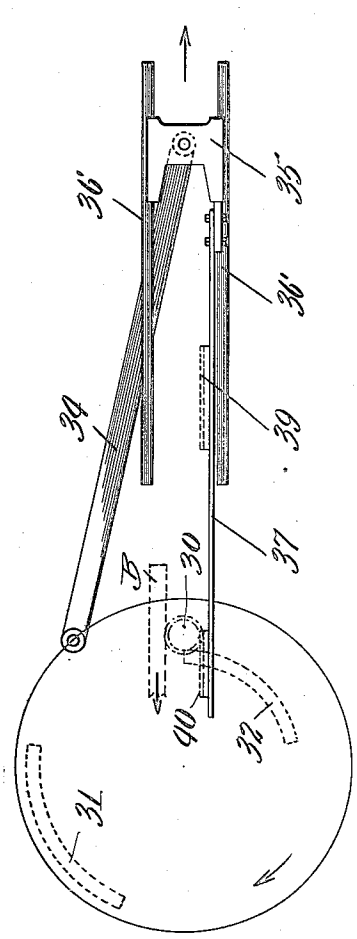

Fig. 10.

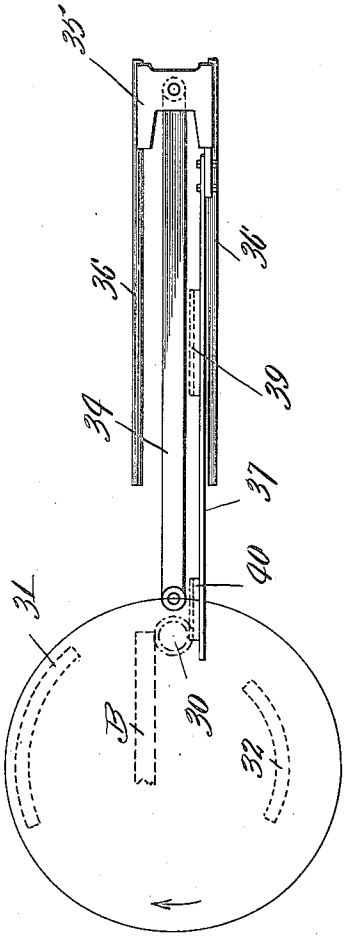

Fig. 11.

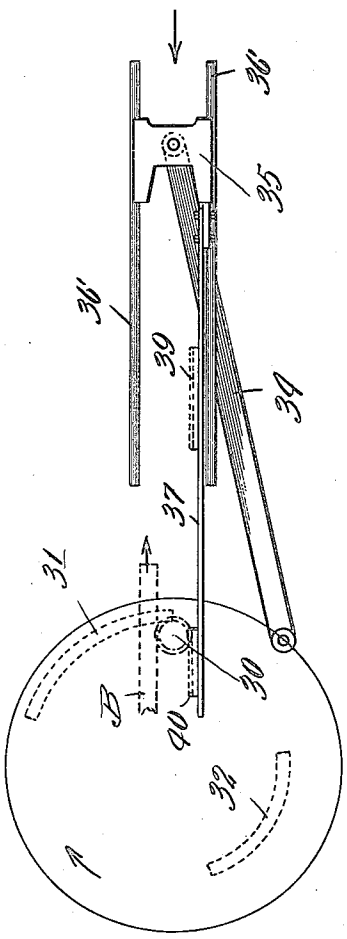

Fig. 12.

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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.

965,942. Specification of Letters Patent. Patented Aug. 2, 1910.

Application filed July 11, 1905, Serial No. 269,265. Renewed November 10, 1909. Serial No. 527,303.

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.

This invention relates to a new and improved mechanical movement for converting rotary motion into rectilinearly reciprocating motion.

The object of this invention is to arrange a single revolution movement so as to impart a constant speed movement and a crank-reverse, and more particularly to arrange a single revolution movement to approximate as closely as possible a two-revolution movement wherein the time of reverse is equal to the time of the constant speed movement.

The mechanism is shown in the accompanying four sheets of drawings, referring to which and in detail, Figure 1 is a sectional side elevation of the mechanism, Fig. 2 is a sectional end elevation, Fig. 3 is a section illustrating the construction of the driving shaft, Fig. 4 is a plan view of the driving gearing, Figs. 5 and 6 are explanatory diagrams hereinafter referred to, Figs. 7 to 9 are diagrammatic plan views illustrating one reversing action, and Figs. 10 to 12 are similar views illustrating the other reversing action.

The mechanism will be best understood by a detailed description thereof.

In detail, A designates the frame-work on which a bed B is mounted to reciprocate under an impression cylinder C journaled in the framing, these parts being arranged as is customary in printing presses, the movement having been designed as one well adapted for reciprocating the beds of printing machines. The shaft 10 of the impression cylinder is journaled in boxes 11 which are fitted to slide in ways in the framing. These boxes are kept normally elevated by springs 12. A cam 13 is arranged above each box as shown in Fig. 1. These cams are oscillated by suitable connections common in printing machinery so as to force the impression cylinder down into contact with the bed on its forward or printing movement, and so as to allow the impression cylinder to lift clear of the bed on its return movement. A vertical shaft 14 is journaled in brackets extending from the frame-work. This shaft carries a belt-pulley 15.

Power is applied to the machine by a belt 16 which is trained over suitable guide pulleys 17—17. The upper end of said shaft 14 has a key-way cut therein, and fitted thereon is a bevel pinion 18 which has a key engaging said key-way and which meshes with a bevel gear 19 secured on the shaft 10 of the impression cylinder. A yoke 20 surrounds the hub of the bevel pinion 18 and is connected to one of the boxes 11 so that said bevel pinion will raise and lower on the vertical shaft 14 with the vertical movements of the impression cylinder, preserving an accurate mesh of gearing between the bevel pinion 18 and bevel gear 19.

On the lower end of the vertical shaft 14 is secured a pinion 21 which meshes with a large gear 22 or revolving member secured on the end of a shaft 23, journaled in a bracket 24 secured between the side-frames of the machine. The gear 22 is horizontally disposed under the bed. The relation of this gearing is such that the gear 22 makes one revolution for each cycle or complete reciprocation of the bed; while the impression cylinder makes two revolutions during the same period, the mechanism being shown as applied to the ordinary two-revolution impression-cylinder printing-machine. A shaft 25 is journaled in bearings projecting from said bracket 24. A driving pinion 26 is secured on the upper end of the shaft 25 and the same meshes with a rack 27 secured to the bottom of the bed. On the lower end of said shaft 25 are secured three pinions 28, 29 and 30, the pinion 28 giving the bed its continuous forward movement; the pinion 29 giving the bed its continuous return movement; and the pinion 30 giving the bed its reversing movement, as hereinafter described.

Secured on the top of the gear 22 is an internal segment 31 which is arranged in position to engage the pinion 28, and also an external segment 32 which is set in position to engage the pinion 29. The pinion 28 and internal segment 31, and the pinion 29 and

the external segment 32 through the shaft and driving pinion 26 and rack 27 make up the main driving mechanism. The gear relation between the internal segment and its pinion, and the external segment and its pinion is such that the constant speed imparted to the driving pinion 26 will be the same from each segment, but the direction will be opposite.

The mechanism which acts to reverse the movement of the bed will now be described.

Projecting down from the gear 22 is a wrist-pin 33 which connects by a pitman 34 to a slider 35 mounted in ways 36—36 so as to be capable of a movement parallel with the bed. Connected to the slider 35 is a long bar 37 which works in ways 38. This bar carries racks 39 and 40 which are set in position to engage with the reversing pinion 30. By this arrangement a simple mechanical movement is provided by which approximately a proper two-revolution constant speed and reversing movement can be imparted to the bed.

In designing the movements of printing presses it has been found particularly advantageous to make the same work on the two-revolution principle, and to arrange the movements between the constant speed and reversing movements so that as they alternate they will take equal periods of time. This is illustrated in diagram in Fig. 5, which shows a forward movement of the bed, the bed starting from its right-hand position at rest and being brought up to full speed by a quarter turn of a crank-element; being given its constant speed motion during a half turn of the crank-element so that such movement will equal a half circumference thereof; and then being retarded by a quarter turn of the crank-element to its extreme position at rest at the left-hand extreme of its movement. The total movement thus with a properly timed mechanism will be two radii of the crank, or a diameter of the crank plus a half circumference of the travel thereof. Now suppose the wrist-pin in the device under consideration should be set so that the diameter of its travel equals the distance above mentioned, that is a crank diameter plus a half crank circumference of a two-revolution movement, the speed or movement imparted by the pitman can be plotted as shown in Fig. 6. Now I have found that a practical movement can be made by dividing this movement of the pitman so that the constant speed movement will intervene in each half turn and so that the same will take substantially the time above indicated, which in the single revolution movement under discussion will be a quarter turn thereof. Now by laying this constant speed movement off on the pitman curve, as shown in Fig. 6, it will be found that an advantageous combination is obtained, and a reversing movement will be imparted suitable for all practical purposes. The only difference to be noted is that the curve will depart slightly from the half circle which represents the true crank reverse, and that the time and distance of the reverse at the forward or left-hand end of the bed travel will be larger as compared with that at the right-hand end. This arrangement when applied to printing presses will enable the so-called "sweet" or "easy" side of the pitman reverse to be used at the fountain end of the machine, and the other reverse at the cylinder end of the machine. More time and travel being given to this latter reverse, the same may be made to take place easily, and the extra travel is advantageous in that it enables a long run of the ink-table under the form inking rollers. The diagrammatic figures illustrate these movements. In Fig. 7 the bed is shown as just completing its constant speed return movement by the engagement between the internal segment 31 and the gear 28, and the rack 39 as just engaging the reversing pinion 30. Now as the wrist-pin moves from the position shown in Fig. 7, and indicated by the numeral 7 in Fig. 4, to its rearward dead center, the bed will be retarded and brought to a state of rest at its rearward or right-hand extreme, the parts assuming the position shown in Fig. 8. Now during the period of revolution of the wrist-pin from position 8 to position 9, the bed will be started from its extreme right-hand position and brought up to its constant speed movement, bringing the parts to the position shown in Fig. 9, wherein the rack 39 is just running out of the reversing pinion 30, and wherein the external segment 32 is just engaging the gear 29 so as to start the bed on its constant speed forward movement. Now while the wrist-pin turns from position #9 to position #10, the bed will be given its forward movement, bringing the parts to the position shown in Fig. 10, wherein the external segment 32 is running out of the gear 29, and wherein the reversing rack 40 is just engaging the reversing pinion 30. This position of the parts is shown in Fig. 10. Now while the wrist-pin moves from position #10 to position #11, the bed will be retarded and brought to a state of rest at its left-hand extreme, the parts assuming the position shown in Fig. 11. Now while the wrist-pin moves from position #11 to position #12, the bed will be started from rest at its left-hand extreme, up to its constant speed movement, bringing the parts to the position shown in Fig. 12, wherein the reversing rack 40 is just running out of the reversing pinion 30, and the internal segment 31 is just engaging the pinion 28. Now while the wrist-pin moves from position #12 to position #7, the bed will be given its constant speed re-

turn movement by the engagement between the external segment 32 and the pinion 29, completing the cycle. Thus a very simple, powerful and advantageous movement is provided.

The details and arrangements 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. A single revolution mechanical movement comprising a bed or moving member, a member revolving once for each cycle, a main driving mechanism for giving the bed a constant forward and backward movement, a wrist-pin mounted on the revolving member, a slider, a pitman connecting the wrist-pin and slider, and connections from the slider to reverse the bed.

2. A single revolution mechanical movement comprising a bed or moving member, a member making one revolution for each cycle, a wrist-pin mounted thereon, a slider actuated from said wrist-pin, two racks connected to said slider, a pinion geared to the bed with which said racks alternately engage, these parts making a reversing mechanism, and a main driving mechanism for giving the bed a constant speed forward and backward movement while the racks are out of mesh with said pinion.

3. A mechanical movement comprising a bed or moving member, a member revolving once for each cycle, an internal and an external segment carried thereby, pinions which said segments engage, and gearing therefrom to the bed to make up a main driving mechanism, a wrist-pin carried by the revolving member, and connections therefrom to reverse the bed between its constant speed movements.

4. A mechanical movement comprising a bed or moving member, a main driving mechanism therefor for giving the bed a constant speed forward and backward movement, and a reversing mechanism comprising a crank element revolving once for each cycle, a slider, a pitman connecting the wrist-pin and slider, and connections from the slider to reverse the bed between its constant speed movements.

5. A mechanical movement, comprising a bed or moving member, a main driving mechanism for giving the bed a constant speed forward and backward movement, and a reversing mechanism comprising a crank-element revolving once for each cycle, a slider, a pitman connecting the crank element and slider, racks actuated by the slider, a pinion which said racks engage, and gearing therefrom to the bed.

6. A mechanical movement comprising a bed, a member revolving once for each cycle, internal and external segments carried thereby, a shaft carrying a pinion, a rack mounted on the bed with which said pinion engages, pinions mounted on said shaft in position to engage said segments alternately to make up a main driving mechanism, a wrist-pin mounted on said revolving member, and connections therefrom to reverse the bed between its constant speed movements.

7. A mechanical movement comprising a bed, a member revolving once for each cycle, external and internal segments carried thereby, a shaft having a driving pinion, a rack carried by the bed which said driving pinion engages, pinions mounted on said shaft to make up a main driving mechanism; a wrist-pin carried by the bed, a slider and a pinion mounted on said shaft which said slider alternately actuates to make up a reversing mechanism.

8. A mechanical movement comprising a bed, a horizontally disposed revolving member arranged under said bed and making one revolution for each cycle, an internal and an external segment mounted on said revolving member, a vertical shaft carrying a driving pinion, a rack mounted on said bed with which said pinion engages, pinions mounted on said shaft to make up a main driving mechanism; a wrist-pin carried by said revolving member, a slider, a pitman connecting said slider and wrist-pin, rack actuated by said slider, and a pinion mounted on said shaft with which said racks alternately engage to make up a reversing mechanism.

9. A mechanical movement comprising a bed, a member horizontally disposed underneath the same and revolving once for each cycle, a main driving and a reversing mechanism actuated from said revolving member, an impression cylinder coöperating with the bed, a vertical shaft geared to drive said revolving member, a bevel pinion on said vertical shaft, a bevel gear on the shaft of the impression cylinder, means for raising and lowering the impression cylinder, and connections therefrom to move the bevel pinion with the impression cylinder to preserve the mesh of gearing.

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

C. J. ROBERTSON.

Witnesses:
ROBERT T. JOHNSTON,
M. J. MORRISON.