C. J. ROBERTSON.

MECHANICAL MOVEMENT.

APPLICATION FILED MAR. 21, 1905. RENEWED JUNE 4, 1909.

945,198.

Patented Jan. 4, 1910.

4 SHEETS—SHEET 1.

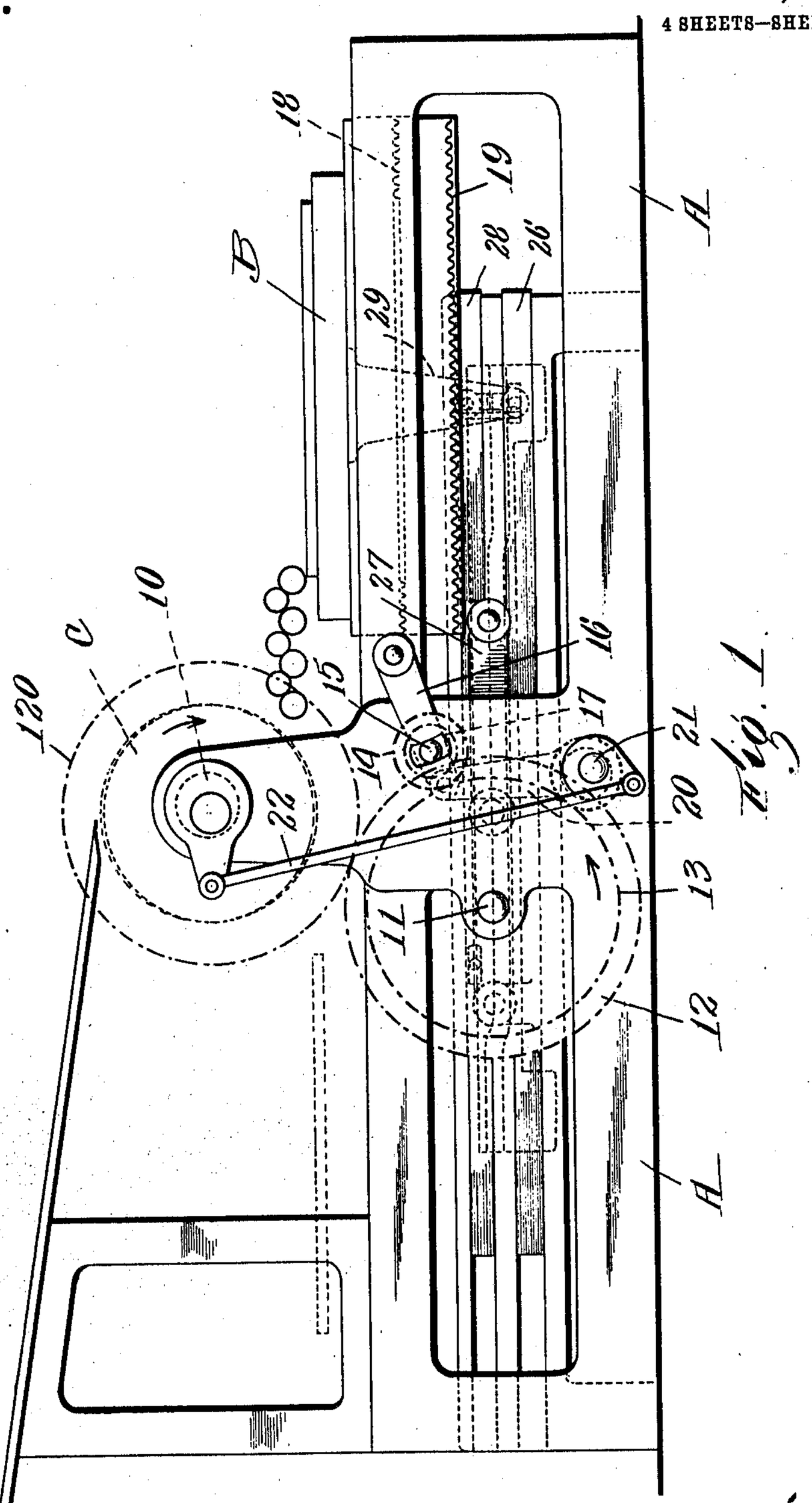

Fig. 1.

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M. E. Regan.

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4 SHEETS—SHEET 2.

Fig. 5.

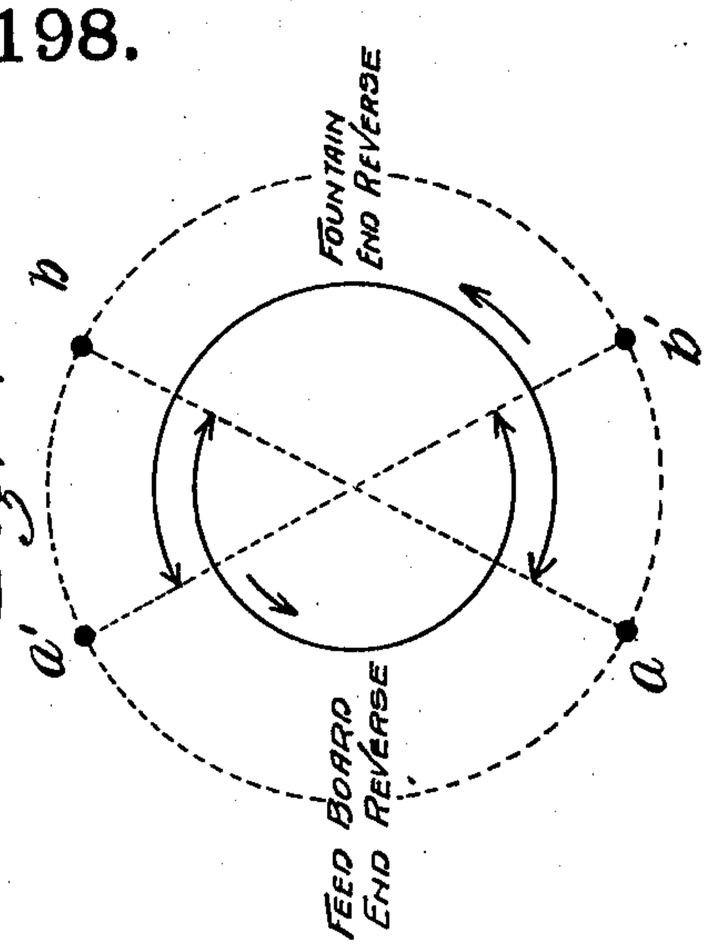


Fig. 4.

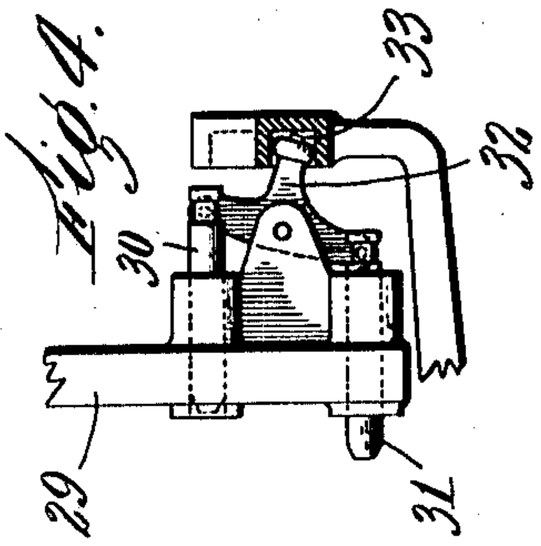


Fig. 2.

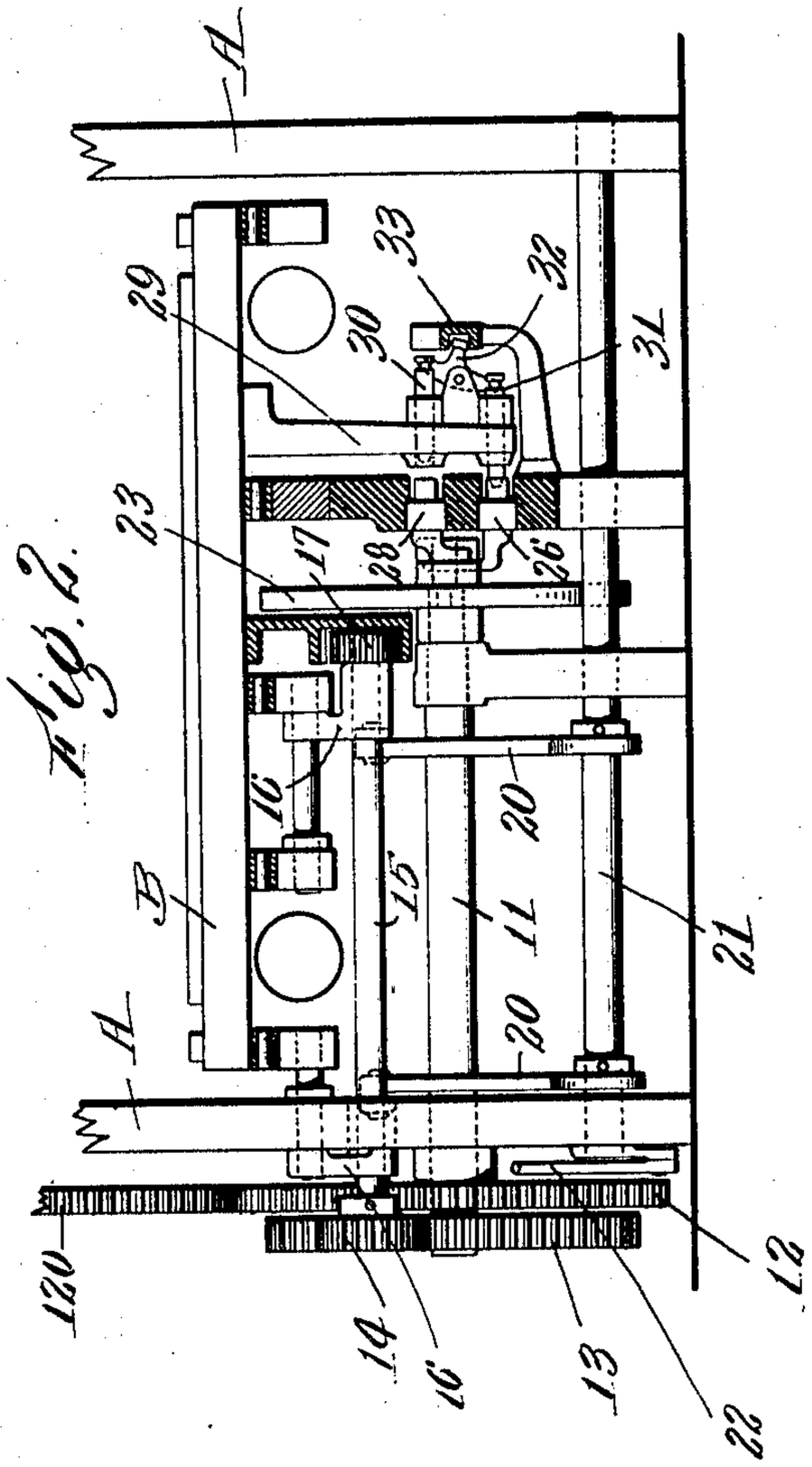
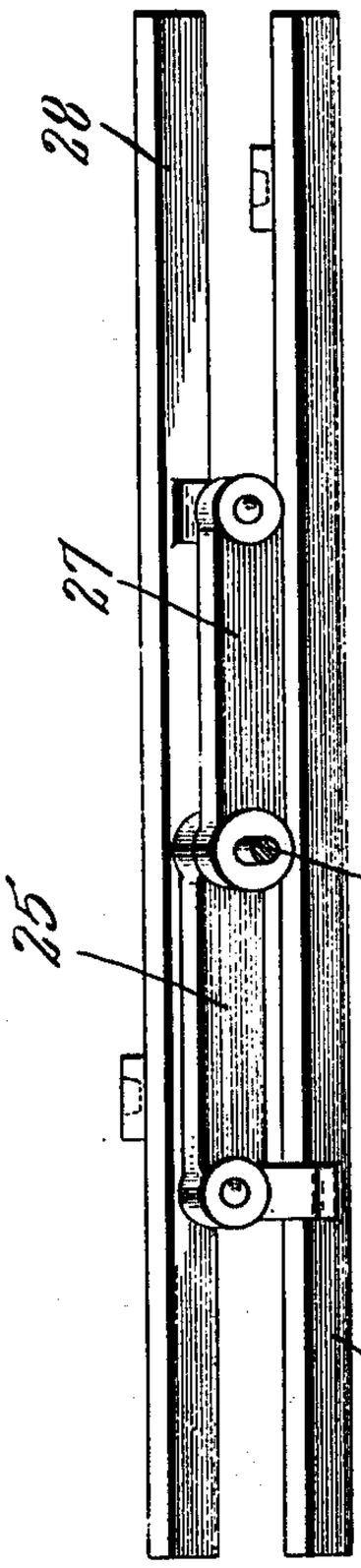


Fig. 3.



Witnesses:

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4 SHEETS—SHEET 3.

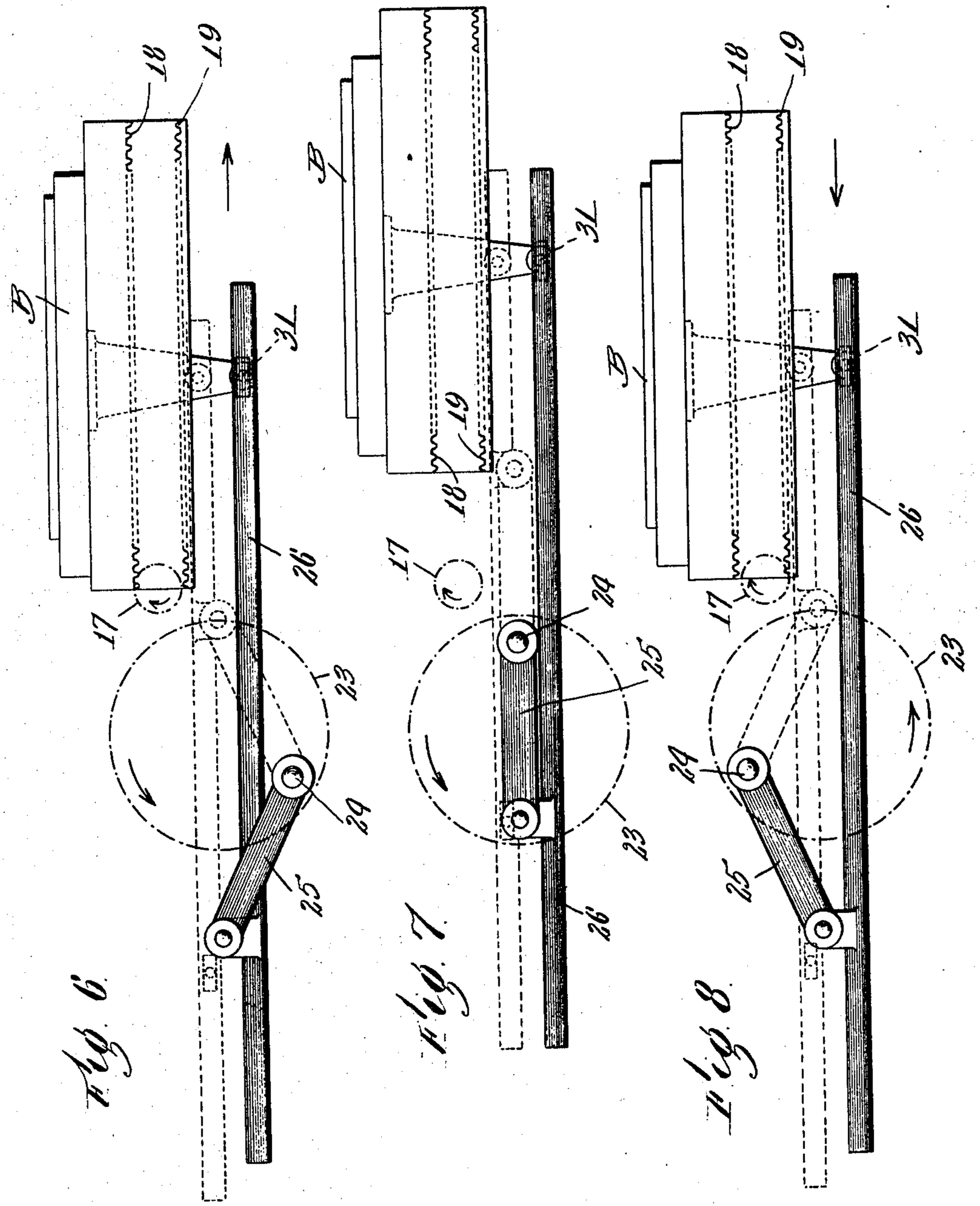

Fig. 6.

Fig. 7.

Fig. 8.

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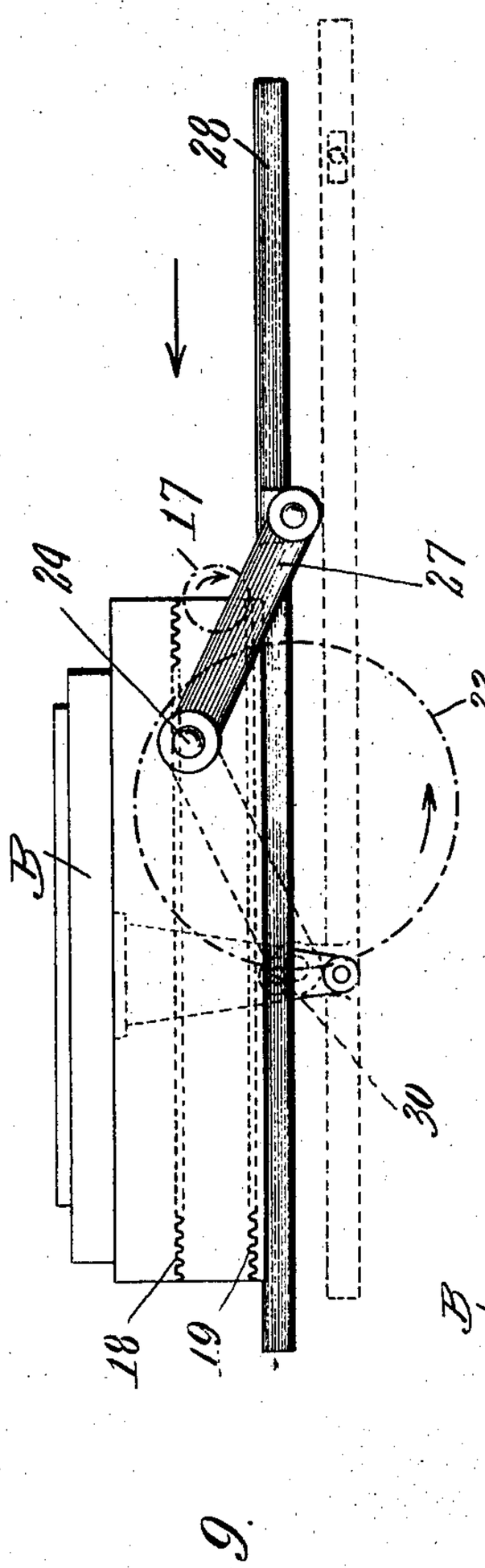

Fig. 9.

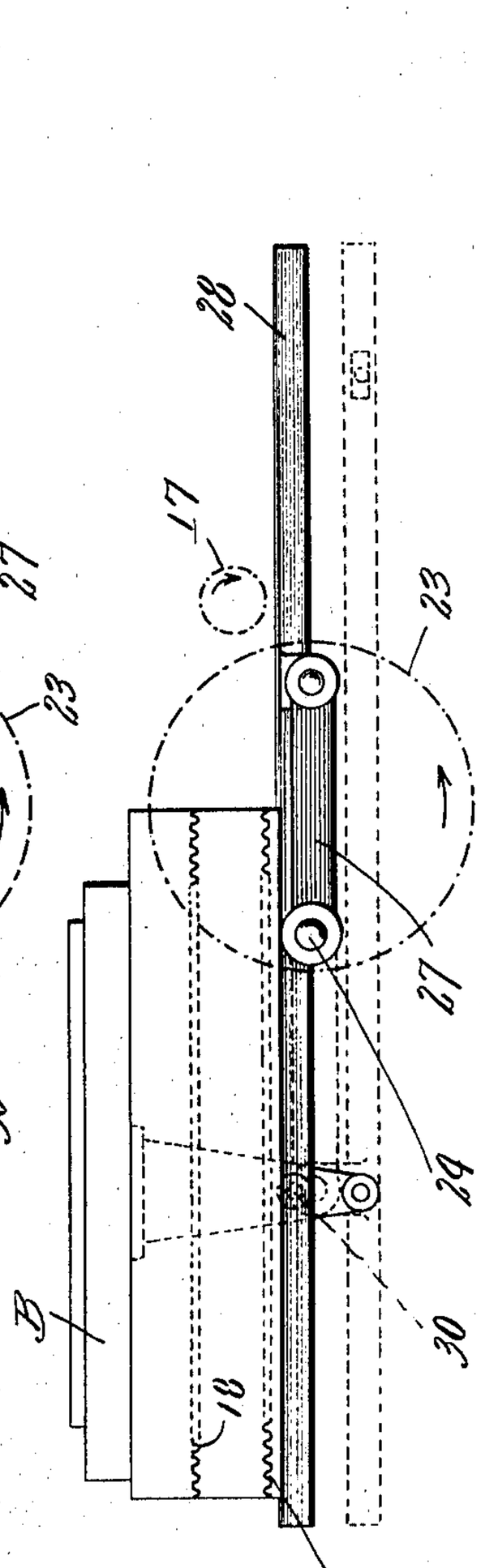

Fig. 10.

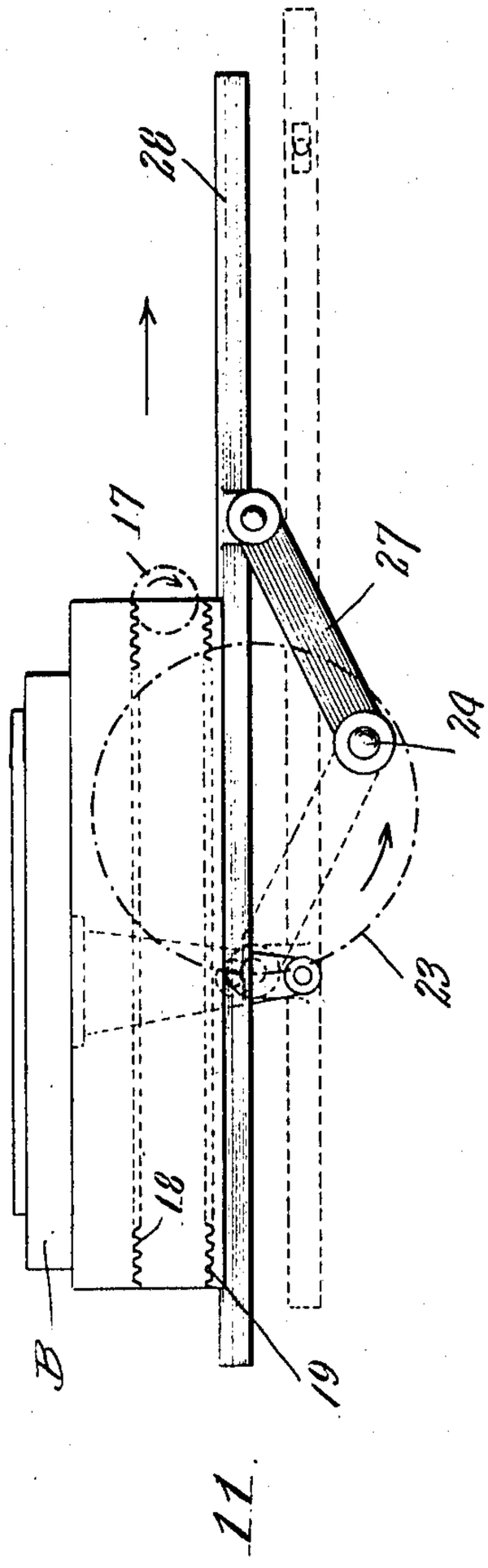

Fig. 11.

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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.

945,198. Specification of Letters Patent. Patented Jan. 4, 1910.

Application filed March 21, 1905, Serial No. 251,206. Renewed June 4, 1909. Serial No. 500,121.

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 that class of mechanical movements which convert rotary motion into rectilineal reciprocating motion, and which are especially adapted for moving reciprocating beds of printing presses or for use in other heavy machinery.

The especial object of this invention is to provide a mechanical movement employing a three-revolution crank-actuated reversing mechanism which is connected to operate for more than a half turn for a reversal.

To this end this invention consists of the mechanical movement, and of the combinations of parts therein as hereinafter described and more particularly pointed out in the claims at the end of this specification.

In the accompanying four sheets of drawings, Figure 1 is a side view of sufficient parts of a printing press to illustrate the application of this invention thereto. Fig. 2 is a transverse sectional view of the same. Fig. 3 is a perspective view of the two independently movable members of the pitmen for operating them from the crank-pin Fig. 4 is a detail view showing the locking-pins and means for operating the same to connect the bed to the independently movable members. Fig. 5 is a diagrammatic view showing the fractions of a revolution occupied by each reversal. Fig. 6 is a diagrammatic view showing the position of the parts at the end of a constant speed movement, and at the beginning of the reversing movement at one end of the press. Fig. 7 is a diagrammatic view showing the position of the parts when the bed is at the limit of its travel in one direction. Fig. 8 is a diagrammatic view showing the position of the parts upon the completion of a reversing movement, and at the commencement of the uniform printing movement of the bed. Fig. 9 is a diagrammatic view showing the position of the parts at the completion of the uniform speed printing movement, and at the beginning of the reversal at the other end of the press. Fig. 10 is a diagrammatic view showing the position of the parts when the bed has reached the limit of movement on its printing stroke, and, Fig. 11 is a diagrammatic view illustrating the position of the parts at the completion of a reversal, and at the beginning of the constant speed return movement of the bed.

A mechanical movement of the class to which this invention relates comprises a main driving mechanism which moves the bed at constant speed during the main forward stroke of the bed and at constant speed during the main part of the return movement of the bed, together with a reversing mechanism which reverses the direction of the motion of the bed at each end of its travel.

In the smaller sized printing presses the mechanical movement which has been used with most success is of the three-revolution type. That is to say, the crank reversing mechanism makes three revolutions for each complete cycle of operation.

In the three-revolution type of bed motion each reversal has ordinarily occupied a half or less than a half turn of the reversing mechanism. In a three-revolution mechanical movement of this class where a reversal requires a half turn, the complete time of operation is divided so that one full turn takes place during the constant speed movement of the bed in one direction, a half turn takes place during one reversal of the bed; a full turn takes place during the constant speed return movement of the bed; and a half turn takes place during the other reversal of the bed.

In the larger sizes of printing presses it has been found in practice that more time ought to be allowed for the reversals. To accomplish this result, I have provided a three-revolution mechanical movement in which a greater fraction than one-half of a turn is occupied by each reversal. I have accomplished this object by utilizing the "sweet side" of a pitman connection for each reverse.

It is well-known in mechanics that if a revolving wrist-pin be connected by a pitman to a sliding member, the movement imparted to that member will be of different character at each side of the central position. This difference arises from the angular deflection of the pitman, or as it is sometimes called to the "pitman error." For example, in the operation of the pitman-connection shown in Fig. 6 of the drawings,

during the movement of the sliding member from its extreme position to the position illustrated by full lines in Fig. 6, the swing of the pitman has produced an advance or travel of the sliding member in addition to the travel due to the turning of the wrist-pin. From the position illustrated by full lines in Fig. 6 to the end of its motion the swing of the pitman will act oppositely to the advance movement imparted by the turning of the wrist-pin, and it results from this "pitman error" that the reversal at one end of the travel of a pitman connected member will occupy more than a half turn of the wrist-pin and this long reverse may be called the "sweet side" of the pitman reverse.

In carrying out the particular object of this invention, which is to provide a three-revolution mechanical movement having longer periods of reverse at each end than is now customary, I preferably employ two independently movable pitman-actuated members, and I utilize the "sweet side" of one of the pitman connections of one of the movable members to reverse the bed at one end of its travel, and I use the "sweet side" of the pitman-connection of the other movable member to reverse the bed at the other end of its travel.

Referring to the accompanying drawings for a detail description of sufficient parts of a printing press to illustrate the application of this invention thereto, as shown in Fig. 1, A designates the usual frame-work having a reciprocating bed B mounted thereon. The impression cylinder C is journaled eccentrically in bushings 10 mounted in the frame. The main driving shaft 11 to which power may be applied in any desired way, carries a gear 12 which meshes with and drives the gear 120 of the impression cylinder. Also mounted on the driving shaft 11 is a gear 13 which actuates the main driving mechanism. Meshing with the gear 13 is a gear 14 mounted on a shaft 15 carried by swinging arms 16. The swinging arms 16 are connected by links 20 to eccentrics secured on a cross-shaft 21. The shaft 21 is provided at its end with a crank which is connected by a link 22 so as to be turned simultaneously with the raising and lowering of the impression cylinder. Any desired connections may serve to operate the cylinder raising and lowering bushings, and by means of this construction the shaft 15 will be moved up and down simultaneously therewith. Secured on the inner end of the shaft 15 is a raising and lowering gear 17 which meshes with a top rack 18 to impart the constant speed printing movement to the bed, and which meshes with the bottom rack 19 to impart the constant speed return movement to the bed. The gear 17 acts as the main driving gear which meshes alternately with top and bottom racks to impart the main movements to the bed in either direction. The top and bottom racks 18 and 19 are shorter than the main racks ordinarily employed in three-revolution mechanical movements, so that the main driving gear will remain in mesh for less than a full turn of the main shaft 11. Secured on the inner end of the main shaft 11 is a disk 23 carrying the wrist-pin 24. Extending from one side of the wrist-pin 24 is a pitman 25 which connects to a sliding member 26. Extending in the opposite direction from the wrist-pin 24 is a pitman 27 which connects to the sliding member 28. To connect the sliding members to the bed at proper times for reversals, the bed is provided with a hanger 29 having lock pins 30 and 31. The lock-pins 30 and 31 are operated by a three-armed lever 32, the extending arm of which runs in a cam-slot 33.

Considering now the operation of a complete mechanical movement as thus constructed, when the parts are in the position illustrated in Fig. 6, the bed will have just completed a constant speed return movement, and the reversing movement will commence under the control of the sliding member 26. To complete the reversal, the bed will be carried to the end of its movement as shown in Fig. 7, and will be brought back to position to begin its constant speed printing movement as shown at Fig. 8. This reversal will, as illustrated in Fig. 5, occupy a turning movement of the crank-pin from the position a to a'. In the reversal at the other end of its travel, the bed will be connected to the other sliding member 28 as shown in Fig. 9, will be carried to the end of its travel as shown in Fig. 10; and will be returned as shown in Fig. 11. This reversal will occupy a turning movement of the wrist-pin from position indicated at b in Fig. 5 to the position indicated at b'. In the complete cycle of operation, therefore, it will be seen that I have provided a crank-actuated reversing mechanism which is connected to act for more than a half turn for a reverse.

By changing the proportional length of the pitman with respect to the crank-arm, I may secure variations of the relative proportions of time occupied by reversals, and by means of this invention a three-revolution mechanical movement is provided which can be used to greater advantage in the larger sized printing presses than the constructions which are now employed.

In this application for patent I do not desire to claim broadly a mechanical movement embodying a crank-actuated reversing mechanism connected to operate for more than a half turn for a reverse, as I have claimed this subject matter broadly in an

application for patent filed of even date herewith, Serial No. 251,120, in which case I have disclosed a two-revolution mechanical movement, each reversal of which occupies more than a half turn.

I am aware that many changes may be made by skilled mechanics in practicing this invention, and in applying the same to various styles and designs of printing presses, or to other machinery. I do not wish, therefore, to be limited to the constructions I have herein shown and described, but

What I do claim and desire to secure by Letters Patent of the United States is:—

1. A mechanical movement comprising a main driving mechanism, and a three-revolution crank-actuated reversing mechanism connected to operate more than a half turn for a reverse.

2. A mechanical movement comprising a main driving mechanism, and a three-revolution crank-actuated reversing mechanism connected to reverse the bed at the extremes of its travel in either direction, and to act for more than a half turn for each reversal.

3. In a mechanical movement, the combination of a main driving mechanism, and a crank-actuated reversing mechanism comprising two independently movable members, one of which is connected to reverse the bed at one end of its movement, and operates for more than a half-turn, and the other of which is connected to reverse the bed at the other end of its movement and operates for more than a half-turn.

4. In a mechanical movement, the combination of a moving bed or member, a main driving mechanism for imparting constant speed forward and backward movements thereto, a three-revolution wrist-pin, and a mechanism for connecting the same to the bed for more than a half revolution thereof for each reversing movement.

5. A mechanical movement comprising a main driving mechanism a revolving crank and two pitmen connected thereto, with connections arranged so that the "sweet side" of one pitman will be used for reversing the bed at one end of its travel and the "sweet side" of the other pitman will be used for reversing the bed at the other end of its travel.

6. A mechanical movement comprising a main driving mechanism, a revolving crank, two pitmen and connections therefrom arranged so that the "sweet side" of one pitman will be employed for a reversing movement at one end of the travel, acting for more than a half turn of the crank, and so that the "sweet side" of the other pitman will be employed for the other reversing movement and act for more than a half turn of the crank.

7. In a mechanical movement, the combination of a main driving mechanism comprising top and bottom racks, and a driving pinion arranged to mesh alternately therewith, and a three-revolution crank-actuated reversing mechanism connected to operate for more than a half turn for a reverse.

8. In a mechanical movement, the combination of a main driving mechanism comprising top and bottom racks, a driving pinion, and means for raising and lowering the driving pinion to mesh with the top and bottom racks respectively, and a three-revolution crank-actuated reversing mechanism connected to operate more than a half turn for a reverse.

9. In a mechanical movement, the combination of a main driving mechanism, and a three-revolution crank-actuated reversing mechanism comprising a wrist-pin, two independent sliding members, a pitman connecting each of the sliding members to the wrist-pin, and means for connecting the sliding members to the bed operating so that each reversal of the bed will occupy more than a half turn of the wrist-pin.

10. In a mechanical movement, the combination of the main driving mechanism comprising top and bottom racks, a driving pinion, and means for raising and lowering the driving pinion, to mesh with the top and bottom racks respectively, and a three-revolution crank-actuated reversing mechanism comprising a revolving wrist-pin, two independently movable sliding members, a pitman connecting the sliding member to the bed operating so that each reversal will occupy more than a half turn of the wrist-pin.

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

C. J. ROBERTSON.

Witnesses:
ROBERT T. JOHNSTON,
FRED J. VIEWEG.