

No. 657,881.

Patented Sept. 11, 1900.

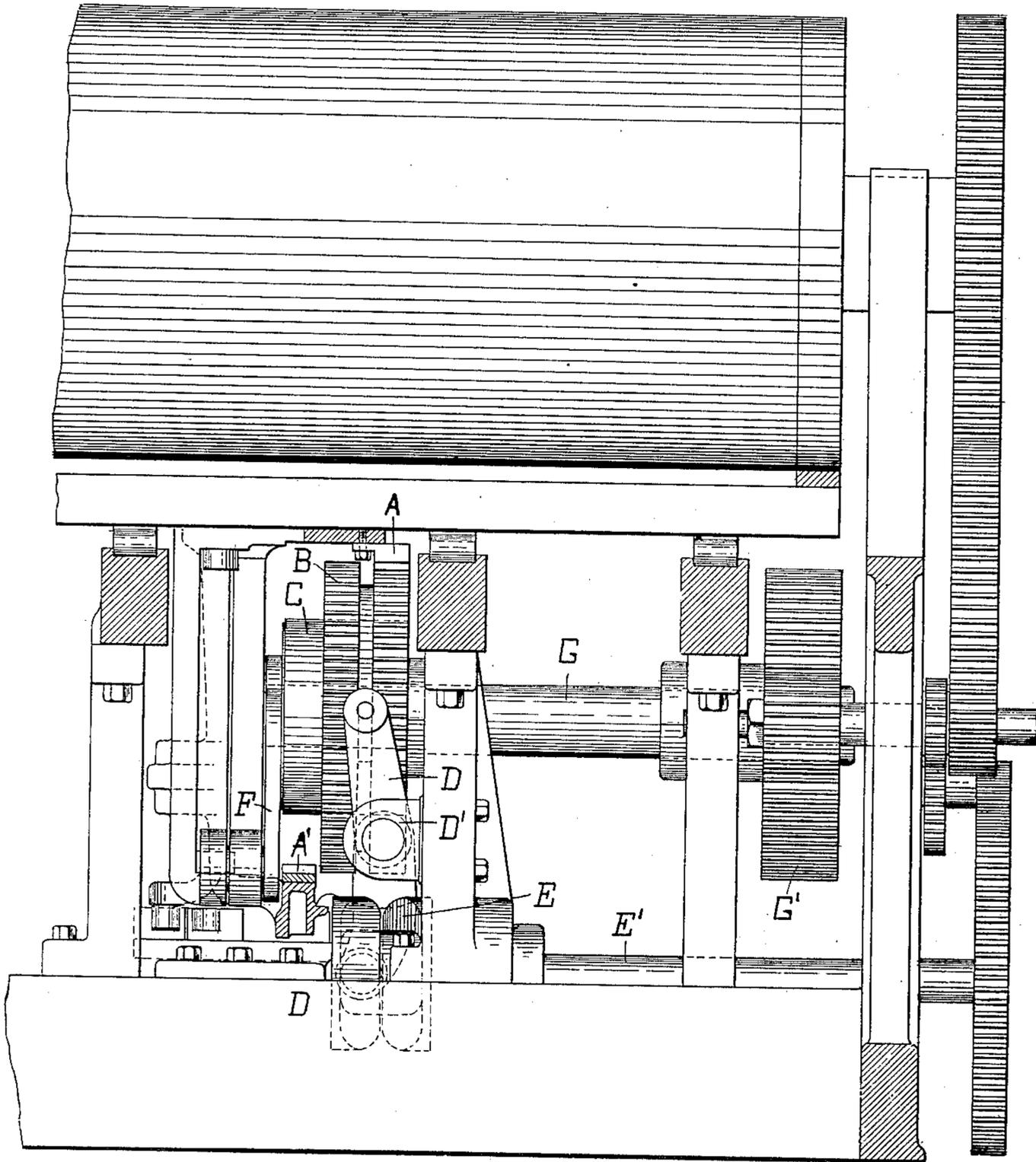
R. MIEHLE.  
PRINTING PRESS.

(Application filed Dec. 20, 1899.)

(No Model.)

4 Sheets—Sheet 1.

*Fig. 1.*



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*Inventor:*  
*Robert Miehle*  
*By his Attorneys.*  
*Alexander & Sowell*

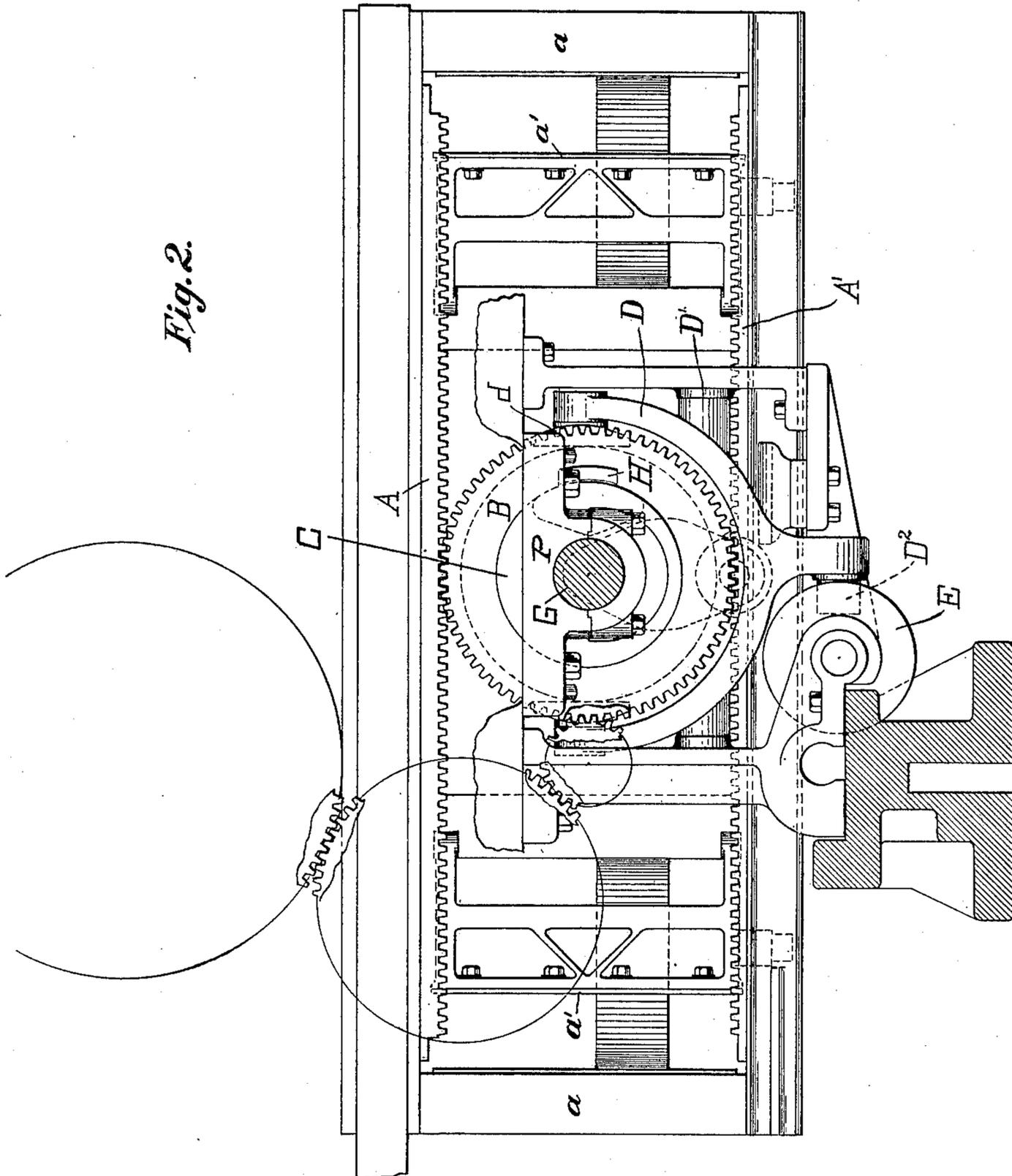
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(Application filed Dec. 20, 1899.)

(No Model.)

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Fig. 2.



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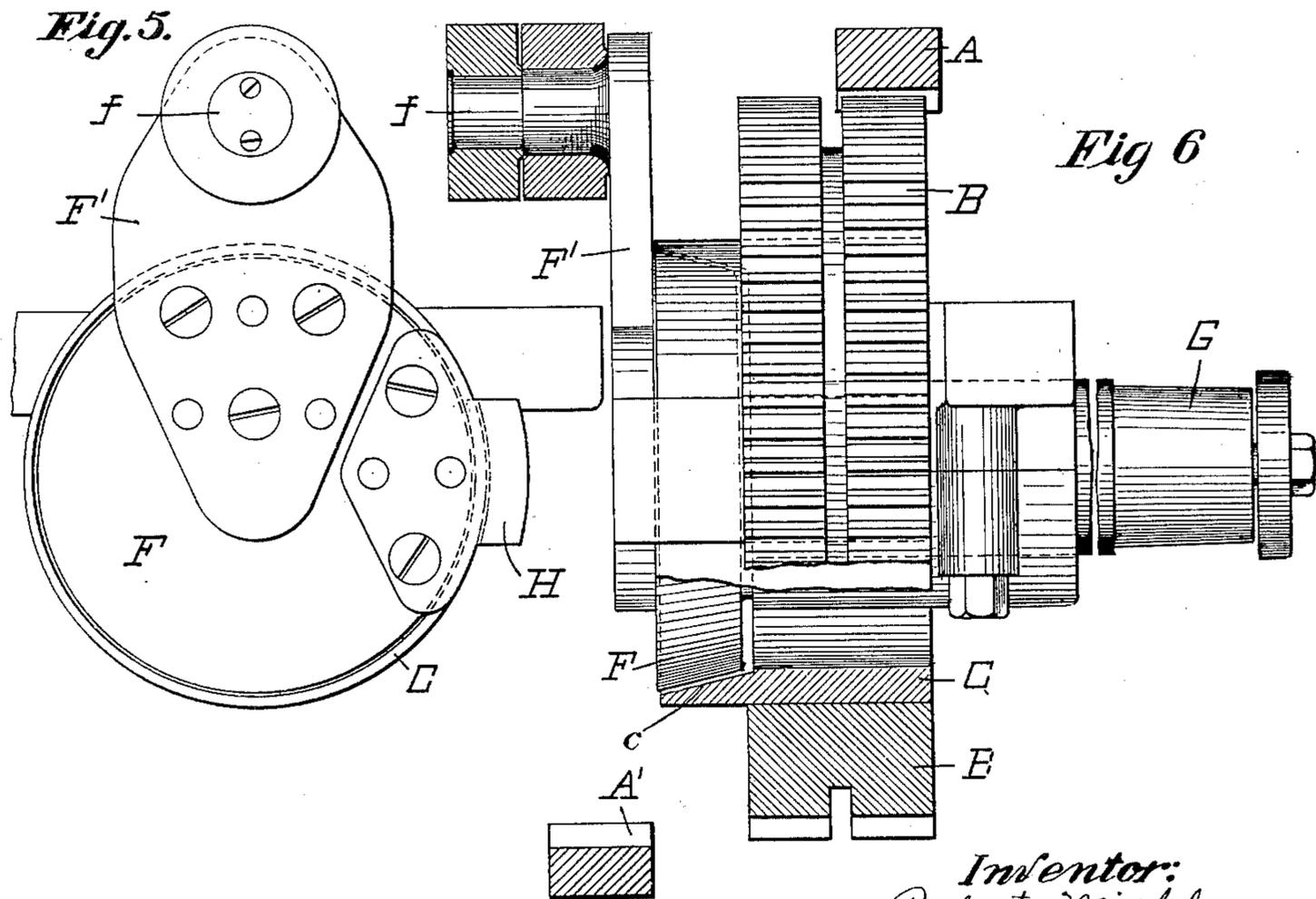
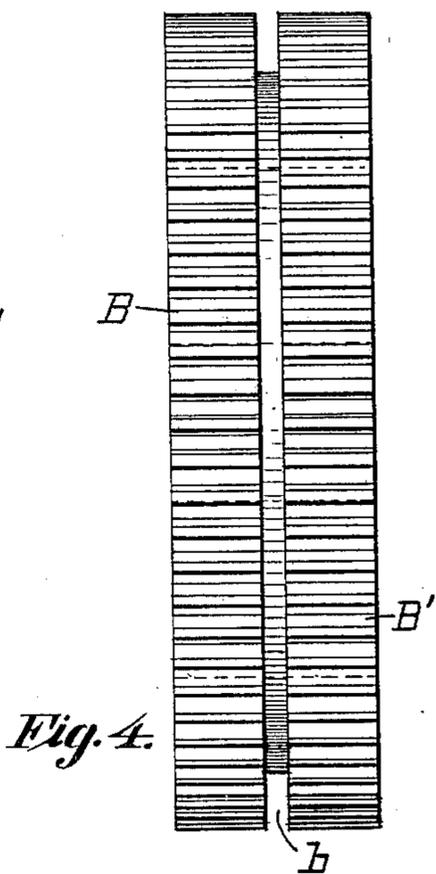
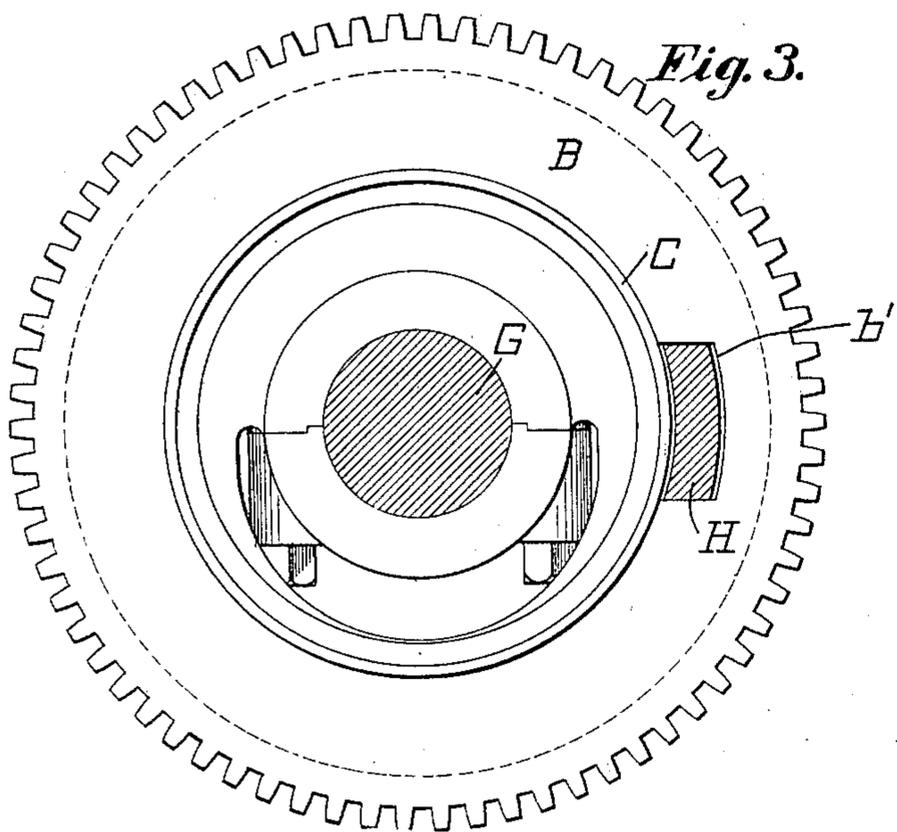
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(No Model.)

4 Sheets—Sheet 3.



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(Application filed Dec. 20, 1899.)

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Fig. 8.

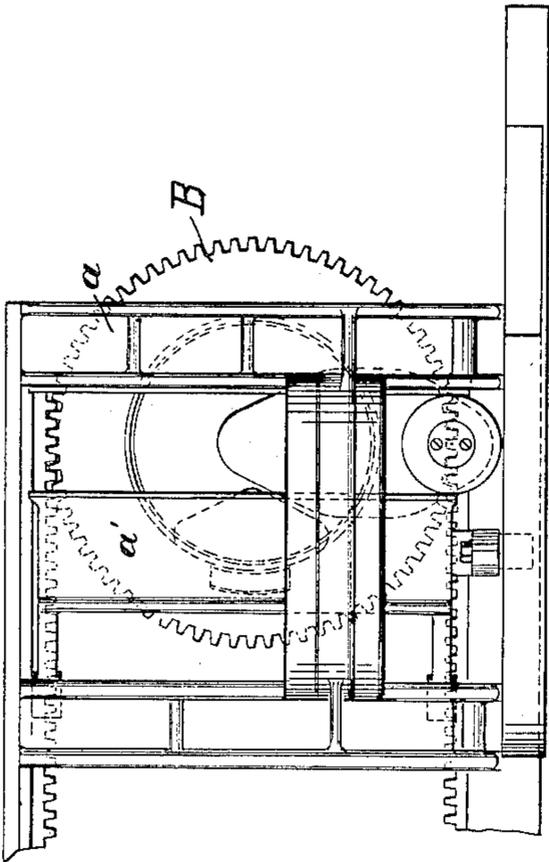


Fig. 10.

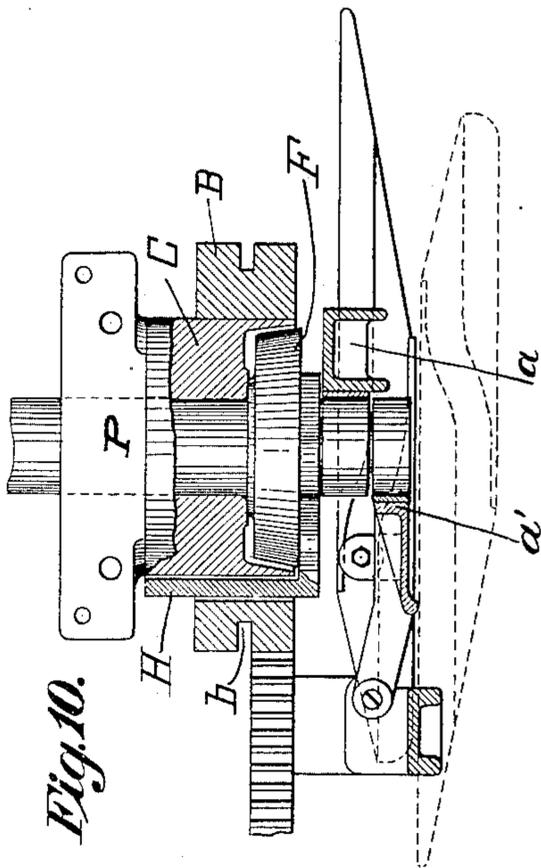


Fig. 7.

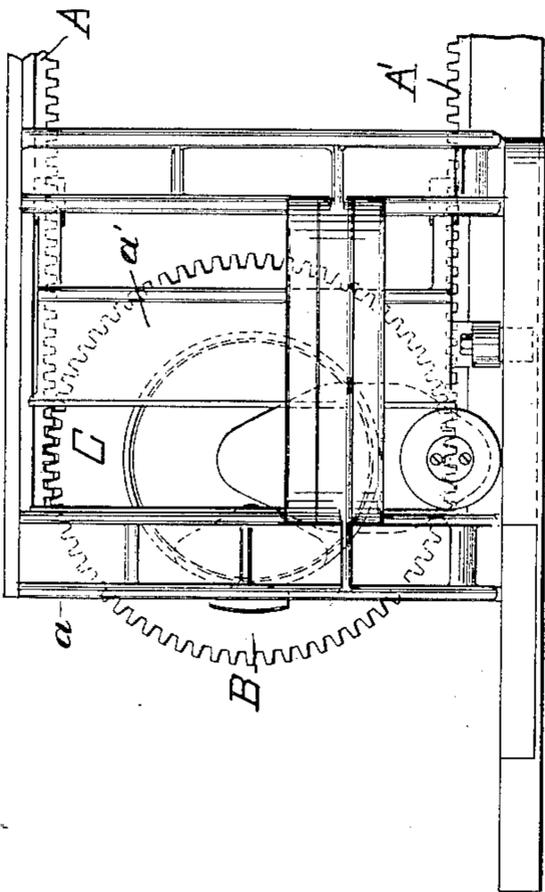
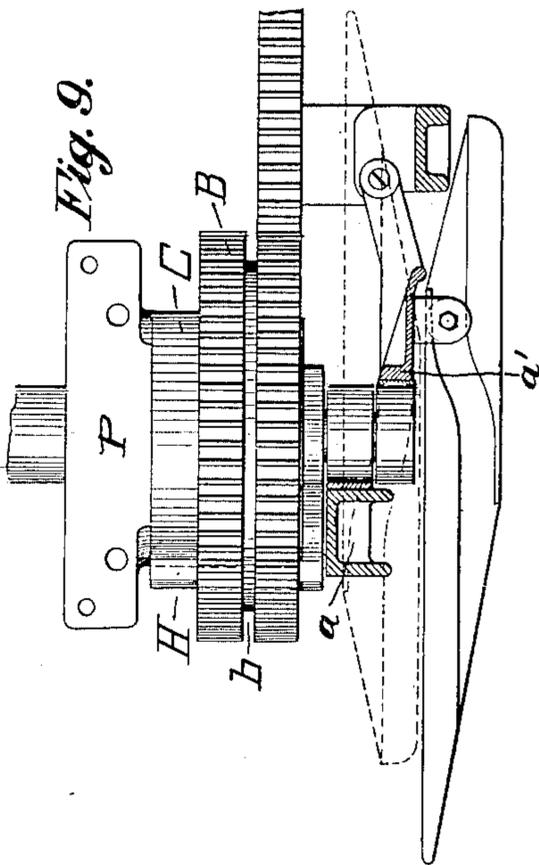


Fig. 9.



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# UNITED STATES PATENT OFFICE.

ROBERT MIEHLE, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE MIEHLE PRINTING PRESS AND MANUFACTURING COMPANY, OF SAME PLACE.

## PRINTING-PRESS.

SPECIFICATION forming part of Letters Patent No. 657,881, dated September 11, 1900.

Application filed December 20, 1899. Serial No. 741,024. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT MIEHLE, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Printing - Presses; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

This invention is a mechanical movement especially adapted to movable-bed printing-presses and is an improvement upon the well-known "Miehle" movement, in which the bed is reciprocated, being moved uniformly during the major parts of its strokes by means of a driving-pinion meshing alternately with upper and lower bed-racks, and the movement of the bed being reversed at the end of each uniform stroke by means of a crank or wrist pin rotating with the pinion and arranged to alternately engage with guide slots or shoes at each end of the rack-frame, the wrist-pin and end slot effecting the reversal of movement of the bed during the time that and while the pinion is out of mesh with both racks and is being shifted from position to engage one rack into position to engage with the other, the wrist-pin and slots further serving to insure the proper reengagement of the pinion and the racks after each reverse, so that the reciprocation and reversal of movement of the beds can be effected rapidly and without jar. This movement, broadly speaking, is covered in my Patents No. 317,663, of May 12, 1885, and No. 322,309, of July 14, 1885. A further improvement on said motion is shown in my Patent No. 429,695, of June 10, 1890, in which patent the wrist-pin, which engages the end slots of the rack-frame to reverse the movement of the bed, is fixedly mounted on a rotating crank, while the gear or main pinion, which engages the bed-racks to impart the uniform portion of the movement to the bed, is mounted concentric to the inner journal of the crank, which passes through the axial sleeve of the pinion, said pinion being rotated with and by the crank and is shifted longitudinally of the shaft or crank during the period of reversal, so that the pinion will alternately engage the upper and lower bed-racks, which are dis-

posed in different vertical planes. The advantage of this latter construction is that the pinion can be shifted facewise from engagement with one rack into engagement with the other without affecting the position of the crank-shaft or the crank carrying the wrist-pin, which have simply a rotary movement in their journals.

The object of the present invention is to retain the advantages of the movement set forth in my Patent No. 429,695 and at the same time to improve upon and simplify the construction; and the present invention, therefore, consists in the novel construction and combination of parts hereinafter claimed and which are shown in the accompanying drawings and hereinafter more particularly described with reference thereto.

In said drawings, Figure 1 is a detail transverse sectional elevation of a portion of a printing-press, showing my improved movement in end elevation. Fig. 2 is a detail longitudinal sectional view of the press, showing the movement in side elevation. Fig. 3 is an enlarged face view of the driving-pinion mounted upon its fixed support or spindle. Fig. 4 is an edge view of said pinion. Fig. 5 is a face view of the crank. Fig. 6 is a partial side elevation and section showing the crank, the driving-pinion, and the fixed support or spindle of the latter. Figs. 7 and 8 are detail side elevations of the rack-frame and the reversing mechanism. Fig. 9 is a top view of Fig. 7, and Fig. 10 is a horizontal sectional view of the reversing mechanism.

A and A' designate upper and lower racks, which are rigidly connected to the bed or part to be reciprocated in any suitable manner and are arranged in different vertical planes. These racks are alternately engaged by a driving-pinion B, journaled upon a fixed support or spindle C, rigidly secured to the frame-work P of the press at the center of movement of the rack-frame equidistant from the upper and lower racks. Spindle C projects between the racks A A'; but the main pinion B is of less width than the spindle and when engaged with one of the two racks will be out of engagement with the other and cannot engage one rack until it is out of engagement with the other, the arrangement of racks and

pinions being substantially such as is described in my Patent No. 429,695. Preferably I make the pinion B duplex—that is, it may be composed of two similar pinions B B', which are separated by a narrow annular groove *b*. These pinions B B' may be made integrally or separately, as preferred. The annular groove *b* is provided for the engagement of the pinion-shifting devices, which, as shown, comprise a bifurcated lever D, pivoted on a stationary part of the frame, as at D', the bifurcations of the lever partially embracing the pinion and having pivoted to their ends blocks *d*, which enter the groove *b*, and therefore by rocking lever D the pinion B may be shifted facewise on spindle C from one rack to the other. The tang of lever D may be provided with a roller D<sup>2</sup>, which engages a driven cam E on the shaft E', which is driven by suitable gearing, as indicated in Fig. 1, so as to shift pinion B at the proper time—*i. e.*, during the periods of reversal—from engagement with one rack into position to engage with the other rack.

The pinion B is to be suitably driven, so as to impart a uniform movement to the beds by any suitable means; but preferably I utilize the crank of the bed-reversing mechanism as the means for rotating this pinion. The bed-reversing mechanism consists of a crank F, fixedly attached to the rotating crank-shaft G, which for convenience is arranged in the plane of the longitudinal axis of the pinion B and extends axially through the spindle C, on which the main pinion is journaled. Said crank-shaft may have its inner end journaled in said spindle or in that portion of the framework to which said spindle is attached, and its outer end is journaled in a boxing on the framework of the machine and is provided with a gear G', which may be driven by a suitable train of gearing from the prime mover or driving-shaft, as indicated in Figs. 1 and 2. It is desirable in practice to have the cylinder and the bed movement geared together, so that the movements of the bed and cylinder shall have a constant fixed relation with each other. The crank F is provided with a rearwardly-extending arm H, which fits closely to the periphery of the spindle C, upon which pinion B is mounted, and enters a slot *b'* in the bore of said pinion, and thus causes said pinion to rotate upon its spindle as the arm H is rotated around said spindle. The crank F is also provided with a wrist-pin *f*, which may be provided with one or more friction-rollers adapted to engage end guide-slots on the rack-frame, which slots are of the well-known Miehle type and, as illustrated in the drawings, are formed between outer fixed shoes *a* and inner movable shoes *a'*, which shoes are constructed and operated substantially as shown and described in my Patent No. 322,309 aforesaid and to which reference may be had for a more complete explanation thereof.

In my Patent No. 429,695 aforesaid the

main pinion is provided with a sleeve-hub which is journaled in a stationary bearing and supported thereby independently of the crank-shaft, and the wrist-pin is mounted on a crank fixed to the crank-shaft, which is journaled in the plane of the longitudinal axis of said pinion and extends through the pinion-sleeve and is journaled therein. In the present case I dispense with the sleeve and journal the pinion on a fixed spindle, thereby lessening friction and wear on the journals and securing a more compact and durable construction and lessening the power required to shift the pinion. By the improved construction both the pinion and the crank-shaft are independently journaled and the wear and strain on the crank and pinion are transmitted to different points of the frame and the pinion and crank-shaft can be independently adjusted. This feature of mounting and supporting the crank and the pinion independently of each other on the frame is one of the principal improvements in the present invention. Another improvement is the construction of the crank in separable parts, for instead of using the solid and straight crank shown in my said patent I prefer to make the crank in separable parts. The advantages of such construction are that each part can be formed and fitted up independently of the other, and it frequently happens that the wrist-pin-carrying portion of the crank is warped in the tempering process, and this warping is difficult to correct in a solid crank. As shown in the drawings, to the inner end of the shaft G is rigidly attached the crank-body F, and to this crank-body is attached a radially-projecting plate or lever F', to the outer end of which is attached the wrist-pin *f*, upon which may be mounted the wrist-pin rollers adapted to engage the opposite end slots of the rack-frame. The lever F' can be hardened more readily and with less liability of warping than if made integral with the body. Again, the arm or feather H, which imparts the rotary motion of the crank to the pinion B, is formed separately from the crank-body and detachably secured thereto, and can likewise be more readily tempered and dressed than if formed integral with the body of the crank. This construction also facilitates the assembling or taking down of the parts, for should it be desired for any reason to remove the wrist-pin and rollers it is simply necessary to detach the plate F' from the crank, or if it be desired to remove the main pinion it may easily be done by simply removing the plate F', whereupon the main pinion can be slipped endwise off its spindle and over the crank. For compactness of construction the outer end of the spindle C may be recessed, as shown at *c*, to receive the main body of the crank F, so that the arm F' and the wrist-pin thereon will rotate in a plane close to the end of the spindle C and bring the wrist-pin nearer to the pinion.

In the machine shown the parts are so pro-

portioned that the main pinion will make three revolutions for each complete reciprocation of the bed. The pinion engages one rack and makes a complete revolution to drive the bed in one direction at uniform speed and goes out of mesh with said rack at the moment that the wrist-pin enters an end slot and takes control of the rack-frame. The pinion makes a half-revolution while the wrist-pin is in engagement with such slot and during this interval is shifted laterally on its spindle into position to engage the other rack at the moment that the wrist-pin leaves the slot upon the completion of the reversal movement. Then the pinion makes another full revolution while engaged with the other rack to propel the bed at uniform speed on its return stroke and goes out of mesh with this rack when the wrist-pin engages the other slot and remains out of engagement with the racks for a half-revolution while the wrist-pin and slot are again reversing the movement of the bed, the pinion being shifted back into position to engage the first rack during such second reverse. This operation is well understood and is clearly set forth in my several patents aforesaid.

From the foregoing description it will be seen that the improved movement resembles the construction shown in my Patent No. 429,695 in that the wrist-pins are mounted on the crank independently of the pinion. In said patent, the shaft of the crank is journaled or supported in the sleeved hub of the main pinion, and the sleeved hub of this pinion is journaled within a cylindrical journal bearing or box on the main frame, both the crank-shaft and the hub of the pinion rotating in said journal-bearing and the sleeved hub of the pinion affording a bushing for the crank within the journal-bearing. The present invention is an improvement upon the said patent in that the main pinion is journaled upon a stationary spindle which partly surrounds the body of the crank and may form the journal-bearing for the shaft thereof, in that the crank is made in separable sections, in the employment of a double pinion, and in the other novel features of construction and combinations set forth in the claims.

While I have described the racks as fixedly located in different planes, which is the preferred form of construction, it is obvious that the principal features of the invention could be embodied in machines wherein the racks were movable, and obviously the invention is not restricted to the specific proportions of the parts shown and described nor to any certain number of revolutions of the main pinion during the reciprocation of the bed. The principal features of the invention could be retained in machines wherein the crank and pinion are rotated at different speeds and also where specifically-different reversing mechanism is employed.

Having thus described my invention, what I therefore claim as new, and desire to secure by Letters Patent thereon, is—

1. In a bed motion, the combination of the bed-racks, a pinion adapted to engage said racks, a stationary spindle supporting said pinion, a crank for rotating said pinion on said spindle and means for shifting said pinion on said spindle to alternately engage the racks substantially as described.

2. In a bed motion, the combination of the bed-racks in different vertical planes, a pinion adapted to alternately engage said racks, a stationary spindle on which said pinion is journaled, a crank for rotating said pinion, and means for shifting said pinion on the spindle to alternately engage the racks; with means for reversing the movement of the rack-frame independently of the pinion and while the same is disengaged from the racks, substantially as described.

3. The combination of the rack-frame and racks, a rotating crank, means for supporting said crank, and means whereby said crank is enabled to reverse the movement of the rack-frame at each end of the movement thereof; with a pinion adapted to be alternately engaged with said racks, means for supporting said pinion concentric to the crank or its supports, the journal-bearings of said pinion and crank being independent, and means for rotating said pinion, substantially as described.

4. The combination of the bed or part to be reciprocated, a pair of racks attached to the bed and located in different vertical planes, a crank-shaft, a crank thereon intermediate the racks, and means whereby said crank is enabled to reverse the movement of the rack-frame at each end of the movement thereof; with a pinion adapted to be alternately engaged with said racks, a stationary spindle supporting said pinion concentric to but independently of the crank, and means for effecting the relative change of position of the racks and pinion during the reversal periods, substantially as described.

5. The combination of a pair of racks in different planes, a rotating crank, a fixed spindle or support concentric to the crank-axis, a pinion supported upon said spindle, means for rotating the pinion, means for engaging said pinion alternately with the racks, and mechanism actuated by said crank for reversing the movement of the bed when the pinion is disengaged from the racks substantially as described.

6. The combination of a pair of racks in different planes, a rotating crank, a fixed spindle or support concentric to the crank-axis, a pinion supported upon and longitudinally movable on said spindle, means for rotating the pinion from said crank, means for shifting said pinion on the spindle to alternately engage the racks, and mechanism ac-

tuated by said crank for reversing the movement of the bed during the shifting movement of the pinion.

7. The combination of the rack-frame, the racks disposed in different vertical planes, a pinion adapted to alternately engage said racks, and a stationary spindle upon which said pinion is journaled; with a shaft extending through the said spindle, and mechanism, operated by said shaft, for reversing the movement of the rack-frame while the pinion is disengaged from the racks, and means for rotating the pinion.

8. The combination of the rack-frame, the racks disposed in different vertical planes, a main pinion adapted to alternately engage said racks, and a stationary spindle upon which said pinion is journaled; with a rotary shaft extending through the said spindle, a crank on the inner end of said shaft, and mechanism whereby said crank is enabled to effect the reversal of movement of the rack-frame while the pinion is disengaged from both racks and means for shifting the pinion, during the reversal, from one rack to the other.

9. The combination of a reciprocating bed, the opposite racks attached thereto, a pinion adapted to alternately engage said racks, a stationary spindle upon which said main pinion is journaled, and means for shifting the engagement of said pinion during the period of reversal from one rack to the other; with a shaft extending axially through said spindle, the crank on the inner end of said shaft, means connected to the rack-frame whereby said crank is enabled to reverse the movement of the racks when the pinion is disengaged therefrom, and means whereby the gear is rotated from the crank while supported independently thereof, substantially as described.

10. The combination of a reciprocating bed, the opposite racks, a pinion adapted to alternately engage said racks, a stationary spindle upon which said main pinion is journaled, said spindle being of greater width than the pinion, and means for shifting the pinion on the spindle during the period of reversal; with a shaft extending axially through said spindle, the crank on the inner end of said shaft, means whereby said crank is enabled to reverse the movement of the bed when the pinion is disengaged from the racks, and means whereby the gear is rotated from the crank while supported independently thereof, substantially as described.

11. The combination of a reciprocating bed, the opposite racks disposed in different vertical planes attached thereto, a pinion adapted to alternately engage said racks, a stationary spindle upon which said main pinion is journaled, said spindle being of greater width than the pinion, and means for shifting said pinion on the spindle during the period of reversal from one rack to the other; with a shaft

extending axially through said spindle, the crank on the inner end of said shaft partially concealed in a recess in the end of the spindle, means connected to the rack-frame whereby said crank is enabled to reverse the movement of the racks when the pinion is disengaged therefrom, and an arm on said crank extending over said spindle and engaging the pinion whereby the latter is rotated with the crank while supported independently thereof, all substantially as and for the purpose set forth.

12. In a bed movement, the combination of the bed, the two opposite racks attached thereto in different vertical planes, a pinion adapted to alternately engage said racks, a stationary spindle upon which said pinion is journaled, and means for shifting said pinion longitudinally on said spindle from position to engage one rack into position to engage the other during the period of reversal; with a rotating crank-shaft projecting axially through and journaled in said spindle, having a crank-body on its inner end, a crank-arm attached to said body and projecting over said spindle and engaging the pinion so as to rotate the latter on the spindle, and means whereby the crank is enabled to reverse the bed while the main pinion is out of mesh with the racks.

13. In a bed movement, the combination of the bed, two opposite racks attached thereto in different vertical planes, a main pinion adapted to alternately engage said racks, a stationary spindle upon which said pinion is journaled, and means for shifting said pinion longitudinally on said spindle from position to engage one rack into position to engage the other during the period of reversal; with a rotating shaft projecting axially through said spindle, having a crank-body on its inner end, a crank-arm attached to said body and projecting over said spindle and engaging a recess in the bore of the pinion so as to rotate the latter on the spindle, a crank-arm attached to said disk and projecting radially therefrom, a wrist-pin on said arm, and end slots at the end of the rack-frame adapted to be engaged by said wrist-pin to effect the reversal of movement of the rack-frame while the pinion is disengaged from the racks, and means for shifting the pinion longitudinally of the spindle while it is disengaged from the racks during the period of reversal.

14. The combination of the rack-frame, the racks, the stationary spindle, the pinion journaled on said spindle, the rotating shaft journaled in and projecting through said spindle and a crank-arm on said shaft engaging said pinion and adapted to rotate the same on the spindle, substantially as described.

15. The combination of the rack-frame, the racks, and the guide-slots on the end of the rack-frame, the stationary spindle, and the main pinion journaled on said spindle; with the rotating shaft projecting through said spindle, a crank-arm on said shaft engaging

said pinion and adapted to rotate the same on the spindle; another crank-arm attached to said shaft and carrying a wrist-pin adapted to engage the guide-slots to effect the reversal of the movement of the bed, and means for shifting the pinion longitudinally on said spindle during the reversal of the bed, substantially as described.

16. The combination of the rack-frame, the opposite racks disposed in different vertical planes, and mechanism for effecting the reversal of the movement of the bed; with a stationary support, a pair of connected main pinions journaled thereon, and adapted to respectively, but at alternate times, engage the opposite racks and a crank for rotating said pinions for the purpose and substantially as described.

17. The combination of the rack-frame, the opposite racks disposed in different vertical planes, a fixed spindle, a pair of connected pinions journaled thereon, respectively adapted to engage the opposite racks, but at alternate times, means for reversing the movement of the beds, a crank for rotating said pinions and means for throwing the pinions alternately into engagement with their respective racks.

18. The combination of the rack-frame, the opposite racks disposed in different vertical planes, a fixed spindle, a pair of rigidly-connected pinions journaled on said spindle and movable longitudinally thereof, and respectively adapted to engage the opposite racks at alternate times; with a crank for rotating said pinions, means for reversing the movement of the frame, and means for shifting the pinions on the spindle alternately into engagement with their respective racks.

19. The combination of the rack-frame, the racks, the stationary spindle, the pair of connected main pinions journaled on said spindle, the rotating shaft journaled in and projecting through said spindle and a crank-arm on said shaft engaging said pinions and adapted to rotate the same on the spindle, and a second crank-arm attached to said shaft and carrying a wrist-pin and the guide-slots on the end of the rack-frame adapted to be engaged by the wrist-pin to effect the reversal of the movement of the beds, and means for shifting the pinions longitudinally on said spindle during the reversals of the bed, substantially as described.

20. The combination of the rack-frame, the opposite racks, a fixed spindle, a pair of pinions journaled thereon, respectively adapted to engage the opposite racks, but at alternate times, and means for throwing the pinions alternately into engagement with their respective racks; with a rotating shaft extend-

ing through the spindle, means for rotating the pinions upon the spindle from said shaft, and means for reversing the movement of the beds while the pinions are being shifted.

21. The combination of the rack-frame, the opposite racks disposed in different vertical planes, a fixed spindle, a pair of connected pinions journaled thereon, respectively adapted to engage the opposite racks, but at alternate times, and means for throwing the pinions alternately into engagement with their respective racks; with a rotating shaft extending through the spindle, a crank-arm attached to said shaft for rotating the pinions upon the spindle, and means, independent of the pinions, actuated by said shaft for reversing the movement of the beds while the pinions are being shifted.

22. The combination of the rack-frame, the opposite racks thereon disposed in different vertical planes and the guide-slots at the end of the rack-frame; a stationary spindle, and a pinion journaled on said spindle, with a crank-shaft extending through said spindle, a crank-arm attached to said shaft and engaging the pinion and rotating the latter upon the spindle, and a second crank-arm attached to said shaft carrying a wrist-pin and rollers adapted to engage the end slots in the rack-frame to reverse the movement thereof, and means for shifting the engagement of the pinion from one rack to the other during the reversal periods, substantially as described.

23. The combination of the rack-frame, the opposite racks thereon disposed in different vertical planes and the guide-slots at the end of the rack-frame, a stationary spindle, a pinion journaled upon and longitudinally movable on said spindle, a crank-shaft extending axially through said spindle and journaled therein, a crank-body on the inner end of said shaft and loosely fitted in a recess in the inner end of the spindle, a crank-arm attached to said body, engaging a recess in the bore of the pinion whereby the latter is rotated upon the spindle, and a second crank-arm attached to the said body carrying a wrist-pin and rollers adapted to engage the end slots in the rack-frame to reverse the movement thereof, and means for shifting the pinion longitudinally of the spindle during the reversal periods, all substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

ROBERT MIEHLE.

Witnesses:

W. H. WARVEL,  
JOHN HEWITT.