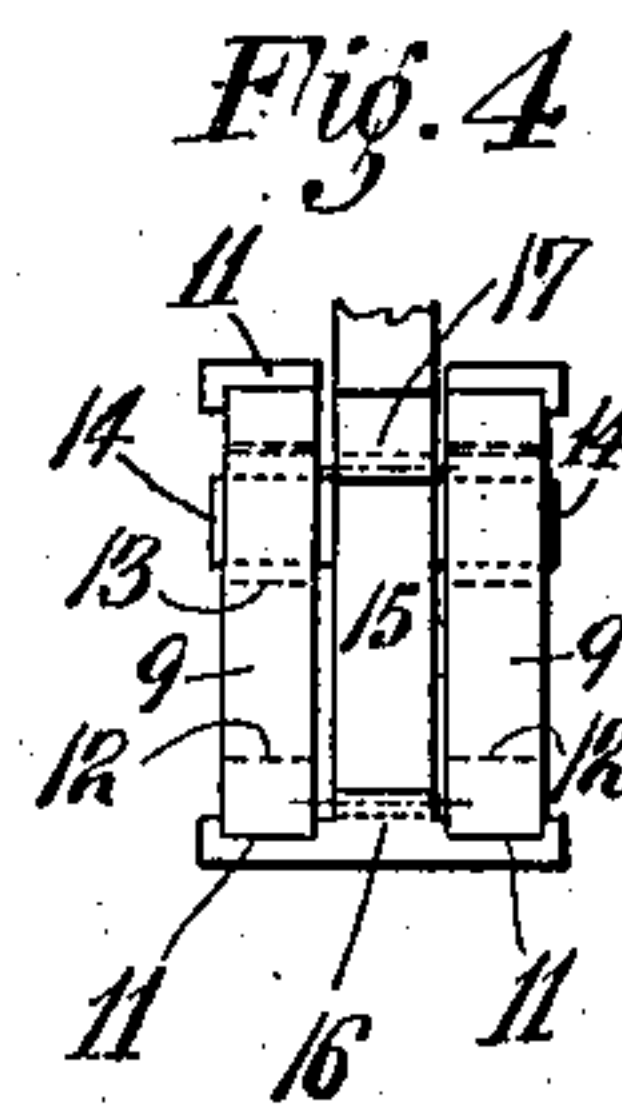
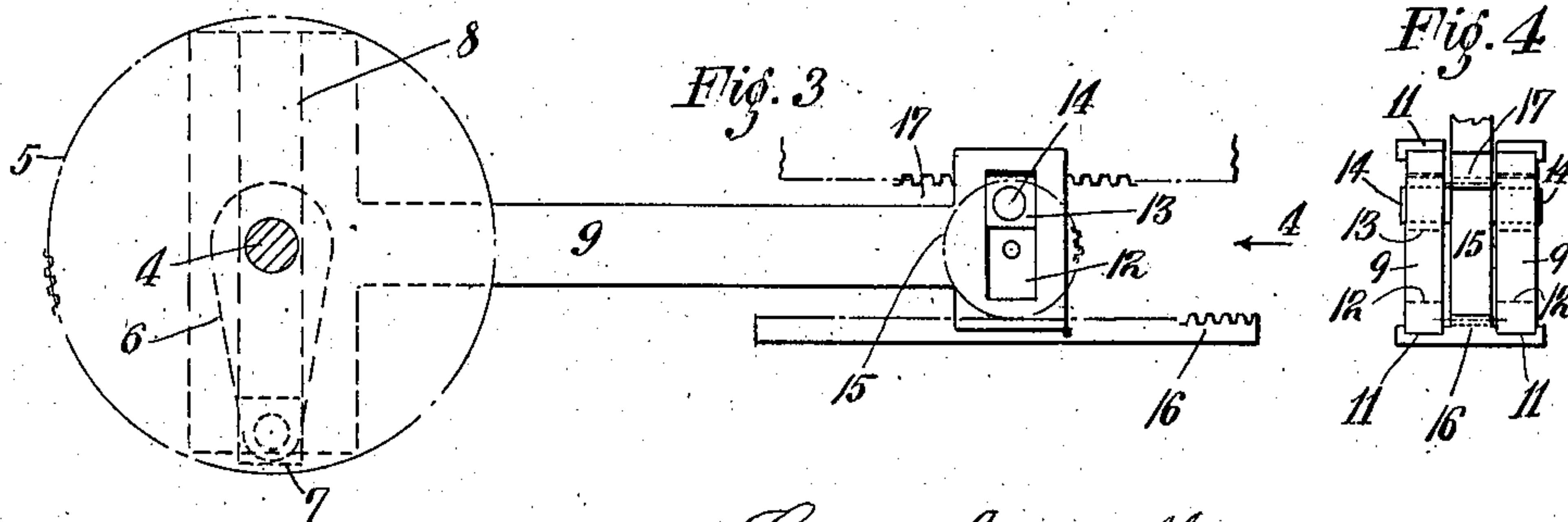
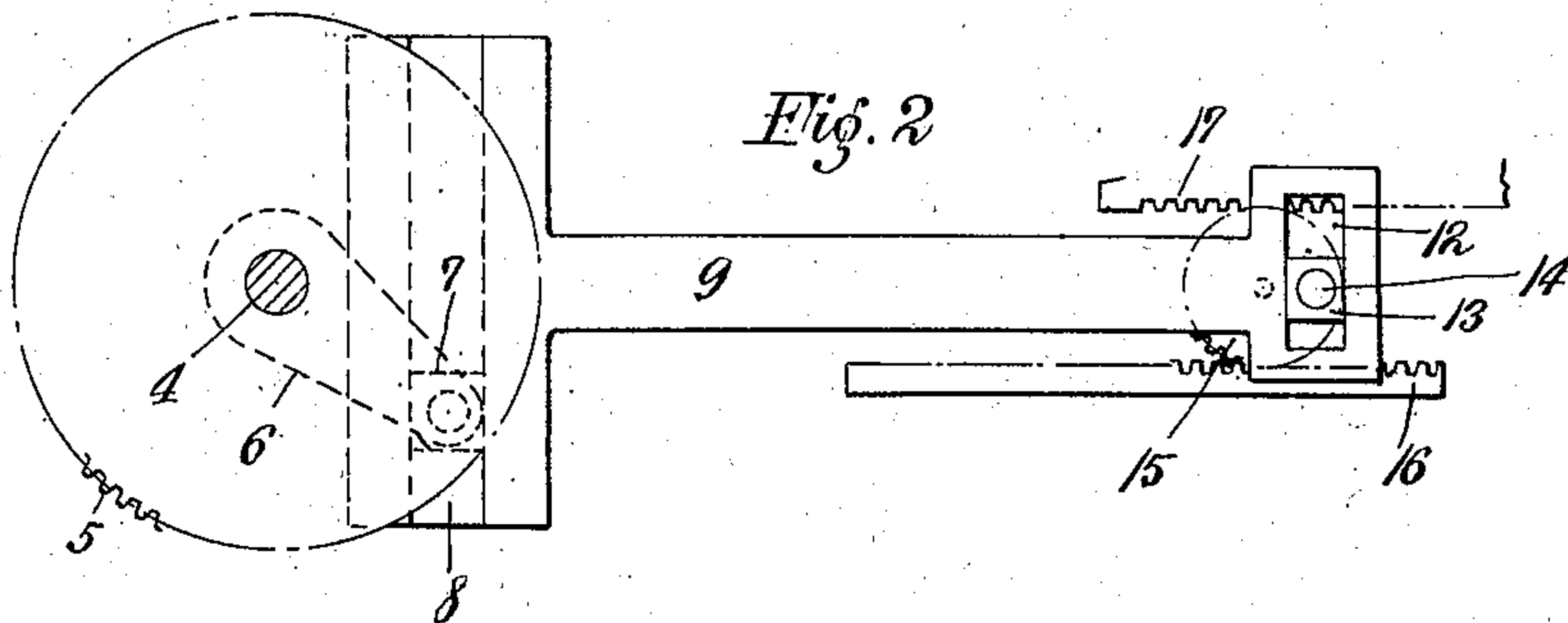
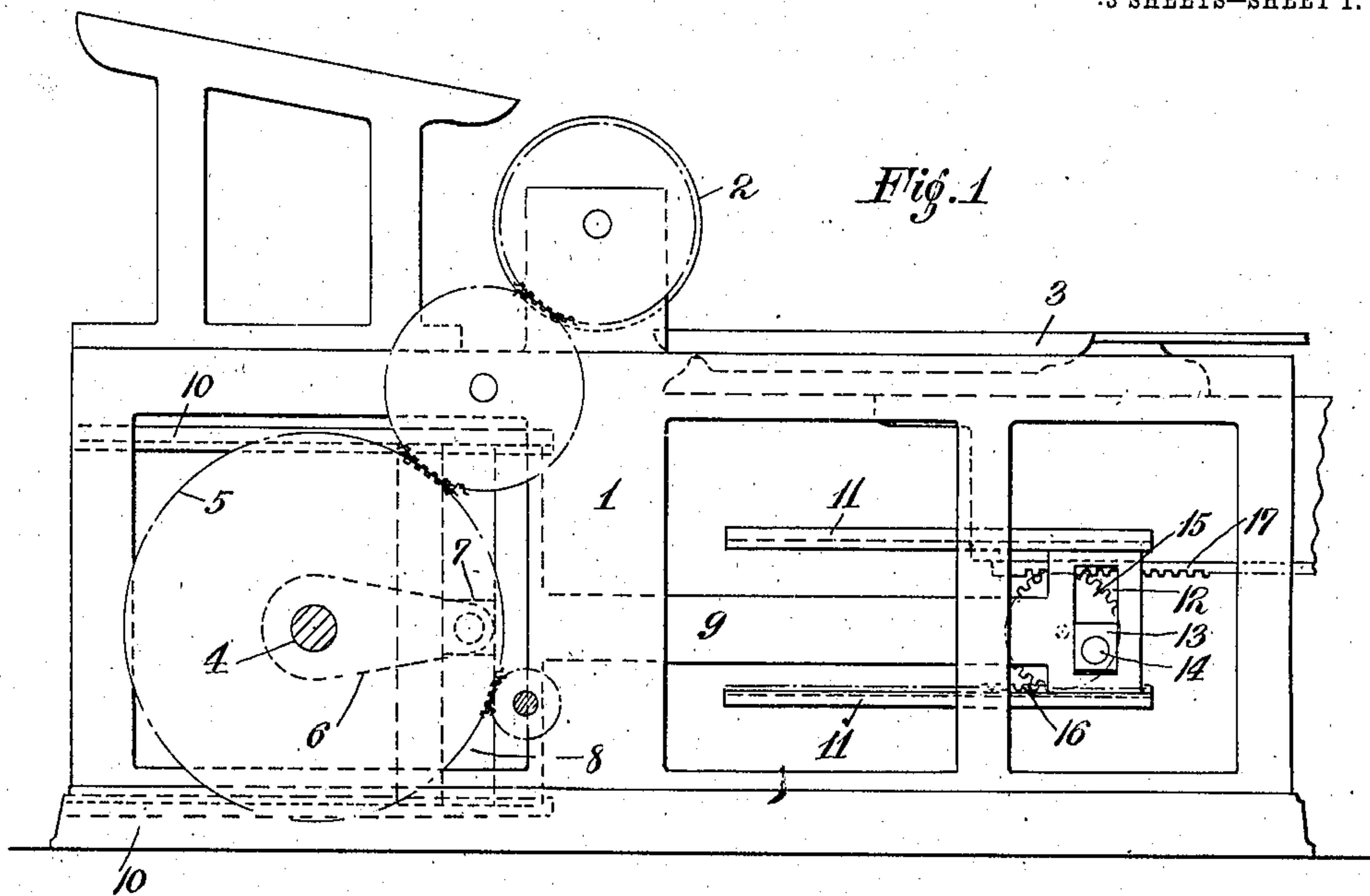


No. 816,110.

PATENTED MAR. 27, 1906.

G. A. MAIN.
PRINTING MACHINE.
APPLICATION FILED JULY 11, 1905.

3 SHEETS—SHEET 1.



Witnesses
Joan Bonigberg.
Anna Wissemann

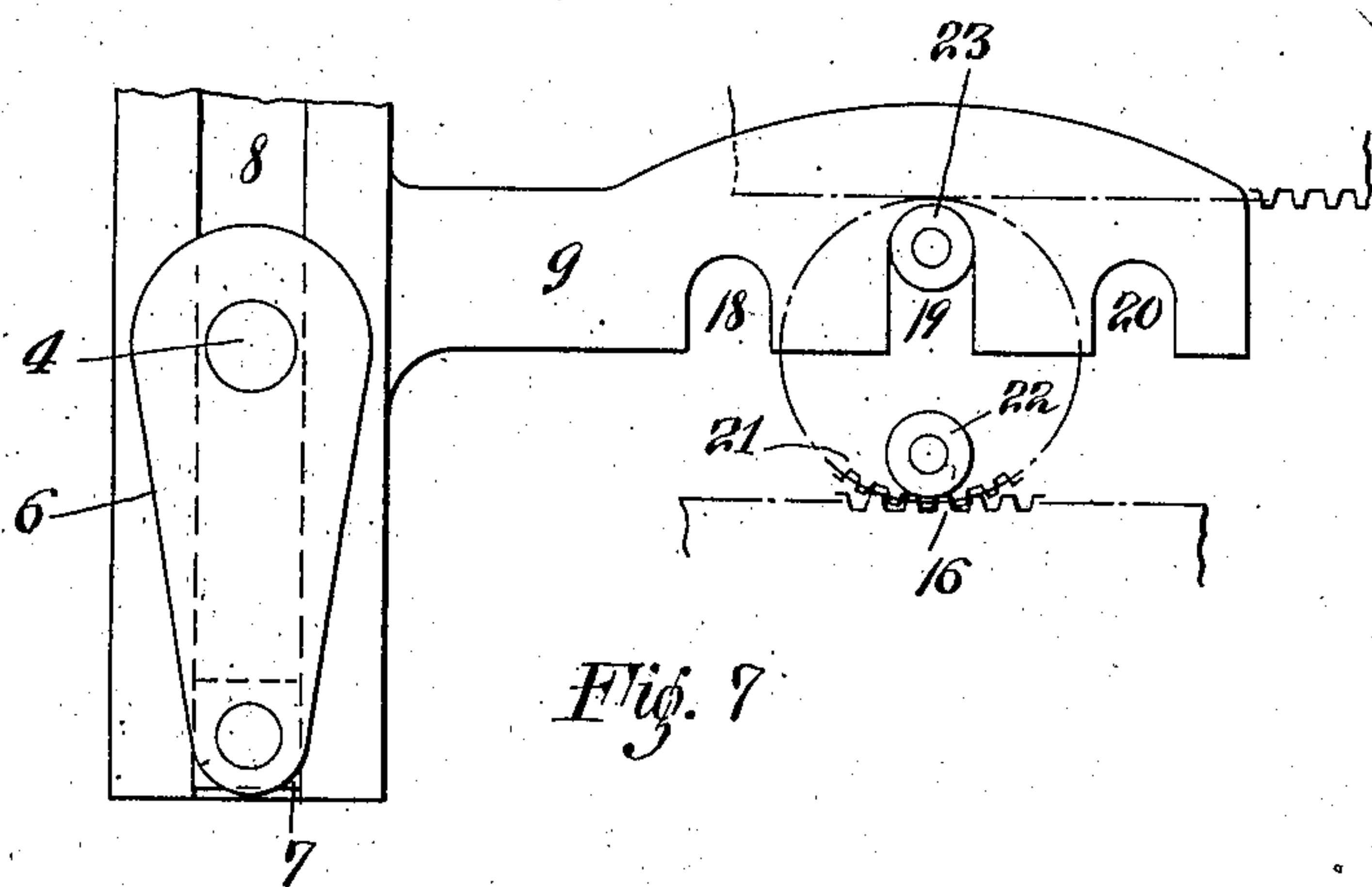
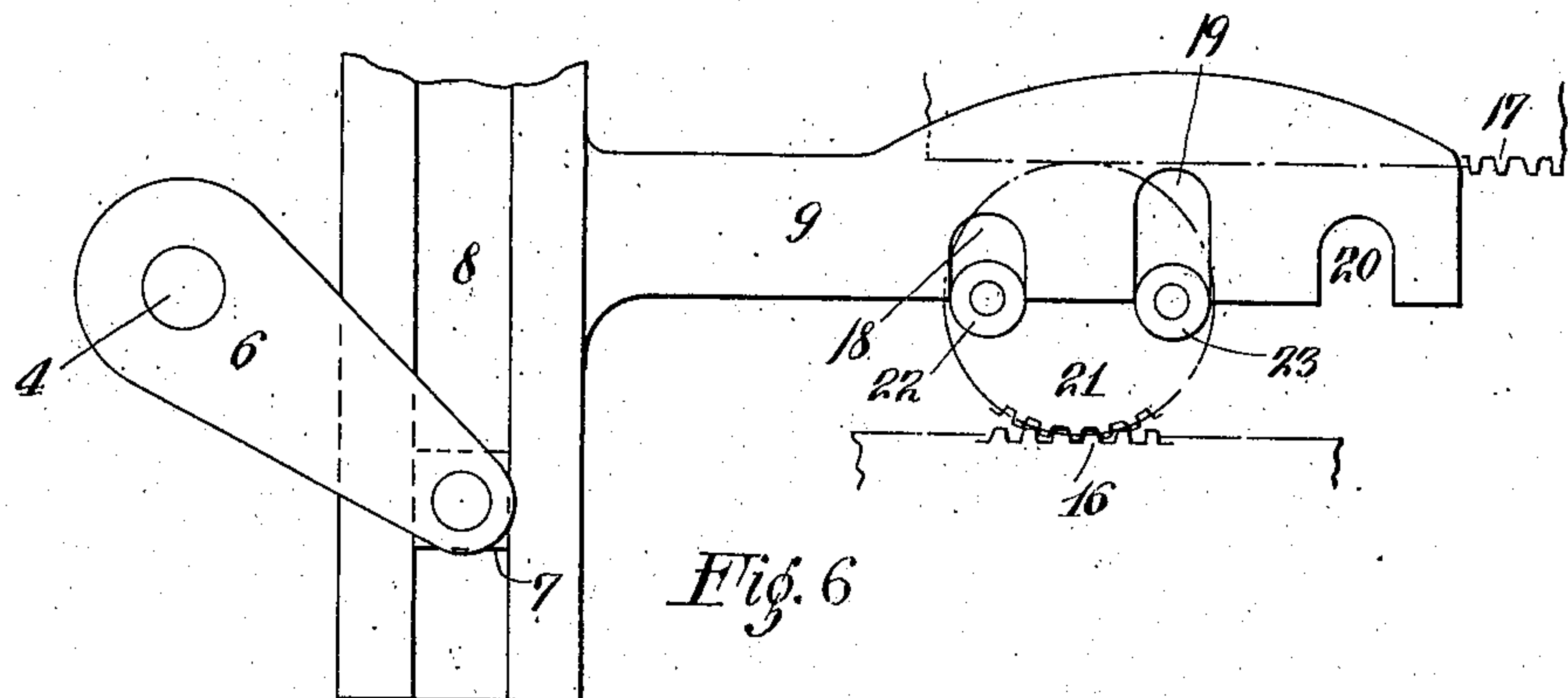
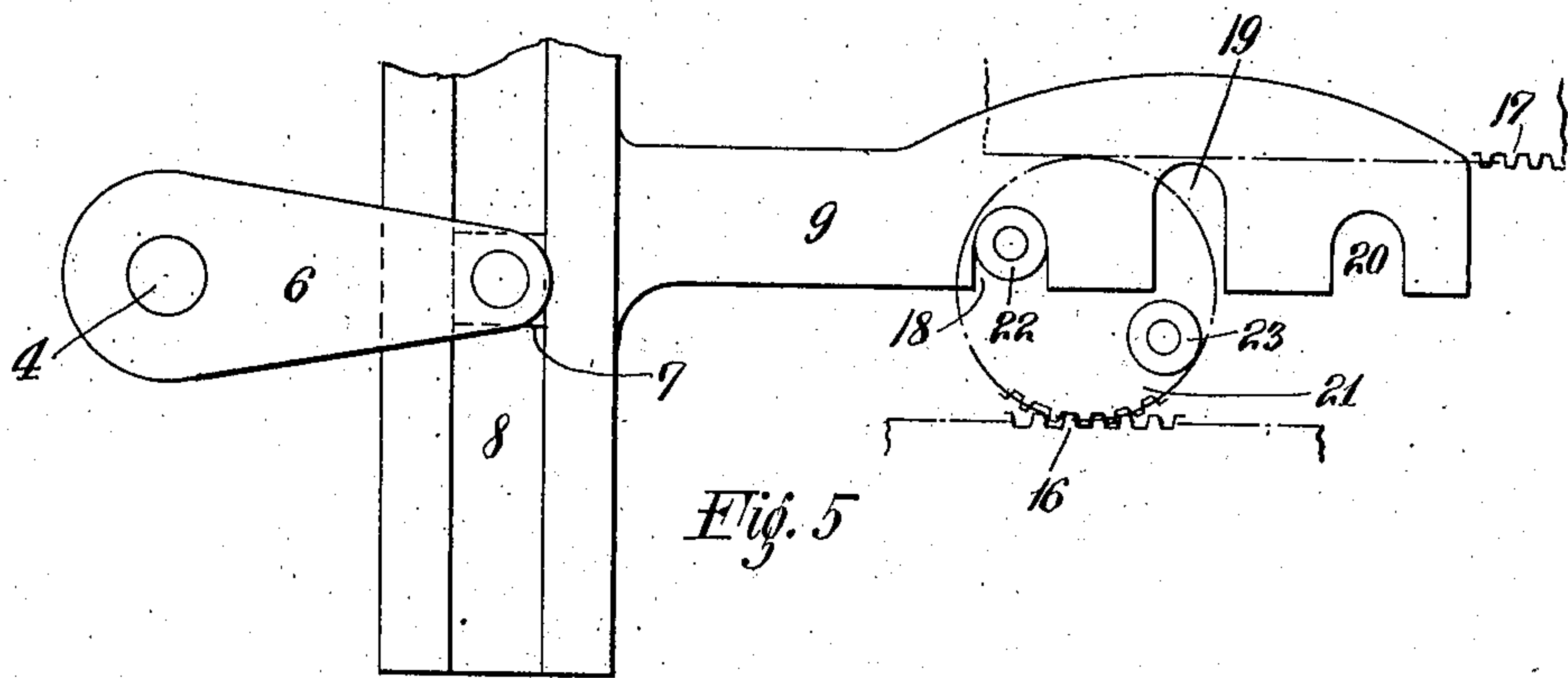
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No. 816,110.

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APPLICATION FILED JULY 11, 1905.

3 SHEETS—SHEET 2.



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3 SHEETS—SHEET 3.

Fig. 8

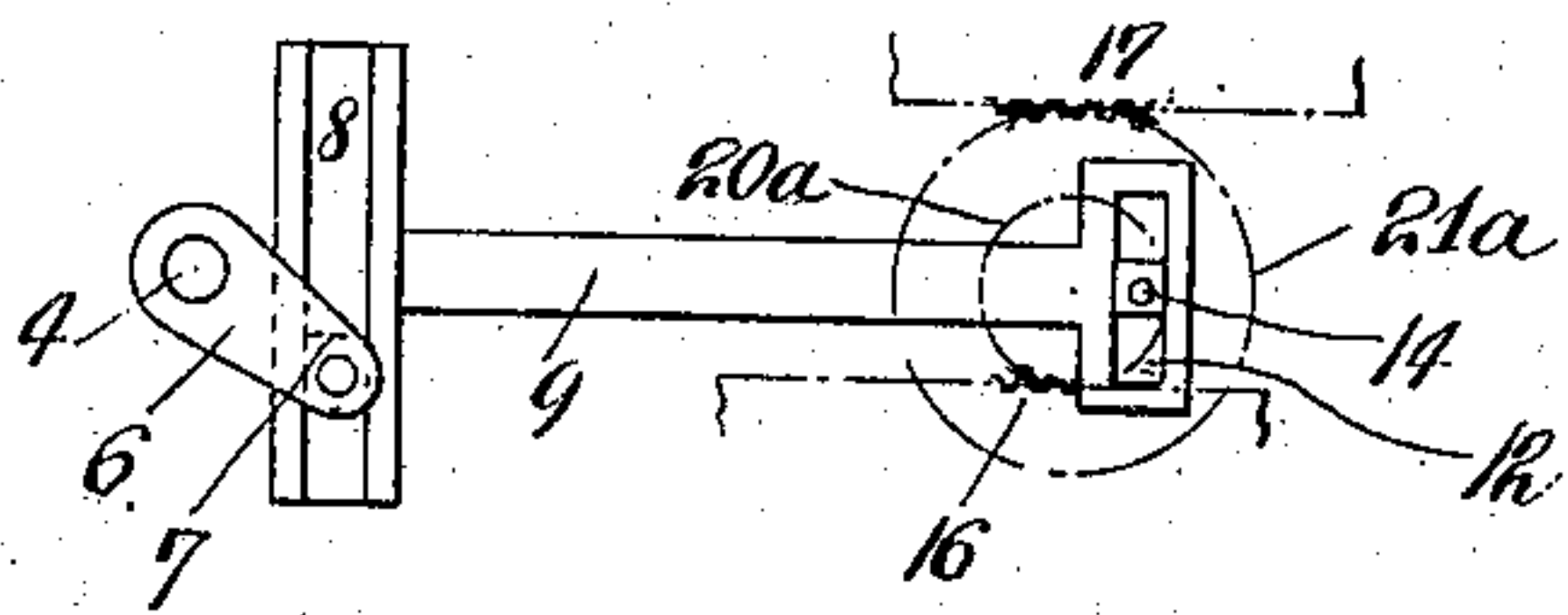


Fig. 9

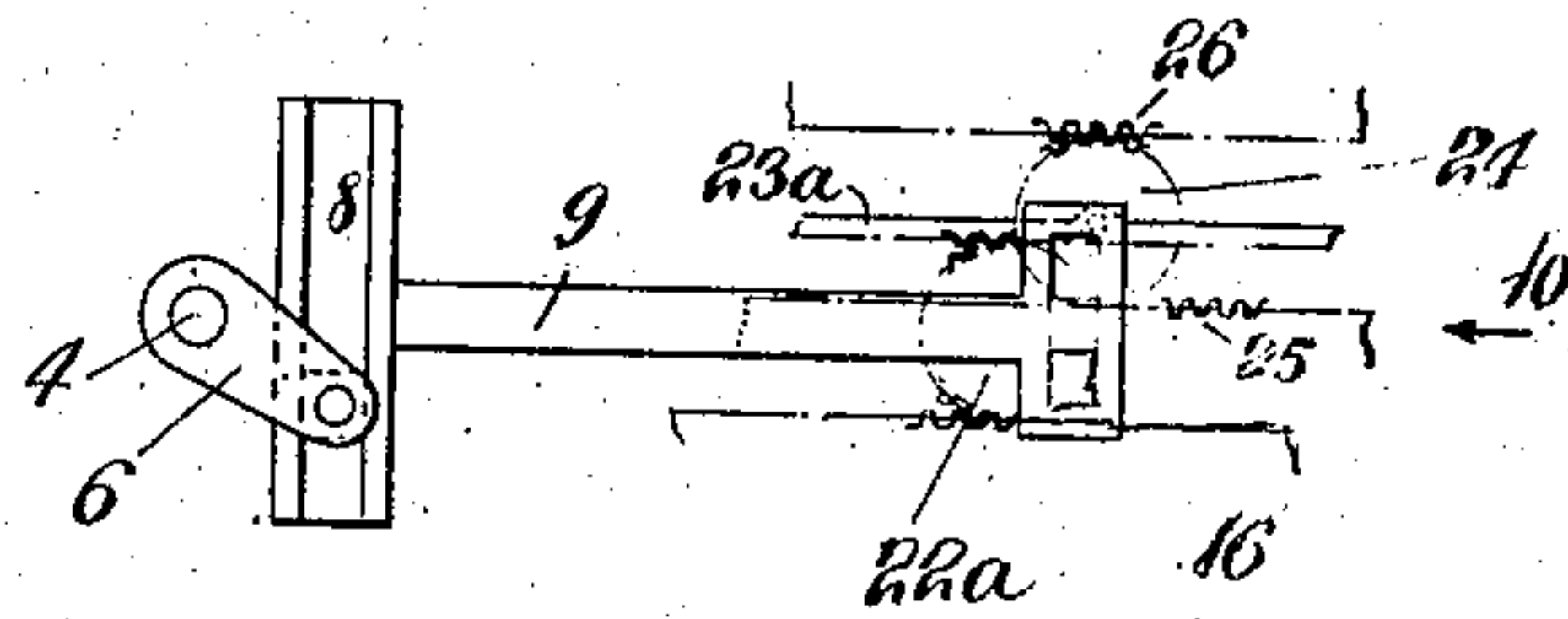


Fig. 10

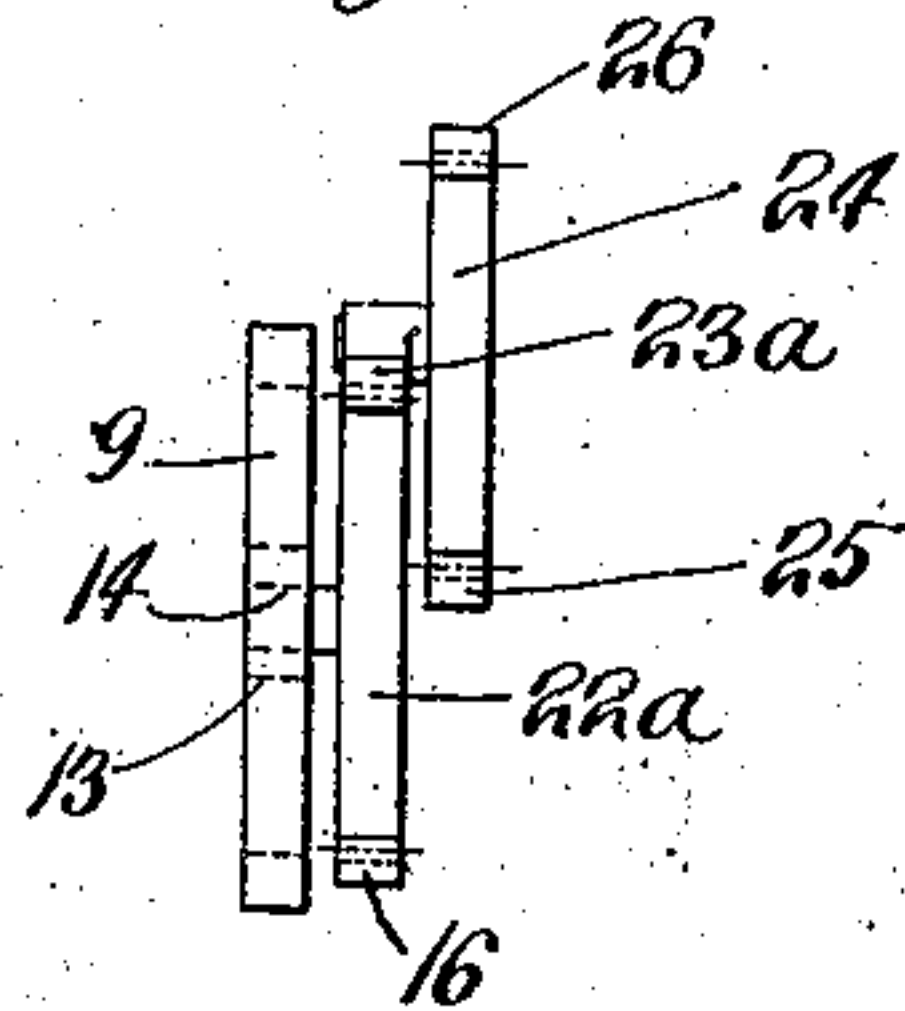


Fig. 11

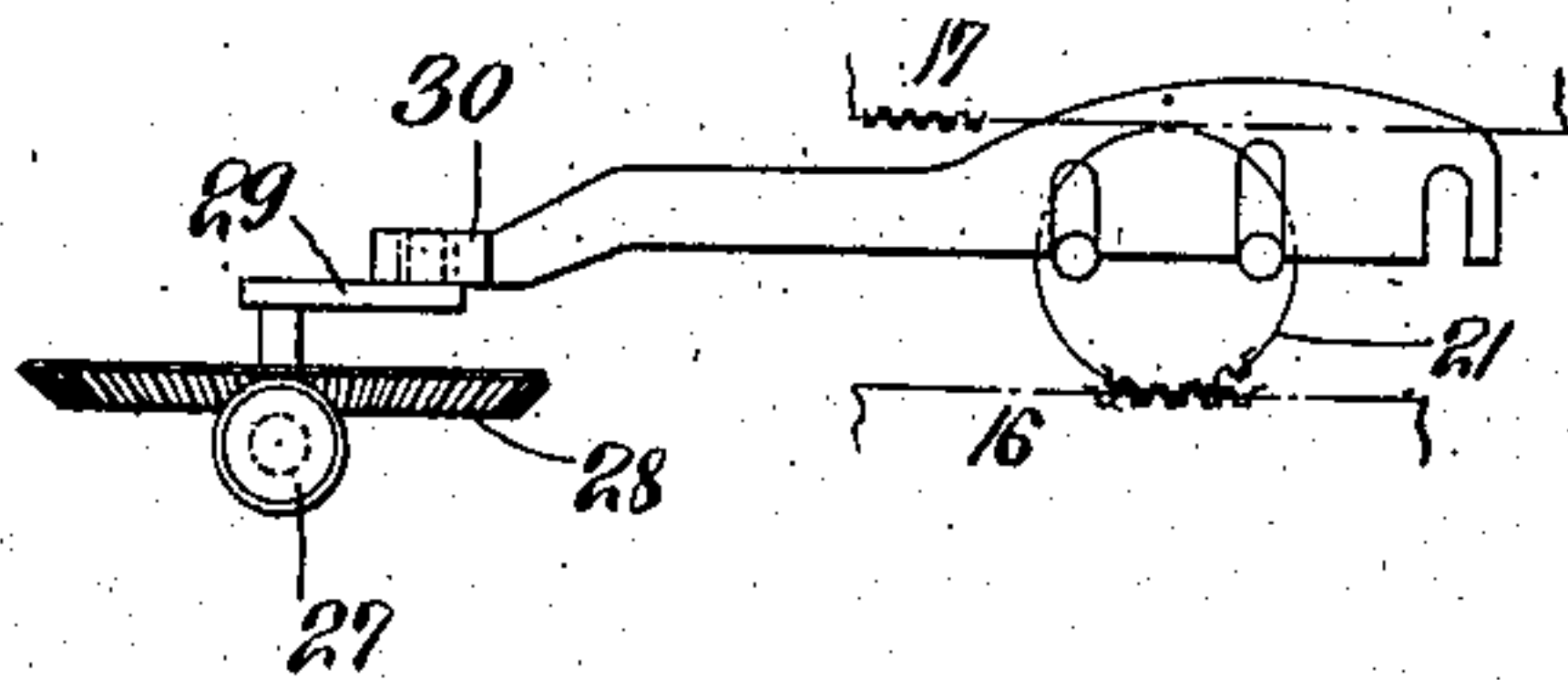
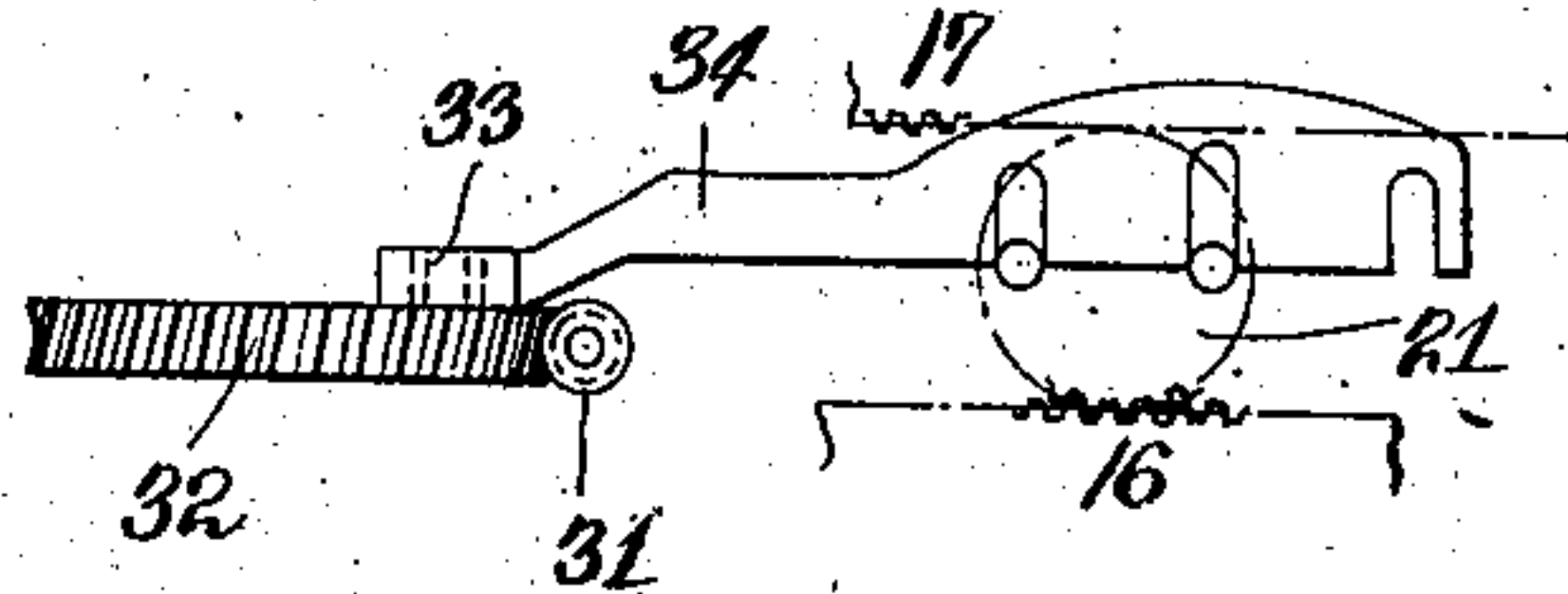


Fig. 12



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UNITED STATES PATENT OFFICE.

GEORGE ARTHUR MAIN, OF ALFRED, NEW YORK.

PRINTING-MACHINE.

No. 816,110.

Specification of Letters Patent.

Patented March 27, 1906.

Application filed July 11, 1905. Serial No. 289,161.

To all whom it may concern:

Be it known that I, GEORGE ARTHUR MAIN, a citizen of the United States of America, and a resident of Alfred, Allegany county, State of New York, have invented certain new and useful Improvements in Printing-Machines, of which the following is a specification.

The present invention relates generally to means for converting rotary motion into a reciprocating motion, and has more particularly reference to means for reciprocating and reversing the bed motion of a bed and cylinder printing-machine.

In the art many devices have been constructed for effecting the reciprocation and the reversal of a bed printing-machine, some of which have employed the well-known crank motion. When this is used, the bed is usually given a constantly-changing speed, varying with the speed imparted by the crank. Inasmuch as the cylinder and bed have to move at the same surface speed it is either necessary to vary the speed of the cylinder to correspond to that of the bed or to provide means whereby the varying speed of the crank will be converted into a uniform motion during the major reciprocation of the bed.

The object of the present invention is to utilize the simplicity of the crank motion in such a manner that the bed will be given a uniform speed during the major portion of its travel.

To this end the invention consists, essentially, in an auxiliary oscillating and reciprocating crank preferably in the form of a gear having a pin eccentrically disposed which is adapted to drive the bed either by engaging directly with the rack on the same or through a train of gears, a main driving-crank making one complete revolution to each complete reciprocation and oscillation of the said gear, the auxiliary crank being properly proportioned with relation to the main crank and so arranged as to form an effective arc of substantially uniform motion during the major reciprocation of the bed, and a reciprocating member actuated by the main rotating crank and provided with one or more guides or slots at one end adapted to engage with the pin or pins on the auxiliary crank.

In the accompanying drawings there is disclosed a structure embodying the invention, together with several modifications of the same. It is to be understood, however, that the invention is not to be limited to the particular means shown, as the particular and

specific embodiment of the invention may be widely varied without departing from it.

In the said drawings, Figure 1 represents a side elevation of a bed and cylinder press embodying the invention and showing the parts in their initial position or at the point when they are about to start. Fig. 2 is a detail view showing the parts in the position at the beginning of the effective arc of the auxiliary crank or at the beginning of the uniform major reciprocation. Fig. 3 shows the parts at a point where the auxiliary crank has made one-half of its movement in one direction. Fig. 4 is an end view looking in the direction of the arrow 4 in Fig. 3. Fig. 5 shows a modification with the parts in the same position as those in Fig. 1. Fig. 6 shows the position of these parts corresponding to the position of Fig. 2. Fig. 7 shows the position of the parts corresponding to Fig. 3. Figs. 8 and 9 show modifications of the structure disclosed in Figs. 1 to 4. Fig. 10 is an end view looking in the direction of the arrow 10 of Fig. 9. Figs. 11 and 12 show the main driving-crank rotating in a horizontal plane instead of in a vertical plane.

Similar numerals of reference indicate corresponding parts in the different views.

1 indicates a framework of any suitable construction for properly mounting the parts of the device, and 2 is the impression-cylinder of any usual or suitable construction, while 3 indicates the reciprocating bed. Mounted on the shaft 4, which may carry the gear 5 for imparting motion to the impression-cylinder, is the main driving-crank 6, provided at its outer end with the guide-block 7, adapted to move in the guide 8 of the reciprocating yoke 9. This yoke is adapted to slide in suitable ways, as 10 and 11, and carries at its other end another guide 12, in which plays the guide-block 13 of the crank-pin 14, which in this instance is mounted eccentrically on the oscillating and reciprocating gear 15, which gear is suitably supported as it reciprocates by means of the lower stationary rack 16 and bearers adjacent to the same in a well-known manner, and imparts its motion to the upper reciprocating rack 17 direct in the present instance. This shows the simplest form of the invention, and the operation can best be explained by considering this construction alone.

As will be noticed, the auxiliary crank formed by pin 14 on the gear 15 is much shorter than the crank 6, and while the main

driving-crank travels from the position shown in Fig. 1 to the position shown in Fig. 2 the auxiliary crank will have traveled a distance to the left and will have turned a distance
 5 sufficient to bring the block 13 from the bottom of the guide 12 up to the position shown in Fig. 2, in which its center is substantially in horizontal alinement with the center of the gear 15. During this movement the speed
 10 of the auxiliary crank will be gradually accelerated and will have reached its maximum when it arrives at the position shown in Fig. 2. The continued rotation of the main crank will cause the auxiliary crank to travel
 15 through an arc of one hundred and eighty degrees—that is, to a position opposite to that shown in Fig. 2, during which the main reciprocation will be imparted to the bed in one direction with a substantially uniform speed.
 20 The auxiliary crank will travel a distance beyond this point, in fact, to a point opposite to that shown in Fig. 1, during which its speed will be gradually retarded to zero. During this movement the main crank will have traveled
 25 from the position shown in Fig. 1 through one hundred and eighty degrees, and the continued movement of the same will gradually accelerate the motion of the auxiliary crank in the opposite direction until it reaches a position in horizontal alinement with the center
 30 of the crank, when the full speed will be attained again.

It will be understood that while the auxiliary crank travels through the short arc at the
 35 end of its uniform movement in opposite directions that the speed of the bed will be gradually retarded and accelerated again, or, in other words, will be reversed, and that
 40 during its travel of one hundred and eighty degrees in either direction it will move at a substantially uniform speed to impart the major reciprocation to the bed. Thus during one
 45 complete rotation of the main crank through three hundred and sixty degrees the auxiliary crank will have oscillated in opposite directions through an arc somewhat longer than one hundred and eighty degrees in both
 50 directions and will have reciprocated a distance equal to exactly one-half the travel of the bed. It will be understood that by varying the diameter of the traveling gear 15 and the relative length of the auxiliary crank and otherwise properly proportioning the parts the length of time used for the reversal and
 55 for the uniform travel of the bed can be changed. In order to avoid cramping of the parts, the reciprocating yoke 9 will generally be forked at the end adjacent to the auxiliary crank with guides in each fork, and the auxiliary
 60 crank will then be provided with a crank-pin and guide-block on either side, as shown in Fig. 4.

Referring now to Figs. 5, 6, and 7, it will be seen that in this instance the yoke is provided
 65 with a plurality of vertical slots open at the

lower end, as 18, 19, and 20, and that the gear 21 is provided with two eccentrically-disposed pins 22 and 23, which progressively engage and disengage with the open slots. In this instance the substantially uniform travel
 70 of the bed will take place from the time the pin 23 enters into engagement with the central slot 19 until it is disengaged from the same and that the periods of reversal take place when the pin 22 engages with the two
 75 end slots 18 and 20. In this instance, as in the construction shown in Figs. 1, 2, 3, and 4, the arrangement may be double, with crank-pins on either side of the auxiliary crank.

In Fig. 8 is shown a construction in which
 80 there is mounted concentrically with the gear 20^a a larger gear 21^a, with which engages the rack on the type-bed, while in Fig. 9 the gear 22^a engages with a reciprocating rack 23^a, with which travels the gear 24, meshing with
 85 the stationary rack 25 and imparting the motion to the rack 26 on the type-bed.

In Figs. 11 and 12 the main crank is shown as rotating in a horizontal plane instead of in a vertical plane, as in the other views. In Fig
 90 11 are shown two beveled gears 27 and 28, the latter carrying the crank 29, sliding in the yoke 30, while in Fig. 12 a worm and a worm-gear 31 and 32 are shown, the said
 95 worm-gear carrying a crank 33, sliding in the yoke 34. The operation of these modifications is substantially similar to that stated in connection with the construction shown in Figs. 1 to 4.

What is claimed is—

1. The combination of a main rotating crank, an auxiliary crank provided with a crank-pin and having an oscillating and reciprocating motion, and a reciprocating member actuated by the main rotating crank and
 105 having at one end a guide for the reception of the pin on the auxiliary crank.

2. The combination of a main rotating crank, an auxiliary crank having an oscillating and a reciprocating motion, and provided
 110 with a crank-pin, a reciprocating member actuated by the main rotating crank, and having at one end a guide for the reception of the pin on the auxiliary crank; whereby during the complete revolution of the main
 115 crank, the auxiliary crank makes a complete oscillating and reciprocating movement with an effective arc of substantially uniform speed during the major portion of its travel in both directions.

3. The combination of a main rotating crank, having a crank-pin, an auxiliary crank having an oscillating and reciprocating motion, also provided with a crank-pin, and a reciprocating member having guides for the
 125 reception of the crank-pins.

4. The combination of a main rotating crank, having a crank-pin, an auxiliary crank having an oscillating and reciprocating motion, also provided with a crank-pin, and a
 130

reciprocating member having guides for the reception of the crank-pins, whereby during a complete revolution of the main crank the auxiliary crank makes a complete oscillating and reciprocating movement with an effective arc of substantially uniform speed during the major portion of its travel in both directions.

5. The combination of a main rotating crank having a crank-pin, an auxiliary crank, having an oscillating and reciprocating motion, provided with two crank-pins, and a reciprocating member having a guide for the crank-pin on the main crank and having a plurality of guides for the two crank-pins on the auxiliary crank.

6. The combination of a main rotating crank having a crank-pin, an auxiliary crank having an oscillating and reciprocating motion, provided with two crank-pins, and a reciprocating member having a guide for the crank-pin on the main crank, and having a plurality of guides for the two crank-pins on the auxiliary crank, whereby during a complete revolution of the main crank, the auxiliary crank makes a complete oscillating and reciprocating movement with an effective arc of substantially uniform speed during the major portion of its travel in both directions.

7. In a printing-machine: the combination of a reciprocating bed, a main rotating crank, having a crank-pin, an oscillating and reciprocating gear adapted to impart motion to the reciprocating bed, provided with a crank-pin, and a reciprocating member having guides for the reception of the crank-pins of the rotating crank and on the gear.

8. In a printing-machine: the combination of a reciprocating bed, a main rotating crank having a crank-pin, an oscillating and reciprocating gear, adapted to impart motion to the reciprocating bed, provided with a crank-pin so disposed that during a complete revolution of the main crank, the gear makes a complete oscillating and reciprocating movement with an effective arc of substantially uniform speed during the major portion of its travel in both directions, and a reciprocating member having guides for the reception of the crank-pins on the main crank and on the gear.

9. The combination of a main rotating crank having a crank-pin, an auxiliary crank having an oscillating and reciprocating motion provided with a crank-pin on both sides,

and a reciprocating member having a guide for the reception of the crank-pin on the main crank, and forked at the end adjacent to the auxiliary crank with guides in each fork for the reception of the crank-pins of the auxiliary crank.

10. In a printing-machine, the combination of a reciprocating bed, a main rotating crank, an oscillating and reciprocating gear adapted to impart motion to the reciprocating bed provided with a crank-pin, and a reciprocating member actuated by the main rotating crank and having a guide at one end for the reception of the crank-pin of the gear.

11. In a printing-machine, the combination of a reciprocating bed, a main rotating crank, an oscillating and reciprocating gear adapted to impart motion to the reciprocating bed provided with a crank-pin so disposed that during a complete revolution of the main crank the gear makes a complete oscillating and reciprocating movement with an effective arc of substantially uniform speed during the major portion of its travel in both directions, and a reciprocating member actuated by the main crank provided with a guide at one end for the reception of the pin on the gear.

12. The combination of a main rotating crank, an auxiliary crank provided with a plurality of crank-pins having an oscillating and reciprocating motion, and a reciprocating member actuated by the main rotating crank and having at one end a plurality of open slots which the crank-pins on the auxiliary crank progressively engage and disengage.

13. In a printing-machine, the combination of a reciprocating bed, a main rotating crank, an oscillating and reciprocating gear adapted to impart motion to the reciprocating bed provided with a plurality of crank-pins, and a reciprocating member actuated by the main crank and provided at one end with a plurality of open slots which the crank-pins on the gear progressively engage and disengage.

Signed at Omaha, Nebraska, this 2d day of June, 1905.

GEORGE ARTHUR MAIN.

Witnesses:

L. BRIN,

A. T. KLOPP.