No. 656,901. Patented Aug. 28, 1900.

# G. A. MAIN.

## PRINTING PRESS.

(Application filed June 12, 1899.)

(No Model.) 2 Sheets—Sheet 1.

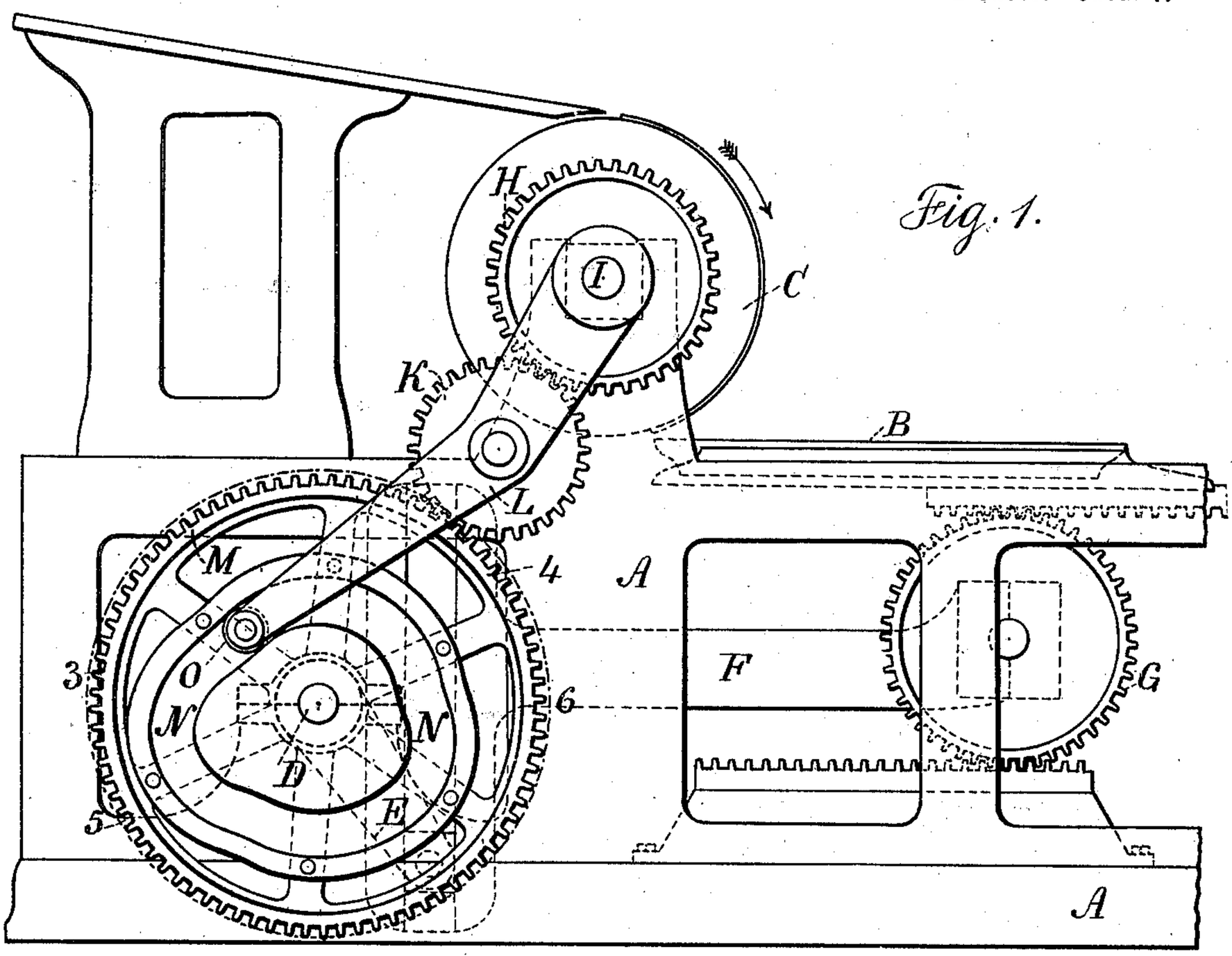


Fig. 1.

Witnesses.
J. Stair.
Chas. H. Smith.

Inventor
George A. Main
per L. W. Serrell & Son
attys.

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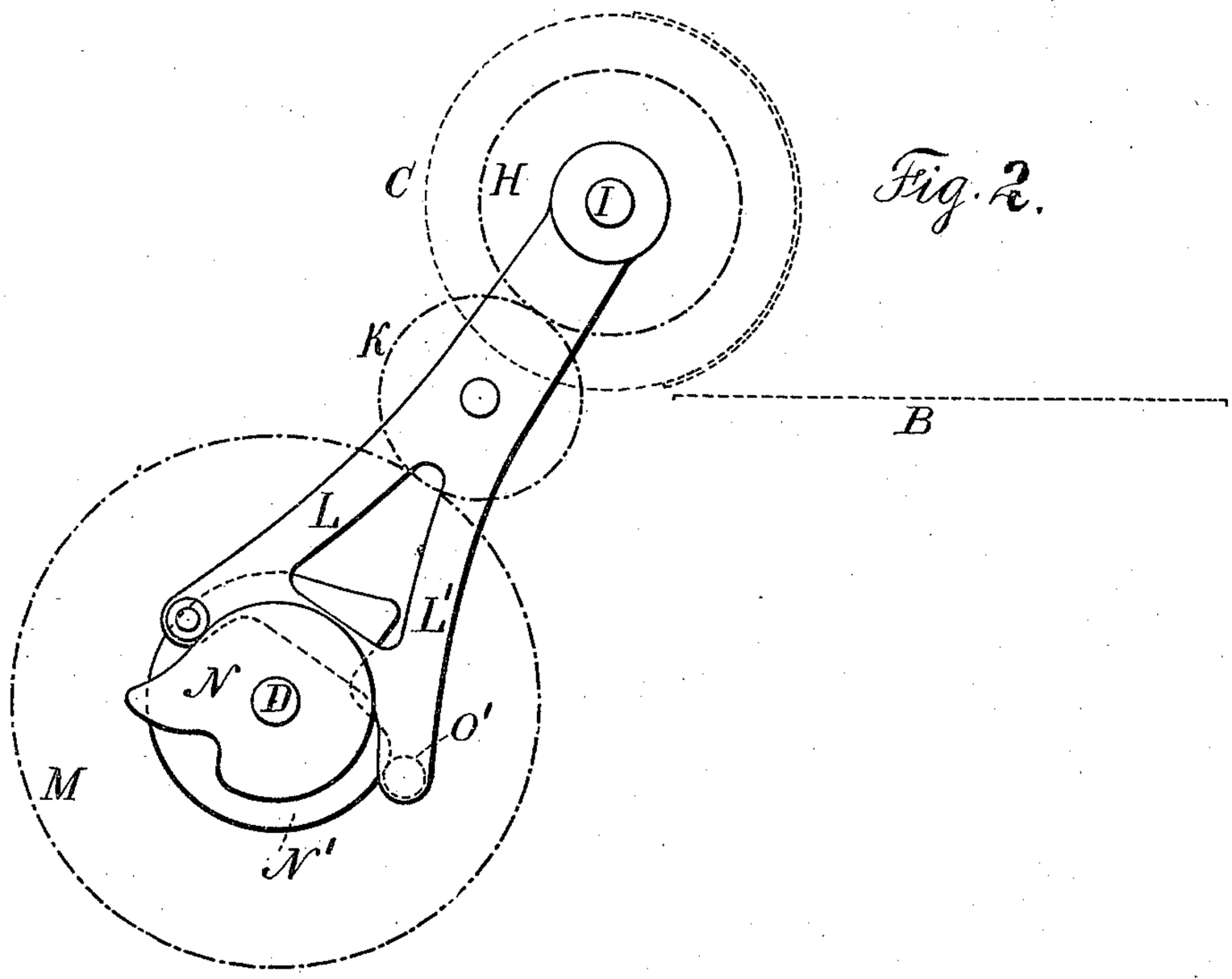


Fig. 2.

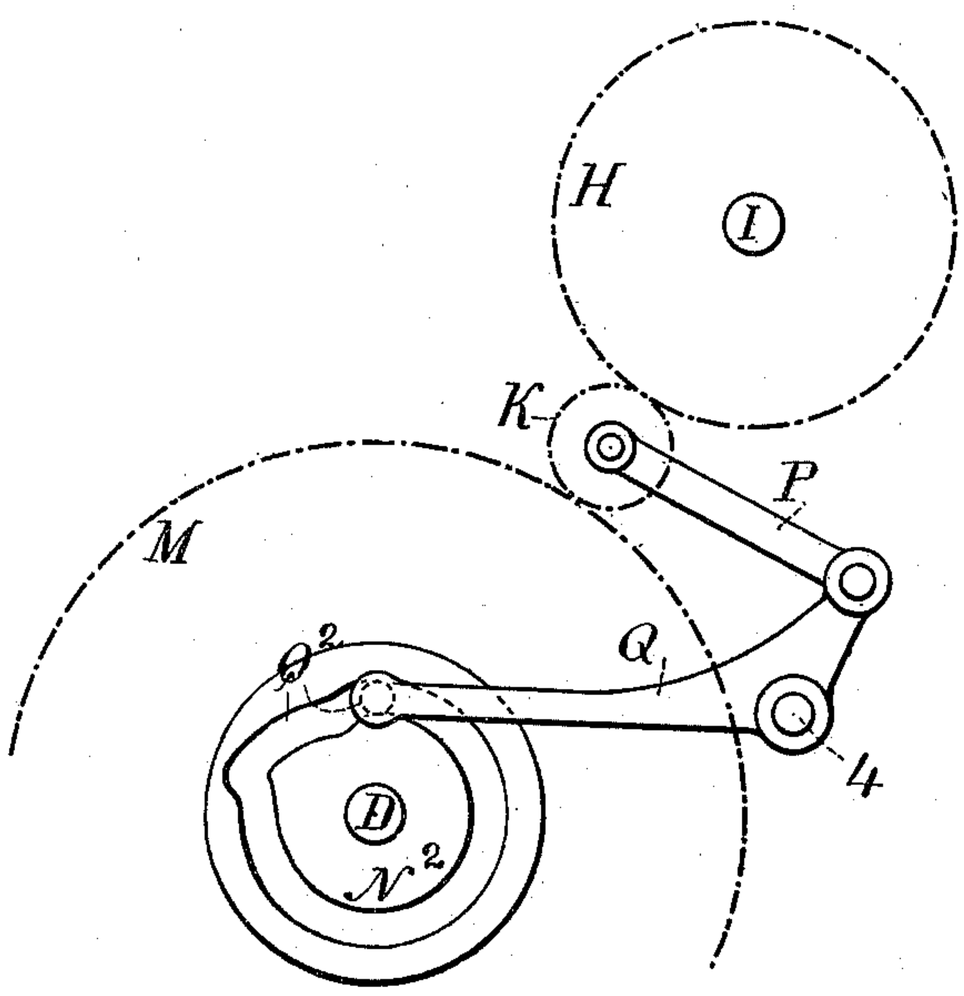


Fig. 3.

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# UNITED STATES PATENT OFFICE.

GEORGE A. MAIN, OF PLAINFIELD, NEW JERSEY.

## PRINTING-PRESS.

SPECIFICATION forming part of Letters Patent No. 656,901, dated August 28, 1900.

Application filed June 12, 1899. Serial No. 720,149. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE A. MAIN, a citizen of the United States, residing at Plainfield, in the county of Union and State of New Jersey, have invented an Improvement in Printing-Presses, of which the following is a specification.

In printing-presses having a reciprocating bed and an impression-cylinder the bed is sometimes given a uniform velocity except toward the ends of the movement, and hence the impression-cylinder can receive a surface speed corresponding to the speed of the bed during the time that the impression is being taken; but where the bed receives a motion from a crank the movement is most rapid in the central portion of the stroke and decreases in velocity toward the ends of the stroke. In printing-presses of the general character last referred to difficulty has arisen in giving to the impression-cylinder a surface speed corresponding to the surface speed of the bed during the time that the impression is being taken. In the present invention the impression-cylinder is driven by gear-wheels from the power and a motion is communicated to an intermediate wheel to move the same laterally in one direction or the other for increasing or lessening the speed of revolution that would otherwise be transmitted from the motor-wheel to the impression-cylinder, and in "two-revolution" presses, where the cylinder is raised after the impression and continues its revolution and then is brought down upon the printing-surface after the bed has been returned to the point of beginning, I make use of a gear-wheel which is not cut with all the teeth equidistant from the axis of rotation, but the teeth are progressively more distant from the axis of rotation to follow up and remain properly in gear with the wheel upon the axis of the impression-cylinder as such cylinder is raised to allow the type-bed and type to return beneath the impression-cylinder without contact therewith. By this means I am enabled to make use of comparatively-small teeth that are closely in gear all the time and avoid the use of gears that are provided with long teeth that separate more or less, and thereby become loose.

In the drawings, Figure 1 is a side elevation representing the improved printing-press diagrammatically, having reference to illustrating my improved gearing and the devices therewith connected. Fig. 2 is a diagram illustrating the improvement with cams that act in two directions, and Fig. 3 is a diagram representing a bent lever intervening between the cam and the lateral moving gear.

The frame of the machine is illustrated at A and the reciprocating bed at B, and the impression-cylinder C is upon a shaft that is mounted in sliding boxes in the upwardly-extended portion of the frame, and D represents the crank or other shaft, and from this any suitable connection is made to the reciprocating bed—such, for instance, as a crank E, with a crank-pin and roller in the vertical slot of the connecting-rod F—and the gear-wheel G runs upon a stationary rack at the bottom and engages a rack upon the under side of the reciprocating bed, as usual.

Upon the projecting end of the shaft I of the impression-cylinder is a gear-wheel H, which engages an intermediate K, and the gudgeon for this intermediate is upon an arm L, that has the shaft I for its center of motion. Hence the gear-wheel H and the intermediate K are always properly in engagement, and in order to give a motion to the impression-cylinder so that its surface speed will correspond to the surface speed of the type or printing surface the arm L is moved in either one direction or the other and carries along with it the intermediate K. If a motion is given to the arm and the intermediate in the direction of the rotation of the impression-cylinder, the surface speed resulting from the action of the gear-wheel is augmented. If, on the other hand, the arm L is moved in the opposite direction to the rotation of the gear-wheel H, the surface speed of the impression-cylinder is lessened. The intermediate gear K is in engagement with the driving-wheel M upon the crank or other shaft D, and there is a cam, preferably a grooved cam N, acting upon a roller O at the end of the arm L, and the shape of this cam N is such that it gives to the arm L and the intermediate K the proper motion at the proper times. I have proportioned the impression-cylinder and the gear-wheels in such a way that the surface speed of the impression-cylinder will

correspond to the surface speed of the type a little before the impression is commenced, and the shape of the cam N will be such as to augment the speed of the impression-cylinder from the time of contact of such cylinder and the paper with the advancing edge of the type until the maximum speed is obtained near the middle of the impression, and then the speed of the surface of the impression-cylinder will be lessened as the speed of the reciprocating type-bed lessens in finishing the impression. It will now be understood that the intermediate gear K, being carried bodily in one direction or the other direction, tends to increase the speed of movement of the impression-cylinder when the gear K is carried bodily in one direction and lessens the speed of movement when it is carried in the other direction and that by bearing these points in mind it is easy to lay out the cam N so that the impression-cylinder will have exactly the proper movement, so that its surface corresponds to the speed of the surface of the type while the impression is being taken.

The impression-cylinder C is in its lowest position only during the time that the impression is being taken by the paper upon the types, and during the rest of the movement the impression-cylinder is in its elevated position, so that the reciprocating bed can perform its motions without the type or any of the devices that are carried by the reciprocating bed coming into contact with the blanket or tympan around the impression-cylinder, and in order to be able to make use of small and accurately-cut teeth the teeth around the gear-wheel M are not all at the same distance from the axis of the shaft D—that is to say, the teeth between the points 3 and 4 are nearest and at the same distance from the axis of rotation and are adapted to engage the teeth of the wheel K and turn the impression-cylinder when the impression is being taken. The teeth on the wheel M between the points 5 and 6 are more distant from the axis of rotation and correspond to the position of the impression-cylinder when it is raised, and the teeth between 3 and 5 on one side and 4 and 6 on the other are at a gradation, so as to correspond with the teeth upon the wheel K as such wheel K is raised or lowered along with the impression-cylinder.

It will be apparent that the size of the intermediate wheel K is entirely immaterial, because the motion is given tooth by tooth to the gear-wheel of the impression-cylinder, and there should of course be twice as many teeth on the gear-wheel M as there are upon the gear-wheel H.

When it is desired to employ two external cams instead of a grooved cam, there should be a second arm L′ projecting from the arm L and having a roller O′ at the opposite side of the cam N′, as illustrated in Fig. 2, so that one cam moves the arm L in one direction and the other cam moves it in the other direction.

In some instances it might be more convenient to place the intermediate wheel K upon a link P, Fig. 3, from a bent lever or arm Q, pivoted at 4, and one arm of the lever Q extends out over the shaft D and is acted upon by a cam, so that through the movement of the bent lever and the link the intermediate wheel K receives a lateral motion at the proper time to either augment or lessen the speed of revolution of the impression-cylinder.

In some instances the grooved cam acts upon a roller $O^2$, held by a slide R, and which slide gives motion to the arm L, it being understood that the details of construction of the devices for moving the intermediate wheel laterally, so as to augment or retard the initial movement from the gearing, may be of any desired character without departing from the substance of this invention.

I claim as my invention—

1. The combination with the impression-cylinder, reciprocating bed and gearing for driving the bed and for revolving the impression-cylinder, of a gear-wheel between the gear on the shaft of the impression-cylinder and the gear on the crank or other shaft and a lever and stud for carrying the intermediate gear, such lever having the shaft of the impression-cylinder as its pivot, and a cam for giving motion to such lever, substantially as set forth.

2. The combination with the impression-cylinder, reciprocating bed and gearing for driving the bed and for revolving the impression-cylinder, of a gear-wheel between the gear on the shaft of the impression-cylinder and the gear on the crank or other shaft, and mechanism for carrying the intermediate gear and a cam on the crank or other shaft for giving motion to such mechanism, and carrying the intermediate gear bodily in one direction or the other direction to augment or retard the speed communicated through the gearing to the impression-cylinder and thereby render the surface speed of the impression-cylinder the same as the speed of movement of the type and bed, substantially as set forth.

3. The combination with the impression-cylinder, reciprocating bed, means for revolving the impression-cylinder and for actuating the reciprocating bed, of a gear upon the shaft of the impression-cylinder, an adjacent intermediate gear meshing therewith and a pivoted lever carrying said intermediate gear, a driving gear-wheel on the power-shaft for driving the impression-cylinder and meshing with the intermediate gear, the teeth of said driving gear-wheel that give motion to the impression-cylinder while the impression is being taken, being nearer to the axis of rotation than the other teeth so that the gears may be in operative contact both when the impression-cylinder is raised and when lowered, substantially as set forth.

4. The combination with the impression-

cylinder reciprocating bed and gearing for driving the bed and for revolving the impression-cylinder, of a gear-wheel between the gear on the shaft of the impression-cylinder and the gear on the crank or other shaft and a lever and stud for carrying the intermediate gear, such lever having the shaft of the impression-cylinder as its pivot, and a grooved cam and a roller fitting the same and supported on the lever so as to carry the intermediate gear in one direction or the other and augment or retard the revolving motion of such impression-cylinder and cause the surface speed thereof to correspond to the surface speed of the bed and type, substantially as set forth.

5. The combination with the type-bed and mechanism for reciprocating the same and an impression-cylinder, of a gear-wheel upon the shaft of the impression-cylinder and a driving gear-wheel and an intermediate gear for giving motion to the impression-cylinder, a lever carrying the intermediate gear and a cam acting upon the lever for giving to the gear on the shaft of the impression-cylinder the proper movement corresponding to the speed of movement of the printing-surface, substantially as set forth.

Signed by me this 6th day of June, 1899.

GEORGE A. MAIN.

Witnesses:
CLAIRE C. SISCO,
HARRY A. ROGERS.