(No Model.) 2 Sheets—Sheet 1.

B. HUBER.

PRINTING PRESS.

No. 571,089. Patented Nov. 10, 1896.

Fig. 1.

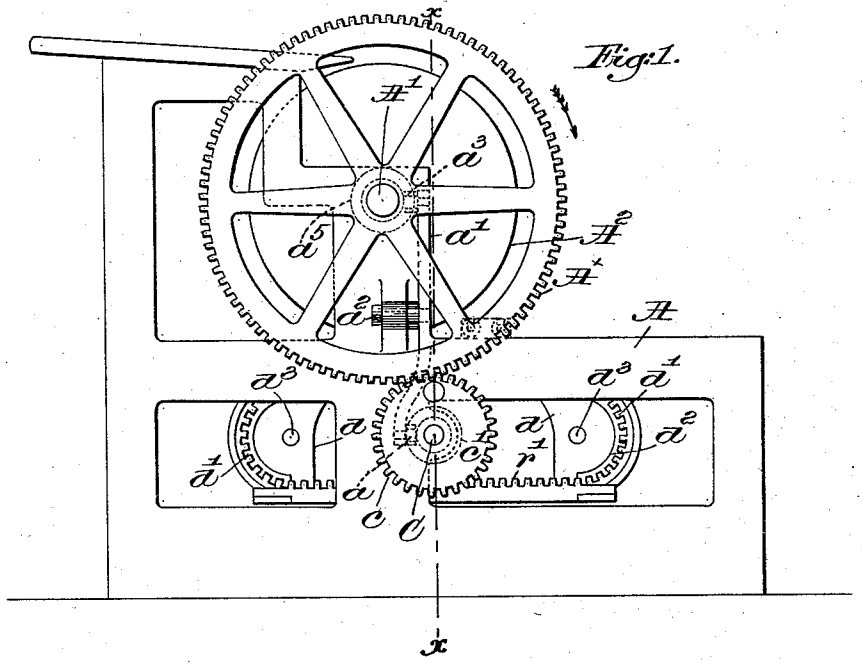
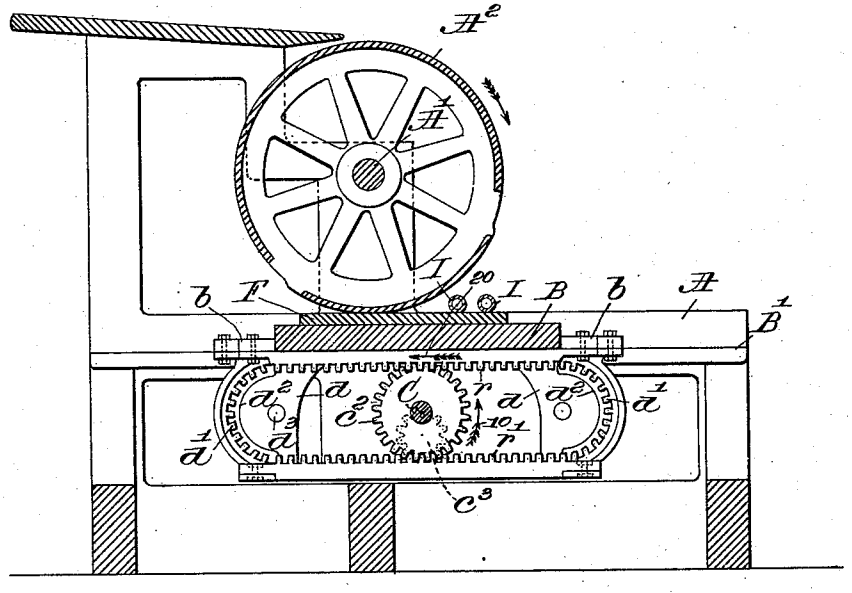


Fig. 3.



Witnesses.

Fred L. Grundorf.

Thomas J. Drummond.

Inventor

Berthold Huber.

by Crosby & Gregory

attys.

(No Model.)

2 Sheets—Sheet 2.

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Fig: 2.

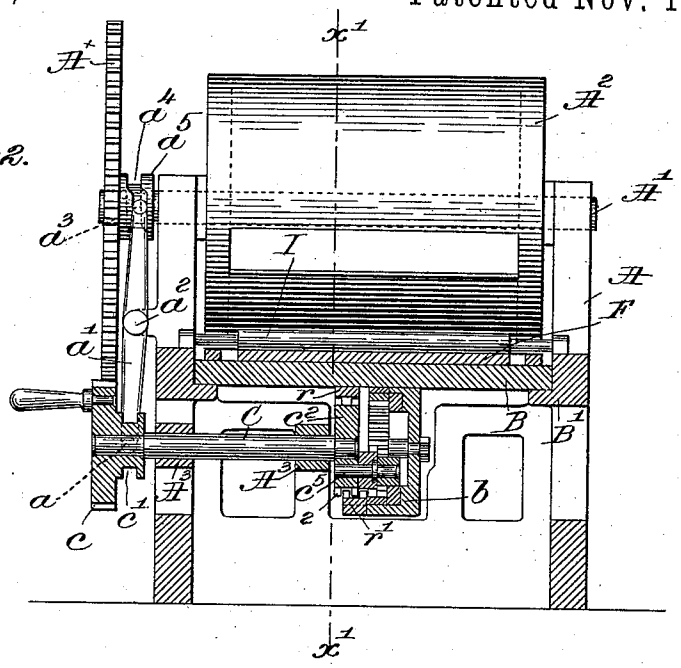


Fig: 4.

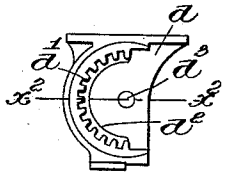


Fig: 8.

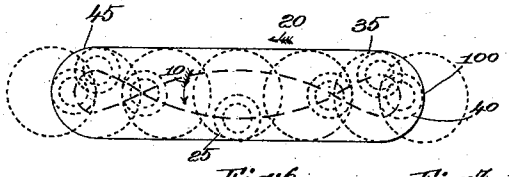


Fig: 5.

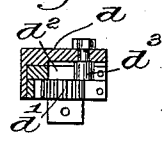
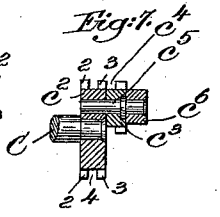


Fig: 6.

Fig: 7.



Witnesses.

Fred. S. Gunnell.

Thomas J. Drummond.

Inventor.

Berthold Huber.

by Crosby & Gregory.

Attys.

UNITED STATES PATENT OFFICE.

BERTHOLD HUBER, OF TAUNTON, MASSACHUSETTS, ASSIGNOR TO THE HUBER PRINTING PRESS COMPANY, OF SAME PLACE.

PRINTING-PRESS.

SPECIFICATION forming part of Letters Patent No. 571,089, dated November 10, 1896.

Application filed April 28, 1896. Serial No. 589,417. (No model.)

To all whom it may concern:

Be it known that I, BERTHOLD HUBER, of Taunton, county of Bristol, State of Massachusetts, have invented an Improvement in Printing-Presses, of which the following description, in connection with the accompanying drawings, is a specification, like letters and numerals on the drawings representing like parts.

This invention relates to printing-presses, and more especially to that class wherein the "form" is mounted upon a bed reciprocated in a path tangent to the impression-cylinder, the latter being continuously rotated in one direction. In such presses it is of the highest importance to impart to the bed a uniform speed in each direction for the greater portion of the stroke, with a gradual diminution and subsequent acceleration of speed at each reversal of its direction of movement, so that when run at high speed there will be no undue or sudden jarring of parts.

My present invention has for its object the production of an apparatus having such movement and operation, and in carrying out such object I mount an actuating-pinion in fixed bearings, a relative lateral movement of the pinion and two racks being effected at the end of each stroke in order to bring the teeth of the pinion in mesh with one or the other of the racks, herein shown as rigidly secured to the bed-frame.

The racks and the pinion are of peculiar construction, in order to reduce the relative lateral movement to the smallest possible proportions without, however, diminishing the strength and durability of the apparatus. During the gradual diminution and acceleration of speed of the bed-frame at the end of each stroke it is under the positive and complete control of the actuating mechanism, internally-toothed segments at the ends of the racks at such time being engaged by a small gear or toothed wrist-pin fast on the actuating-pinion, said gear as it travels over the segment gradually slowing up the speed of the bed-frame, then changing its direction, and finally increasing its speed until the uniform speed of the stroke is attained.

I have herein shown the rack-pinion shaft as geared to and thereby directly driven by the impression-cylinder, whereby the lost motion between the bed and the cylinder is reduced to the least possible amount, and in consequence I am enabled to dispense with the usual register-racks and segments. During the printing-stroke the upper rack is in engagement with the rack-pinion, which is also a very decided advantage in regard to smooth running and reduction of lost motion.

The construction of the apparatus is strong, durable, and highly efficient, and various novel features of my invention will hereinafter be described in the specification and particularly pointed out in the claims.

Figure 1, in side elevation, represents a sufficient portion of a bed and cylinder printing-press to be understood, with my invention embodied therein. Fig. 2 is a transverse section thereof taken on the line x x, Fig. 1. Fig. 3 is a longitudinal sectional view of the apparatus, taken on the line x' x', Fig. 2, and looking toward the right. Fig. 4 is an elevation of one of the segment-gears and shoes at each end of the racks. Fig. 5 is a horizontal section thereof on the line x^2 x^2, Fig. 4. Fig. 6 is an inner side view of the actuating or rack pinion and the parts carried thereby. Fig. 7 is a vertical sectional view thereof on the line x^3 x^3, Fig. 6, and Fig. 8 is a diagrammatic view showing the relative positions of the bed and the rack-pinion and the wrist-pin gear carried thereby as the bed is moved past said pinion.

The frame A, of suitable shape to support the operating-parts, has bearings for the shaft A′ of the impression-cylinder A^2 of usual construction, the reciprocating type-bed B traveling on guides or supports B′ on the frame.

Bearings A^3, below the bed B, (see Fig. 2,) support a shaft C, herein shown as longitudinally movable, said shaft having secured thereto at its outer end a gear c, in mesh with a large gear $A^\times$, fast on the cylinder-shaft A′, the latter being rotated in any well-known or desired manner. The gear c has an annularly-grooved hub c', engaged by a roller or other stud a on one arm of a lever a', fulcrumed at a^2 on the frame and having on its other arm a second stud or roll a^3 to enter the cam-groove a^4 of a hub a^5, (see Fig. 2,) fast on the shaft A′, as herein shown. As the latter rotates the shaft C will be rotated by the

gears $A^{\times}$ c, and it will be moved longitudinally in its bearings at predetermined times by the cam-groove a^4 and the intermediate connections described, the face of the gear c being broad enough to remain in mesh with the gear $A^{\times}$.

Suitable inking-rollers I, forming no part of this invention, supply ink to the type-form F on the bed B. A rack-frame b, securely and rigidly bolted to and depending from the bed B and of substantially ⊏ shape in cross-section, has secured to or forming a part of the inner sides of its horizontal arms racks r r', shown in Fig. 2 as of equal width, but in different vertical planes, the center of one rack being in the plane of the face of the other.

Each rack is grooved or cut out longitudinally along its toothed face to present two parallel series of teeth of equal breadth, the space between the two series being preferably slightly wider than the breadth of a tooth. A rack-pinion c^2, Figs. 2 and 3, fast on the inner end of the shaft C, also has two parallel series of teeth 2 3, Fig. 7, with an intervening annular space 4, the relative location of the racks and pinion being such that when in one position the two series of teeth of the pinion are in mesh with both series of teeth of one of the racks, as r, Fig. 2, while the pinion-teeth will be offset from the series of teeth of the other rack, as r', and vice versa. A relative lateral movement of the rack-pinion and racks for a distance substantially equal to the breadth of a tooth will cause the pinion to engage with the rack r' and will disengage it from the rack r, such relative movement being effected herein by laterally moving the rack-pinion c^2 and its shaft C, as described.

It will be evident that the alternate engagement of the racks by the rack-pinion will impart to the bed a uniform reciprocating motion, due to the continuous rotation of the pinion, the velocity of the bed being uniform with the surface velocity of the impression-cylinder. The gradual reversal of motion of the bed at the end of each stroke is herein effected by a toothed wrist-pin or gear c^3, fast on the inner face of the rack-pinion c^2, said gear c^3, as shown best in Figs. 6 and 7, having a diameter equal to one-half the diameter of the pinion and located between the center and circumference of the pinion.

As shown in Figs. 2 and 7, the teeth of the wrist-pin gear c^3 are cut off on the side next the pinion to leave an annular space c^4, to be entered by the inner series of teeth of the rack r' when the pinion is disengaged therefrom, as shown in Fig. 2. I have herein shown the gear c^3 secured to the rack-pinion c^2 by a bolt or stud c^5, upon which is secured a collar or roll c^6 at the face of the said gear, as clearly shown in Fig. 7. At each end of the rack-frame b I have secured like castings d, having each an internally-toothed semicircular gear d' in the path of and to be engaged by the toothed wrist-pin gear c^3, while between the semicircular gear d' and the back of the casting d is held a curved bearing-surface d^2, upon which the collar or roll c^6 travels at the end of the stroke. Said gear d' and the bearing d^2 are concentric, the latter having the lesser radius, however, and a stud d^3 is secured in the casting d, the head of said stud being located at the centers of the said gear and bearing, to leave an annular path equal in width to the diameter of the roll c^6. The rack-frame is herein shown at mid-stroke and moving in the direction of the arrow 20, the rack-pinion c^2 meshing with the upper rack r, the relative position of the rack-frame and pinion being shown in the diagram view, Fig. 8, wherein the gear c^3 is indicated in central position at 25. When the pinion c^2 has made one-half a revolution in the direction of arrow 10, the gear c^3 will assume a position relative to the rack-frame, as indicated by the dotted circle 35, the pinion at such time just leaving the rack r, and the further movement of the wrist-pin gear c^3 will be about the point 100 as a center, relatively to the position of the rack-frame. While the said gear c^3 moves from the position 35 through one-quarter of the revolution of the pinion c^2, it will engage the internal gear d' at the right-hand end of the rack-frame, Figs. 1 and 3, and will continue the movement of the latter, but at a decreasing speed, until the gear c^3 occupies the relative position 40, Fig. 8. From the position 40 until the said gear leaves the internal gears d' the rack-frame will be moved at a gradually increasing speed and in the direction opposite to arrow 20, until the rack-pinion c^2, shifted into position laterally, engages the rack r', completing the stroke at a uniform speed. While the gear c^3 is in engagement with one of the internal gears d', the collar or roll c^6 moves in a curved path between the bearing d^2 and the stud d^3, preventing any irregularity or lost motion in the movement of the rack-frame. The coöperation of the wrist-pin gear c^3 with the internal gear d' at the other end of the rack-frame will be the same, with the exception, however, that the lower part of the gear d' will first be engaged and then the upper portion emerging when the relative position 45 is reached.

On Fig. 8 I have indicated the curve that would be traced by the center of the toothed wrist-pin or gear c^3 upon the rack-frame in the movement of one past the other. Supposing that the gear c^3 is in the relative position 35, Fig. 8, the rack-pinion c^2 will make two complete revolutions by the time the gear c^3 reaches the relative position 45 and three complete revolutions when it has returned to the relative position 35.

The parts are few in number and obviate entirely the use of cam-grooves or similar devices at the ends of the racks, and by providing a toothed wrist-pin on the rack-pinion to coöperate with the internal gears at the ends of the racks the rack-frame is at all times under the positive control of its actuator.

At the proper time the relative lateral movement of the pinion and racks is effected by the cam a^4, as herein shown, to bring the proper rack into position to be engaged by the pinion when the reversal of movement of the bed-carrier is being effected.

My invention enables me to centrally locate the driving mechanism relative to the longitudinal center of the bed and to take the necessary movements therefrom for the other working parts of the press, and also to drive the rack-pinion shaft directly from the cylinder-gear, thus reducing lost motion to the least possible amount and obviating the use of register-racks and segments.

My invention is not restricted to the precise construction and arrangement herein shown, for the same may be modified in various parts or rearranged without departing from the spirit and scope of my invention.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an apparatus of the class described, a reciprocating frame, racks movable therewith and each having two series of teeth, a rack-pinion having two series of teeth, means to effect a relative movement of said racks and pinion in the direction of the axis of the latter, to thereby cause engagement of the pinion and one of the racks, one of the racks having one of its series of teeth opposite the space between the series of teeth of the other rack, substantially as described.

2. In an apparatus of the class described, a reciprocating frame, racks movable therewith and each having two series of teeth, a rack-pinion having two series of teeth, means to effect a relative movement of said racks and pinion in the direction of the axis of the latter, to thereby cause engagement of the pinion and one of the racks, one of the racks having one of its series of teeth opposite the space between the series of teeth of the other rack, and means for completing, stopping, and reversing the motion of the frame, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

BERTHOLD HUBER.

Witnesses:
W. K. HODGMAN,
F. M. ATWOOD.