(No Model.)

R. LARTER.

MECHANICAL MOVEMENT.

No. 279,571. Patented June 19, 1883.

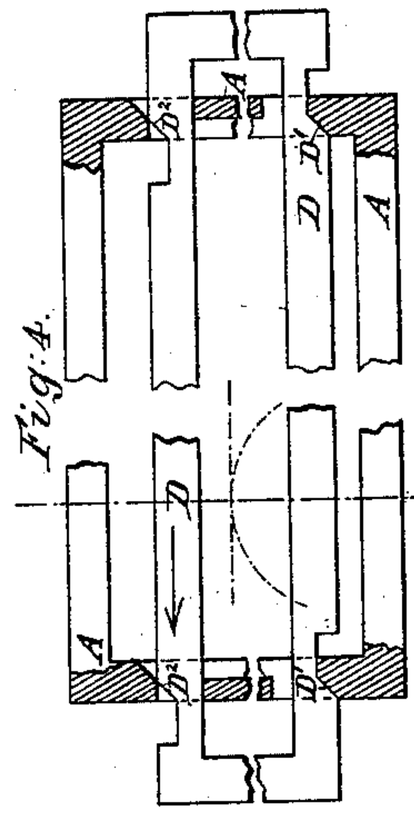
Fig. 4.

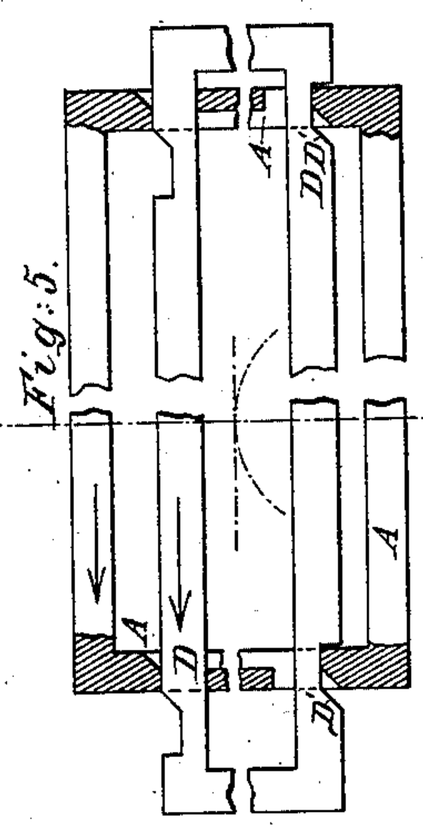
Fig. 5.

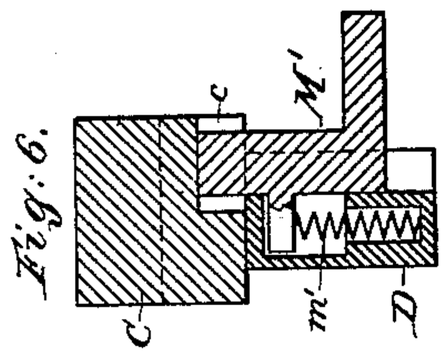
Fig. 6.

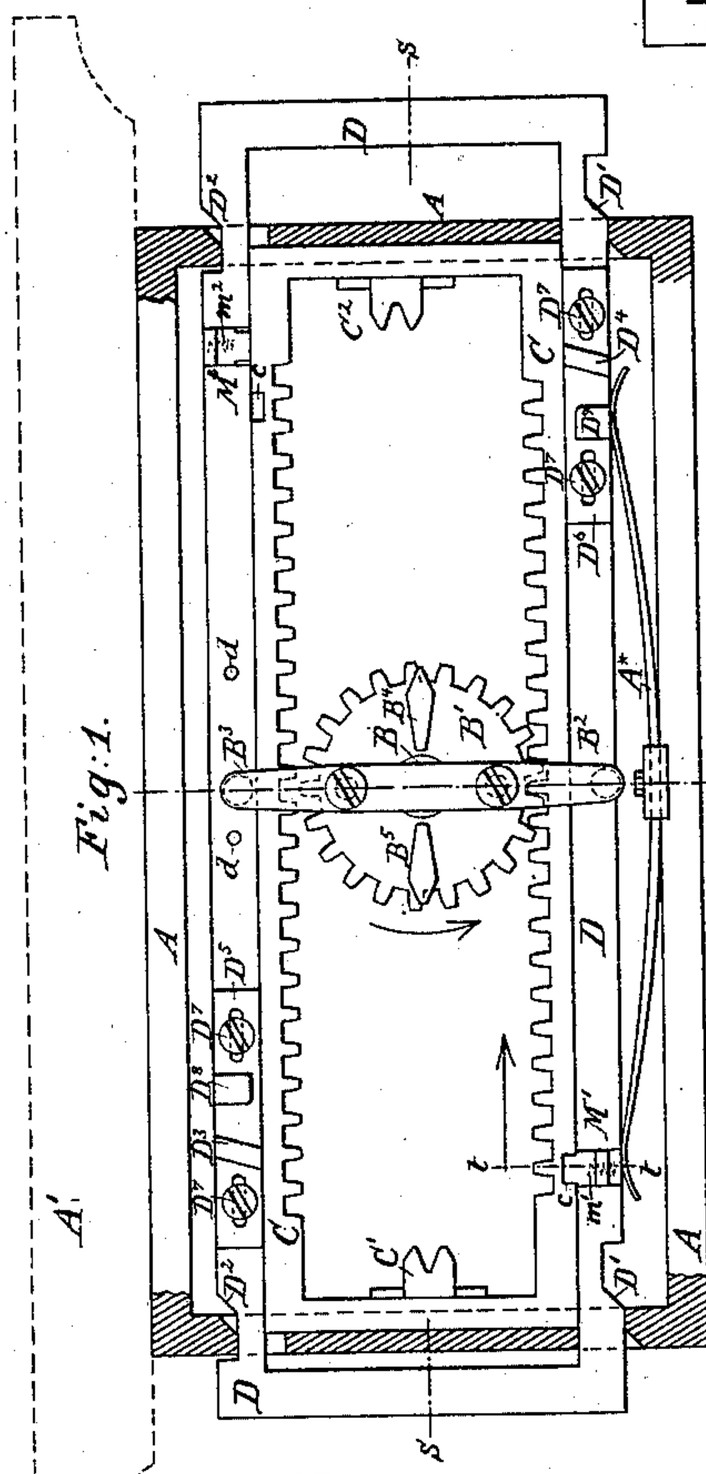
Fig. 1.

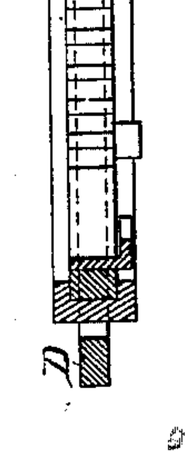
Fig. 3.

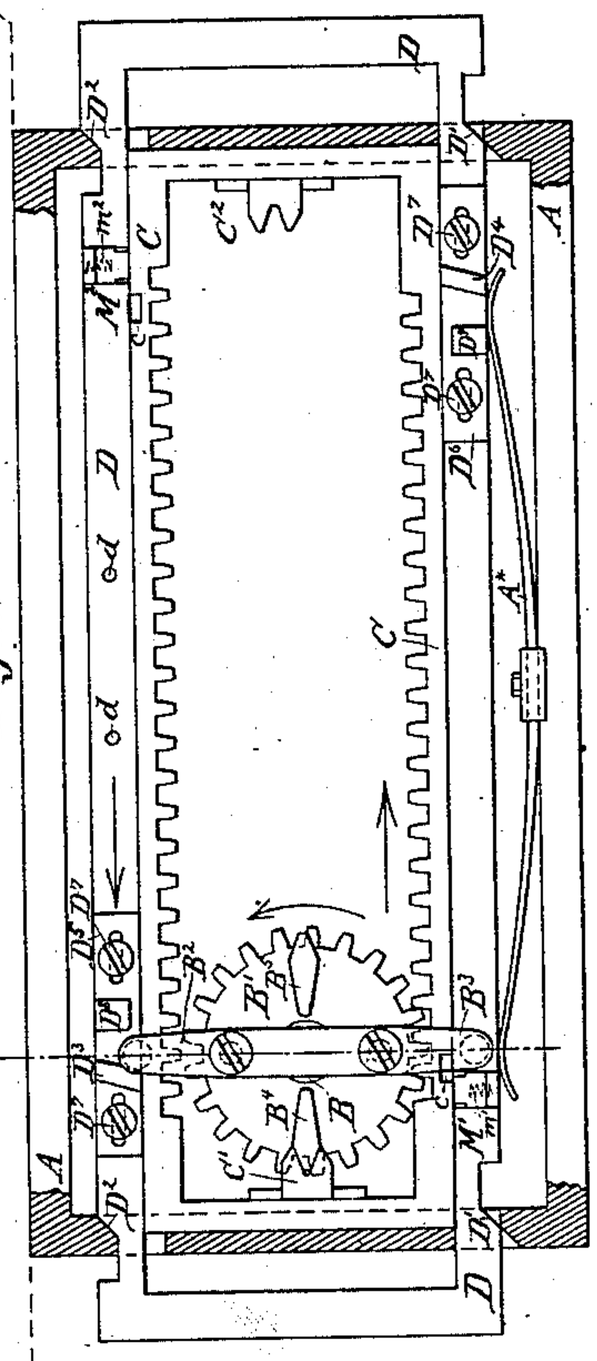
Fig. 2.

Witnesses:
A. D. Gentner
Charles R. Searle,

Inventor:
Robert Larter
by his attorney
Thomas D. Stetson

UNITED STATES PATENT OFFICE.

ROBERT LARTER, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO HIMSELF AND JOTHAM E. HEDDEN, OF SAME PLACE.

MECHANICAL MOVEMENT.

SPECIFICATION forming part of Letters Patent No. 279,571, dated June 19, 1883.

Application filed November 3, 1882. (No model.)

To all whom it may concern:

Be it known that I, ROBERT LARTER, of East Orange, in the county of Essex, in the State of New Jersey, have invented certain new and useful Improvements in Mechanical Motions, of which the following is a specification.

The object of the invention is to provide an efficient and reliable mechanism for inducing from a rotary motion a promptly-changing uniform reciprocating motion. It may be used in various machinery, eminently in moving the reciprocating bed of printing-presses. I will describe it as so applied. This requires a steady movement in both directions, with the strength, durability, and little friction due to stout gearing. I provide a pinion having a set of strong and properly-shaped teeth fixed on a shaft rotated uniformly by a belt and fly-wheel or other ordinary or suitable means. I provide two parallel racks mounted in a frame capable of rising and sinking, so as to engage first one rack and then the other with the pinion; and I provide means for automatically changing the position of the rack-frame upward and downward at each change of motion. I provide for locking this frame in its respective positions and holding it locked until the period arrives for again changing. The unlocking is then effected automatically, the parts being held unlocked only sufficiently long to allow the change of motion, and then becoming locked again. I effect the raising and lowering of the rack-frame by imparting longitudinal motion to another frame which embraces it, and which I will term the "longitudinal" frame. This latter frame is provided with inclined or wedge-formed surfaces, which effect the required raising and lowering. The longitudinal frame is itself raised and lowered, together with its inclosed rack-frame. The rack-frame is mounted in a third frame, which I will term the "main" frame. This latter is strongly attached at its upper edge to the reciprocating bed which it is required to operate, and which latter is guided in any ordinary or suitable manner. The main frame is capable of no motion but a longitudinal reciprocating one. The weights of the rack-frame and longitudinally-sliding frame are balanced by a spring. Two opposite arms turned by the revolving shaft, effect the required operations of unlocking and moving longitudinally the longitudinal frame at each end of the motion. The locking motion is self-acting. I insure the prompt change of conditions at each end of the reciprocating motion of the main frame by additional pieces carried on the revolving parts and engaging in notches presented on the interior of the rack-frame at the ends.

The following is a description of what I consider the best means of carrying out the invention.

The accompanying drawings form a part of this specification.

Figure 1 is a face view, partly in section, showing the reciprocating parts in motion in the direction of the arrow. Fig. 2 is a corresponding view, showing the reciprocating parts in the act of changing their motion by the action of one of the revolving arms on the longitudinal frame, the other longitudinal arm having effected the unlocking. Fig. 3 is a horizontal section on the line *s s*, Fig. 1. Fig. 4 is a side view, partly in section, showing the corners of the main frame, and of the longitudinal frame after the action is completed, which is shown just beginning in Fig. 2, the rack-frame not being represented. Fig. 5 is a view corresponding to Fig. 4, showing the parts after the longitudinal frame has been moved to a very short distance farther with relation to the main frame, both these frames being then again locked. Thus conditioned, the reciprocating parts are moving to the left. Fig. 6 is a section on the line *t t*, Fig. 1, on a larger scale, showing a detail.

Similar letters of reference indicate like parts in all the figures.

A is the main frame, strongly united to the reciprocating bed of the press, which latter is indicated in outline, and marked A′.

B is a continuously-revolving shaft, mounted in fixed bearings and driving a pinion, B′, having strong well-cut teeth. On the face of the wheel B′ is bolted or otherwise rigidly fixed a cross-bar, the two ends of which constitute arms, which perform the important functions of unlocking and moving endwise the longitudinal frame, to be presently described.

C is the rack-frame, mounted within the main

frame with liberty to rise and sink to a sufficient extent therein to engage first the teeth of its upper rack and then the teeth of its lower rack successively with the pinion B′, according as the reciprocating motion is for the time being in one direction or the other.

D is the longitudinal frame. It is of a length considerably greater than the main frame. Its horizontal members extend through slots in the main frame sufficiently deep to allow it to rise and sink. The connection of the longitudinal frame to the main frame is such as to allow liberty both to rise and sink and to move longitudinally in the main frame. The weight of the rack-frame C is supported by the longitudinal frame D. A long spring, A*, abuts against the interior of the main frame A, and lifts on the longitudinal frame D with sufficient force to balance the gravity of the latter and of its inclosed rack-frame. The under side of the longitudinal frame D is formed with two inclined or wedge surfaces, D′, both inclined in the same direction, and so spaced that when the frame D is moved to the left it has liberty to sink; but when it is moved to the right it is lifted by the action of these inclines D′ D′ on the bottom of the respective slots in the main frame A. The upper side of the upper bar of the longitudinal frame D has corresponding inclines, D^2 D^2. When the frame D is moved to the right it is at liberty to rise; but when it is moved to the left it is compelled to sink by the action of these inclines D^2 on the bearings in the upper edge of the respective slots in A. The front face of the longitudinal frame is provided with two stout spurs or projections, D^3 D^4. This face is also formed with vertical grooves of dovetail section, in which are sliding bolts M′ M^2, actuated by springs m' m^2. The rack-frame C is provided with notches *c c*, adapted to receive the respective spring-bolts M′ M^2; but by reason of the notches *c c* being nearer together than the spring-bolts M′ M^2 only one bolt can be engaged at once.

In the operation of the machine the pinion B′ turns continuously in the direction indicated by the arrow. In Fig. 1 the rack-frame C and consequently the entire main frame A and its attachments are traveling to the right. In Fig. 2 the reciprocating parts have reached their extreme right-hand position, and the conditions are on the point of being changed to induce the return movement. Referring to Fig. 2, the arm B^2, which is in that part of its circuit in which it is moving rapidly to the left, has just struck the projection D^3, and is giving to it, and consequently to the entire longitudinal frame D, a short but quick movement to the left. This, by the action of the inclines D′ D′ D^2 D^2, compels a descent of this frame and also of the inclosed rack-frame C. Such movement disengages the lower side of the rack-frame C and engages the upper side thereof with the teeth of the pinion B′. The moment this is effected the rack-frame is urged to the left, carrying with it necessarily the main frame and the entire set of reciprocating parts. This change of conditions occurs very rapidly, and the reciprocating parts, comprising the main frame A and rack-frame C, and also the longitudinal frame D, instantly commence a movement to the left with the same rapidity and uniformity as the movement had previously progressed to the right. In Fig. 1 the sliding bolt M′ is engaged in its notch *c* in the lower edge of the rack-frame C. When the change was being effected the arm B^3 touched a projection on the front of the bolt M′ and moved it downward. So soon as the contact of the upper arm, B^2, with the projection D^3 threw the longitudinal sliding frame D to the left, it presented the proper notch to the upper sliding bolt, M^2, and the latter, by the action of its spring m^2, instantly engaged it. During the entire movement of the reciprocating parts to the left the slide-bolt M^2 remains engaged. The moment the reciprocating parts have attained their extreme movement to the left the arm B^3 will strike the spur D^4, and simultaneously therewith the arm B^2 will touch the sliding bolt M^2 and push it upward. Thus conditioned, the longitudinal frame D will move rapidly to the right and upward, the slide-bolt M′ will again engage in its respective notch, and all the conditions will be again restored for the steady movement of the reciprocating parts to the right, as in Fig. 1.

It remains to describe a provision which is introduced to aid in insuring the prompt execution of the changing movement.

A bifurcated arm, C′, extends inward from one end of the rack-frame C, and a corresponding arm, C^2, extends inward from the other end. Each of these arms is fixed on the rack-frame, standing with its notched or bifurcated end in front thereof. When the parts are effecting the change of motion from the right to the left, the wheel B′ is partially under or behind the arm C′. A projection, B^4, on the front face of the wheel engages with the notch or bifurcation in the arm C′ and aids in depressing the rack-frame. When the parts have moved to the extreme left and the rack-frame C is to be raised, the pinion B′ is under or behind the arm C^2, and the projection B^5 on the face of the pinion engages therewith and aids to raise the frame.

I have shown the device as giving the longest reciprocating motion of which it is capable; but I have provided means for changing the apparatus so as to induce shorter motions. Instead of mounting the spurs D^3 D^4 directly on the frame D, I mount them on plates D^5 D^6, each of which plates is secured to the frame D by screw-bolts D^7. A series of holes, *d*, are tapped in the frame D in the positions to which it may be required to shift the plate D^5. By releasing this plate and shifting the bolts D^7 into their holes the position of the stop, spur, or projection D^3 may be greatly changed and the length of the movement of the reciprocating parts correspondingly varied. The engagement of the bolts D^7 with the plate D^5, and also of the corresponding bolts with the

lower plate, D^6, is through slots which allow some considerable endwise movement of the respective plates. This facilitates the correct adjustment of the parts so that the action of the arms B^2 B^3 shall be always properly timed.

The projections D^8 D^9 on the respective plates D^5 D^6 are of service in receiving the action of the arms B^2 B^3 in the rare occasions when it may be required to reverse the motion, as in extricating one or more tangled sheets from the printing-press.

Modifications may be made in the forms and proportions. Parts of the invention may be used without the whole. I can employ obvious additions.

As shown, the bifurcated arms C' C^2 are only of use when the full stroke of the reciprocating parts is availed of. When the plate D^5 is shifted by the inserting of its bolts D^7 into other holes *d* and the reciprocation is shortened, the arm C' will be inefficient, by reason of its failure to reach the pinion and be engaged by the projection B^4 thereon. I can provide longer arms C', to be applied under such conditions in place of the short one here shown.

I can provide, by a screw, a wedge, or other suitable device, for adjusting the abutment or bearing of the spring A* against the interior of the main frame A, and thus can vary the tension of the spring. It is not essential to success that the weight of the parts be exactly balanced by this spring, or that they be balanced at all; but I prefer to employ the spring, adjusted so that its tension shall be exactly equal to the weight of the parts. I can substitute a weight properly connected in place of the spring A*.

The inclination of the surfaces may be varied within wide limits. I can provide rollers in the frame A to receive the action of these inclines and reduce the friction.

In many applications of the mechanism it may be expedient to extend the shaft B and provide a bearing in front. I have represented the pinion B' and its connections as overhung in order to show the parts more clearly.

Instead of allowing the main frame A and its attachments to reciprocate, and supporting the shaft B in fixed bearings, I can hold the main frame A and its attachments stationary and support the shaft B in a carriage which is capable of reciprocating. In such case the shaft B and its connections will be traversed in the same time and with the same capacities for variation as heretofore described for the traverse of the main frame A.

I can impart a reciprocating motion to the frame A by any efficient means and allow my mechanism, arranged and operating as here shown, to act upon the pinion B' to induce a uniform rotary motion thereof, and consequently of the shaft B. I can thus make the mechanism serve to utilize the action of steam or other fluid on a piston, or to obtain a rotary motion for driving a valve-shaft from the regular or irregular action of a steam-pump.

In some cases I propose to arrange the inclines D' D^2 on a single bar and correspondingly locate the inclines on the frame A. Instead of the bifurcated arms C' C^2, I can use arms having a point or tooth which will engage with notches formed on the side of the wheel B'. These arms C' C^2 may in either case be connected to the plates D^5 D^6, which carry the projections D^3 D^4, so that their position will be changed simultaneously with the latter, thus avoiding the necessity of several sets of such arms, and at the same time insuring that they will always come into the proper position to engage at the desired moment with the corresponding cam-surfaces, B^4 B^5, on the wheel B'.

I claim as my invention—

1. As an improved device for interchanging rotary and reciprocating motion, the shaft B, pinion B', and arm B^2, rack-frame C, longitudinal frame D, having inclines D' D^2, and projections D^3 D^4, combined and arranged to serve substantially as herein specified.

2. The shaft B, pinion B', arms B^2 B^3, and longitudinal frame D, having the inclines D' D^2, and projections D^3 D^4, in combination with each other and with the locking-bolts M' M^2, rack-frame C, and main frame A, adapted for joint operation as herein specified.

3. The pinion B', having one or more projections, B^4 B^5, adapted to engage with the arms or tappets C' C^2 on the rack-frame C, in combination therewith and with the longitudinal frame D, with its inclines D' D^2, projections D^3 D^4, and locking means M' M^2, with their operating means B^2 B^3, and main frame A, arranged for joint operation as herein specified.

In testimony whereof I have hereunto set my hand, at New York city, this 20th day of October, 1882, in the presence of two subscribing witnesses.

ROBT. LARTER.

Witnesses:
WM. C. DEY,
H. A. JOHNSTONE.