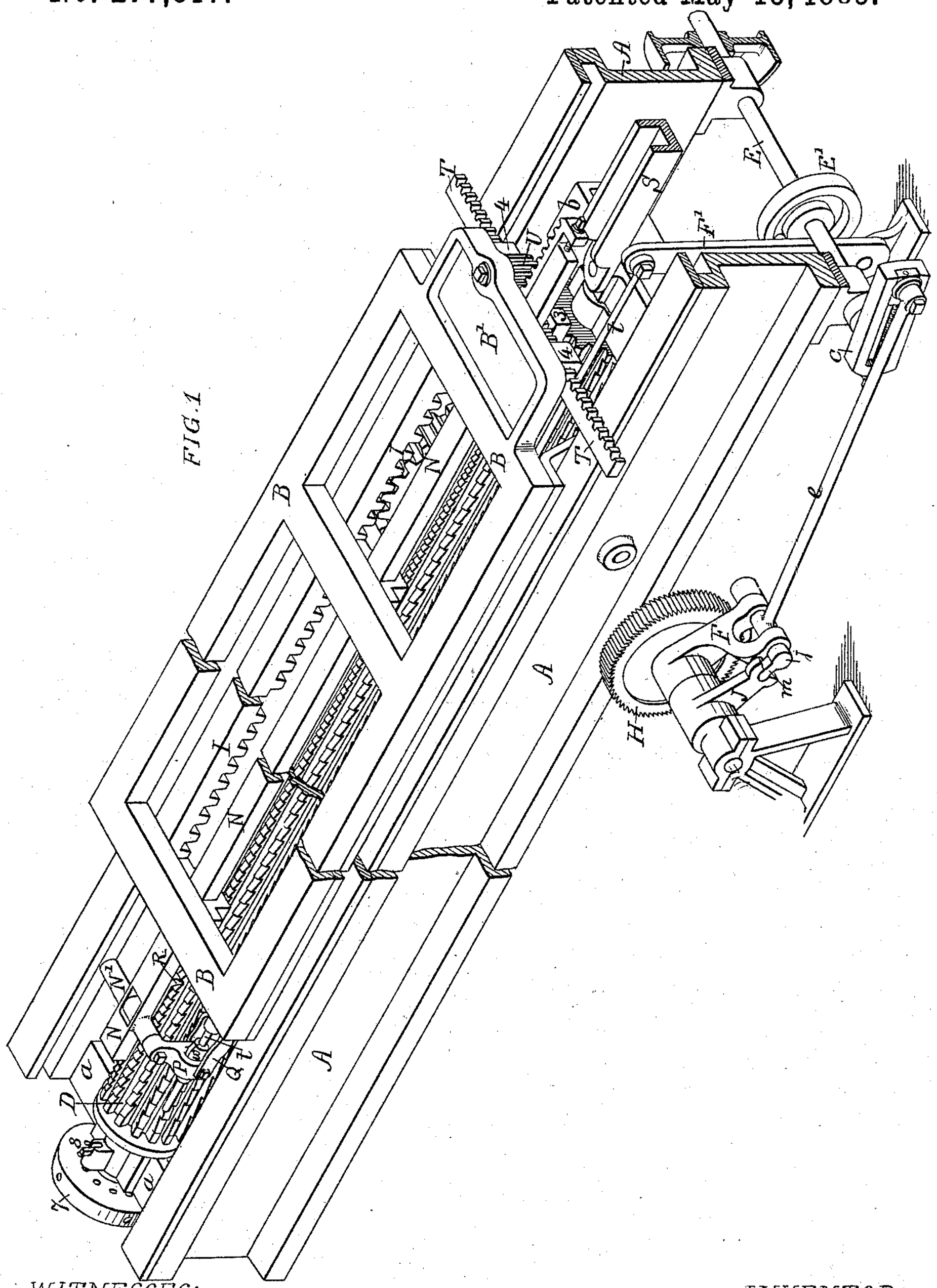
(No Model.) 3 Sheets—Sheet 1.

M. G. WILDER & C. T. PARRY.

METAL PUNCHING MACHINE.

No. 277,817. Patented May 15, 1883.

FIG. 1.



WITNESSES:

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(No Model.)

3 Sheets—Sheet 2.

M. G. WILDER & C. T. PARRY.

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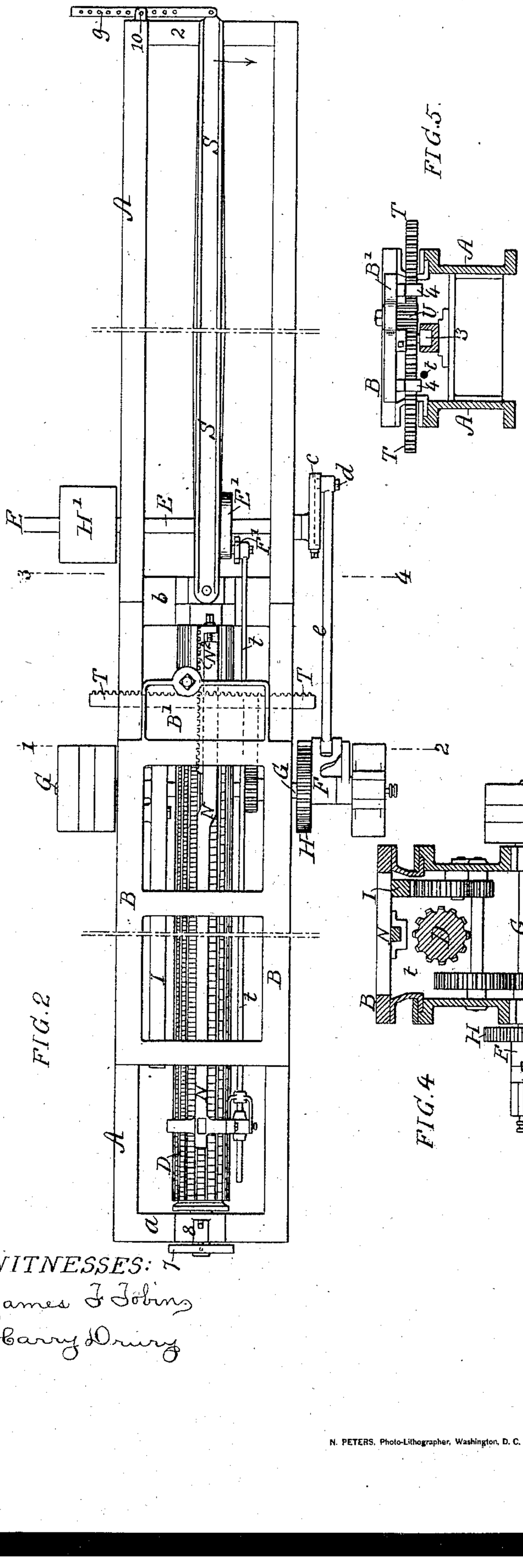

FIG. 2

FIG. 4

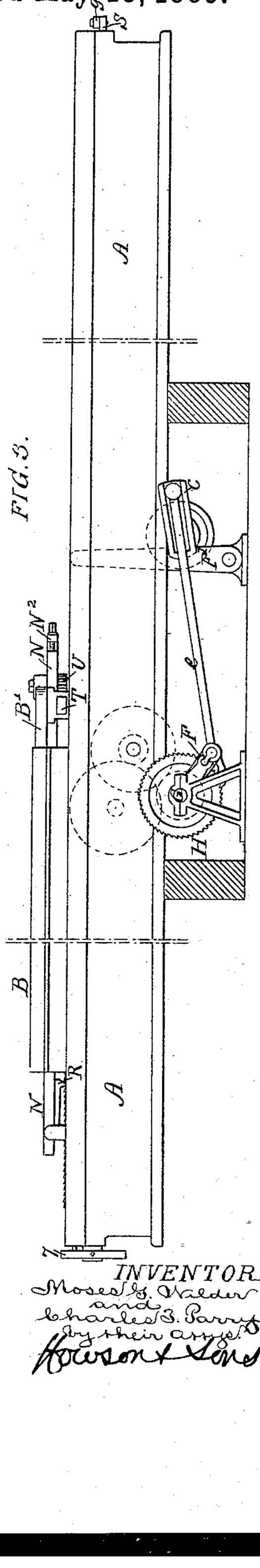

FIG. 3.

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3 Sheets—Sheet 3.

M. G. WILDER & C. T. PARRY.

METAL PUNCHING MACHINE.

No. 277,817. Patented May 15, 1883.

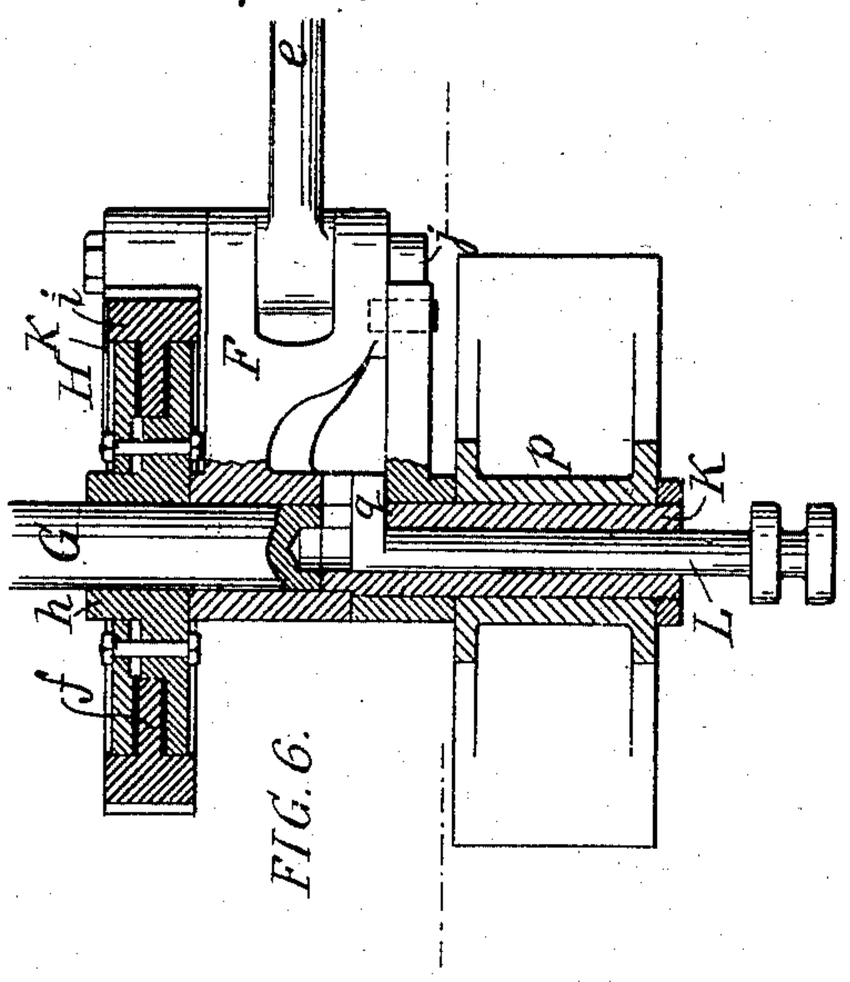

FIG. 6.

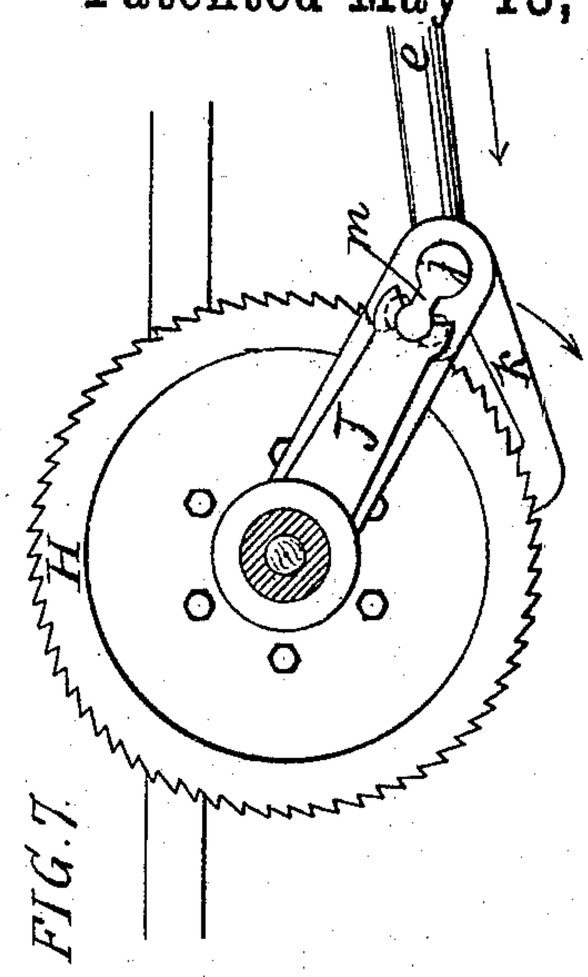

FIG. 7.

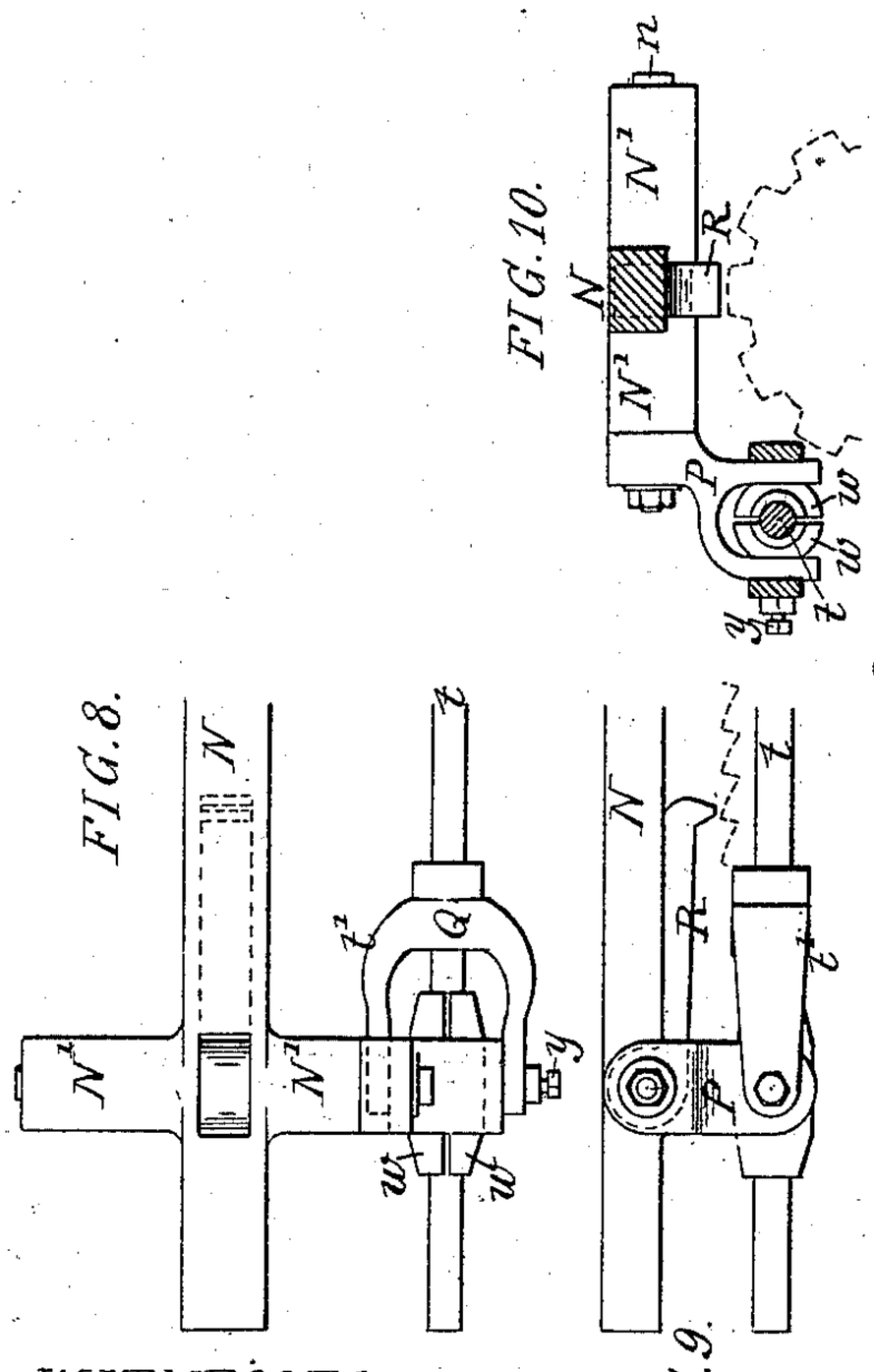

FIG. 8.

FIG. 9.

FIG. 10.

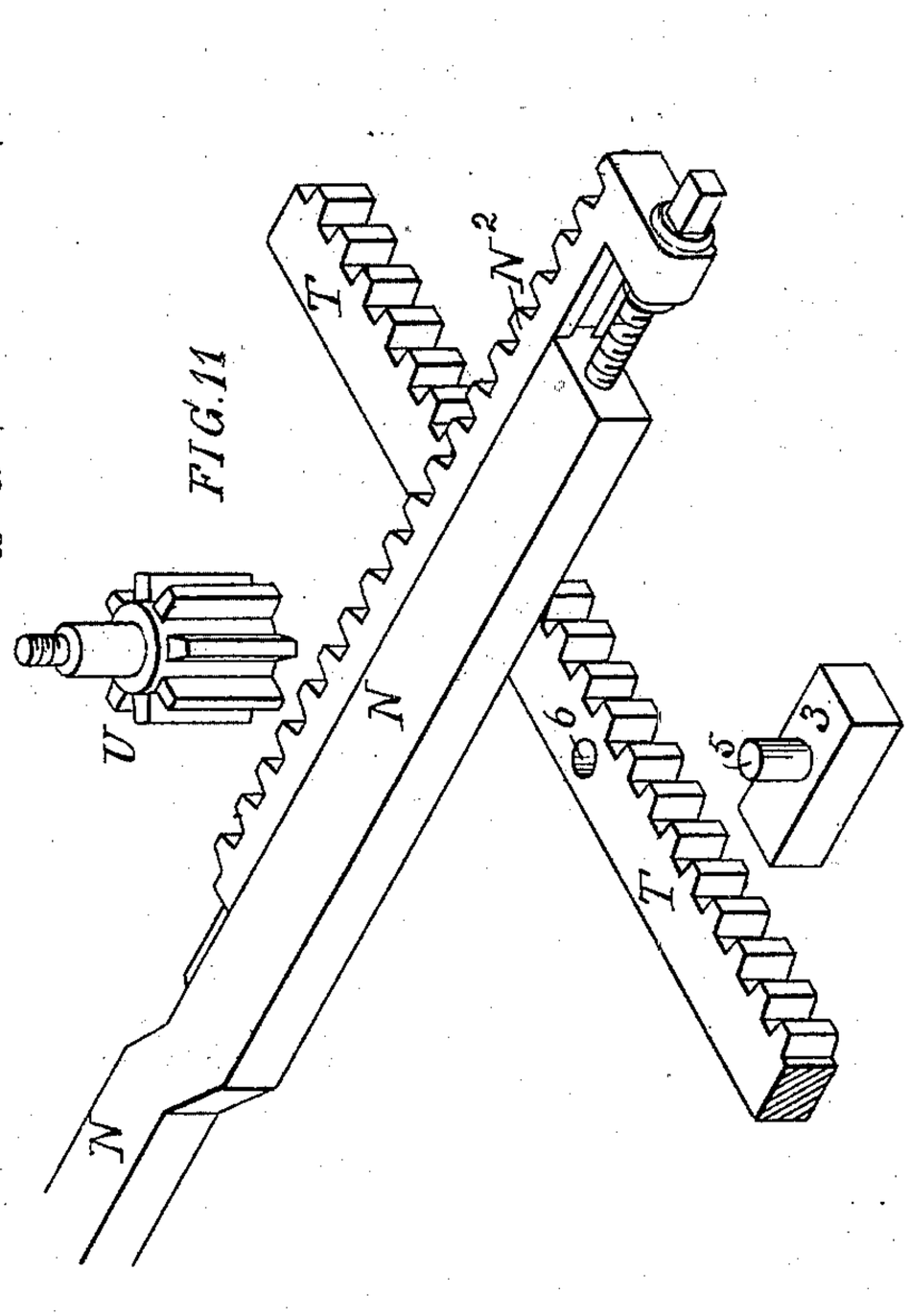

FIG. 11.

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UNITED STATES PATENT OFFICE.

MOSES G. WILDER AND CHARLES T. PARRY, OF PHILADELPHIA, PA., ASSIGNORS TO SAID PARRY, EDWARD H. WILLIAMS, WILLIAM P. HENSZEY, EDWARD LONGSTRETH, JOHN H. CONVERSE, AND GEORGE BURNHAM, OF SAME PLACE.

METAL-PUNCHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 277,817, dated May 15, 1883.

Application filed January 12, 1883. (No model.)

To all whom it may concern:

Be it known that we, MOSES G. WILDER and CHARLES T. PARRY, both citizens of the United States, and residents of Philadelphia, Pennsylvania, have invented certain Improvements in Metal-Punching Machines, of which the following is a specification.

Our invention relates to improvements in mechanism for intermittently and automatically traversing the work-holding carriages of punching-machines, the objects of our invention being mainly to attain accuracy as to the limit of each intermittent movement of the carriage before the descent of the punch, and to afford means for readily changing to a minute degree the extent of the movement, the mechanism for attaining these objects being too fully explained hereinafter to need preliminary description.

In the accompanying drawings, Figure 1, Sheet 1, is a perspective view, partly in section, of our improved carriage and intermittently-traversing mechanism for punching-machines; Fig. 2, Sheet 2, a plan view; Fig. 3, a side view; Fig. 4, a transverse section on the line 1 2, Fig. 2; Fig. 5, a transverse section on the line 3 4; Figs. 6 and 7, Sheet 3, a sectional plan and side view, drawn to an enlarged scale, and illustrating the feeding mechanism; and Figs. 8, 9, 10, and 11, views of detached portions of the machine, also drawn to an enlarged scale.

A is the bed, and B the traversing carriage, adapted to longitudinal guides on the bed.

A cylinder, D, has at each end a journal, one journal being adapted to a bearing in the cross-bar *a* at one end of and forming part of the bed, the other journal having its bearing on the cross-bar *b*. On this cylinder are a series of longitudinal racks having ratchet-teeth of the character illustrated in Fig. 9, the pitch of the teeth of one rack, however, differing from that of the teeth of all the other racks. The journal at the outer end of the rack-cylinder is provided with a disk, 7, having in its periphery holes for receiving the end of the bar by which the cylinder may be turned, and there is a locking-bolt, 8, by which the cylinder is retained after adjustment. The rack which is uppermost will, in connection with devices explained hereinafter, determine the distance apart of the holes punched in the plate on the carriage.

It has not been deemed necessary to show a punching-machine, as it may be of any style in common use.

The shaft E has its bearings on the under side of the bed, and this shaft has at one end a slotted crank, *c*, provided with an adjustable crank-pin, which is connected by a rod, *e*, to an arm, F, on a shaft, G, the latter carrying a ratchet-wheel, H, and the said shaft being geared by a train of wheels (shown in Figs. 3 and 4) to a rack, I, on the under side of the carriage.

The detailed construction of the device to which the feed-shaft G owes its movement will be best understood by reference to Figs. 6 and 7. The hub *h* of the wheel H is separate from the rim *i*, and has an internal flange, *f*, confined to a flange on the hub by a plate, suitable material being so interposed between the internal flange of the rim and flange of the hub and between the confining-plate and said flange of the rim for creating sufficient friction to enable the wheel to transmit the desired movement to the carriage, but not too much friction to prevent the rim from turning on the wheel when the carriage is arrested before the said wheel completes its movement. The purport of this will appear hereinafter.

Referring again to Figs. 6 and 7, a pin, *j*, passes through and is arranged to turn in the forked end of the arm F and through the connecting-rod *e*, this pin carrying a pawl, *k*, having teeth adapted to those of the ratchet-wheel H. The pin has also a small arm, *m*, the rounded end of which fits in a recess in the end of an arm, J, on a shaft, K, which is held in a bearing, *p*, so tightly that it cannot be turned without an effort. When the arm F, Fig. 7, is moved in the direction of the arrow the pawl *k* must be moved into gear with the ratchet-wheel, owing to the engagement of

the small arm *m* with the recess of the stationary arm J; and when the arm F is moved in a contrary direction the pawl will be free from the teeth of the ratchet-wheel. A pin, L, extends through the shaft K, and when this pin is pushed inward a projection, *q*, at its end will lock the shaft K to the shaft G, and the former will rock with the latter, notwithstanding the friction imparted to the said shaft K in its bearing.

It will be observed that the end of the tubular shaft K extends a short distance into the hub of the arm F, and that both hub and shaft K are slotted to receive the locking-projection *q* of the pin L.

It is important that there should be means at hand for promptly arresting the motion of the carriage, and this is afforded by the locking-rod L, for the moment this rod is pushed inward the shaft K and its arm must vibrate with the arm F, and consequently there can be no engagement of the pawl *k* with the wheel H, and therefore no feeding. The latter, however, will be resumed when the locking-rod is again pulled outward.

On the driving-shaft E is a wheel, E′, having in one face a cam-groove to receive a pin on the lever F′, which is connected by a rod, *t*, to mechanism which will be best understood by reference to Figs. 8, 9, and 10.

A longitudinal bar, N, is secured to the under side of the plate-carrying frame B. This bar has lateral extensions N′, in which a small transverse rock-shaft, *n*, has its bearings. To this shaft is secured the forked arm P, to which are pivoted the clamping-jaws *w w*, the rod *t* passing through the latter. Under ordinary circumstances these jaws grip the rod so tightly that the reciprocation of the said rod will cause the vibration of the forked arm P. A yoke, Q, in which the said rod slides, embraces the forked end of the arm P, and by a set-screw, *y*, passing through one arm of the yoke, the clamps *w w* can be made to impart more or less friction to the rod *t*. A detent, R, is secured to the small rock-shaft *n*, and must be raised and lowered in obedience to the cam-groove in the wheel E′ of the shaft E. The end of the detent is adapted to the teeth of the uppermost rack of the cylinder D, a few of these teeth being shown by dotted lines in Fig. 9.

In feeding the plate-holding carriage it may acquire such momentum as to move slightly beyond the limit intended before the punching of the holes in the plate, and consequently the holes would not be accurately punched. The detent R, in connection with the rack on the cylinder D, is to prevent such an occurrence, for as the carriage is fed forward the detent R, which is pivoted to the bar N of the carriage, will fall and thus present a determinate bar to the advancement of the carriage beyond a point determined by a tooth on the rack of the cylinder D. As the clamping-jaws must slide with the carriage, the friction on the rod *t* must not be too great to prevent the jaws from sliding on the said rod; but the friction should be sufficient to permit the reciprocating rod to perform the duty of operating the detent.

On reference to Figs. 1 and 2 it will be seen that one end of a grooved bar, S, is pivoted to the cross-bar *b* of the bed of the machine, the bar resting near its opposite end on the cross-bar 2 of the bed-plate. This grooved bar can be so adjusted that its groove shall be parallel with the carriage-guides of the bed, or it may be moved in either direction, so as to be more or less out of line with the guides, there being a device, referred to hereinafter, for effecting this adjustment of the bar and retaining it after adjustment.

A transverse rack, T, Figs. 1, 5, and 11, is adapted to slide in guides 4 on the under side of an extension, B′, of the carriage, and a sliding block, 3, (shown in perspective in Fig. 11,) is adapted to the groove of the bar S, and has a pin, 5, extending into an orifice, 6, in the rack T. The rod N, which near its outer end carries the detent R, above referred to, has a rack, N^2, arranged at right angles to the rack T, the rack N^2 being longitudinally adjustable on the said bar N, and provision being made for securing it after adjustment.

It should be understood that the bar N moves with and is guided on the carriage, but can have a limited longitudinal movement independently of the same, under the circumstances and in the manner about to be explained. A pinion, U, the vertical spindle of which has its bearing in the extension B′ of the carriage, gears into both of the racks T and N^2.

In punching plates for cylindrical boilers, in which a portion of one section is fitted telescope fashion into another section prior to riveting, one section must necessarily be larger in diameter than the other, and the rivet-holes of the larger section must be farther apart than those of the smaller section. Supposing, for instance, that a rack of the cylinder D has been selected to determine the distance apart of the rivet-holes for the plate of the section of the largest diameter, the grooved bar S being parallel with the carriage-guides of the bed of the machine, the holes punched would be of exactly the same pitch as the teeth of the uppermost rack of the rack-cylinder D; but in punching the holes in the plates for the smaller cylindrical section the feed of the carriage must be slightly diminished. To turn the cylinder so as to bring another rack into operation would be out of the question, for the said cylinder could not be devoted to racks having such a slight variation in the pitch of their teeth as would be necessary to meet the required very slight change in the distance apart of the holes to be punched, the racks of the cylinder being used for effecting much greater changes. The

desired change is effected by moving the grooved bar S out of line with the carriage-guides to an extent which the change in the distance apart of the holes to be punched may determine. The bar S having been adjusted to the desired angle, and the carriage being intermittently fed in a straight course, the sliding block 3, following the inclined course of the grooved bar, must necessarily move the rack T in its guides, and through the intervention of the pinion U must also move the rack N^2, bar N, and detent R independently of any movement of the carriage. It should be understood, however, that the bar N can have no other movement independently of the carriage than the slight movement due to the inclined grooved bar S, for the bar N is locked to the carriage by the pinion U, racks N^2 and T, and block 3, which fits in the groove of the bar S, the locking being such, however, as to permit a slight movement of the bar N independently of the carriage to an extent determined by the inclination of the grooved bar. This slight movement of the detent, so far as the results attained are concerned, is in reality equivalent to a change in the pitch of the teeth of the rack on the cylinder D. This may be best explained by reference to Fig. 9. The rack there shown by dotted lines determines the distance apart of the rivet-holes in the larger section of the boiler when the grooved bar S is parallel with the carriage-guides of the bed. If the grooved bar be moved to an inclined position, there will be a slight advancement of the detent before it presents itself to a tooth of the rack, and this must be the case during every movement of the carriage, so that the extent of the feed will be equal to the distance between the teeth minus the distance advanced by the detent during the interval which elapses between the presentation of the detent to one tooth and its presentation to the next, and the greater the inclination of the bar the greater will be the advance of the detent during this interval. The farther the guide-bar S is moved in the direction of the arrow, Fig. 2, the less will be the distance apart of the holes, and the more the bar is moved in the contrary direction the greater will be the distance between the holes.

In changing the position of the grooved guide-bar S for effecting the change of feed required the primary feeding mechanism affected by the ratchet-wheel H and pawl F and mechanism connected therewith is not changed, the feed effected by these devices being always greater than the final feed; hence the permission given to the rim of the ratchet-wheel to turn on the hub of the same when the carriage is arrested by the detent. When, however, the cylinder is turned so as to present a rack having a greater or less pitch of teeth a change in the position of the crank-pin on the crank of the driving-shaft E will be required.

A horizontal perforated bar, 9, Fig. 2, is pivoted to the end of the guide-bar S, and this bar has a number of holes, through any one of which and through holes in a lug, 10, on the frame passes a retaining-pin. The holes in the perforated bar are graduated in accordance with predetermined alterations in the distance apart of the holes to be punched, so that the attendant in adjusting the bar S will be guided by these holes in the said perforated bar and adjust the retaining-pin accordingly.

It will be understood that the shaft E is so driven in unison with the punching-machine that a feed of the carriage takes place while the punch is free from the metal to be operated on. When a plate has been punched a belt from a pulley, H′, on the shaft E is moved onto a pulley fast on the shaft G, when, through the medium of the train of wheels referred to and the rack I, the carriage will be moved back.

It should be explained that in Figs. 2 and 3 the carriage has been moved so far back that the block 3 is out of the groove of the bar S, and that this has been done for the better exhibition of the operating mechanism.

We claim as our invention—

1. The combination of the bed and intermittently-traversed plate-holding carriage appertaining to a punching-machine with the following elements, namely: first, a rack on the bed; second, a guide-bar, S, pivoted thereto; third, a block adapted to be guided by the said bar; fourth, a bar, N, adapted to guides on the carriage; fifth, a detent pivoted to the said bar N, and mechanism for operating the detent; and, sixth, mechanism whereby the said guide-bar and its block are caused to control the position of the bar N on the carriage and its movement independently of the same, all substantially as set forth.

2. The bed of the machine and its rack, the guide-bar S, pivoted to the bed, the carriage and its bar N, carrying a detent adapted to the said rack, and mechanism for operating the detent, in combination with a block, 3, adapted to the guide-bar, a rack, T, to which the block is connected, a rack, N^2, on the bar N, and a pinion, U, having its bearing on the carriage and gearing into the said racks N^2 and T, all substantially as described.

3. The combination of the carriage and a rack secured thereto, with a vibrated arm, F, carrying a pawl, *k*, and a ratchet-wheel, H, on a shaft, G, geared to the rack, the rim of the said ratchet-wheel being confined to the hub by a friction device which permits the said rim to be turned independently of the hub, all substantially as described.

4. The combination of the shaft G, the shaft K, arranged in line therewith, the ratchet-wheel H on the said shaft G, the arm F, its pawl *k*, and small arm *m*, and the arm J on the said shaft K, substantially as specified.

5. The combination of the shafts G and K,

the arm F on the shaft G, the arm J on the shaft K, the locking-rod L passing through the said shaft K, and having a projection, *q*, adapted to a recess or slot in the hub of the arm F and in the end of the shaft K, substantially as described.

6. The combination of the bar N, the arm P, pivoted thereto, and the detent R with the reciprocated rod *t*, and clamps *w w*, through the medium of which the said rod *t* is connected to the arm P, as set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

MOSES G. WILDER.
CHAS. T. PARRY.

Witnesses to the signature M. G. Wilder:
HARRY SMITH,
HENRY HOWSON, Jr.

Witnesses to the signature of C. T. Parry:
HENRY HOWSON, Jr.,
HARRY SMITH.