(No Model.) 3 Sheets—Sheet 1.

G. F. McINDOE.

METAL PLANING MACHINE.

No. 479,606. Patented July 26, 1892.

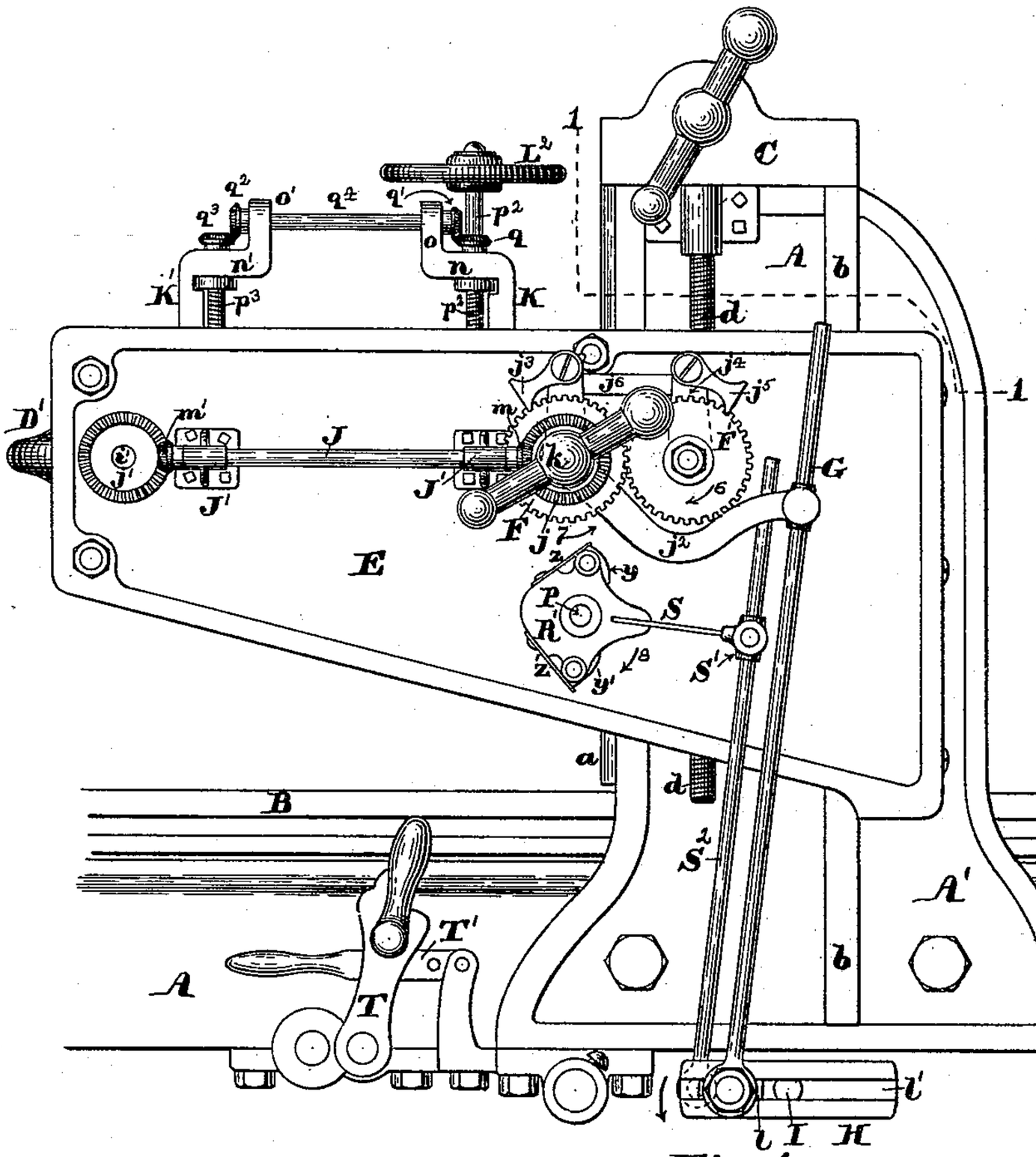

Fig. 1.

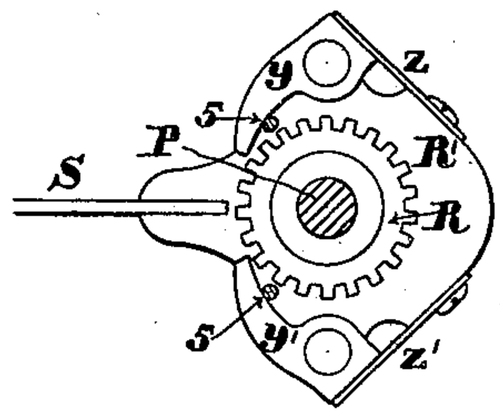

Fig. 7.

Witnesses:
Walter E. Lombard.
James T. Murray.

Inventor:
George F. McIndoe,
by N. E. Lombard
Attorney.

(No Model.) 3 Sheets—Sheet 2.

G. F. McINDOE.

METAL PLANING MACHINE.

No. 479,606. Patented July 26, 1892.

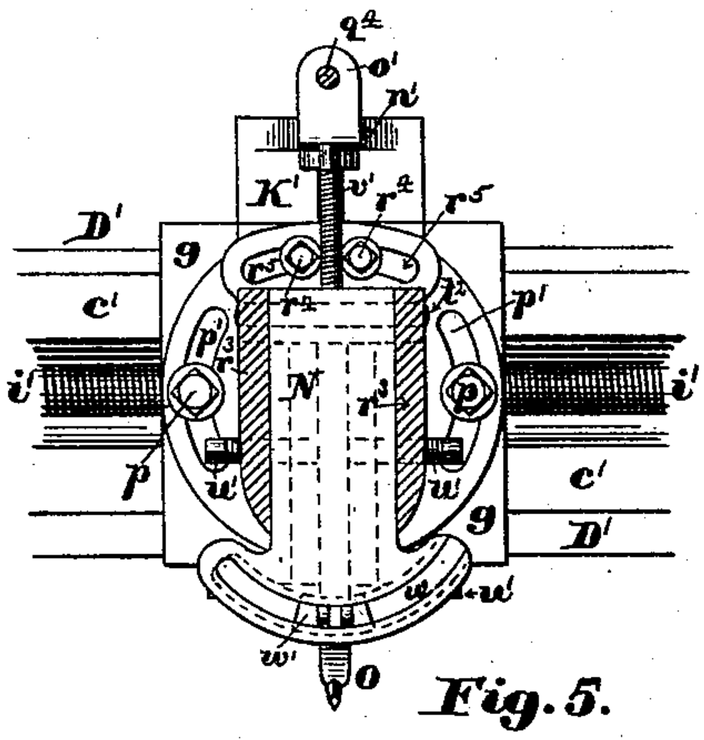

Fig. 5.

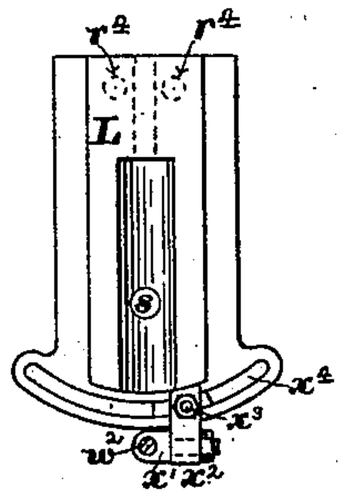

Fig. 6.

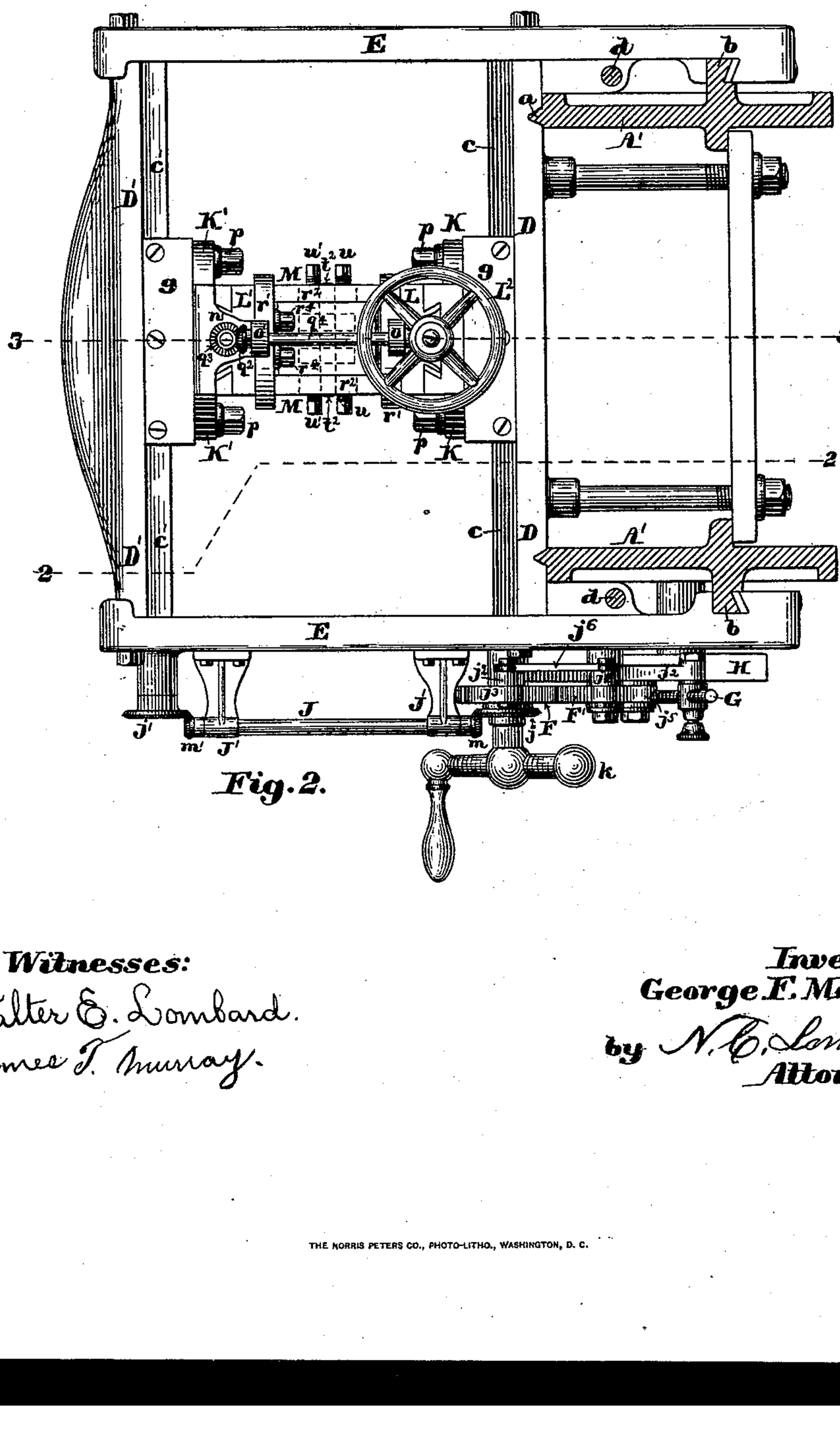

Fig. 2.

Witnesses:
Walter E. Lombard.
James T. Murray.

Inventor:
George F. McIndoe,
by N. C. Lombard
Attorney.

(No Model.) 3 Sheets—Sheet 3.

G. F. McINDOE.

METAL PLANING MACHINE.

No. 479,606. Patented July 26, 1892.

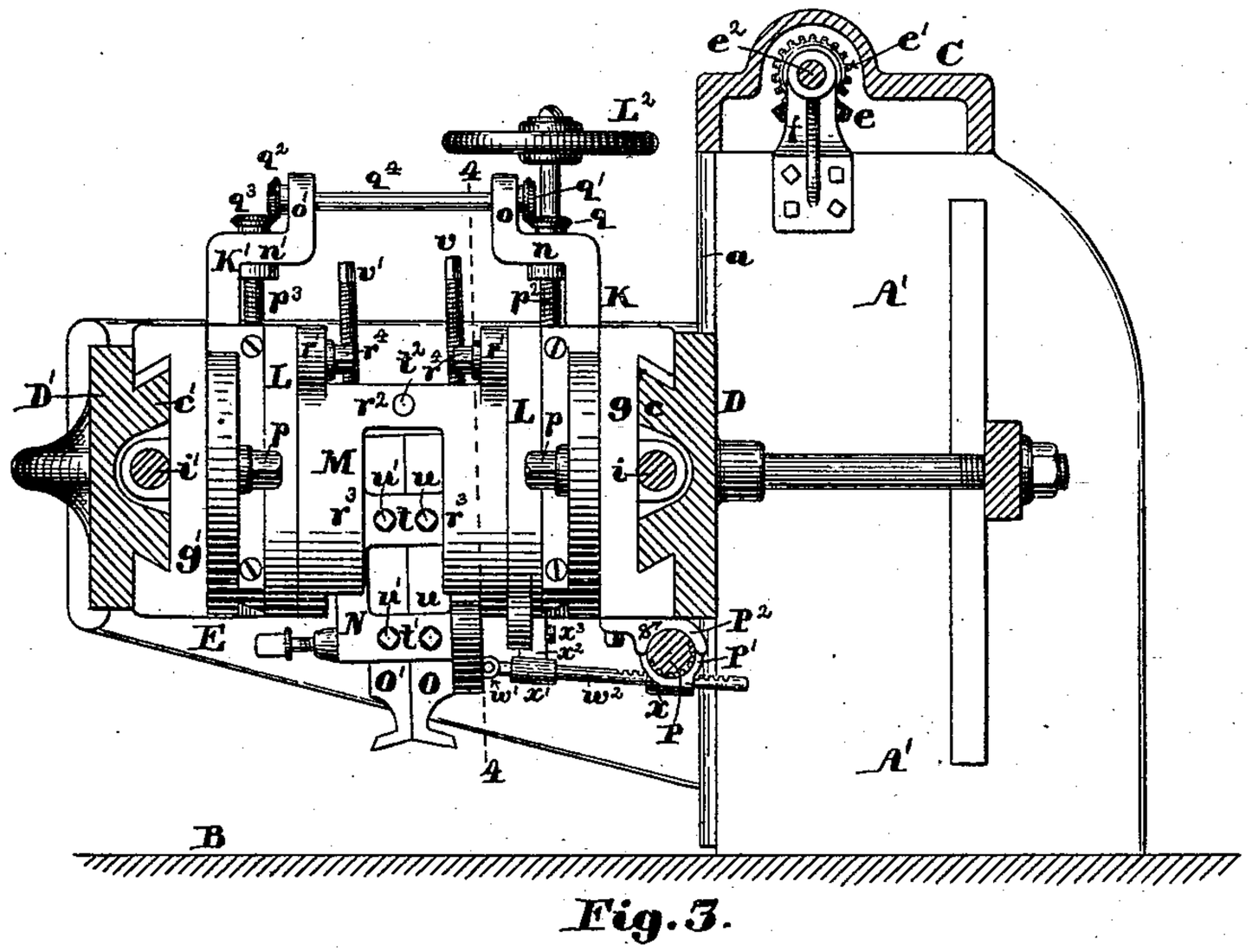

Fig. 3.

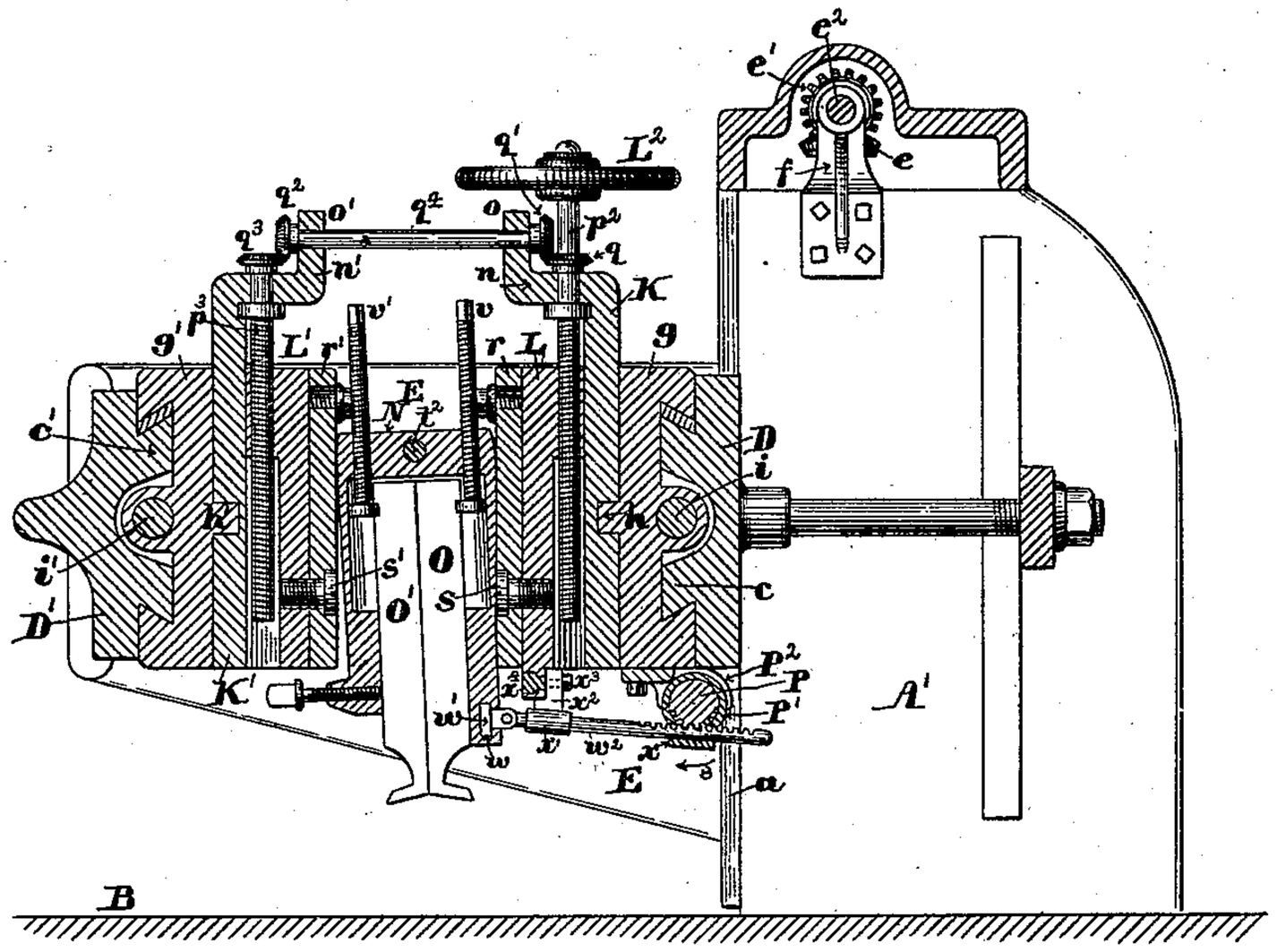

Fig. 4.

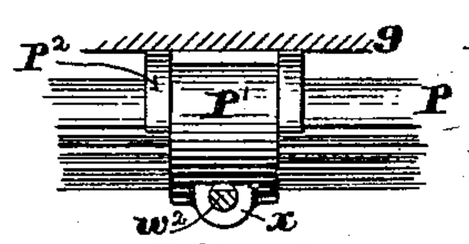

Fig. 8.

Witnesses:
Walter E. Lombard.
James T. Murray.

Inventor:
George F. McIndoe,
by N. D. Lombard
Attorney.

UNITED STATES PATENT OFFICE.

GEORGE F. McINDOE, OF BOSTON, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO JAMES W. McINDOE, OF SAME PLACE.

METAL-PLANING MACHINE.

SPECIFICATION forming part of Letters Patent No. 479,606, dated July 26, 1892.

Application filed November 5, 1891. Serial No. 410,904. (No model.)

To all whom it may concern:

Be it known that I, GEORGE F. McINDOE, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Metal-Planing Machines, of which the following, taken in connection with the accompanying drawings, is a specification.

My invention relates to metal-planing machines and has for its object a material increase in the capacity of the machine; and it consists in certain novel features of construction, arrangement, and combination of parts, which will be readily understood by reference to the description of the drawings, and to the claims hereinafter given and in which my invention is clearly pointed out.

Figure 1 of the drawings is a side elevation of so much of a metal-planing machine embodying my invention as is necessary to illustrate the same. Fig. 2 is a sectional plan, the cutting-plane being on line 1 1 on Fig. 1. Fig. 3 is a sectional elevation, the cutting-plane being on line 2 2 on Fig. 2. Fig. 4 is a similar sectional elevation, the cutting plane being on line 3 3 on Fig. 2. Fig. 5 is a sectional elevation of the tool-carrying mechanism, the cutting-plane being on line 4 4 on Fig. 3. Fig. 6 is an elevation of one of the vertically-adjustable plates, to which is pivoted the tool-carrying frame. Fig. 7 is an inside elevation of the pawl-and-ratchet mechanism for vibrating the tool-holder; and Fig. 8 is an elevation of a portion of the toothed shaft for vibrating the tool-holder with the movable rod-supporting sleeve thereon.

In the drawings, A is the bed of the planer, of usual construction, supported upon legs and provided with suitable ways to guide the work-supporting table B and having bolted thereto the two uprights A′ A′, the upper ends of which are connected together by the tie girt or cap C, all in a well-known manner. The uprights A′ A′ each has formed upon its front edge the V-shaped guideway *a* and upon its outer side the dovetailed guideway *b*, as shown in Figs. 1 and 2.

D is a cross-head fitted to and movable vertically on the ways *a a* and having firmly bolted to each end thereof a bracket or arm E, the inner face of the rear end of which is fitted by a suitable groove and gib to the dovetailed guideway *b*, as shown in Fig. 2. The outer or front ends of the brackets E E are connected together by the bar D′, upon the inner face of which is formed the dovetailed guideway *c*′, and the front face of the cross-head D has formed thereon a similar dovetailed guideway *c*. The cross-head D, the side arms E E, and the bar D′ are adjustable vertically by means of the two vertically-arranged screws *d d*, mounted in fixed bearings at the tops of the uprights A′ A′ and working in nuts formed in the side arms or brackets E E or the ends of the cross-head D, the upper ends of said screws having secured thereon miter or bevel gears *e e*, which engage with and are acted upon by similar gears *e*′ *e*′ on the horizontal shaft e^2, having bearings in the stands *f*, bolted to the inner face of the upper ends of the uprights A′ A′, as shown in Fig. 3.

The dovetailed guideway *c* on the cross-head D has fitted thereon, so as to be movable endwise thereof, the rectangular plate *g*, from the center of the front face of which projects the stud *h*, and a similar plate *g*′, provided with the stud *h*′, is in like manner fitted to the dovetailed guideway *c*′ on the bar D′. The plates *g* and *g*′ are moved on the guideways *c* and *c*′ by the screws *i* and *i*′, respectively, said screw-shafts being mounted, respectively, in bearings in the cross-heads D and D′ on the arms E E and work in nuts formed upon or secured to said plates *g* and *g*′, as shown in Figs. 3 and 4.

The screw-shaft *i* has secured on one end thereof, outside the arm E, the toothed wheel F, the miter gear-wheel *j*, and the hand-crank *k*, and has loosely mounted thereon the elbow-lever j^2, which carries at the end of its short arm the reversible pawl j^3, arranged to engage with the teeth of the wheel F and connected at the end of its longer arm to the upright rod G, the lower end of which is pivoted to an adjustable block *l*, fitted to slide in the slot *l*′ in the bar H, mounted on the end of the shaft I, mounted in bearings on the under side of the bed A, and constructed and arranged to have an intermittent oscillation imparted thereto by gearing under said bed

in a well-known manner, said gearing not being shown in the drawings, as it forms no part of my invention.

In order that both the plates g and g' shall be adjusted in unison, I secure upon the screw i' the miter gear-wheel j', which engages with the teeth of a similar gear m' on one end of the shaft J, which is mounted in bearings in the stands J' J' and has secured upon its other end the miter gear-wheel m, which engages with and has motion imparted thereto by the miter gear-wheel j on the screw-shaft i, all as shown in Figs. 1 and 2.

The plates g and g' have pivoted thereon by means of the studs h and h' the plates K and K', respectively, each being provided at its upper end with the laterally-projecting arm n or n' and the upwardly-projecting ear o or o', and having formed in its face beneath said laterally-projecting arm a dovetailed groove, arranged vertically thereof, as shown in Fig. 2. The plates K and K' are adjustable about the studs h and h', and are secured in any desired position by means of clamping-screws p p, which pass through segmental slots p' in said plates and screw into the plates g and g', as shown in Figs. 2 and 5.

L and L' are two plates provided with dovetailed guide-ribs to fit the dovetailed grooves in the plates K and K', respectively, and movable vertically therein by means of the screws p^2 and p^3, mounted in bearings in the laterally-projecting arms n and n' and working in nuts formed upon or secured to the plates L L', said screws p^2 and p^3 being connected together, so as to be operated in unison by the gears q, q' q^2, and q^3 and the horizontal shaft q^4, the screw p^2 being provided with the hand-wheel L^2 for operating the same, all as shown in Figs. 1, 2, 3, and 4.

M is a frame composed of the plates r and r', connected together by the two ties or bars r^2 and connected to the plates L and L', respectively, by the pivot-screws s and s'. The plates r and r' are each provided with two ribs or lips r^3 r^3, one at each edge, which project therefrom on the side opposite to the plate L or L', said lips serving to partially inclose and hold in position the tool-holding box N, as shown in Figs. 2, 3, and 5. The side plates r and r' extend upward above the tie-bars r^2, and have formed therein the segmental slots r^5 to receive the clamping-screw r^4, set in the plates L and L' for the purpose of clamping said frame to said plates in any desired position to which it may be moved about the pivot-screw studs s and s'.

The tool-holding-box N is rectangular in form, has two solid closed sides connected together by a solid or closed top and at each side by two tie-bars t t', and is pivoted at t^2 to the frame M, said box N being so fitted within said frame M that it may be vibrated therein about its pivot t^2 to a limited extent in the direction of the length of the work-supporting table, while it is held firmly in said frame and immovable relative thereto in the direction at right angles to the length of said table. Two cutting-tools O and O' are placed in said tool-holder, facing in opposite directions, and clamped therein in the proper adjusted position by the set-screws u and u', said tools being separately adjustable vertically by means of the screws v and v', each provided with a head or collar, which engages with a slot formed in the edge of the tool near its upper end, as shown in Fig. 4.

One of the solid sides of the tool-holder N has formed in its lower end and outer face a segmental T-shaped groove w, in which is fitted, so as to be freely movable therein, a T-shaped block w', to the outer end of which is pivoted the rod or bar w^2, the opposite end of which has formed thereon a series of rack-like teeth, which engage with teeth on the shaft P, mounted in bearings in the side brackets or arms E E. The teeth on the shaft P extend the whole length of said shaft between its bearings and has loosely fitted thereon, so as to be freely movable endwise thereof, the sleeve P', upon one side of which is formed the boss x, in which is formed a bearing for the toothed end of the rod or bar w^2, the opposite end of which, near its pivotal connection to the block w', has a bearing in the box x', pivoted to the block x^2, adjustably secured to the lower end of the plate L by means of the clamping-bolt x^3 passing through the slot x^4, and secured in said block x^2 by a clamping-nut, as shown in Figs. 4 and 6.

The tools O and O' are so formed and adjusted that one tool will cut while the table is moving in one direction and the other tool will cut while the table is moving in the opposite direction, thus making a material saving of time in performing a given amount of work. In order that this may be accomplished, it is necessary that the tool-holding mechanism should be fed at the end of each movement of the work-supporting table, and to accomplish this I mount the toothed gear F' on a stud set in one of the brackets or arms E in such a position relative to the gear-wheel F that the teeth of the two wheels F and F' shall engage with each other, and I also mount loosely on said stud the lever j^4, to the upper end of which is pivoted the reversible pawl j^5, arranged to engage with the teeth of the wheel F', said lever j^4 being connected to the short arm of the elbow-lever j^2 by the link j^6, as shown in Fig. 1. It is also necessary, in order that a tool may operate during each movement of the table, that the tool-holder be vibrated at the end of each movement of said table. This is accomplished by imparting to the toothed shaft P a slight movement about its axis in one direction at the end of the movement of the table in one direction and in the opposite direction at the end of the reverse movement of the table. To this end a toothed ratchet-wheel R is firmly secured on the end of the shaft P, and the spider-like plate R' is fitted loosely on said

shaft and has pivoted thereto, upon opposite sides of said shaft, the two pawls y and y', with their free ends toward each other and pressed toward the periphery of the ratchet-wheel R by the springs z and z', respectively. The plate R′ is firmly secured to one end of the spring-arm S, the opposite end of which is pivoted to the sleeve S′, adjustably secured to the rod S^2, the lower end of which is pivoted to the back or inner side of the bar H, all as shown in Figs. 1 and 7. One of the arms E has set therein two pins 5 5, so arranged as to hold both pawls y and y' out of engagement with the teeth of the wheel R when the bar H is in the center of its oscillation.

T is the gear-shipping lever, to be operated by the adjustable tappets on the work-supporting table, but not shown in the drawings, and T′ is the detent-lever for holding the lever T in position until it is acted upon by one or the other of said tappets in a well-known manner.

It will be observed that my tool-holding mechanism consists, substantially, of the ordinary tool-stock doubled and connected together, the two parts being arranged face to face; but instead of the ordinary tool-post with a slot through it to receive the tool I use the tool-box N, with two tools placed therein and arranged to alternately act upon the work secured on the table B.

The operation of my invention is as follows: The parts being in the positions shown in the drawings, with the table B just having commenced its movement toward the left hand of Figs. 1, 3, and 4 and the bar H moving about its axis in the direction indicated by the arrow on Fig. 1 and a piece of work being secured upon the table and the cross-head D, bar D′, side arms E E, and the tool-carrying mechanism being adjusted to the proper height, if the motion of the table toward the left of Fig. 1 be continued the bar H will complete its movement in the direction indicated by the arrow, thus moving the movable end of the long arm of the elbow-lever j^2 downward and its short arm and the lever j^4 toward the right of Fig. 1, causing the pawl j^5 to engage a tooth of the wheel F′ and turn it about its axis in the direction indicated by the arrow 6, and through it the wheel F in the direction indicated by the arrow 7, thus causing the screws i and i' to be turned so as to feed the tools transversely of the table a suitable distance for the next cut. The same movement of the bar H, acting through the rod S^2, moves the pawl-carrying plate R′ about the shaft P in the direction indicated by the arrow 8, causing the pawl y to engage a tooth of the wheel R and move the shaft P about its axis in the direction indicated by said arrow 8, which causes the rod or bar w^2 to be moved toward the left of Figs. 1, 3, and 4, and thereby move the lower end of the tool-holding box in the same direction until it is forced hard against the plate r' of the frame M, thus causing the point of the tool O to be depressed, while the point of the tool O′ is raised, when said tools are held firmly by the tension of the spring-arm S, it being understood that the movement of the movable end of said arm is greater than is required to just reverse the position of the tool-box. The table being moved to the extreme of its movement toward the left of Fig. 1, the tool O will cut a shaving from the work, and when the table commences to move toward the right of Fig. 1 the bar H is moved in a direction opposite to that indicated by the arrow. The motion of the elbow-lever j^2 will be reversed, the pawl j^3 will engage a tooth in the wheel F to turn it and the screw-shafts i and i' and feed the tools another step transversely of the table, and at the same time reverse the positions of the tools, so that as the table continues its movement toward the right of Fig. 1 the tool O′ will cut a shaving from the work. When the tool-holding mechanism is moved transversely of the table, the sleeve P′ is compelled to move along the shaft P by the forked stand P^2, secured to the under edge of the plate g and embracing the ends of said sleeve, as shown in Figs. 3, 4, and 8.

The tools O and O′ may be made of any of the usual forms and may be set back to back, as shown, or side by side and may have their cutting-points in the same or different vertical planes parallel to the line of movement of the work-supporting table or at different heights without affecting the principles of my invention. For some kinds of work the two cutting-edges may be formed upon a single tool instead of two separate tools, as shown.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a metal-planing machine, the combination, with the ordinary uprights and vertically-movable cross-head mounted thereon, of two side arms secured to and movable with said cross-head, a second cross head or bar secured to the ends of said side arms with its dovetailed slide facing toward said ordinary cross head, tool supporting and manipulating mechanism carried by and adjustable on said cross-head and bar, two cutting-tools carried by the central member of said tool-supporting mechanism, said tools being arranged with their cutting-points facing in opposite directions, a pair of feed-screws for moving said tools and tool-supporting mechanism transversely of the work-supporting table, said screws being connected together so as to be operated in unison, a toothed wheel secured to one of said screws, an elbow-lever mounted loosely on said screw and carrying a reversible pawl to engage said wheel, a second toothed wheel engaging said first-mentioned wheel, a lever mounted loosely on the axis of said second wheel and carrying a reversible pawl to engage the teeth of said wheel, a link connecting the two pawl-carrying arms, the rod G, and the oscillating bar H.

2. In a metal-planing machine, the combi-

nation, with the reciprocating table of an ordinary planer and any suitable gearing for operating said table, of the cross-heads D D′, the brackets or side arms E E, the duplicate sliding plates g and g', mounted on said cross-heads, the duplicate plates K and K′, pivoted upon and clamped to the plates g and g', the duplicate plates L and L′, fitted to and movable vertically on the plates K and K′, the screw-shafts p^2 and p^3, connected together by the gears q, q', q^2, and q^3 and the shaft q^4, the hand-wheel L^2, the frame M, pivoted upon and clamped to the plates L L′, the tool-holder N, pivoted to the frame M, the cutting-tools O and O′, each provided with a slot near its upper end, the screws v and v' for adjusting said tools vertically, and means having provision for feeding said tools and their holders transversely of the table and moving the tool-holder about its pivotal support at the end of each movement of said table.

3. In a metal-planing machine, the combination, with the reciprocating work-supporting table and a cutting tool or tools constructed and arranged to act upon the work during each movement of said table, of the feed-screw i, the toothed wheel F, secured thereon, the elbow-lever j^2, the pawl j^3, carried by said lever, the rod G, the oscillating bar H, the toothed wheel F′, the lever j^4, the link j^6, and the pawl j^5, all constructed, arranged, and operating to feed said cutting-tool transversely of said table at the end of each movement thereof.

4. In a metal-planing machine, the combination, with the reciprocating work-supporting table, of a pivoted tool-holder, a tool or tools having two cutting-edges facing in opposite directions, the toothed rod or bar w^2, connected to said tool-holder, the toothed shaft P, engaging said toothed bar, the sleeve P′, movable endwise on said toothed shaft and forming a bearing for the toothed rod or bar w^2, the forked stand P^2, secured to and movable with the tool-holder-supporting slide, and a ratchet-and-pawl mechanism constructed and arranged to impart an intermittent partial rotation of said shaft about its axis alternately in opposite directions, one of said partial rotations taking place at each reversal of the motion of said table.

5. In a metal-planing machine, the combination, with the reciprocating work-supporting table, of a pivoted tool-holder, a cutting tool or tools having two cutting-points facing in opposite directions, a toothed rod or bar connected to the movable end of said tool-holder, the toothed shaft P, engaging said toothed bar, the sleeve P′, mounted upon said toothed shaft and movable transversely of said table with the tool-holder, the ratchet-wheel R, secured on said shaft, the pawl-carrying plate R′, the pawls y and y', the spring-arm S, secured to said pawl-carrying plate, the rod S^2, the oscillating bar H, and the two pawl-controlling pins 5 5, set in the side bracket E in positions to hold the pawls y and y' out of engagement with the teeth of the wheel R when the pawl-carrying plate is in the center of its vibratory motion, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 4th day of November, A. D. 1891.

GEORGE F. McINDOE.

Witnesses:
N. C. LOMBARD,
WALTER E. LOMBARD.