

No. 685,347.

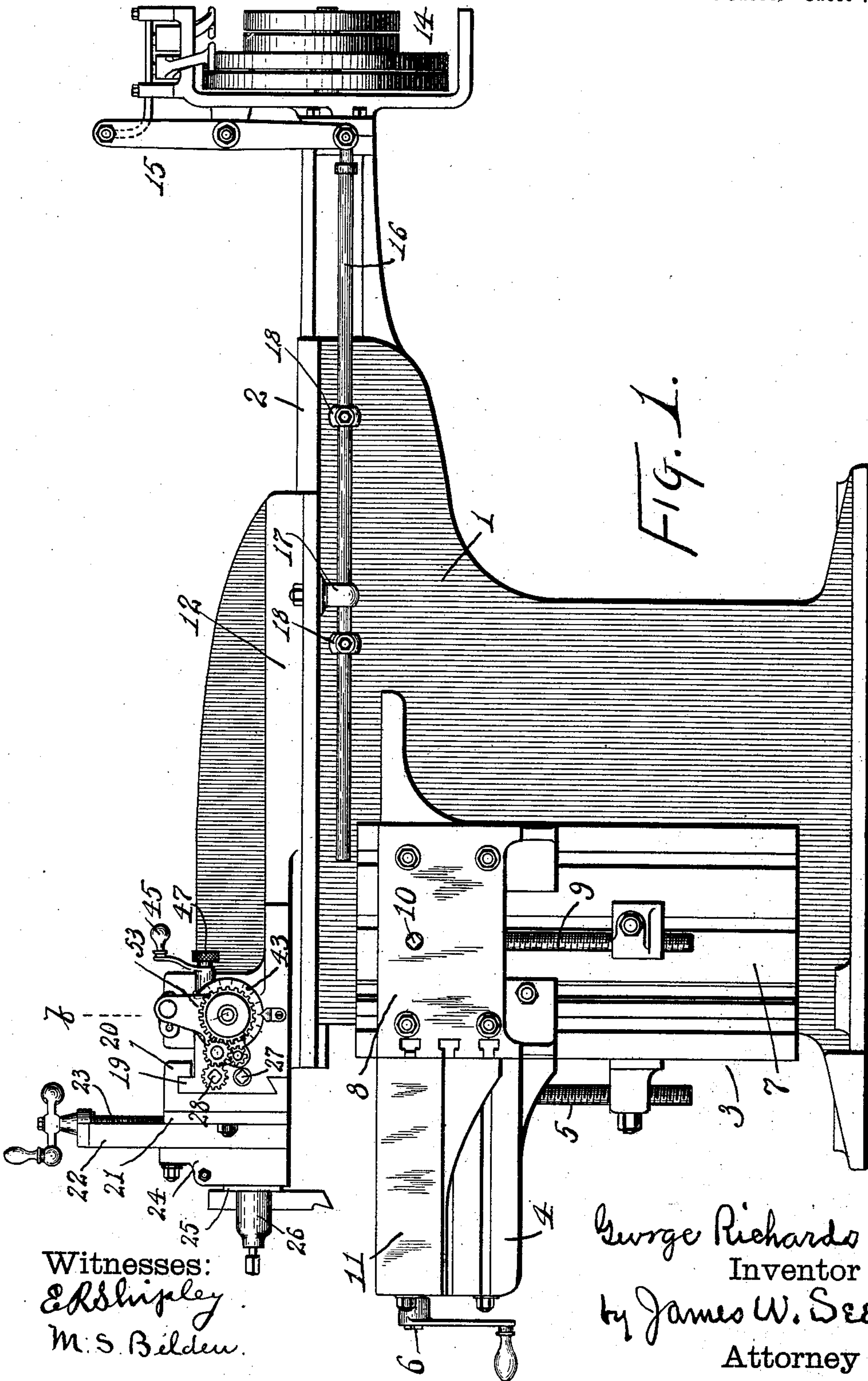
Patented Oct. 29, 1901.

G. RICHARDS.
METAL PLANING AND SHAPING MACHINE.

(Application filed Mar. 21, 1901.)

(No Model.)

4 Sheets—Sheet 1.



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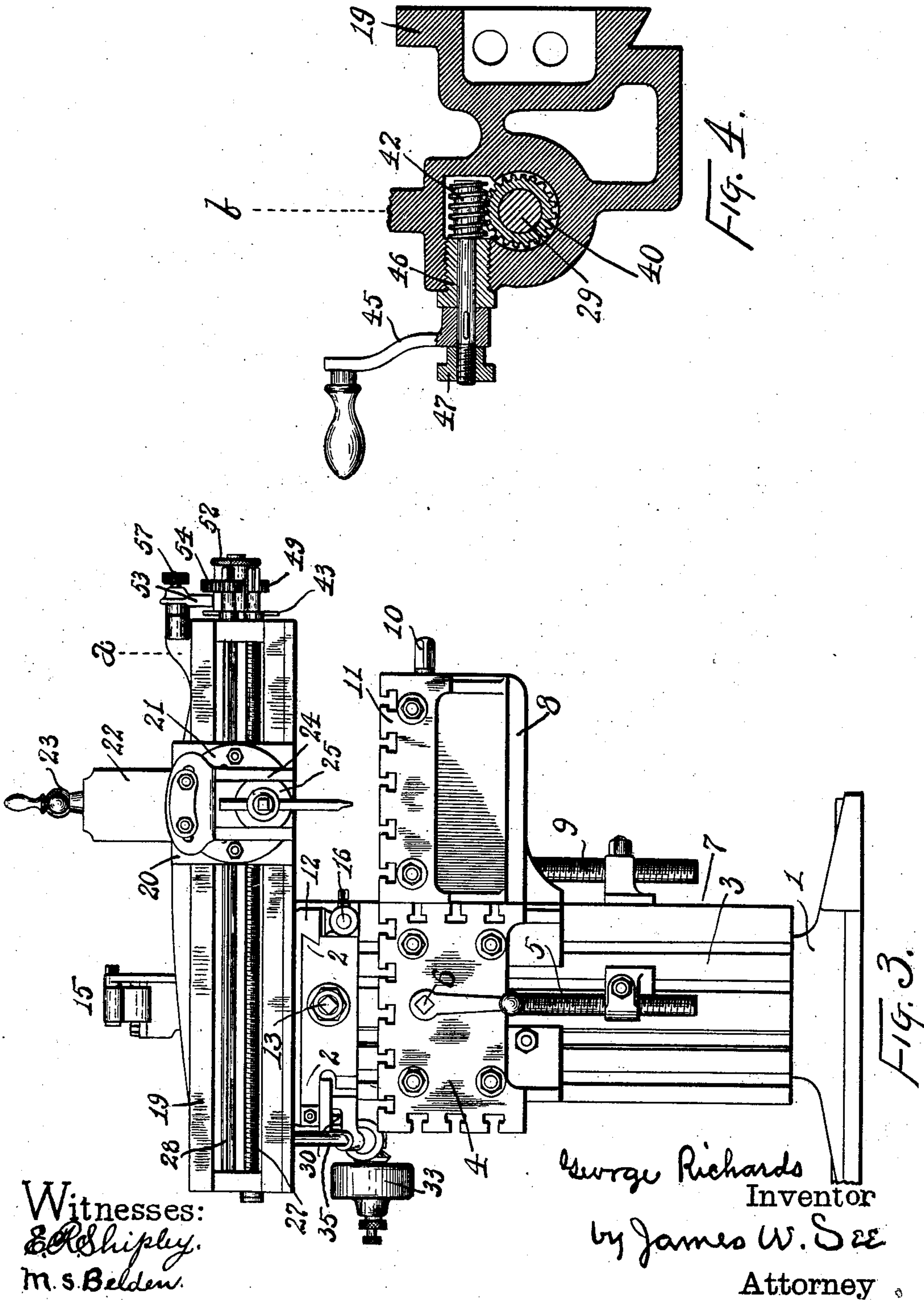
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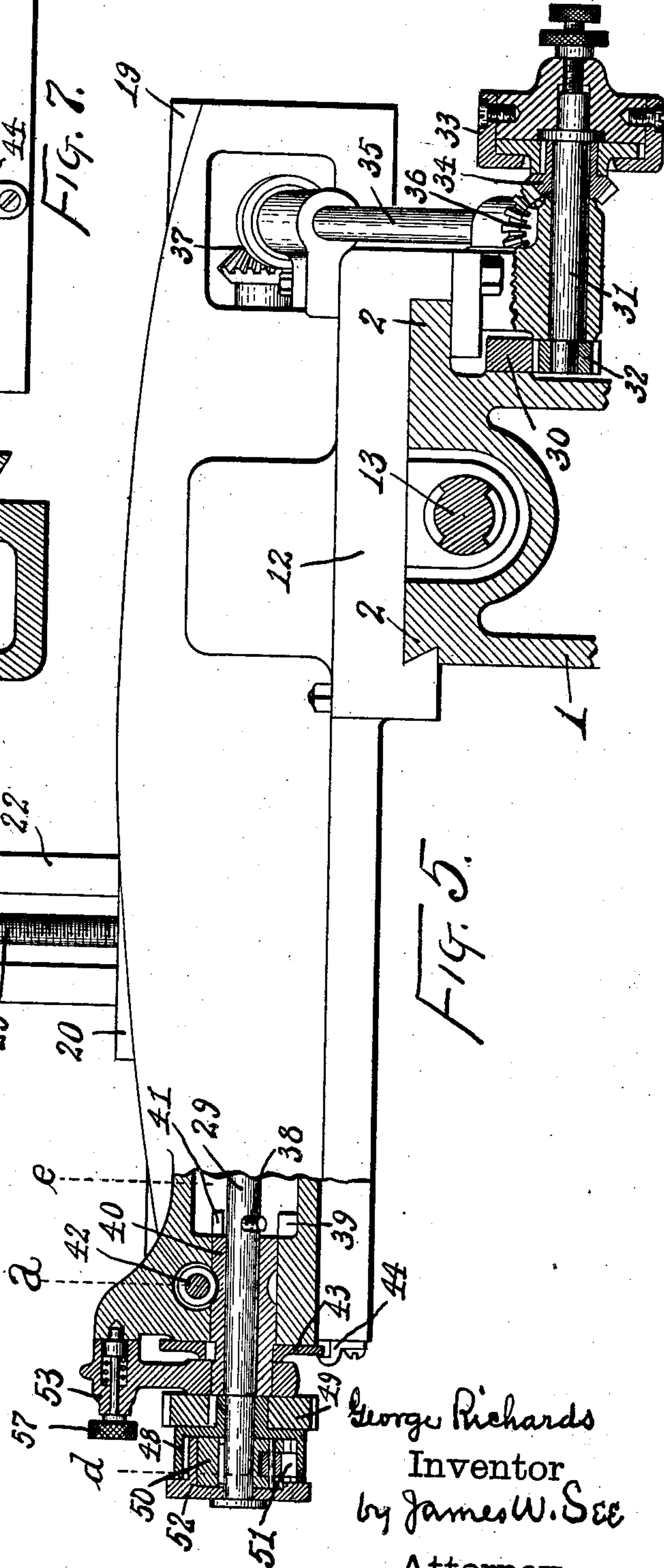
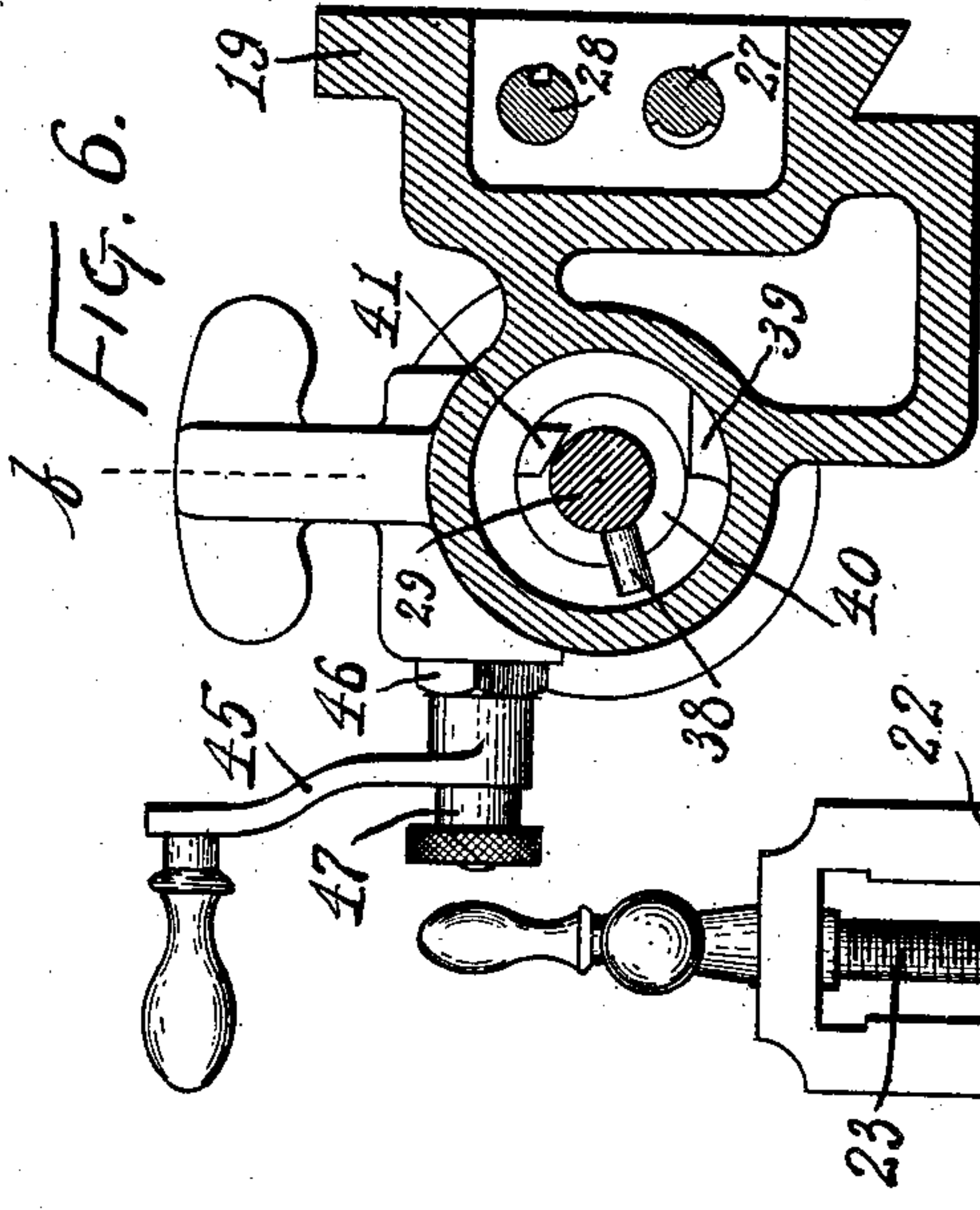
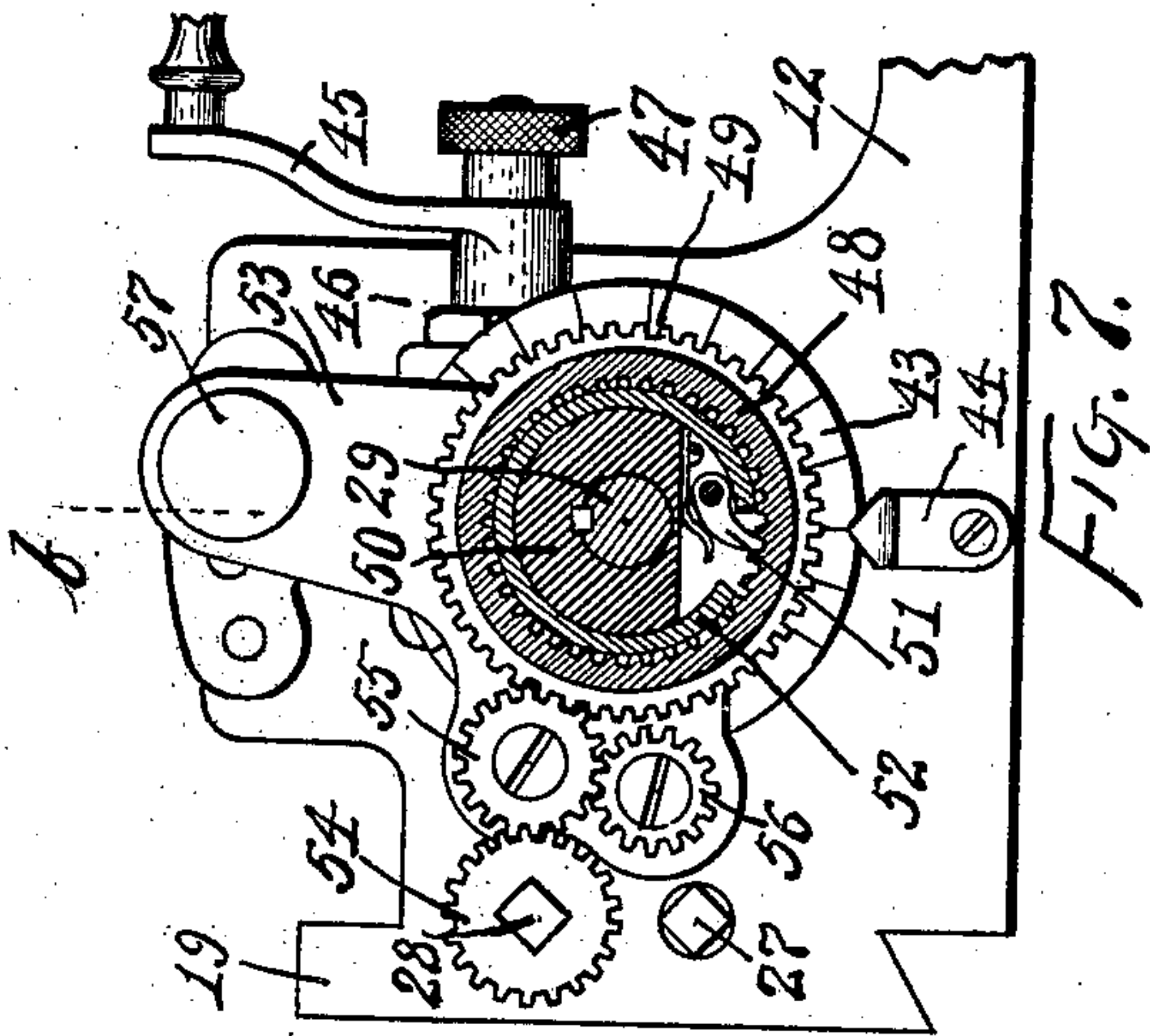
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UNITED STATES PATENT OFFICE.

GEORGE RICHARDS, OF BRUSSELS, BELGIUM.

METAL PLANING AND SHAPING MACHINE.

SPECIFICATION forming part of Letters Patent No. 685,347, dated October 29, 1901.

Application filed March 21, 1901. Serial No. 52,155. (No model.)

To all whom it may concern:

Be it known that I, GEORGE RICHARDS, a citizen of the United States, residing in Brussels, Belgium, (post-office address Nos. 102 and 104 Rue de Louvain, Brussels, Belgium,) have invented certain new and useful Improvements in Metal Planing and Shaping Machines, of which the following is a specification.

This invention has been patented or patent applied for in Great Britain, No. 16,345, dated September 14, 1900.

This invention, pertaining to improvements in metal planing and shaping machines, will be readily understood from the following description, taken in connection with the accompanying drawings, in which—

Figure 1 is a side elevation of a combined planing and shaping machine embodying my invention; Fig. 2, a plan of the same; Fig. 3, an end elevation; Fig. 4, a vertical transverse section of the rail in the plane of line *a*; Fig. 5, a rear elevation of the rail, portions of the same and of the bed of the machine appearing in vertical section in the planes of lines *b* and *c*; Fig. 6, a vertical transverse section of the rail in the plane of line *e*; and Fig. 7, an end elevation of the rail, parts appearing in vertical transverse section in the plane of line *d*.

In the drawings, 1 indicates the frame or bed of the machine; 2, a longitudinal horizontal guideway at the top thereof for the reception of a sliding tool-carrier; 3, a vertically-slotted face at one end of the bed or frame for the reception of a work-holding table; 4, a work-holding table bolted against the face 3 and adapted for vertical adjustment thereon and to receive work which is to be operated upon at the end of the bed or frame; 5, elevating-screw for vertically adjusting this table; 6, elevating-shaft pertaining to table 4 and bevel-gear to screw 5 and provided with a crank and adapted for raising and lowering table 4 after the manner usual in connection with shaping-machines; 7, a vertically-slotted table-receiving face on the side of the bed or frame, near the end on which is mounted the table 4; 8, a work-holding table similar to table 4 and arranged for vertical adjustment on surface 7; 9, elevating-screw for table 8; 10,

elevating-shaft geared to screw 9 to serve in adjusting table 8; 11, a bracket-table secured to the end face of table 8, this bracket-table serving when tables 4 and 8 are brought to a common level to fill up the corner-gap between those tables, whereby the three tables 4, 8, and 11 form, together, a table-surface at the end and side and adjoining corner of the bed or frame; 12, a carriage arranged for reciprocating motion on the longitudinal top guideway 2 of the bed, the carriage being gibbed to the bed after the manner usual in shaping-machines; 13, a screw journaled longitudinally in the bed or frame and engaging the nut in the carriage and serving as a means for reciprocating the carriage upon the bed after the usual manner of screw-operated planing-machines, it being understood, however, that this screw and its accessories are merely exemplifying carriage-reciprocating devices, finding their full equivalent in any of the mechanisms usually employed for reciprocating the rams or carriages of shaping or planing machines, such mechanism often consisting of rack-and-pinion devices, or spiral-gear devices, or crank and connecting-rod devices, or lever and connecting-rod devices; 14, pulleys by means of which belt-power is transmitted to the screw 13 after the manner usual in screw-driven planers; 15, belt-shifting apparatus, which will be recognized as of the ordinary character employed in reversing the motion of screw-driven planers; 16, reversing-rod through the medium of which the reciprocating carriage automatically shifts the belts and reverses the carriage motion at the ends of the strokes; 17, a tappet on the carriage and sliding on the reversing-rod; 18, dogs adjustable along the length of the reversing-rod and adapted to be engaged by the tappet and effect the shifting of the belts and the reversal of direction of the carriage motion, the length of the carriage-stroke being dependent on the adjusted position of the dogs upon the rod; 19, a rail upon the carriage, the same extending across the bed or frame in a direction at right angles to the motion of the carriage and extending forwardly some distance beyond the front of the bed or at that side at which is mounted the side table 8; 20, a saddle fitted to slide upon rail

19 after the manner usual in planer-saddles; 21, the swing, mounted on the saddle as in planers and similarly adapted for angular adjustment on a horizontal axis of the saddle for angular planing; 22, the slide vertically adjustable upon the swing to provide for the down feeding motion of the tool, as in planers; 23, the downfeed-screw for moving the saddle upon the swing, as in planers; 24, the apron-box, mounted upon the front of the swing and adapted for limited angular adjustment thereon to provide for the side clearance of the tool in vertically planing, as in planers; 25, the apron or clamp swinging in the apron-box, as in planers; 26, the tool-holder mounted in the apron; 27, a rail-screw for traversing the saddle and its accessories upon the rail and giving a longitudinal feeding motion to the tool, this screw being arranged for hand movement by crank or for power movement by gearing, as in planers; 28, the downfeed rail-rod geared to the downfeed-screw 23 and serving as means by which the downfeed motion may be given to the tool either by hand-crank or automatically by gearing, as usual in planers, it being understood, of course, that this downfeed rail-rod may be omitted, as is usual in planers not having automatic downfeed; 29, a feed-shaft journaled longitudinally in the rail; 30, a rack extending longitudinally of the bed and secured thereto; 31, a short shaft journaled in the carriage 12 at the rear of the bed; 32, a pinion fast on shaft 31 and engaging rack 30 and serving as the carriage moves back and forth on the bed to give rotary motion to shaft 31 in one direction or the other, according to the direction of movement of the carriage; 33, a friction-box frictionally clamped to the rear end of shaft 31 and driven thereby by friction, but slipping in case of sufficient resistance; 34, a bevel-gear fast with the friction-box and turning when the latter turns; 35, a shaft extending from shaft 31 to feed-shaft 29; 36, a bevel-gear on shaft 35 and engaging bevel-gear 34; 37, a pair of bevel-gears connecting shaft 35 and feed-shaft 29, the obvious result of the mechanism described being that as the carriage reciprocates upon the bed the shaft 29 will, if uninterfered with, be turned first in one direction and then in the other, dependent upon the direction of carriage motion; 38, a pin projecting radially from shaft 29; 39, a fixed stop supported by the rail in the path of pin 38 and adapted to limit the turning of shaft 29 in one direction by being engaged by pin 38; 40, a sleeve surrounding shaft 29 and journaled in the outer end of the rail; 41, a stop projecting from the end of sleeve 40 in the path of pin 38 and adapted to be engaged by pin 38 and limit the rotation of shaft 29 to a degree corresponding with the angular adjustment of sleeve 40 and its stop 41; 42, a worm journaled in the rail and engaging a worm-gear formed of the periphery of sleeve 40 and serving as a means by which the sleeve may be turned and the position of

stop 41 adjusted; 43, a dial-plate fast on the outer portion of sleeve 40 and provided with graduations for indicating the angular adjustment of the sleeve and its stop 41; 44, an index for showing the angular position of the sleeve and its stop 41; 45, a hand-crank splined on the spindle of worm 42; 46, a gland or bushing screwed into the rail and serving as the bearing for the spindle of worm 42, the worm engaging against the inner end of this bushing, while the hand-crank engages against its outer end; 47, a hand-nut on the spindle of worm 42 and serving to press crank 45 against the bushing, and thus clamp the bushing between the worm and hand-crank and lock the spindle of the worm; 48, an internally-toothed click-gear loose upon the outer end of shaft 29; 49, a spur-gear fast upon the hub of click-gear 48; 50, a cylindrical block or hub fast upon the outer end of shaft 29 within click-gear 48; 51, a spring-pressed pawl pivoted in block 50 and engaging the teeth of click-wheel 48; 52, an annular shell disposed within click-gear 48 and encircling block 50, exterior to the pawl, and having through it a gap through which the pawl reaches to engage the teeth of the click-wheel, the shell being of such form that if properly turned it will bring a solid portion of its wall between the pawl and the click-wheel, thus pulling the pawl out of engagement with the click-wheel and holding it in idle position; 53, a tumbler mounted for rocking motion on the end of the rail with its axis coincident with that of feed-shaft 29; 54, a pinion fitting removably upon the outer end of feed-screw 27 or downfeed-rod 28; 55, a pinion mounted loosely on tumbler 53 and permanently engaging gear 49 and adapted to engage gear 54 when the latter is upon either the feed-screw or the downfeed-rod of the rail; 56, a pinion mounted loosely upon the tumbler and engaging pinion 55 and adapted to engage pinion 54 in either of the two functional locations of the latter, and 57 a detent-pin carried by the tumbler and adapted to hold the tumbler in any one of its four adjusted positions--namely, with the pinion 54 when on the rail-screw engaged by pinions 55 or 56, or the same when pinion 54 is on the downfeed-rod.

Long work may be secured to the table at the side of and parallel with the bed or frame and operated upon by the tool when the saddle is upon the transverse projecting portion of the rail. The cuts thus taken may obviously be as long as the stroke of the carriage upon the bed, and the bed may of course be of any desired length. Under these conditions the machine is adapted for such work as is usually done in open side planing-machines or other planing-machines adapted for cutting longitudinally of the pieces being operated upon. By securing the work to the table at the end of the bed or frame, with the piece lying transverse to the length of the bed, transverse cuts may be taken upon the

work with the saddle disposed at any point on or feeding along upon the rail, the work done in such case being of the character usually done in shaping-machines. Both tables may, if desired, be employed in conjunction either with or without the supplemental table 11, which table, by the way, is adapted to be secured to either table 4 or 8. It will thus be observed that this machine, having only a simple as distinguished from a compound actuating motion for the tool, is adapted for the longitudinal work of planing or the transverse work of shaping.

Through the medium of rack 30, friction-box 33, &c., feed-shaft 29 makes a partial rotation at each reversal of the carriage motion, the degree of the rotation depending on the angular adjustment of stop 41 relative to stop 39. The degree of rotation of feed-shaft 29 determines the degree of feeding motion imparted to the tool, and this degree may be adjusted by means of worm-crank 45, index 44 showing the degree of feed for which the adjustment has been made.

Pawl 51 on its forward stroke engages the internal teeth of click-wheel 48 and through that wheel turns gear 49 and transmits feeding motion to the rail-screw or downfeed-rod, according to the location of pinion 54, and in a direction dependent upon whether the motion to pinion 54 is received from pinion 55 or pinion 56. Normally shell 52 is without office, the shell turning with block 50, and thus accompanying the pawl; but if the shell be turned a distance it will lift and hold the pawl out of action, thus rendering the pawl inert. The feed may thus be arrested at any time by so turning the shell as to withdraw the pawl, and the feed may be installed at any time by so turning the shell as to bring the gap in the shell opposite the pawl and permit the pawl to go into action. The feed may also be arrested at any time by turning worm-crank 45 and so adjusting stop 41 as to clamp pin 38 between that stop and fixed stop 39, under which conditions feed-shaft 29 will have no motion, the friction-box in such case slipping at all times. The feed may also be arrested by withdrawing pinion 54 from the rail-screw or downfeed-rod, as the case may be. Hand-feeding of the tool may obviously be performed by means of a hand-crank placed on the end of the rail-screw or downfeed-rod.

I claim as my invention—

1. In a reciprocating metal-cutting machine, the combination, substantially as set forth, of a bed provided with a longitudinal guideway upon its top, a vertical guideway upon an end face of said bed, a work-holding table mounted for vertical adjustment on said vertical guideway, a carriage mounted for reciprocation upon said top guideway and provided at its end nearest said work-holding table with an integrally-formed rail extending across and projecting beyond each side of said bed, mechanism for reciprocating said

carriage upon its guideway, a tool-supporting saddle and accessories mounted for sliding motion along said rail, a feed-screw mounted in the rail for traversing the saddle thereon, and automatic mechanism for intermittently turning said screw and moving said saddle upon said rail at each reciprocation of the carriage upon its guideway.

2. In a reciprocating metal-cutting machine, the combination, substantially as set forth, of a bed provided with a longitudinal guideway upon its top, a vertical guideway upon an end face of said bed, a work-holding table mounted for vertical adjustment on said vertical guideway, a carriage mounted for reciprocation upon said top guideway and provided at its end nearest said work-holding table with an integrally-formed rail extending across and projecting beyond each side of said bed, mechanism for reciprocating said carriage upon its guideway, a tool-supporting saddle and accessories mounted for sliding motion along said rail, a feed-screw mounted in the rail for traversing the saddle thereon, automatic mechanism for intermittently turning said screw and moving said saddle upon said rail at each reciprocation of the carriage upon its guideway, a vertical guideway upon a side face of said bed, and a work-holding table mounted for vertical adjustment upon said last-mentioned vertical guideway.

3. In a reciprocating metal-cutting machine, the combination, substantially as set forth, of a bed or frame provided with a longitudinal guideway for a carriage, a carriage arranged for reciprocating motion on said guideway, means for reciprocating said carriage, a rail supported by said carriage above and transversely of said bed or frame and having an end projecting beyond the side of the bed or frame, a tool-holding saddle and accessories mounted for sliding motion on said rail, a work-holding table mounted at the end of the bed or frame, a work-holding table mounted at the side of the bed or frame, and a supplemental table separately secured to the side of one of the tables and adapted to project alongside the other table.

4. In a reciprocating metal-cutting machine, the combination, substantially as set forth, of a bed having a longitudinal guideway, a carriage thereon, mechanism for reciprocating said carriage, an oscillating feed-shaft mounted in said carriage, an internally-toothed click-wheel mounted loosely thereon, a block fast upon said shaft within said click-wheel, a spring-pawl pivoted in said block and adapted to engage the teeth of said click-wheel, an annular shell surrounding said block within said click-wheel and having a gap through which said pawl may protrude into engagement with the teeth of the click-wheel, a handling portion to said shell projecting exterior to said click-wheel whereby said shell may be turned to carry the gap therein away from the pawl and cause the wall of the shell to become interposed between

the pawl and the teeth of the click-wheel, and mechanism for producing an oscillation of said shaft at each reciprocation of said carriage.

- 5 5. In a reciprocating metal-cutting machine, the combination, substantially as set forth, of a bed, a carriage mounted thereon and provided with a rail, a tool-holding saddle and accessories mounted for sliding motion on said rail, a feed-screw journaled in the rail for imparting feeding motion to said saddle and accessories, a pinion on said feed-screw, a feed-shaft journaled in the rail parallel with said feed-screw, means for imparting a partial rotation to said feed-shaft first in one direction and then in the other, a sleeve surrounding said feed-shaft, a pin projecting from said feed-shaft, a fixed stop supported by the rail in the path of said pin, a stop carried by said sleeve in the path of said pin, mechanism for turning said sleeve and locking the same, pawl-and-ratchet mechanism for transmitting motion from said feed-shaft to the pinion on said feed-screw.
- 25 6. In a reciprocating metal-cutting machine, the combination, substantially as set forth, of a bed, a carriage thereon provided with a rail, a tool-holding saddle and accessories mounted for sliding motion thereon, a feed-screw journaled in the rail for imparting feeding motion to said saddle and accessories, a pinion on said feed-screw, a feed-shaft journaled in the rail parallel with said feed-screw, means for imparting a partial rotation to said feed-shaft first in one direction and then in the other, a sleeve surrounding said feed-shaft, a pin projecting from said feed-shaft, a fixed stop supported by the rail in the path of said pin, a stop carried by said

sleeve in the path of said pin, a worm engaging said sleeve and adapted to serve in turning the same, an indicating-dial on said sleeve, and pawl-and-ratchet mechanism adapted to transmit motion from said feed-shaft to the pinion on said feed-screw.

7. In a reciprocating metal-cutting machine, the combination, substantially as set forth, of a bed, a carriage thereon provided with a rail, a tool-holding saddle and accessories mounted for sliding motion thereon, a feed-screw mounted in the rail and adapted to impart feeding motion to said saddle and accessories, a feed-shaft journaled in the rail parallel with the feed-screw, means for partially rotating said feed-shaft first in one direction and then in the other, stops to limit the degree of rotation of the feed-shaft, an internally-toothed click-wheel mounted loosely upon the feed-shaft, gearing connecting said click-wheel with said feed-screw, a pawl carried by said feed-shaft within said click-wheel and adapted to engage the internal teeth thereof, and a gapped annular shell disposed within said click-wheel and adapted to permit the normal action of the pawl upon the click-wheel or to be turned so as to hold the pawl out of action, said shell being adapted to be adjusted by hand so as to bring the gap therein to the pawl and permit the pawl to protrude therethrough and act, or to carry the gap away from the pawl so as to interpose the wall of the shell between the pawl and the click-wheel and hold the pawl out of action.

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Witnesses:

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