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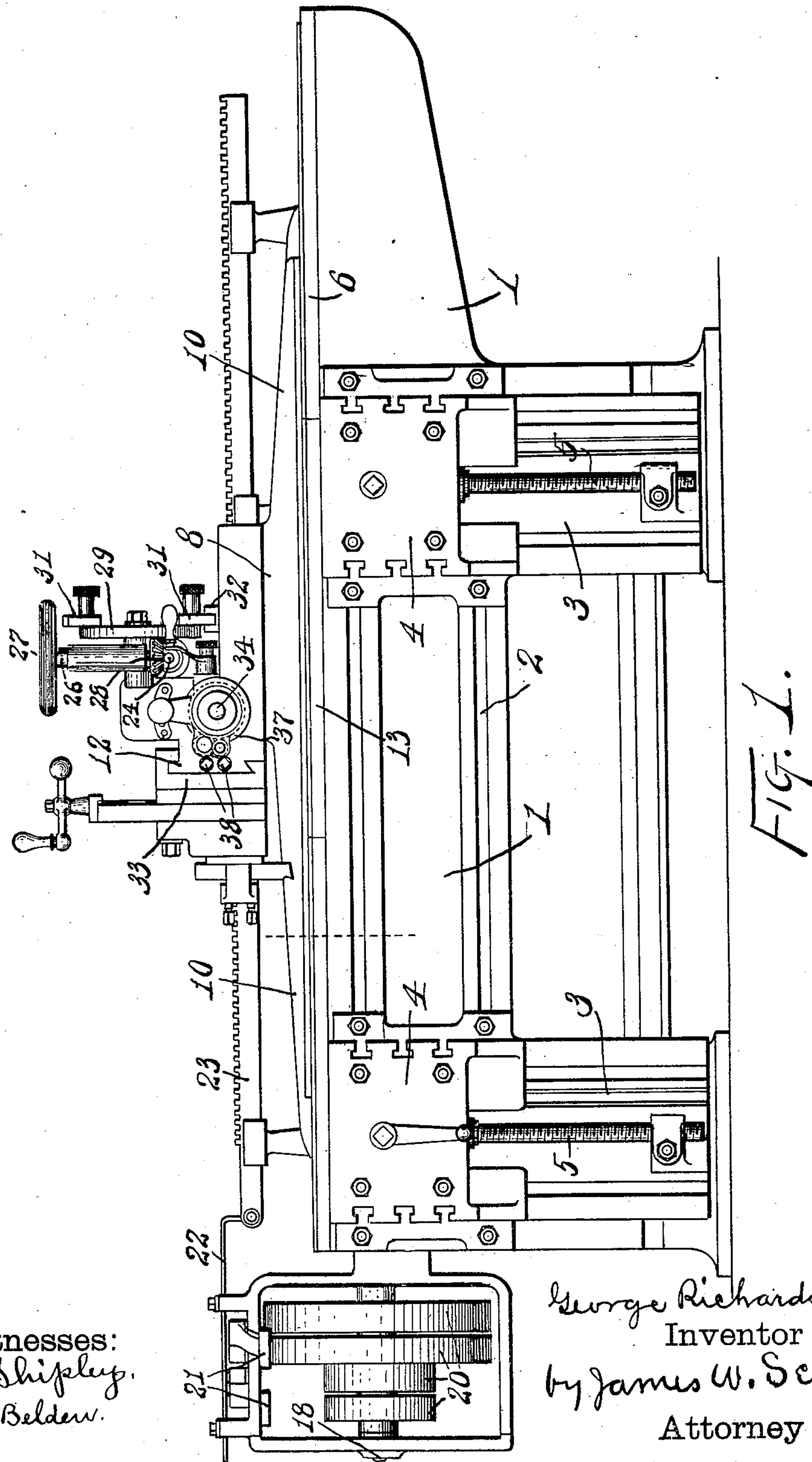
Patented Oct. 29, 1901.

G. RICHARDS.
METAL PLANING MACHINE.

(Application filed Apr. 22, 1901.)

No Model.)

4 Sheets—Sheet 1.



Witnesses:
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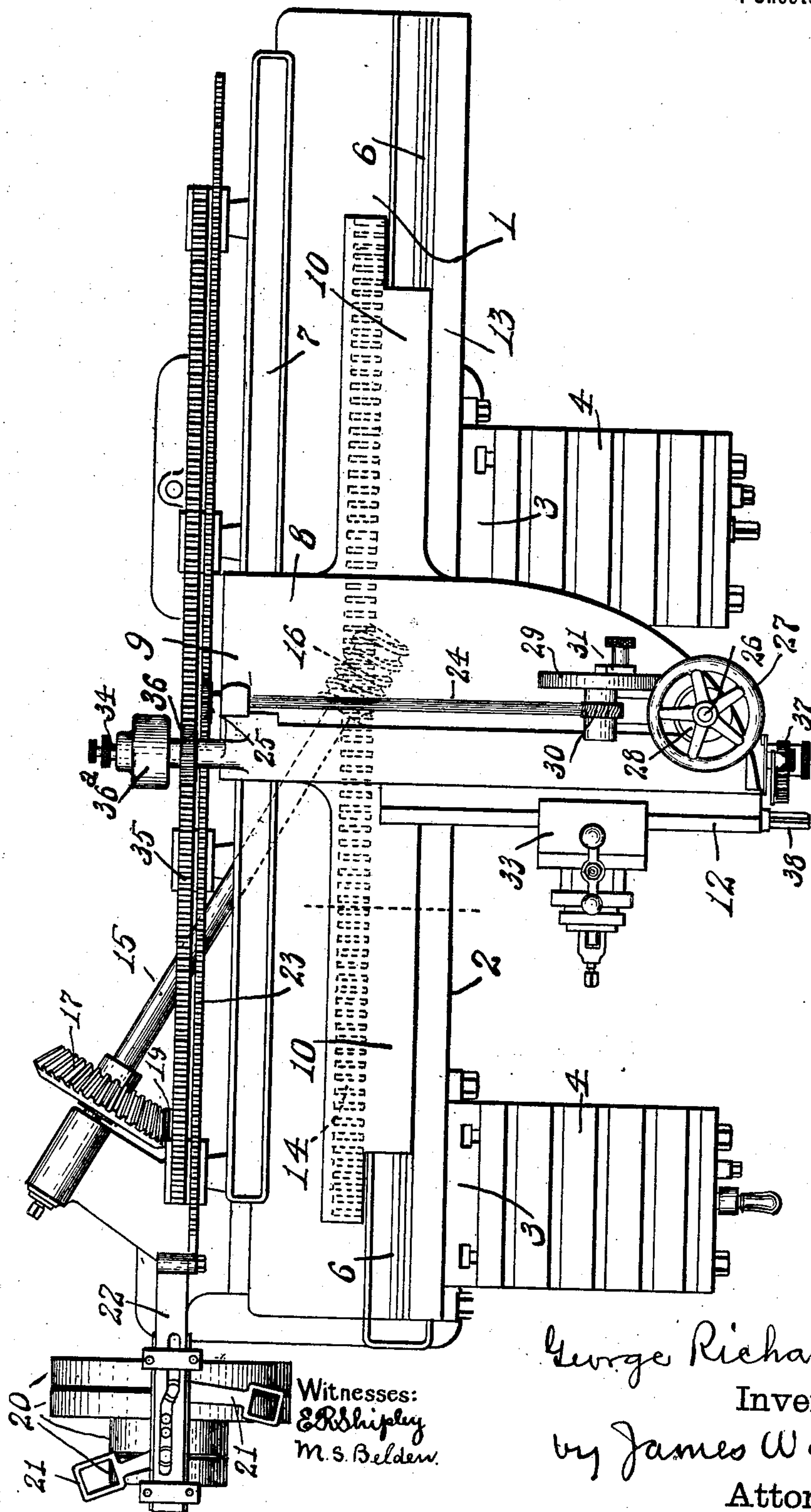
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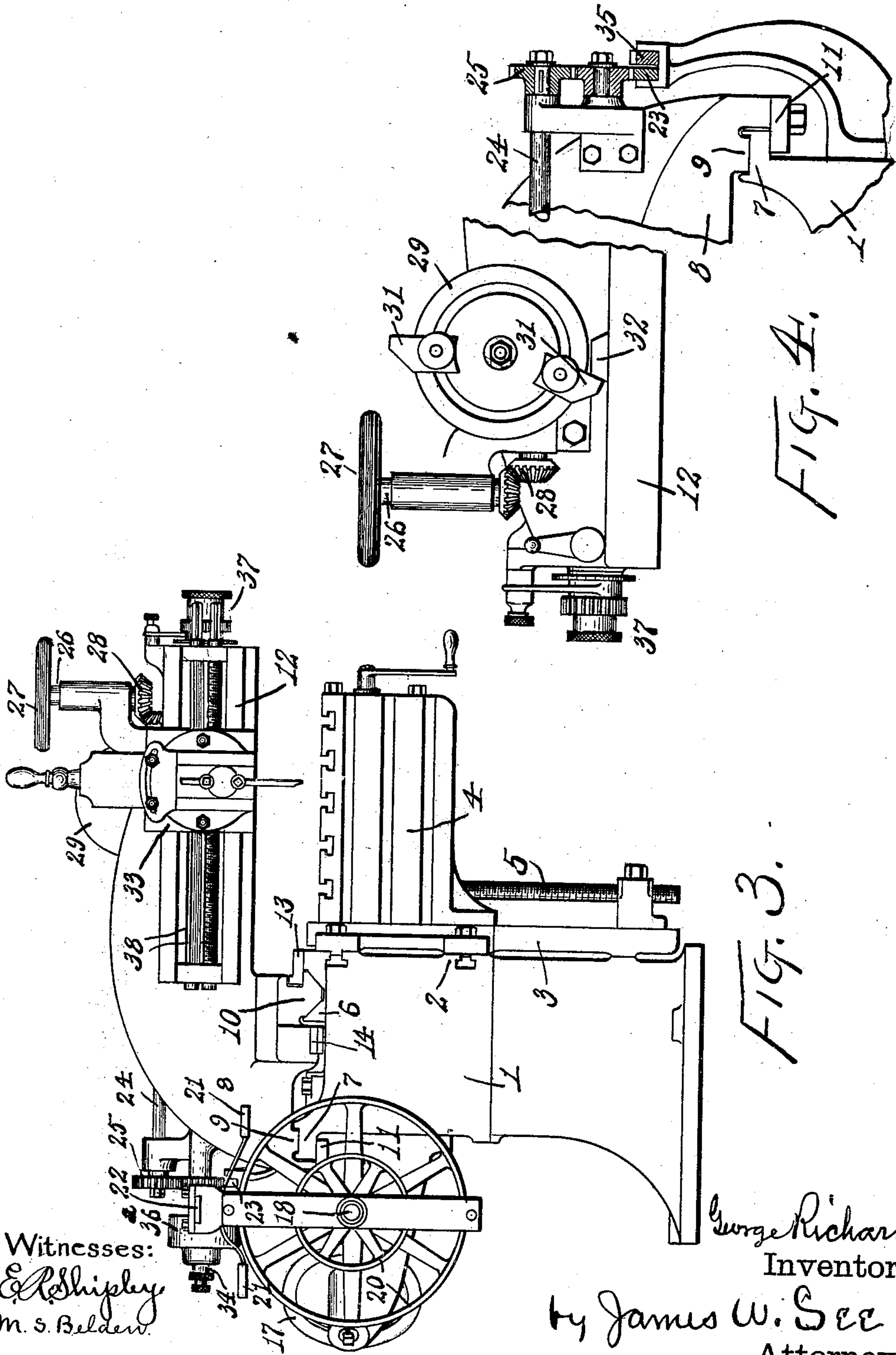
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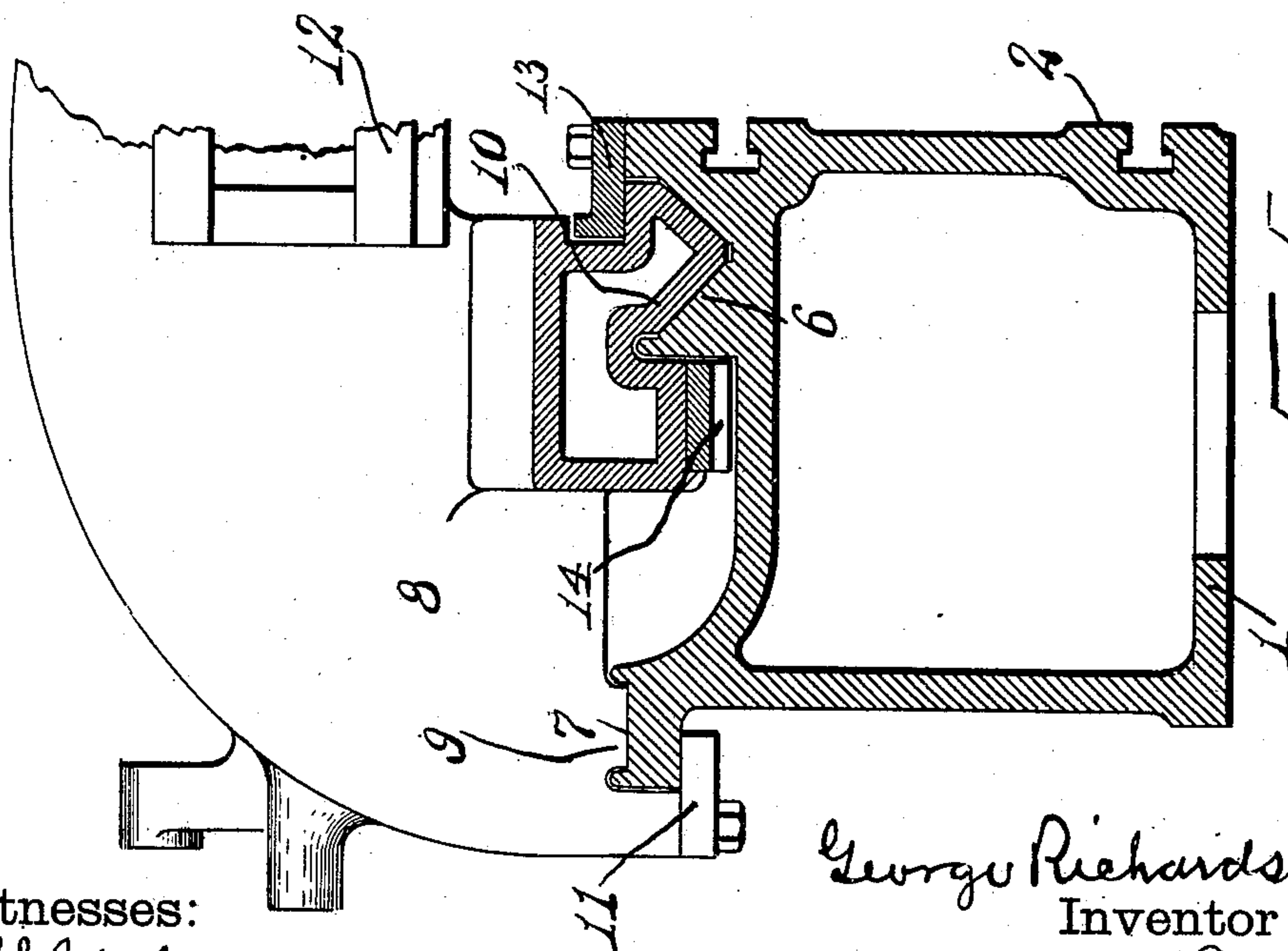
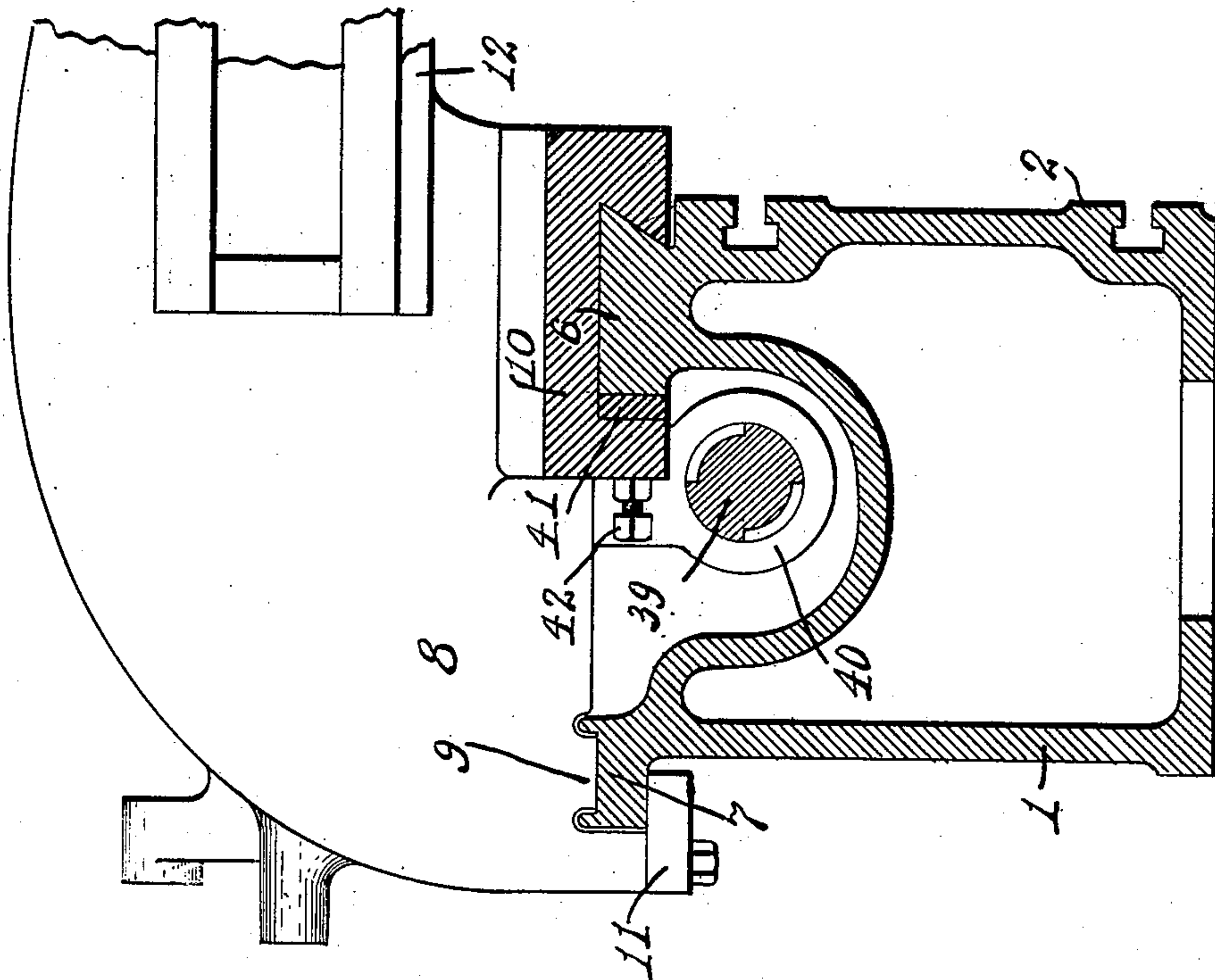
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UNITED STATES PATENT OFFICE.

GEORGE RICHARDS, OF BRUSSELS, BELGIUM.

METAL-PLANING MACHINE.

SPECIFICATION forming part of Letters Patent No. 685,348, dated October 29, 1901.

Application filed April 22, 1901. Serial No. 56,893. (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 Machines, of which the following is a specification.

This invention has been patented or patents applied for in Great Britain, No. 3,914, dated February 23, 1901.

This invention pertains to improvements in that class of metal-planing machines known as "open-side" planers and involving a bed, work-holding devices at the side of the bed, a carriage reciprocating upon the top of the bed, a rigid arm carried by the carriage and projecting out over the work-holding devices, and tool-holding appliances carried by and adjustable in and out upon the overhanging projecting arm. The accuracy of the work produced by this class of planers is dependent upon the accuracy of the sliding motion of the carriage upon the bed. Under working conditions a very peculiar set of strains are set up, the tendency of which in ordinary constructions is to interfere with accuracy of movement or the maintenance of accuracy. My present invention is designed to obviate these defects and also to improve the carriage-reciprocating mechanism and the carriage-reversing mechanism.

My invention will be readily understood from the following description, taken in connection with the accompanying drawings, in which—

Figure 1 is a front elevation of a planer of the class specified embodying my invention; Fig. 2, a plan of the same; Fig. 3, an end elevation of the same; Fig. 4, an elevation of portions of that face of the carriage and overhanging arm opposite the face appearing in Fig. 3; Fig. 5, a vertical transverse section of the bed and carriage; and Fig. 6, a view similar to Fig. 5, but illustrating a modified construction adapted for light or small machines.

In the drawings, ignoring Fig. 6 entirely for the present, 1 indicates the horizontal bed of the machine; 2, the longitudinally-slotted front face of the bed; 3, the table-brackets rigidly secured to the slotted face of the bed

and adjustable along the same; 4, a work-holding table firmly secured to each of the brackets 3 and vertically adjustable upon the same; 5, an elevating-screw and accessories carried by each bracket 3 and serving for the vertical adjustment of the tables thereon, all of the parts thus far referred to being the same as is usual in this class of planers; 6, a narrow longitudinal guideway disposed at the front of the top of the bed, this guideway, as shown in the drawings, (excluding Fig. 6,) having the cross-sectional form of an open-top V; 7, a narrow longitudinal guideway disposed at the extreme rear of the top of the bed, this guideway having a flat upper surface; 8, a comparatively narrow stiff carriage lying upon the bed, across the same, and projecting beyond the front of the bed, so as to overhang the work-holding tables; 9, a rear under portion of the carriage, resting upon and sliding upon the flat guideway 7, the longitudinal extent of the bearing of carriage portion 9 upon the guideway 7 being comparatively small, owing to the narrowness of the carriage, and this bearing portion having only vertical contact with the bed, being free from sidewise contacts, so that guideway 7 is a guide for the carriage only as regards vertical restraint; 10, wings extending from each edge of the carriage along over the guideway 6, the under portion of these wings and also the under portion of the carriage in line with them having a cross-sectional form accurately fitting the guiding V-surfaces of the guideway 6, the total length from end to end of the two wings 10 being preferably equal at least to the intended maximum travel of the carriage upon the bed; 11, a gib-strip secured to the lower rear portion of the carriage and clipping under the rear portion of the bed and serving to restrain or limit the rear portion of the carriage against upward motion; 12, the overhanging rail rigidly supported by the overhanging portion of the carriage and constituting the tool-carrying portion of the traveling carriage; 13, a gib-strip firmly but adjustably secured upon the front upper surface of the bed and clipping over an upwardly-projecting portion of the wings 10 and serving to restrain the front portion of the carriage against upward motion or to limit the up-

ward motion; 14, a rack disposed upon the under side of the carriage and extending the entire length of the wings 10, this rack being disposed between the guideways 6 and 7; 15, a shaft diagonally housed by the bed below the plane of the carriage; 16, a worm or so-called "spiral" pinion upon the inner end of shaft 15 and engaging the teeth of rack 14; 17, a bevel-gear on the outer portion of shaft 15; 18, a driving-shaft mounted at one end of the bed and parallel therewith, its axial line, if produced inwardly, intersecting the axis of shaft 15; 19, a bevel-pinion on the inner portion of shaft 18 and engaging bevel-gear 17; 20, two pairs of tight and loose pulleys on shaft 18 to receive motion from open and crossed belts; 21, a belt-shifter at each of the pairs of pulleys; 22, a longitudinally-sliding cam-plate for operating the belt-shifters; 23, a rack extending lengthwise of the bed and sliding in brackets at the rear thereof and connected with cam-plate 22, so that reciprocating motion of the rack will result in proper shifting of the belts; 24, a cross-shaft journaled on the carriage and extending along the rear of the overhanging rail portion thereof; 25, a pinion fast on the rear end of this shaft and having connection with rack 23; 26, a vertical shaft journaled at the outer end of the overhanging arm; 27, a hand-wheel on the upper end of this vertical shaft; 28, bevel-gearing connecting this vertical shaft with cross-shaft 24; 29, a disk disposed near the outer end of the overhanging arm at the rear of the rail and mounted on a short shaft with its axis parallel with the bed, this disk being provided on its face with an annular bolt-holding slot; 30, worm-gearing serving to impart motion from shaft 24 to disk 29, the proportioning of the gearing between disk 29 and rack 23 being such that as the carriage performs its maximum travel along the bed and rack 23 the disk 29 will be given less than a full rotation; 31, a pair of dogs bolted in the annular slot in the face of disk 29 and angularly adjustable with reference to each other, these dogs being preferably provided with knurled bolting devices, so that they may be readily adjustable upon the disk; 32, a fixed stop upon the overhanging arm in the path of the dogs; 33, a saddle arranged for sliding motion upon rail 12, this saddle carrying the swing, slide, apron-box, apron, and tool-holder, usual in planing-machines; 34, a feed-shaft journaled in the overhanging arm and extending from the front end thereof to a point some distance rearward of the bed; 35, a fixed rack rigidly supported at the rear of the bed and extending the general length thereof; 36, a pinion loose on the rear portion of feed-shaft 34 and engaging fixed rack 35; 36^a, a friction-box of the construction usual in planer feeding devices, serving to bind pinion 36 frictionally to feed-shaft 34, so as to tend to impart rotary motion to the feed-shaft in one direction or the other, according to the direction of travel of the carriage with

reference to fixed rack 35; 37, a ratchet device, tumbler, &c., at the outer end of feed-shaft 34 and serving to transmit proper feeding motion to the feed-screw and down feed-rod of the rail, these feeding devices, and indeed all of the devices pertaining to the feed, being of a construction not peculiar to the present invention and not claimed herein, and 38 the feed-screw and down feed-rod of the rail.

The feeding devices are not illustrated or described in detail, because the present invention is not concerned with them. It is sufficient to say that as the carriage traverses the bed the fixed rack 35 causes the feed-shaft 34 to turn a measured distance in opposite directions at the opposite ends of the stroke of the carriage, which motion of the feed-shaft is imparted to the feed-screw and down feed-rod of the rail or either of them in appropriate direction of transmission of motion through the medium of the ratchet and tumbler device 37.

Heretofore in machines of this type the motion has been transmitted to the carriage and overhanging arm through the medium of a screw journaled in the bed. In the present case the carriage by reason of the wing extensions 10 has a length at least equal to the maximum travel of the carriage, and hence motion may be imparted to the carriage through the medium of a rack. The rack may be actuated through any suitable pinion and driving mechanism; but my preference is to employ the diagonal shaft 15 and spiral pinion 16. By reason of the peculiar guiding system, hereinafter more fully explained, the transmission of motion to the carriage by means of a rack results in a peculiarly efficient operation of the machine, it being understood, however, that the peculiar merits of the guiding system are largely independent of the mechanism employed for giving the traveling motion to the carriage.

Referring to Fig. 5, attention is called to the fact that the accurate guiding of the carriage upon the bed and the consequent accuracy of the work produced are due to the guiding contact of long wings 10 with front guideway 6, the wings having downward contact with the guideway and the contact being maintained by the gravity of the carriage. Gib-strip 13 is merely a precautionary device and in practice will not have working contact with the carriage or wings. The cooperation between parts 9 and 7 is for supporting rather than for guiding purposes, and the bearing of carriage part 9 upon flat guideway 7 is made short and free from side contacts in order to avoid as far as possible influencing the guide action of the front guide 6. Clip-strip 11 is a precautionary device without normal working contact with the bed. It will thus be seen that accuracy of guiding motion is obtained at a single long narrow guideway as near as practicable to the tool, the length of the bearing of the carriage in the guide-

way being greatly in excess of the distance from the guideway to the tool even when the tool is at the outer extremity of the overhanging arm. By this system of guiding the range of utility of this type of planer becomes greatly extended, and a degree of accuracy can be obtained and maintained which has not been heretofore practicable.

The guiding of the carriage by the comparatively narrow front guideway is founded largely upon the gravity of the carriage and carriage parts, and it results that in the case of small or light machines the gravity of the carriage and carriage parts may not be sufficient to maintain continued proper contact of the guiding parts when taking heavy cuts. Such small or light machines may be provided for by gibbing the carriage to the narrow front guideway, as illustrated in Fig. 6, in which it will be seen that the narrow front guideway 6 presents a flat top, a flat rear, and an undercut front portion, the carriage and wings having an appropriate cross-sectional form. The rear portion of the wings carries the shoe 41, adjusted by the set-screws 42 and engaging the rear portion of the guideway and causing the front portion of the wings where they engage the undercut portion of the guideway 6 to hold the carriage and wings down properly upon the guideway. By this means, even with the small and light machines, there is still retained the system of a single narrow front guideway on which the carriage has an extremely long bearing by reason of the wings, the rear portion 9 of the carriage where it engages the flat support 7 being of such limited longitudinal extent and so free from side contacts as to leave the front guideway uninfluenced. In this modification, as illustrated in Fig. 6, the carriage is shown as being reciprocated by means of the usual longitudinal screw 39, engaging a nut 40, attached to the carriage. The screw may of course be used in either case, and so, also, may the rack system of driving be employed in either case.

Regarding the reversing mechanism, the carriage being in motion in a given direction cross-shaft 24 and disk 29 turn continuously in a corresponding direction, rack 23 being stationary. The motion continues till one of the dogs 31 makes contact with stop 32, thus arresting the motion of the disk and cross-shaft 24, the result being that pinion 25, now held stationary, enforces an endwise movement of rack 23, thus sliding cam-plate 22 and causing the shifting of the belts and the consequent reversal of the carriage motion. The same action takes place when the carriage is moving in the opposite direction, the other dog in such case coming into action. The length of stroke of the carriage and the points on the bed at which the reversal shall take place can be adjusted by adjusting the dogs upon the disk. During the movement of the carriage the hand-wheel 27 is in motion, and the operator may arrest the motion of

this hand-wheel at any time, thus shifting the belts to position of reversal or to idle position, if he wishes to arrest the motion of the carriage. The carriage being stationary, the operator may turn the hand-wheel in appropriate direction and shift the belts to cause the carriage to move in such direction as may be desired.

I claim as my invention—

1. In a planing-machine, the combination, substantially as set forth, of a bed, work-holding devices at the side thereof, a carriage adapted to reciprocate along the top of the bed, an arm upon the carriage overhanging said work-holding devices, tool-holding devices mounted on said arm, a longitudinal guideway disposed at the front upper portion of the bed and provided with upwardly and laterally presenting guiding-surfaces, a longitudinal guideway disposed at the rear upper portion of the bed and provided with an upwardly-presenting surface, wings upon the front portion of said carriage engaging said front guideway of the bed, a rear portion of said carriage engaging the rear guiding-surface of the bed and having a bearing thereon longitudinally less in extent than the bearing at said wings, and mechanism for reciprocating the carriage upon the bed.

2. In a planing-machine, the combination, substantially as set forth, of a bed, work-holding devices at the side thereof, a carriage adapted to reciprocate along the top of the bed, an arm upon the carriage overhanging said work-holding devices, tool-holding devices mounted on said arm, a longitudinal guideway disposed at the front upper portion of the bed and provided with upwardly and laterally presenting guiding-surfaces, a longitudinal guideway disposed at the rear upper portion of the bed and provided with an upwardly-presenting surface, wings upon the front portion of said carriage engaging said front guideway of the bed and having a length equal to the maximum travel of the carriage upon the bed, a rear portion of said carriage engaging the rear guiding-surface of the bed and having a bearing thereon longitudinally less in extent than the bearing at said wings, and mechanism for reciprocating the carriage upon the bed.

3. In a planing-machine, the combination, substantially as set forth, of a bed, work-holding devices at the side thereof, a carriage adapted to reciprocate along the top of the bed, an arm upon the carriage overhanging said work-holding devices, tool-holding devices mounted on said arm, a longitudinal guideway disposed at the front upper portion of the bed and provided with upwardly and laterally presenting guiding-surfaces, a longitudinal guideway disposed at the rear upper portion of the bed and provided with an upwardly-presenting surface, wings upon the front portion of said carriage engaging said front guideway of the bed and having a length equal to the maximum travel of the carriage

upon the bed, a rear portion of said carriage engaging the rear guiding-surface of the bed and having a bearing thereon longitudinally less in extent than the bearing at said wings, 5 a longitudinal rack carried by said wings, a pinion engaging said rack, and mechanism for imparting motion to said pinion.

4. In a planing-machine, the combination, substantially as set forth, of a bed, work- 10 holding devices at the side thereof, a carriage adapted to reciprocate along the top of the bed, an arm upon the carriage overhanging said work-holding devices, tool-holding devices mounted on said arm, a longitudinal 15 guideway disposed at the front upper portion of the bed and having a V-shaped cross-section, a longitudinal guideway disposed at the rear upper portion of the bed and having an upwardly-presenting surface, a rear portion 20 of the carriage engaging downwardly upon said rear guideway free from lateral contacts, and wings disposed at the front of the carriage and engaging said V-shaped front guideway and having a length of bearing in said 25 front guideway greater in extent than the length of bearing of the rear portion of the carriage upon said rear guideway.

5. In a planing-machine, the combination, substantially as set forth, of a bed, work- 30 holding devices at the side thereof, a carriage adapted to reciprocate along the top of the bed, an arm upon the carriage overhanging said work-holding devices, tool-holding devices mounted on said arm, a longitudinal 35 guideway disposed at the front upper portion of the bed and provided with upwardly and laterally presenting guiding-surfaces, a longitudinal guideway disposed at the rear upper portion of the bed and provided with an upwardly-presenting surface, wings upon the 40 front portion of said carriage engaging said front guideway of the bed, a rear portion of said carriage engaging the rear guiding-surface of the bed and having a bearing thereon longitudinally less in extent than the bear- 45 ing at said wings, means for restraining the upward motion of said wings relative to said front guideway, and mechanism for reciprocating the carriage upon the bed.

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Witnesses:

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