

No. 638,274.

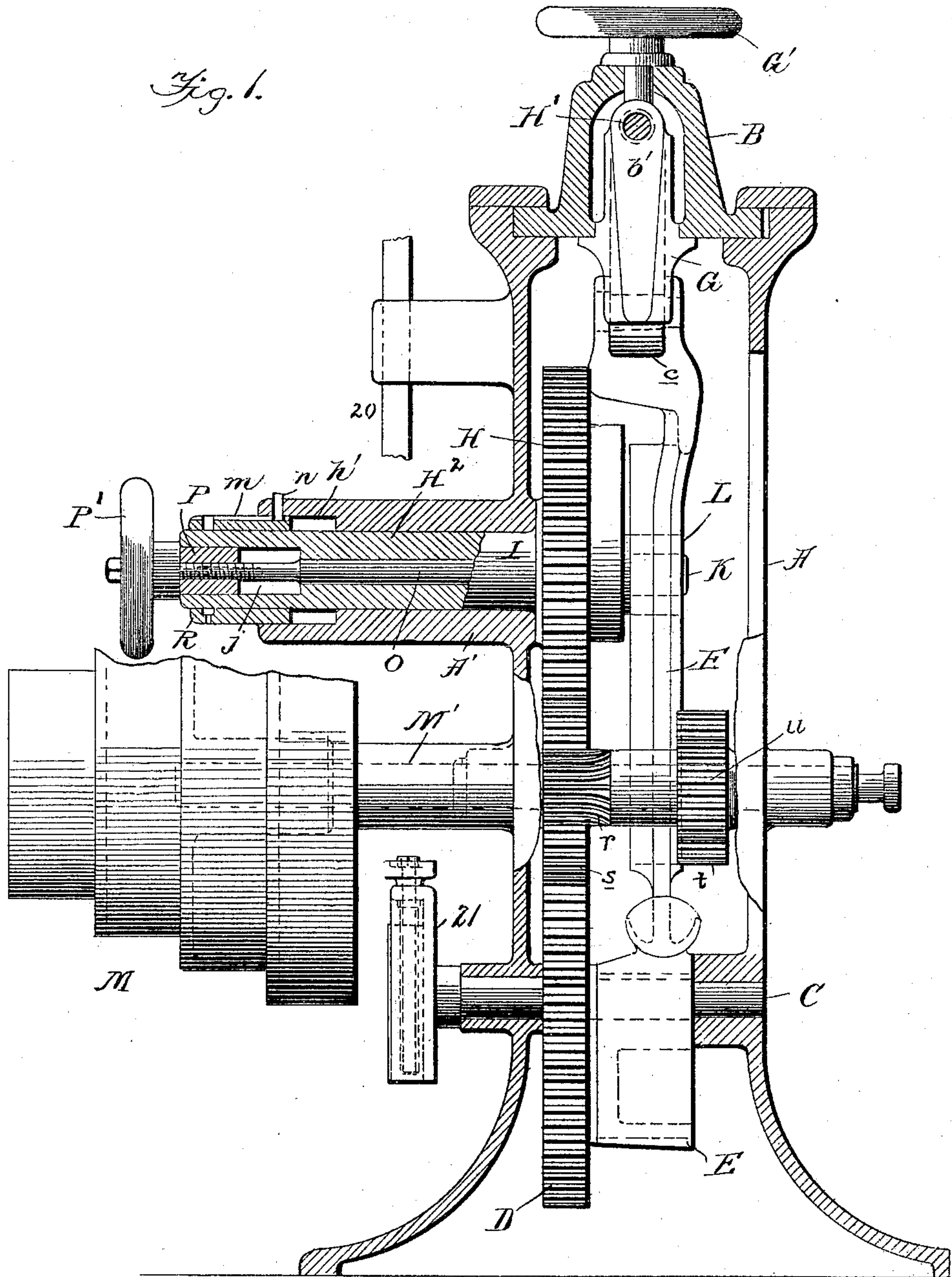
Patented Dec. 5, 1899.

S. W. PUTNAM & S. W. PUTNAM, JR.  
METAL WORKING MACHINE.

(Application filed June 23, 1899.)

(No Model.)

5 Sheets—Sheet 1.



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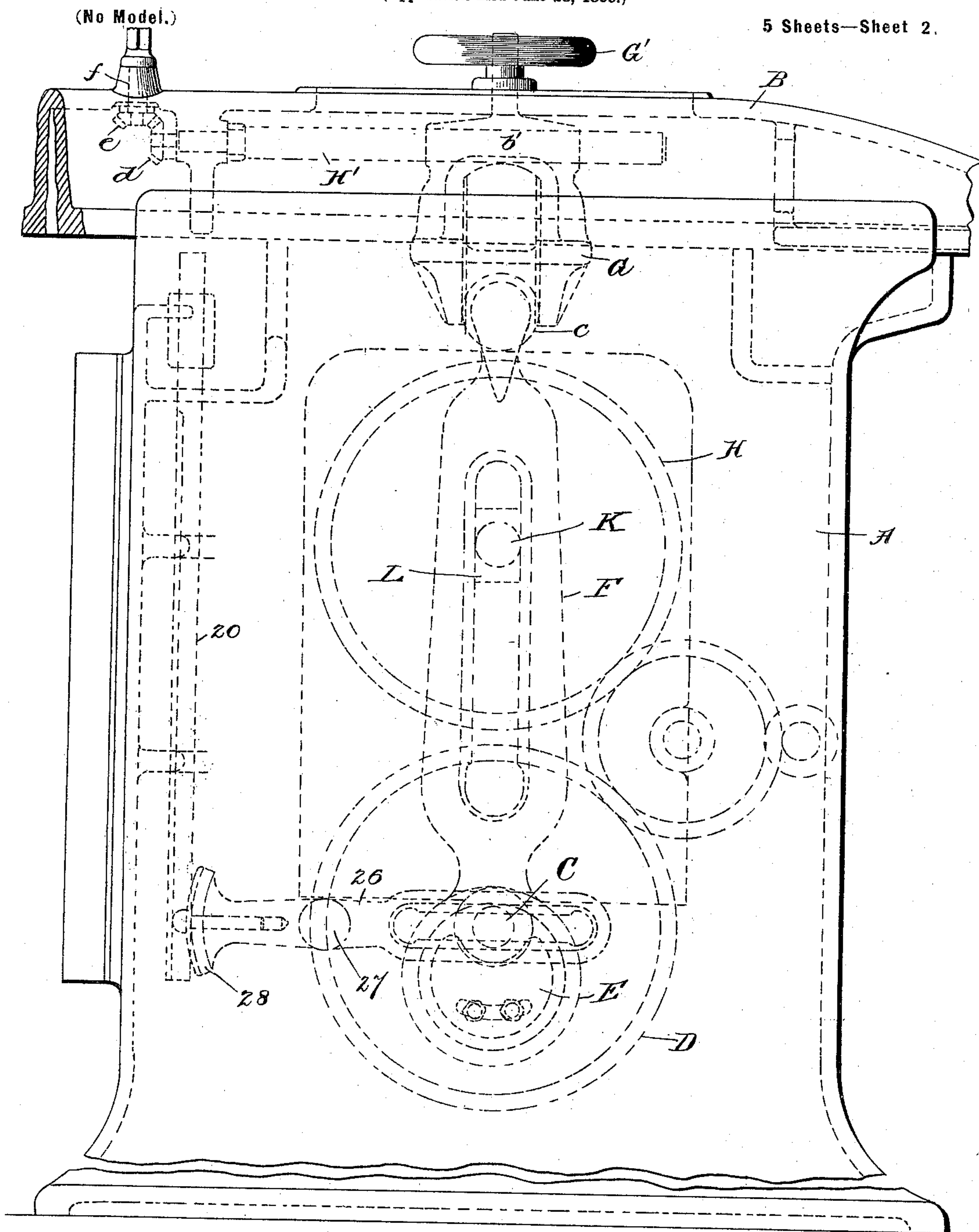


Fig. 2.

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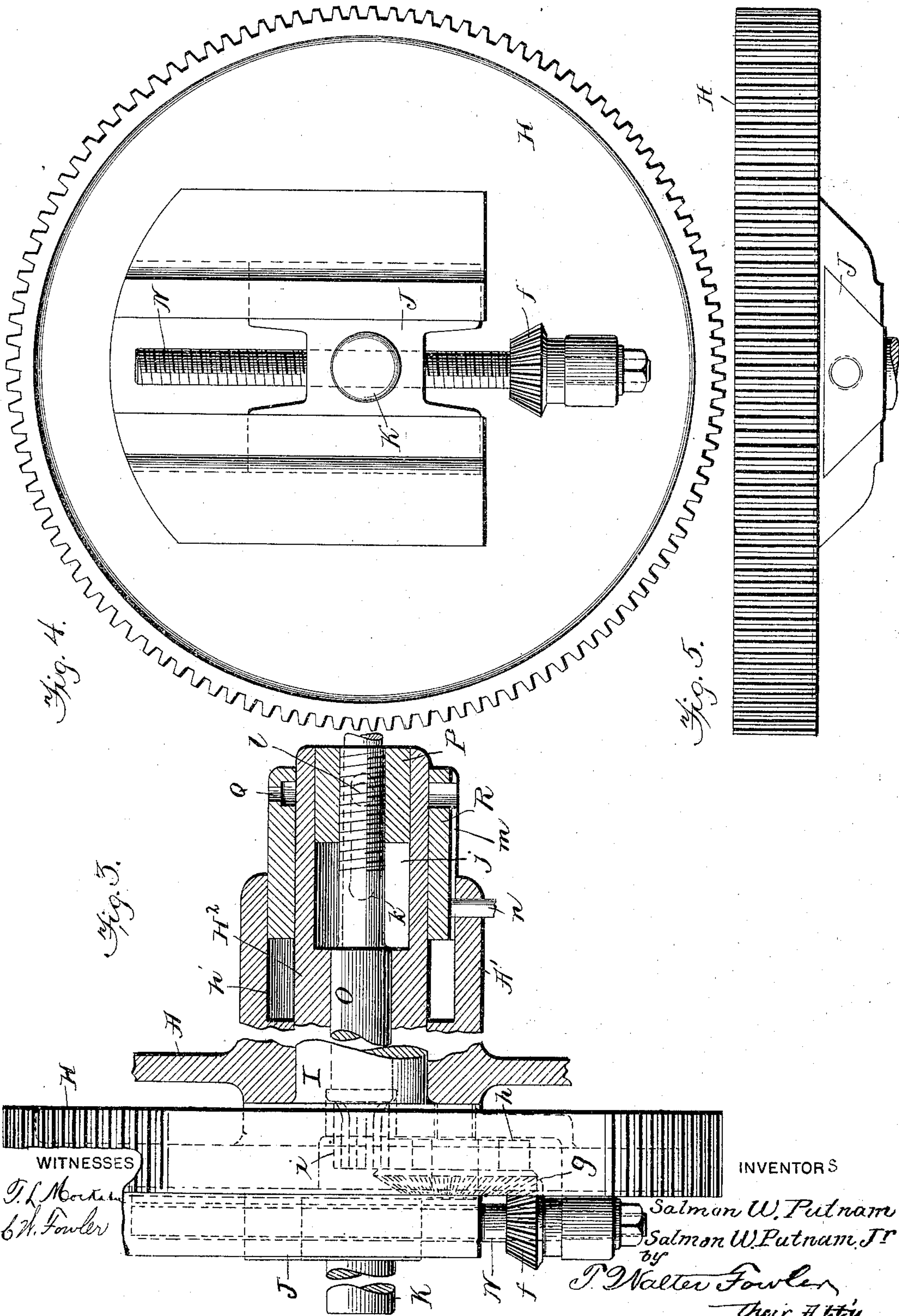
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5 Sheets—Sheet 3.



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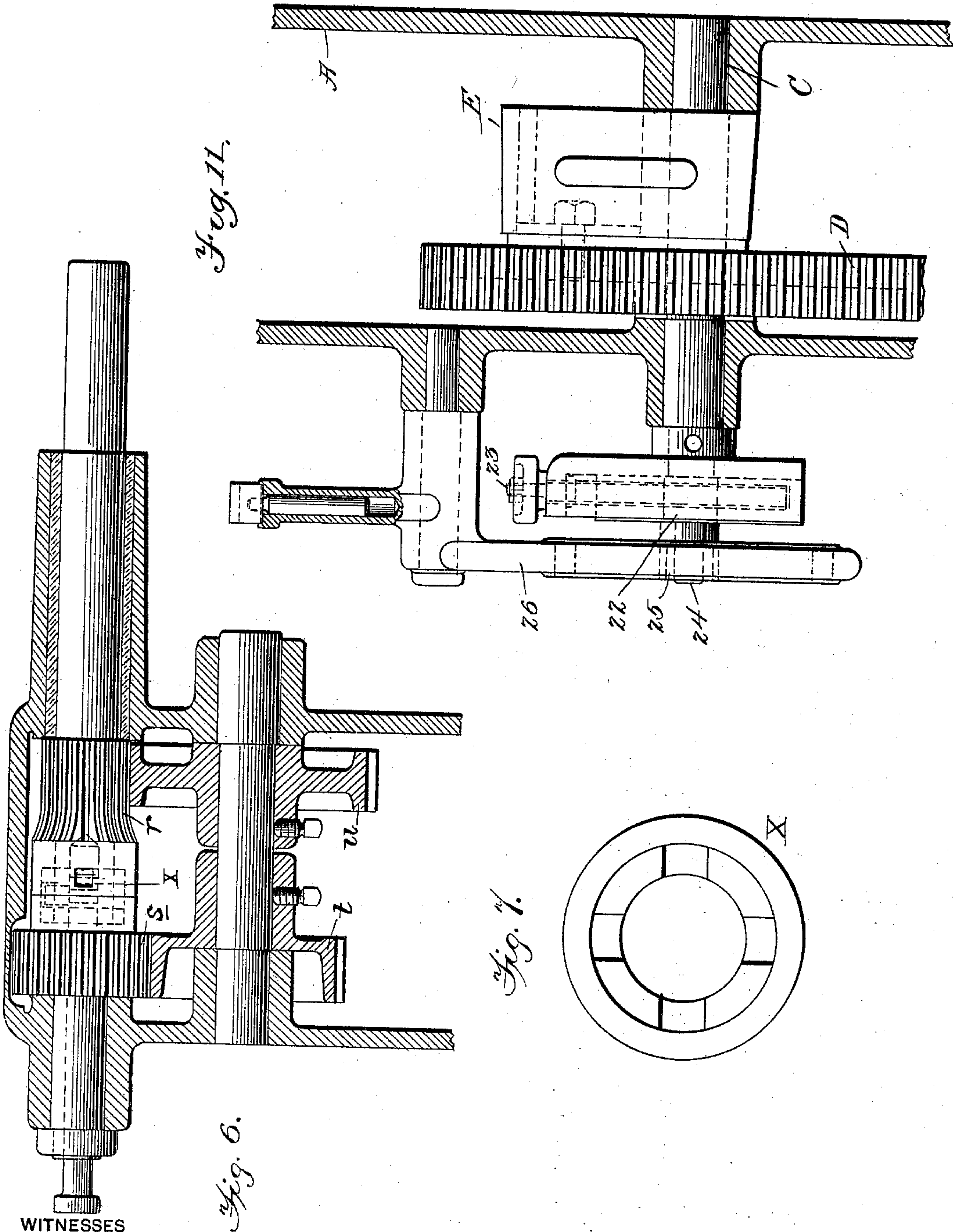
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5 Sheets—Sheet 4.



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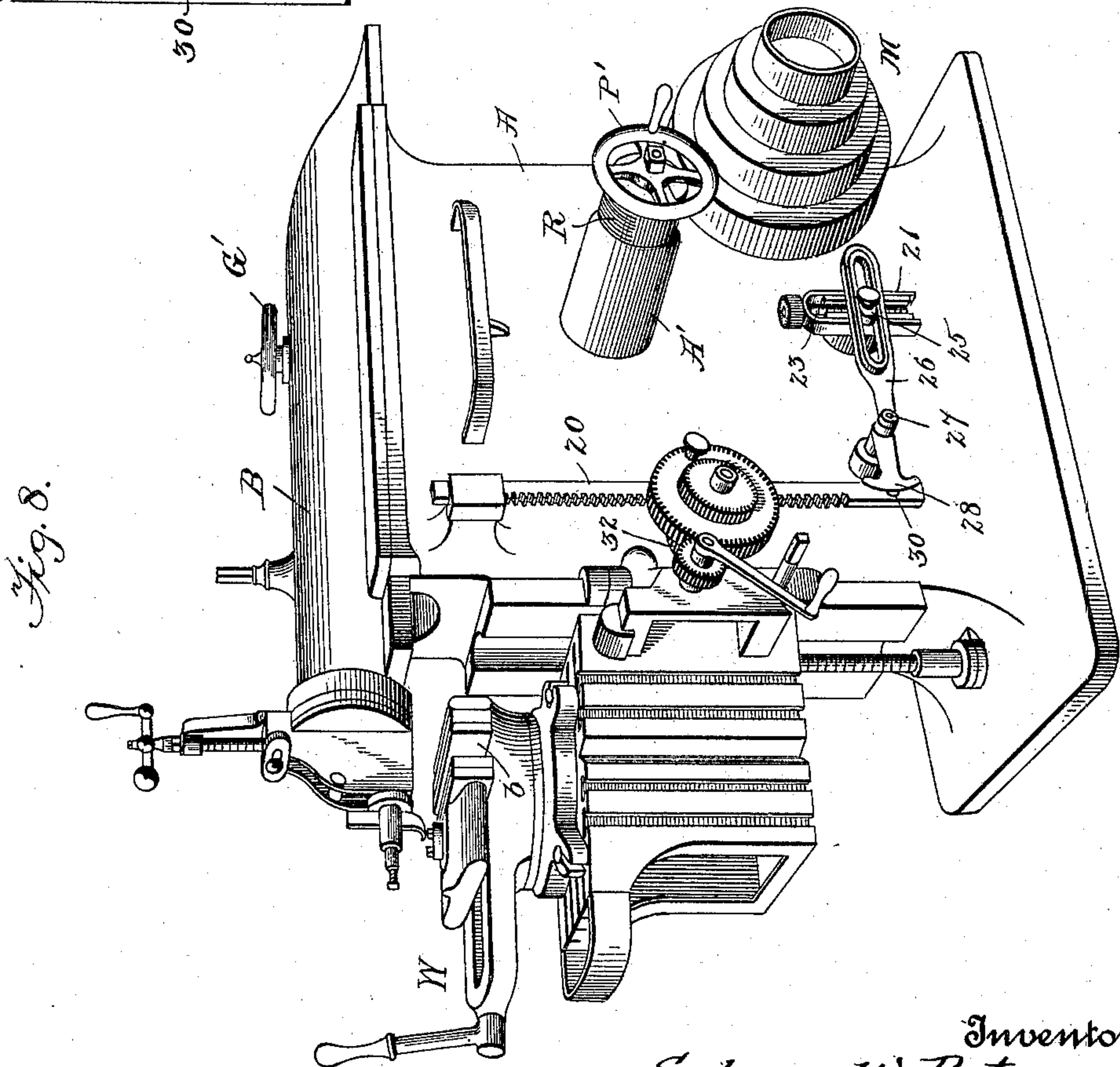
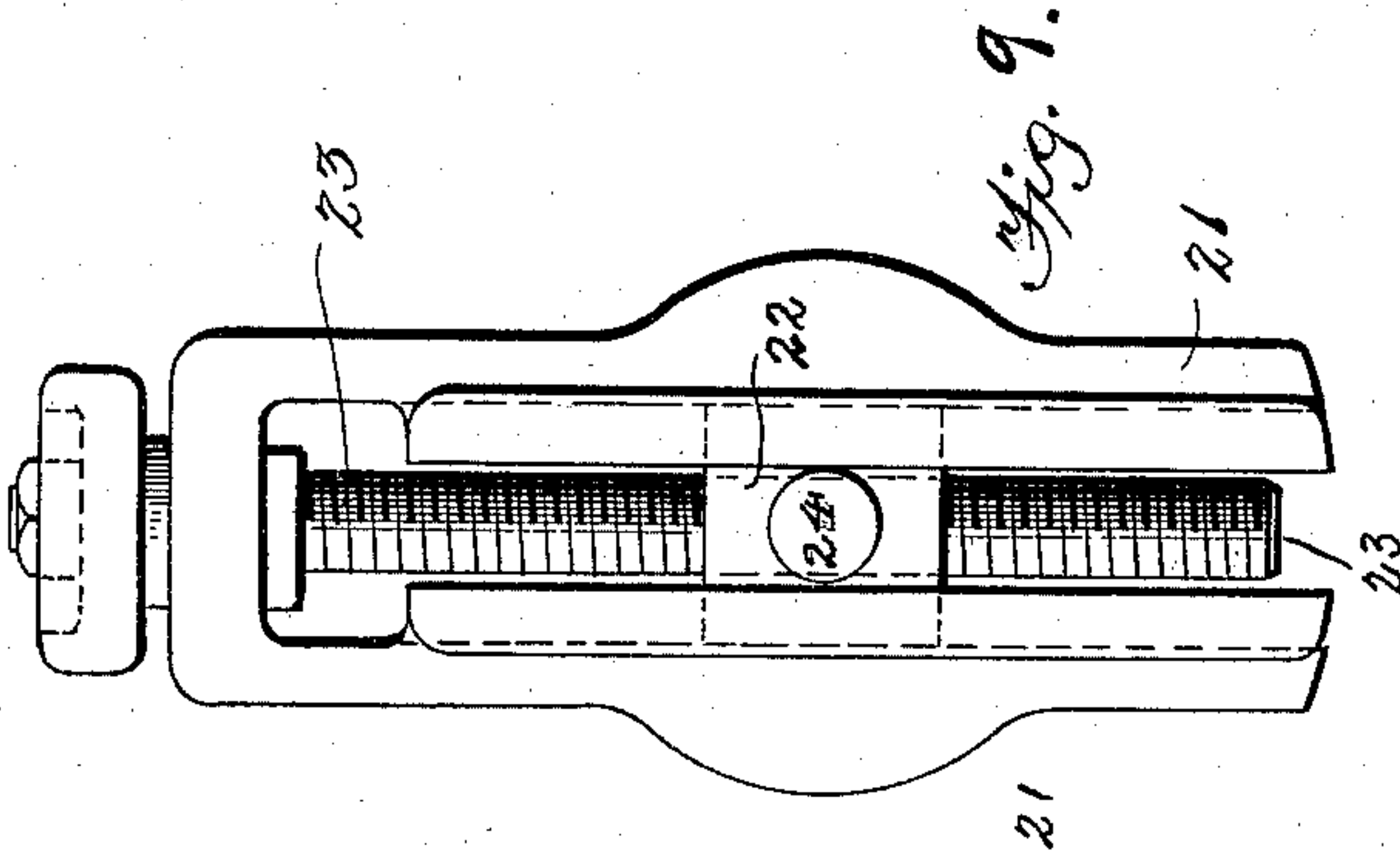
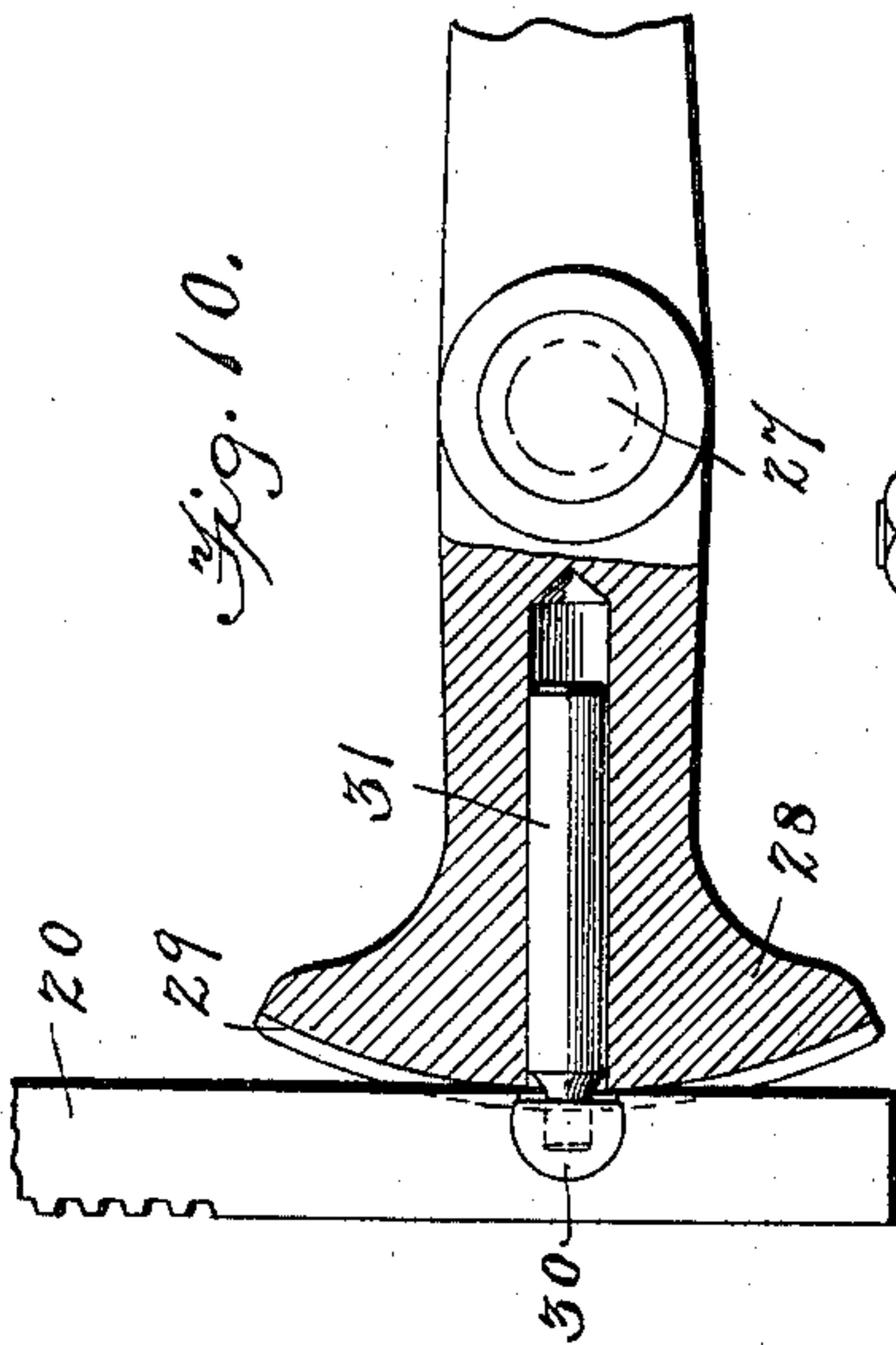
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5 Sheets—Sheet 5.



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# UNITED STATES PATENT OFFICE.

SALMON W. PUTNAM AND SALMON W. PUTNAM, JR., OF FITCHBURG,  
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## METAL-WORKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 638,274, dated December 5, 1899.

Application filed June 23, 1899. Serial No. 721,613. (No model.)

*To all whom it may concern:*

Be it known that we, SALMON W. PUTNAM and SALMON W. PUTNAM, Jr., citizens of the United States, residing at Fitchburg, in the  
5 county of Worcester and State of Massachusetts, have invented new and useful Improvements in Metal-Working Machines, of which the following is a specification.

Our invention relates particularly to a  
10 driving and returning mechanism intended for application to a shaping, slotting, or other machine employing a vibrating or reciprocating ram or slide to which is secured a cutting or working tool. In such mechanisms  
15 the usual cutting-stroke of the ram or slide is of practically a uniform or constant velocity, while the "quick-return" stroke is unusually accelerated, the advancing and receding stroke of the ram or slide being such that  
20 the minutely-retarded portion at each end of the stroke is utilized to overcome the momentum of the ram and actuate the feeds, which operate without shock or jar. Various quick-return mechanisms have heretofore been em-  
25 ployed and are in use and intended to accomplish the desired result—namely, an even cut and an accelerated quick return of the ram or slide—most of which mechanisms, however, are complicated in construction, easily  
30 disarranged, expensive, and give but partially-satisfactory results.

Our invention is believed to differ, essentially, from anything now in use by reason of its simplicity of parts, its endurance, and by  
35 producing theoretically and practically better working results.

Our invention consists, essentially, in the employment of a pitman or link mechanism connected with the ram and also with a "live  
40 eccentric," which is a member of the driving mechanism, and means whereby the longitudinal position of the ram or slide may be adjusted or located with reference to a certain line or cut in the work.

Our invention further consists in a telescopic or adjustable indexed gage which admits of a "sight" adjustment to indicate the  
45 amount of ram traverse.

The invention further consists in the parts  
50 and in the constructions, arrangements, and

combinations of parts, which we will hereinafter describe and claim.

In the accompanying drawings, forming part of this specification and in which like letters and figures of reference indicate correspond-  
55 ing parts, Figure 1 is a part elevation and part sectional view of a shaping-machine embodying our invention. Fig. 2 is a side elevation of the machine, showing operating parts in dotted lines. Fig. 3 is an enlarged sectional  
60 view of the mechanism for obtaining the sight adjustment of the link-block. Fig. 4 is a face view of the upper driving-gear, showing the sliding or adjustable block with its trunnion. Fig. 5 is an edge view of Fig. 4. Fig. 6 is an  
65 enlarged sectional detail of the clutch-gearing. Fig. 7 is a face view of one of the clutch members. Fig. 8 is a perspective view of the machine. Figs. 9, 10, and 11 are details to  
70 be referred to.

In the drawings we illustrate the conventional type of shaping-machine; but it will be understood that the invention is not restricted to this type of machine only, but is  
75 applicable to any shaping, slotting, or other machine employing a ram, slide, or carriage to which a cutting or working tool is secured or any machine in which it is desirable to have a cutting-stroke of uniform or constant  
80 velocity and an unusually-accelerated or quick-return stroke.

The frame A of the machine shown is constructed in any desired manner and will have such design, size, and general characteristics  
85 as may suit the purposes or the character of the work to be performed by the machine.

As herein shown, the frame A is hollow and forms a housing or inclosure for the driving mechanism, and its upper portion is provided  
90 with guides or channels for the reciprocating ram B, to which is secured in any appropriate manner a cutting or working tool adapted to shape, slot, or otherwise operate upon the piece of material held within a vise or the  
95 jaws b of a rest or other work-holder W.

Suitably journaled in the lower portion of the frame or casing of the machine is a transverse shaft C, to which is fixed a driving-gear D, to the face of which is secured an eccentric E, said eccentric being affixed to and made  
100



a rigid part of the driving-gear, (the eccentric may be fixed or made adjustable relative to its position of the gear,) which is preferably of the same size as the driving "link-block" gear we will presently describe. The eccentric being thus secured to the driving-gear is what we term a "live eccentric," and to this eccentric the lower end or portion of the pitman F is appropriately connected, this pitman having a longitudinally-extending guide or slot and the upper end of the pitman being connected to the under side of the ram by means of a jaw-nut G, held in position by any suitable mechanical device, as a hand-wheel on a stem G' of the nut. As herein shown, the jaw-nut consists of a body *b'*, having spaced jaws forming a guide between which the upper end of the pitman is located, said end of the pitman preferably carrying a roller *c*, (or its equivalent sliding block,) to the movement of which, caused by the sliding vibration or oscillation of the eccentric pivot, together with the sliding link-block pin or trunnion hereinafter described, is confined the jaw-nut, through which is transmitted to the ram more or less motion. The jaw-nut is designed to be operated to adjust its position for the purpose of changing the longitudinal position of the ram or locating it to a certain line of cut in the work by means of a screw H', mounted horizontally in the ram and passing through a threaded opening in the body of the jaw-nut and having secured to one end a bevel-pinion *d*, adapted to mesh with a similar pinion *e* on a shaft or stem *f*, which passes through the top of the ram and has its exposed end adapted to be engaged by a wrench or other tool, whereby the pinion *e* may be turned and its motion transmitted, through its companion pinion and the screw, to shift the jaw-nut into the desired position.

The upper driving-gear H, which we term the "sliding-nut" gear, is mounted on a transverse shaft I, parallel with and above the shaft of the lower driving-gear, which carries the eccentric, and on the face of the upper gear H is slidably mounted in a dovetailed groove or guide a sliding or adjustable nut J, having a projecting pin or trunnion K, which fits loosely an opening in link-block L, adapted to slide within the slotted portion of the pitman and to determine the amount of stroke or ram traverse. This link-block may be securely held in position by any suitable mechanical device.

The upper driving (sliding-nut) gear and the lower (eccentric) gear are driven by a cone-pulley M, mounted on a shaft M', through which shaft and pinion-gears *r*, *s*, *t*, and *u* (shown in detail in Fig. 6) the power of the cone-pulley is transmitted to the upper and lower driving-gears. The cone-pulley (for convenience) is preferably located on the working side of the machine, and to obtain a quick action of the motive parts and also to avoid running the driving-cone at an excess-

ive velocity for short strokes of ram, &c., we use pinion-gears of different diameters and which are made to run free on the driving-shaft, except when they are locked by an internal clutch X, which affects but one pinion at the same time, leaving the other (or others) to remain inoperative.

To enable the operator to conveniently and accurately determine and adjust the amount of stroke or traverse of the ram, we prefer to use a telescopic indexed gage, which admits of sight adjustment either when the machine is running or is at rest. This portion of our invention is fully shown in the enlarged Figs. 3 and 8, and it includes the following: The sliding nut J has its trunnion (or pin) connected with the link-block L in the pitman, and through this sliding nut passes a screw N, to which is secured a beveled pinion *f*, Figs. 3 and 4, which meshes with a similar gear *g*, which carries or upon the shaft of which is mounted a gear *h*, which meshes with a pinion *i* on the end of a shaft O, the outer end of which is provided with a hand-wheel P' or equivalent operating device.

At one side the frame of the machine is extended to form a long bearing or boss A' for a similarly long hub H<sup>2</sup> of the upper driving-gear H, the outer end of the bearing or boss being bored out to form an enlarged chamber *h'* and the outer end of the said hub being likewise bored out to form an enlarged chamber *j*, and the shaft O is threaded and receives an internally-threaded nut P, which is capable of longitudinal movement in the enlarged chamber of the hub. In this long hub of the upper driving-gear is made a longitudinal slot *k*, and a pin *l*, projecting from the nut P, passes through this slot and has its end entering an annular groove Q, made in the inner face of an adjustable piece R, which is fitted to telescope with the enlarged chamber in the long bearing or boss A', as plainly shown in Figs. 1 and 3. The telescopic piece R has a longitudinal groove *m*, and a fixed pin *n* in the bearing or boss A' has its inner flattened end engaging this slot to prevent the piece R from rotating, but allowing of its longitudinal adjustment in the chamber of the bearing. From the description of these parts it will be apparent that when the hand-wheel P' is turned it rotates the shaft O, and the pin on the nut P causes the telescopic piece R to be longitudinally moved, this piece having preferably a series of graduations on its upper side to indicate by its relative position to the outer edge or face of the long bearing or boss A' (which is immovable) the precise length of stroke of the ram.

The turning of the hand-wheel is transmitted through the gears *i*, *h*, *g*, and *f* to the screw N and finally to the sliding nut J, whereby the position of the latter on the upper driving-gear is determined. Thus by turning the hand-wheel the stroke of the machine is determined by effecting the position of the sliding block in the pitman, and a sight



adjustment is obtained to accurately determine in a most convenient manner the amount of stroke or traverse of the ram.

In Figs. 2, 8, 9, and 10 we show a vertical rack-bar 20 to impart feed to the work relative to the cutting-tool, which is attached to and carried by the ram. On the shaft is mounted a slotted piece 21, (see Fig. 9,) in which is adjustably mounted a nut 22, the position of which in the slot of said piece 21 is determined by means of a screw 23, passing through the nut. This nut has a trunnion or stud 24, which carries a roller 25 or equivalent sliding block, Fig. 8, adapted to operate in a slot formed in a rocker-arm 26 exterior to the frame or case and fulcrumed at 27, the outer end of this rocker-arm having a segmental head 28, adapted to engage the back of the rack-bar 20, and having flanges 29 to embrace the sides of said rack. Within the back of the rack is mounted an oscillatory cylindrical block 30, and within the head end of the rocker-arm 26 is fitted a plunger or rod 31, Fig. 10, which engages the block 30 and is adapted to slide in and out of the rocker-arm according to the amount of throw that is given the same. The vertical rack-bar 20 is held up against the segmental head of the lever or arm by the action of the rack-pinion 32, which works on the opposite or toothed side of the rack. The object of this construction is to give a reciprocating movement to the rack to impart feed to the work relative to the cutting-tool attached to the ram.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a machine of the character described, having a reciprocating ram or slide, a mechanism for imparting to the ram or slide a practically uniform cutting-stroke and an accelerated or "quick-return" receding stroke including a pitman, having one portion connected with the ram or slide, an eccentric connected with the opposite portion of the pitman and a driving-gear and loose connections between the same and the pitman at a point between the ends of the latter.

2. In a machine of the character described, the combination with the ram or slide, of upper and lower driving-gears, a live eccentric operatively connected with one gear and a sliding nut operatively connected with the other gear, and a pitman connection between the eccentric and ram or slide and operatively connected at points between its ends, with the sliding nut.

3. In a machine of the character described, the combination with a ram or slide, of a pitman introduced between the same and the power, a driving-gear and a live eccentric operatively connected therewith and with the pitman, and a second driving-gear and sliding-block connection between it and the pitman at a point between the ends of the latter.

4. In a machine of the character described,

the combination with a ram or slide adapted to have a practically uniform and constant cutting-stroke and a "quick-return" or accelerated receding stroke, of a power mechanism including upper and lower driving-gears, an eccentric movable with the lower gear, a pitman connected at one end with the eccentric and having the opposite end connected with the ram or slide and connections between the upper driving-gear and the pitman for determining the amount of ram traverse.

5. A machine of the character described, including a ram or slide adapted to have a practically uniform and constant cutting-stroke and a "quick-return" or accelerated receding stroke, upper and lower driving mechanisms, an eccentric forming part of one of the driving mechanisms, and a pitman connected with the eccentric at one end and having the opposite end loosely connected with the ram or slide and an intermediate portion connected with the other driving mechanism whereby the ram is driven.

6. In a machine of the character described, the combination with a ram or slide and a power mechanism, of a pitman connection between the ram and power, having one end connected with the ram and the opposite portion connected directly and eccentrically with the power mechanism in contradistinction to being secured to a fixed pivot, and a second power mechanism loosely connected with the pitman between its ends whereby the ram is driven.

7. In a machine of the character described, the combination with a reciprocating ram or slide, of upper and lower power devices, a pitman having one end connected with the ram and an eccentric member of the lower power devices operatively connected with the lower end of the pitman, slidable connections between the upper power devices and the pitman at a point between the ends of the latter, and means for adjusting the amount of ram traverse including an operating-handpiece on the outside of the machine, connections between the same and one of said slidable connections, and means for visibly indicating on the outside of the machine the extent of the adjustment of the slidable connections.

8. A machine of the character described, including a reciprocating ram or slide, a power mechanism including an eccentric and a pitman one portion of which is connected with the eccentric and another portion with the ram, a block slidably mounted in or on the pitman, a handpiece on the outside of the machine and rotative mechanism between the same and the block whereby the position of the latter in or on the pitman is adjusted to determine the amount or stroke of the ram or slide, and a telescopic gage connected with the rotative mechanism and which admits of "sight" adjustment either when the machine is running or at rest.



9. In a machine of the character described, a reciprocating ram or slide and mechanism including an eccentrically-operated pitman between the ram and the power for giving to  
 5 the ram or slide a uniform and constant cutting-stroke and a "quick-return" or accelerated receding stroke, an upper driving-gear, a block slidably mounted thereon, and having a projecting trunnion, a second block slid-  
 10 ably mounted in the pitman and loosely connected with said trunnion, means for adjusting the position of the first-named block on its gear to determine the amount of travel of the second-named block and, consequently,  
 15 the stroke of the ram, an exterior "sight" gage operatively connected with the said adjusting mechanism, and a lower driving-gear meshing with the upper gear and having an eccentric member connected with the lower  
 20 end of the pitman.

10. In a machine of the character described, a reciprocating ram or slide, a power mechanism, including a driving-gear having an eccentric and a pitman connecting the eccentric  
 25 with the ram, and a second driving-gear having a block adjustably mounted thereon; a slidable block carried by the pitman and connected with the first-named block, a screw and threaded shaft and intermediate gearing  
 30 by which the first-named block is adjusted on its driving-gear, means whereby the shaft and gearing may be adjusted from the outside of the machine, a longitudinally-movable nut on the shaft and a telescopic indexed  
 35 gage connected with the nut for indicating by "sight" adjustment the amount of the ram traverse.

11. In a machine of the character described, a reciprocating ram, the upper and lower  
 40 driving-gears, the pitman, a block slidably mounted in the pitman and a second block on the upper driving-gear and having a trunnion which carries the sliding pitman-block, in combination with a screw for adjusting  
 45 the position of the block on the gear, a shaft having an operating-handpiece and gearing between said shaft and the screw, said shaft having a threaded portion and a longitudinal slot, a nut on the shaft and having a pin  
 50 working in the slot thereof, a chambered bearing or boss and a longitudinally-slidable gage or piece movable therein and connected with the nut said gage or piece forming an external "sight" adjustment in connection  
 55 with the bearing or boss in which it telescopes.

12. In a machine of the character described, the reciprocating ram or slide, a jaw-nut and a screw and gears by which its position is ad-  
 60 justed, to change the longitudinal position of the ram, a mechanism including a lower power

mechanism and an eccentrically-operated pitman and an upper power mechanism and sliding-block connection between the same and the ram, means for adjusting the amount of  
 65 stroke or traverse of the ram and an exterior telescopic indexed gage for indicating the amount of adjustment of the ram traverse.

13. In a machine of the character described, the upper and lower driving-gears, the power-  
 70 shaft and pulley, gears of different diameters between the shaft and driving-gears, an eccentric fixed to one of the driving-gears and a sliding block adjustable on the other gear, a reciprocating ram and a slotted pitman se-  
 75 cured to the eccentric of the driving-gear and connected with the ram, a block carried by the pitman and loosely connected with the driving-gear sliding block, and means for ad-  
 80 justing this last-named block and indicating the extent of the adjustment.

14. In a machine of the character described, the combination with a ram or slide adapted to carry a cutting-tool, and means for oper-  
 85 ating the ram or slide, of means for imparting feed to the work relative to the cutting-tool comprising a vertical rack-bar, a rocker-arm having a flanged segmental head to engage the back of the rack, an oscillatory piece in the rack and a plunger or rod slidably fitted  
 90 within the rocker-arm and having one end connected with said oscillatory piece, and a pinion engaging the rack-bar and holding the latter in contact with the segmental head of the rocker-arm.  
 95

15. In a machine of the character described, the combination with the ram or slide and means for operating the same, of means for imparting feed to the work relative to the cutting-tool consisting of a vertical rack-bar,  
 100 a slotted or channeled piece, a nut slidably fitted to said piece and having a projecting pin or trunnion, provided with a roller or slide, a screw for adjusting the position of the nut, a rocker-arm having a slot for the  
 105 reception of the roller or slide and having a flanged head to engage the back of the rack-bar, a cylindrical piece mounted to oscillate in the rack-bar and a plunger or rod slidably fitted in the rocker-arm and connected with  
 110 said cylindrical piece, and a pinion for engaging the toothed portion of the rack-bar and holding said bar in contact with the head of the rocker-arm.

In testimony whereof we have hereunto set  
 115 our hands in presence of two subscribing witnesses.

SALMON W. PUTNAM.  
 SALMON W. PUTNAM, JR.

Witnesses:

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 GEO. H. KNIGHT.