

(No Model.)

2 Sheets—Sheet 1.

A. KLAY.

MILLING CUTTER FOR METAL WORKING MACHINES.

No. 602,291.

Patented Apr. 12, 1898.

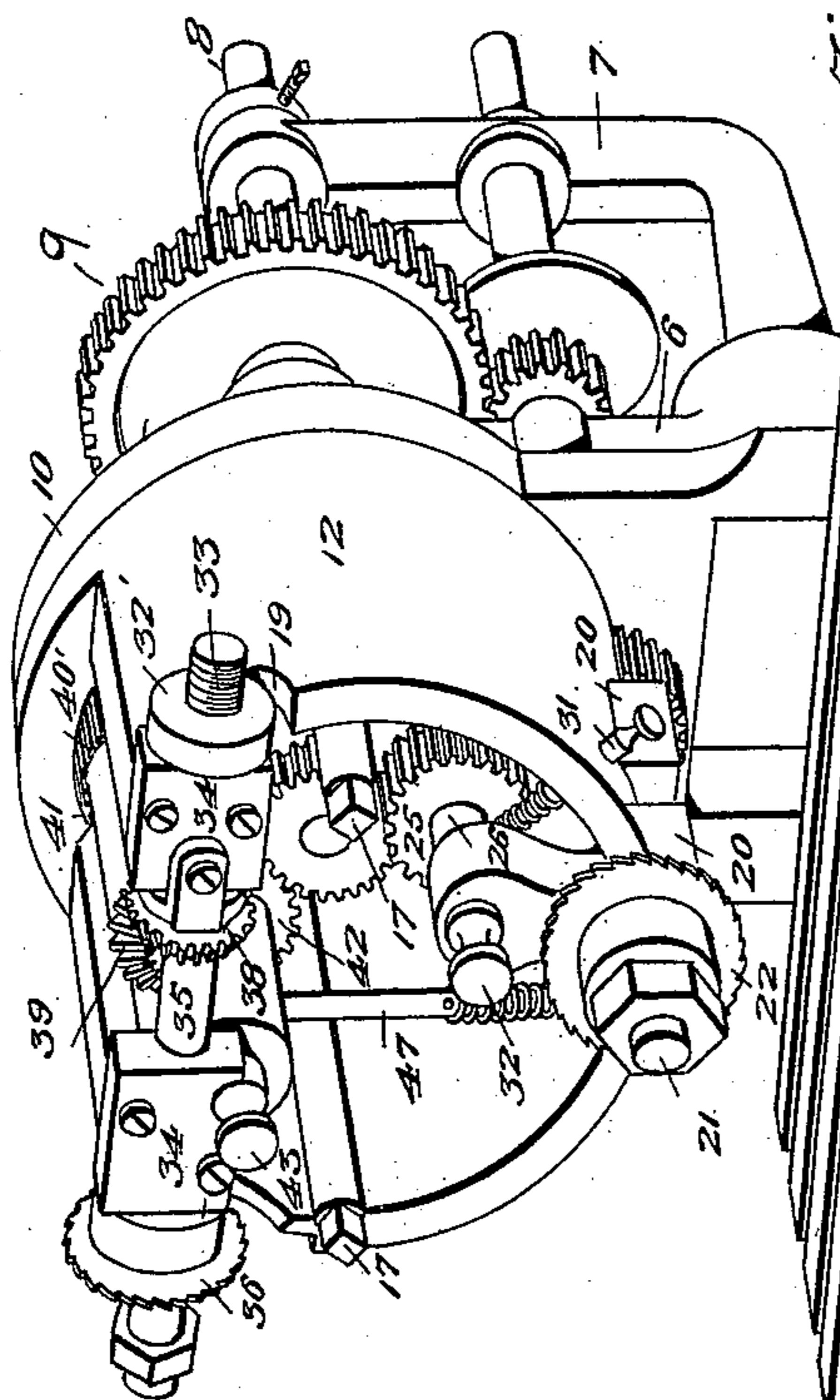
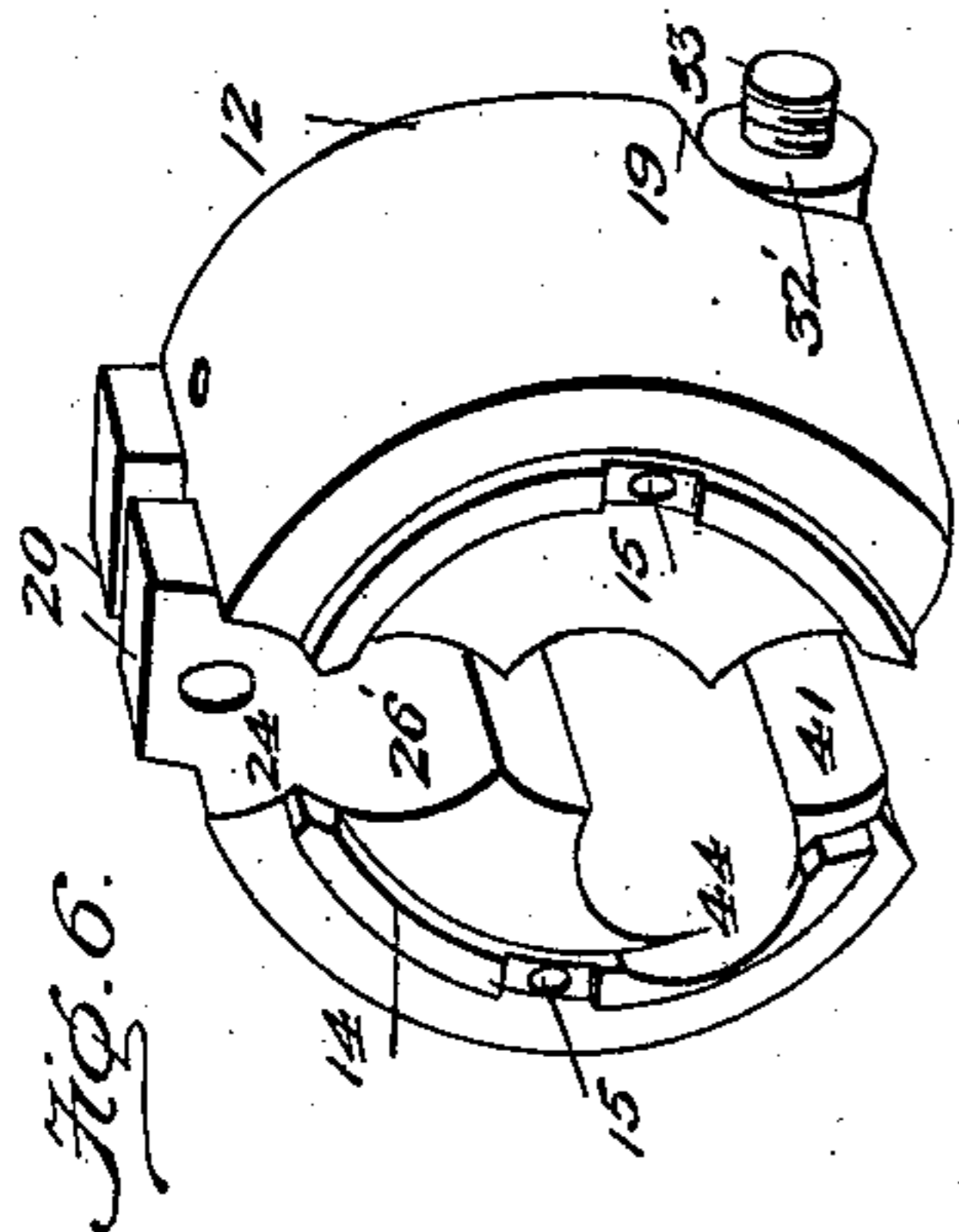
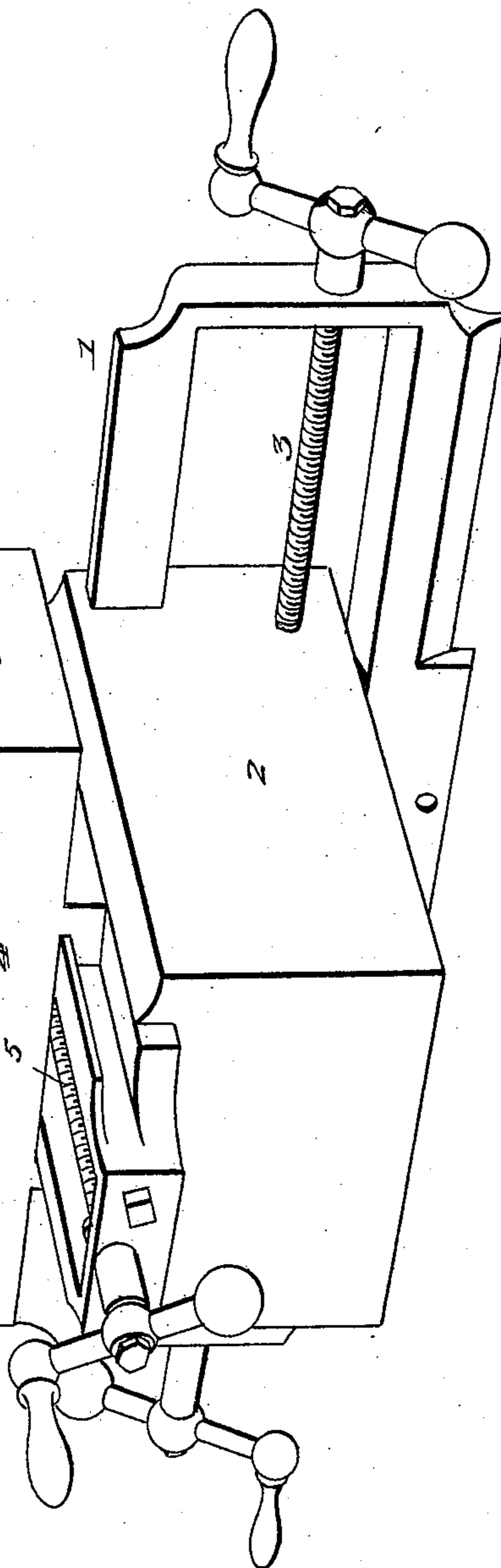


Fig. 1.



Witnesses

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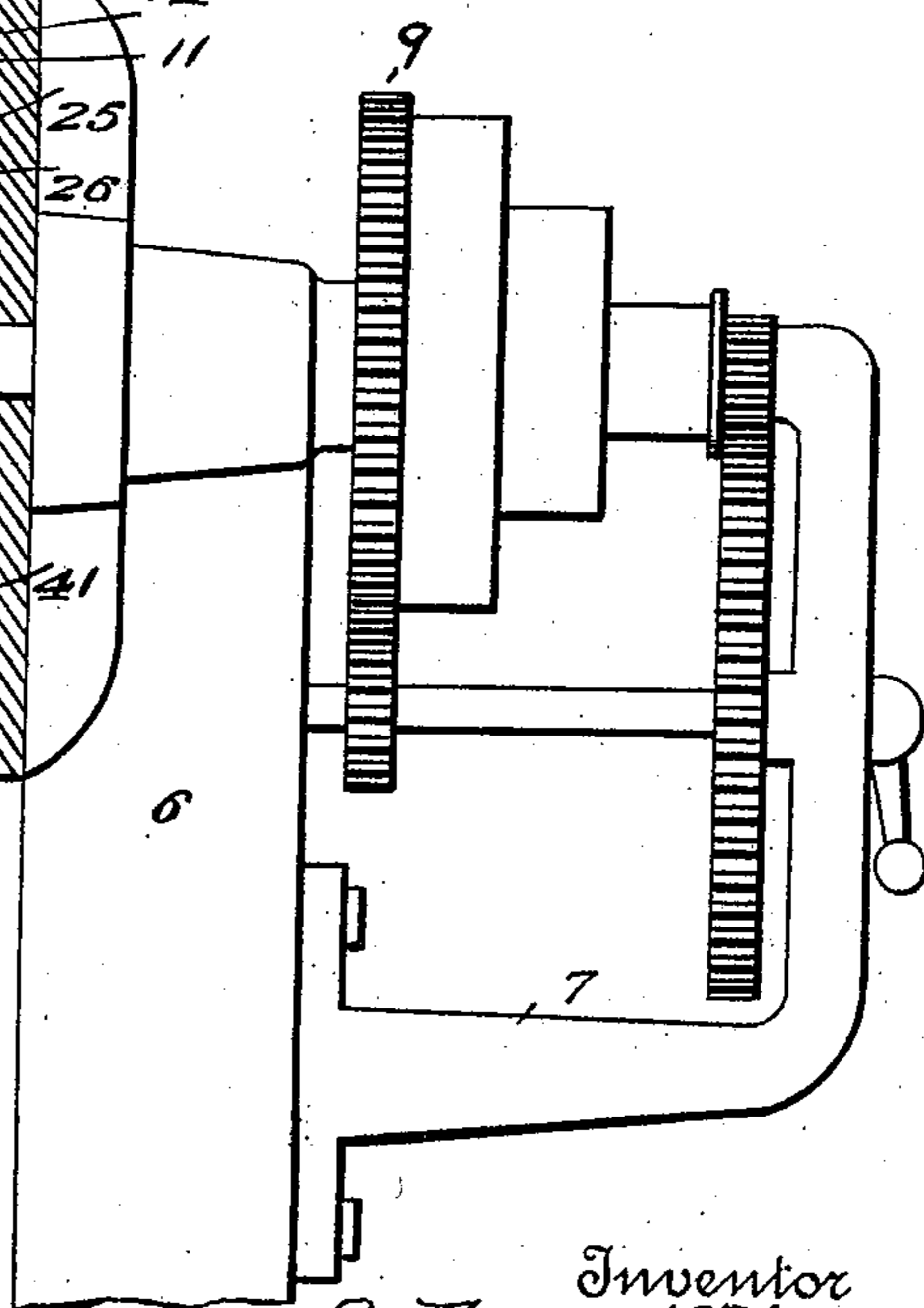
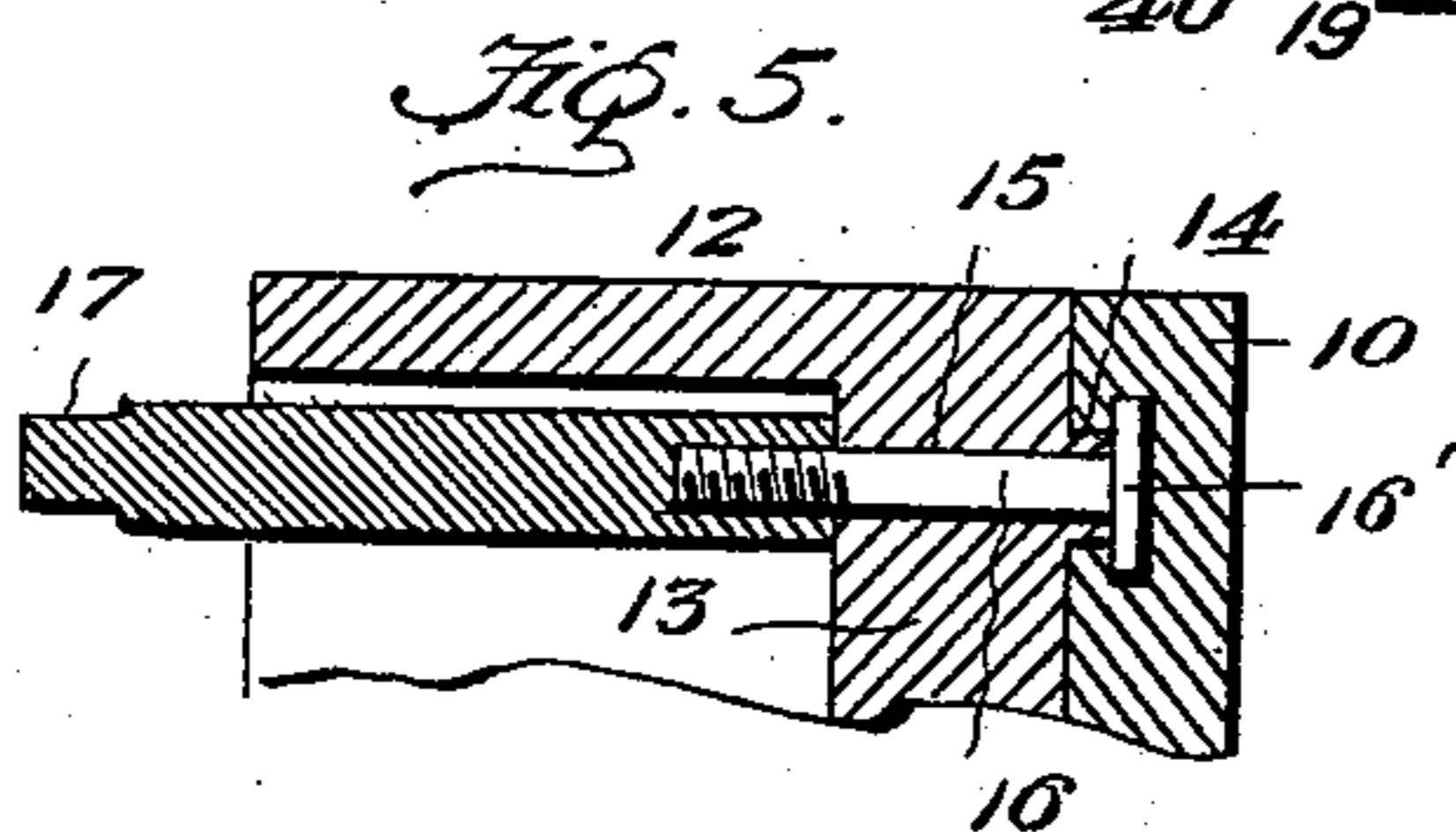
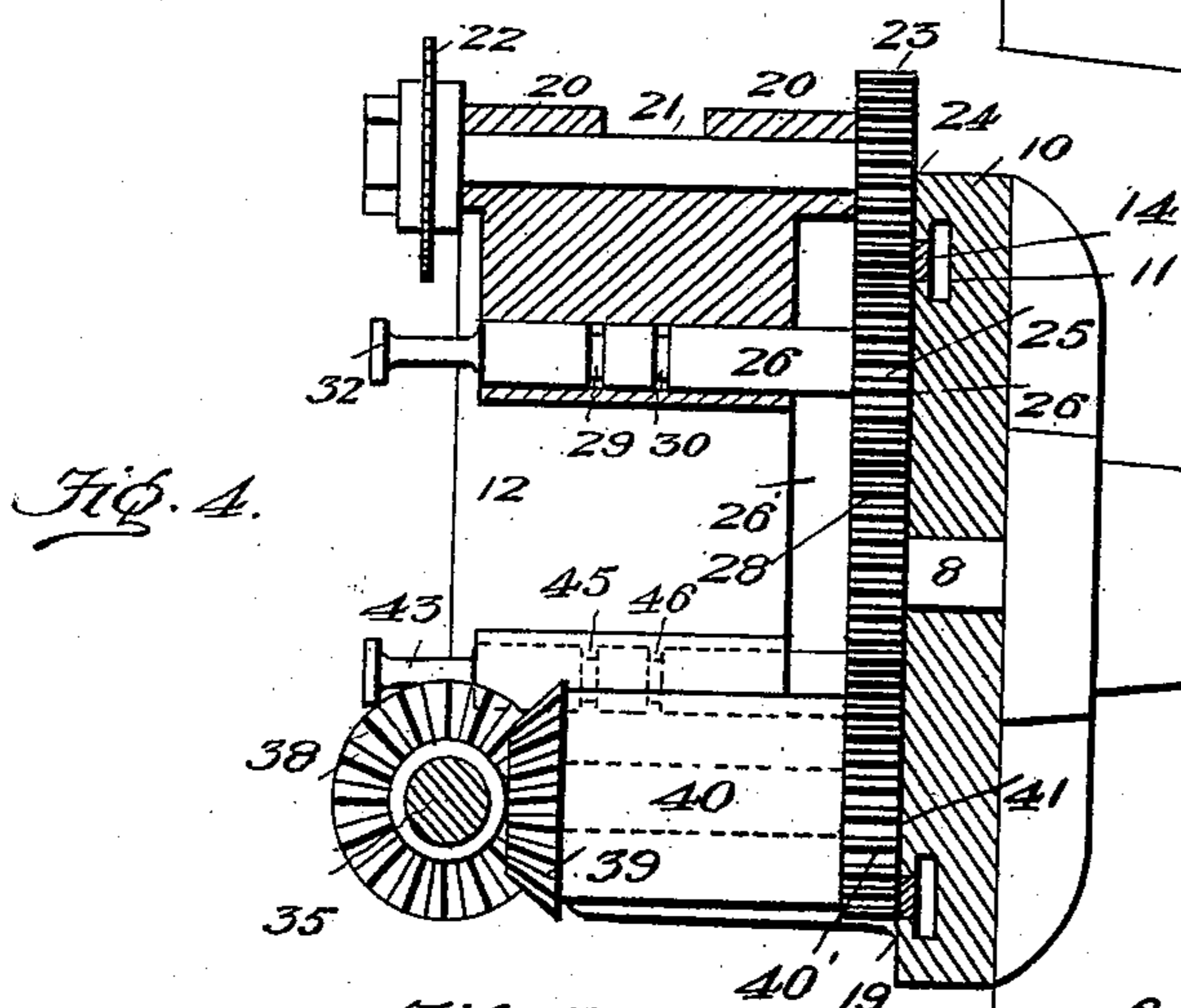
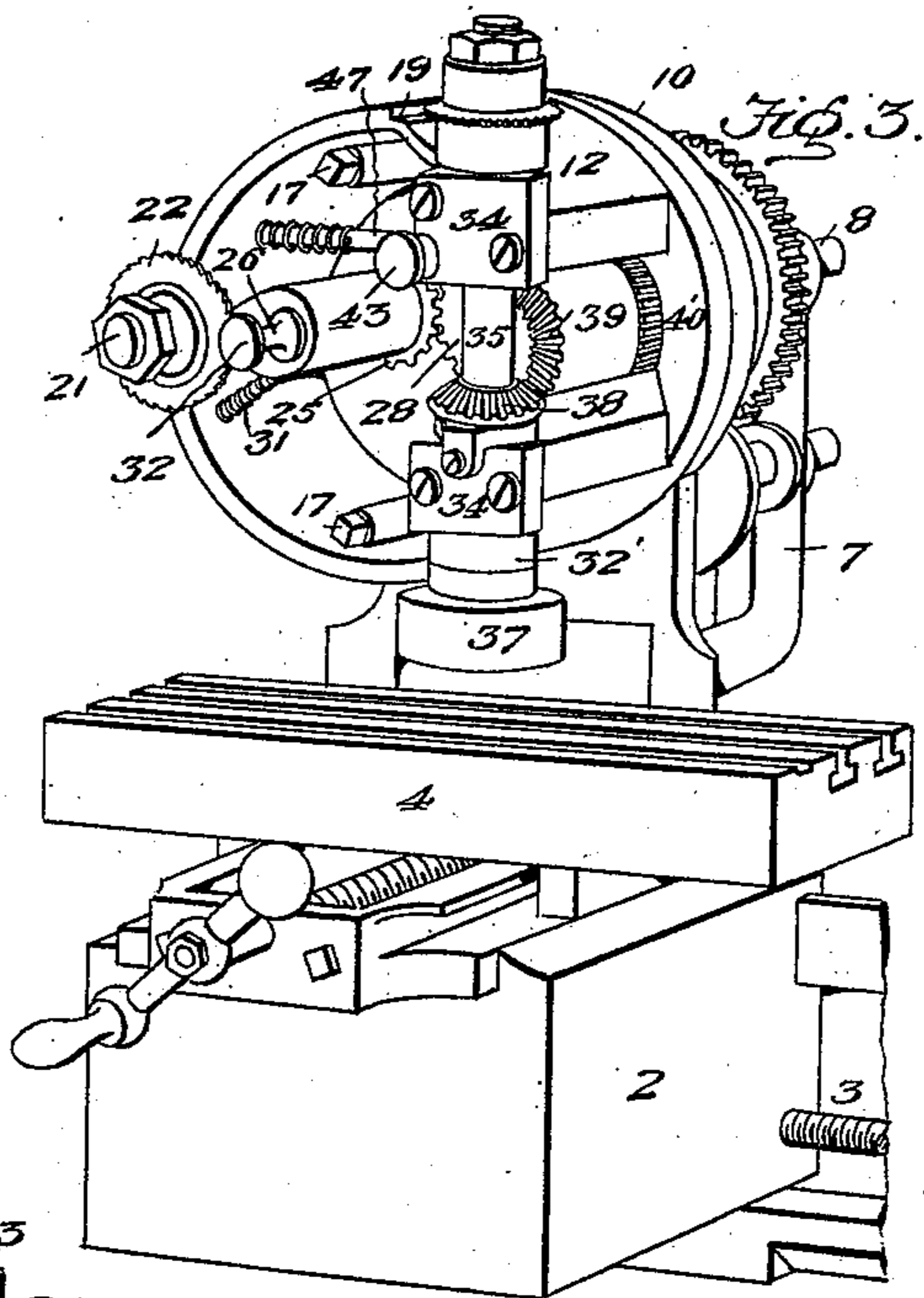
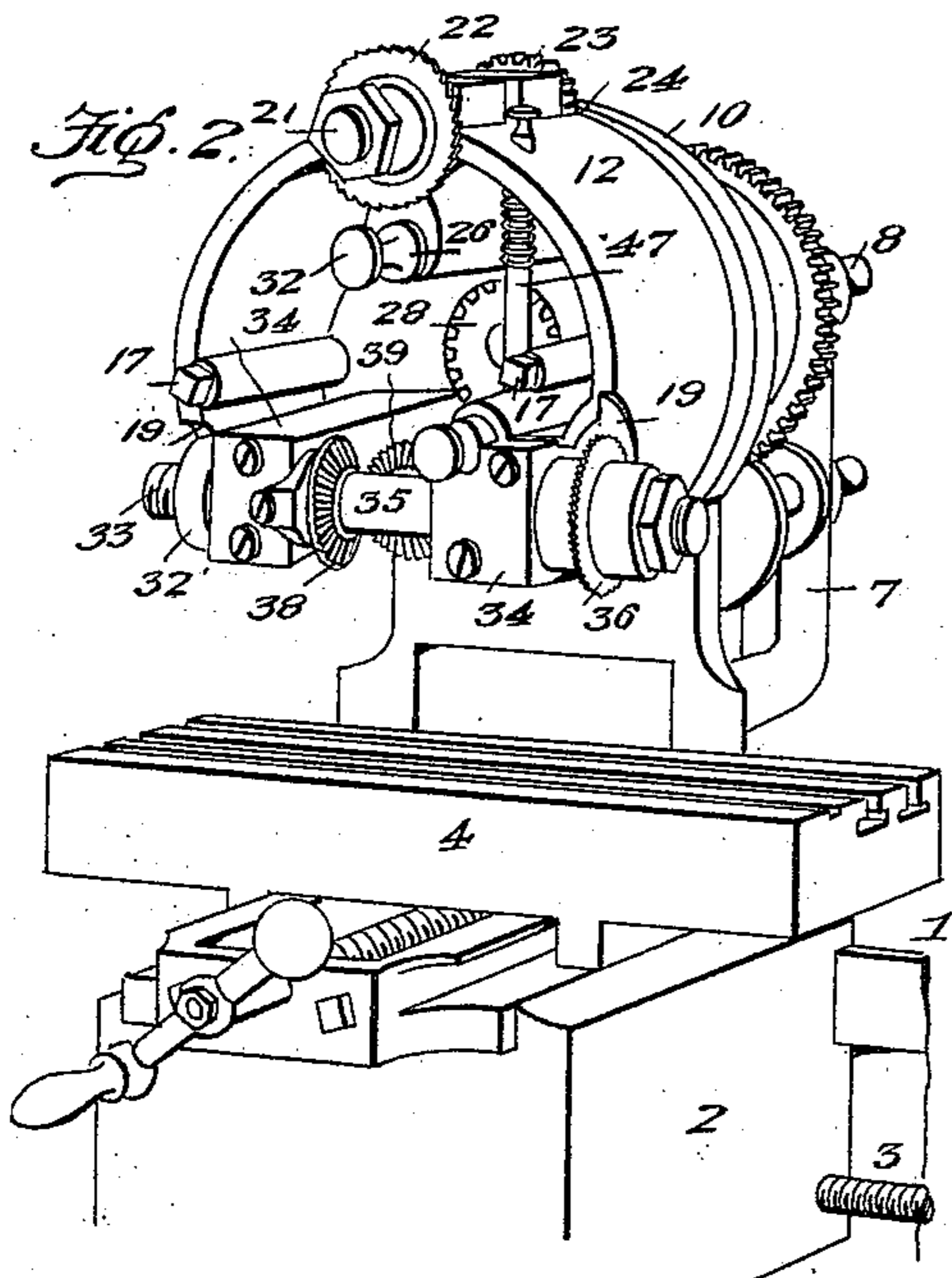
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UNITED STATES PATENT OFFICE.

ANDREW KLAY, OF BLUFFTON, OHIO.

MILLING-CUTTER FOR METAL-WORKING MACHINES.

SPECIFICATION forming part of Letters Patent No. 602,291, dated April 12, 1898.

Application filed April 22, 1897. Serial No. 633,345. (No model.)

To all whom it may concern:

Be it known that I, ANDREW KLAY, a citizen of the United States, residing at Bluffton, in the county of Allen and State of Ohio, have
5 invented certain new and useful Improvements in Milling-Cutters for Metal-Working Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others
10 skilled in the art to which it appertains to make and use the same.

My invention relates to a milling-cutter for metal-working machines in which the cutter is made adjustable for milling purposes
15 lengthwise or crosswise on the work and either horizontally, vertically, or crosswise at different angles for the various kinds of work necessary to be performed.

The object of my invention is to provide a
20 simple construction for a metal-working machine in which spindles arranged at right angles to each other are carried in or by a revoluble head which may be adjusted to bring either of the spindles and cutters thereon into
25 operative relation to the work.

A further object of the invention is to connect the revoluble spindle-carrying head to the machine-post in a simple manner.

A further object is to provide simple means
30 for locking either of the power-transmitting arbors either into or out of operative connection with the driving-shaft and the cutter-spindle.

With these ends in view my invention consists in the combination, with a back post, of
35 a face-plate rigid or integral with said post and provided in one face thereof with an annular channel or groove, a revoluble spindle-carrying head fitted against said face-plate, and socket-bolts which extend through the
40 revoluble head and headed to fit and travel in said channel of the face-plate, said bolts serving to support the head on the face-plate, in the channel of which the bolt-heads are
45 adapted to travel when the head is rotated on its horizontal axis.

The invention further consists in the combination, with a revoluble head and a power-shaft, of cutter-spindles journaled in said
50 head, one spindle having a bevel-gear and the other spindle provided with a straight spur-pinion, a counter-shaft geared to said

spindle with the bevel-gear thereon, endwise-movable grooved arbors mounted in the head adjacent to the power-shaft and adapted to
55 be geared therewith, one arbor being adapted for connection direct to the spindle with the straight spur-pinion, and the other arbor arranged to be geared to the counter-shaft for driving the other spindle, whereby the spin-
60 dles may be geared independently with the power-shaft, and locking devices arranged to engage with the grooved arbors to hold them into or out of gear with the power-shaft and the cutter-spindles; and the invention fur-
65 ther consists in the novel combination of elements and in the construction and arrangement of parts, as will be hereinafter fully described and claimed.

To enable others to understand my inven-
70 tion, I have illustrated the preferred embodiment thereof in the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a perspective view of a part of a metal-working machine with my milling-
75 cutter applied thereto and showing the same adjusted for milling lengthwise on the work. Fig. 2 is a front elevation with the head in position for cutting crosswise on the work. Fig. 3 is a front elevation with the head ad-
80 justed and provided with a cutter-head for surfacing the work for T slotting or grooving. Fig. 4 is a vertical central transverse sectional view. Fig. 5 is a detail sectional view illustrating one of the locking-bolts to hold the
85 rotatable head on the standard. Fig. 6 is a detached perspective view of the rotatable head, showing its rear side or end.

Like numerals of reference denote corresponding parts in all the figures of the draw-
90 ings, referring to which—

1 designates a part of the bed of a metal-working machine, 2 is the work-carriage fitted to the machine-bed to move longitudinally thereon under the operation of the adjusting-
95 screw 3, and 4 is the work-bed, which is slidably fitted to the carriage 2 to move transversely across the same under the control of the screw 5, all of these parts being of the usual or any preferred construction of metal-
100 working machines.

Rigidly attached at a suitable place on the machine-bed is fitted the upright post 6, which is of any suitable form and is braced by a

standard 7, and in the post and standard are provided journal-bearings (not shown) for the accommodation of the shafting by which power is applied to the cutter-spindles. The power-shaft is indicated at 8 in the drawings, and it has a large gear 9, which is driven in a suitable way.

On the upper end of the post 6 is provided a face-plate 10, the axis of which is horizontal. This face-plate is preferably integral with the post, and it is of disk-like form to afford a proper bearing for the revoluble head. In the side of the face-plate adjacent to the work-bed is provided an annular groove or channel 11, preferably T-shaped in cross-section, and through the center of the face-plate is an opening through which passes one end of the power-shaft 8.

The revoluble head 12 is of annular form arranged to have one end fit laterally against the grooved or channeled face-plate 10. This annular head 12 lies over the work-bed, and it is held in a position where its longitudinal axis is horizontal. Said head is connected in a novel way to the face-plate to be adjustable on its horizontal axis for the purpose of bringing either of its cutter-spindles to the work on the bed 4. The head has a series of journal-bearings and a transverse wall or bridge 13, in which is produced a plurality of openings, said bearings and openings being provided for the accommodation of the various shafts or arbors and gears used in my improved milling appliance, and at the end of the head which bears laterally against the face-plate it is provided with an annular flange 14, adapted to enter and fit rotatably in the channel or groove 11 in the face-plate. The head is further provided with transverse openings 15 at diametrically opposite points, which openings extend through the flange 14 and the partition 13, and through said openings pass the bolts 16, the inner ends of which have the heads 16', that fit loosely in the T-channel 11 in the face-plate, so as to travel therein when the head is adjusted on its horizontal axis. These bolts 16 pass through the hollow annular head, and they are threaded at their outer ends to enable the sleeves or elongated nuts 17 to be screwed thereon, as shown by Fig. 5, said nuts or sleeves 17 bearing at their inner ends against the partition 13 in the revoluble head, whereby the bolts are rigidly connected to the revoluble head. The described construction couples the head to the face-plate in a secure steady manner, and at the same time the head is free to turn or rotate on its horizontal axis. The annular head is cut away or recessed at one side, as at 19, to accommodate a removable tool-head, which may be attached to one of the cutter-spindles, and the front end of this head is open, as shown, to expose the operating elements and for easy expeditious access thereto, particularly to the slidable arbors.

On one side of the annular head and lying externally thereof is a bearing or bearings

20, in which is mounted a rotary spindle 21, the axis of which is parallel to the axis of rotation of the annular head. One end of this arbor 21 extends beyond the open front side of the head 12, and on this end of said spindle is mounted one of the milling-cutters 22. The other end of the spindle 21 is provided with a straight spur-gear 23, fitted partly in a recess 24 in the head, so as to bring said spur gear-pinion 23 into position to mesh with a similar pinion 25 on one of the endwise-movable arbors 26. This arbor 26 is journaled in a suitable opening provided in the wall or partition 13 of the head, and the pinion 25 on said arbor 26 occupies a deep enlarged cavity 26', provided in the wall or partition 13, the depth of said cavity being sufficient for the play of the arbor 26 and its attached gear-pinion 25 to throw said gear into and out of mesh with the pinion 23 and with a spur gear-pinion 28, rigidly attached to the inner end of the power-shaft 8. It will be understood that the arbor 26 and its pinion 25 are mounted in the wall or partition 13 of the head, so as to rotate therein, as well as to have a limited sliding movement, and that the pinion 25 is adapted to connect the arbor 21 operatively with the power-shaft 8 through the medium of the train of gears 23 28, which mesh with said pinion 25; but when the arbor 26 is moved endwise to disconnect said gear 25 from the gears 23 28 the arbor itself remains idle and the spindle 21 is disconnected from the power-shaft 8, so that the spindle 21 and its cutter 22 remain at rest. To hold the arbor 26 in position, either when its pinion 25 is in or out of gear with the pinions 23 and 28, I provide the arbor with the spaced annular grooves or channels 29 30 and a spring-pressed locking-rod 31, said rod being slidably fitted in the head 12 to leave the head on one end thereof exposed outside of the head for ready access thereto, while the other end of said rod 31 is arranged to fit in either of the grooves 29 or 30, according as the arbor is adjusted to have its pinion 25 into or out of gear with the pinions 23 28, as will be readily understood.

The revoluble head 12 carries another spindle 35, which is arranged in a position at right angles to the longitudinal center of the head and to the first-named spindle 21 thereon, the spindle and cutter 21 22 being adapted to mill or cut lengthwise on the work, while the spindle 35 and its cutter 36 are adapted to operate crosswise on the work, according as the head is adjusted to bring the spindle and cutter in proper relation to the work on the work-bed 4. This spindle 35 is journaled in suitable bearings 34, rigid with the annular head, and the ends of said spindle are projected beyond the bearings and the outer cylindrical surface of the revoluble head. To one end of the spindle 35 is fastened the milling-cutter 36; but the opposite end of said spindle is formed with a screw-thread 33 and with a collar 32', said threaded end of the spindle 35

being adapted to a tool-head 37, attached thereto, as shown by Fig. 3, when it is desired to have the head surface the work or adapt it for T slotting or grooving purposes. This tool-head is rigidly attachable to or detachable from the spindle 35; but the tool-head is not fitted to the spindle when the machine is used for milling the work lengthwise or crosswise.

For the purposes of distinguishing the spindles 21 35 from each other I will hereinafter term the spindle 21 as the "longitudinal" spindle, because it is parallel to the axis of the head, and the spindle 35 as the "transverse" spindle, because it is at right angles to the axis of the head.

On the transverse spindle 35 at a point between its bearings is attached a bevel-gear 38, with which meshes a similar bevel-gear 39, which is carried by a counter-shaft 40, the latter being journaled in a suitable opening provided in the wall or partition 13 of the revoluble head. The end of the counter-shaft opposite to the bevel-gear 39 has a straight spur gear-pinion 40', which fits in a recess 41 in the wall or partition 13, and with said pinion 40' is adapted to mesh a pinion 42 on one end of a slidable arbor 43, said pinion 42 fitting in a deep recess 44, provided in the partition 13, and the arbor 43 fitted snugly in a suitable opening in said partition 13 to rotate and slide therein. This arbor 43 is adapted to adjust the pinion 42 so it will mesh with the gear 28 and the pinion 40' in order that the pinions 40, 42, and 28 may operatively connect the spindle 35 with the power-shaft 8 through the counter-shaft 40 and the slidable arbor 43; but said arbor may be adjusted to bring its pinion 42 out of engagement with the pinions 40' and 28, thus disconnecting the spindle 35 from the power-shaft 8. Said arbor 43 has two grooves or channels 45 46, in either of which may be fitted the inner end of a spring-pressed locking-rod 47, which is supported in the revoluble head and has one end thereof exposed outside of said head for easy manipulation, whereby the arbor 43 may be locked in either of its positions—i. e., when the pinion 42 meshes with the pinions 40' 28 or is free from the same.

It will be understood that the head may be turned on the face-plate to bring either of the spindles 21 35 and the cutters thereon into operative relation to the work on the bed 4, which may be moved and adjusted as in ordinary metal-working machines. The cutter 22 on the spindle 21 is adapted to mill or cut the work lengthwise on the bed 4, as shown by Fig. 1, while the cutter 36 of the spindle 35 lies across the work, as shown by Fig. 2, to operate crosswise on the work. The head may also be reversed or adjusted to the position shown by Fig. 3, in which position the tool-holder on the threaded end of the spindle 35 is brought into proper relation to the work to cause the tool to operate in surfacing the work or in forming T slots or grooves therein,

according to the nature of the tool employed. The spindles 21 or 35 may be operatively geared to the power-shaft by adjusting the proper arbor to complete the train of gears between the power-shaft and the spindle that it may be desired to use; but the spindles are designed to be used independently—that is, both spindles are not geared at one time to the power-shaft. The spindles are positively held against endwise movement by locking-rods, and their inner ends are readily accessible to the attendant, so that they may be easily adjusted.

It is thought that the operation and advantages of my improvement will be readily understood and appreciated from the foregoing description, taken in connection with the drawings.

I am aware that changes in the form and proportion of parts and in the details of construction herein shown and described as the preferred embodiment of my invention may be made by a skilled mechanic without departing from the spirit or sacrificing the advantages of my invention, and I therefore reserve the right to make such modifications and alterations as fairly fall within the scope of my invention.

Having herein fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with a post, and a work-bed, of a revoluble head, a central power-shaft, a cutter-spindle 21 journaled on said head, a slidable arbor carried by the head and adapted to be operatively connected with or disconnected from the power-shaft and said spindle, another spindle 35 journaled on the head at right angles to the spindle 21, and a train of gear connections, including another slidable arbor, between the power-shaft and the cutter-spindle 35, as and for the purposes described.

2. The combination of a face-plate carried by a suitable post, a revoluble chambered head fitted laterally against said face-plate and connected thereto to rotate or turn on the same, a power-shaft arranged centrally to said head, independent cutter-spindles carried by the head, and independent gear connections housed within said chambered head and arranged between said cutter-spindles and the power-shaft, as and for the purposes described.

3. The face-plate provided with an annular channel or groove, a rotatable chambered head fitted against said face-plate, and bolts connected to the head and fitted in said channel or groove to travel therein, combined with a power-shaft, and independent exposed spindles journaled on said head and gearing housed in the chambered head and connecting the cutter-spindles independently with said power-shaft, as and for the purposes described.

4. The face-plate provided with an annular channel or groove, a rotatable head hav-

- ing an annular rib fitted in said channel or groove, bolts having heads which travel in said channel and pass through the head, and nuts on the bolts pressing against the sleeves
5 to hold the head rigidly in position, combined with a power-shaft, cutter-spindles carried by the head, and gearing between said spindles and the power-shaft, as and for the purposes described.
- 10 5. The combination with a post, and a work-bed, of a horizontally - arranged head connected to said post to rotate on its horizontal axis and arranged to overhang the bed, spindles carried by said head and arranged at an
15 angle to each other, a power-shaft common to both spindles, and slidable arbors forming part of the train of gears for connecting the power-shaft and the spindles, as and for the purposes described.
- 20 6. The combination with a post, and a work-bed, of a power-shaft, a revoluble head connected to said post and arranged concentric with said power-shaft, cutter-spindles carried by said revoluble head and arranged at an
25 angle to each other, and arbors carried by said head and geared with the power-shaft and said spindles, each arbor being adjustable in the head to disconnect the cutter-spindle and the power-shaft, as and for the purposes described.
- 30 7. The combination with a post, and a work-bed, of a power-shaft, a revoluble head concentric with said shaft and connected to the post, cutter-spindles carried by said head, independent slidable arbors adapted to operatively connect the cutter-spindles with the power-shaft, and means for locking the arbors in their adjusted positions, substantially as described.
8. The combination of a power-shaft, a revoluble head, cutter-spindles carried by said head, grooved arbors slidably fitted in the head, geared to the power-shaft and the cutter-spindles, and adapted to be independently withdrawn from engagement with said spindles and power-shaft, and locking-rods engaging with said grooved arbors, as and for the purposes described.
9. The combination of a power-shaft, a rotatable head, cutter-spindles carried by said head, a slidable arbor having a gear adapted to mesh directly with the power-shaft and one of the spindles, a counter-shaft geared to the other spindle, another slidable arbor having a gear which meshes with the power-shaft and the counter-shaft, and means for locking either arbor in its adjusted position, as and for the purposes described.
- In testimony whereof I affix my signature in presence of two witnesses.
- ANDREW KLAY.
- Witnesses:
CHRISTIAN KEMPF,
GOTTLOB F. GREENWALD.