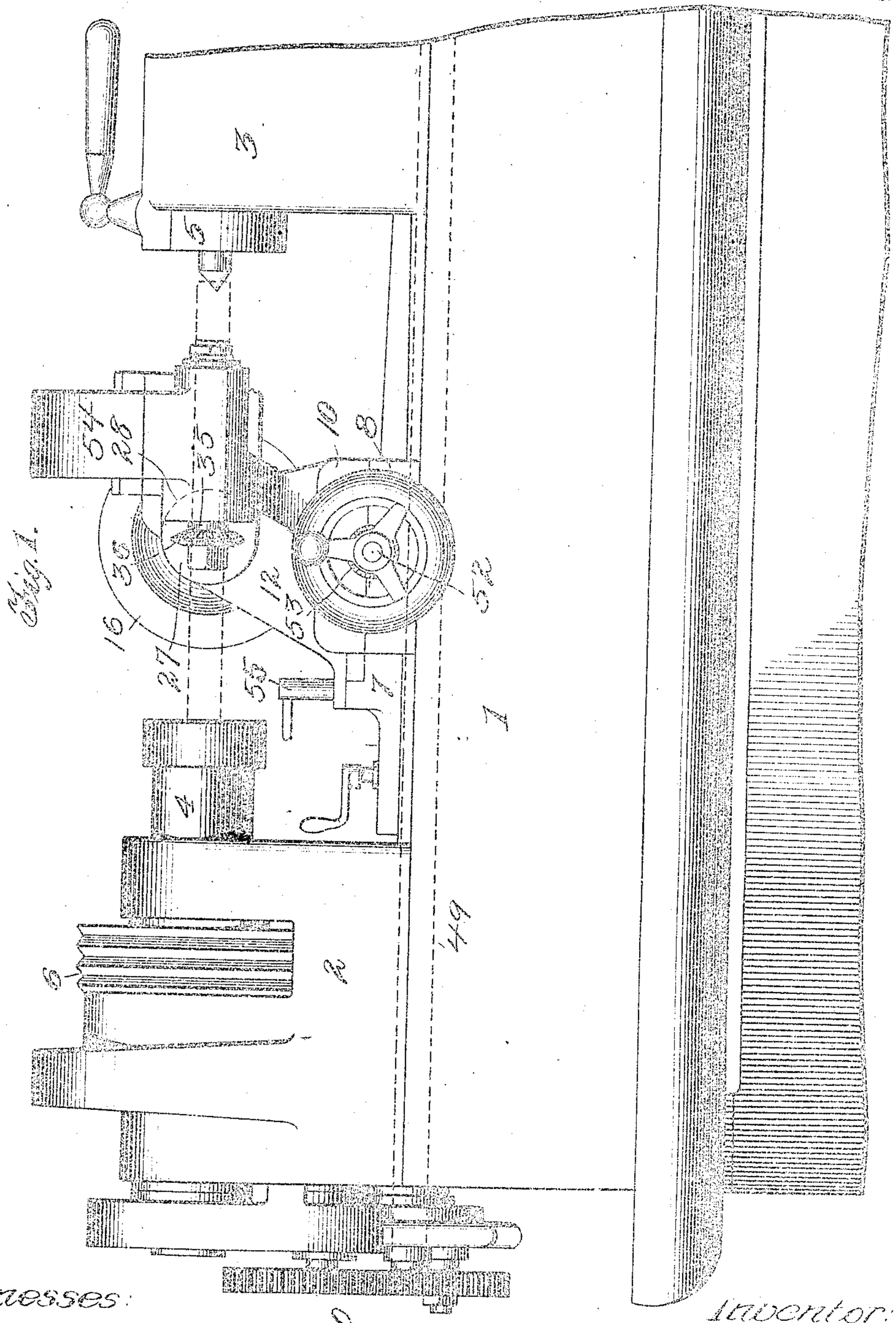
No. 813,381. PATENTED FEB. 20, 1906.

B. M. W. HANSON.

ADJUSTABLE SUPPORT FOR METAL WORKING TOOLS.

APPLICATION FILED NOV. 29, 1902.

4 SHEETS—SHEET 1.



Witnesses:
F. G. Campbell.
Wm. P. Laraway.

Inventor:
B. M. W. Hanson.
By his Attorneys:
Lothrop & Peck

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4 SHEETS--SHEET 2

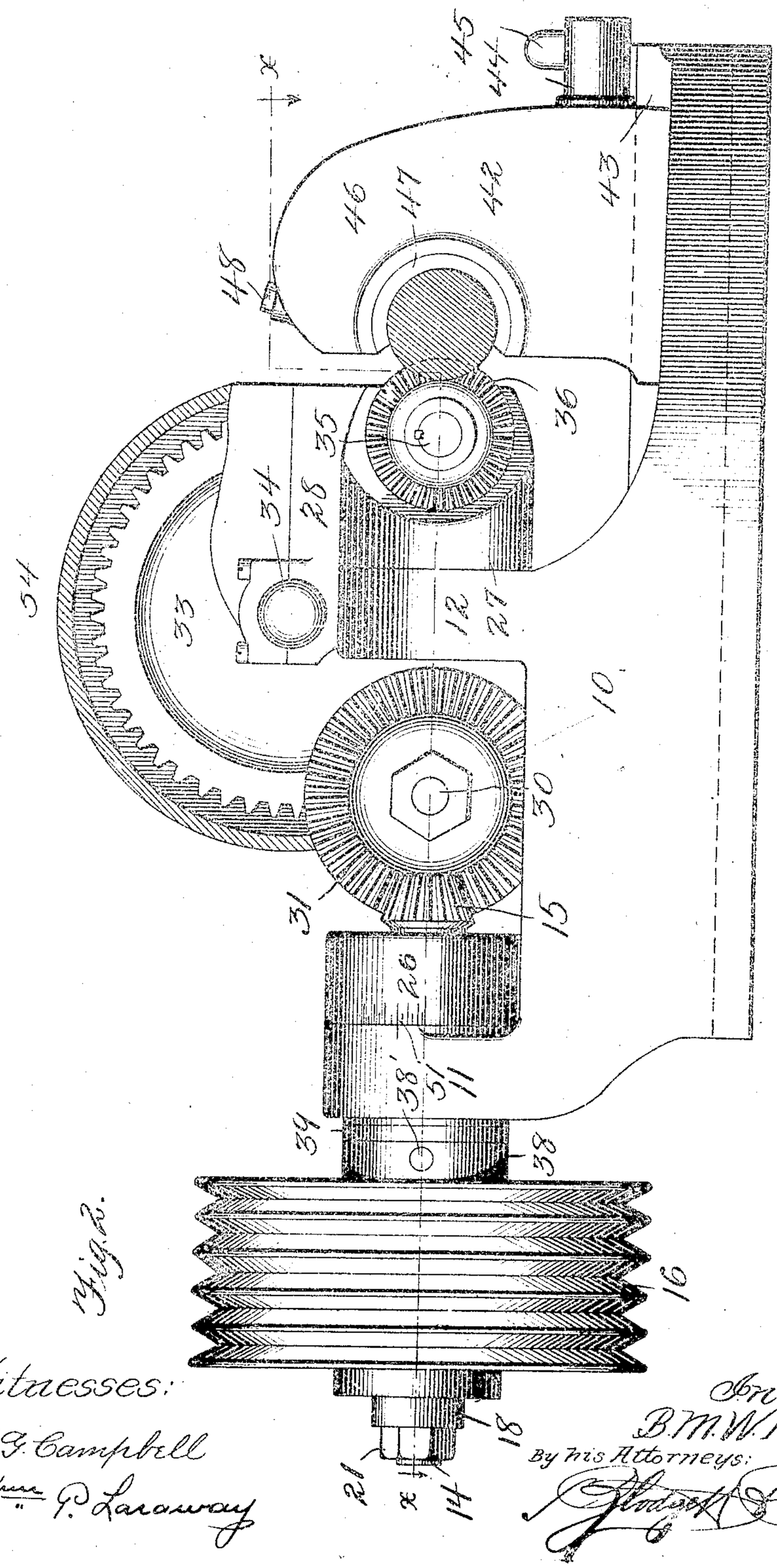

Fig. 2.

Witnesses:

F. G. Campbell

Wm. P. Laraway

Inventor:

B. M. W. Hanson.

By his Attorneys:

Thurston & Peck

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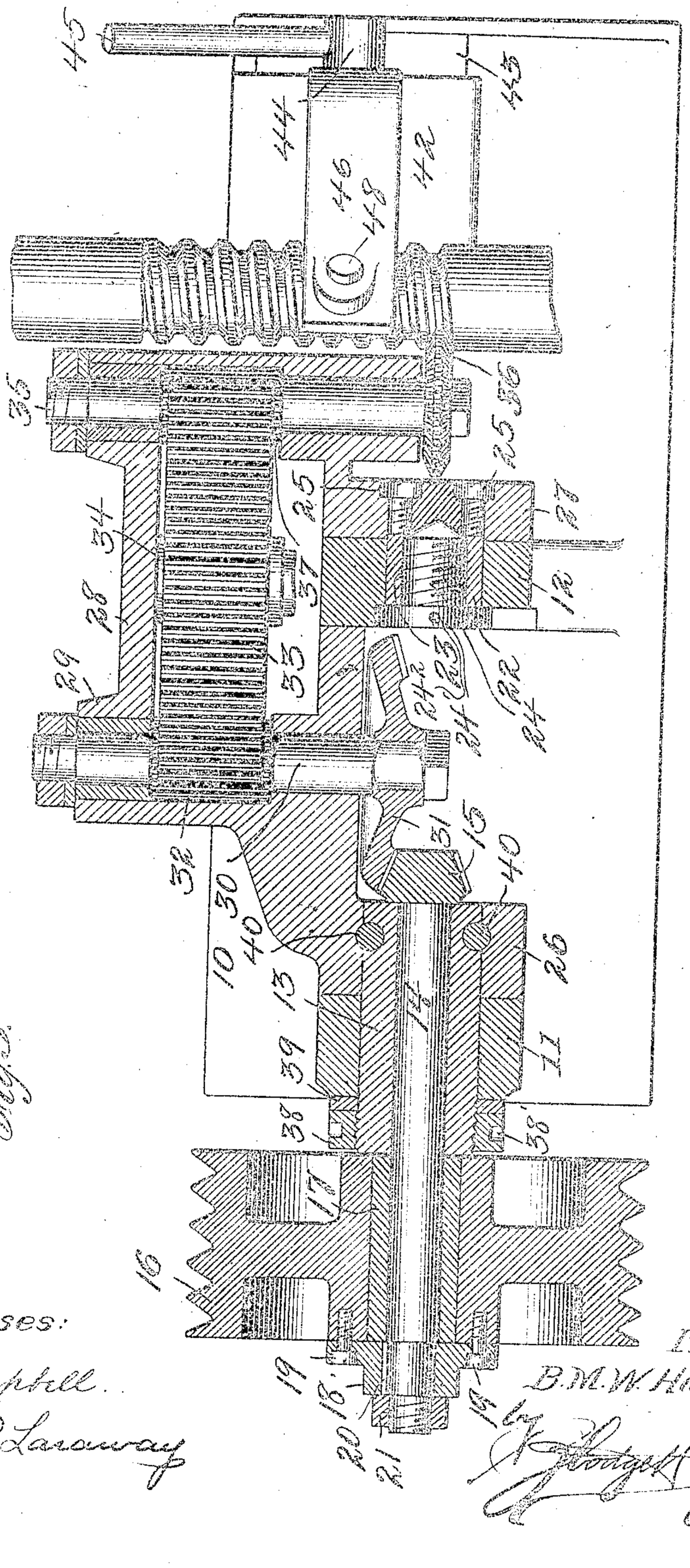

Fig. 3.

Witnesses:

F. E. Campbell.

Wm. P. Lawrence

Inventor:

B. M. W. Hanson.

by Dwight Brock

Atty.

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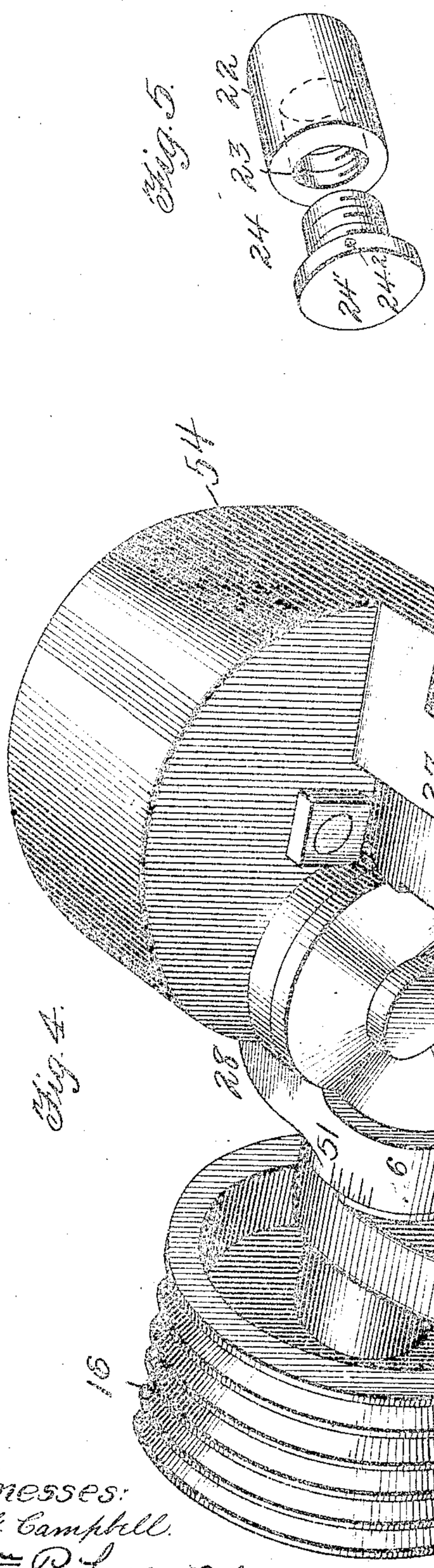

Witnesses:
F. G. Campbell.
Wm. P. Laraway

Inventor:
B. M. W. Hanson.
By his Attorneys:
Dodge & Peck

UNITED STATES PATENT OFFICE.

BENGT M. W. HANSON, OF HARTFORD, CONNECTICUT, ASSIGNOR TO PRATT & WHITNEY COMPANY, OF HARTFORD, CONNECTICUT, A CORPORATION OF NEW JERSEY.

ADJUSTABLE SUPPORT FOR METAL-WORKING TOOLS.

No. 813,381. Specification of Letters Patent. Patented Feb. 20, 1906.

Original application filed July 12, 1902, Serial No. 115,337. Divided and this application filed November 29, 1902. Serial No. 133,180.

To all whom it may concern:

Be it known that I, BENGT M. W. HANSON, a citizen of Sweden, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Adjustable Supports for Metal-Working Tools, of which the following is a specification.

My invention relates to adjustable supports for metal-working tools of various kinds—as, for instance, milling-cutters, grinding and buffing disks, and many tools and contrivances in the use of which it may be desired to set the tool at different angles with relation to the work.

As shown, the adjustable tool-support carries the arbor and gearing for driving the same of a milling-cutter, adapted in the exemplication given to form worms, threads, or spirals on stock held in a suitable chuck.

Primarily the object of the invention is the provision of means whereby the tool-support may be adjusted to the angle required for a given pitch of thread or spiral and then secured firmly in position.

A further object of the invention is the provision of a tool-support mounted on trunnions, whereby it may be adjusted to place the tool at the desired angle, and of means, preferably coöperating with one of the trunnions, for securing said support in its adjusted position.

Referring to the drawings, Figure 1 is a side elevation of a metal-working machine with my invention in position on the carriage thereof. Fig. 2 is a side view of the frame on which the improved tool-support is mounted, the work being shown in section. Fig. 3 is a horizontal section taken on line $x\,x$ of Fig. 2 with parts shown in elevation. Fig. 4 is a perspective view of the cutter-slide and its elements with parts broken away, and Fig. 5 is a detail perspective view of one of the trunnions and its retaining-screw.

Like numerals designate similar parts throughout the several views.

Referring to the drawings, the numeral 1 designates the frame or bed of the machine, which may be of any desired shape and construction. Rising from this bed are heads 2 and 3, respectively, in the former of which is journaled a chuck-spindle 4 and in the latter an adjustable center 5. These heads 2 and 3 are supported on ways of the bed in the usual manner, the latter being adjustable to bring the center 5 to the proper position.

For driving the chuck-spindle any desired means may be employed, that shown being a pulley 6. Designated in a general way by the numeral 7 is a slide or carriage which is mounted for reciprocatory movement upon the shears of the machine-bed. Upon this slide or carriage is a bed-plate 8, and fitted upon transverse ways 9 of said bed-plate is a cutter-slide 10, provided with bearing extensions 11 and 12 for a purpose hereinafter described. Journaled in the bearing of the extension 11 is a sleeve or hollow trunnion 13, and mounted for rotary movement in this sleeve is a shaft 14, carrying a bevel-gear 15 at its inner end and a pulley 16 at its outer extremity. This pulley is shown as having a grooved periphery for the reception of multiple belts actuated from a counter-shaft, (not shown,) and it is sleeved upon a hub 17, through which the shaft 14 passes. A plate 18 is secured to the pulley by screws 19, and this plate has a hub which is splined upon the shaft 14, as at 20 in Fig. 3, and the pulley is located between the end of the sleeve 13 and a nut 21, secured to the threaded extremity of the shaft, as illustrated in said Fig. 3.

Within the bearing of the extension 12 is located a partially-hollow hub or trunnion 22 internally threaded at 23 for the reception of a screw 24, having a wide head 24′ bearing against a shoulder of said extension 12, the said head being provided with holes 24^2, in which a tool may be inserted for adjusting the screw.

In its solid end the hub 22 is threaded for the reception of screws 25, the heads of which fit in recesses formed in the arm of a cutter-frame hereinafter described, said screws serving to secure the hub to said arm and to prevent its turning in the perforation therein. Sleeved upon and capable of rotary adjustment with the trunnions 13 and 23 are arms 26 and 27, respectively, of a cutter-frame 28, said frame being provided with a bearing 29 for the reception of a shaft 30, to the end of which a large bevel-gear 31, intermeshing with the small bevel-pinion 15, is secured.

Upon this shaft 30 is a spur-pinion 32, the teeth of which are in engagement with a larger spur-pinion 33, carried upon a shaft 34, journaled in bearings of the adjustable frame 28.

Designated by the numeral 35 is a shaft to which the tool 36 (shown as a milling-cutter) is secured, and this shaft is also journaled in a bearing of the adjustable frame and carries a pinion 37 in engagement with the large gear 33, as illustrated in Fig. 3. It is desirable at times to vary the position of the cutter with relation to the work, so that it may be set at different inclinations thereto when required, and the object of the construction just described is to enable this result to be effected in a reliable, quick, and convenient manner.

Threaded upon the sleeve 13 exterior of the bearing extension 11 is a nut 38, provided with openings 38′ in its periphery, in which a tool may be inserted to turn said nut, and between this nut and the end of said bearing extension 11 is a washer 39.

When it is desired to vary the angular relation of the tool to the work, the nut 38 and screw 24 are loosened sufficiently to permit the cutter-frame 28 to be tilted to the desired position, the sleeve 13 and hub 22 attached, respectively, to said frame by keys 40 and screws 25, rocking in their seats or bearings, and after the desired adjustment has been attained the nut 38 is turned against the washer 39 to force the same against the end of the bearing extension 11, and thereby cause the bearing 26 of said frame to be brought tightly against said extension 11, and the screw 24 is also turned to cause the bearing 27 to be brought into close contact with the bearing extension 12.

To sustain the work and prevent it from springing while the tool 36 is in operation thereon, a follow or steady rest (designated in a general way by 42) may be employed, the base of said steady-rest being fitted upon a guide 43 of the slide 10, adjustable upon ways of the carriage, and suitable means (not shown) actuated by a shaft 44, having a handle 45, being employed for securing the base of the steady-rest after adjustment. In a recess of the standard 46 of said steady-rest is fitted a partially-cylindrical open bushing 47, secured in place by a pin 48, passing through the standard, as illustrated in Figs. 2 and 3. This improved follow or steady rest constitutes no part of the present invention, it being set forth and claimed in my concurrently pending application, Serial No. 131,807.

For advancing and retracting the carriage 7 upon the shears of bed 1 any desired means may be employed—for instance, a lead-screw 49, (see dotted lines, Fig. 1,) and for actuating this lead-screw a change-gear train of gears 50, driven from the chuck-spindle 4, may be utilized, as set forth in my application filed July 12, 1902, Serial No. 115,337, of which the present case is a division.

To provide for adjusting the cutter-frame to set the cutter accurately at the desired angle for any given spiral, graduations 51 are formed on the arm 26 of said frame, as shown in Figs. 2 and 4.

For adjusting the cutter-slide 10 to cause the cutter to form the thread or spiral to the correct depth a screw 52, having a micrometer-head 53, is employed, as shown in Fig. 1.

To protect the gearing and shafts of the cutter-driving mechanism, they are inclosed by a hood or casing 54, as shown in Figs. 1 and 4.

Operation: Work finished to size for the required diameter of the spiral to be cut is placed in chuck 4 and supported at its rear end on center 5 and screw 52 is turned to adjust slide 10 until a tooth of the cutter 36 just touches the work, and the micrometer 53 is set to zero. Adjustment of the carriage 7 along the machine-bed is then made until the tooth of the cutter passes beyond the end of the work, and the cutter-slide is advanced by screw 52 until the correct depth of the spiral to be formed is indicated by the micrometer, this depth being determined by a scale-table furnished with the machine, and said slide is then clamped rigidly in position by a screw 55. Then with the proper gearing in place in train 50 the machine is set into operation and the cutter commences its work, suitable stop and clutch-shifting mechanisms—for instance, those set forth in my application aforesaid, but not herein shown—being employed to control the movement of the cutter-slide. By tilting the frame 28 upon its trunnions (the gear 31 rotating over pinion 15) and then clamping it in position by the means described the cutter may be readily set at the desired angle for the given pitch of thread, and as the axis of the cutter intersects the axis of the frame and the point of intersection is in the same horizontal plane as that of the axis of the spiral to be formed and in the same vertical plane as the axis of the trunnions 13 and 22 the points of the cutter-teeth while in action will always be level with the axis of the work notwithstanding the angle to which the cutter may have been adjusted. In other words, the center line of the cutter 36 is in the same horizontal plane as the center line of the screw to be cut and in the same vertical plane as the center line through the trunnions, whereby no matter to what angle the cutter may be set the point of the cutting-tooth is always level with the center line of the work.

While the machine is shown in position for cutting right-hand spirals, yet it can readily be adapted for cutting left-hand ones by making suitable changes in the gear-train 50 and swinging the cutter-frame 28 over to the opposite angle. So, too, if it is desired to

cut toward the tail-stock this may be accomplished by reversing the motion of the lead-screw.

From what has been stated it will be seen that a universal machine capable of forming all kinds of spirals—such, for instance, as precision-screws, lead and feed screws, thrust-screws, and spiral gears—is provided, said machine being composed of comparatively few parts and being simple and compact in construction and reliable in operation.

Changes may be made in many of the details of construction without departure from the invention, which is not limited to the exact devices shown and described nor to any special means for actuating said devices.

Having thus described my invention, what I claim is—

1. The combination, with a slide having bearings, of an adjustable cutter-frame having trunnions journaled in said bearings; means for fixing the frame in position after adjustment; a pair of shafts journaled in the cutter-frame; a gear secured to each of said shafts; a gear journaled in the cutter-frame intermediate to, and in mesh with, the shaft-gears; a shaft passing through one of the trunnions and carrying a gear for driving one of the pair of shafts; and a milling-cutter secured to one of said shafts, the axis of said milling-cutter intersecting the axis of the cutter-frame, and the point of intersection being in the same horizontal plane as the work-spindle.

2. The combination, with a slide having standards, of an adjustable cutter-frame; trunnions carried by said frame and journaled in bearings of said standards, one of said trunnions being externally threaded and the other provided with a threaded bore; a nut upon the externally-threaded trunnion, and serving to draw the same within its bearing; a screw engaging the threaded bore of the other trunnion, and having a head bearing against one of the standards; a rotary cutter carried by the cutter-frame; and means for actuating said cutter.

3. In a machine of the class specified, the combination, with a tool-carriage having standards, of a cutter-frame located between said standards; trunnions fitted in bearings of the standards, one of said trunnions having a longitudinal bore; a shaft mounted in said bore; means for rotating said shaft; a gear secured to said shaft; a shaft journaled in the cutter-frame and having a pair of gears, one of which is in mesh with the gear on the shaft mounted in the bore of said trunnion; a second gear journaled in the frame and engaging the other of said pair of gears; a cutter-shaft having a gear in mesh with said second gear; and a milling-cutter secured to the cutter-shaft.

4. The combination, with a support, of a cutter-frame; trunnions projecting from said frame and entering bearings of the support, one of said trunnions having a hollow portion with an internal thread; screws for securing said internally-threaded trunnion to the support; and a screw engaging the thread of said trunnion and having a head bearing against the support.

5. The combination, with a support, having standards provided with bearings, of a chambered frame having fixed trunnions mounted in said bearings, one of said trunnions being tubular; means applied to each trunnion for securing the frame against movement; a driven shaft passing through the tubular trunnion; a bevel-pinion on the end of said driven shaft; a shaft journaled in the frame; a bevel-gear in engagement with said bevel-pinion, and carried by said shaft; gearing mounted in a chamber of the frame; a cutter-spindle driven by said gearing; and a milling-cutter secured to said cutter-spindle.

6. In a machine of the class specified, the combination, with a support having standards provided with bearings, of a frame having fixed trunnions mounted in said bearings; a nut threaded on one of said trunnions at the outer side of one of the bearings: a screw tapped into the other trunnion and having a head bearing against the inner side of the standard in the bearing of which said trunnion is mounted; a tool-spindle journaled in the frame; and means for driving said tool-spindle.

7. In a machine of the class specified, the combination, with means for supporting and rotating work, of a reciprocatory carriage; a slide transversely adjustable on said carriage, and having standards provided with bearings; a frame having fixed trunnions journaled in said bearings, one of said trunnions being tubular; means for securing the frame against the standards; a shaft journaled in the tubular trunnion; a bevel-pinion secured to said shaft; a shaft journaled in the frame; a bevel-gear on said shaft; a spur-pinion also on said shaft; a spur-wheel; a cutter-spindle carrying a spur-pinion in engagement with said spur-wheel; and a milling-cutter carried by the cutter-spindle.

In testimony whereof I affix my signature in presence of two witnesses.

BENGT M. W. HANSON.

Witnesses:
C. S. GOODRICH,
H. E. BAILEY.