(No Model.)

3 Sheets—Sheet 1.

P. J. HOENSCHEID.

GRINDING MACHINE.

No. 563,593. Patented July 7, 1896.

Fig. 1.

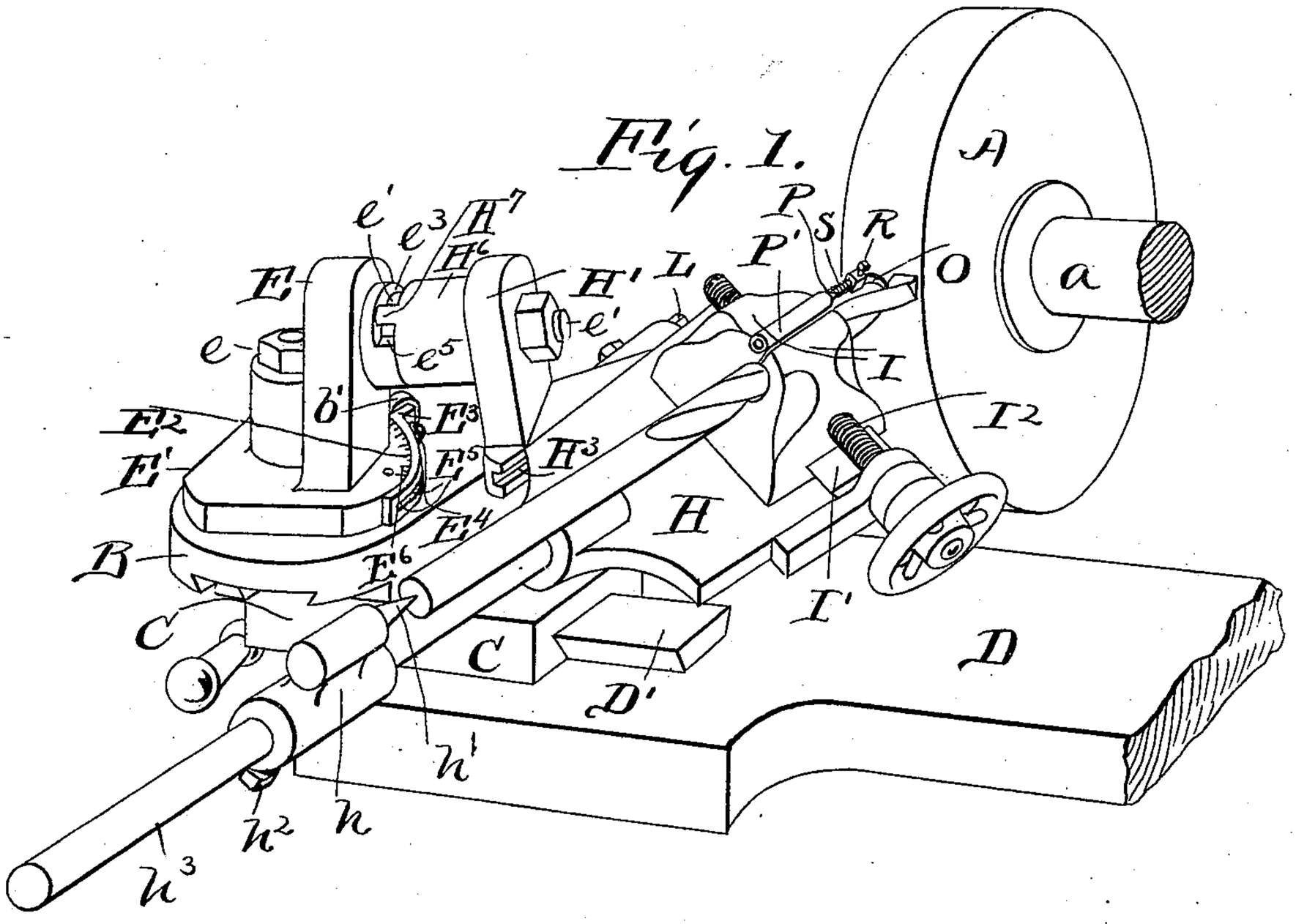
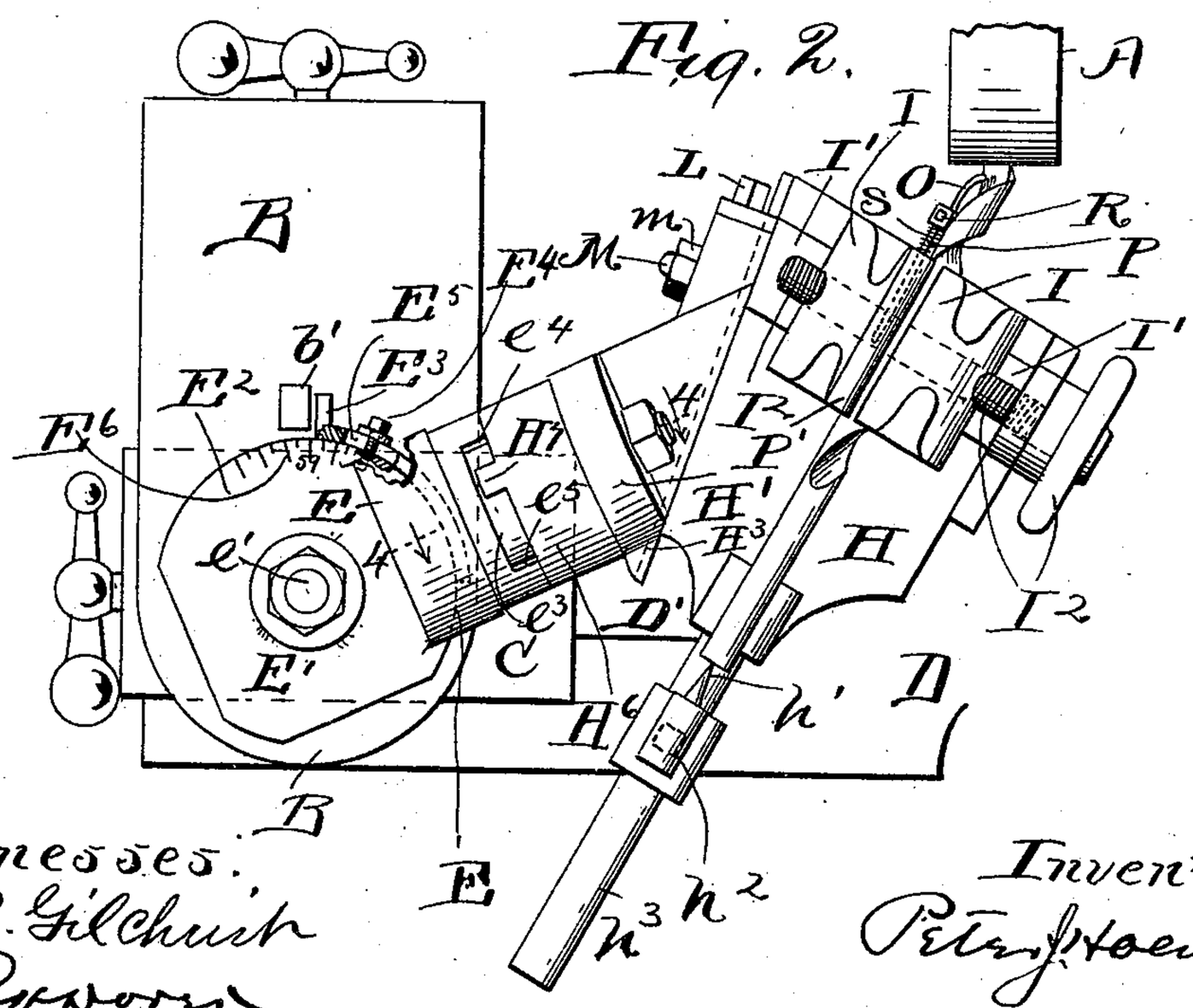


Fig. 2.



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(No Model.) 3 Sheets—Sheet 2.

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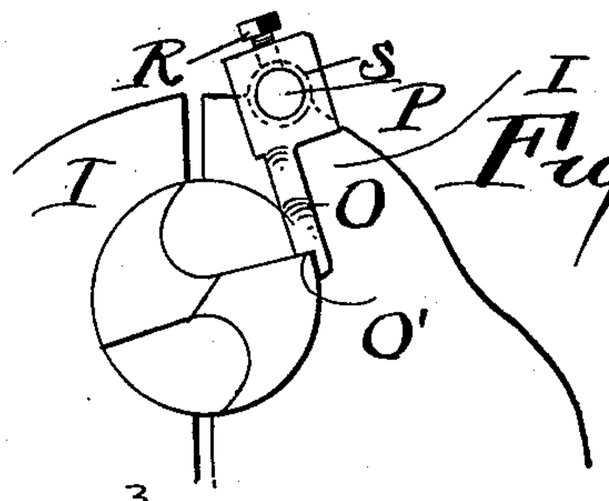

Fig. 3.

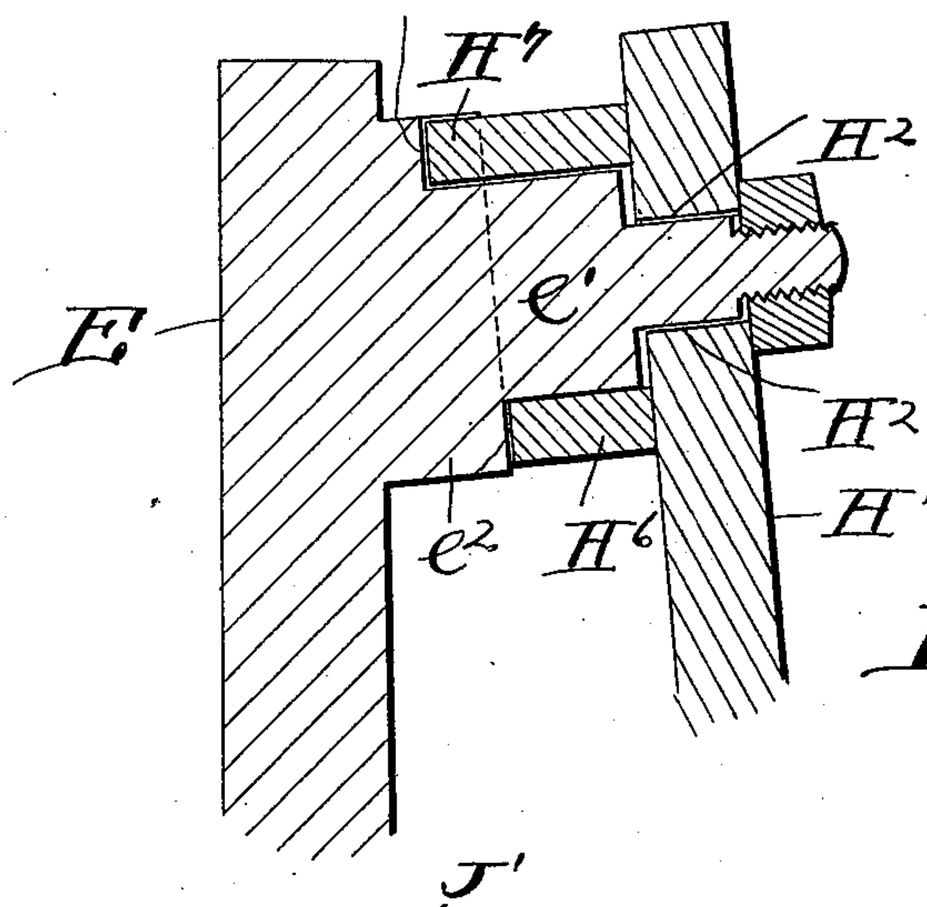

Fig. 4.

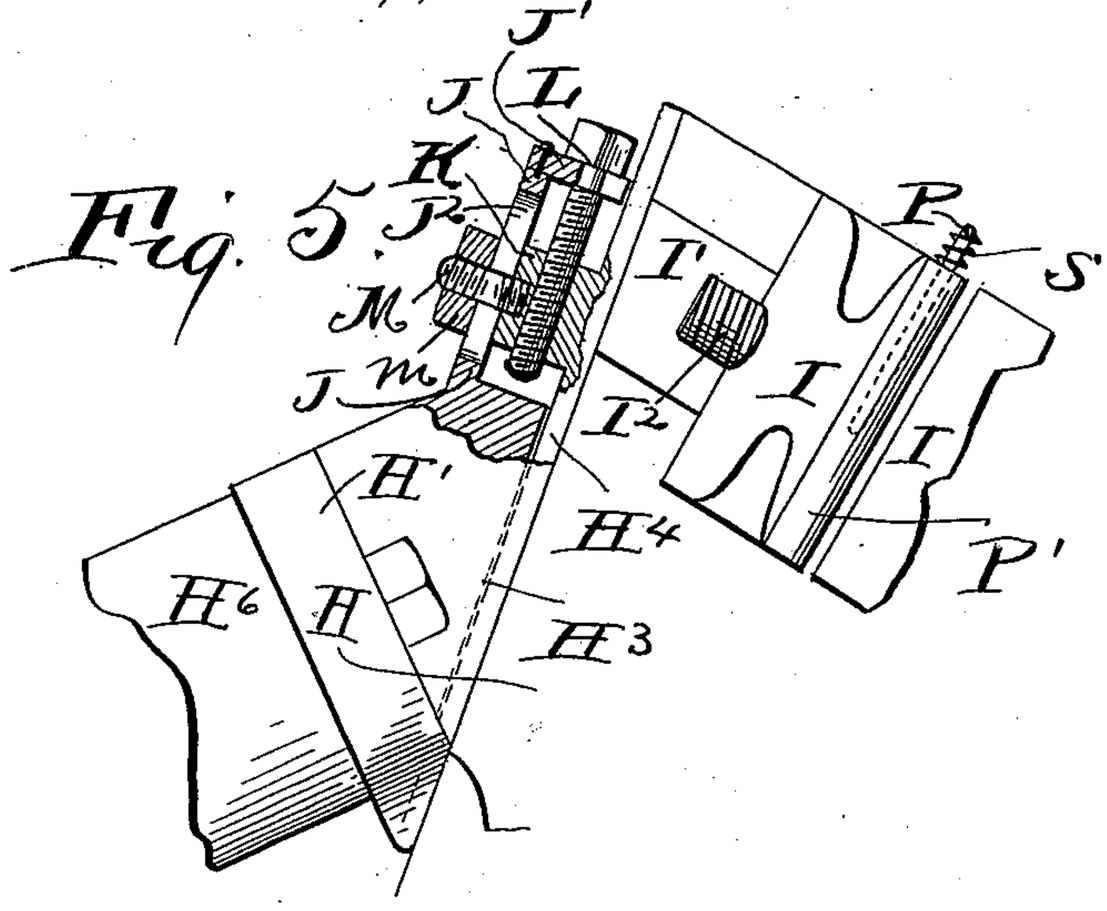

Fig. 5.

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(No Model.) 3 Sheets—Sheet 3.

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GRINDING MACHINE.

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Fig. 6.

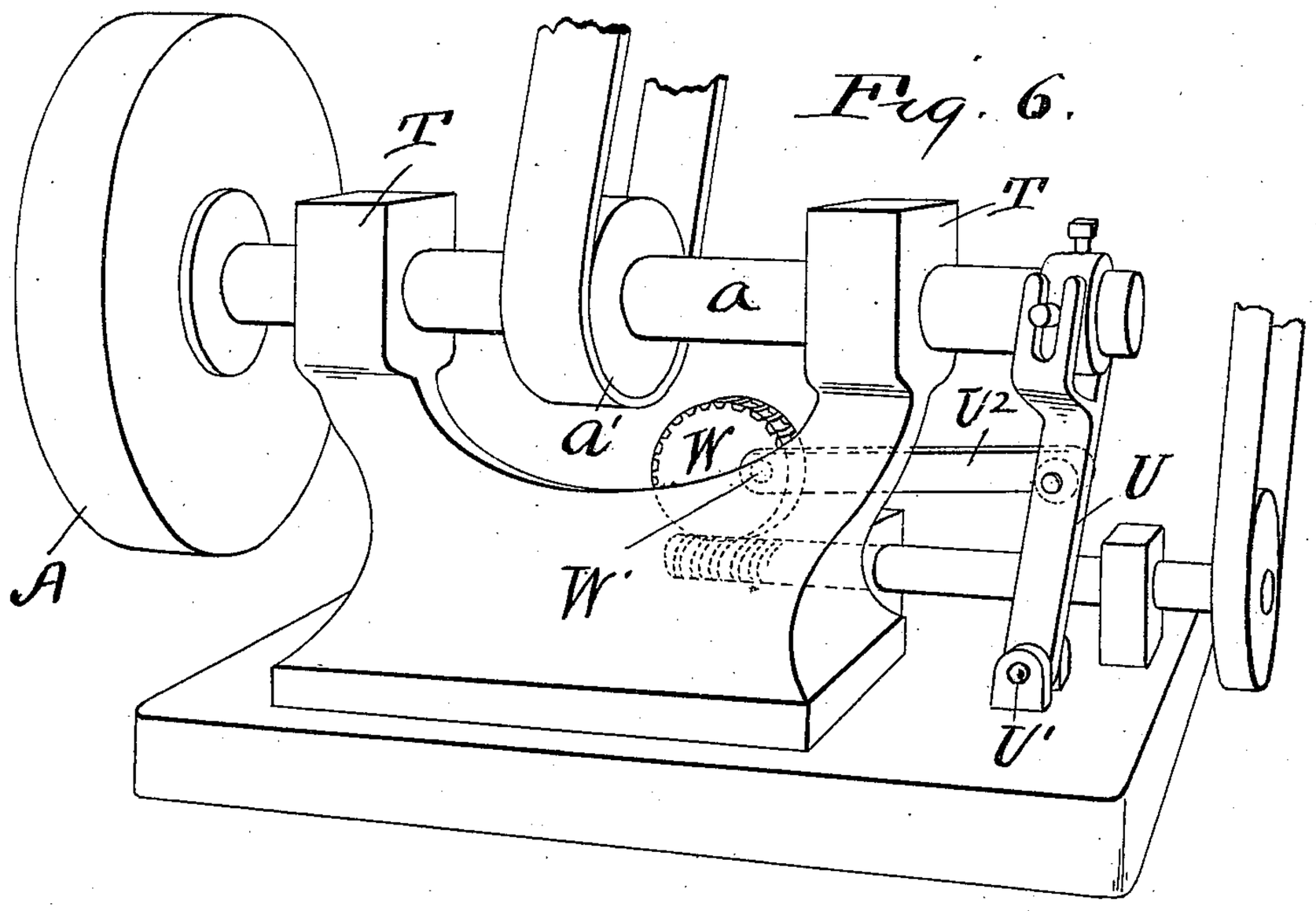
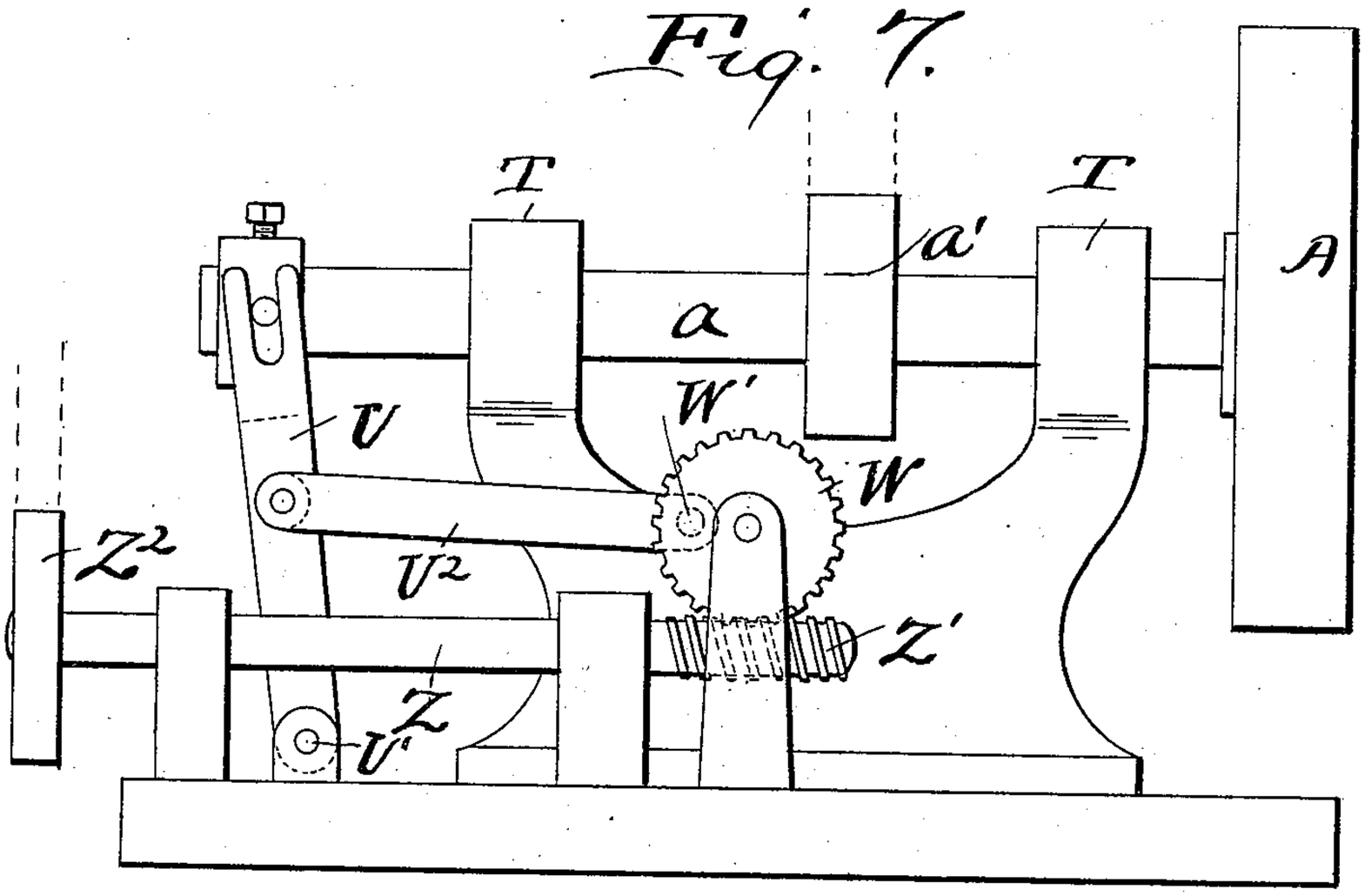


Fig. 7.



WITNESSES

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UNITED STATES PATENT OFFICE.

PETER J. HOENSCHEID, OF AKRON, OHIO, ASSIGNOR TO THE WHITMAN & BARNES MANUFACTURING COMPANY, OF SAME PLACE.

GRINDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 563,593, dated July 7, 1896.

Application filed May 13, 1895. Serial No. 549,202. (No model.)

To all whom it may concern:

Be it known that I, PETER J. HOENSCHEID, of Akron, in the county of Summit and State of Ohio, have invented certain new and useful Improvements in Grinding-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

My invention relates to improvements in twist-drill-grinding machines.

One object of my invention is to construct a machine whereby the cutting edges of the drill can be ground at any desired angle to each other or to the axis of the drill and whereby the lips of the drill can be backed off or cleared more or less, as desired.

A further object is to grind the drill on the peripheral or circumferential surface of a grinding disk or wheel and to have the latter movable axially, whereby the entire circumferential surface of the grinding disk or wheel is utilized.

A further object is to render the machine as simple, durable, and convenient as practicable and to provide suitable means for facilitating and holding the drill in the proper adjustment circumferentially preparatory and during the grinding operation.

With these objects in view my invention consists in certain features of construction and combinations of parts hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a perspective of the essential portion of a twist-drill-grinding machine embodying my invention. Fig. 2 is a top plan of the same with portions in section and broken away. Fig. 3 is an enlarged front end elevation of the drill-holding jaws, showing the work in position and the means employed for facilitating the circumferential adjustment of the drill in the jaws and holding the drill in the desired adjustment. Fig. 4 is a side elevation of a portion of the machine, partly in section on line 4 4, Fig. 2. Fig. 5 is a top plan of a portion of the drill-carriage, partly in section. Fig. 6 is a perspective of the grinding-wheel and its supporting-shaft and mechanism for moving said shaft longitudinally. Fig. 7 is a side elevation of the parts exhibited in Fig. 6.

Referring to the drawings, A represents the grinding wheel or disk of my improved machine, the same being operatively mounted upon a shaft *a*, that is supported and driven in any suitable manner, the drill in the case illustrated being designed to be ground upon the peripheral or circumferential surface of the grinding wheel or disk. In suitable proximity to the grinding wheel or disk, near one end of shaft *a* and a suitable distance below the axial horizontal plane of said wheel or disk, are provided a pair of slides B and C, slide B being arranged in a horizontal plane and at right angles to a line drawn parallel with the axis of the grinding disk or wheel and being mounted upon slide C, that is provided with suitable slideways (not shown) for slide B. Slide C is arranged at right angles to slide B, and consequently parallel with the axis of the grinding disk or wheel, and D represents the supporting-bed for slide C, said bed being provided with a suitable slideway D′ for said slide.

An upright post or standard E is pivotally mounted, as at *e*, upon slide B, at or near the forward end of the latter, and forward of the grinding-surface. Post or standard E, at its lower end, is provided with an external flange E′, that rests upon slide B. Said flange has at least a portion E^2 of its periphery concentric with the axis of post or standard E, and is provided with a laterally-projecting dog or member E^3, adapted to engage an upwardly-projecting lug or stop *b*′, formed upon slide B, member E^3 being adjustable endwise of portion E^2 of flange E′ and secured in the desired adjustment by means of a bolt or screw E^4, that screws into portion E^2 of member E′, and the hole E^5 through which said bolt or screw passes in member E^3 being elongated to accommodate said adjustment of member E^3. The object of this adjustment will be more fully referred to hereinafter.

Arm or standard E, at its upper end, is provided with a laterally-projecting arm or bearing *e*′, from which the head-block and tail-block H and *h*, respectively, that support the drill in the grinding operation, are supported and adapted to be swung or moved. Tail-block *h*, that carries the center *h*′, adapted to carry the shank end of the drill, is adjustably secured, by means of a set-screw h^2, to an arm

or bar h^3, rigid with head-block H, and the latter is provided with a pair of jaws I for holding the lipped end of the drill, said jaws being adjustable apart to accomodate different sizes of drills. Jaws I are preferably rigid with slides I′ I′, respectively, and said slides are engaged by the right and left hand threaded portions, respectively, of a right and left handed stationary screw I^2, whereby the jaws are moved toward or from each other according as the screw is turned in the one direction or the other.

Blocks H and h and connecting-rod h^3 are arranged obliquely to the grinding-surface, as shown, and upon loosening bolt or screw E^4 are capable of being swung in a horizontal plane to bring the lipped end of the drill carried by said blocks into the required position relative to the grinding-surface to grind the cutting edges of the drill to the angle desired, this angle being greater or less according as the drill carriage or device is moved and adjusted laterally upon pivot e in the one direction or the other.

The arrangement of parts is such that that side of lug or stop b' that is presented toward the drill-carriage is adapted to be engaged by member E^3, and said lug or stop, in conjunction with member E^3, therefore limits the horizontal movement of the drill-carriage in the direction of the grinding-surface. Portion E^2 of member E′ of post or standard E is graduated, as at E^6, and if the maximum angle at which the cutting edges of twist-drills are ground were fifty-nine degrees, the number "59" might be marked upon one end of the graduated surface of member E′, indicating that when that surface of adjustable member E^3 that is adapted to engage lug b' is brought opposite said number of the graduated surface, and when the drill-carriage is therefore actuated to bring said member E^3 into contact with member b, the drill shall have been brought into such position relative to the grinding-surface that the cutting edges of the drill shall be ground at an angle of fifty-nine degrees.

The drill-carriage is supported from bearing e, and to this end the head-block of said carriage is provided with an upright arm H′ that is perforated, as at H^2, (see Fig. 4,) to accommodate its being easily mounted upon the outer portion of lug or bearing e, that inclines upwardly more or less toward its outer end, as shown and for the purpose hereinafter made apparent. The drill-carriage is also adjustable longitudinally toward and from the grinding-surface, as required, to back off or clear the lips of the drill more or less during the clearing operation, the lips of the drill being backed off or cleared more by adjusting the drill closer to the grinding-surface. Said longitudinal adjustment of the drill-carriage, and consequently of the drill, is attained as follows: Arm H′ of the drill-carriage, at its lower end, is provided with a groove or mortise H^3, that is engaged by a tongue or tenon H^4 on the body portion of the head-block of the drill-carriage, the arrangement of said mutually-engaging tongue and groove being such that the drill-carriage, and consequently the drill, shall be adjusted longitudinally by adjusting the tongue endwise of the groove. Means employed for actuating said tongue, and consequently the drill-carriage, in the direction just indicated consists, preferably, of a screw L, (see Fig. 5,) that engages a nut K, rigid with tongue H^4, which screw L is suitably fixed to a flange or member J′, formed upon the outer end of an arm J of member H′, which screw L and member J are arranged parallel with tongue H^4, and which member J is arranged at the outer side of the screw. Screw L, and consequently the drill-carriage, is positively secured in the desired longitudinal adjustment by means of a stud M and a nut m, said stud being rigid with tongue H^4 and extending through a slot J^2, formed in member H^5, and arranged parallel with screw L, and accommodating the adjustment of parts upon loosening nut m.

I would here remark that the position of parts at the commencement of the clearing operation should be such that the point of the drill, whose lips are to be backed off or cleared, shall be located in the same horizontal plane as the axis of the grinding-surface and rearward of an imaginary line coincident with the axis of lug or bearing e', but in the same inclined plane with said axis. By means of the inclination of bearing e' toward the free end of said bearing, and in the direction of the point at which the drill-point engages the grinding-surface at the commencement of the clearing operations, the lips of the drill, during the clearing operation, are also elevated, and thereby assist in the clearing operation.

Suitable means for limiting the vertical swinging movement of the drill-carriage in opposite directions is preferably provided and is shown to be as follows: Lug or bearing e', at its inner end, (see Figs. 1, 2, and 4,) is enlarged circumferentially, as at e^2, and said enlargement of the lug is recessed upon its periphery and circumferentially, as at e^3, forming two shoulders e^4 e^5, located a suitable distance apart circumferentially of said lug.

Recess e^3 is engaged by a lug or projection H^7, formed upon sleeve H^6, that is rigid with arm H′, and embraces lug or bearing e', said lug H^7 being adapted to engage with shoulders e^4 e^5, and thereby limit a vertical oscillation of the drill-carriage during the clearing operation, the arrangement of parts being such that when lug H^7 engages shoulder e^4 the point of the drill shall be in the same horizontal plane as the axis of the grinding-surface, ready for the clearing operation.

By the construction hereinbefore described, wherein the drill-carriage, and consequently the drill, are arranged obliquely to the grinding-surface, and are capable of being swung or oscillated in the inclined bearing e', and are susceptible of the adjustments hereinbe-

fore referred to, it will be observed that the lips of the drill can, with great facility and accuracy, be backed off or cleared more or less as desired.

Briefly stated, by my improved machine the cutting edges of the drill can be ground to any angle, and any desired clearance and shape can be given to the lips of the drill.

Suitable means for facilitating the adjustment of the drill circumferentially when the drill is placed in the drill-carriage is provided, and the means shown for the purpose consists of a guide comprising a dog or finger O, (see Figs. 2 and 3,) adjustably mounted upon oscillating shaft P, journaled in a box P′, rigid with one of the jaws of the head-block of the drill-carriage, said guide being held in the desired adjustment by means of a set-screw R, that is adapted to engage the supporting-shaft through a correspondingly-threaded hole in the guide. Guide O is notched, at its outer end, as at O′, (see Fig. 3,) to embrace one of the cutting edges of the drill at the land of the drill, and S designates a spring acting to retain member O in engagement with the drill. The oscillating capability of guide O enables it to be swung out of the way to accommodate the introduction of the drill into the drill-carriage and its removal therefrom. By means of said guide absolute accuracy is attained in the adjustment of the drill circumferentially preparatory to the clearing operation, resulting in a uniformity in the clearance given to the different lips of the drill.

Slides and slideways B, C, C′, and D′, it will be observed, accommodate the adjustment of the drill-carriage in directions parallel with and at right angles to the axis of the grinding-surface.

In order to utilize the whole grinding-surface of the grinding-wheel during the grinding operation, I provide mechanism for reciprocating the shaft, that bears said wheel, longitudinally during the grinding operation. Said shaft (see Figs. 6 and 7) has bearing in two boxes T, located a suitable distance apart, and the shaft, between said boxes, is provided with a driving-pulley a' for rotating the same. Shaft a, at any suitable point, is operatively engaged by the upper end of a tilting or vibrating lever U, fulcrumed, at its lower end, at U′, to any suitable support, and operatively connected, at or near its central portion, by means of a link U^2, with the wrist W′ of a combined worm and crank wheel W, that meshes with a worm Z′ of a suitably-supported worm-shaft Z, arranged parallel with shaft a and provided with a driving-pulley Z^2.

What I claim is—

1. In a drill-grinding machine, in combination with a revoluble grinding-surface, of an upright post or standard E having a circular adjustment horizontally, a bearing e' rigid with said post or standard and inclining upwardly toward its free end and in the direction of the point at which the point of the drill engages the grinding-surface at the commencement of the clearing operation, and the suitably-arranged drill-carriage suitably supported from said bearing, substantially as shown, for the purpose specified.

2. In a drill-grinding machine, in combination, slide B provided with an upwardly-projecting lug b, an upright post or standard E pivoted to said slide, as at e, and provided, at its lower end, with a laterally-projecting flange E′, a portion E^2 of which flange is provided with a peripheral surface concentric with the axis of the post or standard and graduated, as at E^6, a dog or projecting member secured upon said peripheral surface and adjustable endwise of said surface, and a drill-carriage arranged obliquely to the grinding-surface and suitably supported from the aforesaid post or standard, substantially as shown and described.

3. In a drill-grinding machine, in combination, a revoluble grinding-surface, an upright post or standard E having a circular adjustment in a horizontal plane, a lug or bearing e' rigid with and projecting laterally from said post or standard and inclining upwardly toward its free end and in the direction of the point at which the drill-point engages the grinding-surface at the commencement of the clearing operation, the suitably-arranged drill-carriage provided with an upright arm turnably mounted upon the aforesaid bearing, and means whereby said carriage is rendered adjustable longitudinally as required to adjust the drill borne by the carriage endwise, substantially as shown and described.

4. In a drill-grinding machine, the combination with a revoluble grinding-surface, of an upright post or standard E provided with a lateral lug or bearing, e', drill-carriage provided with an upright arm journaled upon the aforesaid bearing, said arm and the body portion of the carriage being provided the one with a tongue or tenon and the other with a mortise or groove engaged by the tenon or tongue, said tongue and groove being arranged to afford a longitudinal adjustment to the drill-carriage, and suitable means for securing the carriage in the desired longitudinal adjustment, substantially as set forth.

5. In a drill-grinding machine, the combination with a drill-carriage, of an oscillating shaft P borne by said carriage, a dog or finger O upon said shaft, said dog or finger being notched, as at O′, to embrace a cutting edge of the drill at the land of the drill, a spring acting to retain said dog or finger in its operative position, substantially as shown, for the purpose specified.

In testimony whereof I sign this specification, in the presence of two witnesses, this 12th day of October, 1894.

PETER J. HOENSCHEID.

Witnesses:

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C. H. DORER.