C. E. WALLING.

GRINDING MACHINE.

APPLICATION FILED OCT. 1, 1913. RENEWED MAY 12, 1915.

1,143,337. **Patented June 15, 1915.**

2 SHEETS—SHEET 1.

Fig. 1,

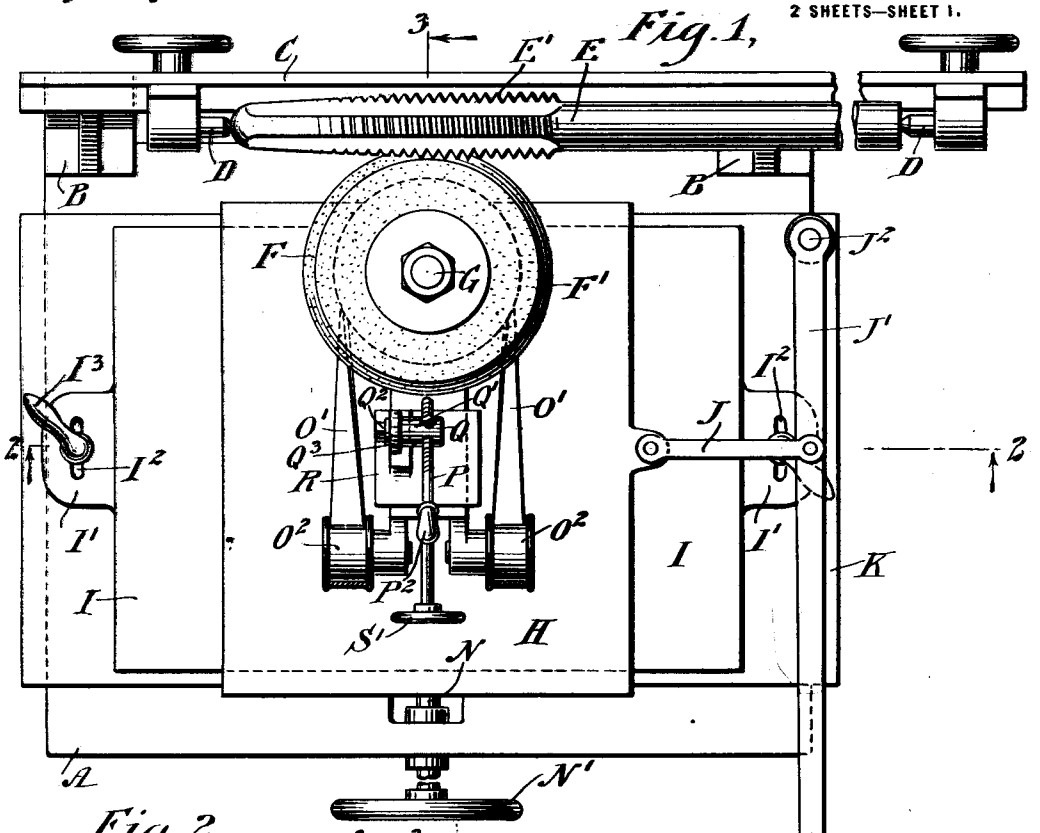
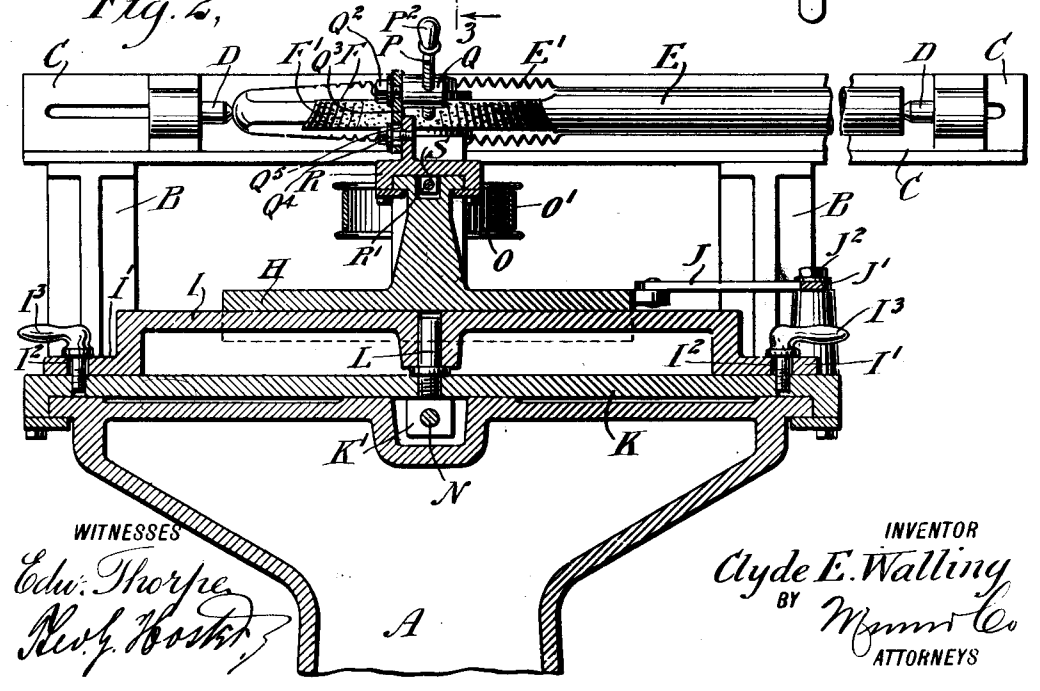


Fig. 2,



WITNESSES

Edw. Thorpe

Rud. J. Koster

INVENTOR

Clyde E. Walling

BY Munn & Co

ATTORNEYS

C. E. WALLING.

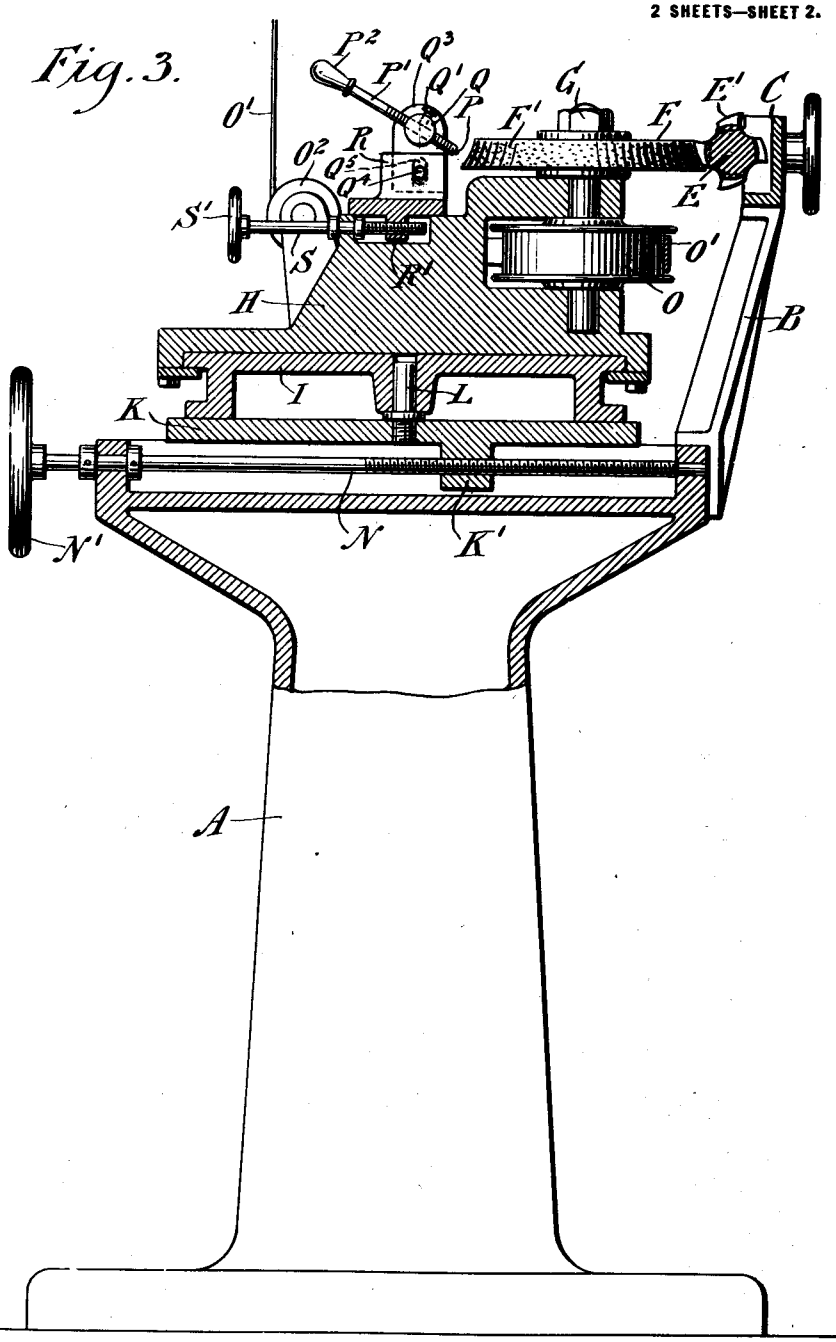
GRINDING MACHINE.

APPLICATION FILED OCT. 1, 1913. RENEWED MAY 12, 1915.

1,143,337. **Patented June 15, 1915.**

2 SHEETS—SHEET 2.

Fig. 3.



WITNESSES

Edw. Thorpe

Reg. Hoskins

INVENTOR

Clyde E. Walling

BY Munn & Co

ATTORNEYS

UNITED STATES PATENT OFFICE.

CLYDE E. WALLING, OF SOUTH WHITLEY, INDIANA.

GRINDING-MACHINE.

1,143,337. Specification of Letters Patent. Patented June 15, 1915.

Application filed October 1, 1913, Serial No. 792,759. Renewed May 12, 1915. Serial No. 27,667.

To all whom it may concern:

Be it known that I, CLYDE E. WALLING, a citizen of the United States, and a resident of South Whitley, in the county of Whitley and State of Indiana, have invented a new and Improved Grinding-Machine, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved grinding machine, more especially designed for grinding taps, reamers and similar tools, and arranged to provide the cutting teeth of a tool with peripheral faces sloping rearwardly and inwardly from the front edges of the teeth to the back thereof.

For the purpose mentioned, use is made of a grinding wheel having a concave peripheral face adapted to engage and grind a correspondingly shaped sloping back on the row of teeth on the tool to be ground, the grinding wheel and the means for holding the tool having sliding movement one relative to the other.

A practical embodiment of the invention is represented in the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a plan view of the grinding machine as applied for grinding the cutting teeth of a tap; Fig. 2 is a sectional side elevation of the same on the line 2—2 of Fig. 1; and Fig. 3 is a transverse section of the same on the line 3—3 of Fig. 1.

The improved grinding machine is mounted on a suitably constructed stand A provided at the rear with upwardly-extending brackets B supporting a longitudinally-extending rail C carrying lengthwise adjustable centers D for axially supporting a tap, reamer or other similar tool E, the teeth E′ of which are to be ground, as hereinafter more fully explained. For the purpose mentioned use is made of a grinding wheel F provided with a peripheral face F′ of curved or concave shape, as plainly indicated in Figs. 2 and 3. The grinding wheel F is disposed horizontally and its peripheral face F′ is adapted to engage and grind the peripheral faces of a row of teeth E′ in such a manner that the backs slope rearwardly and inwardly from the front or cutting edges of the teeth, as will be readily understood by reference to Fig. 3. By grinding the cutting teeth E′ of a tap or a similar tool E in the manner described a desired clearance is had to permit only the cutting edges to come in contact with the material of the article when the tap, reamer or similar tool E is used, thus insuring a ready tapping or reaming of the bore in an article. The grinding wheel F is secured to the upper end of a vertically-disposed spindle G journaled in a support H mounted to slide in the direction of the axis of the teeth of the tool E so that the peripheral face F′ of the grinding wheel F successively grinds the cutting teeth E′ of a row of teeth on the tool E. The support H is mounted to slide axially on a table I by the use of a link J pivotally connecting the support H with a lever J′ under the control of the operator. The lever J′ is pivoted at its rear end at J^2 on a carriage K mounted to slide transversely on the top of the stand A, and the said carriage K is provided with a pivot L on which the table I is mounted to turn, the axis of the pivot L being parallel to but spaced from the axis of the spindle G carrying the grinding wheel F. The table I is provided at the sides with flanges I′ having segmental slots I^2 engaged by clamping bolts I^3 screwing in the carriage K to permit of fastening the table I in position after the same has been turned on the pivot L to a desired position. The table I is mounted to turn to permit of setting the support H in such a manner that the center of the grinding wheel F travels parallel to the axis of the tool E for grinding the teeth E′ at the cylindrical portion of the tool or for setting the table I at an angle so that the peripheral face of the grinding wheel F travels along the tapering portion of the tool, as will be readily understood by reference to Fig. 1.

In order to move the carriage K in a transverse direction with a view to engage the peripheral face of the grinding tool F with the row of teeth E′ to be ground, use is made of a screw rod N extending transversely and journaled in suitable bearings arranged on the top of the stand A. The screw rod N screws in a nut K′ depending from the under side of the carriage K, and the forward end of the screw rod N is provided with a suitable hand wheel N′ under the control of the operator for turning the screw rod N with a view to move the carriage K in a transverse direction so as to move the peripheral face F′ of the grinding

wheel F into grinding engagement with the row of teeth E′ or out of engagement with the same after the teeth have been ground to the desired shape. The spindle G of the grinding wheel F is provided with a pulley O around which passes a belt O′ also passing around idlers O^2 journaled on the support H, the belt O′ also passing over a driving pulley for imparting a rotary motion to the spindle pulley O, spindle G and grinding wheel F.

In order to provide the peripheral face F′ of the grinding wheel F with the desired curvature use is made of a diamond or other abrading tool P mounted on the end of a screw rod P′ screwing in a nut Q and adapted to be fastened thereto by a set screw Q′. The nut Q is provided with a pivot Q^2 mounted to turn in a plate Q^3 secured by a bolt Q^4 to a slide R mounted to slide transversely on the support H. The bolt Q^4 passes through a slot Q^5 in the plate Q^3 and screws in the slide R to allow of vertically adjusting the plate Q^3 and with it the pivot Q^2 and the nut Q carrying the screw rod P. The slide R is provided at the bottom with a nut R′ in which screws a screw rod S journaled in suitable bearings on the support H, as plainly indicated in Fig. 3. The outer end of the screw rod S is provided with a suitable handle S′ under the control of the operator for moving the slide R toward or from the grinding wheel F with a view to engage the abrading tool P with the peripheral face F′ of the grinding wheel F. The outer end of the screw rod P′ is provided with a suitable handle P^2 under the control of the operator for turning the screw rod P′ in the nut Q at the time the set screw Q′ is loosened so as to advance or retract the tool P relative to the peripheral face F′ of the grinding wheel F. After the desired adjustment is made the set screw Q′ is screwed up to fasten the screw rod P′ in place in the nut Q, and then the operator on swinging the handle P^2 up and down causes the tool P to travel up and down on the peripheral face F′ of the grinding wheel F to give the desired segmental or concave shape to the said peripheral face. It is understood that by screwing the screw rod P′ farther in or farther out in the nut Q the radius of the segmental curve given to the peripheral face F′ of the grinding wheel F is increased or diminished as desired, and by adjusting the nut-carrying plate Q^3 up or down on the slide R the center of the swinging screw rod P′ is raised or lowered correspondingly to vary the inclination of the curvature given to the peripheral face F′ of the grinding wheel F.

The machine is used as follows: The tool E is mounted on the centers D and turns so that a row of its cutting teeth E′ is opposite the peripheral face F′ of the grinding wheel F, and then the operator turns the hand wheel N′ to move the carriage K transversely with a view to engage the peripheral face F′ of the grinding wheel F with the row of teeth E′. The operator then imparts a swinging motion to the lever J′ to shift the table I longitudinally so that the grinding wheel F grinds the teeth E′ in the row. The hand wheel N′ is next turned in the opposite direction with a view to withdraw the grinding wheel F from the tool E and then the latter is turned to move another row of teeth E′ to the front, after which the above-described operation is repeated, to grind the teeth E′ of the second row. The operation is repeated until the different rows of teeth on the tool are ground.

In case the tool has tapering portions of teeth as is the case of a tap, for instance, and as shown in Fig. 1, then the table I is set at an angle to move the grinding wheel F at a corresponding angle to the tapering portion of the tool on manipulating the lever J′ as above described and imparting sliding motion to the support H on the table I set at a corresponding angle. The grinding wheel F is advanced and retracted as before explained to permit of grinding the several rows of tapering teeth of the tool E.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A tool grinding machine, comprising means for supporting a tool, and a revoluble grinding wheel having a concave peripheral face adapted to engage the cutting teeth of the tool to slope the backs of the teeth rearwardly and inwardly from the front edges to the back edges thereof, the said tool and the said grinding wheel having bodily movement one relative to the other and in the direction of the length of the tool.

2. A tool grinding machine, comprising a tool support for axially supporting a tool to be ground, a revoluble grinding wheel having a curved peripheral face adapted to engage and grind a row of cutting teeth on the tool, a grinding wheel support mounted to slide in the direction of the axis of the tool, a table on which the said support is mounted to slide, and a carriage mounted to travel transversely and on which the said table is mounted to turn.

3. A tool grinding machine, comprising a tool support for axially supporting a tool to be ground, a revoluble grinding wheel having a curved peripheral face adapted to engage and grind a row of cutting teeth on the tool, a grinding wheel support on which the said grinding wheel is journaled, a table on which the said support is mounted to slide longitudinally, a carriage mounted to slide transversely, and a pivot connecting the said table with the said carriage, the pivot being

spaced from and parallel to the axis of the grinding wheel.

4. A tool grinding machine, comprising a tool support for axially supporting a tool to be ground, a revoluble grinding wheel having a curved peripheral face adapted to engage and grind a row of cutting teeth on the tool, a grinding wheel support on which the said grinding wheel is journaled, a table on which the said support is mounted to slide longitudinally, a carriage mounted to travel transversely, a pivot connecting the said table with the said carriage, the pivot being spaced from and parallel to the axis of the grinding wheel, and means for securing the said table to the said carriage after the table is adjusted.

5. A tool grinding machine, comprising a tool support for axially supporting a tool to be ground, a revoluble grinding wheel having a curved peripheral face adapted to engage and grind a row of cutting teeth on the tool, a grinding wheel support on which the said grinding wheel is journaled, a table on which the said support is mounted to slide longitudinally, manually-controlled means for imparting sliding movement to the said support, and a carriage mounted to travel transversely and on which the said table is mounted to turn.

6. A tool grinding machine, comprising a stand, a tool support at one side of the stand, a carriage mounted to slide on the stand toward and from the tool support, means for sliding the carriage, a table pivoted on the carriage, means for locking the table in position, a support mounted to slide on the table in a direction at right-angles to the movement of the carriage, means for sliding said support, a revoluble vertical shaft mounted in the support, and a grinding wheel on the upper end of said shaft.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CLYDE E. WALLING.

Witnesses:
E. B. TIBBETS,
MARGARET S. TIBBETS.