No. 690,999. Patented Jan. 14, 1902.

E. RIVETT.

GRINDING MACHINE.

(Application filed May 8, 1901.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

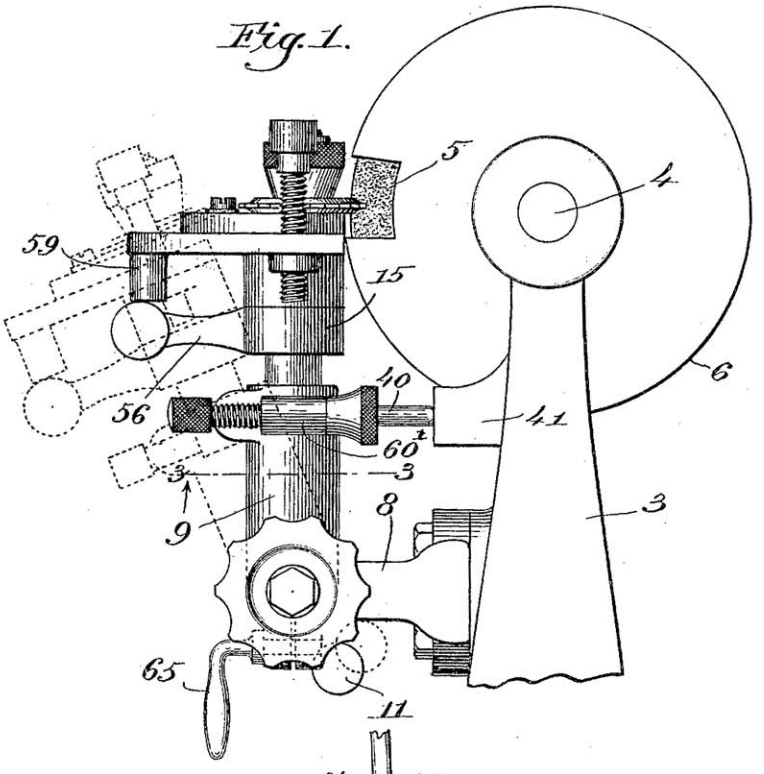
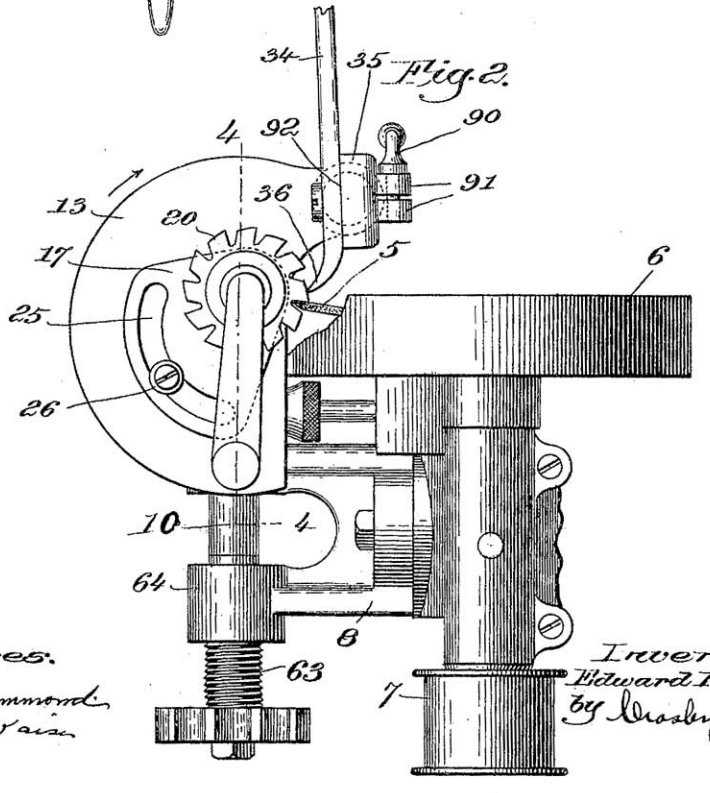


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

Fig. 3.

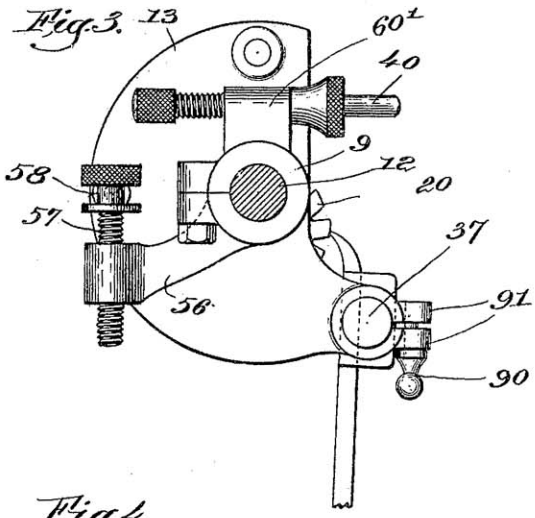


Fig. 4.

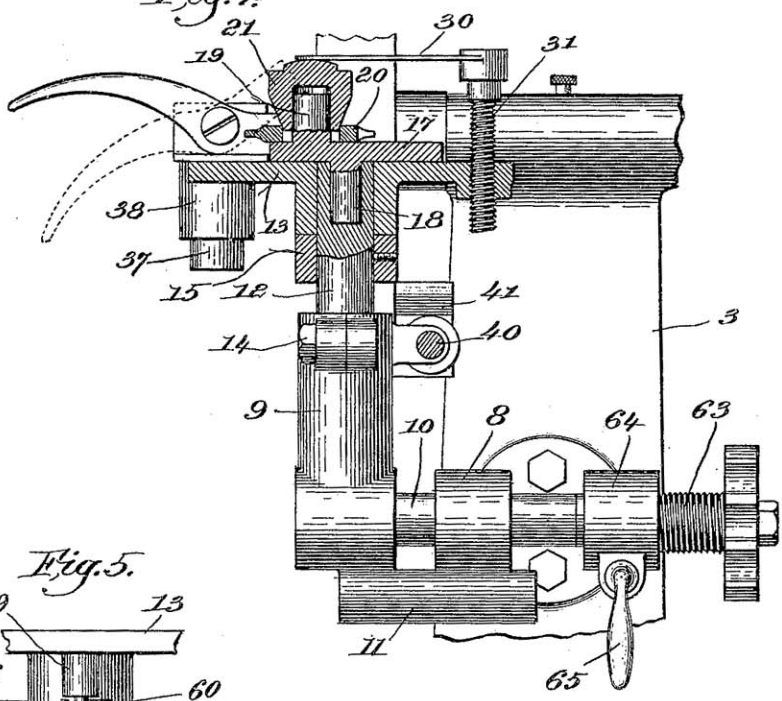
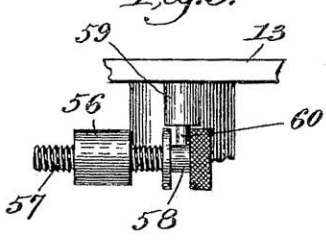


Fig. 5.



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UNITED STATES PATENT OFFICE.

EDWARD RIVETT, OF BOSTON, MASSACHUSETTS.

GRINDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 690,999, dated January 14, 1902.

Application filed May 8, 1901. Serial No. 59,228. (No model.)

To all whom it may concern:

Be it known that I, EDWARD RIVETT, a citizen of the United States, and a resident of Boston, county of Suffolk, and State of Massachusetts, have invented an Improvement in Grinding-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like numerals on the drawings representing like parts.

It is the object of my invention to provide a grinding-machine which is especially designed for grinding or sharpening the toothed cutters that are used on milling-machines, the machine being constructed, as hereinafter described, so as to insure that the cutters will be ground concentrically—that is, in the grinding thereof all the teeth will be ground to the same length.

Heretofore in the grinding or sharpening of circular toothed cutters, such as are used on milling-machines, it has been common to provide some suitable centering device or holder for the cutter which may be moved toward and from the abrasive wheel, the said cutter being given the correct angular position for the grinding of any one tooth by means of an index or stop pawl, which was so shaped as to engage the back side or back face of the cutter-tooth. While in this type of machine the width of the tooth is properly gaged, yet it not infrequently happens, especially where worn or dull cutters are being resharpened, that one tooth will be longer than the rest, and where the indexing or the positioning of the cutter angularly is done by means of an index-pawl which engages the back face of the cutter-tooth the grinding of the cutter or sharpening of the same does not remedy this defect in the cutter, caused by one of the teeth being longer than the others. To overcome this objection and to insure the grinding of the cutter concentrically and with all the teeth of the same length, I provide a cutter-holder having means for indexing or angularly positioning the cutter from the outside edge of the teeth instead of from the back side thereof.

My invention comprises in connection with a suitable abrasive wheel a work-holder for sustaining the cutter, said holder being capable of movement toward and from the abrasive wheel and sustaining at its upper end a table, on which is adjustably mounted a suitable centering device for the cutter. An adjustable index-pawl is pivoted to the table, the said index-pawl having its operative face so shaped and positioned as to engage the outside face or end of the teeth of the cutter instead of the back side thereof.

Another feature of my invention consists in supporting the table so as to allow of the same having a slight free movement about a vertical axis, this being an important feature when the apparatus is used to regrind or sharpen old or worn cutters, for the cutter may be properly adjusted on the centering device and the work-holder thrown into operative position with the outer edge of the abrasive wheel between the cutter-teeth, when the table may be turned slightly about its vertical axis to bring the cutting-face thereof against the face of the abrasive wheel, and thus grind or sharpen the tooth.

Figure 1 is a side elevation of my grinding-machine. Fig. 2 is a plan view thereof. Fig. 3 is a section on the line 3 3, Fig. 1, looking in the direction of the arrow. Fig. 4 is a partial section on the line 4 4, Fig. 2. Fig. 5 is a detail of the device for permitting a slight turning movement of the table.

3 represents a suitable standard carrying at its upper end a shaft 4, on which is secured a suitable abrasive wheel 5, of emery or other usual material, the said wheel being preferably inclosed in a housing 6, as usual in this class of devices, and being driven by a pulley 7 upon the shaft 4. Secured to one side of the stand 3 is a double arm 8, to which is pivoted the work-support, hereinafter described. The work-support comprises the stand 9, having the arm 10 extended at right angles therefrom and journaled in the arms 8 on the standard 3, the said stand having the stop 11 extending beneath the arm 8 and serving to limit the outward swinging motion thereof, as seen in dotted lines in Fig. 1. The stand 9 is cylindrical in shape and is preferably split, the said stand having inserted therein the stem 12 of the table 13, upon which the centering device is mounted, the stem being held in any adjusted position in the stand 9 by means of the set-screw 14, as usual.

The table 13 is preferably of the shape illus-

trated in Fig. 3 and is sleeved over the upper end of the stem 12 (see Fig. 4) and rests upon the collar 15, fast upon the said stem 12, the said table being capable of adjustment about the stem 12. Adjustably supported on the table is a centering device comprising a plate 17, having a stem 18 projecting therefrom and swiveled in a concentric socket in the end of the stem 12 (see Fig. 4) and having projecting from its upper face and offset from the center thereof a cylindrical stem or projection 19, over which the cutter or other instrument 20 is adapted to be slipped. A conical centering-piece 21 is sleeved over the projection 19, the conical portion thereof entering the central bore of the cutter 20 (see Fig. 4) and serving to positively center the same. This form of centering device is adapted to be used with different-sized cutters and cutters having different-sized bores, as will be obvious.

The cone or conical centering-piece 21 is held in position by means of the spring-arm 30, projecting from a screw-threaded shank 31, which works in a screw-threaded aperture in the table 13, the screw-threaded shank 31 serving as a means for adjusting the height of the arm 30, so that the same may bear yieldingly against the upper end of the cone 21.

The plate 17 is provided with the slot 25, which slot is concentric with the stem 18, and a set-screw 26, passing through the slot and into the table 13, serves to hold the plate 17 in any adjusted position.

Since the projection 19 is eccentric to the axis of rotation of the plate 17, it will be seen that by adjusting the said plate or centering device about its pivotal stem 18 the eccentric post or stem 19 may be moved toward or from the abrading-wheel to accommodate cutters of different diameters.

In order to grind the cutters to the proper size, I use an index-pawl 34, which is pivoted to the table 13, preferably by pivoting said pawl to the head 35 of a post 37, which is adjustably held in the split socket 38, made integral with the table and clamped therein by any suitable means, as the usual clamp-screw 90, passing through the lugs 91. I prefer to pivot the index-pawl to move about a horizontal axis, and the face 92 of the head 35 of the post to which the index-pawl is pivoted is preferably made rather broad, as seen in Fig. 2, so as to steady the pawl and prevent its yielding any in a horizontal direction after the post 37 has been clamped in its adjusted position.

In the grinding of a cutter it is placed upon the centering device when the work-support is in dotted-line position, Fig. 1, the said plate 17 thereof being adjusted to correspond to the diameter of the cutter, and the index-pawl is adjusted about its horizontal axis to bring the nose thereof in the correct position to properly index or gage the teeth of the cutter that is to be ground.

It will be understood, of course, that the outside edge or the end of the teeth of the cutter are backed off, as usual in this class of devices, such outside edge being, therefore, eccentric to the center of the cutter, and after the cutter has been placed on the centering device said cutter is turned about its axis until the outside or eccentric edge of the tooth that is to be ground engages the nose of the index-pawl, as seen in Fig. 2. When in this position, the tooth of the cutter is so positioned angularly relative to the plane of rotation of the abrasive wheel that the working or cutting face of the tooth will be properly ground. The work-support as a whole is then swung toward the abrasive wheel 5 until the adjustable stop 40, carried by the stand 9, strikes the lug 41 on the standard 3. It will be understood, of course, that the stop 40 will be properly adjusted, so that the abrasive wheel will make the proper depth of cut.

After one tooth has been ground the work-support as a whole is swung away from the abrasive wheel into the dotted-line position, Fig. 1, and the index-pawl swings about its pivot into the dotted-line position, Fig. 4, to elevate its nose above the cutter-teeth. The cutter may then be turned to bring the next tooth into position to be ground, when the index-pawl will be brought to its operative position—that shown in full lines, Fig. 4—and the said next tooth will be properly indexed or gaged for grinding by bringing its eccentric face or outer edge against the nose of the index-pawl.

Since each tooth is indexed from its outer or eccentric edge and since the nose of the pawl, and consequently the point on the outer face of each tooth which engages the said pawl, have a fixed relation to the grinding-face of the emery or other wheel when the work-support is in operative position, it will readily be seen that each tooth will be ground to exactly the same length, a result that would not be accomplished if the indexing were done from the back side of the teeth. I consider this as quite an important feature of my invention, and as I believe I am the first to provide means whereby I may index or position my cutter 20 angularly by means of an index-pawl which engages the outer ends of the cutter-teeth instead of the back side thereof I claim the same broadly and would consider as coming within my invention any means for accomplishing this result.

Projecting from the collar 15 on the stem 12 is an arm 56, in the end of which is mounted a screw 57, having a groove 58 in its head, and depending from the table 13 is a lug 59, carrying a pin 60 in its end, which is received in the groove 58. The diameter of the pin, it will be seen from Fig. 5, is less than the width of the groove, thus allowing a slight free turning movement of the table about the stem 12.

In regrinding cutters after the cutter has been properly adjusted on the centering de-

vice the work-support will be swung into its operative position—that is, full-line position, Fig. 1—with the outer edge of the abrasive wheel between the cutter-teeth. The table 13 may then be given a slight turning movement about its axis, limited by the width of the groove 58, such turning movement being in the direction of the arrow in Fig. 2 and serving to bring the cutting-face of the cutter-tooth against the outer face of the abrasive wheel 5 to grind or sharpen the cutter-tooth. With this attachment, therefore, the work-support may be swung into operative position without bringing the cutter-tooth into contact with the abrasive wheel, when by the slight turning movement of the table, as above described, the grinding may be accomplished.

To vary the depth of the cut between each tooth of the cutter, the stop 40 is made adjustable by having the stem thereof screw-threaded through a lug 60′ upon the side of the stand 9. The work-supporting device is also made adjustable in a line parallel to the axis of the abrasive wheel 5, as usual in this class of devices, preferably by swiveling the arm 10 in some suitable way to the screw 63, which operates in the lug or arm 64, the arm or offset 10 being connected to the screw 63, so that they will move together in a longitudinal direction, but so that they may have an independent movement about their axis. The end of the arm 64 is preferably split, and the screw 63 may be locked in adjusted position by means of the suitable clamp device 65.

From the above it will be seen that my invention comprises a work-support adapted to sustain a cutter and angularly position the same by means of the index-pawl, which engages the ends of the cutter-teeth.

Various changes may be made in the construction of the device without departing from the spirit of my invention.

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

1. In a machine for grinding milling-machine cutters, an abrasive wheel, a work-supporting device adapted to be moved toward and from the abrasive wheel, said work-supporting device including a centering device for the cutter, and an index-pawl adapted to engage the outside face of the teeth of the cutter.

2. In an apparatus of the class described, an abrasive wheel, a work-support adapted to be moved toward and from the abrasive wheel, said work-support including an adjustable centering device for the cutter, and an adjustable index-pawl adapted to be engaged by the ends of the teeth of the cutter to thereby angularly position the cutter.

3. In a machine for grinding milling-machine cutters, an abrasive wheel, a work-supporting device adapted to be moved toward and from the abrasive wheel, said work-supporting device including a centering device for the cutter, an index-pawl adapted to engage the outside face of the teeth of the cutter, and an adjustable stop device to limit the movement of the work-supporting device toward the abrasive wheel.

4. In a machine of the class described, an abrasive wheel, a work-support adapted to be moved toward and from the abrasive wheel, said work-support including a table, an adjustable index-pawl pivoted thereto, and an adjustable centering device for the cutter, the index-pawl operating to give to the cutter correct position for grinding.

5. A work-supporting attachment for grinding-machines, comprising an adjustable table, an adjustable centering device supported thereon and adapted to hold the cutter to be ground, and an index-pawl adapted to be engaged by the ends of the teeth of the cutter.

6. A work-supporting attachment for grinding-machines, comprising a holder or stand, a table vertically adjustable therein, a centering device on said table and adapted to be adjusted toward and from the abrasive wheel, and an index-pawl pivoted to the table and adapted to be engaged by the ends of the teeth of the cutter to thereby properly position the cutter with relation to the abrasive wheel.

7. In a machine of the class described, an abrasive wheel, a work-support mounted to be moved toward and from the abrasive wheel, an adjustable stop for limiting the movement of the work-support toward the abrasive wheel, said work-support including a vertically-adjustable table, a centering device supported on the table and adjustable toward and from the abrading-wheel, and an index-pawl pivoted to the table and operating to give the correct position to the cutter.

8. In an apparatus for grinding toothed cutters, an abrasive wheel, a work-support adapted to be moved toward and from the abrasive wheel, said work-support comprising a stand, a table vertically adjustable therein, a centering device supported on said table and mounted to move about a vertical axis, means for locking the said centering device to the table in any of its adjusted positions, and an index pawl or stop to engage the teeth of the cutter and properly position the same for grinding.

9. A machine for grinding toothed cutters, comprising an abrasive wheel, a work-support including a vertically-adjustable table, a centering device carried thereby, said centering device comprising a plate mounted to turn about a vertical axis, and having extended from its upper face a projection eccentric to the axis of the plate, said projection being adapted to have a cutter placed thereover, a centering-cone on said projection adapted to engage the central aperture in said cutter, and means to properly position the cutter for the grinding operation.

10. In a grinding-machine, an abrasive wheel, a cutter-holding device adapted to be moved toward and from the abrasive wheel,

said device comprising a table, centering means for the cutter to be ground and adjustably secured to said table, and means for allowing a slight free turning movement of the table about a vertical axis whereby the cutter-tooth being ground may be brought against the face of the abrasive wheel.

11. In a grinding-machine, an abrasive wheel, a work-support adapted to be moved toward and from the abrasive wheel, said support comprising a table adjustable about a vertical axis, a centering device for the cutter to be ground, adjustably secured to the table, said centering device supporting the cutter at one side of the line of the vertical axis of the table, and means for allowing a slight free turning movement of the table about its axis whereby the cutter-tooth being ground may be brought against the face of the abrasive wheel after the work-support has been moved to its operative position.

12. In a grinding-machine, an abrasive wheel, a cutter-holding mechanism adapted to be moved at right angles to the axis of the abrasive wheel, said cutter-holding mechanism comprising a table adjustable about a vertical axis, a centering device for the cutter adjustably secured to said table, a stop for limiting the movement of the table toward the wheel, and means for allowing a limited free turning movement of the table about its axis whereby after the table has been brought into operative position the cutting-face of each tooth of the cutter may be brought against the face of the abrasive wheel.

13. In a grinding-machine, an abrasive wheel, a work-support adapted to be moved toward and from said abrasive wheel, said support comprising a table adjustable about a vertical axis, a centering device for the cutter to be ground, adjustably secured to the table, said centering device supporting the cutter at one side of the line of the vertical axis of the table, means for allowing a slight free turning movement of the table about its axis whereby the cutter-tooth being ground may be brought against the face of the abrasive wheel after the work-support has been moved to its operative position, and an index-pawl adapted to be engaged by the outer edges or ends of the teeth of the cutter as they are ground, said index-pawl serving to properly position the cutter about its axis.

14. In a machine for grinding toothed cutters, an abrasive wheel, a work-supporting device mounted to swing toward and from the said wheel and adjustable in a line parallel to the axis of the wheel, a stop to limit the movement of the work-supporting device toward the abrasive wheel, said work-supporting device comprising a table adjustable about a vertical axis, a plate supported on said table and having an independent movement about the same vertical axis, means for adjustably securing the plate to the table, said plate having an eccentric projection adapted to receive a cutter, means for centering said cutter on said projection, and an index-pawl pivoted to the table and adapted to be engaged by the ends of the cutter-teeth.

15. In a machine for grinding toothed cutters, an abrasive wheel, a work-supporting device mounted to swing toward and from the abrasive wheel and adjustable in a line parallel to the axis of the wheel, a stop to limit the movement of the work-supporting device toward the abrasive wheel, said work-supporting device comprising a table adjustable about a vertical axis, a plate supported on said table and having an independent movement about the same vertical axis, means for adjustably securing the plate to the table, said plate having an eccentric projection adapted to receive a cutter, means for centering said cutter on said projection, an index-pawl pivoted to the table and adapted to be engaged by the ends of the cutter-teeth, and means for allowing a limited free turning movement of the table about its axis whereby after the work-support has been moved to its operative position the table may be turned slightly to bring the cutting-face of the cutter against the face of the abrasive wheel.

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

EDWARD RIVETT.

Witnesses:
JOHN C. EDWARDS,
LOUIS C. SMITH.