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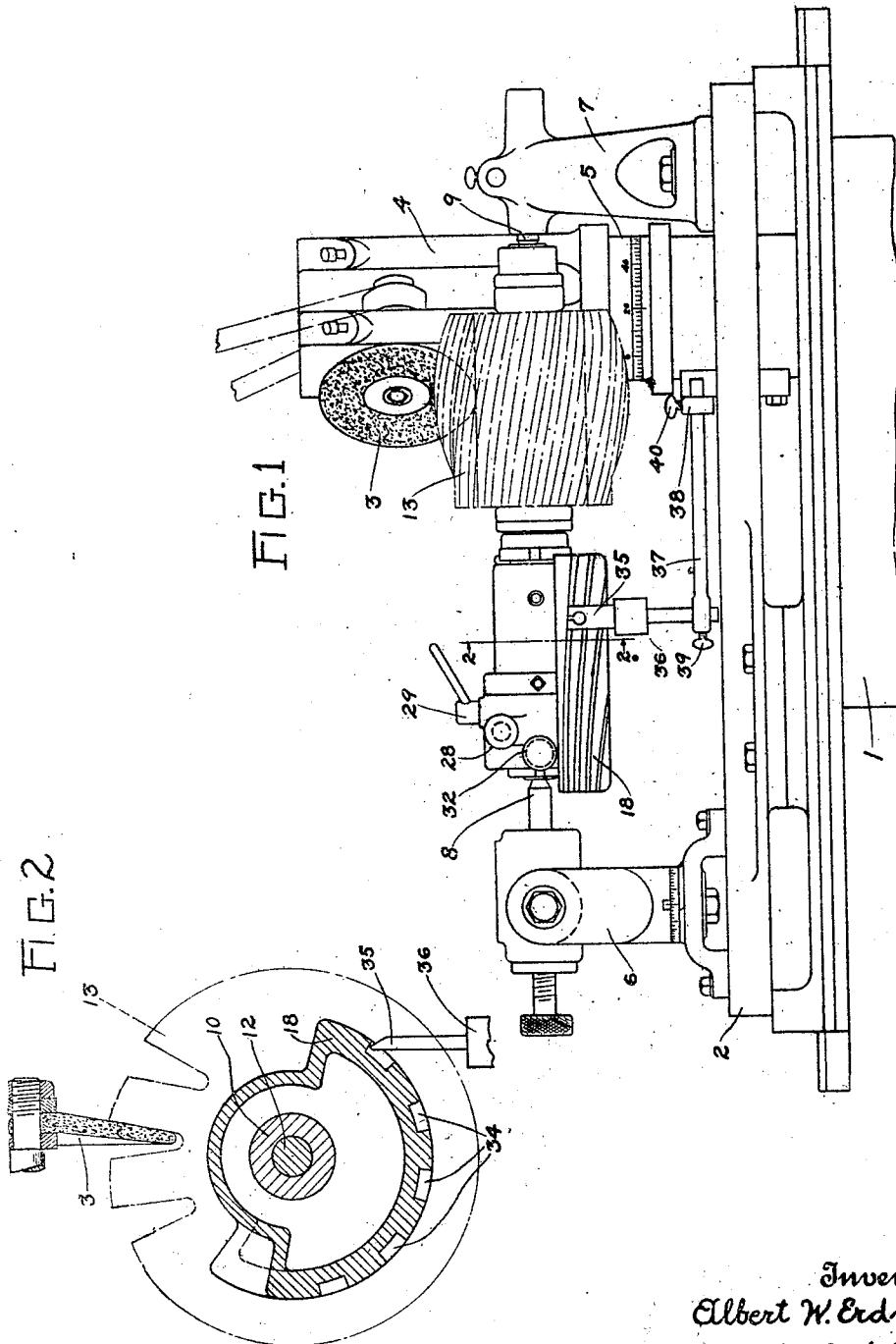
1,472,827

A. W. ERDMAN

CUTTER GRINDING ATTACHMENT

Filed March 1, 1921

2 Sheets-Sheet 1



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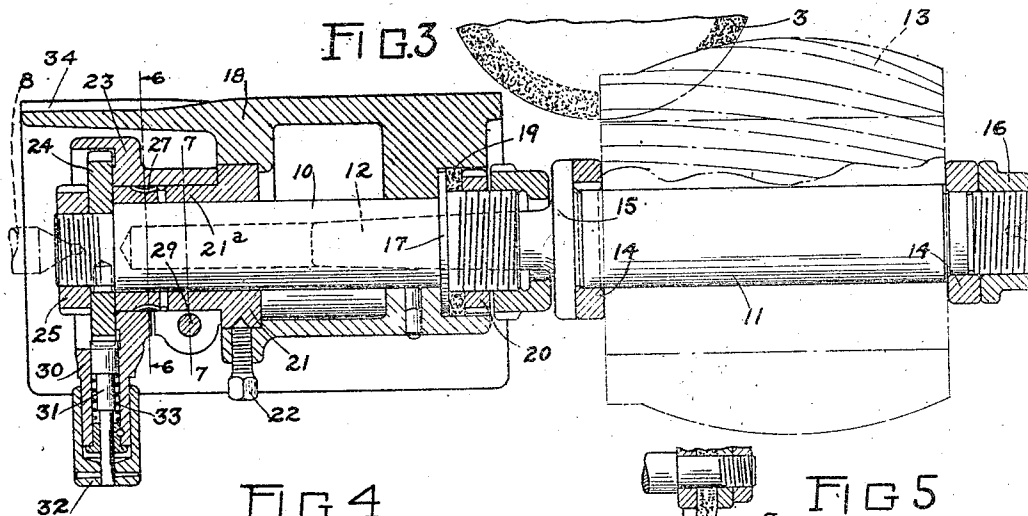
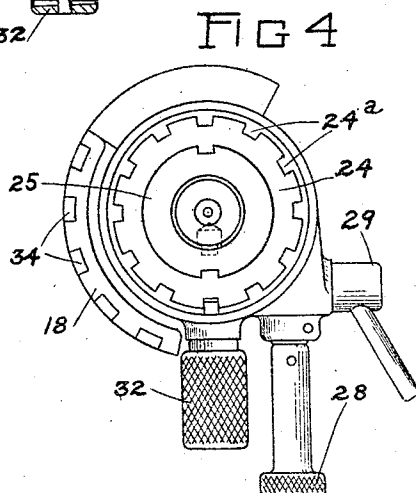
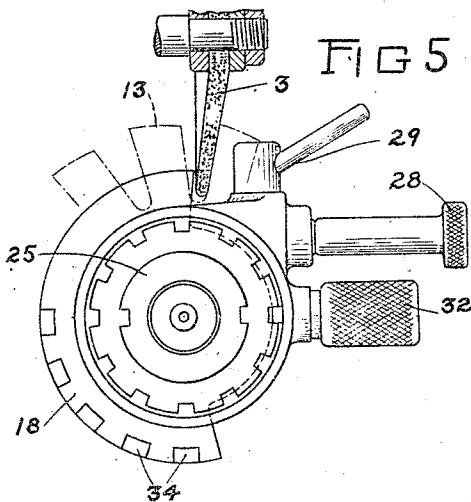
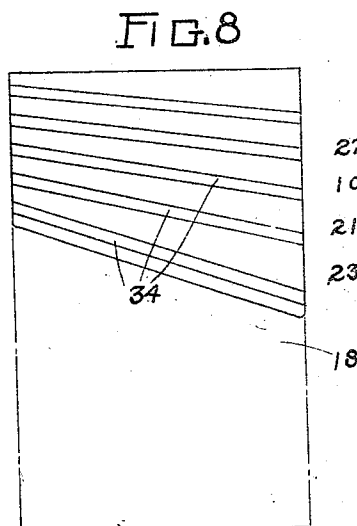
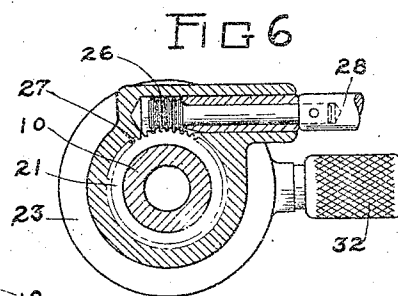
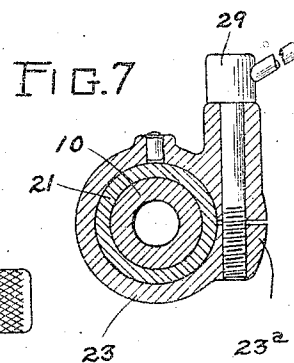
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UNITED STATES PATENT OFFICE.

ALBERT W. ERDMAN, OF HARTFORD, CONNECTICUT, ASSIGNOR TO PRATT & WHITNEY COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

CUTTER-GRINDING ATTACHMENT.

Application filed March 1, 1921. Serial No. 440,75

To all whom it may concern:

Be it known that I, ALBERT W. ERDMAN, a citizen of the United States, residing at Hartford, is the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Cutter-Grinding Attachments, of which the following is a specification.

This invention relates to cutter grinding machines and particularly to a simple attachment whereby cutters having longitudinally extending teeth either of a straight, angular or spiral configuration may be ground with little or no change in the machine. The primary object of the invention is to provide a simple means for performing such function, the said means being in the form of an attachment adapted to be mounted on the centers of a grinding machine or of a machine adapted to have a grinding wheel mounted thereon.

Other and more specific objects of the invention will appear as the description proceeds.

Referring to the figures of the drawings:

Figure 1 is a partial side elevation of a machine showing the invention applied thereto.

Fig. 2 is a cross section through the arbor and cam member, taken on line 2—2 of Fig. 1.

Fig. 3 is an enlarged detail view similar to Fig. 1 and showing a portion thereof in longitudinal section.

Fig. 4 is an end view showing the indexing mechanism.

Fig. 5 is a view similar to Fig. 4 but showing the cam member in another position.

Fig. 6 is a cross section on line 6—6 of Fig. 3.

Fig. 7 is a cross section on line 7—7 of Fig. 3.

Fig. 8 is a diagrammatic view showing the cam member spread out flat.

A milling cutter, to operate most efficiently, must frequently be ground or sharpened and a special machine for performing such functions, particularly for grinding cutters having angularly or spirally arranged teeth, is rather expensive for small shops. The present invention aims to provide a

simple and inexpensive attachment for performing this function, the attachment being adapted to be mounted on a grinding or other machine already in the shop.

Briefly, the invention comprises an arbor on which is supported a cam member and the cutter to be ground. The cam member is provided with a longitudinally extending cam surface or groove of a contour corresponding to the teeth of the cutter to be ground. By means of a finger engaging in this groove, the cutter is given a rotary movement to keep the tooth being ground accurately in contact with the grinding wheel as the cutter is moved past the wheel. Preferably a plurality of relatively angular grooves are provided in the cam whereby the same cam may be used to guide different cutters having teeth of varying shapes longitudinally. The details of the invention, including the means for indexing the cutter, will now be more specifically described.

1 represents the base of a grinding or other machine on which is mounted a reciprocating slide 2. A grinding wheel 3 is supported on an upright 4 on the base and is illustrated as angularly adjustable on the base at 5. A pair of standards 6 and 7, supporting centers 8 and 9 therein, are mounted on the slide. The greater portion of the invention per se, which is now to be described, is adapted to be mounted with the cutter on these centers as illustrated in Fig. 3.

The arbor, mounted between the centers 8 and 9 and adapted to support the cam member and the cutter to be ground, comprises a socketed shaft 10 and a mandrel 11 having a shanked portion 12 adapted to seat in the socket of the shaft 10. The mandrel is adapted to support the cutter 13 which is held thereon between a pair of washers 14 adjacent a flange 15 on the mandrel and a nut 16 thereon. When it is desired to grind a shanked cutter, the cutter shank is secured in the socket of the shaft 10 in place of the mandrel 11.

The shaft 10 is threaded at its ends and is provided with a flange 17 adjacent one end thereof. The cam member 18 is mounted on this shaft as illustrated in Fig. 3. The mem-

ber is socketed at its forward end and abuts against the flange 17 which is held between a friction washer 19 and the cam by means of a nut 20. The shaft extends through a bushing 21 secured to the rear end of the cam by means of a set screw 22. A second bushing 23 is mounted on an extending portion 21^a of the bushing 21 and an indexing wheel 24 is pinned to the shaft adjacent the rear end thereof. A nut 25 on the shaft secures all the said parts together on the shaft.

The bushing 23 is rotatably adjustable on the extension 21^a by means of a worm 26 engaging worm teeth 27 in the said extension. The worm may be rotated by means of a knurled head 28. Since the extension 21^a and the bushing 23 are secured respectively to the cam 18 and the arbor shaft 10, rotation of the head 28 rotates one of these members relative to the other. This mechanism provides a fine feeding adjustment between the cutter and its guiding cam member 18. A portion 23^a of the bushing 23 is split and is provided with a clamping screw 29 whereby the bushing may be securely clamped in adjusted position on the extension 21^a.

The indexing mechanism for cooperating with the index wheel 24 is carried by a lateral extension 30 on the bushing 23. A plunger 31 having an operating head 32 thereon is mounted in a radially extending bore in the extension 30. A spring 33 surrounds the plunger and is adapted to normally hold the same in engagement with the wheel 24. The wheel is provided with spaced notches 24^a into which the plunger is adapted to engage.

The cam member 18 is provided with one or more grooves 34 adapted to cooperate with a finger 35 to rotate the arbor and cutter as the same is reciprocated. The longitudinal configuration or shape of such groove is the same as that of the teeth of the cutter it is desired to grind. By providing the cam member with a plurality of relatively angular grooves, as illustrated in Fig. 8, as many cutters having teeth of the shape of such grooves may be ground by the use of the one cam member. It should be understood that a cam groove is selected which corresponds in longitudinal configuration or lead to the longitudinal configuration of the cutter teeth to be ground. The finger 35 is supported on a holder 36 vertically adjustably mounted in an arm 37. The arm 37 is longitudinally adjustably mounted in a bracket 38 on the base of the machine. Screws 39 and 40 serve to secure the holder 36 and arm 37 in place.

In operation, the mechanism is set up as illustrated in the drawings. The proper cam-groove 34 is selected and engaged with the finger 35 as illustrated in Figs. 1 and 2. The plunger 31 is engaged in one of the

notches 24^a in the index wheel 24 and the cutter is then adjusted by means of the worm 26 to bring a tooth thereof into grinding contact with the grinding wheel. The slide 2 is now reciprocated to move the cutter past the grinding wheel during which operation, the operator holds the cam groove in engagement with the finger. The longitudinal contour or lead of the cutter teeth being the same as that of the cam groove engaged by the finger, it is evident that the cutter tooth being ground will be held in accurate contact with the grinding wheel throughout the entire reciprocation and length of the tooth. The indexing mechanism is adapted to be operated by hand to bring each tooth of the cutter successively into grinding relation with the grinding wheel, it being understood that the index wheel has as many notches therein or a multiple thereof as the cutter has teeth.

What I claim is.

1. An attachment for grinding milling cutters comprising in combination, an arbor adapted to be mounted on a pair of centers, one portion of the arbor being adapted to support a milling cutter thereon, a cam member on another portion of the arbor provided with a plurality of longitudinally extending cam shoulders thereon, the said shoulders being relatively angular and being adapted to optionally cooperate with a stop element to accurately position the cutter during the grinding operation, mechanism for rotatably indexing the member through a definite angle on the arbor, other mechanism for finely rotatably adjusting the member on the arbor, and clamping means for securing the member to the arbor.

2. An attachment for grinding milling cutters comprising in combination, an arbor adapted to be mounted on a pair of centers, one portion of the arbor being adapted to support a milling cutter thereon, a cam member on another portion of the arbor provided with a longitudinally extending cam shoulder thereon corresponding in shape to the teeth of the milling cutter it is desired to grind, the shoulder being adapted to cooperate with a stop element to accurately position the cutter during the grinding operation, mechanism including a notched disk on the arbor for rotatably indexing the member through a definite angle on the arbor, a worm and worm wheel for finely adjusting the member on the arbor, and clamping means for securing the member to the arbor.

3. An attachment for grinding milling cutters comprising in combination, an arbor adapted to be mounted on a pair of centers, one portion of the arbor being adapted to support a milling cutter thereon, a cam member on another portion of the arbor provided with a plurality of longitudinally

extending cam shoulders thereon, the said shoulders being relatively angular and being adapted to optionally cooperate with a stop element to accurately position the cutter during the grinding operation, mechanism including a notched disk on the arbor for rotatably indexing the member through a definite angle on the arbor, and a worm and worm wheel for finely rotatably adjusting the member on the arbor. 10

In testimony whereof, I hereto affix my signature.

ALBERT W. ERDMAN.