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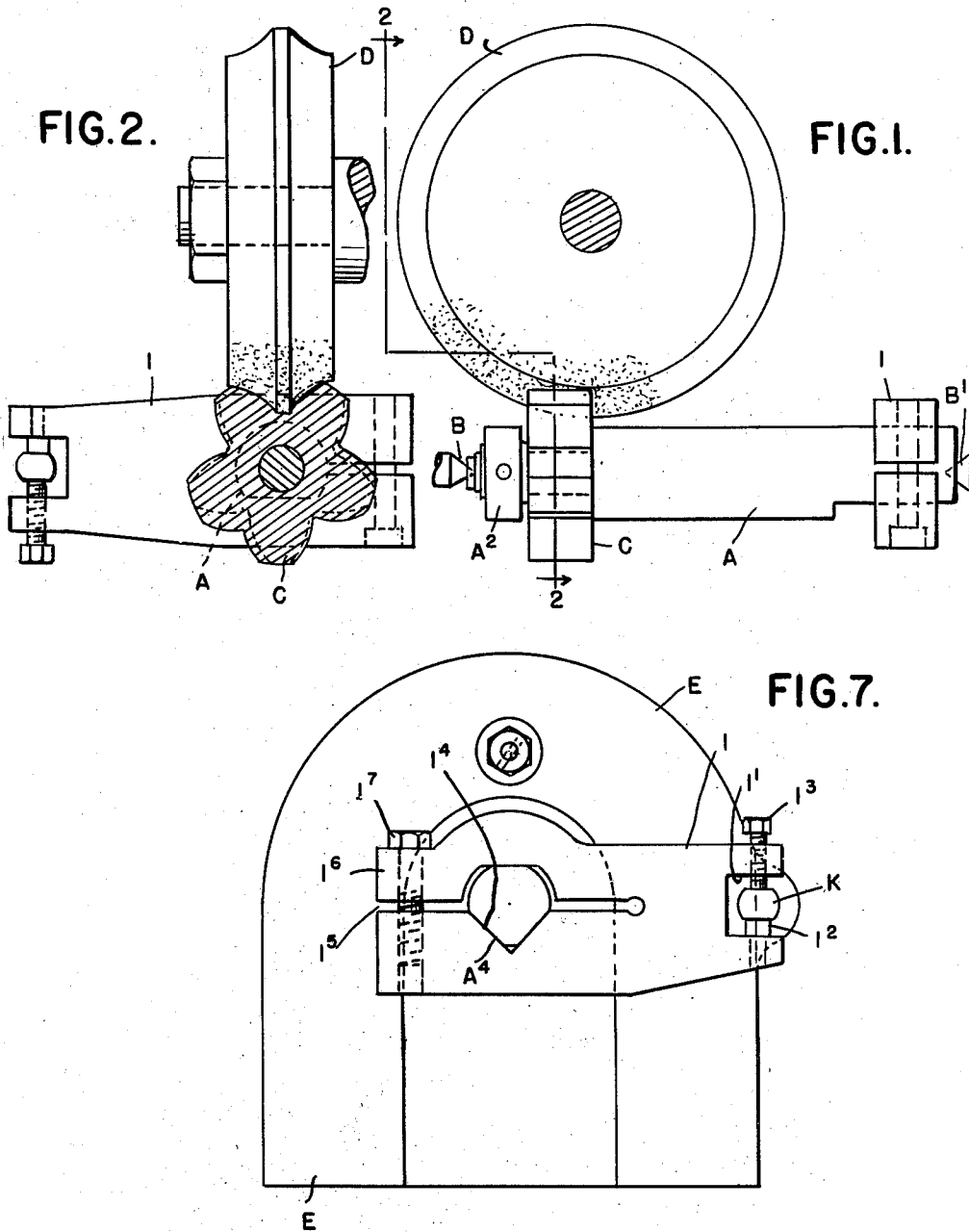
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MEANS FACILITATING THE MOUNTING OF WORK ON AN ARBOR
PREPARATORY TO THE FORM GRINDING OF THE SAME

Filed June 18, 1956

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FIG. 3.

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FIG.5.

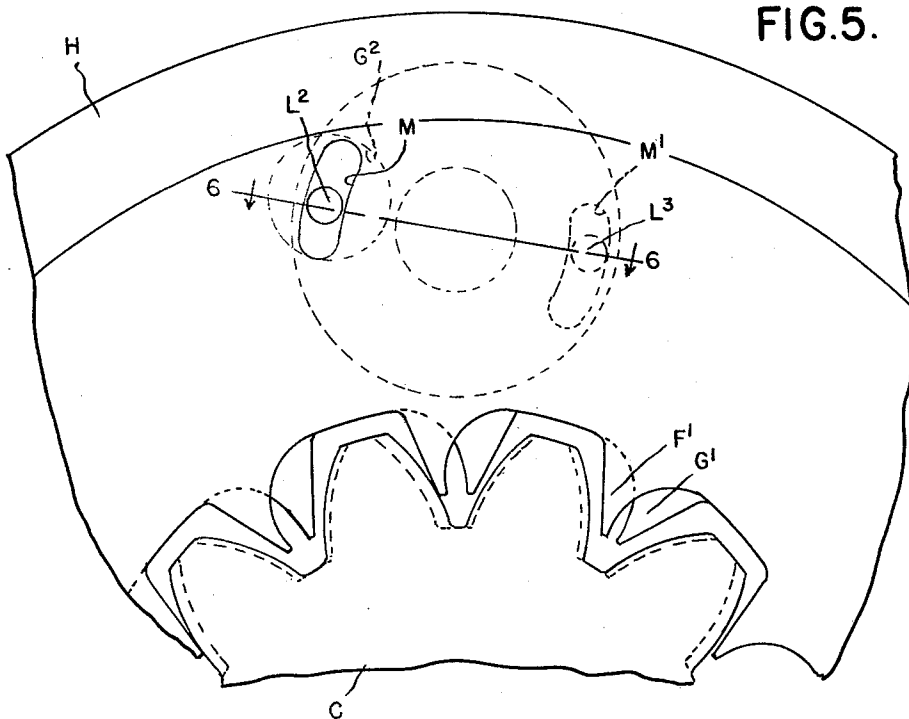
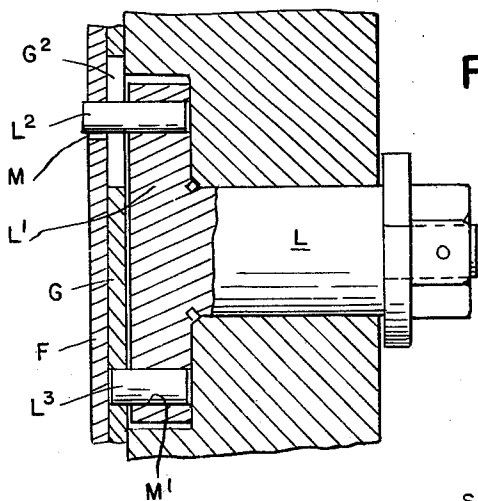


FIG.6.



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MEANS FACILITATING THE MOUNTING OF WORK ON AN ARBOR PREPARATORY TO THE FORM GRINDING OF THE SAME

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5 Claims. (Cl. 51—277)

In the form grinding of articles which have been heat treated subsequent to the machining of the same a great deal of time is consumed in the proper positioning of each article on the supporting holder. This is because distortion occurs during heat treatment and where, as in the case of gears, this distortion may be in different directions in different teeth, it is desirable to average such differences, otherwise the grinding of some part may penetrate through the hardened layer, thereby rendering the structure useless. If, however, the work is so positioned that maximum distortions in opposite directions are averaged less material will be removed from any one part so that all may still be within the hardened layer. The usual practice is to determine such position by successive tests which consume time. It is therefore the object of this invention to obtain a means for accomplishing the desired result by a single test and adjustment which may be quickly performed. The invention is particularly applicable to articles like gear wheels which have a series of teeth subject to differential distortion during heat treatment. The same means may however be applicable to other structures.

Broadly the invention consists in a fixture for receiving the work holder with the work thereon free for adjustment, together with means engageable with the work at points of maximum distortion thereof for adjusting it on the holder with respect to an index portion thereof. More specifically the invention consists in a construction as hereinafter set forth.

In the accompanying drawings:

Fig. 1 illustrates diagrammatically an arbor with a gear to be ground mounted thereon and in operative relation to a form grinder wheel.

Fig. 2 is a sectional elevation on line 2—2 of Fig. 1.

Fig. 3 is an elevation of a fixture for positioning the gear on its arbor.

Fig. 4 is a section on line 4—4 of Fig. 3.

Fig. 5 is an enlarged elevation of a portion of Fig. 3.

Fig. 6 is a section on line 6—6 of Fig. 5.

Fig. 7 is an elevation viewed as indicated by line 7—7 of Fig. 3.

As shown in Figs. 1 and 2, A is an arbor adapted to be mounted on centers B, B' and C is a gear wheel mounted on the arbor and in operative relation to a form grinder wheel D. As shown in these figures the gear has only five teeth but it may have any number of teeth, a greater number being shown in Fig. 5. The means for positioning the gear on the arbor preparatory to the grinding of the same is illustrated in Figs. 3 and 4. This comprises a block or fixture E which has a bore E' therethrough for receiving the arbor A. At one end of the block there is a larger counterbore E² for receiving the gear C and a still larger counterbore E³ for receiving a pair of annular disk members F and G. An annular cap member H secured to the block E overlaps the outer portion of the member F and retains the same and the member G within the counterbore E³. Each of the members F and G is provided with a series of inwardly projecting fin-

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gers F' and G' which engage the interdental spaces of the gear and are adapted to contact respectively with opposite faces of the gear teeth C. These fingers are exactly positioned with respect to each other so that their contact portions can only all simultaneously engage their corresponding teeth if the latter are true free from any distortion. On the other hand where there is differential distortion of the teeth, only the tooth of maximum distortion in one direction can be contacted by the corresponding finger of the member F and only the tooth of maximum distortion in the opposite direction can be contacted by the finger of the member G. The arbor A is provided with an index arm I detachably secured to one end thereof to extend radially and having at its outer end means for engaging a pin J of the indexing mechanism (not shown). When the arbor is engaged with the block E (which can only be done by first removing the arm I and then replacing it), the arm I is engaged with a pin K projecting from the block in the same relation to the arbor as the pin J of the indexing mechanism. As specifically shown the outer end of the arm I has a recess I' therein for receiving the pins J or K. A bearing within said recess formed by the hardened head of a screw I² contacts with one side of said pins and a setscrew I³ engages the opposite side, thereby exactly positioning it in relation to said pins. The attachment between the arm I and the arbor is formed by a V-shaped portion A⁴ of the latter engaging a correspondingly shaped bearing I⁴ in the arm and for securing the arm it is split at I⁵ forming a clamping portion I⁶ secured by a screw I⁷. Thus, the arm is easily detached from the arbor and when replaced will be in exactly the same position. The gear wheel C is mounted on a small diameter portion A' of the arbor A and is secured by a clamping nut A² engaging a threaded portion A³ beyond the portion A². When the arbor is first placed in the fixture the nut is loosened to free the gear wheel for rotation on the portion A'. Thus, if the members F and G are rotated in their recess, pressure of the fingers F', G' may rotatively adjust the gear wheel on its arbor. This adjustment should be such that the oppositely distorted teeth will be equally displaced from the true position. This may be accomplished by simultaneously rotating the members F and G an equal amount from their neutral position. Whichever finger contacts first with a gear tooth will rotate the gear on its arbor in this direction until stopped by an oppositely contacting finger. The nut A² may then be tightened to hold the gear in such position on said arbor. As specifically shown the rotation of the members F and G is accomplished by a rotary shaft L mounted in a bearing in a flange E⁴ of the block E, said shaft having a crank disk L' occupying a counterbore in said flange to be adjacent to the member G. Crank pins L² and L³ extend from the disk L' into engagement respectively with bearings in the members F and G. The member G is cut away at G² to provide clearance surrounding the pin L² sufficient for its maximum rotation. While the bearings for the pins L², L³ on the respective members F and G might be at right angles to their direction of movement, I preferably form them by slots M and M' extending obliquely to this direction. This will form a step-down transmission between the rotating shaft L and the rotated annular disks F and G and a more sensitive adjustment of the latter. Also this will lock the shaft at the limit of its adjustment and hold the members F and G in fixed position until the nut A² is tightened to lock the gear wheel on its arbor. The shaft L may then be reversely rotated to neutral position and the arbor with its positioned gear wheel thereon removed from the fixture and placed in engagement with the grinding machine. It is obvious that the operations just described may be performed in a fraction of the time required for

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the setting of the work on the arbor by trial and error.

What I claim as my invention is:

1. Means facilitating the positioning on a work holder of work to be ground which has a series of spaced projecting portions subject to distortion during previous heat treatment; comprising a fixture for receiving said work holder with an indexing portion thereof held in fixed position and with the work thereon free for adjustment, a series of fingers extending into the spaces between said projections of the work and being fixed in relation to each other corresponding to the relation between said work projections in the true form to be ground, a second similar series or fingers also similarly engaging said spaces, means for moving the two series oppositely on said fixture in relation to said index portion, whereby finger contact will be made with only those work projections which have maximum distortion respectively in opposite directions and the work adjusted thereby on said holder, and means for locking the work in such position on said holder.

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2. The construction as in claim 1 in which the work holder is an arbor and the work a gear wheel.

3. The construction as in claim 2 in which the said series of fingers are on separate annular members to project radially inward therefrom and rotatively mounted on said fixture coaxial with said arbor and surrounding the gear thereon.

4. The construction as in claim 3 having means for rotating said annular members simultaneously and through equal angles until stopped by opposing fingers.

5. The construction as in claim 4 in which said rotating means is a revoluble shaft mounted in said fixture and having crank pins of equal radius engaging the respective annular members.

References Cited in the file of this patent

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