Mar. 13, 1923. 1,448,170.

A. J. UTZINGER.

BROACH.

FILED OCT. 30, 1920.

Fig. 1.

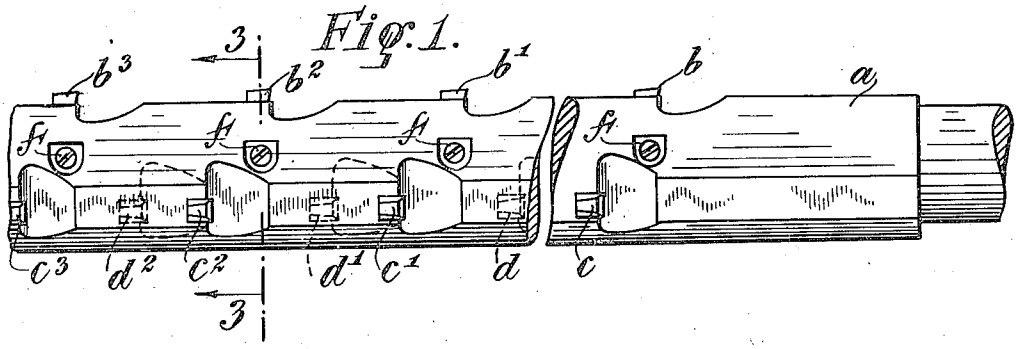


Fig. 2.

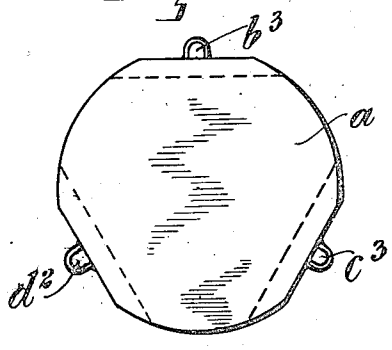


Fig. 3.

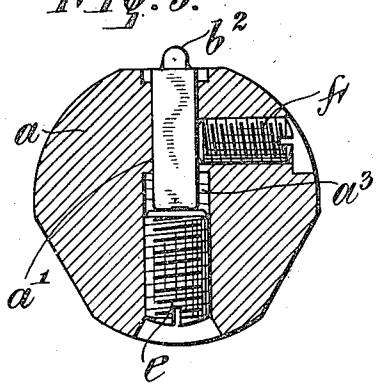


Fig. 4.

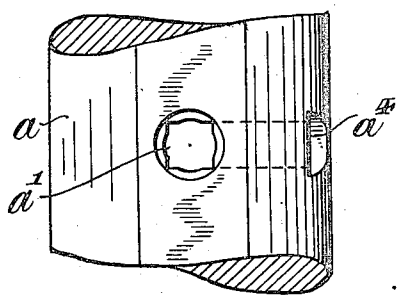


Fig. 5.

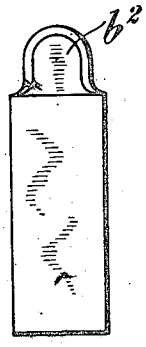
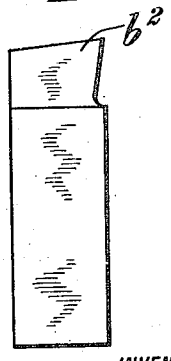


Fig. 6.



INVENTOR

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BY

Redding & Greeley

his ATTORNEYS

Patented Mar. 13, 1923. 1,448,170

UNITED STATES PATENT OFFICE.

ARTHUR J. UTZINGER, OF PLAINFIELD, NEW JERSEY, ASSIGNOR TO INTERNATIONAL MOTOR COMPANY, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE.

BROACH.

Application filed October 30, 1920. Serial No. 420,604.

To all whom it may concern:

Be it known that I, ARTHUR J. UTZINGER, a citizen of the United States, residing in the city of Plainfield, in the State of New Jersey, have invented certain new and useful Improvements in Broaches, of which the following is a specification, reference being had to the accompanying drawing, forming a part hereof.

This invention relates to broaching tools and has reference particularly to such tools as are constructed for broaching oil grooves or key-ways in gears. Heretofore it has been the practise to cut the broaching teeth integral with the body of the tool and then hardening the unit. Breakage or wear of any one of the many teeth has reduced the effective operation of such tools and usually required them to be discarded. The cost of such practise, not to speak of the inconvenience and loss of time in replacing discarded tools with new ones, has been very great. The object of the present invention is to provide a broach of the character described in which the broaching teeth or cutting pieces are formed as separate units of high speed hardened steel which are adjustably and removably supported within the body of the broach, this body being, in the preferred form, of soft steel. The improved construction permits the ready removal or adjustment of any one of the separate broaching teeth so that the operator always has within his determination the height and effectiveness of any one of said teeth. Further, the proposed tool lends itself to the provision of a plurality of series of cutting pieces displaced angularly about the body and, if necessary, disposed in staggered relationship to give ample clearance for the adjusting and securing means for the individual teeth. Reference is now to be had to the accompanying drawing for a detailed description of a preferred embodiment of the invention, in which—

Figure 1 is a view in elevation of a fragment of a broach showing two series of cutting teeth secured removably within the body.

Figure 2 is a view in end elevation of the tool shown in Figure 1.

Figure 3 is a view in transverse section through the body taken on the plane indicated by the line 3—3 of Figure 1 and looking in the direction of the arrows.

Figure 4 shows a fragment of the body of the broach with a tooth and its retaining devices removed therefrom.

Figures 5 and 6 are detail views on an enlarged scale of a suitable type of tooth.

As pointed out heretofore, it has been the usual practise to cut the teeth of a broach integral with the body and then harden the tool thus formed. Broaching tools for cutting oil grooves and key-ways are usually formed with a series of teeth of gradually increasing height arranged to make successive cuts as the tool is passed through the work. The breakage or wear of any one of the teeth of a series necessarily interrupts the sequence of effective cutting operations. Indeed, when any one of the teeth of a series thus becomes ineffective it is usually necessary to discard the entire tool. The improved broach illustrated in the drawing comprises a body a carrying, in the preferred form, three series of teeth disposed longitudinally thereof and displaced about the periphery at equi-distant angles, one series of teeth being indicated at b, b^1, b^2, b^3; another series at c, c^1, c^2, c^3 and the third series in dotted lines in Figure 1 at d, d^1, d^2. The invention is not to be limited to the number of teeth nor to the number of series, since each of the teeth is mounted by the same means; a description of means for one such tooth, such as b^2 (Figure 3) will be sufficient for an understanding of the construction. The body of the broach a, which is preferably of soft steel, is drilled through diametrically to provide a channel a^1 to receive the shank of the tooth b^2 and which may be of any approved cross-sectional form, depending on the form of the shank of the tooth. The channel a^1 which receives the shank of the tooth communicates with an internally threaded bore a^3 in which is threaded a set screw e. The body of the broach a is drilled in, as at a^4, at an angle of 90° to the recess a^1 and threaded to receive a locking screw f, the inner end of which can be moved into locking engagement with the side of the shank of the tooth b^2. The channels a^3 and a^4 are countersunk to leave the heads of the screws e, f, within the periphery of the body a of the broach.

Each of the several teeth of the several series noted hereinbefore is made of high speed hardened steel and each of these teeth has its own separate securing and adjusting screws corresponding to the screws *e*, *f*, respectively, whereby the height of the tooth above the body of the broach, which determines the cut of the particular tooth, can be readily fixed by the operator. A tooth which becomes worn can be raised by loosening the set screw *f* and threading in the adjusting screw *e* until the tooth, such as b^2, is given the desired height, whereupon the locking screw *f* can be set up against its shank. Where three series of teeth are employed, as illustrated in Figure 1, it will preferably be desirable to stagger the corresponding teeth *b*, *c*, *d*, of the different series, so that the drillings through the body *a* of the broach to receive the respective teeth and their adjusting and locking devices will not intersect.

The construction is initially inexpensive and insures the provision of a tool which can be kept in continuous operation, the body *a* of the broach not being subjected to any disintegrating action and all of the teeth, as appears, being susceptible of ready replacement or adjustment as may be necessary.

I claim as my invention:

1. As an article of manufacture, a cylindrical broaching tool having a body formed with a plurality of rows of openings displaced angularly about the tool to receive removable cutting pieces, adjusting screws threaded in the body opposite said openings respectively to bear on the rear ends of the cutting pieces to force them outwardly, and locks screw threaded in at right angles to the cutting pieces respectively to clamp them in adjusted position.

2. As an article of manufacture, a broaching tool having a body formed with longitudinal rows of independent slots and a plurality of separate cutting pieces of equal length mounted removably and adjustably in the slots, the slots for the cutting pieces of the several rows being staggered circumferentially with relation to one another to stagger the cutting pieces.

This specification signed this 26 day of October, A. D. 1920.

ARTHUR J. UTZINGER.