(No Model.) 2 Sheets—Sheet 1.

G. F. HUTCHINS.

PLANER ATTACHMENT FOR CUTTING INTERNAL GEARS.

No. 381,788. Patented Apr. 24, 1888.

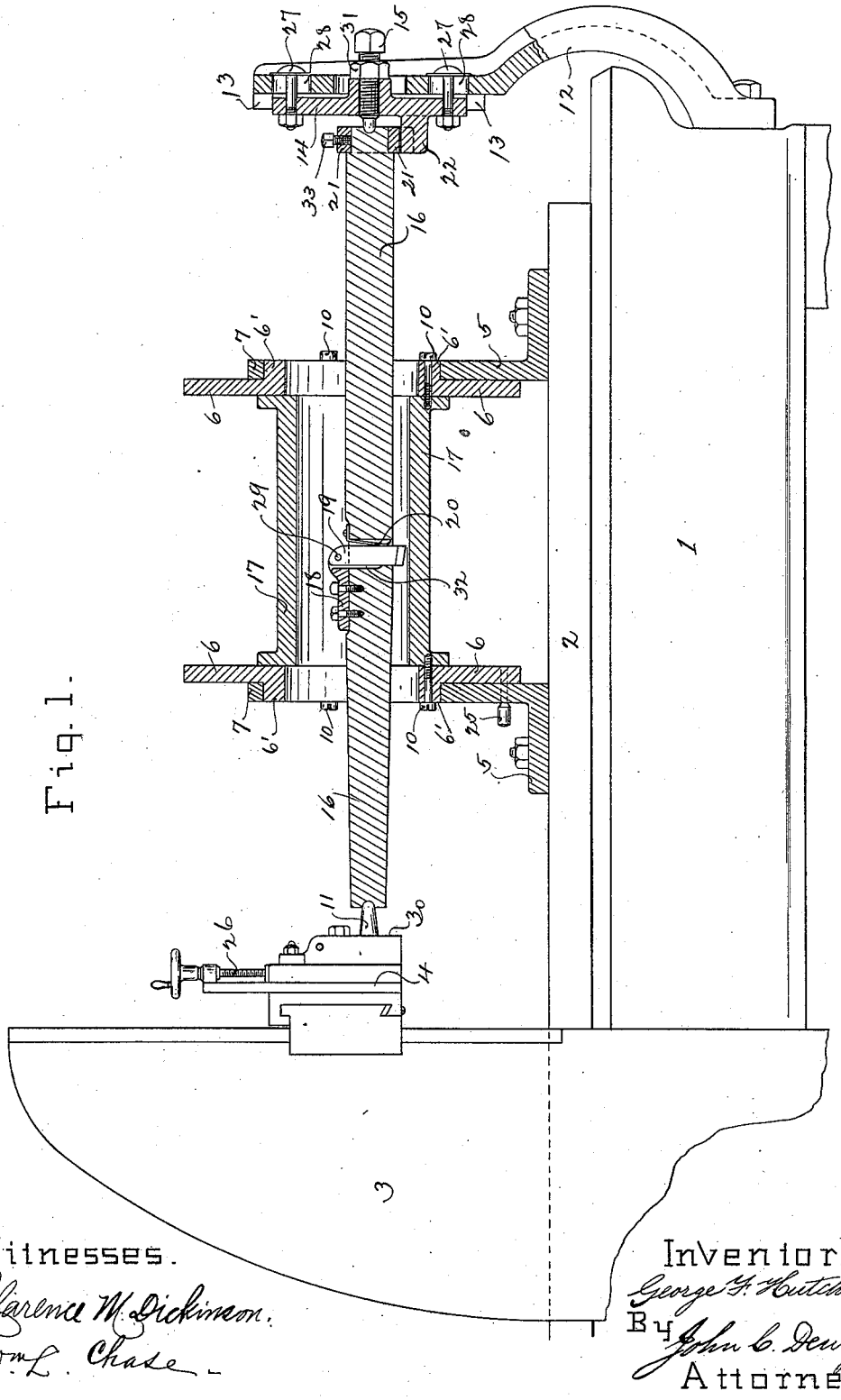

Fig. 1.

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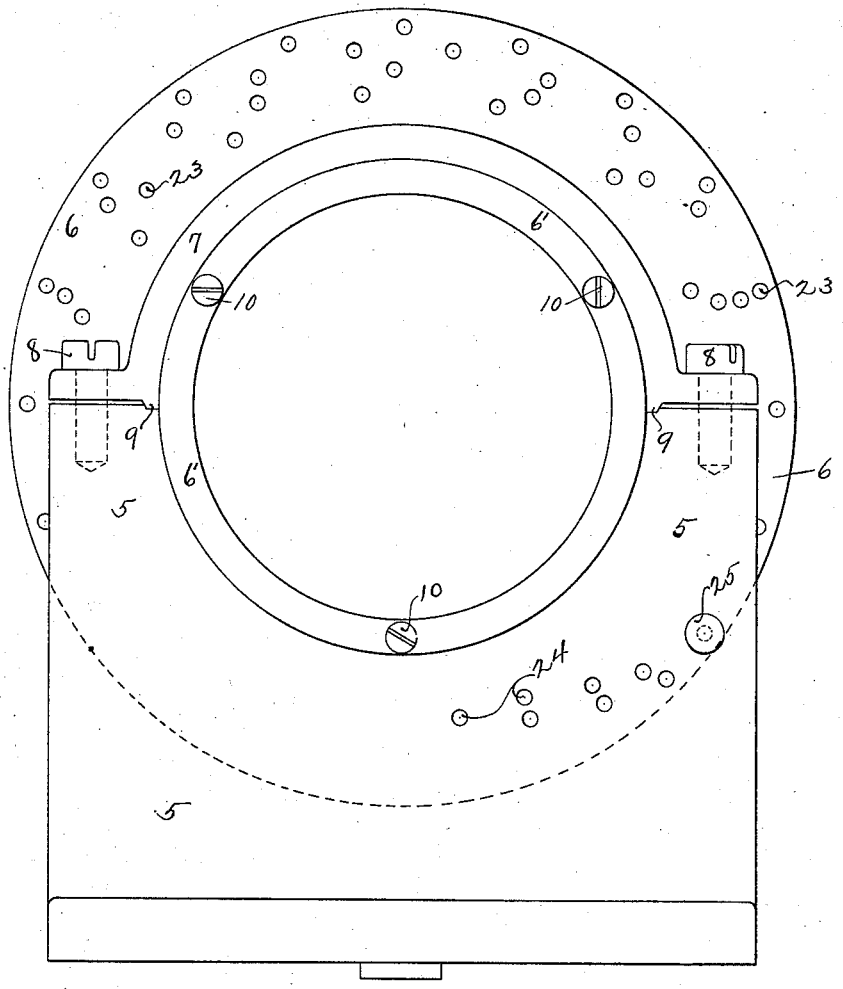
Fig. 2.



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UNITED STATES PATENT OFFICE.

GEORGE F. HUTCHINS, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO THE KNOWLES LOOM WORKS, OF SAME PLACE.

PLANER ATTACHMENT FOR CUTTING INTERNAL GEARS.

SPECIFICATION forming part of Letters Patent No. 381,788, dated April 24, 1888.

Application filed February 13, 1888. Serial No. 263,845. (No model.)

To all whom it may concern:

Be it known that I, GEORGE F. HUTCHINS, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Gear-Cutting Machinery; and I do hereby declare that the following is a full, clear, and exact description thereof, which, in connection with the drawings making a part of this specification, will enable others skilled in the art to which my invention belongs to make and use the same.

My invention relates to machines for cutting internal gears, and more particularly for gears of comparatively small diameter and long face; and the object of my invention is to provide a mechanism for cutting internal gears, which can be readily applied to any ordinary iron planer and be simple in construction and mode of operation.

My invention consists in certain novel features of construction of the mechanism for cutting internal gears, as will be hereinafter fully described, and the nature thereof indicated by the claims.

Referring to the drawings, Figure 1 is an elevation, partly in section, showing my gear-cutting mechanism applied to an ordinary metal planer; and Fig. 2 shows, on a much enlarged scale, an end of one of the index-heads shown in section in Fig. 1.

In the accompanying drawings, 1 is the bed, 2 is the movable table, 3 the housings, and 4 the cross-head, of an ordinary metal planer.

Angle-plates 5 are bolted to the table 2, in the upright part of which are formed bearings for the index-heads 6. The caps 7 of the bearings are held in place by screws 8, (see Fig. 2,) and fitted with the customary lips 9, so that the caps can be screwed up to the proper point at once when replaced. The index-heads 6 are provided with short hubs 6′, which enter the bearings cast on the flanges 5, which face each other on the table 2, and between which the gear to be cut is held by means of screws 10, passing loosely through the hubs 6′ of the index-heads 6, and tapped into the gear-casting 17 to be cut. In the index-heads 6 are drilled a series of holes, 23, on circles concentric with the center holes through the heads, the number of holes 23 in a given circle being the same as the number of teeth required to be cut in a given gear.

Through the upright part of the angle-plates 5, and on the same circles as the rows of index-holes 23, are drilled pairs of holes 24, the same size as said index holes, and whose distance apart is half the pitch of the corresponding index-circle. A pin, 25, with its head pointing outward, passes through the holes 24 in the angle-plate 5, and projects into the holes 23 in the corresponding row in the index-head 6, and holds the heads 6 and the gear 17 to be cut in position for cutting successive teeth.

In applying my gear-cutting mechanism to the planer the ordinary tool holder is removed from the swivel on the planer-head, and bolted firmly in its place is a plate, 30, carrying the stud 11. To the end of the planer-bed 1 is firmly bolted an arm or stand, 12, which extends upward and is provided on its sides at the top end with flanges or ribs 13, between which is bolted a plate, 14, in the center of which is a screw, 15, with a rounded point projecting inward, and provided on the outside with a check-nut, 31. The cutter-bar 16 extends between and is supported by the stud 11 and screw 15. Said cutter-bar passes through the gear-blank 17 and index-heads 6. Near the center of the length of the bar 16 is bolted the stand 18, to which is pivoted the tool 19, which passes through a slot, 32, in the cutter-bar 16, and projects a short distance from the bottom side of said bar. The projecting point of the tool is properly shaped for cutting out the space between the teeth in a gear. A flat spring, 20, bears lightly upon the tool 19, to keep it against the back side of its slot 32 and cause it to start in at the full depth of a cut, and still allow the tool to give and not grind off its point on the back travel of the planer-table. A collar, 21, fastened by a set-screw, 33, is secured upon the end of the cutter-bar 16, and a lug, 22, cast upon the plate 14, enters a slot in said collar 21 and prevents the cutter-bar 16 from revolving on its bearings 11 and 15.

The operation of my gear-cutting mechanism is as follows: A gear-blank, 17, is placed in position between the index-heads 6, and the cutter-bar 16, carrying the cutting-tool 19, is set by means of the screw 26 on the planer-

head and the plate 14, which is vertically adjustable on the stand 12 by means of the bolts 27 and slots 28 in said stand 12, so that the center line of said cutter-bar is parallel with the planer-table 2 when half the required depth of the tooth in the gear-blank has been cut. The planer is now started, reciprocating the table 2, so that the whole length of the gear-blank 17 is moved past the cutting-edge of the tool 19, and the space between a pair of teeth is cut by feeding down the screw 26. The pin 25 is now withdrawn, the heads 6 revolved one space on the index-head, and said pin 25 replaced, when the operation of cutting by the tool 19 is repeated, and so on until all the internal teeth on the gear are cut. The tool 19 is now removed by taking out the pivot-pin 29, and a tool substituted for it whose cutting end is properly shaped for finishing the point of the tooth. The pin 25 is withdrawn and placed in the other hole, 24, of the same pair, and the heads 6 revolved half a space to bring an index-hole, 23, to match, which brings the point of a tooth under the tool 19 in the cutter-bar 16, and the points of the teeth are successively finished in the same manner that the spaces between the teeth were cut, as above described.

It is not necessary to use two tools and make two operations in cutting and finishing the teeth on the gear, as one tool could be so shaped as to do the cutting and finishing at one operation, if preferred.

In order to put in or take out a gear-blank from the machine, the cutter-bar 16 is removed by withdrawing the screw 15. The caps 7 of the head-bearings are removed by turning set-screws 8, when the heads 6 and blank 17 are unconfined. In cutting short gears one of the index-heads 6 may be dispensed with, in which case the hub of the head would be made longer and provided with a retaining-flange on the end opposite to the index-flange.

By substituting for the index-heads 6 and stands 5 a plain angle-plate with a hole through it for the cutter-bar, and to which the work may be bolted, the machine may be economically used for cutting internal keyways.

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

1. The combination, with a reciprocating table, a supporting-bed, and stands for carrying the work, of a cutter-bar supported at one end from the bed on a bearing adjustable in the direction of the length of the cutter-bar, and at the other end on a bearing carried by a tool-head movable in a direction at right angles to the length of the cutter-bar, and a cutting-tool carried by the bar, substantially as shown and described.

2. The reciprocating table, supporting-bed, stands for carrying the work, tool-head, cutter bar and tool, in combination with a supporting-stand attached to the bed and provided with a plate, 14, at the top, adjustable in a direction at right angles to the length of the cutter-bar, and carrying a bearing for one end of the cutter-bar, adjustable in the direction of the length of the bar, substantially as shown and described.

3. The reciprocating table, supporting-bed, a cutter set in a cutter-bar supported by the tool-head, and an arm from the bed, in combination with a head or heads through which the cutter-bar passes, supported in bearings fastened to the reciprocating table to which the work is attached, and provided with index-holes by which the work is set and held in position for successive cuts, substantially as set forth.

4. The reciprocating table, supporting-bed, stands for carrying the work fastened thereto, tool-head, and cutter-bar support attached to the bed and provided with a lug, 22, in combination with a cutter-bar carrying a cutter, and a projection or collar, 21, provided with a slot which is entered by the lug 22, for the purpose stated, substantially as shown and described.

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