E. J. LEES.

HOB FOR GEAR CUTTINGS.

APPLICATION FILED APR. 19, 1907.

924,679. Patented June 15, 1909.

Fig. 1.

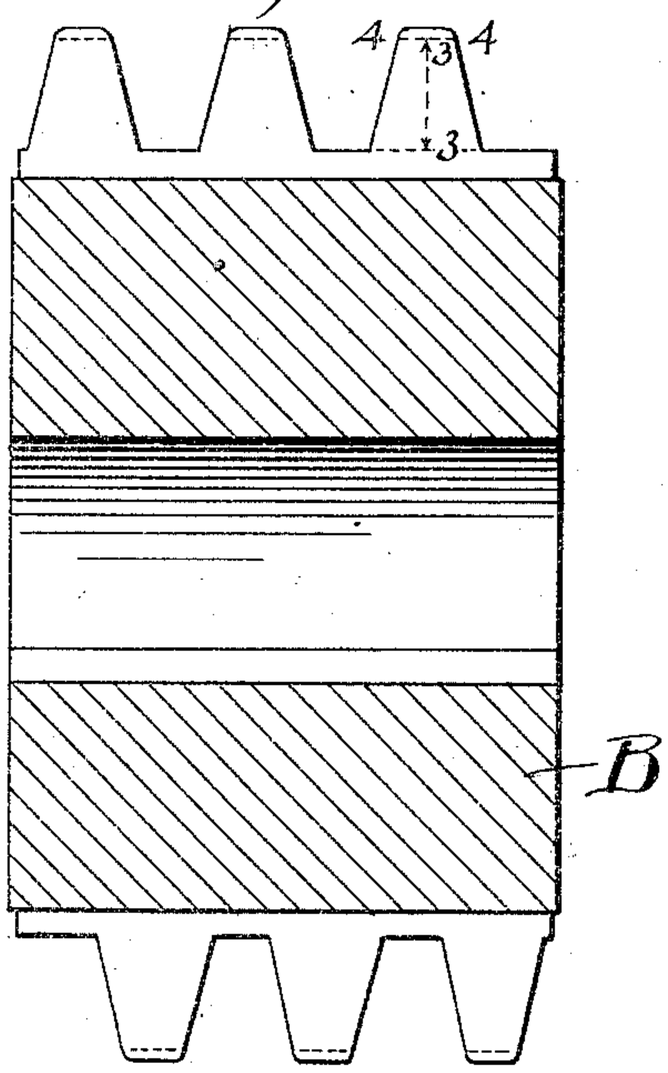


Fig. 2.

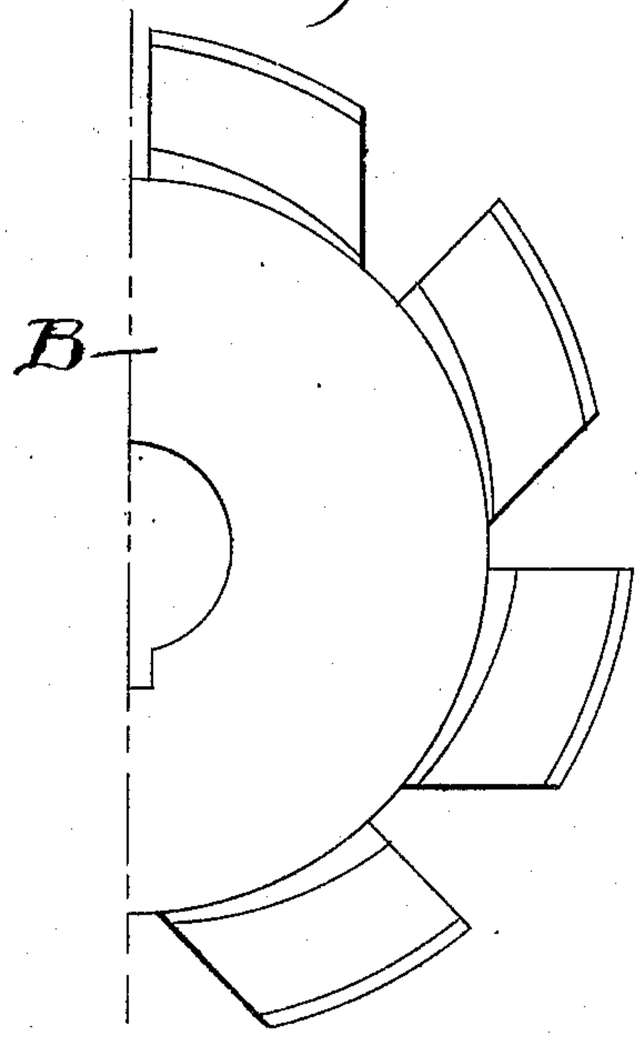
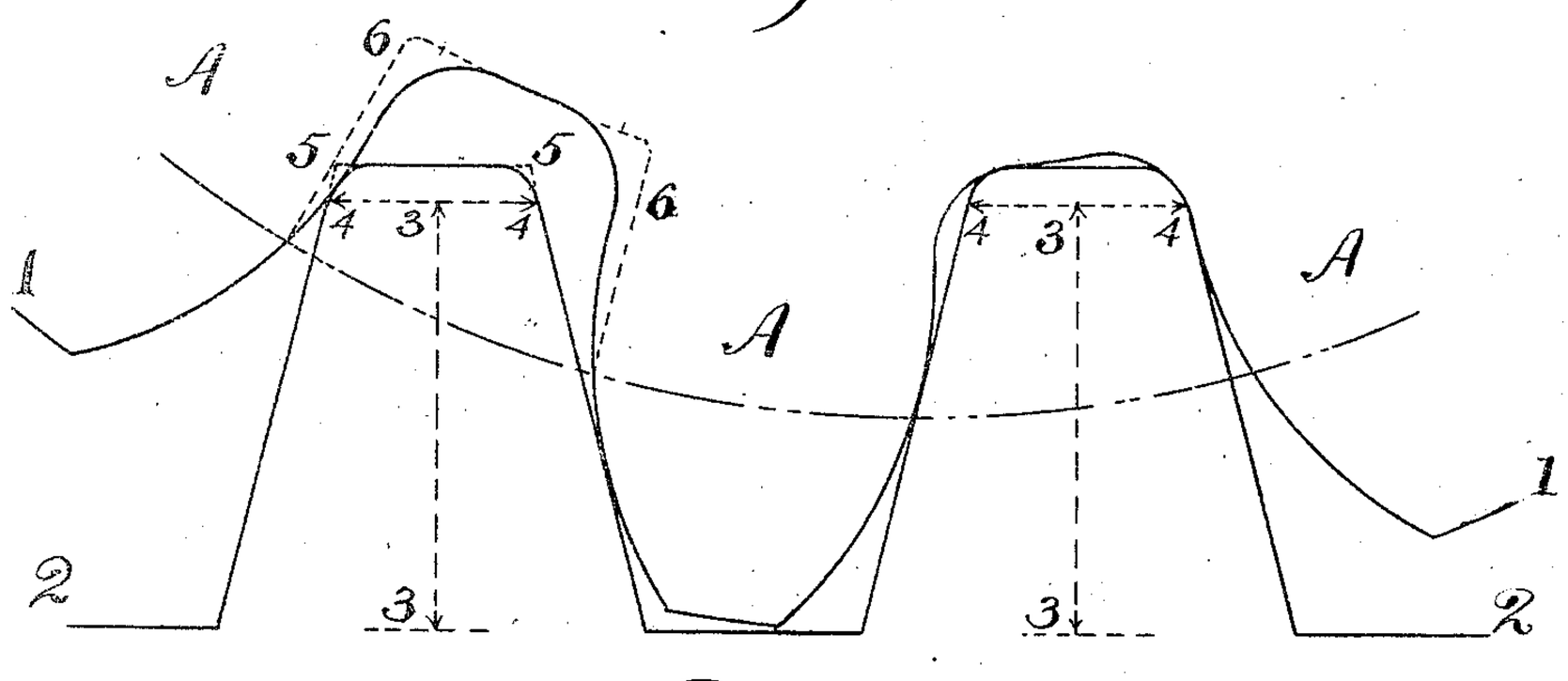


Fig. 3.



Witnesses
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UNITED STATES PATENT OFFICE.

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HOB FOR GEAR-CUTTINGS.

No. 924,679. Specification of Letters Patent. Patented June 15, 1909.

Application filed April 19, 1907. Serial No. 369,057.

To all whom it may concern:

Be it known that I, ERNEST J. LEES, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Hobs for Gear-Cuttings, of which the following is a full, clear, and exact description.

The object of the present invention is to provide an improved hob for the generating of gears.

The particular purpose is to provide a form of hob which will be capable of cutting accurate teeth on the gears so that they will mesh closely and at the same time have proper clearance space between the teeth such as should be had in order to take care of the dirt which always accumulates at such points.

An embodiment of my invention is illustrated in the accompanying drawings in which—

Figure 1 is a longitudinal section of one of my improved hobs showing the generating teeth to be of the true involute basic form commonly called the rack. Fig. 2 is an end elevation of Fig. 1. Fig. 3 is a diagrammatic illustration of the manner of operation compared with the operation of other forms of hobs.

In the cutting of gear teeth, there are, of course, many methods adopted, but it has been found that cutting them with a hob is preferable because of the regularity of spacing of the teeth and the rapidity and ease with which the cutting is accomplished. The cutting operation itself causes the gear blank to be fed in the proper manner and this, while being an advantage, obviously entails, as a consequence, a peculiar movement of the cutting edges of the hob through the blank. When hob cutters of the ordinary contour, shaped to cut clearance space, follow the line of travel through the blank the result is that the gear teeth take a contour such that they fit imperfectly. This will be made clear by referring to the diagram shown in Fig. 3. In this case we will let the full line 1—1 represent the outline of the gear teeth A as cut by my improved form of hob B the cutting edges of which will be represented by the full line 2—2. Now suppose the dimension line 3—3 designates that depth of the cutter which cuts out what is commonly designated as the working depth of the gears, that is the depth to which the meshing teeth will engage each other.

It is sometimes the practice to have the hob cutter terminate in a cutting edge along the line 4—4 and, while the curve of the teeth is properly formed to insure close fitting, nevertheless no clearance space is provided by such a hob, and the intermeshing teeth will ground. This may make no difference when the fit is absolutely accurate and when there is no dirt or deposit in the space between the teeth, but when such deposit occurs, obviously the meshing of the gears will cease to be close or correct. It has therefore been proposed, in order to avoid this grounding of the teeth, to extend the hob cutters to a greater height than is necessary to provide for cutting out the gear teeth to the ordinary working depth and thereby cause a clearance space to be formed. This proposition has merely involved the extending of the tapered straight side lines of the cutter so that the top edge of the cutter will be advanced a slight distance beyond the line 4. This would produce a top cutting edge along the dotted line 5—5 shown in Fig. 3, the sharp corners of which would follow along the path shown in the dotted lines 6. That portion of the cutter between the lines 4—4 and 5—5 would make a clearance space at the base of the teeth all right but the travel of the corners 5—5 along the line 6—6 destroys the proper contour of the teeth so that they no longer fit as they should.

It so happens that the use of hobs in the cutting of gears has been mainly confined to worm gears where this defective feature was not very apparent or of importance. On ordinary gears, however, it is a matter of great consequence and it is to remedy this that I have devised the hob having the form shown in Figs. 1 and 2 and the outline of whose teeth is shown to be of the true involute basic form commonly called the rack, following the line 2—2 of Fig. 3.

It will be observed that in this hob I extend the cutter to a height to enable it to cut a clearance space beyond the line 4—4 which marks the outer extent of that portion of the hub which forms the working depth of the gear teeth. This extension of the hob cutter,

however, I provide with beveled or reduced corners which may be either curved or plane, according to the accuracy of the work desired and the limit of cost on the manufacture.

With the corners of the clearance cutting portion of the hob so rounded or beveled, as for example Fig. 3, it will be seen that the path of the cutter through the gear blank will be the same as usual, to the depth 3—3, thus forming the contour of the gear teeth along the proper lines so far as their working depth is concerned, while the path of the clearance cutting portion will fall within the lines cut by that portion of the line below the line 4—4.

The precise angle at which to give the curve or bevel at the outer corners of the cutter will depend upon the individual circumstances in the case, and it is therefore not thought necessary to note any particular measurements, but it is necessary, in actual practice, that the reduction of the corners be sufficient to keep them within the lines followed by that portion of the cutter below or behind the line 4—4 which marks the outer limit of that portion of the hob which determines the working depth of the gear teeth.

Having thus described my invention, I claim:

1. A hobbing-cutter for generating gear teeth, the cutting edges of which have the outline of an involute rack tooth, said cutting edges being extended beyond the point where those of the involute rack tooth would terminate, said extensions of the cutting edges being inclined inwardly so as not to affect the shape of the flanks of the teeth being cut, but provide clearance at the bottom of the space between the teeth.

2. A hobbing-cutter for generating gear-teeth, comprising cutting teeth of involute rack tooth-shape in cross section but extended at the point to provide clearance in the gear being cut, said extended portions being reduced in width so that their cutting edges will not act on the flanks of the teeth being cut, to affect their correct shape but will provide clearance at the bottom of the space between the teeth.

In testimony whereof, I hereunto affix my signature in the presence of two witnesses.

ERNEST J. LEES.

Witnesses:

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