(No Model.)

T. W. GARDINER.

KNIFE FOR TURNING IRREGULAR FORMS.

No. 454,041. Patented June 16, 1891.

Fig. 1.

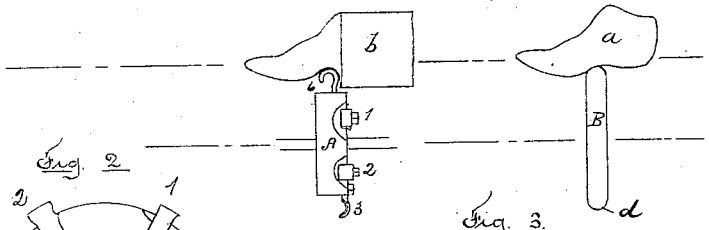


Fig. 2.

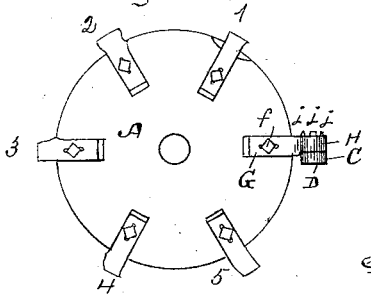


Fig. 3.

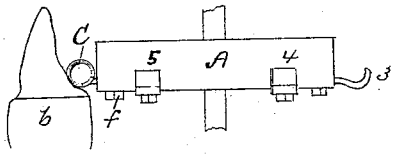


Fig. 4.

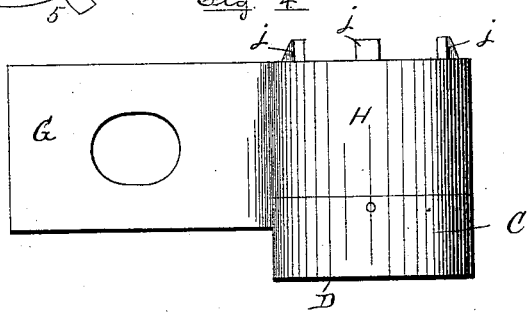


Fig. 5.

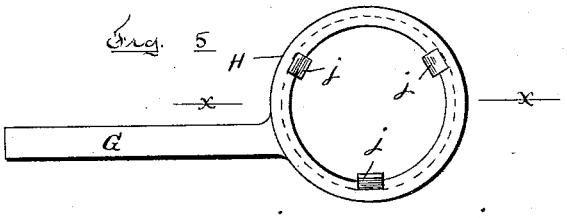
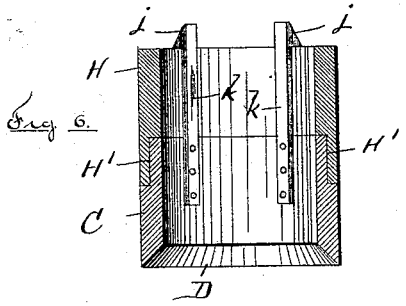


Fig. 6.



Witnesses

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THOMAS W. GARDINER, OF WORCESTER, MASSACHUSETTS.

KNIFE FOR TURNING IRREGULAR FORMS.

SPECIFICATION forming part of Letters Patent No. 454,041, dated June 16, 1891.

Application filed November 26, 1890. Serial No. 372,667. (No model.)

To all whom it may concern:

Be it known that I, THOMAS W. GARDINER, a citizen of the United States, and a resident of Worcester, in the county of Worcester, State of Massachusetts, have invented a new and useful Improvement in Knives for Turning Irregular Forms, of which the following is a specification, accompanied by drawings, in which I have represented a finishing knife for a last-turning machine embodying my invention, and in which—

Figure 1 is a diagrammatic figure, in which is represented the relation of the model-last, model-wheel, block to be turned, and the cutter-head of a last-turning machine. Fig. 2 is a side view of the cutter-head of a last-turning machine. Fig. 3 is an edge or face view of the same, and showing the relation of the block to a finishing-knife of my improved construction. Fig. 4 is a side view of a finishing-knife embodying my invention and shown in full size and detached from the cutter-head. Fig. 5 is an edge view of the supporting-ring, showing the rear edge; and Fig. 6 is a sectional view in line X X, Fig. 5.

Similar letters refer to similar parts in the different figures.

My invention relates to the knife ordinarily used in a machine for turning irregular forms and known as the "finishing-knife" or the knife by which the last cut is made in the form as it is turned from the block.

I have represented the cutter-head of a last-turning machine, which consists of a cylindrical block A, mounted upon a revolving arbor and carrying a series of knives 1 2 3 4 5, by which the surplus stock of the block is reduced, the last cut being taken by a finishing-knife 6, which must exactly correspond with the "model-wheel" B in its curvature and in its radial distance from the center of the revolving arbor upon which the cutter-head is mounted, in order to give the last the same contour as the model from which the last is turned. This finishing-knife is made in a curved form, the curvature corresponding with the curvature of the rim of the model-wheel, and the action of the finishing-knife is illustrated in the diagrammatic figure shown in Fig. 1 of the drawings, in which the relations of the parts concerned in the improvement made by me are shown in their relation to each other, the construction of a machine for turning irregular forms being so well understood that a detailed illustration of the entire machine is not deemed necessary.

In turning a last or other irregular form a model of the shape to be produced is hung upon a slowly-revolving arbor whose axis is coincident with the axis of the model. Such a model is represented at *a*, Fig. 1. The block to be turned is mounted in an arbor coincident with the axis of the model and having a corresponding rotating motion. This block is shown at *b*. The model *a* and block *b* are carried in a frame capable of a swinging motion, to which force is applied to press the model against a wheel B, turning upon a fixed stud and having a rim *d*, provided with a circular face to rest against the model *a*, the frame in which the model and block are carried having a swinging motion, owing to the irregularity of the model as it is rotated in contact with the rim of the model-wheel B, thereby carrying the block *b* toward or away from the cutter-head A. The finishing-knife 6 is attached to the cutter-head by a bolt passing through the stem of the knife, and as the knife is worn away by repeated use its position is varied on the cutter-head to bring the cutting-edge of the knife the same radial distance from the axis of the cutter-head as the rim of the wheel B. As the cutting is chiefly performed upon one side of the knife, as represented in Fig. 1, the continued wear with the process of sharpening the knife changes the curvature of the knife, so that it fails to shape the turned block in exact correspondence with the model. The preservation of the finishing-knife in a machine for turning irregular forms is, therefore, a difficult task. To obviate these difficulties is the object of my invention, and I accomplish this object by means of the knife and knife-holder shown in the accompanying drawings. In place of the ordinary form of finishing-knife (represented in Fig. 1 at 6) I attach to the cutter-head A, by means of a bolt *f*, in the usual manner, the stem G, upon the outer end of which is a ring H, preferably formed integrally with the stem G. This ring is formed with an internal bearing H′ to re-

ceive the annular knife C, which is journaled in the bearing of the ring H, and is held in place by the spring-catches *j j j*, extending through the ring H and engaging the opposite edge. The body *k* of these spring-catches is made to clear the inner surface of the ring, so as not to impede the free rotation of the annular knife in its bearing. The diameter of the annular knife at its cutting-edge D is exactly the same as the diameter of the rim of the model-wheel B in contact with the model *a*. As the cutting action of the knife as it is brought into contact with the block to be turned is at one side of the plane of rotation of the center of the annular knife, the knife will be made to rotate in its bearing by the resistance of the work against its edge. The entire cutting-surface of the knife is thus brought into action, causing the wear to be uniform around its entire extent.

When dull the knife is readily removed from the ring H by the compression of the spring-catches, and as the cutting-edge D is circular and continuous I am able to sharpen the knife by a circular grinding-wheel working against the inside of the knife and grinding it equally upon all sides, thereby preserving the diameter and true circular shape of the knife. When it becomes necessary to replace the knife, the ring-holder H need not be removed, but a new knife can be inserted in the holder and the radial position of the knife preserved. The constant adjustment of the knife to correct the variations caused by the wear of the knife is therefore entirely avoided, and the duration of the knife is extended, as the cutting-edge is greatly increased.

I do not confine myself to the specific construction shown and described whereby the annular knife is held in its holder, as other means can obviously be employed for the purpose.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a machine for turning irregular forms, the finishing-knife consisting of a ring or holder attached to a revolving cutter-head and an annular knife capable of being turned in said ring or holder, so as to bring different sections of its cutting-edge into action, substantially as described.

2. In a machine for turning irregular forms, the finishing-knife consisting of an annular ring having a continuous cutting-edge forming a complete circle and carried by a revolving cutter-head, substantially as described.

3. In a machine for turning irregular forms, the combination, with a revolving cutter-head, of an annular knife-holder carried by said cutter-head and an annular knife journaled in said holder, so as to be rotated by the contact of the knife with the work, substantially as described.

4. In a machine for turning irregular forms, the combination, with a revolving cutter-head, of a knife-holder attached to said cutter-head, an annular knife held in and capable of being turned in said holder, and spring-catches attached to said annular knife and engaging said knife-holder, substantially as described.

5. In a machine for turning irregular forms, the combination, with a revolving cutter-head, of an annular ring H, provided with a stem G, by which it is attached to said cutter-head, and an annular knife C, journaled in said ring, substantially as described.

Dated at Worcester, in the county of Worcester and State of Massachusetts, this 22d day of November, 1890.

THOS. W. GARDINER.

Witnesses:
RUFUS B. FOWLER,
H. W. FOWLER.