R. Ward & J. B. & H. C. Hubbell,

Spoke Lathe.

No. 9597. Patented Feb. 22, 1853.

Fig. 1

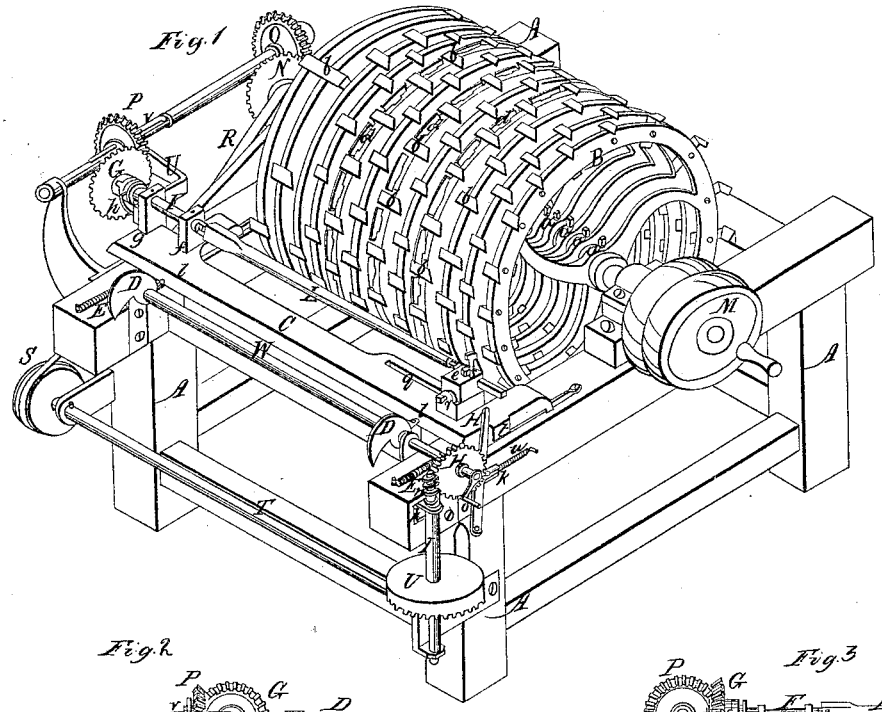


Fig. 2

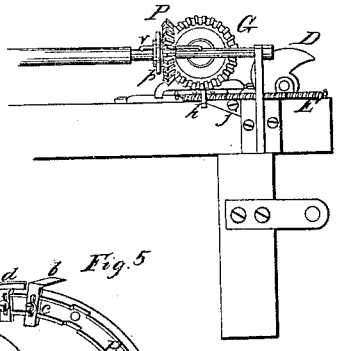


Fig. 3

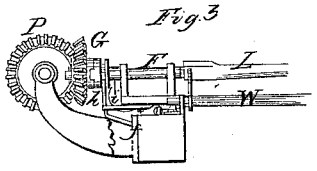


Fig. 4

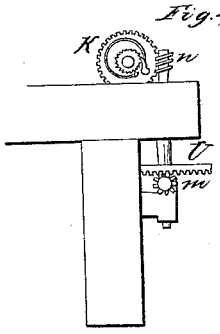
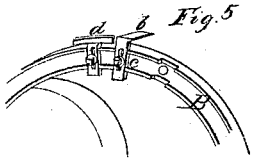


Fig. 5



UNITED STATES PATENT OFFICE.

RICHARD WARD, J. B. HUBBELL, AND H. C. HUBBELL, OF NAUGATUCK, CONNECTICUT; LAUREN WARD ADMINISTRATOR OF SAID RICHARD WARD, DECEASED.

MACHINE FOR TURNING IRREGULAR FORMS.

Specification of Letters Patent No. 9,597, dated February 22, 1853.

To all whom it may concern:

Be it known that RICHARD WARD, while in life, now deceased, JEROME B. HUBBELL, and HART C. HUBBELL, all of the town of Naugatuck, in the county of New Haven and State of Connecticut, did invent a new and useful Improvement in Machinery for Turning Irregular Shapes; and we do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the accompanying drawings, which make a part of this specification, in which—

Figure 1, is a perspective view of the whole machine, showing, essentially, all of its operating parts. Fig. 2, is a perspective view of a section of the gearing which connects the motion of the cutter wheel with that of the material, as seen from the left hand side. Fig. 3, is a perspective view of the same section, as seen from the front, showing the operation of the clutch which throws it into and out of gear. Fig. 4, is a view of a section of the feed gear. Fig. 5, is a perspective view of a section of one of the circles of the cutter wheel, showing how the cutters and the guides, or rests, are attached.

We make the frame A, A, &c., of posts and bars, in the usual way, and of any suitable material. We make the cutter wheel, B, of cast iron, or any other suitable material, in separate circles, as represented in Fig. 1, (and in section, in Fig. 5,) and secure these circles on the arbor, or shaft, by means of binding screws, as seen at *a*, *a*, &c., Fig. 1, or otherwise. We make the cutters of steel, of shapes suited to the different parts of the article to be turned by them, either straight or curved, (as for carriage wheel spokes, similar to those shown at *b*, *b*, &c., Figs. 1, and 5,) and attach them to the circles, in their appropriate situations, by means of binding screws passed through slots, as seen at *c*, Fig. 5, so that they may be adjusted to conform, (in reverse,) to the shape of the article to be turned, in every particular case. The pattern disclosed on the surface of the pattern wheel will be the reverse of the pattern to be turned.

For turning an ordinary oval, the cutters may be fitted as near together, on each circle, as they will cut to advantage. But for different shapes, in the same article, they must be fitted to the appropriate parts of each circle so as to make the cut in the right place, (and the cutters so shaped as to give the proper form of cut, either straight or curved, &c.,) as for a square section, there should be four cutters, set at equal distances from each other, to cut the four sides, (although if the cut be very heavy there may be two cutters set close together in each of the proper positions).

To regulate the depth of the cut, in part, (as to prevent the cutters from eating in, &c.,) and to steady the material while being turned, we attach two, or more, circles of guides, or rests, as seen at *d*, *d*, *d*, Fig. 1, by means of binding screws, passing through a slot, to allow of adjustment, the same as the cutters, as seen at *d*, Fig. 5.

We have three puppet heads, or stocks, *e*, *f*, *g*, in the common way, to hold the centers, in which the material is placed. These puppet heads are attached to a sliding bed, C, Fig. 1. This sliding bed is fed up to the cutters by means of the cams, D, D, and thrown back by means of the spiral springs, E, E, Fig. 1, or by any other suitable method.

The live center F, Fig. 1, is thrown into and out of gear with the wheel, G, by means of the clutch, *h*, Figs. 1, 2, and 3, which is pressed forward by the spring, *i*, Fig. 3, and it is drawn back by the effect of the inclined plane, *j*, Figs. 2, and 3, when the sliding bed, C, is thrown back.

The feed motion is thrown out of gear by means of the lever, H, Fig. 1, which is attached to the bar, *k*, *k*, in which the upper journal of the shaft, I, works. On the upper end of this shaft, I, is a worm, *n*, which works in the teeth of the spur wheel, K, and thereby revolves the arbor, or shaft, W, of the cams, D, D, Fig. 1, and when the sliding bed, C, is thrown back, the projection, *t*, carries back the lever, H, and throws the worm, *n*, out of gear with the wheel, K. In this situation there will be no feed motion, nor rotary motion of the material. The cutter wheel being thus made, and fitted in its proper position, and the cutters properly adjusted for the particular work designed to be turned, the ma-

terial is secured in the centers, as seen at L, Fig. 1, with all the gearing, &c., arranged as seen in Fig. 1. The power is applied to the driving pulley M, which gives a rapid rotary motion to the cutter wheel. On the end of the arbor or shaft, of the cutter wheel, is a toothed wheel, N, which drives the wheels, O, P, and G, which, by means of the live center, F, revolves the material in exactly the same time with the revolution of the cutter wheel. While the band, R, by means of the pulley, S, gives motion to the shaft, T, on which is a pinion, *m*, Fig. 4, working in the crown wheel, U, on the shaft, I, of which is the worm, *n*, working in the spur wheel, K, which revolves the arbor W, of the cams, D, D, which cams, working against the heads of the set screws, *l*, *l*, in the sliding bed, C, regularly feed the material to the cutters. These set screws, *l*, *l*, are used to regulate the size of the article. And the cams D, D, near the outer extreme of the scroll, are made, essentially, segments of circles, so that there may be several revolutions, of both the material and cutter wheels, with but very light cuts, so as to give a smooth finish to the article.

When the article is finished, as the extreme scroll points of the cams, D, D, pass he heads of the set screws, *l*, *l*, the spiral springs, E, E, will drawn back the sliding bed, C, by which movement the lower end, or lever, of the clutch, *h*, Figs. 2, and 3, will be carried down by the inclined plane, *j*, so as to throw the live center F, out of gear with the wheel, G, and by means of the projection, *t*, acting on the lever, H, throw the worm, *n*, out of gear with the wheel, K, when the article may be taken out, and another material put in its place, and so on.

Should it be necessary, at any time, to throw the live center out of gear before the work is finished, draw back the lever, H, Fig. 1, which will thrown the worm, *n*, out of gear with the wheel, K, when the cam shaft, W, may be turned back, at pleasure, and the live center be thrown out of gear as before.

To put the feed motion in gear, turn the crank *o*, Fig. 1, until the cams carry forward the sliding bed sufficiently to release the lever, H, and allow the spiral spring, *u*, to draw the worm, *n*, into gear with the wheel, K, when the feed motion will proceed, and when the lower, or lever, end of the clutch, *h*, is relieved from the inclined plane, (*j*, Fig. 2,) the spring, (*i* Fig. 3,) will cause the clutch to throw the live center into gear during the first revolution of the wheel, G. And should it be desired to bring the material up to the cutters, in the first instance, quicker than the ordinary operation of the machine would do, turn the crank, *o*, as long as necessary for the purpose, as the ratchet wheel and ratch, shown on the wheel, K. Fig. 4, will prevent its effecting any other part of the machinery.

The wheel, P, Figs. 1, and 2, slides on the shaft, on a flange, *v*, which causes it to turn with the shaft; and it is always kept in gear with the wheel, G, by means of a clutch, *p*, Fig. 2, on the end of the arm, V, Fig. 1, which is attached to the puppet head, or stock, *y*. (But the wheel, P, may be made as a trundle head, and G, a crown wheel.)

The puppet head, or stock, *e*, is movable, in the slot, *q*, to suit the length of the article; and adjustable, by the set screws, *r*, and *s*, to regulate the taper, as may be desired.

We design so to arrange the cutters on the circles, for turning ovals, that one or more of them will be cutting, essentially, at all times, yet so that the fewest number of which the case will admit, may be cutting at the same time, as this will tend to give regularity to the motion, and steadiness to the whole operation, and therefore produce the most perfect article, and the smoothest finish.

For the common size machine, we would advise a cutter wheel of about two and a half feet diameter, composed of about twelve circles; and for turning the oval, or cylindrical, parts, about eighteen cutters on a circle.

For turning short articles, such as shoe lasts, &c., we contemplate using a face wheel, with all the other apparatus properly arranged to suit such an alteration, should it be found more useful.

The advantages of this improvement consist in making the cutter wheel of a series of separate circles so that they may be readily adjusted on the arbor, for turning different articles. And in the manner of adjusting the cutters so that the shape of the article may be given by the cutters alone, (dispensing with all patterns, or cams, for that purpose.) And in that, with the beforenamed advantages, it is a self-acting machine; so that, after the circles, cutters, and rests, are adjusted, nothing remains to be done but to put in the rough material and take out the finished article, while the cutter wheel may continue running.

We are aware that machines have been made for turning irregular shapes, by means of sliding centers, grooves, patterns, cams, &c., and that cutters have been so formed and arranged as to assist the cams, &c., in giving the shape to the article. We, therefore, do not claim either of these, as such, as our invention; but

What we claim as our invention, and desire to secure by Letters Patent, is—

The use of a cutter wheel for turning irregular forms, the cutters being so ar-

ranged that the pattern may be disclosed in reverse on its surface, when combined with the feed motion herein described, so that in turning said cutter wheel the desired irregular shape will be given to the article without using guides or patterns; when the whole is constructed, arranged, combined, and made to operate, substantially, as herein described.

In witness whereof, we have hereunto subscribed our names, &c., January 9th A. D. 1852.

LAUREN WARD, [L. S.]
Adr. of Richard Ward.

JEROME B. HUBBELL. [L. S.]
HART C. HUBBELL. [L. S.]

Witnesses:
JAMES SPENCER,
S. W. KELLOGG.