J. Russell,

Turning Irregular Forms,

No. 10,369. Patented Jan. 3, 1854.

Fig. 1.

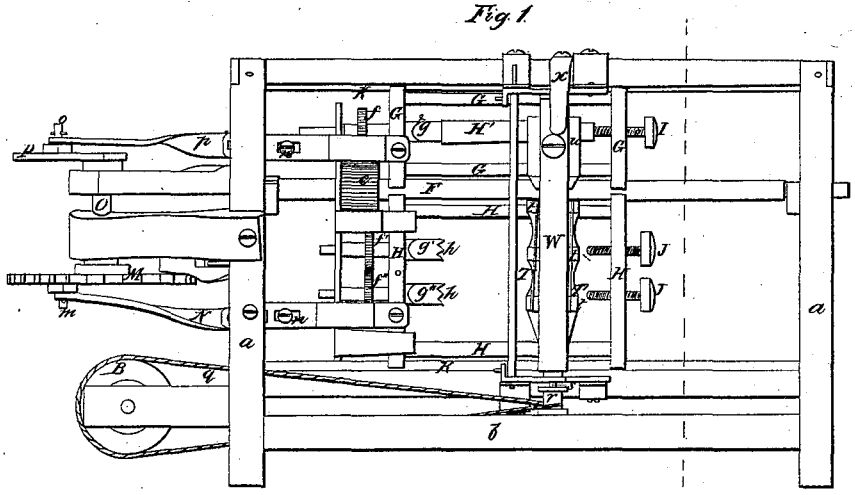


Fig. 2.

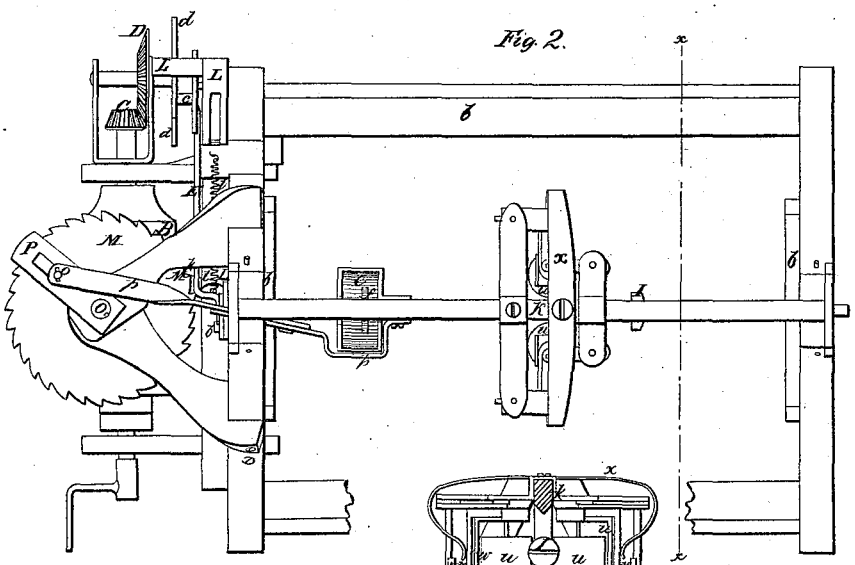
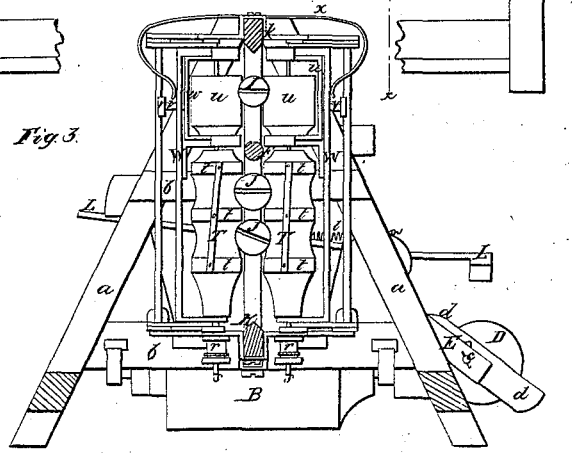


Fig. 3.



UNITED STATES PATENT OFFICE.

JONATHAN RUSSELL, OF PHILADELPHIA, PENNSYLVANIA.

MACHINE FOR CUTTING IRREGULAR FORMS.

Specification of Letters Patent No. 10,369, dated January 3, 1854.

To all whom it may concern:

Be it known that I, JONATHAN RUSSELL, of the city and county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Machines for Cutting Irregular Forms by Patterns; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, making a part thereof, in which—

Figure 1, represents a view from one of the sides. Fig. 2, represents a top view, and Fig. 3 represents a vertical cross section taken at the line *x x* of Fig. 2.

Similar letters in the several figures denote like parts.

The nature of my invention consists in so combining the spur wheel on the mandrel which carries the pattern, and the spur wheels on the mandrels for carrying the rough material, with the main wheel for turning them, through their respective carriages, that the carriage which carries the pattern may have a uniform or differential advancing and receding longitudinal motion relatively with the carriage for carrying the rough material, for the purpose of cutting to the same, or to a greater or less size than the pattern. And also in hanging the tracers in independent frames within the frames which carry the cutters, so as to allow the cutters to reduce the rough material to the same or to a greater or less size than the pattern in its transverse direction. And also in giving to the pattern and the rough material a half or less than a half revolution at each traversing motion of their respective carriages, for the purpose of cutting or reducing in longitudinal sections without revolving the pattern or rough material.

To enable others skilled in the art to make and use my invention, I will proceed to describe the same with reference to the drawings.

The frame may be constructed in any well known substantial manner of wood, or iron, or portions of each, *a*, *a*, *a*, *a*, representing the posts, and *b*, *b*, *b*, *b*, the side and end rails. A long drum B, to which the power for driving the lathe may be communicated from any first mover, has upon one of the ends of its shaft, a bevel gear pinion C, Fig. 2, which works into a larger bevel gear wheel D, on the shaft of which wheel D, is arranged the cam arms *d d*. In a suitable slot in one of the cam arms *d* (partially seen at Fig. 3,) is an adjustable slide carrying a wrist pin *c*, to which one end of the pitman E is attached, the other end of said pitman being connected to a crank *i* on the end of the slotted rod F. By means of this rod or shaft F (as will be hereafter described) a half or less than half a revolution is imparted to the pattern and rough material, and the adjustment of the pitman E regulates the extent of this turning of said pattern or rough material upon their respective mandrels, which will of course vary with the special article being operated upon at the time.

The rod or shaft F, carries the long cog wheel *e*, said shaft being slotted, and the cog wheel *e*, having a feather upon it which fits into said slot, in a manner well known to mechanicians, for the purpose of allowing the wheel *e*, to have a sliding motion along said shaft, but to be turned by said shaft when it turns. Upon the mandrel *g*, which holds one end, and controls, the pattern H′, is a small spur wheel *f*, which works in the long cog wheel *e*, and every portion of a revolution given to the shaft F, is communicated through the wheel *e*, to the spur wheel *f*, and of course to the mandrel *g*, which it is attached to. Underneath the long cog wheel *e*, is another spur wheel *f′*, which meshes with, but turns in an opposite direction to itself, another spur wheel *f″* still farther below in the frame. Each of these spurs *f′*, *f″*, is arranged upon its own special mandrel *g′*, *g″*, respectively, and both receive their portion of a revolution from the wheel *e*—the lower one *f″*, turning in the same direction with the wheel *e*, but the other *f′*, turning in the opposite one. This is for turning a right and left shoe last, from the same pattern at the same time. And it might be proper to state that, in turning spokes or any other thing, the opposite sides of which are exactly alike, the moving of one in one direction, and the other in an opposite direction, does not make any difference. The rough material is held at one end by the points *h*, *h* in the mandrels *g′*, *g″*, and at the other ends by the screws J, J, the whole being embraced within the carriage H, H, H, H, while the pattern, its mandrel *g*, and screw I, are similarly embraced within the carriage G, G, G, G, said carriages having for their support and

guides the V-shaped rails K, K, above and below, and the rod or shaft F, intermediate between them, to move upon.

The cam arms *d*, *d*, as they are revolved by the wheel D, strikes the arm L, upon which is a dog or pawl *k* (Fig. 2) that works in the teeth of the ratchet wheel M, giving to said ratchet wheel and its shaft O, to which it is firmly attached, a movement equivalent to one, two, or more of its teeth, as may be required—said arm L, being made adjustable for this purpose. The arm L, is driven, to give the feed by the cams *d*, *d*, and is drawn back for the next operation by the helical spring *l*, (Figs. 2, 3).

A suitable slot, is cut in the ratch wheel M, in which is placed a slide, so as to be adjustable, and to this slide is attached a wrist pin *m*, Fig. 1, to which is attached one end of the pitman N, the other end of said pitman being connected to the carriage H, which carries the rough material. The pitman N, is made in two pieces, one sliding against the other, but held together when properly adjusted by the set screw at *n*, Fig. 1, passing through slots as represented in the drawing. On the upper end of the shaft O, which is the shaft of the ratch wheel M, and as before described permanently attached to, so as to move with, said ratch wheel, is placed an arm P, having a slot and a slide in it, to which slide is attached a pin *o* to connect with the pitman *p*, at one of its ends, the other end being connected to the carriage G, which carries the pattern. This pitman *p*, may be lengthened and shortened, in the same manner as the pitman N, before described, by slots and set screws (as seen at *n'*, Fig. 1). As the ratchet wheel is rotated, it moves the carriages forward and back, and carries the pattern H', against and past the tracers *u*, *u*, and the rough material against and past the cutters T, T, the tracers causing said cutters to move toward and from the rough material, in exact conformity with the pattern. Now if the pitmen *p*, N, are of the same precise length, it is evident that the carriages will travel at the same uniform speed in the same direction, and to the same extent of distance; and the rough material in the one carriage will be dressed to the exact length of the pattern in the other. But if it is desired to dress the rough material longer or shorter than the pattern, and yet preserve the shape of the thing operated upon, in its exactness to the pattern, the pitman N, may be lengthened in the one case, or the pitman *p*, in the other, which accomplishes the purpose fully, and with great exactness. In order that these carriages may have a differential movement, the upper spur wheel *f*, is so arranged as that it may travel or slide on the main cog wheel *e*, but at the same time be turned in perfect uniformity with the spurs *f'*, *f''*, below it, so that whatever portion of a revolution the pattern may receive, the rough material shall receive a similar revolution upon its mandrels, so as to cut away the excess of material, in longitudinal sections from end to end.

The cutters T, T, are attached to the ribs *t*, *t*, on the cutting cylinder, the shaft or spindles *s*, *s*, being their center of motion. These cutters may be straight or inclined, and any other form of cutting or reducing tools than those represented may be used, their function being to remove the excess of material upon the rough blocks. Motion is communicated to the cutters by the bands *q*, passing over the drum B, and around the pulleys *r*, *r*, Figs. 1, 3. The cutters are hung in the frames W, W, and the tracers *u*, *u*, are hung in independent frames *w*, *w*, but within the frames W W, and said frames *w w*, by means of the set screws *v*, *v* may be so adjusted as that the tracers will allow the cutters to reduce to the exact size of the pattern, in its transverse diameter, or by moving the tracers forward of, or behind, the line of the cutting edges to increase or diminish the transverse diameter of the thing being cut. This method of enlarging or diminishing the transverse diameters of the thing being cut, together with the method of increasing or diminishing its length (heretofore described) enables me to cut from the same pattern, a fac simile, or a larger or smaller thing, from the said same pattern, preserving all its proportions in every respect. In cutting shoe lasts, from the same pattern, I not only cut a right and left last, but I can cut a complete set of lasts, varying in size, but uniform in proportion. And in cutting this article (the lasts), the machine is not strictly limited to the varying of the sizes and the right and left lasts, but the heel or toe, or any intermediate portion between them on one side or top of the last, may be enlarged or diminished by the setting of the tracers, a thing impossible if the pattern and rough material were to be revolved or turned entirely around on their mandrels. The spring *x* forces the frames W, W, and the tracers and cutters therein up to their work, said frames being hinged so as to move toward or from the pattern and rough material as the tracers may direct or control it.

In turning out thin and light spokes, there is an equal pressure on both sides of the pattern, which supports it, and prevents it from bending while being operated upon, which bend if permitted would be transferred to the thing being cut from the pattern. The rough material is similarly sustained by the cutters working exactly opposite to, and each sustaining the other.

It is obvious that, instead of moving the pattern and rough material past the tracers and cutters, said tracers and cutters may move along the pattern and material to be cut, with like result. The turning of the pattern and rough material on their mandrels, may also be done in sections after they have passed the tracers and cutters, instead of in the act of passing, turning a section every time they pass and repass, until the whole half revolution is made.

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

1. So combining the spur wheel *f*, on the mandrel which directs the pattern, and the spur wheels *f'*, *f''*, for controlling the rough material, with the main wheel *e* which moves or turns them, through their respective carriages, as that the carriage which carries the pattern may have a uniform or differential advancing and receding longitudinal motion, relatively with regard to the carriage for carrying the rough material, for the purpose of cutting to the same, or to a greater or less size than the pattern, substantially as described.

2. I also claim hanging the tracers in independent frames within the frames which carry the cutters, so as to allow the cutters to bring the rough material to the same, a greater, or less, size than the pattern in its transverse diameter substantially as described.

3. I also claim giving to the pattern and rough material a half, or less than a half revolution at each traversing motion of their respective carriages, for the purpose of cutting or reducing in longitudinal sections. without revolving the pattern or rough material, substantially as described.

JONATHAN RUSSELL.

Witnesses:
C. BRAZER,
S. A. STROUSE.