TEAL & TYLER.

Turning Lathe.

No. 10,946. Patented May 23, 1854.

Fig: 1.

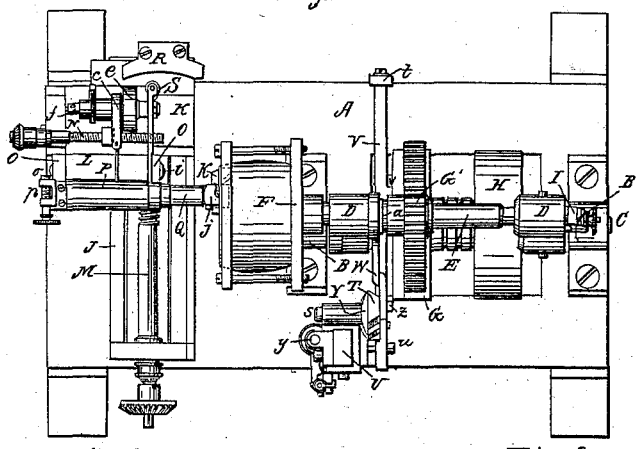


Fig: 2.

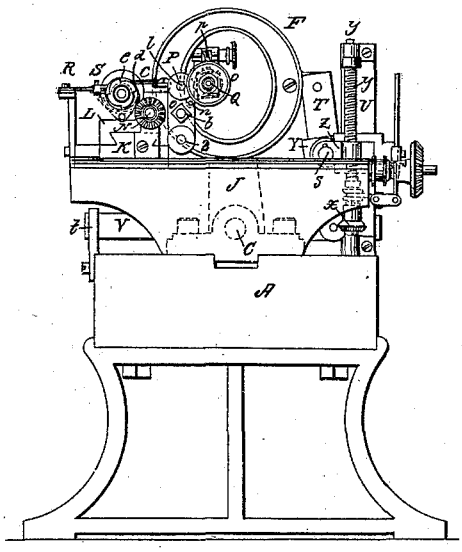


Fig: 3.

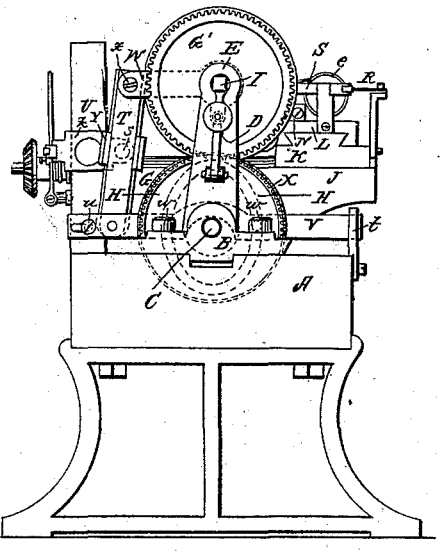


Fig: 4.

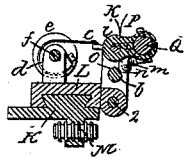
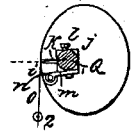


Fig: 5.



UNITED STATES PATENT OFFICE.

PETER TEAL AND CHAS. TYLER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO WM. P. CRESSON & CO.

LATHE FOR TURNING THE INTERIOR SURFACE OF HOLLOW WARE.

Specification of Letters Patent No. 10,946, dated May 23, 1854.

To all whom it may concern:

Be it known that we, PETER TEAL and CHARLES TYLER, of the city and county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Turning-Lathes; 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, making a part of this specification, in which—

Figure 1, is a plan of a lathe, constructed according to our improvements. Fig. 2, is a front end view of the same. Fig. 3, is a back end view of the same. Fig. 4, is a transverse section of the tool stock and slide rest. Fig. 5, is a transverse section of the tool holder.

Similar letters of reference indicate corresponding parts in the several figures.

These improvements are more particularly applicable to lathes for turning out the interior of what is termed, "hollow-ware," which term includes all hollow vessels of cast metal; but they may in whole or in part be applicable to lathes for other turning.

The turning of hollow-ware differs from almost all other kinds of turning, inasmuch as "truth" is not so necesary as a clean bright surface. The ware is always made as thin as possible to save weight of metal. It is therefore desirable that no more of the metal should be turned off than is indispensable to the removal of the crust on the surface of the casting, the removal of this crust being necessary to effect the tinning. Owing to the peculiar nature of the cut required, no self-acting or machine lathe has ever, to our knowledge, been successfully used for this description of turning, which has to be and is commonly performed by turning with a hand tool, and is a work of the most laborious kind, the workman having to accommodate himself to the deviations of the surface from the circular or oval form desired and being constantly jerked and shaken in the most violent manner by the irregularities which unavoidably occur in the surface.

These improvements consist in certain means of holding and controlling the movements of the turning tool, whereby it is made to accommodate itself to irregularities in the surface of the article being turned.

To enable those skilled in the art to make and use our invention, we will proceed to describe its construction and operation.

A, is the bed of the lathe, which is supported upon suitable standards at a proper elevation, and which carries two blocks, B, B, forming the bearings of a strong shaft, C, to which are firmly secured two strong arms, D, D, which are in line with each other on the shaft and constitute the mandrel-head of the lathe, the said arms being bored and fitted with collars or otherwise suitably furnished with bearings for the mandrel, E, on the front end of which is the chuck, F, to which the work is secured. The mandrel head is held stationary for circular turning; but for oval turning it receives a vibratory motion for the purpose of giving a lateral motion to the mandrel. This will be described in its proper place. The mandrel receives its rotary motion through a pair of spur wheels, G, G, one fast upon it and the other loose upon the shaft, C, the last named wheel being secured to a driving pulley, H, which derives its motion from any first mover. It is kept in its proper longitudinal position by a spring lever, I, which is attached at the back of the head, D, D, and presses on its back end, so as to force a shoulder, *a*, (see Fig. 1,) against the back of the front bearing of the head. The spring lever, I, allows the mandrel to spring back and produce a yielding cut, in face turning with a rigid tool.

J, is the slide bed of a slide rest, secured to the lathe bed in the common way and carrying a bottom slide, K, and top slide, L, which are moved in directions at right angles to each other by screws, M, N, in the same way as the slides of any other slide rest. To one side of the top slide, L, is attached a swinging frame, composed of two side pieces, O, O, and a stretcher, *b*, to keep them at a proper distance apart. The pivot or axis, 2, of this frame is parallel with the axis of the lathe. The upper part of this frame is connected by a metal strap, *c*, with an eccentric, *d*, which is secured to one side of a spring box, *e*, on a small shaft, *f*, which works in suitable bearings on the top of the top slide. The spring box, *e*, contains a spring, which is coiled around the shaft and

secured in such a way as to produce tension on the strap, *c*, which tension may be regulated by a ratchet, *g*, and pawl, *h*, at the front end of the shaft, *f*. The frame, O, O, carries the tool-stock, P, which is of the same length as the top slide, L, and bored longitudinally with two parallel holes, (see Fig. 4,) one to receive a pivot, *i*, which pivots it to the frame, O, O, and the other to receive the tool-holder, Q, which consists of a cylindrical spindle fitted to turn freely in the tool stock and protruding some distance through the back end thereof, having a square head, *j*, at its back end, which is furnished with a transverse slot to receive the turning too, *k*, which is secured therein by a set screw, *l*. The turning tool, *k*, has two cutting edges, one for turning the bottom and the other for the sides.

To the under side of the head, *j*, of the tool holder is secured a small rest block, *m*, furnished with a friction roller, *n*, which is intended to bear upon the inside of the vessel in turning the sides, and thus form a rest for the tool upon the work itself. This will be best understood by Fig. 5, where the ellipse is supposed to represent the interior surface of a vessel being turned, the frame, O, O, and the tool-stock P, being omitted, but having their positions shown by black central lines. The spring within the box, *e*, draws the edge of the tool with considerable force against the sides of the vessel, and the rest, *m*, keeps the tool in proper position, while, at the same time, it allows it to yield to any inequality or undulation on the surface, and as the spring exerts a uniform or nearly uniform tension, when once adjusted, the tool will exert a uniform pressure on the surface, and thus remove a uniform thickness therefrom. The cut is regulated by properly regulating the tension of the spring upon the frame, O, O.

The tool is set at a proper angle to the face of the work by means of an endless screw, *p*, which works in bearings on the top of the tool-stock and gears with a worm wheel, *o*, secured on the front end of the tool-holder, *q*, which protrudes through the stock, the tool-holder being, by these means, turned in the stock and adjusted and held to present the tool at any desirable angle, and the movement of the stock upon the pivot, *i*, allowing the roller *n*, to preserve its bearing on the work in all the changes of the angle or inclination of the tool. For the purpose of preventing the spring throwing the frame, O, O, with the tool-stock and its appendages too far back when the tool is withdrawn from its work or taken from the holder, a stop-piece, R, is attached to the back end of the bottom slide, and opposite this stop-piece a bar, S, is attached to the frame, O, O, with a friction-roller at its end. This friction-roller nearly touches the stop-piece when the lathe is at work, but when the tool is not in working position it rests and runs against the edge of the stop-piece.

The vibrating motion which it is necessary to combine with a circular motion to produce an elliptical or oval motion is given to the mandrel, E, by means of a lever, T, which works on a fulcrum, *s*, attached to a standard, U, on the lathe bed. The upper end of this lever is connected at *x*, with the mandrel by a link W, and the lower end with a horizontal transverse sliding bar, V, working in a guide, *t*, on the bed, and with a slot upon a stud, *u*, at the back of the standard, U. This sliding bar, V, carries a stud, *v*, which works in an elliptical groove, *w*, *w*, in a disk, X, secured to the front side of the spur-wheel, G, on the shaft, C; shown in dotted lines in Fig. 3.

In turning the bottom of an elliptical vessel, the most expeditious way is to commence turning at the center with a circular motion, without any vibration, and to then let the vibration commence, and increase gradually, as the tool moves from the center. In this way the motion of the parts brought successively into contact with the point of the tool will change from a circular to an elliptical motion, the ellipses described becoming more and more elongated as the vibration increases. By making the vibration increase in proper relation to the motion of the tool when the tool reaches the corners of the bottom and arrives at the sides of the vessel the motion described is made to correspond exactly with the elliptical form of the vessel. In order to give the necessary changing vibration to the mandrel, E, for this purpose, we make the fulcrum, *x*, movable upon the standard, U, by attaching it to a slide, Y, which fits to slide upon the lever, and fitting it to rock in a slide, Z, which fits to slide upon the standard, and is adjustable thereon by a screw, *y*. When the slide, Z, is moved by the screw, it moves the slide, Y, upon the lever, and if it is adjusted to bring the fulcrum opposite the pin, *x*, which connects the lever with the mandrel, any amount of vibration may be given to the lever without vibrating the mandrel; but as the fulcrum is moved from the pin, *x*, it causes the mandrel to vibrate, the distance of the said vibration increasing with the distance of the fulcrum from the pin, *x*. The screw, *y*, is intended to receive motion through a bevel wheel, *z*, at its lower end, which is driven from the lathe itself, and when the slide has been moved low enough to give the required vibration to turn to the sides of the vessel the wheel is intended to be uncoupled from the shaft by suitable mechanism. The screw, M, receives motion from the lathe itself through a bevel wheel, 1, which is

also intended to be furnished with means of throwing it out of gear at the proper moment simultaneously with the stoppage of the screw, *y*. The screw, N, is also intended to be driven by the lathe itself and to be furnished with proper means of throwing it in and out of gear.

To illustrate the operation of the lathe, we will proceed to describe the operation of turning the interior of an oval iron pot, with bulging sides, which is shown in the chuck. The slide rest is moved to bring the turning tool opposite the center of the mandrel, which is held in a fixed position by drawing the slide, Z, up high enough on the standard, U, to bring the fulcrum, *s*, opposite the pin, *x*. The tool-stock in turning the bottom is intended to rest against the front side of the frame, O, O, which thus holds it in proper position. When the lathe is started, the screws, M, and, *y*, move simultaneously, and both are thrown out of gear together as soon as the bottom is finished and the tool reaches the sides of the vessel, the screw, N, being at this moment thrown into gear. By the uncoupling of the screw, *y*, the slides, Z, and Y, and the fulcrum, *s*, are made stationary, and the vibration of the mandrel remains constant. By the throwing of the screw, N, into gear the tool is made to commence moving outward and turning the sides of the vessel, and during this part of the operation the free movements of the swinging-frame, O, O, and the tool-stock, P, allow the tool to follow the bulging form of the sides, against which it is drawn by the spring in the box, *e*, the rest, *m*, with its roller, *n*, running freely on the surface, keeping the tool at a proper inclination thereto.

The operation of turning ware of circular form is performed in the same manner as above described, with the exception of the vibration of the mandrel, which remains stationary. For circular turning, instead of applying a spring to the tool a spring may be applied to the mandrel, the latter being then left free to vibrate and the tool being held stationary.

Having thus fully described our invention, we will now state what we claim as new, and desire to secure by Letters-Patent.

We claim—

1. The rest, *m*, with or without a friction roller, *n*, attached to, or combined with a swinging turning tool, *k*, so as to move therewith, and bear on the surface on which the tool is operating, substantially as herein described, for the purpose of keeping the tool in a suitable position in relation to the surface that is being turned, and furnishing a proper rest therefor, in all its movements to follow the deviation of the motion of the surface from a true circle.

2. We claim, hanging the tool in a frame, O, O, which is left free to vibrate, and keeping it in contact with the work by a spring or analogous device, while the axis of the work is fixed or has its motion limited, substantially as described; or, what is equivalent, hanging or supporting the axis of the work in such a way as to allow it to vibrate freely, but keeping it in contact with the tool by a spring or analogous device, while the tool is stationary; for the purpose of keeping the tool and work in proper contact, but allowing them to yield to any want of "truth" in the surface of the work, and thereby cause the tool to take about the same depth of cut on all parts of he surface.

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CHARLES TYLER.

Witnesses:
C. A. RICHARDS,
HENRY SIMPSON.