Sheet 1 - 2 Sheets.

E. Tucker.

Turning Irregular Forms.

No. 3,805. Patented Oct. 24, 1844.

Fig 1

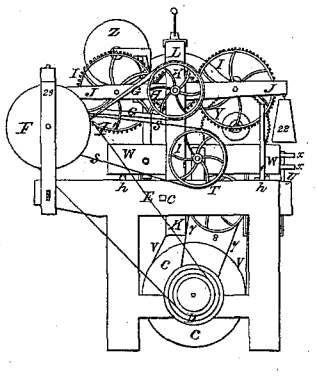


Fig 4

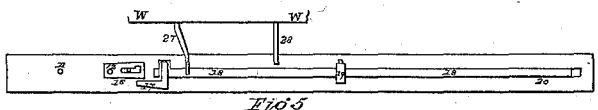


Fig 5

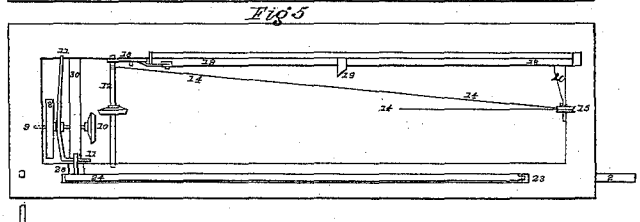


Fig 6

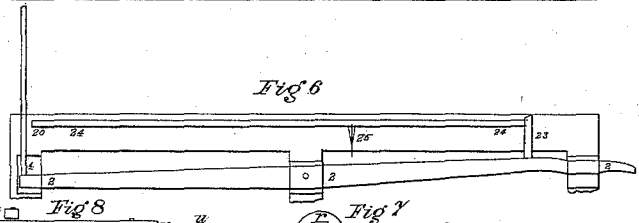


Fig 8

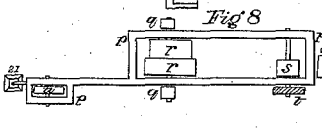


Fig 7

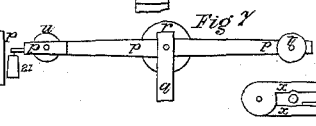


Fig 9

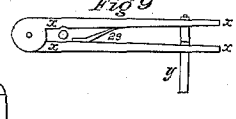


Fig 3

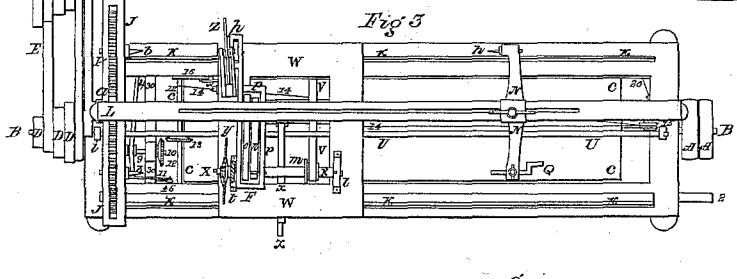


Fig 10

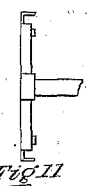


Fig 2

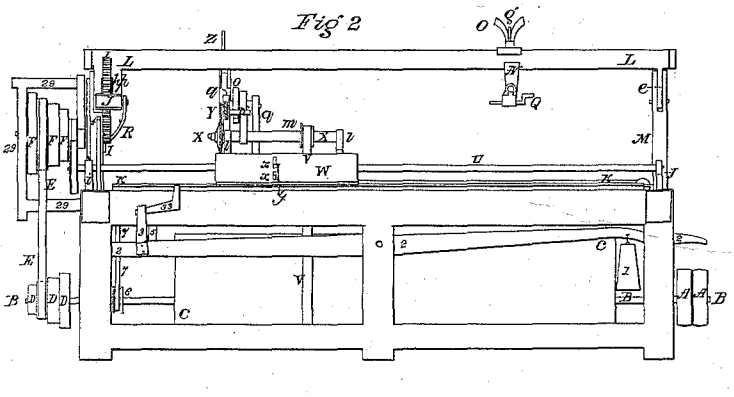
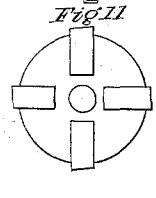


Fig 11



Sheet 2 - 2 Sheets.

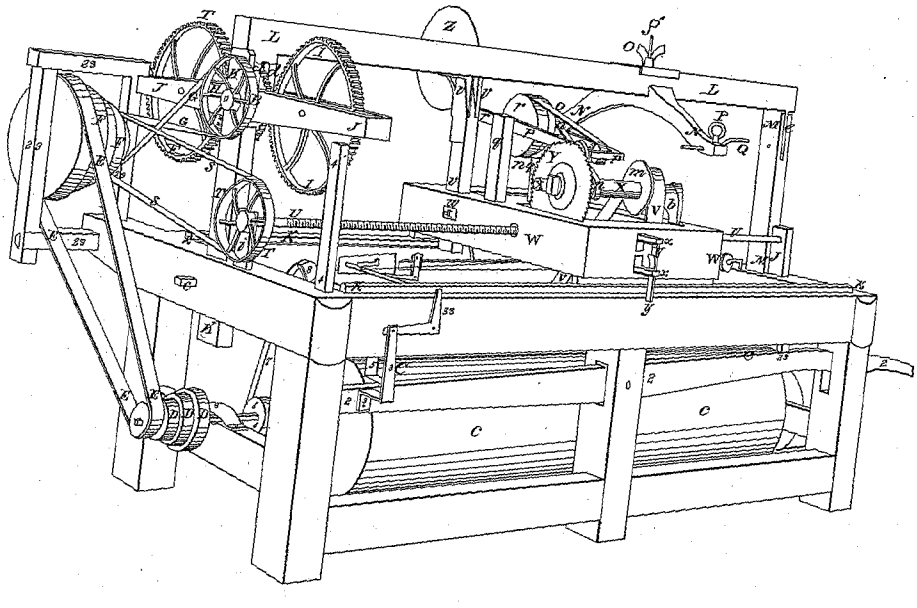
E. Tucker,

Turning Irregular Forms,

No. 3,805.

Patented Oct. 24. 1844.

Fig. 12



UNITED STATES PATENT OFFICE.

EDWIN TUCKER, OF BUCYRUS, OHIO.

MACHINERY FOR TURNING IRREGULAR FORMS.

Specification of Letters Patent No. 3,805, dated October 24, 1844.

To all whom it may concern:

Be it known that I, EDWIN TUCKER, of the town of Bucyrus, in the county of Crawford and State of Ohio, have invented a new and useful Machine for Turning, called "Tucker's Improved Turning-Lathe" for turning irregular bodies, which is described as follows, reference being had to the annexed drawings of the same, making part of this specification.

Figure 1 is a left-end elevation of the whole machine. Fig. 2 is a front-side longitudinal elevation. Fig. 3 is a top view. Fig. 4 is a view of the inner side of the back top side plate of the main frame. Fig. 5 is a top view of the main frame with the carriage tilting beam and arms cone pulleys and drums removed therefrom. Fig. 6 is a side view of the front top side plate of the main frame showing the construction and operation of the lever. Fig. 7 is a side view of the metal frame suspended over the carriage. Fig. 8 is a top view of the same metal frame. Fig. 9 is a side view of the clamps. Fig. 10 is an edge view of one of the plates of cutters. Fig. 11 is a front view of ditto. Fig. 12 is a perspective view of the whole machine.

I construct a strong frame of iron or other suitable material of a rectangular form and of suitable size to contain the several parts hereafter described.

A square iron shaft B with round bearings turned near the ends is fitted and placed on the end girts of the aforesaid frame having on its right end two pulleys A A, one fast and the other loose, the propelling power being applied by band to the inner or fast pulley and taken away by shifting the band to the loose pulley. Upon said shaft B is placed a drum C. On the left end of the shaft is placed a cone pulley D. Another cone pulley F is placed on a horizontal shaft in a small additional frame No. 29 of the main frame. Motion is communicated to the larger cone by means of a band E running over it and the smaller cone D. Upright posts M M are let into the top of the main frame and secured by keys C so that they can be raised or lowered at pleasure. At the upper end of the left post M K a slit 9 or 10 inches long and 1 inch wide is made. A metal band wheel H is secured to this post by a horizontal shaft. Motion is given to said wheel H by a band G running over it and the cone F. Inside of post K M and on the shaft sustaining the band wheel H are suspended two wooden parallel arms J J placed apart so as to leave a space between them and fastened together at their ends, in which space the cog wheels I I′ and *a* are placed. These arms vibrate on the axle of the band wheel H. A tilting beam L is connected at the left end with the arms J by means of a hanging post *p p* mortised into the tilting beam and the arms. The said hanging post has a slit about 2½ inches long and 1½ inches wide, or thereabout.

The tilting beam L at the right end is connected with the post M by means of an arm *e* mortised into the tilting beam and running into the slit in said post and there fastened by an iron pin on the same center with the horizontal shaft of the band-wheel H. For the purpose of supporting the inner end of the shaft on which the band wheel H and arms J are suspended a strong iron brace is fastened to the inside of the post K and bent and extended upward so as to receive the end of said shaft, as shown at R. On the same shaft and revolving between the arms J is fastened a fine geared metal cog wheel *a*. The aforesaid cog wheels I I′ in the arms J work into the said cog wheel *a* and turn on horizontal axles passing through the vibrating arms J J. A vertical slit *f* is cut longitudinally through the tilting beam L (see Fig. 3) to admit the screw *g* of the crooked arm N to move back and forth therein for the proper adjustment of the arm N.

The crooked arm N is attached to the tilting beam by means of the screw *g* running up through the slit *f* and kept in its place by a thumb nut *o*. The back end of the said crooked arm on the inner side has upon it a revolving chuck *h* arranged on the same horizontal center with the shaft of the cog wheel I′ on which there is formed a chuck *b* for turning the pattern. The said chuck *h* and *b* are the points on which the pattern is placed which governs the work performed. The front end of the crooked arm N has passing through it a crank screw Q on the same horizontal line or center with the shaft of the cog wheel I′ on which there is formed a chuck *b b*. The crank screw Q and the chuck *b b* form the points on which the block or timber is placed upon which the work is to be performed, so constructed as to give motion to the block. In the frame are mortised posts *i j* in which is placed a hori

zontal screw U for moving the carriage *w*, said screw having on its left end a metal band wheel T turned by a band S leading to the cone wheel F.

k k represent the ways on which the carriage moves. The carriage *w* moves over the ways on rollers let into the carriage in the usual way. The screw rod U passes through the carriage. Head blocks or posts *l* are placed on the carriage *w* to receive the mandril of a circular saw Y turned by a pulley *m* and by a brand V leading to the drum C.

Directly opposite the saw is placed an adjustable post *v*. This post passes through the carriage and is kept at the desired height by a screw passing through the carriage and a perpendicular slit in the post. Two arms project horizontally back from this post between which is placed a pattern wheel turning on a horizontal shaft passing through said arms. This shaft is placed directly over the center of the line formed by the chucks *b* and *h*. The pattern wheel is placed opposite the saw and is set at an angle of about 10 degrees with the plane of the saw. A weight No. 22 is suspended from the front end of the arms J for the purpose of counteracting the tendency of the arms to be depressed at the back end and elevated at the front end by the action of the band wheel H and by the cog wheel *a* and the weight of the pattern.

The pattern wheel rolls on its stationary axis by the motion of the pattern. Inequalities in the shape of the pattern as it gradually comes in contact with the pattern wheel causes the pattern to be elevated and depressed giving the same motion to the back ends of the arms J and the crooked arm N whereby the opposite ends of the arms J and the crooked arm N whereon the block or timber to be turned revolves make the reverse motion. By this means the saw playing under the block or timber and the pattern wheel revolving over the pattern the saw is required to constantly give the block or timber the configuration of the pattern where it is in contact with the pattern wheel. On a line with the posts K and M a piece of timber of suitable thickness and of appropriate length is framed into the carriage on a level with the upper part of the carriage *w*.

A pair of iron clamps of convenient length in shape similar to a pair of dividers is at the united ends fastened to the piece of timber just described a few inches from the left side of the carriage with the points extending horizontally through the front side of the carriage. The clamps may be fastened by attaching metal ears to the piece of timber just described and heading into them the pin on which the legs of the clamps turn one leg of the clamps pass over the iron screw rod U and the other under it. At the point of contact the inner sides of the legs are cut in form to receive a screw with thread to fit the screw rod so that when the legs of the clamps are closed they form a burr over the screw rod U; a steel spring is fastened to the under leg for the purpose of keeping the legs of the clamps apart. On the upper leg of the clamps outside the front of the carriage a spring catch is fastened with a shoulder placed at the proper distance on its left side fitting its lower leg for the purpose of holding the legs of the clamps together. The clamps are represented in Fig. 9 detached.

Before the propelling power is attached to the machine the cariage *w* is moved to the right on the ways to the point where the saw will be just clear of the block or timber on which the work is to be performed and to the right of it. The clamps *x* are closed upon the screw rod *v* and held in their place by the spring catch "*y*." The propelling power applied sets the wheel T and the screw rod *v* in motion. By the operation of the screw the clamps are forced slowly along the screw to the left taking the carriage *w* on which the saw is located along with it. By this means the saw moves along the whole length of the block or timber with sufficient velocity to make it operate on every part of the surface of the block or timber.

Two perpendicular posts *q q* are set in the carriage on the left side and about 20½ inches from the front of the carriage on a line parallel with the saw mandrel. Near the top of the post *q*, a shaft is fixed firmly on which a horizontal metal frame *p* is hung the left side being longer than the right side. In front the two sides extend an equal distance, shown by the letters P in Plate 1 and Figs. 2, 3 and 8 of Plate 2. Inside the said metal frame and on the same shaft is hung a metal cone containing two pulleys.

A metal pulley is fastened on the saw mandrel, a band passes over this pulley and the pulley *r* by which motion is given to cone *r* shown by the letters *r* in Plate 1 and Figs. 2 and 3 of Plate 2. A metal shaft is inserted in the metal frame. Within the metal frame close to its left side and on said shaft a metal pulley is fastened shown by the letters *s s* in Plate 1. A band passes over the pulleys *s* and the cone *r* by which motion is given to the pulley *s* and the shaft to which it is attached. On the left end of said shaft outside the metal frame *p* a steel smoothing wheel *t* is screwed with a left hand thread. The edge of the smoothing wheel must be made in file form with the teeth running diagonally across the edge and about $\frac{1}{16}$th inch apart. The smoothing wheel is just back of the saw. It performs the office of smoothing the roughness left on

the block or timber by the saw. To every machine there must be a variety of smoothing wheels to suit the inequalities in the shape of the patterns.

The smoothing wheel is shown by the letters *t* in Plate 1 and Figs. 2, 3, 7, and 8 of Plate 2. At the back end of the longest arm of the metal frame *p* a small pattern wheel of the same size and shape of the smoothing wheel (except the file form of the edge) is hung to run on the pattern and vary the position of the smoothing wheel according to the inequalities of the shape of the pattern shown by the letters *u* in Figs 3, 7 and 8 of Plate 2.

A weight of from 1 to 2 pounds as the case may require is suspended at the back end of the longest arm of the metal frame *p* in order to keep the small pattern wheel *u* constantly resting upon the pattern, shown by the figures 21 in Figs 7 and 8 of Plate 2.

Mortises are cut through the right and left front legs of the main frame. A small mortise is cut through the middle legs. A lever 2 is inserted through these mortises so that the right end forming a handle will extend beyond the right side of the frame. The lever is hung on a center pin passed through the mortise of the middle front leg, shown by the figures 2 in Plate 1 and Figs. 2, 3, 5, and 6 in Plate 2.

Along the front top piece inside the way *k* a groove is cut, six inches from the left end the groove for the space of two inches is extended back through the top piece. In this groove a rod sufficient to fill the groove and move in it freely is inserted but one inch shorter than the groove. A pin is fastened horizontally in the rod so as to extend out through the center of the enlarged part of the groove. On the right end of the rod a perpendicular tenant is cut and rounded on the under side. A mortise extending half way through the rod is cut on the under side of the rod fourteen inches from its right end and running crosswise on the rod. The rod is shown by the figures 24, in Figs. 5 and 6 of Plate 2. The pin is shown by the figures 26 of Fig. 5 Plate 2.

A perpendicular steel spring is fastened to the under side of the front top side plate extending up through the plate into the mortise under the rod. The plate is cut away so as to give about one inch play to the spring shown by the figures 25 in Fig. 6 Plate 2.

At the right end of the groove directly under the end of the rod 24 a perpendicular square mortise is cut through the side plate, a post is mortised into the lever with a pin holding it and giving it sufficient play. This post runs up through the mortise in the side plate under the right end of the rod 24. A notch is cut on the left side of this post. This post is shown by the figures 23 Figs. 5 and 6 Plate 2. A thin plate of wood is fastened over the groove and rod to guard it from dust and other obstructions. A mortise is cut on the under side of this thin plate where it comes over the post 23 in order to allow the post sufficient play. A weight of from 10 to 12 pounds is attached to the lever 2 to counteract the pressure upon the opposite end.

An iron plate is attached to the lever 2 where it is bent outward and upward so as to extend along the side of the top plate of the main frame. A metal bent lever 33 composed of two arms at right angles with each other is hung by a pin on the side plate of the frame. One arm extends upward, the other extends to the left and is then united by a pin to the upper end of the iron plate 3 just described.

A perpendicular mortise is made in the left end top plate of the main frame directly over the left end of the lever 2 and extending into the mortise in which the left end of the lever 2 plays. In this mortise a post is placed which is moved up and down by the action of the lever shown by Fig. 4 in Plate 1 and Figs. 1, 2, 4 and 6 of Plate 2.

A pulley with a flange 6 on each side is fastened on the iron shaft B to the right of the cone and shown by the Fig. 6 in Plate 1 and Fig. 2 Plate 2.

A girth 30 is framed into the side top pieces of the main frame below the top of the said side pieces, shown by the figures 30 in Figs. 3 and 5 of Plate 2.

An iron shaft is laid horizontally with the left end resting on the left end top piece and the right end lying across the girth 30 and extending beyond it. This shape is so inserted that it may be moved back and forward, shown by the figure 9 in Figs. 3 and 5 of Plate 2. The shaft is secured on the girth 30 by a cap.

A metal band wheel is fastened on the shaft 9 shown by figure 8 in Plate 1 and Figs. 1 and 5 of Plate 3.

A band 7 passes over the pulley 6 and the band wheel 8 by which motion is given to the band wheel and to shaft 9, shown by the Fig. 7 of Plate 1 and Figs. 1 and 2 of Plate 2. A metal bevel cogwheel is fastened on the right end of the shaft 9 the cogs pointing to the right shown by figures 10 in Figs. 3 and 5 of Plate 2.

A flange is fastened on the shaft 9 to the right of the hub of the band wheel and forming a groove around the shaft between the band wheel and the flange. An iron plate is attached on the inner side of lever 2 opposite to iron plate 3. It is bent inward and upward so as to extend along the inner side of the front top side piece of the main frame. A metal button or right-angled plate composed of two arms at right angles with each other is hung by a

pin below the center of the inner side of the top front side plate of the main frame. One arm of said right-angled plate extends upward the other extends horizontally to the left and is then united by a pin to the upper end of the bent iron plate just described shown by figure 5 of Plate Fig. 2.

A rod of iron marked 11 about one-half inch square iron is fastened by its end to the inner side of the back top side piece of the main frame opposite the flange or shaft 9 and extends forward through the groove between said flange and the hub of the band wheel 8 to the inner side of the front top piece of the main frame; it then turns to the right and extends to the upper end of the arm of the right-angled plate or button 4 to which it is attached by a pin, shown at No. 45 in Fig. 3 Plate 2. A horizontal groove is cut on the inner side of the back top side piece of the main frame. The right end of this groove extends to the right-end top piece of the main frame. A mortise is cut at the right end of the groove in the side and end piece of the main frame. A rod 18 is inserted in this groove having $\frac{3}{4}$ inch of the breadth of the rod out. A small notch is cut on the inner side of the rod. A steel spring 20 is fastened to the inner side of the right-end top piece of the frame with the other end inserted in the aforesaid notch in the rod. This spring pushes the rod to the left as far as the groove will admit. The right end of the rod goes into the mortise when influenced by the spring. The rod is shown by the figures 18 in Figs. 4 and 5 Plate 2. The spring is shown by the figures 20 in Figs. 4 and 5 Plate 2.

A button or right-angled turning plate 17, Fig. 4, of metal is hung on a pin in the top piece of the main frame, one arm of said plate extending upward where it is attached to the left end of the rod 18 by a pin, the other arm extending horizontally to the left. The end of the rod is halved out to admit the arm of the button or right-angled plate 17 close to the top piece of the main frame.

On a level with the shaft 9 a short groove is cut in the back top piece of the main frame. A metal plate is placed on the inner side of the back top piece of the main frame with its right lower end resting on the horizontal arm of the metal button 17 and its left end extending over the groove just described, through it a horizontal slit is cut. At its right end the said slit is extended upward a pin $\frac{3}{4}$ inch long and $\frac{1}{2}$ inch square is fastened to the inner side of the back top piece of the main frame so as to hold the plate by the extended part of the slit while the plate occupies the position in which it is above described, shown by the figures 16 in Fig. 4 of Plate 2.

A metal shaft No. 12 is set horizontally in the front and back top pieces of the main frame on a level with the shaft 9 with its front end inserted $4\frac{1}{2}$ inches from the girth 30 and its back end passing through the plate 16 and into the groove back of the said plate 16, shown by the figures 12 in Figs. 3 and 5 of Plate 2. A metal bevel cog wheel is fastened on the said shaft 12 with the cogs pointed in front and meshing with the cogs of the metal bevel cog wheel 10 shown by figure 13 in Figs. 3 and 5 of Plate 2.

On the center of the right top end piece of the main frame a concave metal rolling pulley is placed shown by the figures 15 in Fig. 5 Plate 2.

A small cord 14 is fastened by one end to the shaft 12 near the back end and extended over the pulley 15 and the other end fastened to a hook on the under side of the right main piece of the carriage *w*, shown by the figures 14 in Figs. 3 and 5 of Plate 2.

A small iron pin is fastened on the under side of the carriage *w* so near the front side that when the carriage is moving it will pass close to the inside of the front top piece of the main frame and in such position that it will strike and move the pin 26 when the carriage has arrived to the extreme left point of its travel. A similar pin is placed under the carriage so near its right back corner that when the carriage moves it will pass close to the inner side of the back top piece of the main frame. The latter pin is shown by the figures 28 in Fig. 4 Plate 2. A pin 27 is placed near the left back corner of the carriage underneath in such a position that when the carriage has reached its extreme left point of travel the pin will pass the shaft 12 as far to the left as it will go said pin being shown by figures 27 in Fig. 4 Plate 2. A metal clasp 19 is so constructed that it may at pleasure be screwed upon any part of the rod 18 to fix the distance to which the carriage shall move to the right, shown by the figures 19 in Figs. 4 and 5 of Plate 2.

While the carriage *w* is running through to the left and the saw and the smoothing wheel are performing their work the clamps *x* are closed upon the screw rod *v*—the right end of the lever 2 is elevated, the post 23 is raised, the rod 24 by the action of the spring 25 is pushed to the right into the mortise near the upper end of the post 23 by which the lever 2 is kept in its position, the post 4 is depressed, the button 5 pushing against the rod 11 the shaft 9 with the band wheel 8 and the bevel cog wheel 10 are pushed as far to the left as they will go, the pin described as resting in the extended part of the slit in Plate 16 is resting in the horizontal part of said slit, the plate 16 and the back end of the shaft 12 are slipped to the right as

far as the groove under said plate will allow them to go. The rod 18 by the action of the spring 20 is pushed as far as it will go to the left and the bevel cog wheels 10 and 13 are so far apart that they do not mesh together.

The carriage moves forward and when about 2 inches from its greatest point of travel to the left of the pin 27 (a stiff spring of the same shape may answer a better purpose) comes in contact with the back end of the shaft 12 and moves it as far as it will go to the left the plate 16 slips along with it until the extended part of the slit falls upon the pin letting the lower right edge of the plate 16 down upon the horizontal arm of the button 17 putting the plate 16 and the back end of the shaft 12 in a firm position. The pin under the left front side of the carriage comes in contact with the pin 26 drawing it and the rod 24 to which it is attached to the left until the right end of the rod 24 is drawn out of the mortise in the upper end of post 23 the right end of the lever 2 falls by its weight, its left end rises drawing the upper arm of the button 5 to the right by which the rod 11 the shaft 9 the band wheel 8 and the cog wheel 10 are drawn as far to the right as they will go putting the cog wheels 10 and 13 in mesh; the post 4 rises and pushes up the front end of the arms J so as to throw the timber on which the saw has been at work far out of the way of the saw. At the same moment with the fall of the right end of the lever 2 the spring *y* comes in contact with the upper arm of the button 3 pushing the shoulder of the spring clear of the lower leg of the clamps *x*, the spring 29 instantly opens the clamps *x* setting them free from the screw rod *v* and the carriage *w* stops. The propelling power of the machine being continued without abatement and the cog wheels 10 and 13 being in mesh the cog wheel 13 and the shaft 12 are set in motion rolling to the right, the shaft 12 takes in the length of its circumference of the cord 14 at each revolution, the cord passing over the pulley 15 and having its other end attached to the carriage *w* shortens by this means the carriage *w* is rapidly drawn back until the pin under the right back end of the carriage comes in contact with the metal clasp 19 stationed on the rod 18 to bound the backward motion of the carriage *w*. The pin pressing against the clasp 19 moves the rod 18 to the right by which the horizontal arm of the button 17 is pressed upward against the right lower edge of the plate 16 pushing it up until the pin passes out into the horizontal part of the slit in plate 16, the pressure of the cord 14 on the shaft 12 drawing the whole weight of the carriage *w* instantly draws the shaft 12 and the plate 16 to the right throwing cog wheel 13 out of mesh and then the backward motion of the carriage necessarily stops.

No further preparation is necessary in order to produce the forward motion of the carriage except to close the clamps *x* upon the screw rod *v* and raise the right end of the lever 2 by the hand.

The arms J^2 may be in the same straight line with the arms J′, or they may radiate from the center on which they vibrate at any required angle, so as to have the relative position therewith required for producing the intended effect.

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

1. Arranging the pattern on one set of arms of a tilting or vibrating frame and the article to be turned or formed on another set vibrating on the same center and with them, as herein described, the gearing for communicating motion to the pattern and mandrel being arranged at one end of the tilting or vibrating frame, substantially as herein described.

2. I also claim arranging the smoothing wheel *t*, and small pattern or guide wheel *u* on different sets of arms vibrating together and on the same center attached to the frame of, and traveling with the reducing and main pattern wheels, as described, and this arrangement of the small smoothing and pattern wheels I claim in combination with the arrangement of the pattern and article to be formed as above described.

EDWIN TUCKER.

Witnesses:
WM. P. ELLIOT,
ALBERT E. JOHNSON.