

(No Model.)

2 Sheets—Sheet 1.

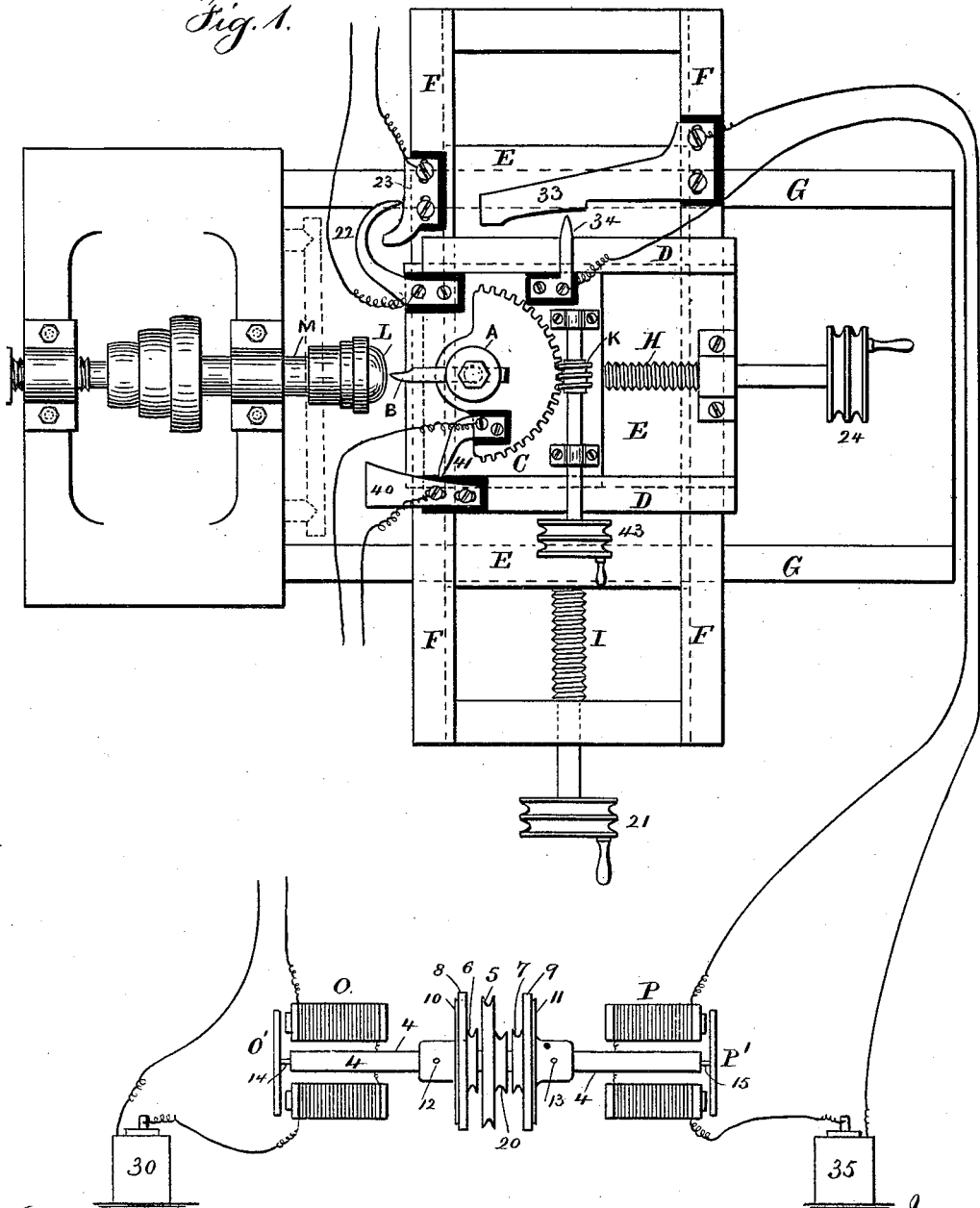
G. M. GUERRANT.

MEANS FOR MOVING AND GUIDING TURNING, ENGRAVING, OR PLANING TOOLS.

No. 431,578.

Patented July 8, 1890.

Fig. 1.



Witness

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Inventor

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Fig. 2.

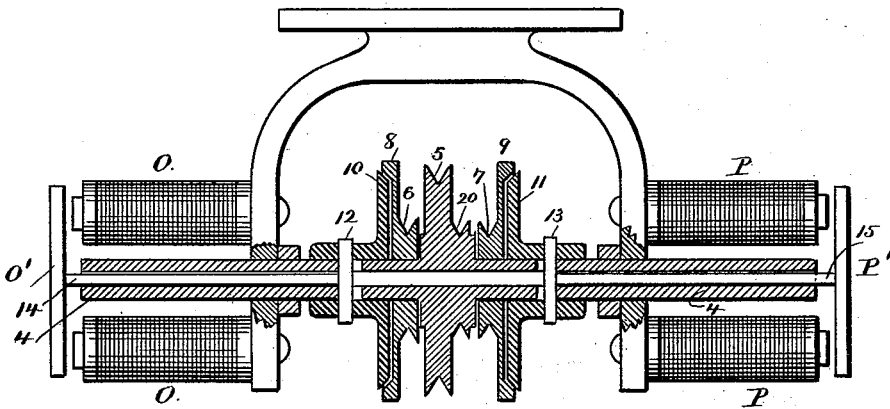
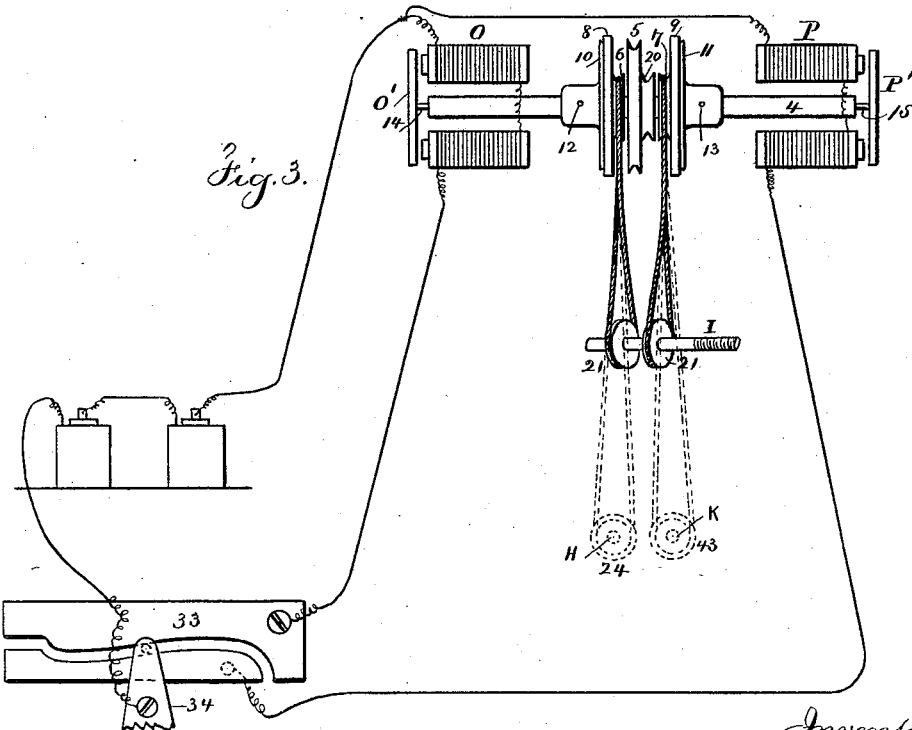


Fig. 3.



Witnesses

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UNITED STATES PATENT OFFICE.

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MEANS FOR MOVING AND GUIDING TURNING, ENGRAVING, OR PLANING TOOLS.

SPECIFICATION forming part of Letters Patent No. 431,578, dated July 8, 1890.

Application filed November 25, 1889. Serial No. 331,414. (No model.)

To all whom it may concern:

Be it known that I, GEORGE M. GUERRANT, a citizen of the United States, residing in the city and State of New York, have invented an Improvement in Means for Moving and Guiding Turning, Engraving, or Planing Tools, of which the following is a specification.

The object of this invention is to move and guide the cutting-tool electrically and in accordance with a pattern.

In machines heretofore made by me for engraving, the tool has been withdrawn or projected by the action of an electro-magnet, the circuit to the magnet being closed or broken by the action of a pattern-plate, and in Letters Patent No. 414,526, granted to me November 5, 1889, there is an electro-magnet that brings into action mechanism for withdrawing the engraving-tool in harmony with the pattern that is rotated synchronously with the article that is being engraved. In my present improvement a pattern corresponding to the article to be turned, engraved, or otherwise acted upon is made use of, together with a moving circuit-closer, and there is a revolving mechanism that is brought into action by the circuit-closing devices to control the slide-rest or other tool-holding device by the action of screws, pinions, racks, or similar means, so that the tool is guided mechanically through the intervention of electrical appliances and a circuit-closing pattern, thus performing the work heretofore usually done by hand in giving motion to the respective screws or racks of the slide-rest to move the tool as required for the shape to be produced.

In the drawings, Figure 1 is a diagrammatic view illustrative of the turning-lathe and the connections therefrom to the electric appliances. Fig. 2 is an elevation, partly in section, illustrating the electrical device for bringing into action the mechanism for turning the respective screws or pinions, and Fig. 3 is a diagram illustrating the device for turning compound curves or irregular shapes.

Turning-lathes having slide-rests are well known, and such slide-rests have also been made with a tool-supporting post adapted to

be rotated, so that the tool can be moved into the proper position in relation to the article operated upon, and my present improvements are available with any kind of a turning-lathe or engraving-machine having a slide-rest or tool-holder, and the improvements are also available with planing-machines in which the tool-holder is upon a head capable of being raised or lowered or moved to the right or left, so that the point of the tool follows the contour of the article to be planed upon the reciprocating bed of the lathe.

In turning-lathes and planing-machines, screws or pairs of screws at right angles and acting upon the main or secondary bed, are the usual devices for giving the compound movement to the tool. In some instances racks and pinions take the place of the screws.

In the drawings I have illustrated by the plan view of the turning-lathe the tool-holder A for the tool B, and this rests upon the secondary bed C in slideways D, upon the primary bed E, and this bed E is in ways F, resting upon the shears or bed G of the lathe, and H represents a screw to give motion to the secondary bed C, and I a screw to give motion to the main bed E, and K a pinion to give motion to the base of the tool-holder A for rotating the same in any desired direction; and it is to be understood that the screws H and I are only illustrative of the devices for moving the slide-rest in the two directions, as usual, and that the pinion K is illustrative of the device for giving a rotary movement to the tool-holder and that these appliances vary in the respective planing, turning, or engraving machines heretofore made use of, and I have illustrated at L the article to be engraved, turned, or planed, the same being shown upon the mandrel M of a lathe, and this article is to be of any desired shape, the other parts being adapted to the shape of such article, in order that the proper movement may be given to the tool in turning, engraving, or otherwise finishing or surfacing such article, and I remark that in the class of engraving known as "engine-turning," the article itself usually receives a movement by the action of a cam, as it is revolved, in order to produce the representation of bar-

ley-corn work, and the tool itself is caused to follow the contour of the surface by my improvements regardless of whether the article that is being engraved or finished simply rotates or receives a compound movement in addition thereto, and when the engraving-tool is provided with the means for withdrawing it electrically, as in my aforesaid patent, the devices hereinafter described may be employed in addition for giving to the tool the desired movement across the surface of the article operated upon and for giving to the tool-holder a partial rotation, as required from time to time, in order that the tool may be perpendicular to the surface acted upon thereby.

To give motion to the respective screws and pinions, I prefer to use belts and pulleys, and to make use of the electrical devices next described as the most convenient way for bringing into action such belts or pulleys; but I do not limit myself to the specific construction of the respective parts, as these may be varied as most convenient, according to the particular machine to which these means for guiding the tool are applied. I have represented two electro-magnets O and P, with armatures O' P' at the end of a shaft 4, that is continuously revolved by the pulley 5 and belt to any suitable power, and upon this shaft are loose pulleys 6 and 7, with friction-plates 8 and 9, and adjacent to these plates are the disks 10 and 11, that revolve with the shaft 4, and there are cross-keys or similar devices 12 and 13 and central pins 14 and 15 through the tubular shaft 4, the ends of which pins are adjacent to the respective armatures O' P'; hence when either magnet is energized its disk 10 or 11 is moved against the friction-clutch 8 or 9, and motion is given to the pulley 6 or 7 as long as the magnetism remains in the corresponding electro-magnet, and from the pulleys 6 and 7 belts are laid to the respective pulleys upon the screws or pinions of the turning, engraving, or planing machine, and the mode of bringing into action the respective screws or pinions will be apparent from the diagrammatic illustration. The respective screws and pinions H I K should be capable of motion by hand, as usual, in running back or moving the parts of the slide-rest or tool-holders, and for this object I have illustrated handles upon the pulleys of the respective parts; but these devices are to be of any known or desired character. I have represented a pulley 20 as continuously revolving along with the pulley 5, and it may now be presumed that a belt from the pulley 20 is connected with the pulley 21 of the screw I to give to the same a continuous movement at the proper speed, in order that the main bed E of the slide-rest may be moved gradually and cause the tool B to commence at the center of the article L and turn or engrave the same outwardly toward the circumference. In this instance an arm 22 is connected with the secondary bed C, and there is a circuit-closing

plate 23 on the bed F, and a belt passes from the pulley 6 to the pulley 24 upon the screw H, and this belt is either straight or crossed, according to the direction of rotation of the pulley 5, and there are circuit-wires leading from 22 and 23 and battery 30 to the electro-magnet O; hence as the screw I moves the tool, the arm 22 closes circuit between 22 and 23 and energizes the magnet O, and the pulley 6 is caused to give motion to the pulley 24 and screw H until the arm 22 is moved away from the circuit-closing plate 23 sufficiently to break the electric circuit, and the moment the further movement of the bed E brings the point of 22 sufficiently close to 23 for the circuit to be again closed, the operations are repeated and the point of the tool is caused to travel in the path that is controlled by the shape of the circuit-closing plate 23, and by varying the position and shape of this plate 23 the movement of the tool can be regulated with the greatest accuracy. If the shape of the article operated upon is more or less cylindrical or conical, then it is preferable to connect the pulley 24 by a belt with the pulley 20, so that the secondary bed C will be moved progressively and continuously, the tool of course being properly set at right angles, or nearly so, to the article being operated upon, and the pulley 21 may then be belted to the pulley 7 and the electric circuit will be controlled by the circuit-closing pattern-plate 33 upon the bed F, and the arm or finger 34 upon the secondary bed C, so that as the bed C is moved continuously by the screw H the screw I will draw back the tool whenever the end of the finger 34 closes circuit with the plate 33, battery 35 in that case energizing the electro-magnet P and applying friction by the clutch 9 11, to rotate the pulley 7, and in this way the tool can be made to conform to the pattern-plate during its action in engraving or cutting the article that is rotated by the mandrel M.

During the operation of turning, planing, or engraving it is often important to partially rotate the tool-holder A by the action of the worm-gear K, in which instance the circuit-closing pattern-plate 40 is upon the slideway for the bed C, and the finger 41 projects from the base of the tool-holder A, and when the finger 41 touches the pattern-plate 40 the circuit-wires leading to the battery 30 and electro-magnet O cause the clutch 8 10 to rotate the pulley 6, and the belt from the same to the pulley 43 upon the shaft of the pinion K is used to give motion to such pinion K and turn the segmental rack and base of the tool-holder until the contact is broken between the finger 41 and the plate 40, and it will be apparent that this means for turning the tool-holder upon the post may be made use of to bring the tool perpendicular to the article operated upon, whether motion is being given continuously by the screw H or by the screw I, and whether the electric circuit is in operation by the fin-

ger 34 and plate 33, or by the finger 22 and plate 23, for by the use of two electro-magnets O and P, I am enabled to control the action of two belts, and these two belts may pass to the pulleys 21, 24, or 43, or to either two of them; and in Fig. 3 I have illustrated a means for making use of the two belts to either one of such pulleys 21, 24, or 43. In this instance the belt from the pulley 7 is straight and the belt from the pulley 6 is crossed, so that when the pulley 7 is brought into action by its friction-clutch the screw or rack will be rotated in one direction, and when the pulley 6 is brought into action by its friction-clutch the pulley will be rotated in the other direction. It will now be presumed that the tool-holder and tool are in a position adapted to turn the compound curve, such as that usual in an ordinary handle. In this case the pulley 24 and screw H will be rotated continuously to move the tool in the direction of the length of the handle, and the screw I and pulleys 21 will be made use of in moving the tool toward and from the axis of the handle, and the plate 33, Fig. 3, will be made in two parts, and the finger 34, that projects from the bed C, will terminate as a downwardly-projecting pin in a slot of the shape of the handle to be turned, which slot in the plate 33 is very slightly wider than the diameter of the pin upon the finger 34; hence as the bed C is moved along in either direction the pin on the finger 34 will touch either one side or the other of the slot in the pattern-plate 33, and when it touches upon one side it brings into action the electro-magnet O and pulleys 6 with the cross-belt to the pulley 21, to rotate the screw I in one direction, and when the pin on the finger 34 comes in contact with the pattern-plate on the other side of the slot it closes the circuit to the electro-magnet P, and by the pulley 7 and straight belt to the pulley 21, the screw I is rotated in the other direction, and by the joint action of these two electro-magnets and pulleys 6 and 7 the screw I is made to keep the pin of the finger midway in the slot as such pin is moved along in the slot during the operation of turning up the article.

It is to be understood that the pattern-plates are to be insulated, and also the respective fingers, in order that they may properly act as circuit-closers, and it will also be understood that the shape of the circuit-closing pattern plate or plates will be varied according to the article that is being turned or engraved; and in case of this improvement being used upon a planing-machine the parts represented in Fig 1 will illustrate the tool-holder and the respective slide-rests of the planing-machine, the reciprocating bed of the planing-machine illustrated by dotted lines taking the place of the revolving mandrel carrying the article to be operated upon; and it is also to be understood that a compound movement can be given to the tool-holder and tool by the belt from the pulley 6 passing to the pulley 24 of

the screw H, and the belt from the pulley 7 passing to the pulley 43 of the screw-pinion K, as indicated by dotted lines in Fig. 3, or one belt from the pulley 6 may pass to the pulley 24 of the screw H, and the other belt from the pulley 7 may pass to the pulley 21 of the screw I. In this instance the slotted pattern-plate 33 may be supported by the main bed or shears G of the machine, so as to remain stationary for the pin of the finger 34 on the bed C to move along through the slot of such pattern-plate and close the electric circuit to either one or the other of the electro-magnets O P, according to the direction of movement required for the tool, and given to the same by the screw H or I and by the joint action of the two.

I claim as my invention—

1. The combination, with the respective screws or their equivalents for giving motion to the slide-rests and tool-holder, of a continuously-revolving pulley, a pulley and belt leading to the screw or pinion to be moved, an electro-magnet and friction-clutch brought into action by the electro-magnet, and a circuit-closing pattern-plate and finger connected with the tool-holding mechanism, whereby the electro-magnet brings into action the mechanism for moving the screw or pinion to move the tool in harmony with the pattern, substantially as set forth.

2. The combination, with the tool-holder and means for adjusting the position of the tool-holder, of a circuit-closing pattern-plate and finger moving with the tool or its holder, an electric circuit and electro-magnet, a continuously-rotating mechanism and a friction-clutch or its equivalent controlled by the electro-magnet, and belts or equivalent connection from the continuously-rotating mechanism to one or more of the screws or pinions for moving the holder and tool, substantially as set forth.

3. The electro-magnets O P, the continuously-revolving pulley 5, the pulleys 6 and 7, and their respective friction-clutches brought into action by the respective electro-magnets, one or more pattern-plates and circuit-closing fingers, and a tool-holding mechanism to which the circuit-closing finger or fingers are connected, the screws or pinions for giving motion to the tool-holding mechanism, and belts from the pulley 6 or 7 to pulleys on one or more of the axes of the screws or pinions, substantially as set forth.

4. The combination, with the tool-holder and its segmental rack and pinion K, of a pattern-plate 40, and finger 41, connected with the tool-holder, an electro-magnet, a continuously-revolving pulley, a pulley and its friction-clutch brought into action by the electro-magnet, circuit-connections to the pattern-plate and finger, respectively, and to the electro-magnet, and a belt to the pulley of the pinion, substantially as set forth.

5. The combination, with the tool-holder and the screw or pinion for giving motion to

the same, of a pattern-plate and circuit-closing finger, electro-magnets and circuit-connections, a continuously-revolving pulley, two pulleys and their friction-clutches controlled
5 by the electro-magnets, and a straight and cross belt to the pulleys upon the screw or pinion to be rotated, whereby the pattern-plate and circuit-closing finger bring into action the mechanism for revolving the screw
10 or pinions in either one direction or the other and causing the tool to follow the contour of the pattern-plate, substantially as set forth.

6. The combination, in a turning-lathe, of a tool-holder, a rack and pinion for rotating
15 the tool-holder upon its base, a slide-rest, the screws or their equivalents for moving the

slide-rest, a continuously-revolving device and connections for moving either or both screws and the pinions, electro-magnets and clutch mechanism brought into action by the
20 electro-magnets, electric circuits, and one or more pattern-plates and fingers moving with the tool and bringing into action the mechanism that causes the tool to move in harmony with the pattern, substantially as set
25 forth.

Signed by me this 15th day of November, 1889.

GEO. M. GUERRANT.

Witnesses:

AUSTIN BRAINARD,
ANDREW F. GATES.