

F. NERZ.

MACHINE FOR GRINDING OR FORMING PARABOLIC SURFACES.

No. 547,153.

Patented Oct. 1, 1895.

Fig. 1.

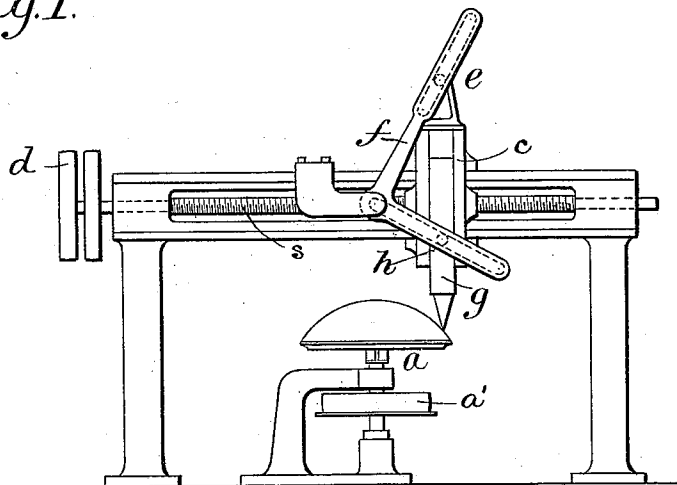
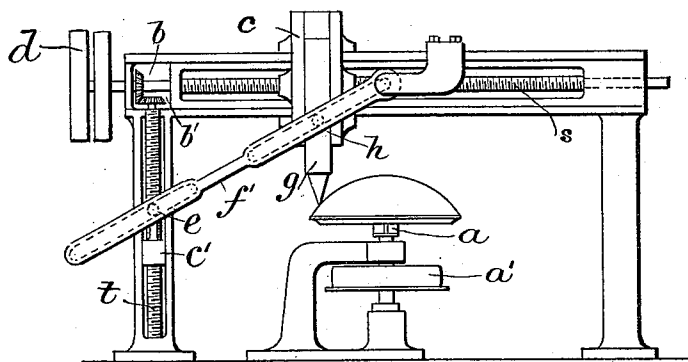


Fig. 2.



Witnesses:

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Fig. 3.

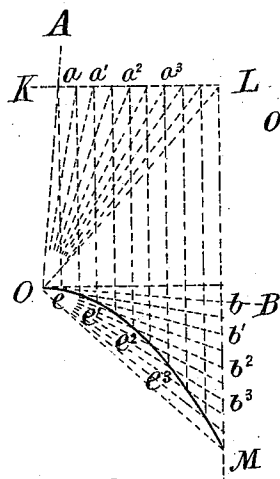


Fig. 4.

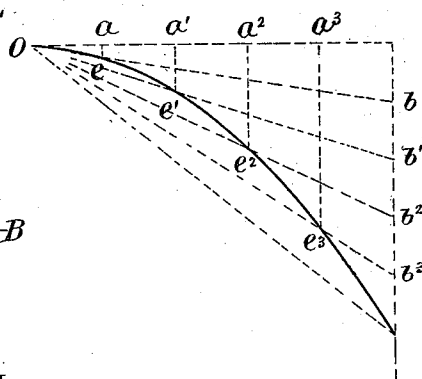


Fig. 5.

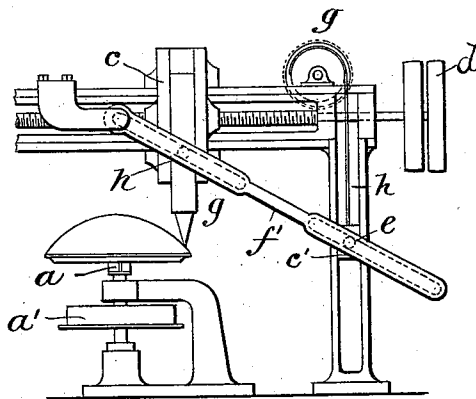
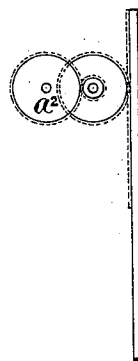


Fig. 6.



Witnesses

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UNITED STATES PATENT OFFICE.

FIDELIS NERZ, OF NUREMBERG, GERMANY, ASSIGNOR TO SCHUCKERT & CO., OF SAME PLACE.

MACHINE FOR GRINDING OR FORMING PARABOLIC SURFACES.

SPECIFICATION forming part of Letters Patent No. 547,153, dated October 1, 1895.

Application filed February 9, 1893. Serial No. 461,695. (No model.) Patented in Germany July 17, 1892, No. 71,840, and in England October 19, 1892, No. 18,734.

To all whom it may concern:

Be it known that I, FIDELIS NERZ, a subject of the German Emperor, residing at Nuremberg, Bavaria, Empire of Germany, have made a new and useful Improvement in Machines for Grinding and Polishing Curved Surfaces, of which the following is a specification, and for which Letters Patent have been obtained with my knowledge and consent in England October 19, 1892, No. 18,734, and in Germany July 17, 1892, No. 71,840.

My invention is directed particularly to improvements in apparatus for making or constructing true parabolic or other analogous curved surfaces.

In order that my invention may be fully understood, reference is had to the accompanying drawings, in which—

Figure 1 is a side elevational view of one form of my improved machine; and Figs. 2 and 5 are similar side elevational views of additional forms thereof, Fig. 6 being a side elevational view of a detail of the modified form shown in Fig. 5. Figs. 3 and 4 are diagrammatic views illustrating the principle upon which a parabolic surface is constructed in accordance with my invention.

In order to grind parabolic vessels, it is necessary to give to the grinding-tool that grinds over the revolving vessel a kinematic grinding, which produces the parabola shape.

The geometrical principle upon which the hereinafter-described machine is founded is as follows: Given a fixed right angle K L M, Fig. 3, and a movable right angle A O B—to wit, revolvable about O—if, now, we draw through the intersection-point *a* a parallel to L M until O B is intersected at *e* the geometrical place is for *e* a parabola.

The construction of the grinding-machine is shown in Fig. 1. The piece of work to be ground is carried by a vertical spindle *a* with a plate-like head and is rotated by the horizontal pulley *a'*.

Upon the frame of the machine is fixed a horizontal support *c*, which is driven by a belt-pulley *d* or the like. At the upper end of the support-slide is a pin *e*, which engages a slit of the angle-piece *f*. In the second arm of

the angle-piece a second slit is cut perpendicular to the first and determines by engaging the pin *h* the position of the slide *g*, vertically movable in the support-slide. Under these conditions it follows from the foregoing geometrical considerations that the pin *h*, as well as all other points of the slide *g*, describe parabolas which are parallel to each other.

A modification of the machine, as shown in Fig. 2, may be made. In case the parts *a* *a'* and *a*² *a*³ of Fig. 3 are equal then the parts *b* *b'* and *b*² *b*³ are always equal, or, to express it differently, the points *a* and points *b* traverse during the movement paths which always stand in a fixed relationship—i. e., the parabolas may be produced according to the scheme Fig. 4. To preserve this proportional relationship conical gearing *b* *b'* is provided at the end of the screw-shaft *s*, Fig. 2, so that the vertical screw-shaft *t* with the support *c* is also actuated. From the head-block *c'* the motion is further transmitted by the pin *e*, attached thereon to the slotted guide-rod *f*. The guide-rod, however, determines the place of the pin *e*, as well as the entire vertical slide *g* connected therewith, so that again all points of the slide describe parabolas. By the pitch of the two screw-shafts or the size of the conical gear-wheels the dimensions of the parabola are correspondingly determined. Obviously the gearing may be supplanted by equivalent elements. Thus in Fig. 6, for example, a rack and pinion gear *a*² is shown, wherein by a corresponding choice of pinions it is possible to flatten the parabola as desired. In Fig. 5, on the contrary, a worm-gear is provided, which rotates a roller *g*, upon which the band *h* winds or unwinds, and thus actuates the vertical support and, as before, adjusts the guide-rod properly. The size of the roller *g* determines again the form of the parabola in like manner as the corresponding elements did before. Furthermore, the band may be fastened directly to the horizontal head-block, the roller *g* then serving simply as a guide-roller.

It is obvious that the principle herein described of imparting motion to a cutting-tool in the line of curvature of a parabola may be

applied equally well for other curved surfaces, such as the circle, the ellipse, or the hyperbola, &c.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. In a machine for grinding and polishing curved surfaces, the combination of a holder for the surface to be operated upon, a carriage for the tool holder, gearing for causing the travel of the carriage in one direction, and additional gearing for simultaneously moving the tool in a different direction; substantially as described.

2. In a machine for grinding and polishing curved surfaces, the combination of a holder for the surface to be operated upon, a carriage for the tool holder, gearing for causing the travel of the carriage across the face of the surface to be operated upon, and additional gearing for simultaneously moving the tool in the direction of the curve of the surface; substantially as described.

3. In a machine for grinding and polishing curved surfaces, the combination of a rotating holder for the surface to be operated upon, a carriage for the tool holder, a screw-rod for causing the travel of the carriage in a direction transverse to the axis of rotation of the surface to be operated upon, and a second

screw rod for simultaneously moving the tool in the direction of the line of said axis; substantially as described.

4. In a machine for grinding and polishing curved surfaces, the combination of a rotating holder for the surface to be operated upon, a carriage for the tool holder, a screw-rod for causing the travel of the carriage in a direction transverse to the axis of rotation of the surface to be operated upon, a second screw-rod for simultaneously moving the tool in the direction of the line of said axis and gearing connecting said screw-rod together; substantially as described.

5. In a machine for grinding and polishing curved surfaces, the combination of a holder for the surface to be operated upon, means for rotating said holder, a carriage for the tool-holder, a screw-rod for causing the travel of the carriage in a direction transverse to the axis of rotation of the surface to be operated upon, and a second screw-rod for simultaneously moving the tool in the direction of the line of said axis, said screw-rods being of different pitch and being geared together; substantially as described.

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Witnesses:

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