

No. 611,323.

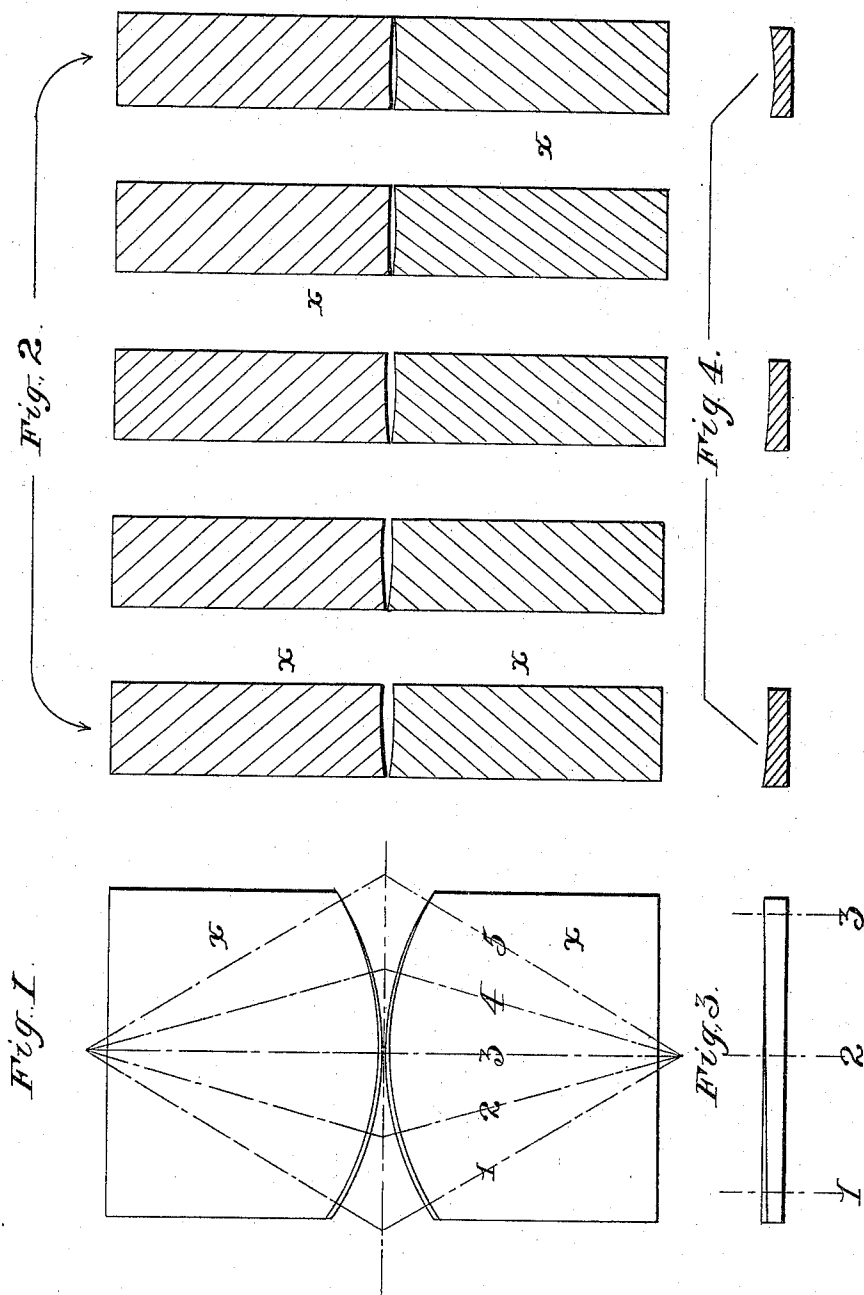
Patented Sept. 27, 1898.

A. JOHNSTON.
GRINDING MACHINE.

(Application filed Mar. 19, 1898.)

(No Model.)

4 Sheets—Sheet 1.



Witnesses.

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Amos Lewis.

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Fig. 5.

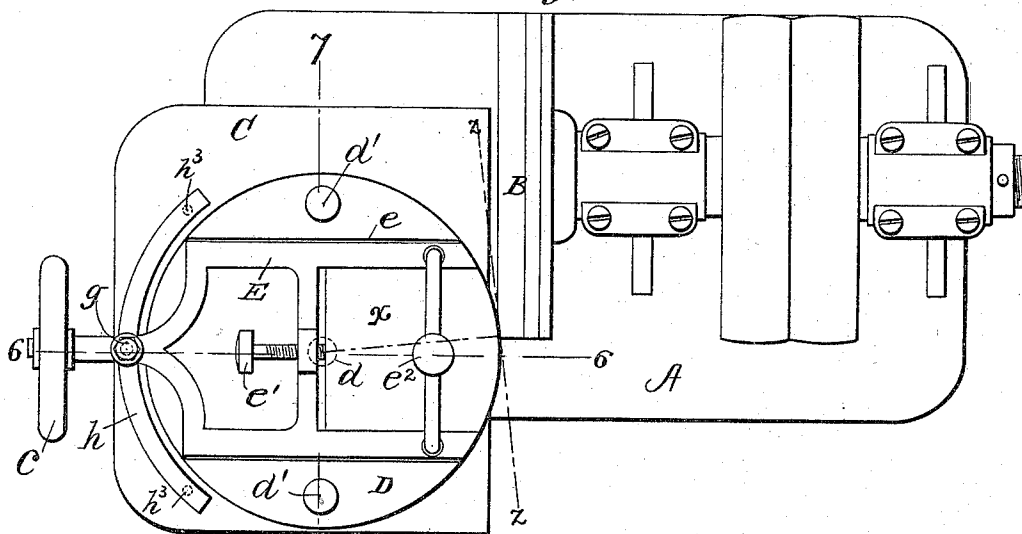
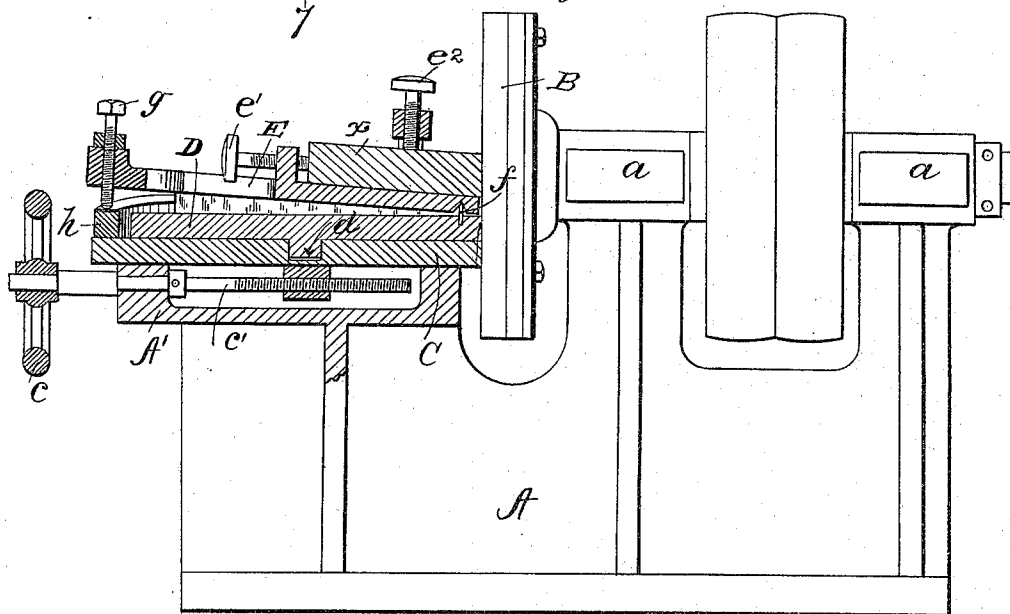


Fig. 6.



Witnesses
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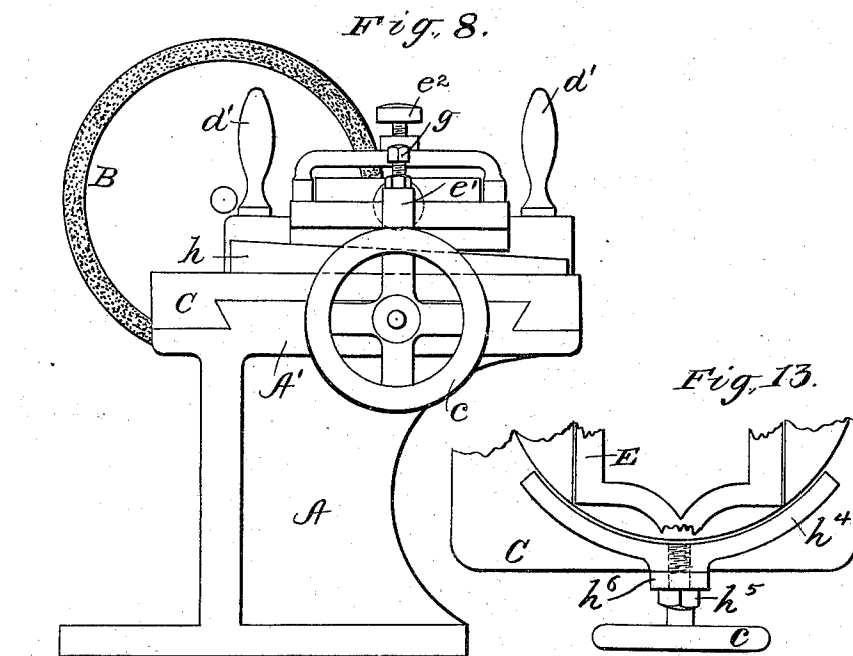
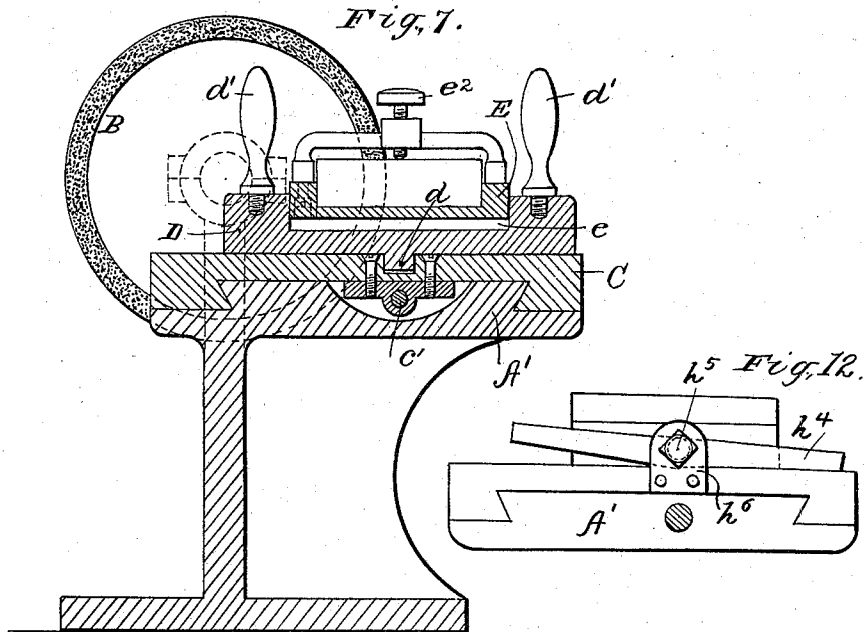
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4 Sheets—Sheet 3.



Witnesses.

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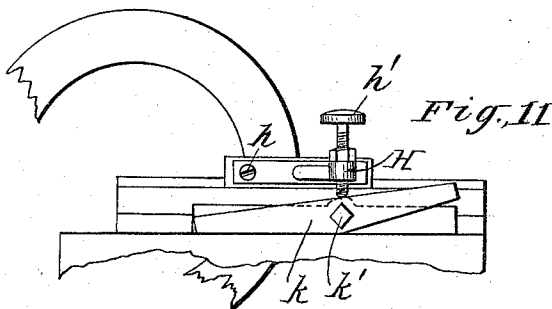
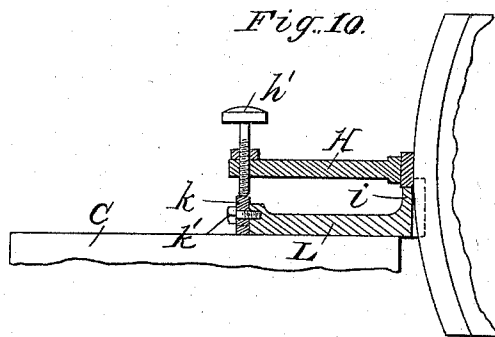
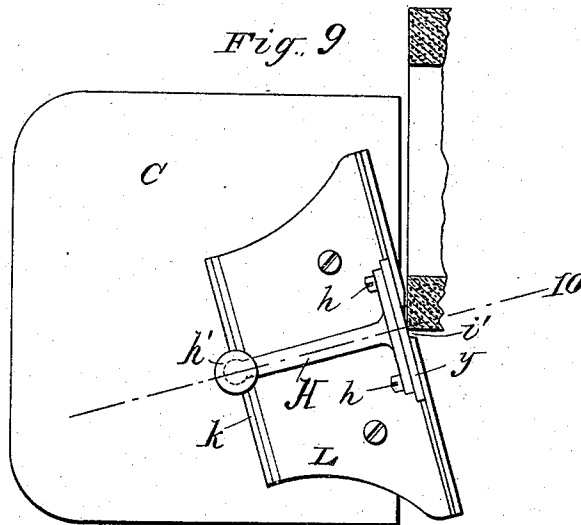
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(Application filed Mar. 19, 1898.)

(No Model.)

4 Sheets—Sheet 4.



Witnesses.

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UNITED STATES PATENT OFFICE.

ALLEN JOHNSTON, OF OTTUMWA, IOWA.

GRINDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 611,323, dated September 27, 1898.

Application filed March 19, 1898. Serial No. 674,511. (No model.)

To all whom it may concern:

Be it known that I, ALLEN JOHNSTON, of Ottumwa, Iowa, have invented a new and useful Improvement in Grinding-Machines, which improvement is fully set forth in the following specification.

The blades of table-knives as generally formed taper along the back edge from the thickest part at the handle to the point of the blade, while the cutting edge is of substantially uniform thickness from end to end. The blade also has a transverse taper from its thick back edge to its thinner cutting edge, which I will for convenience refer to as the "twist" of the surface, the amount of said transverse taper gradually decreasing from the handle end of the blade to the point thereof in accordance with the longitudinal taper of the back edge. The faces of the blade having these characteristics, while usually and preferably slightly convex in a transverse direction, may also be straight.

In rolling or otherwise forging knife-blank blades to impart thereto the form above referred to it is customary to employ dies the acting surfaces of which have been ground to the proper corresponding form. Heretofore these dies have been ground entirely by hand, so far as I am aware—that is to say, the workman holds the die in his hands and by proper movements thereof against the grinding-wheel endeavors to impart the desired shape to the acting surface. The proper manipulation of the work under such circumstances requires the greatest skill and experience, and even these qualifications in the workman fail to produce anything approximating satisfactory results.

The object of my present invention is to provide a machine for grinding the acting surfaces of dies such as above referred to, whether straight or curved, in the operation of which little, if any, dependence is placed upon the skill of the operator and whereby the desired results can be attained with mechanical precision, accuracy, and uniformity. Said machine is also adapted for grinding surfaces other than the acting surfaces of dies having the peculiarities above referred to—as, for example, the face of a plate against which one face of a knife-blade rests while the opposite face is being ground or polished.

(Shown at P in my Patent No. 534,394, dated February 19, 1895, or W in my Patent No. 557,825, dated April 7, 1896.) These plates, in order to prevent yielding, springing, or rocking of the blade with relation to the knife-holder, must closely conform to the shape of the blade.

With this object in view the principal novel features of my machine reside in the relative arrangement of the grinding-wheel and work-holder, according to whether the surface is to be ground straight, convex, or concave in a transverse direction, and in means for tilting the work-holder with relation to the grinding surface, or vice versa, whereby the desired twist is imparted to the surface ground. These features of my invention, as well as others of importance, will be fully understood by reference to the accompanying drawings, wherein—

Figure 1 is a view in elevation of two dies adapted for use in a rolling-machine for rolling knife-blades or similar articles, the acting surfaces of said dies being curved circumferentially. Fig. 2 represents five sectional views taken on the dotted radial lines 1, 2, 3, 4, and 5 of Fig. 1, respectively, beginning with the sectional view to the extreme left. Figs. 3 and 4 are views similar to Figs. 1 and 2 of a straight form of die or plate. Fig. 5 is a plan view of a machine embodying my invention. Fig. 6 is a side elevation, partly in section, the sections being taken on line 6, Fig. 5. Fig. 7 is a vertical sectional view on line 7, Fig. 5. Fig. 8 is an end elevation from the left of Fig. 5. Fig. 9 is a detail view of the grinding-wheel and slide, showing a work-holder mounted thereon suitable for use in grinding dies or plates such as shown in Figs. 3 and 4. Fig. 10 is a view partly in elevation and partly in section on line 10, Fig. 9. Fig. 11 is an elevation from the left of Fig. 9. Fig. 12 is a front elevation, and Fig. 13 a plan view, showing the arc-shaped track mounted to rock on a pivot.

Referring to the drawings, A represents the frame of the machine, having suitable bearings *a a* formed thereon for the shaft of ring-shaped grinding-wheel B.

A' is a table formed on frame A and having suitable ways thereon on which slide C is adapted to be moved in a direction parallel

with the axis of wheel B by hand-wheel *c* and screw *c'*, whereby the work-holder may be adjusted to compensate for wear on the face of the grinding-wheel.

5 D is a turn-table mounted to rotate on a pivot *d* on table A'. It may be moved by hand by means of handles *d'* *d''* or by any suitable well-known mechanism. (Not shown.) Work-holder E, of rectangular form, fits
10 closely in a transverse recess *e* (see Fig. 7) in the upper face of turn-table D, resting at its forward end on a fulcrum-point *f*, projecting upwardly from turn-table D, and at its rear end supported by adjusting-screw *g*, passing
15 therethrough and bearing against a curved inclined track *h* on table A'. Track *h* has pins *h*³ on its under side (see dotted lines, Fig. 5) engaging openings in the top of table A', whereby the track may be readily re-
20 moved and replaced by one of opposite or different inclination, according to the twist that it is desired to impart to the surface being ground. Instead of using two oppositely-in-
25 clined tracks *h* a single track *h*⁴ may be employed, as shown in Figs. 12 and 13, pivoted by a bolt *h*⁵ to an upwardly-extending ear *h*⁶ on table C and adapted to be tilted in one di-
30 rection or the other and locked by screwing bolt *h*⁵ up tightly. The work, such as die-block *x*, (shown in Figs. 1, 2, 5, 6, 7, and 8,) is held in place by clamping-screws *e'* *e*².

From the foregoing description it will be observed that the work-holder is so mounted that a line 6, Fig. 5, drawn through its axis
35 of rotation and at right angles to the plane of the flat face of the grinding-wheel intersects said plane at a point outside of the periphery of said wheel, so that the work-holder in rotating on its axis will feed the work across the
40 flat face of the curved peripheral edge of the grinding-wheel, whereby a concave surface is ground, the line of travel of the work and work-holder with reference to the flat grind-
45 ing-surface being approximately in the direction of line *z*, Fig. 5, forming an angle of less than ninety degrees with said surface. When it is desired to grind a convex surface, the work-holder may be correspondingly arranged
50 with reference to the inner edge of a ring-shaped grinding-wheel; also, by arranging the work-holder so that the line 6 intersects the flat surface of the wheel a transversely straight surface may be ground.

The rotation of the work-holder on its axis
55 causes adjusting-screw *g* to travel up or down the inclined track *h*, thereby tilting the work-holder from a practically horizontal position when the set-screw rests on the lowest point of the track to a position of maximum incli-
60 nation when said set-screw rests on the highest point of the track. This tilting of the work-holder imparts the twist to the surface ground.

In Figs. 9 to 11 I have illustrated my in-
65 vention as applied in grinding the surfaces of dies or plates such as illustrated in Figs. 3 and 4, in which case the rotary work-holder

of Figs. 5 to 8 is displaced by a work-holder H, to which the work *y* is secured by screws
70 *h*, or otherwise held. Said work-holder and the work carried thereby are adapted to be moved by hand along suitable tracks *i* *k*, the former formed on a plate L, which takes the place of turn-table D of the construction
75 shown in Figs. 5 to 8. Track *i* is cut away at *i'* to expose the work to the action of the grinding-wheel, and track *k* is pivoted at *k'*, so as to be inclined in one direction or the other, according to the end of the die or block *y* at
80 which the twist is to begin and whereby the same mechanism may be used for forming pairs of dies or plates. Adjusting-screw *h'*, passing through the extremity of work-holder H, runs on track *k*.

In the construction just described, as in the
85 construction of Figs. 5 to 8, the line of travel of the work in moving across the edge of the grinding-wheel is on a line forming an angle of less than ninety degrees with the plane of the flat surface of the grinding-wheel and
90 whereby in the arrangement shown the work is ground with a lateral concavity, while the travel of screw *h'* on track *k* tilts the work-holder to impart the desired twist to the surface ground.

As described in connection with the work-holder of Figs. 5 to 8, the work-holder H and plate L may also be arranged in such manner that a transversely straight or convex surface may be ground.

While I have herein referred particularly to the grinding as being effected by the flat face of a ring or cup shaped grinding-wheel, my invention also embraces, as will be obvi-
105 ous, the employment for this purpose, where suitable, of the peripheral surfaces of such wheels or the flat or peripheral surface of an ordinary disk-shaped wheel.

Modifications of the precise constructions herein shown and described may be made
110 within wide limits without departing from my invention.

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

1. In a grinding-machine, the combination with the grinding-wheel, of a movable work-holder, means for guiding said work-holder so that its line of travel in presenting the work to the action of the edge of the flat face
120 of the grinding-wheel will form an angle of less than ninety degrees with said flat face, whereby the lateral curvature is imparted to the surface ground, and means—such as an inclined track—for tilting the work-holder
125 during its feed movement, whereby the desired twist may be imparted to the surface ground, substantially as described.

2. In a grinding-machine, the combination with the grinding-wheel and a movable work-
130 holder arranged approximately at right angles to the flat-face surface of the grinding-wheel, means for guiding the work-holder during its feed movement, and means for

tilting the work-holder to impart the desired twist to the surface ground, substantially as described.

3. In a machine for grinding dies for the manufacture of table-knife blades, means for guiding the die across the grinding-surface of a suitable grinding-wheel and for imparting such movement to the die as to form a twisted surface thereon, substantially as described.

4. In a machine for grinding dies for shaping table-knife blades, means for guiding the die across the grinding-wheel and for imparting such movement to the die as will produce a concave and twisted surface thereon, substantially as described.

5. In a grinding-machine, the combination with the grinding-wheel, of a work-holder mounted to tilt on a suitable support at one end, and means—such as an inclined track—for raising or lowering the other end of the work-holder to tilt the same at a varying angle with reference to the grinding-wheel during the feed movement of the work-holder, substantially as described.

6. In a grinding-machine, the combination with the grinding-wheel, of a work-holder mounted to tilt on a suitable support at one end thereof adjacent to the grinding-wheel, and an inclined track on which the work-holder runs at its other end, and means whereby the work-holder may be moved to feed the work to the grinding-wheel, substantially as described.

7. In a grinding-machine, the combination with the grinding-wheel, of a work-holder mounted to rotate on a suitable axis and to tilt on a suitable support at one end thereof, of means—such as an inclined track—for raising or lowering the other end of the work-

holder on rotation thereof, substantially as described.

8. In a grinding-machine, the combination with the grinding-wheel, of a work-holder mounted to rotate on an axis so located with reference to the flat grinding-face of the wheel that a line drawn through said axis and parallel to the axis of rotation of the grinding-wheel intersects the plane of the flat face of the grinding-wheel at a point outside of the periphery of said wheel, and means for tilting the work-holder during its rotary feed movement, substantially as described.

9. In a grinding-machine, the combination with a ring-shaped grinding-wheel, of a work-holder mounted to rotate on an axis so located with reference to the flat grinding-face of the wheel that a line drawn through the axis of rotation of the work-holder and parallel to the axis of rotation of the wheel intersects the plane of the flat grinding-surface of the latter at a point outside of said surface, and means for tilting the work-holder during its rotary feed movement, substantially as described.

10. In a grinding-machine, the combination with the grinding-wheel, of a movable work-holder mounted to tilt on a suitable support at one end thereof, and a pivoted track on which the holder moves at its other end adapted by movement on its pivot to be inclined in opposite directions, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

ALLEN JOHNSTON.

Witnesses:

REEVE LEWIS,
E. T. CAMERON.