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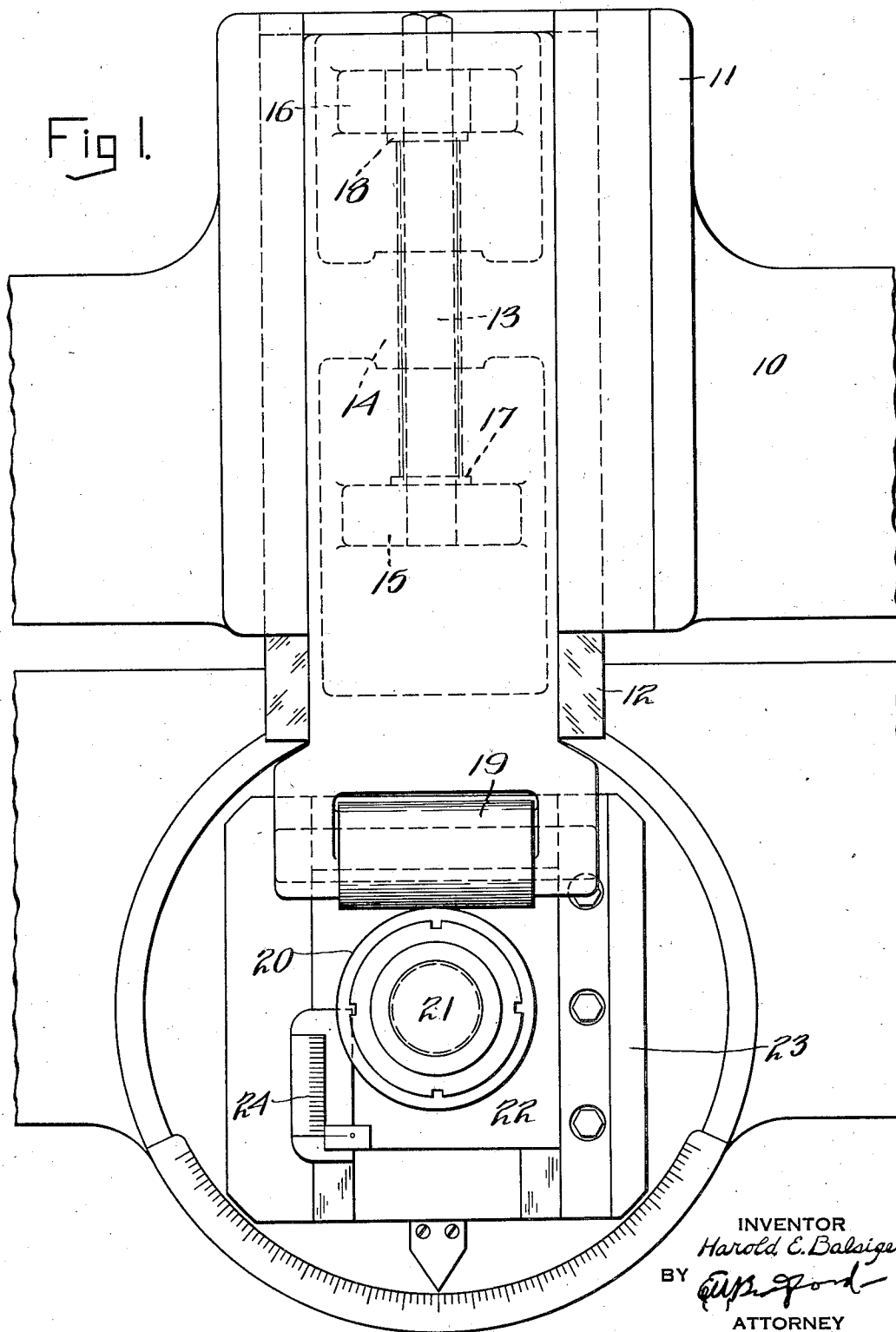
H. E. BALSIGER

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CROWNING AND CONCAVING DEVICE FOR ROLL GRINDING MACHINES

Filed March 31, 1932

4 Sheets-Sheet 1



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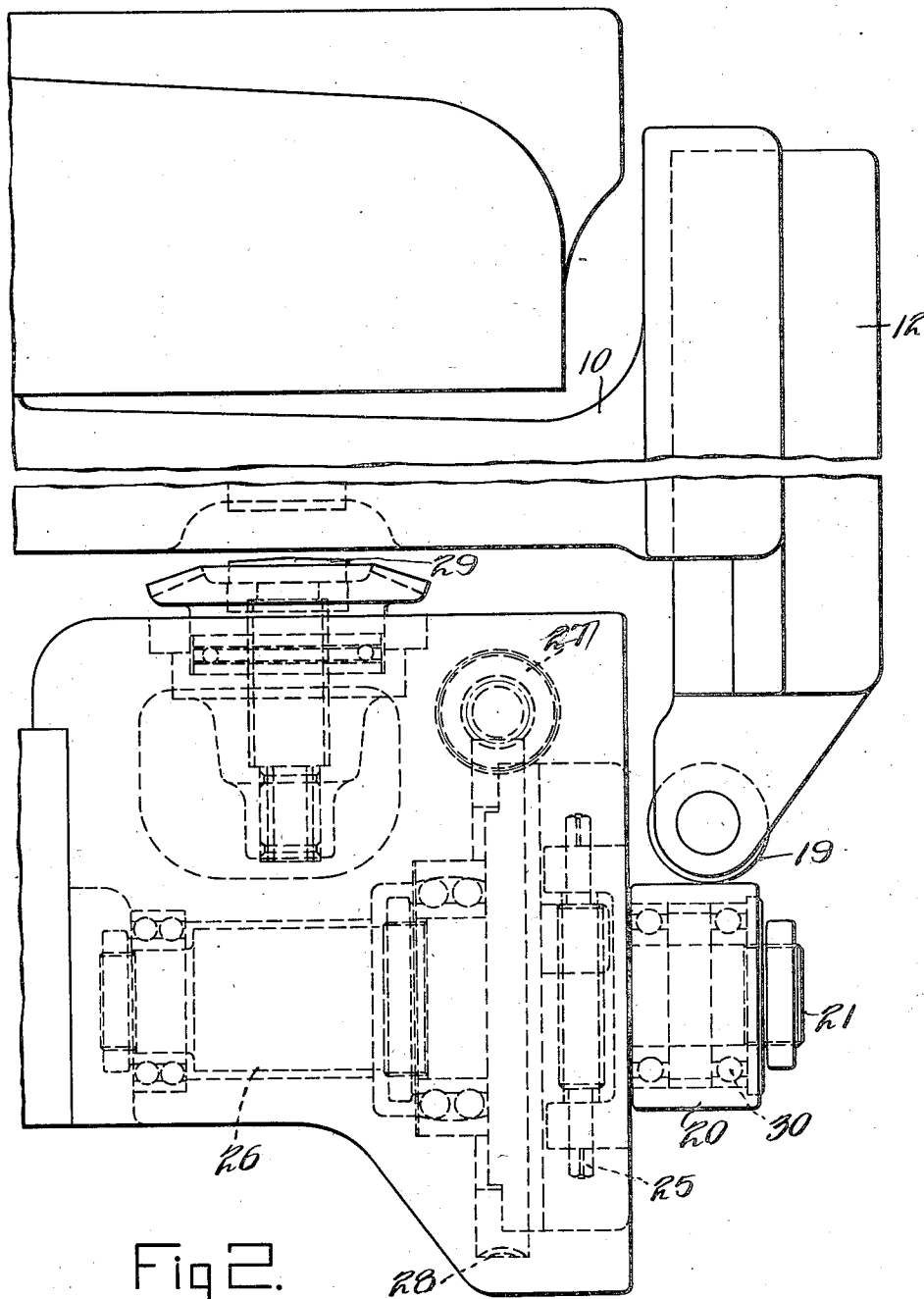
H. E. BALSIGER

2,025,010

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INVENTOR
Harold E. Balsiger.
BY *[Signature]*
ATTORNEY

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H. E. BALSIGER

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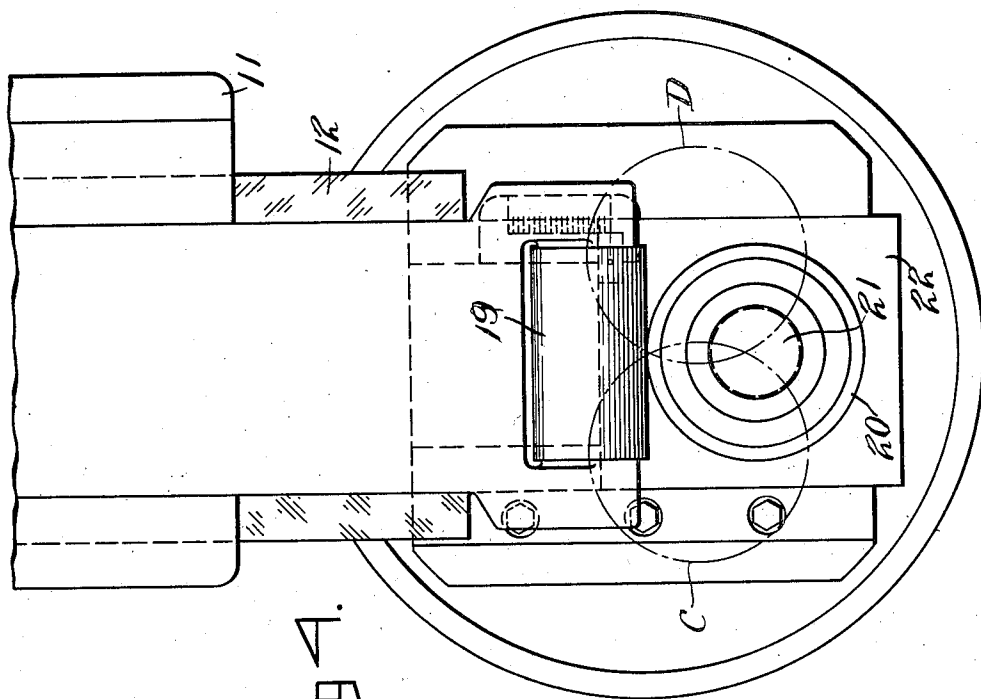


Fig. 4.

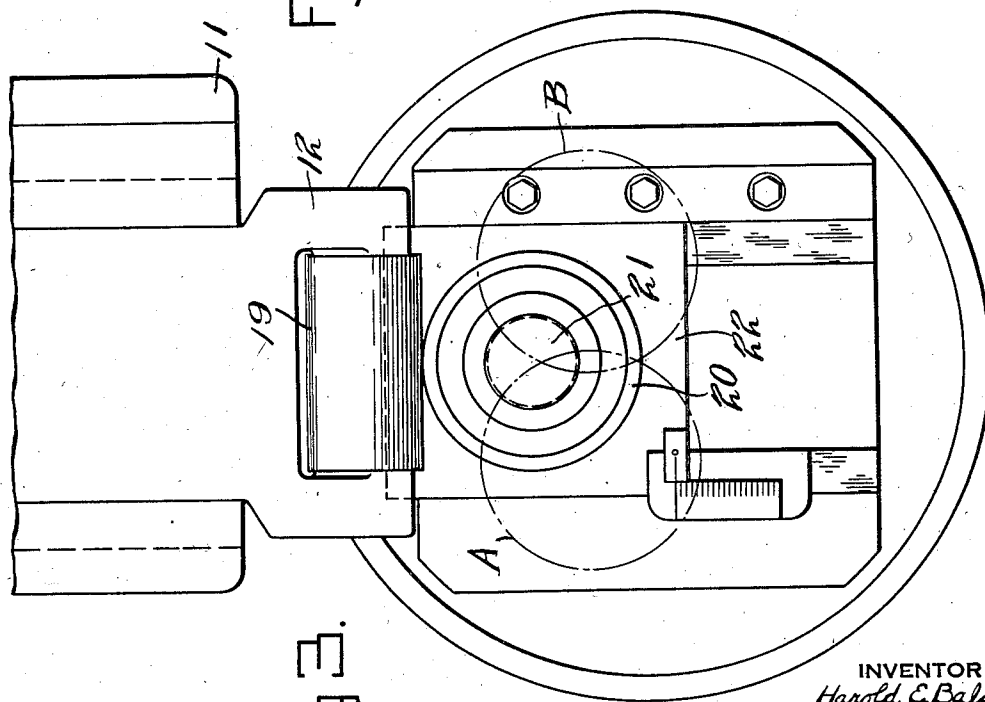


Fig. 3.

INVENTOR
Harold E. Balsiger.
BY *[Signature]*
ATTORNEY

Dec. 17, 1935.

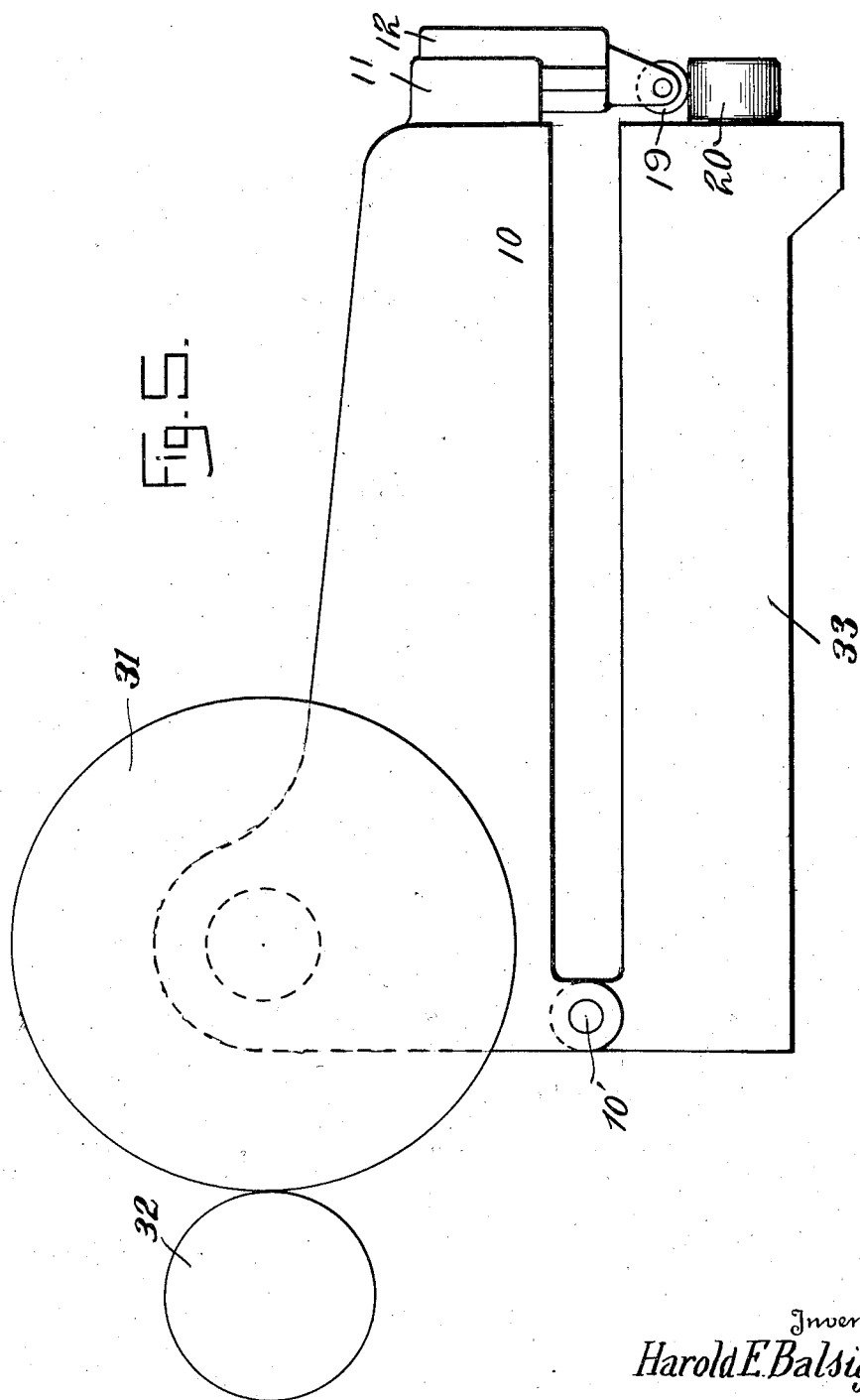
H. E. BALSIGER

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CROWNING AND CONCAVING DEVICE FOR ROLL GRINDING MACHINES

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4 Sheets-Sheet 4



Inventor
Harold E. Balsiger

By

E. M. Bedford

Attorney

UNITED STATES PATENT OFFICE

2,025,010

CROWNING AND CONCAVING DEVICE FOR
ROLL GRINDING MACHINESHarold E. Balsiger, Waynesboro, Pa., assignor to
Landis Tool Company, Waynesboro, Pa., a corporation of Pennsylvania

Application March 31, 1932, Serial No. 602,298

8 Claims. (Cl. 51-49)

This invention relates to devices for grinding concaved and crowned surfaces on mill rolls and its object is to provide in a grinding machine, a means for accurately tilting the grinding wheel support relative to its supporting base through each increment of movement imparted thereto so as to produce a concavity or crown on the mill roll which has the same curvature at opposite sides of the center of the roll but in reverse relation to each other.

A further general object is to provide a mechanism of the kind described having a minimum number of working parts and provide further means for eliminating friction between moving parts.

The invention is a variation of and an improvement over that shown in patent to Harper A. Good, No. 1,904,827, granted April 18, 1933.

Referring to the accompanying drawings, which are made a part hereof and on which similar reference characters indicate similar parts,

Figure 1 is a rear view in elevation of the tilting mechanism,

Figure 2, an end elevation of the same,

Figures 3 and 4 are details showing the range of movement of the tilting mechanism for concaving and for crowning respectively.

Figure 5 is a view in elevation somewhat diagrammatically showing a wheel base and wheel support showing my invention applied thereto.

Since the invention in the present application relates specifically to the means for tilting the wheel base in a roll grinding machine only so much of the structure will be shown as is necessary to understand this particular apparatus.

In the drawings a grinding wheel is indicated at 31 and the work operated upon is indicated at 32. The grinding wheel is mounted for rotation on the grinding wheel support 10, which is pivoted at 10' to the usual traversing base or carriage 33. The grinding wheel support 10 is provided with a bracket 11 which is preferably formed integral therewith and in this bracket is mounted a movable slide 12. This slide is adjustable vertically and held in adjusted position by means of a screw 13 threaded through a lug 14 on the slide 12 and held between lugs 15 and 16 on the wheel support 10. Hardened washers 17 and 18 may be held between the shoulders on the screw and the lugs 15 and 16 respectively. The purpose of the adjusting screw just described is to keep the wheel support in central position or horizontal regardless of the position of the operating crank pin later to be described. The slide 12, as illustrated in the accompanying

drawings, carries at its lower end a roller 19, the axis of which is parallel with the axis 10 of the wheel supporting carriage. This roller 19 makes engagement with an eccentric lifting mechanism comprising a ball bearing element 20 carried by a crank pin 21 which is in turn carried by a block 22. The block 22 is carried by a wheel 23 and is adjustable eccentrically of the wheel by a screw 25. By a turning of the screw the eccentricity of the pin 21 may be varied and thus the depth of the concavity or height of the crown of the mill roll varied. The extent of the eccentricity is indicated by a graduated scale 24. The shaft 26 carrying the wheel 23 at its outer end is driven in any suitable way, as by means of a worm 27 and worm wheel 28, all of which is shown more in detail in the patent to Good, above referred to.

The axis of rotation of the eccentric is at right angles to a vertical plane containing the pivotal axis of the wheel support. The follower roll 19 is mounted directly above said lifting element and makes direct contact therewith so that at the vertical limit of movement of the element 20 in both directions, the point of contact between the element and follower 19 lies in a line through the center of the shaft 26. Due to this arrangement, the wheel support 10 is lifted exactly the same distance when the element 20 is oscillated through equal angles of movement on opposite sides of the point of maximum lift.

While a roller is shown as carried by the slide 12 and contacting with the lifting element, it will be understood that the follower may be otherwise constructed. It is essential, however, that the surface of the follower and the surface of the eccentric shall be shaped relative to each other so as to provide a point contact between the two.

It is the arrangement of the eccentric lifting element, so that its axis of oscillation is perpendicular to the axis about which the wheel support is tilted and the shaping of the follower and lifting element so as to provide a point contact only therebetween, together with the disposition of the follower relative to the lifting element so that the point of contact at maximum point of lift is directly over the axis of oscillation of said lifting element that brings about an accurate tilting movement of the grinding wheel support which results in the production of a concavity or crown on the mill roll which has the same curvature on the opposite sides of the center of the roll but, of course, in reverse relation to each other.

A jack 29 is provided for lifting the wheel sup-

port to remove its weight from the crank pin in the manner shown and described in full in the Good patent above referred to.

Figures 3 and 4 show the positions of the crank pin for concaving and for crowning respectively. In Figure 3 the dotted circles A and B indicate the range of movement of the pin during concaving of a roll and dotted circles C and D the range of movement of the pin during the crowning of a roll. By reason of the roller 19 friction is lessened between the ball bearing element 20 and the vertically movable block 12 on the wheel support. The ball bearing elements 30 eliminate friction due to rotation of the element 20 but this would not eliminate any friction laterally on the surface of the bearing element 20 due to the tilting of the wheel support. The rolling contact provided by roller 19 eliminates this lateral friction and hence provides for a more nearly frictionless machine throughout.

It will be obvious to those skilled in the art that various changes may be made in my device without departing from the spirit of the invention and therefore I do not limit myself to what is shown in the drawings and described in the specification, but only as indicated by the appended claims.

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

1. In a roll grinding machine having a wheel base support, means for tilting said support, comprising an oscillating roller, a vertically adjustable slide mounted on said support, an elongated roller rotatably mounted in said vertical slide and adapted to engage said oscillating roller, said elongated roller having its axis substantially at right angles to the plane of movement of said support, the axes of said rollers being substantially perpendicular to each other, substantially as set forth.

2. In a roll grinding machine, a pivotally mounted wheel support, means for tilting said support, comprising an elongated roller rotatably and adjustably mounted on said support, the axis of said roller being substantially parallel with the axis about which the support is tilted, an eccentrically mounted oscillating roller adapted to engage said first mentioned roller with the axes of the roller substantially perpendicular to each other, substantially as set forth.

3. In a machine of the kind described for generating a crown or concave surface on a roll, a support having a tool for operating upon the roll mounted thereon, means for moving the tool toward and from the roll comprising a block adjustably mounted in the tool support, said block having a roller mounted thereon, an oscillating shaft having an eccentric mounted thereon, said eccentric having its periphery directly engageable with the said roller, the axis of oscillation of said shaft being parallel with the direction of movement of the tool toward and from the work, and the axis of said roller being substantially at right angles to the axis of said eccentric, substantially as set forth.

4. In a machine of the kind described a wheel support, a wheel spindle mounted in said support, a work support, means for moving the wheel sup-

port toward and from the work support comprising a roller rotatably mounted on said wheel support with its axis substantially parallel to the axis of the wheel spindle, an eccentric lifting mechanism having its periphery in engagement with said roller, the axis of rotation of said eccentric being perpendicular to the axis of rotation of the wheel spindle.

5. In a machine of the kind described, a pivotally mounted wheel support, a work support, means to pivot said wheel support toward and from the work piece comprising a roller rotatably mounted on the wheel support with its axis substantially parallel to the pivotal axis of the wheel support, an eccentric lifting mechanism having its periphery in engagement with said roller, the axis of rotation of said eccentric lying in a plane which is perpendicular to the axis of the pivot of the wheel support.

6. In a grinding machine, a base, a wheel support pivotally mounted on said base, means for tilting said support comprising an eccentric lifting element, means for oscillating said eccentric lifting element about an axis included in a plane at right angles to the axis of the wheel support, a roller follower on said wheel support with its axis parallel to the axis of the wheel support, said roller follower being disposed substantially directly above the center of oscillation of said lifting element whereby the point of contact between said lifting element and said roller at the maximum point of lift of the lifting element is directly over the center of oscillation.

7. In a grinding machine, a base, a wheel support pivotally mounted on said base, a grinding wheel mounted thereon, means for tilting said support toward and from a work piece during the grinding thereof comprising an eccentric lifting element having a curved periphery, means for oscillating said lifting element about an axis at right angles to the axis of the wheel support, a follower element on said wheel support contacting with said lifting element, one of said elements having the contacting surface thereof curved in a direction at right angles to the curved periphery of said eccentric, whereby said follower will have a point contact only with the said lifting element, said follower being disposed relative to said lifting element so that the point of contact at the maximum point of lift is directly over the axis of oscillation of said lifting element.

8. In a grinding machine, a base, a wheel support pivotally mounted on said base, a grinding wheel mounted thereon, means for tilting said support toward and from a work piece during grinding thereof, comprising an eccentric lifting element, means for oscillating said lifting element about an axis at right angles to the axis of the wheel support, a follower on said wheel support contacting with said lifting element, the contacting surface of said follower being curved about an axis at right angles to the axis of said eccentric lifting element whereby said follower will have point contact only with said lifting element, said follower being disposed relative to said lifting element so that the point of contact at maximum point of lift is directly over the axis of oscillation of said lifting element.

HAROLD E. BALSIGER.