P. P. FENAUX.

GRINDING MACHINE.

APPLICATION FILED JULY 3, 1916.

1,286,977.

Patented Dec. 10, 1918.

2 SHEETS—SHEET 1.

Fig. 1

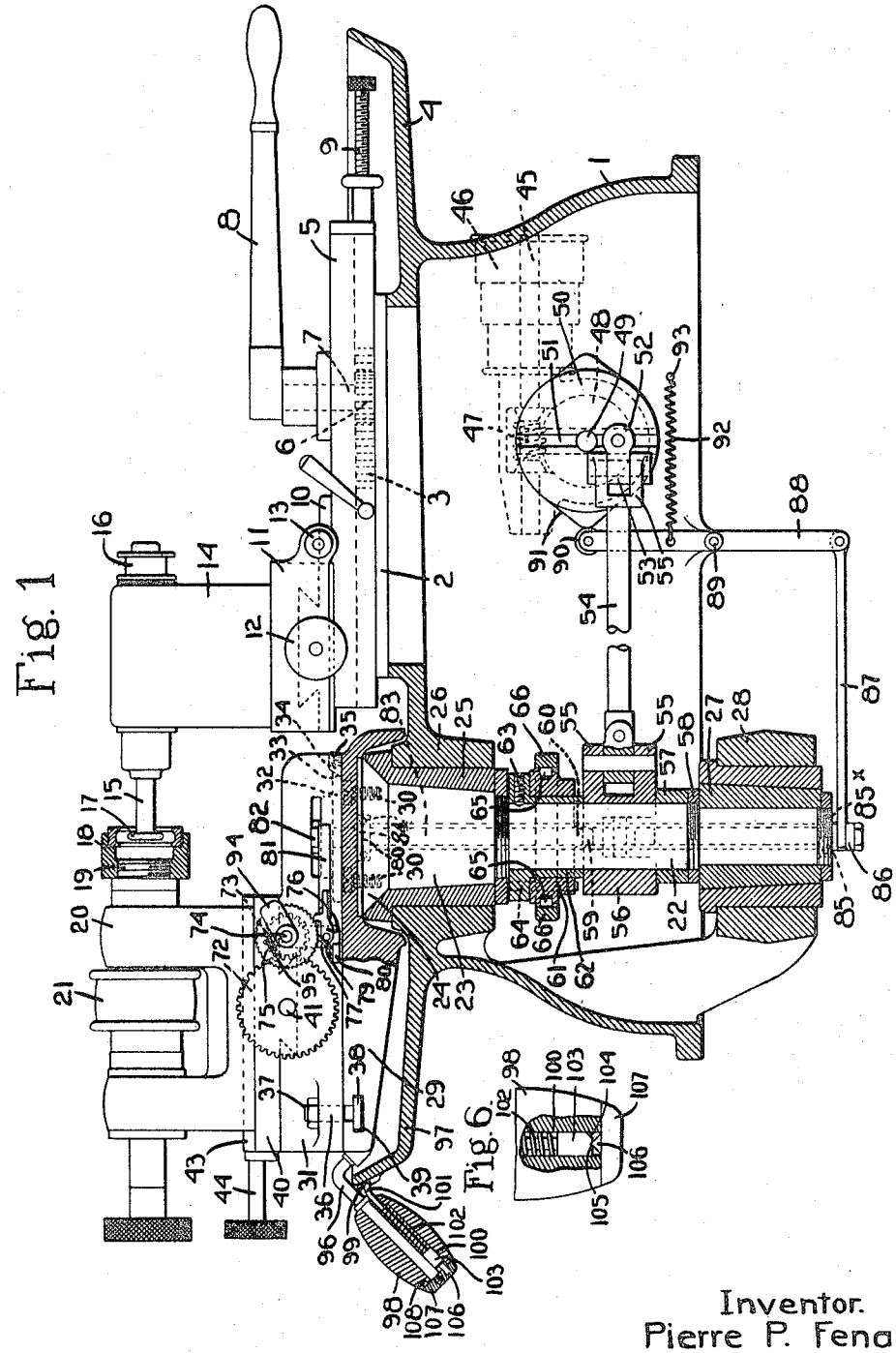


Fig. 6.

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2 SHEETS—SHEET 2.

Fig. 2.

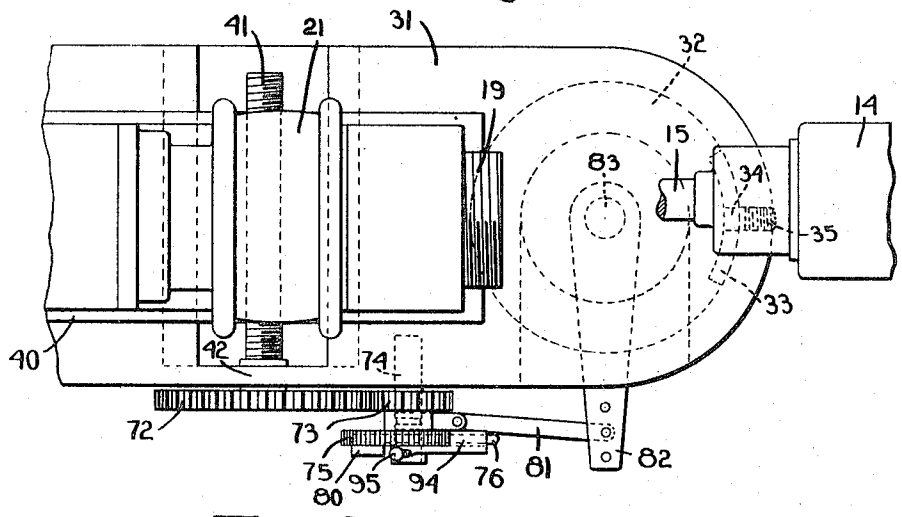


Fig. 3.

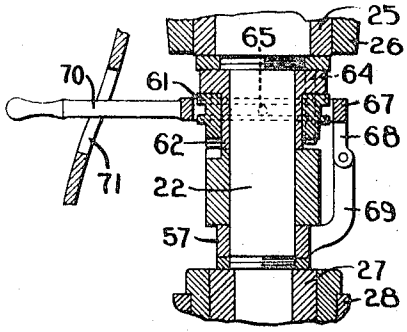


Fig. 4.

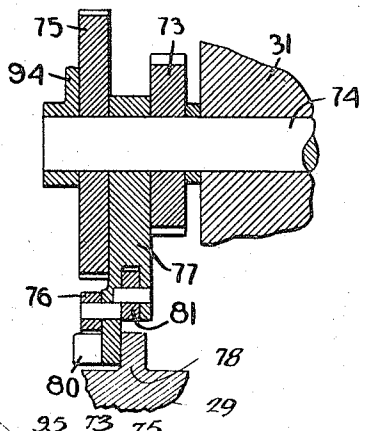
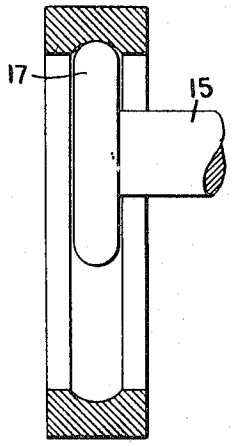


Fig. 5.



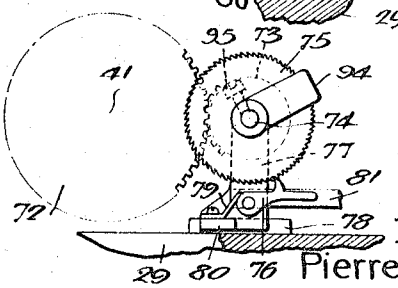


Fig. 7.

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UNITED STATES PATENT OFFICE.

PIERRE P. FENAUX, OF NEWTONVILLE, MASSACHUSETTS, ASSIGNOR TO RIVETT LATHE & GRINDER COMPANY, OF BRIGHTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

GRINDING-MACHINE.

1,286,977. Specification of Letters Patent. Patented Dec. 10, 1918.

Application filed July 3, 1916. Serial No. 107,254.

To all whom it may concern:

Be it known that I, PIERRE P. FENAUX, a citizen of France, and resident of Newtonville, county of Middlesex, State of Massachusetts, have invented an Improvement in Grinding-Machines, of which the following description, in connection with the accompanying drawing, is a specification, like characters on the drawing representing like parts.

This invention relates to improvements in grinding machines adapted to grinding raceways for ball bearings and the like and the principal object thereof is to provide a grinding machine having means for automatically causing a relative movement between the work and the grinder, which will produce a raceway groove having at all times an arc of constant radius, whereby a more accurate and uniform raceway for the ball bearings will be produced.

Another object of the invention is to provide a machine of the above character with means for feeding the oscillating member, preferably the work support, with an automatic feeding mechanism to advance the same toward the coöperating stationary member which in such case is the radial grinder.

A further feature of the invention consists in providing a single instrumentality for actuating the oscillating member and the feeding mechanism whereby the correct timing movements of these parts is at all times preserved.

Other objects of the invention and the nature thereof will more fully appear from the following description and the accompanying drawings and will be pointed out in the annexed claims.

In the drawings:

Figure 1 is a partial side elevation and a partial longitudinal section view of a grinding machine embodying a preferred form of my invention.

Fig. 2 is a detail plan view of a portion of the machine illustrating the feeding mechanism for the oscillating grinding member.

Fig. 3 is a detail view partially in section of the clutch mechanism for controlling the oscillating work support.

Fig. 4 is an enlarged sectional view of a portion of the feeding mechanism.

Fig. 5 is a sectional view of a raceway showing its position relatively to the grinding wheel with the groove formed therein by grinding with a constant radius of curvature, and,

Fig. 6 is a detail view of the end portion of a preferred form of handle for manipulating the work supporting table.

Fig. 7 is an enlarged detail view of a portion of the mechanism for actuating the cross feed for the rotary work supporting member.

The grinding machine illustrated in the accompanying drawings has the usual cast iron frame 1 which is adapted to be mounted upon a suitable base, not shown.

The top of the frame 1 has a guideway 2 and an upwardly projecting, longitudinally extending, toothed rib forming a rack 3. The frame preferably also is provided with a laterally extending apron 4, adapted to catch water drippings. The usual longitudinally movable slide 5 is mounted upon the ways 2 and is actuated by a pinion 6 screwed to a shaft 7 journaled in said slide and meshing with the rack 3, the shaft and pinion being rotated by a hand lever 8.

The slide 5 is provided with the usual screw 9 adapted to coöperate with a stop on the frame to limit the forward movement of the slide.

The slide 5 has in its inner end an extension 10 upon which is mounted a cross slide 11 manually adjusted by the usual adjusting or feeding screw 12 and with a stop 13 to limit the movement thereof. A head 14 is mounted upon, or integral with the slide 11 and carries a rotatable spindle 15 adapted to support one of the grinding members. The spindle 15 may be rotated in any convenient manner, as by a pulley 16 driven by a suitable belt.

The spindle 15 as shown herein carries a grinding wheel 17 but may be utilized to support the work in case the grinding wheel is carried by the coöperating grinding spindle, as will more fully appear hereinafter.

The coöperating grinding member as illustrated herein comprises a work support or chuck 18 mounted upon the end of a spindle

19 which is journaled in a head 20 and is rotated by a pulley 21, or other suitable driving means. The head 20 is mounted upon a support which is adapted to be oscillated about a fixed axis disposed in angular relation to the axis of the spindle 15, the axis of the work support preferably being at right angles to the axis of the spindle 15.

As illustrated in the accompanying drawings, the oscillating head 20 is carried by a vertical shaft 22 which has at its upper end a conoidal portion 23 having an enlarged head 24 of greater conicity mounted in a bushing 25 which is situated in a boss 26 in the top of the frame 1. At its lower end the shaft 22 is of smaller diameter and is seated in a bushing 27 carried by an inwardly extending boss or bracket 28. The lower end of the shaft 22 may be supported upon ball bearings (not shown) of any suitable type, if found desirable.

A table 29 is rigidly secured by screws 30 to the enlarged end portion 24 of the shaft 22. A plate 31 desirably is mounted upon the table 29 in such a manner as to be pivotally adjustable about the axis of the shaft 22 to enable the field of oscillation to be adjusted.

In the preferred construction illustrated herein the table 29 has an upwardly extending circular boss 32 adapted to fit a corresponding recess in the under face of the plate 31 providing a pivot for said plate. This boss 32 desirably may be provided with an under-cut portion 33 of sufficient extent to provide for the angular adjustment of the plate 33, said under-cut portion forming part of a locking means for retaining the plate in place and more particularly for clamping the plate 31 firmly down upon the top of the table 29. This is accomplished by providing a wedge shaped locking member 34 seated in a suitable aperture in the inner end of the plate 31 and having a set screw 35 adapted to thrust said locking member firmly against the beveled under-cut portion 33 of the plate. At its opposite end the plate is provided with one, or preferably two, laterally extending bosses 36 carrying bolts 37 the heads 38 of which extend into an arcuate recess 39 in the table 29. By the construction thus described it will be apparent that the plate 31 may be adjusted about the axis of the shaft 22 to any degree of desired angularity with respect to the rotating member 17.

The principal feature of the present invention consists of mounting one grinding member upon the oscillating table in such a manner that it is adapted to be fed transversely in relation to the coöperating grinding member. In the preferred embodiment of the invention illustrated herein the head 20 is carried upon a cross-slide 40 which is mounted upon the plate 31, the cross-slide being adapted to be fed transversely of the plate 31 by a feed screw 41 rotatably mounted in the bearing 42 in the plate 31 and engaging a suitable nut upon the cross slide 40. The upper face of the cross slide 40 preferably is provided with a guideway 43 upon which the head 20 is adjustably mounted, a suitable adjusting screw 44 serving to move the head 20 axially toward and from the grinding member 17. The cross feeding screw 41 may be rotated by any suitable mechanism but preferably is actuated by a mechanism, which will hereinafter be described, which is adapted to transmit a feeding movement to the screw from the same instrumentality which serves to oscillate the oscillating grinding member.

The driving mechanism for actuating the oscillating grinding member and the cross feeding mechanism therefor comprises the usual main shaft 45 having cone pulleys 46 adapted to be driven by a belt from any suitable source of power, said shaft 45 having a worm 47 adapted to engage a worm gear 48 mounted upon a counter shaft 49 journaled in suitable bosses in the frame 1. The shaft 49 is provided at its end with a crank disk 50 having a radial slot 51 in which a slide 52 carrying the crank pin is adjustably mounted. An arm 53 preferably is mounted upon the crank pin and one end of a connecting rod 54 having a bifurcated end 55 is pivotally secured to the arm 53 by a suitable bolt or pin. The opposite end of the connecting rod 54 is pivotally connected to the ears 55 upon a collar 56 which is rotatably mounted upon the shaft 22. The collar 56 may be conveniently supported by a sleeve 57 resting upon a nut 58 screwed upon the shaft above the bushing 27.

Any suitable clutching mechanism may be provided for connecting the shaft 22 to the collar 56, which is oscillated in the usual manner from the crank disk 50. A preferred mechanism is illustrated herein wherein the clutch mechanism is carried by movable members instead of the frame of the machine as is customary in machines of this character.

The oscillating collar 56 is provided with a recess 59 adapted to be engaged by lugs 60 projecting downwardly from a collar 61 which is slidably mounted upon a sleeve 62 which preferably is rigidly secured to the shaft 22 by a set screw 63. The collar 61 is prevented from rotation relative to the sleeve 62 by a pin 64 seated in the sleeve 62 and extending downwardly in parallelism with the axis of the shaft into an aperture in the collar 61. The collar or clutch member 60 is provided with an annular groove to receive studs 65 projecting inwardly from the arms 66 of a yoke 67 having a downward extension 68 pivotally mounted upon the upper end of an arm 69 extending upwardly

from the sleeve 57. The yoke 67 has at its opposite end a handle 70 extending through a slot 71 in the frame in convenient reach of the operator.

In the operation of the machine a depression of the handle 70 will throw the lugs 60 of the clutch into engagement with the recess 59 of the oscillating sleeve 56 thereby rigidly connecting the shaft 22 with said oscillating sleeve and causing oscillation of the oscillating grinding member which, as shown herein, is the work support. By moving the slide 52 toward or from the center of the crank disk 51 the amplitude of oscillation of the shaft 22 and the grinding member supported thereby may be accurately regulated.

The field of oscillation of the rotating grinding member may be regulated by the adjustment of the plate 31 about the axis of the shaft 22 in the manner above described.

The principal feature of the present invention consists in providing a cross-feeding mechanism for the oscillating grinding member and the main object thereof is to produce a mechanism in which the groove of a bearing will be ground with a constant radius of curvature at all times.

In usual raceway grinding machines the radius of curvature of the groove or raceway is varied as the grinding operation progresses. Such grinding machines are adjusted so that the final curvature is the one which is desired, but it will readily be apparent that if an inaccurate adjustment of the stop is made the raceway will be ground with a radius of curvature differing from the desired radius of curvature whether the grinding is arrested before the proper position is reached or proceeds beyond the desired point. Inasmuch as the greatest accuracy is necessary in ball raceway grinding any failure of the proper adjustment will produce a raceway which is defective. The present invention is designed to overcome such defects by causing the raceways to be ground at all times with a constant radius of curvature. This necessitates a special mechanism for feeding the oscillating grinding head relatively to the stationary grinding head and so far as I am aware the present invention is the first embodiment of an automatically operating machine to produce this result.

In accomplishing this desired purpose a further improvement consists in providing a single instrumentality for actuating both the oscillating head and the feeding mechanism therefor in order to preserve accurately at all times the timing relation between these mechanisms. In the preferred embodiment of my invention illustrated herein the cross-slide for the oscillating head 20 is actuated through the screw 41 which is provided at its end with a gear 72 which meshes with a gear 73 upon a stub shaft 74 projecting from the plate 31, the shaft 74 being provided with a ratchet wheel 75 which is actuated by a suitable reciprocating pawl 76. The pawl 76 may conveniently be mounted upon an arm 77 which in turn is pivotally supported upon the shaft 74 between the ratchet 75 and the gear 73. A guide 78 secured to or integral with the top of the plate 31 may be provided for the end of the arm 77. The pawl 76 is retained in engagement with the teeth of the ratchet 75 by a spring 79 secured to an extension 80 of the arm 77 and engaging at its free end a flattened shoulder upon the pawl 76. The arm 77 preferably is oscillated about the shaft 74 by a link 81 made in two connected pieces, the outer end of the link being adjustably secured to the end of an arm 82 projecting radially from the rock shaft 83 which is journaled in an axial bearing in the shaft 22. In order to provide for the movement of the arm 82 the plate 31 is provided with a recess which forms a continuation of the recess which receives the pivotal boss 32 for the plate 31. The recess for the arm 82 extends through the side of the plate 31.

The rock shaft 83 may be supported upon suitable ball bearings 84 carried by the upper portion 24 of the shaft 22 and its lower end desirably is mounted in ball bearings 85 carried by a plate 85× which is secured to the end of the bushing 27.

The rock shaft 83 is provided at its lower end with a radially extending arm 86 which is connected by a link 87 to the lower end of a lever 88 which is pivotally mounted upon a stud 89 on the main frame 1. The upper end of the lever 88 is provided with an anti-friction roll 90 which engages a surface cam 91 connected to or preferably formed integral with the crank disk 50. A spring 92 connected to said lever and to a stud 93 on the main frame serves normally to hold the roll 90 in engagement with the cam 91.

The cam 91 preferably has two crests disposed diametrically opposite to each other to produce a feeding movement at the end of each vibration of the oscillating head so that a fresh cut will be made.

In order to arrest the feeding movement of the oscillating head the usual guard-plate 94 is adjustably secured to the shaft 74 by means of a set screw 95. The guard plate 94 is caused by the rotation of the shaft 74, to which it is affixed to enter between the ratchet and the pawl, so that when the desired amount of cross-feeding movement has been obtained the guard-plate will pass between the pawl and the teeth of the ratchet and thereby prevent feeding engagement of the pawl.

In order to provide ready access to the chuck for the purpose of examining the

work or for removing the finished work from the slide I have provided means for removing the work out of operative position in relation to the grinder head and locking the same in inoperative position.

This may conveniently comprise an extension 96 in the form of a rod which conveniently may be screwed into the head of the work supporting table 29 and bent downwardly in proximity to the end of an apron 97 which extends beneath the oscillating table. A handle 98 mounted upon the rod 96 is preferably so constructed as to form both a means for oscillating the table and a detent adapted to engage lugs 99, or a suitable recess, in the apron 97 and thereby hold the oscillating grinding member in inoperative position.

A preferred handle construction is illustrated herein in which the handle 98 is rotatably mounted upon the rod 96 the inside of the handle being provided with a chamber 100 in which a pawl 101 is slidably mounted. The end of the pawl 101 is adapted to be projected into engagement with the lugs 99 but is normally withheld therefrom by a helical spring 102 resting at one end against the upper wall of the chamber 100 and at its lower end against an enlarged head 103 on the pawl 101. The lower end of the enlarged head 103 is provided with a beveled portion 104 and with a central notch 105 adapted to receive the apex of a V-shaped stud 106 extending upwardly from the inner face of the metallic cap 107 which is secured upon the end of the rod 43. The end of the handle 98 is provided with a groove 108 to receive the stud 106 and to permit rotation of the handle upon the rod 96.

When it is desired to remove the work from its clutch the operator grasps the handle 98 and swings the oscillating table sufficiently to permit the pawl 101 to engage the lugs 99. The operator then rotates the handle slightly thereby causing the inclined portion 104 of the head 103 to ride up upon the V-shaped stud 106 until the end of the stud 106 drops into the notch 105 in said head. The pawl 101 is thereby thrust into and retained in locking engagement with lugs 99.

When it is desired to restore the oscillating grinding member to operative position the operator merely gives the handle 98 a slight turn in the opposite direction, thereby releasing the pawl and permitting the same to be withdrawn by the action of the spring 102 from engagement with the lugs 99.

In the operation of the machine the rotation of the crank disk 50 acts through the connecting rod 54 and the clutch mechanism above described to oscillate the shaft 22 and the grinding member carried by it. The cam which is upon the crank disk 50 or carried thereby actuates the lever 88 which in turn acts through the link 87 and arm 86 to oscillate the rock shaft 83. The arm 82 of the rock shaft 83 causes the reciprocation of the link 81 and through it the pawl 76 which in turn rotates the ratchet 75 and through the train of gears 73 and 72 the feed screw 41. Inasmuch as all of these mechanisms are actuated through the instrumentality of the crank disk the proper timing is at all times preserved and by reason of the feeding of the oscillating grinding member toward and from the relatively stationary grinding member the arc of the raceway is formed with a constant radius of curvature throughout the entire grinding operation, thus insuring the accuracy of curvature of the raceway under all conditions.

So far as I am aware no one has heretofore provided a grinding machine having a stationary and an oscillating grinding member in which the work, supported by one of said members, is provided with means for automatically feeding the same toward the complementary grinding member and the claims are to be construed as broadly covering this combination. It is also to be understood that the mechanism disclosed herein constitutes an illustrative embodiment of my invention and is not restrictive of the invention as broadly defined by the following claims.

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

1. A grinding machine comprising a grinding member and a rotary work supporting member, means for causing an oscillatory movement therebetween and means automatically operable to move said members relatively to each other and to maintain throughout the grinding operation upon the work an arcuate grinding path having a constant radius whereby a groove will be formed which is adapted to fit a ball having a constant radius irrespective of the depth to which the groove is ground.

2. A grinding machine comprising a rotary grinding member and a rotary work supporting member, means for oscillating one of said members and means automatically operable to feed the oscillating member toward the other member to cause the grinding member to produce upon the work a groove having a constant radius irrespective of the depth to which the groove is ground.

3. A grinding machine comprising a rotary grinding member and a rotary work supporting member, means for oscillating said work supporting member and automatically operated means for advancing the oscillatory work supporting member toward

the grinding member, whereby a groove having an arc of constant radius will be formed.

4. A grinding machine comprising a rotary grinding member and a rotary work supporting member, an automatically rotatable instrumentality and means operated thereby respectively to oscillate said work support and to advance the same toward the grinding member whereby a groove having an arc of constant radius will be ground and accurate timing of said movements will be insured.

5. A grinding machine comprising a cooperating rotary grinding and a rotary work supporting member, means for pivotally supporting one of said members, means for oscillating said pivotally supported member and means, including a pivotal member coaxial with said pivotal supporting means, for feeding said oscillating member toward the coöperating member.

6. A grinding machine comprising cooperating rotary grinding and work supporting members, means for pivotally supporting one of said members, a shaft coaxial with said pivotal supporting means, means for oscillating said pivotal supporting means and said shaft in alternately timed relation, and means operated by said shaft for feeding said oscillating member toward the coöperating grinding member.

7. A grinding machine comprising a rotary grinding member mounted upon a normally stationary head, a rotary work supporting member, having a pivotal support, and means for oscillating the same, a shaft coaxial with said pivotal support, means for oscillating said shaft, and means operated by said shaft for advancing said work supporting member toward said grinding member.

8. A grinding machine comprising a normally fixed rotary grinding member, a cooperating rotary work supporting member pivotally supported upon an axis angular to the axis of the fixed grinding member, means for oscillating said work supporting member, means for moving the latter relatively to the fixed rotary grinding member, including a feeding screw, and pawl and ratchet mechanisms for actuating the same.

9. A grinding machine comprising a normally fixed rotary grinding member, a cooperating rotary work supporting member pivotally supported upon an axis angular to the axis of the fixed grinding member, means for oscillating said work supporting member and cross feeding mechanism for said work supporting member, including a feeding screw, pawl and ratchet mechanism for actuating the same, and adjustable means for disengaging the pawl and ratchet to limit the feeding movement.

10. A grinding machine comprising a normally fixed rotary grinding member, a cooperating rotary work supporting member, means for pivotally supporting the latter upon an axis angular to the axis of the fixed grinding member, means for adjusting the work supporting member about said axis to vary its field of operation, means for oscillating said work supporting member, and means for feeding the same relatively to said fixed grinding member, whereby a groove will be formed with a constant radius of curvature.

11. A grinding machine comprising a normally fixed rotary grinding member, a cooperating rotary work supporting member, means for pivotally supporting the latter upon an axis angular to the axis of the fixed grinding member, means for adjusting the work supporting member about said axis to vary its field of operation and means including a common instrumentality for oscillating said pivotal supporting means and for feeding said work supporting member relatively to said fixed member.

12. A grinding machine comprising a vertical oscillating shaft, a table carried thereby, a support pivotally mounted upon said table and adjustable about the axis of said shaft, a cross slide mounted upon said support, a head having horizontal work supporting spindle mounted upon said cross slide, means for oscillating said shaft, automatically operated means for feeding said cross slide, and a normally fixed head having a rotatable tool carrying spindle in operative relation to said work carrying spindle.

13. A grinding machine comprising a vertical oscillating shaft, a table carried thereby, a support pivotally mounted upon said table and adjustable about the axis of said shaft, a cross slide mounted upon said support, a head having horizontal work supporting spindle mounted upon said cross slide, means for oscillating said shaft, automatically operated means for feeding said cross slide, a normally fixed head having a rotatable tool carrying spindle in operative relation to said work carrying spindle, and means for adjusting said tool carrying spindle in the direction of the axis of said spindle.

14. A grinding machine comprising a vertical oscillating shaft, a table carried thereby, a support pivotally mounted upon said table and adjustable about the axis of said shaft, a cross slide mounted upon said support, a head having horizontal work supporting spindle mounted upon said cross slide, means for oscillating said shaft, automatically operated means for feeding said cross slide, a normally fixed head having a rotatable tool carrying spindle in opera-

tive relation to said work carrying spindle and independently operable means for adjusting said tool carrying spindle transversely of and in the direction of the axis of said spindle.

15. A grinding machine comprising a vertical oscillatory shaft, a table carried thereby, a cross slide supported by said table, a head, having a horizontal work supporting spindle, adjustably mounted upon said cross slide, means for oscillating said shaft, means for automatically feeding said cross slide, and a normally fixed head having a horizontal tool carrying spindle in operative relation to said work carrying spindle.

16. A grinding machine comprising a vertical oscillatory shaft, a table carried thereby, a support pivotally mounted upon said table and adjustable about the axis of said shaft, a cross slide mounted upon said support, a head, having a horizontal work supporting spindle, slidably mounted upon said cross slide, means for adjusting the same transversely of said cross slide, means for oscillating said shaft, automatically operated means for feeding said cross slide, and a normally fixed head having a horizontal tool carrying spindle in operative relation to said work supporting spindle.

17. A grinding machine comprising a vertical oscillating shaft, a table carried thereby, a cross slide supported by said table, a head having a horizontal work supporting spindle mounted upon said cross slide, means for oscillating said shaft, adjustable means for automatically feeding said cross slide, and a normally fixed head having a horizontal tool carrying spindle in operative relation to said work supporting spindle.

18. A grinding machine comprising a vertical oscillating shaft, a table carried thereby, a cross slide supported by said table, a head having a horizontal work supporting spindle mounted upon said cross slide, a feeding screw for said cross slide, pawl and ratchet mechanism for rotating said feeding screw, means for actuating said pawl, means for adjusting the extent of movement thereof, and a normally fixed head having a horizontal tool carrying spindle in operative relation to said work supporting spindle.

19. In a grinding machine comprising a spindle carrying a rotary tool and a work carrying head mounted for oscillation on an axis angular to the axis of the tool spindle, means for imparting oscillatory movement to said head which is adapted to be connected with and disconnected from the latter, means carried by the oscillatory head supporting means for controlling the action of the connecting and disconnecting means, and means for preventing oscillation of said controlling means.

20. In a grinding machine comprising a horizontal spindle carrying a rotary tool and a work carrying head mounted upon a vertical shaft, a collar on said shaft and means for oscillating the same, a clutch slidably connected to said shaft and adapted to be moved into and out of clutching engagement with said collar, a lever having a yoke engaging said clutch pivotally mounted upon a member carried by said oscillating shaft and means for preventing oscillation of said lever.

21. In a machine of the class described comprising a bed, an oscillatory work supporting member mounted thereon and means for actuating the same, means for disconnecting said actuating mechanism and releasable means for locking said work supporting member against oscillatory movement.

22. In a machine of the class described comprising a bed, an oscillatory work supporting member mounted thereon and means for actuating the same, means for disconnecting said actuating mechanism and releasable means for locking said work supporting member against oscillatory movement comprising a pawl and a coöperating pawl engaging means carried respectively by said oscillatory work support and a relatively stationary member and means causing to engage with or to be withheld from engagement with said pawl receiving means.

23. In a machine of the class described comprising a bed, an oscillatory work supporting member mounted thereon and means for actuating the same, means for disconnecting said actuating mechanism and releasable means for locking said work supporting member against oscillatory movement comprising a spring actuated pawl carried by said work supporting member, means on said bed adapted to be engaged by said pawl, and means for retaining said pawl in extended or retracted position.

24. In a machine of the class described comprising a bed, an oscillatory work supporting member mounted thereon and means for actuating the same, means for disconnecting said actuating mechanism and releasable means for locking said work supporting member against oscillatory movement, comprising a rod secured to said work supporting means, a handle on said rod, a pawl slidably mounted in said handle, means upon said bed adapted to be engaged by said pawl when in extended position and means for maintaining said pawl either in extended or retracted position.

25. In a machine of the class described comprising a bed, an oscillatory work supporting member mounted thereon and means for actuating the same, means for disconnecting said actuating mechanism and releasable means for locking said work supporting member against oscillatory movement com-

prising a rod secured to said work supporting means, a handle rotatably mounted in said rod and secured from endwise movement by a relatively stationary cap secured to said rod, a spring actuated pawl having a stem slidably mounted in said handle and normally retained in retracted position and an inclined lug on said cap adapted to engage the stem of said pawl and to extend the same upon rotation of said handle and means upon the bed adapted to be engaged by said pawl when in extended position.

26. In a machine of the class described comprising a bed, an oscillatory work supporting member mounted thereon and means for actuating the same, means for disconnecting said actuating mechanism and releasable means for locking said work supporting member against oscillatory movement comprising a rod secured to said work supporting means, a handle rotatably mounted in said rod and secured from endwise movement by a relatively stationary cap secured to said rod, a spring actuated pawl having a stem slidably mounted in said handle and normally retained in retracted position and an inclined lug on said cap adapted to engage the stem of said pawl and to extend the same upon rotation of said handle, a recess in the head of said pawl to receive the apex of said lug and thereby retain the pawl in extended position and means on said bed adapted to be engaged by said pawl when the latter is in extended position.

In testimony whereof, I have signed my name to this specification.

PIERRE P. FENAUX.