

July 25, 1933.

G. GORTON

1,920,073

GRINDING MACHINE AND THE LIKE

Filed July 10, 1930

4 Sheets-Sheet 1

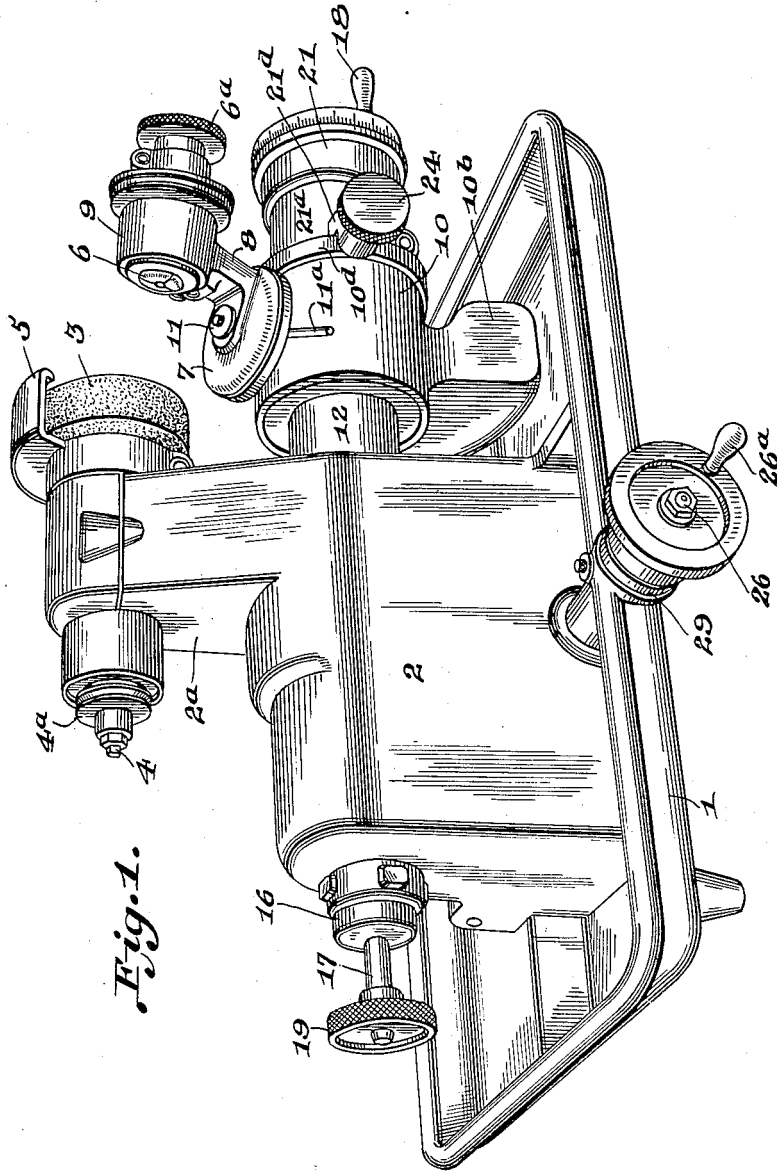


Fig. 1.

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4 Sheets-Sheet 2

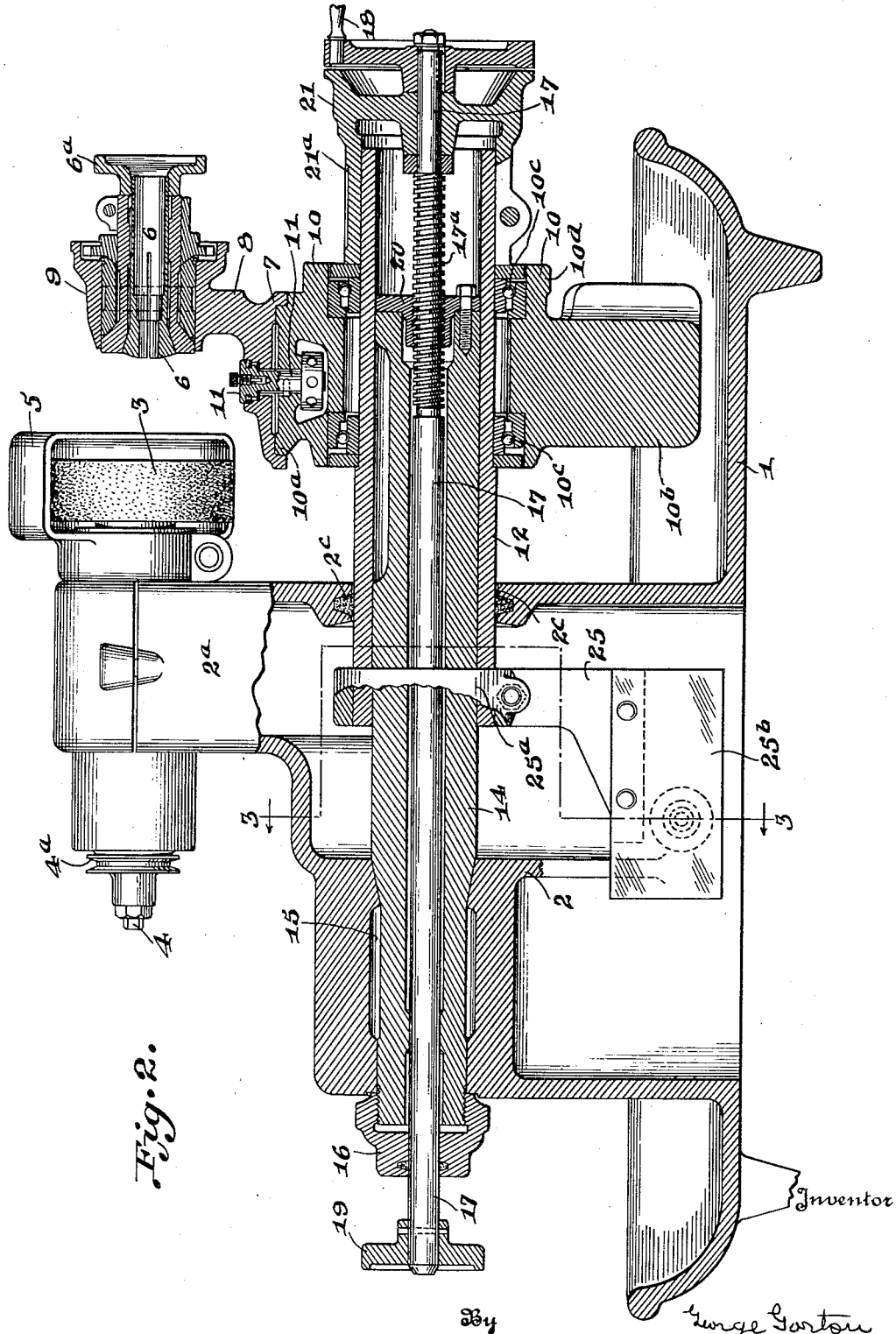


Fig. 2.

Fig. 2

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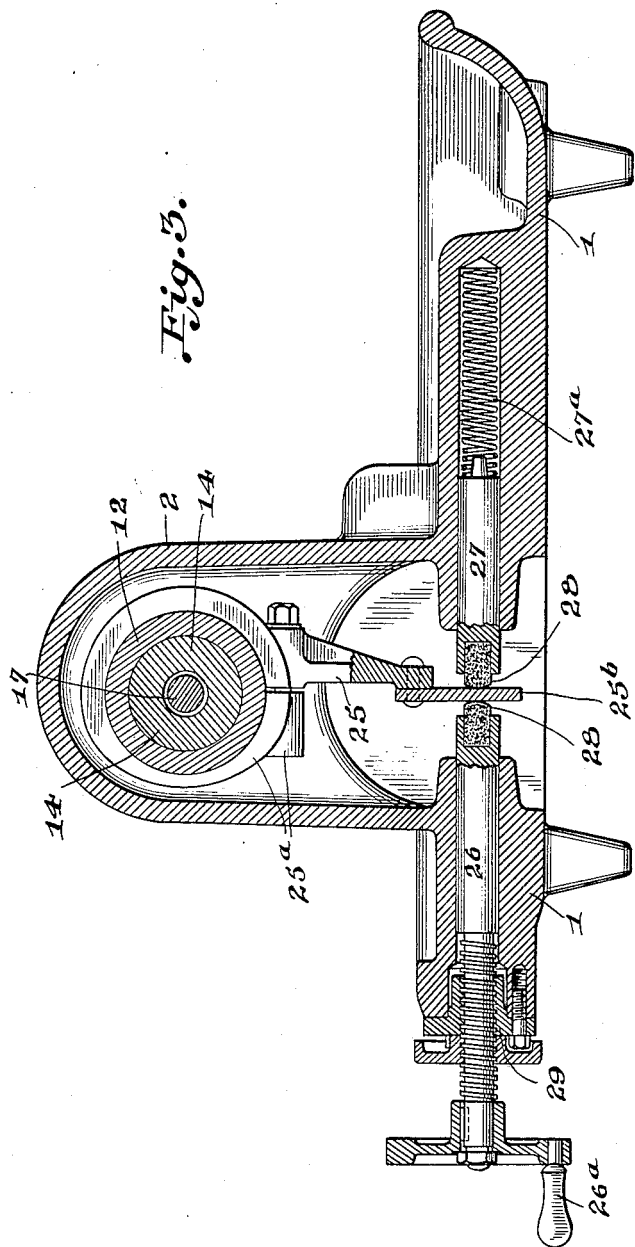
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4 Sheets-Sheet 4

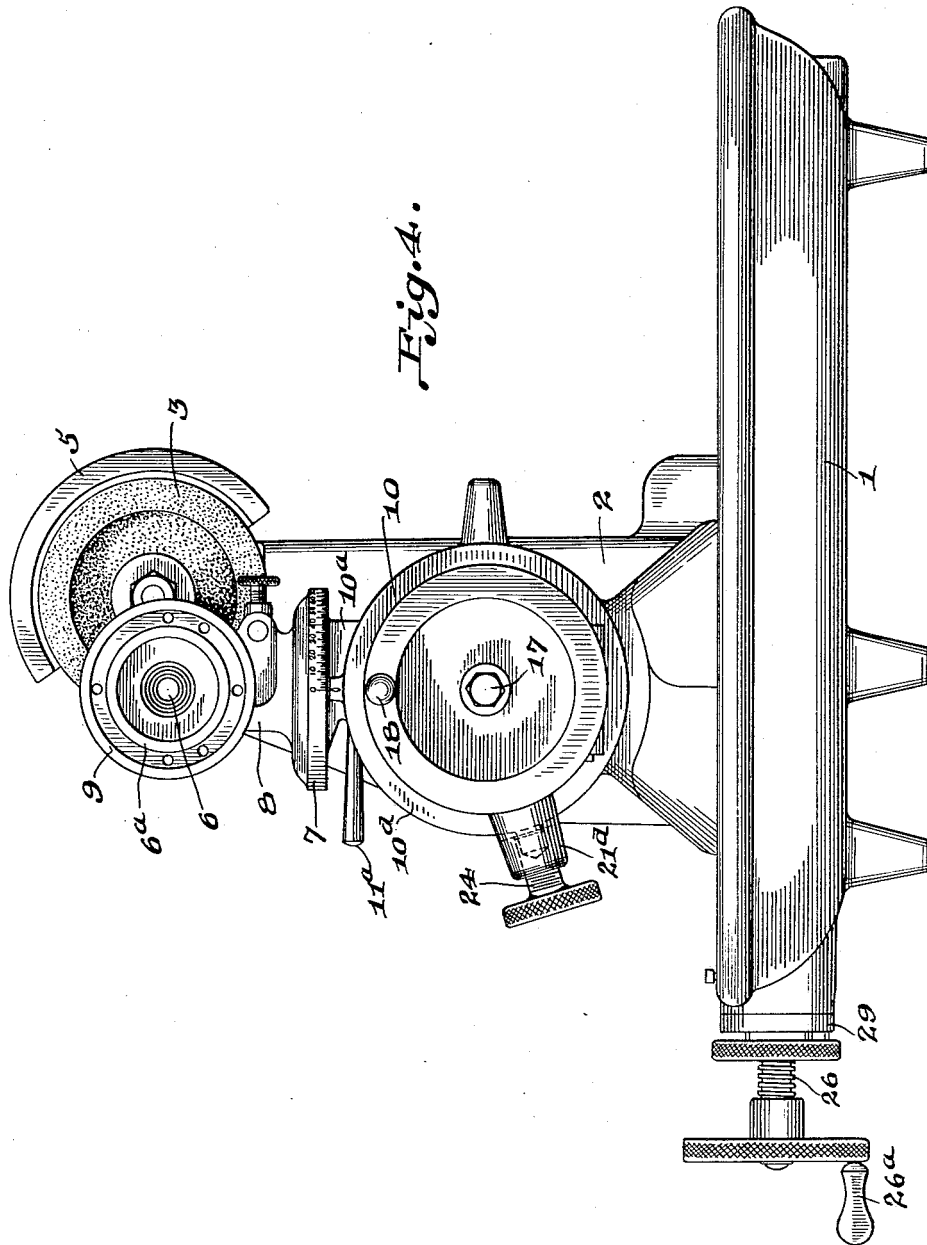


Fig. 4.

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UNITED STATES PATENT OFFICE

GEORGE GORTON, OF RACINE, WISCONSIN

GRINDING MACHINE AND THE LIKE

Application filed July 10, 1930. Serial No. 467,092.

This invention relates to grinding machines and the like, and from a specific standpoint particularly concerns grinders for rotary and other cutters; and the objects and nature of the invention will be understood by those skilled in the art in the light of the following explanations of the accompanying drawings that illustrate what I now believe to be the preferred mechanical expression or embodiment of my invention from among other forms, constructions and developments thereof within the spirit and scope of the invention.

An object of the invention is to provide certain improvements in the manual controls for the cutter or tool, by which the cutter or tool being operated on by the grinding element is fed, moved and manipulated during the shaping or grinding operation, with the end in view of adapting the machine to both right and left hand operators and to enable each operator to assume a position, when actuating and manipulating such controls, best suited to the particular individual for comfort, convenience and the highest efficiency.

A further object of the invention is to provide certain improvements in constructions, combinations and arrangements for the production of an improved and highly desirable grinder.

With the foregoing and other objects in view, my invention consists in certain novel structural features and new combinations and arrangements, more fully and particularly described and specified hereinafter.

Referring to the accompanying drawings, forming a part hereof:—

Fig. 1 is a perspective view of a grinder as an example of an embodiment of my invention.

Fig. 2 is a longitudinal vertical section, showing a portion of the grinder in side elevation.

Fig. 3 is a cross section taken in the plane of the line 3—3, Fig. 2.

Fig. 4 shows the grinder in end elevation.

In the embodiment illustrated, I provide a base 1, for a rigid strong vertical casing or housing 2, preferably rigid with and up-

standing from the base. This housing, preferably at one end, provides a vertical extension 2a, forming a part of the housing, and constituting a rigid upstanding supporting pedestal for the rotary shaping or grinding wheel or disk 3, and its mounting. This grinder 3, is carried and driven by a shaft 4, extending through the upper end of pedestal 2a, with the shaft ends projecting beyond the vertical side faces of the pedestal. The grinder 3, is fixed to one overhanging end of said shaft to present the peripheral as well as the vertical flat outer shaping or grinding surfaces to operate on a rotary cutter or other tool as hereinafter explained. The opposite projecting end of the shaft can be equipped with pulley 4a, by which the shaft and its grinder can be driven from any suitable motor through the medium of a belt or other power transmission. However, the grinder can be driven and supported in any suitable manner and by any suitable means.

In the embodiment illustrated, a guard 5, is provided for the grinder, and the mounting for shaft 4 extends through and is carried by the pedestal and provides the shaft bearings.

The rotary cutter or other tool to be shaped or ground by the outer vertical face of the rotary shaper or grinder 3, is held with its working end in operative relation to the vertical face of the rotary grinder. A collet or chuck 6, is provided to removably receive and clamp the rotary cutter or other tool to be shaped or ground by operative contact with the driven rotary shaper or grinder 3, and this collet is so mounted, supported and controlled as to be capable of bringing the working end of the cutter, or the portion thereof to be shaped, into operative engagement with the grinder and to move and shift the same as required to produce the cutter shape desired. In the example shown, the collet 6, is carried by a holder that embodies a flat or disk-like base 7, rigid with an upstanding arm 8 that is rigid with and carries a top head 9, through which the collet 6, extends and in which it is rotatable by manipulation of the finger

or hand wheel or disk 6a, exposed and accessible on the rear end of the collet, i. e. on the collet end remote from the grinder. The collet disclosed is of a common type, but I do not wish to limit my invention to any particular chuck or collet for removably receiving and clamping the work such as the cutter to be shaped. The head 9, is arranged in front of the operating vertical face of grinder 3, and is spaced therefrom, and the longitudinal axis of the elongated collet 6, is parallel with or arranged at any suitable angle with respect to the axis of rotation of the grinder 3, and the collet is formed to longitudinally receive the cutter to be shaped through its end facing the grinder with the cutter projecting therefrom toward the grinder.

The support or holder for the collet includes the upstanding bracket 8, 9, rigid with base 7, and a vertical sleeve or hollow head 10, having top seat 10a, on which the base 7, is fitted and to which it is normally rigidly clamped by vertical clamping bolt 11. When the bolt 11, is loosened, as by rotation through the medium of handle 11a, the bracket 7, 8, 9, can be rotated on seat 10a, around vertical bolt 11, as a center, to set the collet and the rotary cutter held therein at any desired angle with respect to the working face of grinder 3, and thereupon the bolt can be tightened to lock the bracket 7, 8, 9, rigidly to the sleeve 10, extending upwardly approximately radially therefrom. The longitudinal axis of sleeve 10, is parallel with and a distance below the axis of rotation of grinder 3, and said sleeve surrounds and is rotatable on a support projecting from the housing 2, and constituting said longitudinal axis of the sleeve 10, and on which the same is rotatable, when desired, to swing or oscillate the bracket 7, 8, 9, in a vertical plane back and forth in front of the grinder to carry the working end of the tool back and forth across the grinder.

In the example shown, the sleeve 10 is formed or provided with a depending weight 10b, to approximately counter weight or compensate for the weight of the upstanding bracket 7, 8, 9, and the load carried thereby.

In this embodiment, the slide or support carrying the head, carrier, or sleeve 10, and on which the same is centered and rotatable, constitutes a part of the feed slide or mechanism whereby the collet and the work carried thereby are fed toward and from the working face of the grinder. This support is in the form of a strong horizontal longitudinally elongated slide tube 12, parallel with shaft 4, and located a distance below the same. The sleeve 10, rotatably surrounds slide 12, preferably on interposed rolling bearing 10c, if so desired.

This supporting slide tube 12, extends in-

to the housing 2, through a bore or opening 2c, in the front vertical wall of the housing and is longitudinally slidable therethrough on its feeding movements. The tube 12, with its load, is carried by and longitudinally slidable on the fixed horizontal guiding and supporting spindle 14, extending longitudinally through the housing and into the tube 12, preferably, at least into the portion of the tube surrounded by sleeve 10. The outer end of this spindle 14, extends through a bore 15, in the rear (or left hand Fig. 2) wall of the housing and is rigidly wedged and clamped therein by exterior nut 16. The fixed supporting spindle 14, is formed with a central longitudinal bore extending throughout the length thereof, and the rotary feed shaft 17, is mounted to rotate in said bore and extends throughout the length of said spindle and beyond the ends thereof, and one end of said feed shaft (the right hand end Fig. 2) has fixed thereto an accessible exposed handle 18, for rotating the shaft, and the other end of said shaft (the left hand end Fig. 2) has fixed thereto the exposed accessible handle 19, for rotating the shaft. The rotary feed shaft 17 is formed with the longitudinally threaded feed screw portion 17a, extending through and meshing with the stationary feed nut 20, in the right hand end of the longitudinal bore of spindle 14, and fixed to said spindle.

The outer or right hand end of the feed shaft 17, extends beyond the end of the slide tube 12, and extends through and has bearing in and is held against substantial relative longitudinal movement in, an end head 21, rigid with split sleeve clamp 21a, surrounding the end of tube 12, and normally clamped fixedly thereon, and preferably aiding in holding the sleeve 10, against relative longitudinal movement on tube 12.

Rotation of feed shaft 17, in one direction, by the right hand applied to handle 18, or by the left hand applied to handle 19, will cause the sleeve 12, to slide longitudinally on spindle 14, to carry the work, such as a cutter, say toward the grinder, while rotation of said shaft in the opposite direction will feed the cutter away from the grinder. Means are provided for locking the rotary sleeve 10, against rotary movement on the tube 12 and in any desired angular position on said tube. For instance, I show the split sleeve clamp 21a, normally fixed on the end of the tube 12, projecting beyond rotary sleeve 10, formed with a rigid exterior radial arm 21d, formed with a radial screw threaded hole meshing with and receiving clamping screw 24, arranged radially of the cylindrical rim 10d, of sleeve 10, and adapted when rotated in one direction, to tightly abut said rim to lock the sleeve against rotation on the tube, or when un-

screwed, to release the sleeve for rotary movement on said tube.

The cylindrical tube 12, is mounted for rotary or turning movement on the cylindrical spindle 14, and the end of said tube, within housing 2, is provided with a depending radial arm 25, normally fixed to or rigid with the tube. For instance, the arm 25, can be carried as a fixed part of a ring clamp 25a, surrounding and tightly clamped on the tube end. A stiff vertical plate 25b, is fixed to and depends from arm 25, and this plate is so arranged with respect to the tube axis that pressure on one flat face thereof will rotate the tube in one direction and pressure on the other plate face will rotate the tube in the opposite direction. Hence, I arrange this metal wing or plate 25b, between two aligned opposing reciprocatory metal plungers 26, 27, having preferably non-metallic, such as hard fibre, contact plugs or noses 28, abutting the opposite side faces of the plate, to alternately apply pressure in opposite directions against the plate and thereby rock the plate back and forth to oscillate the tube 12, and hence move the collet and the cutter carried thereby back and forth across the working face of the grinder, when the sleeve 10, is locked to the tube 12, by set or clamping screw 24. This is desirable and very convenient for shaping and grinding certain kinds of cutters, particularly where a steady regular movement of the cutter is required, and this movement is also advantageous when dressing the working face of the grinder by a tool having a diamond point, held by the collet.

As convenient means for actuating and controlling the plungers 26, 27, I provide a guide socket in the base 1, in which plunger 27, is confined to reciprocate under the propulsion of expansion spring 27a, in one direction, and under push of plunger 26, in the opposite direction by which the spring is compressed. The plunger 26, slidable and rotatable in a guideway in base 1, is screw threaded to mesh with the nut 29, fixed to the base, and is provided with handle 26a, exposed and accessible at the machine front. The shaft 26, can be rapidly rotated first in one direction, then in the opposite direction, to attain the desired back and forth swing of wing or plate 25b, and consequently of the collet and the work as hereinbefore described.

Grinders of this type, are comparatively small in size so that the operator standing in front thereof can assume a comfortable easy position with either hand on either wheel 19 or wheel 18, to operate the feed mechanism to keep the work up to the working surface of the grinder, while the other hand grasps the hand wheel 6a, to rotate the collet to turn the work, such as a rotary cutter, while against the grinder, or to otherwise

manipulate the work or to oscillate the collet carrier 10, 7, 8, and 9, on tube 12, as an axis, if the work requires such movement.

The handle wheel 26a, is conveniently and centrally located at the machine front so that the operator can assume a comfortable position and by one hand rotate said handle back and forth to oscillate the collet or work holder back and forth, while with the other hand, the operator can rotate either handle wheel 19, or hand wheel 18, to feed the work. The feed tube will be oscillated by the wing 25b, and opposing plungers while the feed is moving and regardless of the position of the tube, particularly as the wing is elongated to a length approximately equal to the range of feeding movement of tube 12.

Machines of this type that require close concentrated attention and the simultaneous use of both hands for operation of controls by manipulating different handles or wheels, quickly tire and cramp many operators, because of their inability to assume a comfortable position while thus employing both hands, particularly any handle arrangement while convenient for some operators will be very inconvenient for others, and while convenient for a so-called right handed operator will be exceedingly inconvenient for a left handed individual. I have successfully solved this particular problem by providing the rotary feed screw shaft with exposed operating handles at both ends, both handles easily accessible from the machine front and with the collet controlling handle also easily accessible from the operator's position, so that the operator can assume the position most restful to his individuality, while manipulating the collet with either hand and the feed with the other hand.

As various variations, modifications and departures of and from my invention are possible without departing from the spirit and scope thereof under the claims when construed as broadly as permitted by the prior art, the disclosure hereof is for purposes of explanation and not for purposes of limitation except where required by the prior art.

What I claim is:—

1. A cutter grinder embodying a rotary grinding member; a collet for removably holding the cutter in operative relation to said member; a carrier for said collet, said collet provided with a manipulating handle accessible from the operator's position; said carrier including a rotatable sleeve and a bracket upstanding from said sleeve approximately radially thereof and rotatably adjustable thereon, said bracket having a top head in which said collet is rotatably mounted; and feed mechanism for said sleeve for carrying the collet toward and from said grinding member, said feed mech-

anism having manual operated actuating mechanism with operating means accessible from the operator's position, said feed mechanism including a longitudinally arranged slide for said sleeve and on which the same is mounted for rotatable adjustment.

2. A grinder including a grinding member; a housing; a fixed supporting spindle carried by said housing; a rotary screw threaded feed screw extending longitudinally through and beyond the ends of said spindle and at both ends having accessible handles for rotating said screw by manipulation of either handle; said spindle having a relatively fixed feed nut receiving said rotary screw; a feed tube longitudinally slidable and also rotatable on said spindle and provided with a bearing in which said feed screw is confined and rotatable; manually actuated means for rotatably oscillating said tube on said spindle; a sleeve mounted to rotate on said tube and carried by said tube on its longitudinal feeding movements; means whereby said sleeve can be locked to said tube at various angular positions to rotatively oscillate therewith and whereby said sleeve can be released to rotatively oscillate on said tube; a bracket rising from and carried by said sleeve and provided with a holder for the work to be operatively engaged by said grinding member; and means whereby said bracket can be adjusted and locked on said sleeve to present the work at various angles to said member.

3. A grinder for rotary and other cutters, including a support; a spindle fixed at one end to said support and projecting therefrom; a feed tube longitudinally slidable on said spindle and projecting beyond the free end thereof; a rotary feed screw extending longitudinally through and mounted to rotate in said spindle and projecting beyond both ends of the spindle and beyond both ends of said tube and provided at both ends with handles for rotating the screw, both handles being accessible from the operator's position; said spindle having a relatively fixed feed nut for said rotary screw; said screw mounted to rotate with respect to said tube and to slide the tube on its feed and return strokes; and a carrier for the cutter to be operated on, said carrier propelled by said tube on its feed and return movements.

4. A grinder for rotary and other cutters, including a longitudinally elongated collet to grip and hold the cutter to be operated on, said collet having a manipulating handle; an upstanding bracket having a head carrying said collet and in which the same is rotatable; a carrier for said bracket; means for clamping said bracket to said carrier and whereby said carrier can be adjusted and set to hold the collet at various angular position; supporting means for

said carrier, means for rotatively moving said carrier; and manually actuated feed mechanism for moving said carrier to carry said collet on its feed and return movements.

5. A grinder having a rotary grinding element with a vertical end operating face; an upstanding bracket having a head in front of said face; a collet extending through and rotatable in said head and at its outer end provided with a manipulating handle, said collet adapted to receive and hold the cutter in operative relation to said face and to rotate the cutter during the shaping operation; a carrier for said bracket; means whereby the bracket is adjustable with respect to the carrier to change the angular position of the collet with respect to said face; a support for said carrier; said carrier being rotatively adjustable on said support to move said collet in a vertical plane back and forth in front of said face; means whereby said carrier can be locked to said support in various angular positions; and feed mechanism for moving said support to feed the collet toward and from said face.

6. A grinder including a longitudinally movable feed slide; feed mechanism for moving said slide on its feeding and return movements; means for rotatably oscillating said slide on its longitudinal axis during its feeding movement and while in any position within its feeding range of movement; and a work carrier supported by said extending approximately radially of said slide and mounted to rotatably oscillate on said slide; and means whereby said carrier can be released to rotatably oscillate on said slide and whereby said carrier can be locked to said slide in various relative angular positions and to oscillate with said slide.

7. A grinder including a work carrier; a longitudinally movable feed slide therefor; feed mechanism for actuating said slide on its feeding and return strokes; said slide being rotatably oscillatory and provided with a radial wing; oppositely arranged plungers to bear against and reciprocate said wing to rotatively oscillate said slide, one of said plungers being spring pressed, and the other manually reciprocated.

8. A grinder including a work carrier; a longitudinally movable feed slide thereof; feed mechanism for actuating said slide on its feeding and return strokes; said slide being rotatably oscillatory and provided with a radial wing and manually actuated means for rotatively oscillating said slide by opposing forces alternately acting in opposite directions on said wing.

9. In combination; a frame; a rotary grinder carried thereby and provided with driving means; a feed slide carried by said frame and having a longitudinal path of movement radially spaced from and parallel with the axis of rotation of said grind-

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er; a carrier mounted on said slide to oscillate thereon on an axis parallel with said grinder axis; means whereby said carrier can be locked to said slide against relative oscillation; a holder mounted on said carrier and provided with means for holding a cutter or the like with its working end in operative relation to said grinder, said means being relatively rotatable on an axis approximately alined with the longitudinal axis of the cutter held thereby; means whereby said holder can be adjusted with respect to said carrier to vary the angle of the cutter with respect to the working face of the grinder; and screw feed mechanism for said feed slide for feeding said cutter toward and from said grinder.

10. In combination; a frame; a rotary grinder carried thereby and provided with driving means; a feed slide carried by said frame and having a longitudinal path of movement; a carrier mounted on said slide to oscillate thereon on an axis parallel with said grinder axis; means whereby said carrier can be locked to said slide against relative oscillation; a holder mounted on said carrier and provided with means for holding a cutter or the like with its working end in operative relation to said grinder, said means being relatively rotatable on an axis approximately alined with the longitudinal axis of the cutter held thereby; means whereby said holder can be adjusted with respect to said carrier to vary the angle of the cutter with respect to the working face of the grinder; and screw feed mechanism for said feed slide for feeding said cutter toward and from said grinder, said carrier being provided with means for approximately counterbalancing the weight of said holder and means carried thereby.

11. In combination; a frame, a rotary grinder carried thereby and provided with driving means; a feed slide carried by said frame and having a longitudinal path of movement radially spaced from and parallel with the axis of rotation of said grinder; a carrier mounted on said slide to oscillate thereon on an axis parallel with said grinder axis; means whereby said carrier can be locked to said slide against relative oscillation; a holder mounted on said carrier and provided with means for holding a cutter or the like with its working end in operative relation to said grinder, said means being relatively rotatable on an axis approximately alined with the longitudinal axis of the cutter held thereby; means whereby said holder can be adjusted with respect to said carrier to vary the angle of the cutter with respect to the working face of the grinder; and screw feed mechanism for said feed slide for feeding said cutter toward and from said grinder, said carrier being provided with a radially projecting counter-

balancing weight, for the purpose substantially as described.

12. In combination; a frame; a rotary grinder carried thereby and provided with driving means; a feed slide carried by said frame and having a longitudinal path of movement radially spaced from and parallel with the axis of rotation of said grinder; a carrier mounted on said slide to oscillate thereon on an axis parallel with said grinder axis; means whereby said carrier can be locked to said slide against relative oscillation; a holder mounted on said carrier and provided with means for holding a cutter or the like with its working end in operative relation to said grinder, said means being relatively rotatable on an axis approximately alined with the longitudinal axis of the cutter held thereby; means whereby said holder can be adjusted with respect to said carrier to vary the angle of the cutter with respect to the working face of the grinder; and screw feed mechanism for said feed slide for feeding said cutter toward and from said grinder, said rotatable means provided with a manipulating handle accessible to either hand of the operator; said feed mechanism being provided with a left hand handle and with a separate right hand handle either adapted to operate said feed mechanism, said left and right hand handles being so arranged with respect to each other, said manipulating handle, and the operator's position that the operator while manipulating said manipulating handle with either hand can operate the feed mechanism with the other hand.

13. In combination; a frame; a rotary grinder carried thereby; an elongated normally-fixed spindle carried by said frame radially spaced from and approximately parallel with the axis of rotation of said grinder; a feed slide embodying a sleeve on and slidable longitudinally of said spindle, and a carrier mounted on said sleeve to oscillate thereon, means being provided whereby said carrier can be locked to said sleeve against relative oscillation thereon, said carrier being provided with a holder mounted thereon and extending radially therefrom with respect to said sleeve, said holder being provided with adjustable means for grasping and holding a cutter or the like in operative relation to said grinder; and feed mechanism for actuating said slide to feed said cutter toward and from the grinder.

14. In combination; a supporting frame; a rotary grinder carried by said frame; a normally fixed spindle carried by said frame with its longitudinal axis spaced radially from and approximately parallel with the grinder axis of rotation; a slide sleeve on said spindle and slidable longitudinally thereof; mechanism carried by and extend-

ing laterally from said sleeve for holding a cutter or the like in operative relation to said grinder and embodying means whereby the cutter can be moved back and forth across the face of the grinder and means whereby the cutter can be rotated approximately about its longitudinal axis; a rotary feed shaft; and a screw threaded operative connection between said shaft and said slide sleeve.

15. In combination; a supporting frame; a driven rotary grinder or cutter shaper carried thereby; a normally-fixed longitudinally elongated spindle carried by said frame; a rotary feed shaft mounted in and extending longitudinally through said spindle and having handles for rotating the shaft, one at each end thereof, and both accessible from the operator's stand; a feed slide carried by and movable longitudinally of said spindle and having screw threaded operative connection with said feed shaft, said slide including means for holding the cutter to be sharpened or shaped at various angles with respect to the working face of the grinder and means whereby the cutter can be moved back and forth across said face of the grinder, and a manipulating handle accessible to either hand of the operator while located at the operator's stand with his other hand operating one of said feed shaft handles.

16. In combination; a supporting frame; a driven rotary grinder or cutter shaping member; a normally-fixed elongated spindle carried by said frame; a feed slide for the cutter or other work the point or end of which is to be sharpened or shaped by said

grinder, said slide embodying an elongated tube slidable longitudinally of and rotatable on said spindle, means for controlling the axial movement of the tube on the slide including an accessible operating handle, said slide also including a holding chuck for the cutter and means whereby said cutter can be moved back and forth across the working face of the grinder; and a screw threaded feed mechanism for feeding said slide longitudinally of said spindle to carry the cutter to and from the working face of the grinder.

17. In combination; a supporting frame; a cutter end shaping and sharpening rotary grinder; a feed and carrying slide for the cutter longitudinally movable in a line parallel with the axis of rotation of said grinder and oscillatory on said line and including a chuck for the cutter, said chuck arranged in front of the working face of the grinder with its longitudinal axial line intersecting the plane of said working face, and being relatively rotatable with respect to said slide on an axis approximately parallel with the longitudinal axis of the cutter and having a manipulating handle accessible to either hand of the operator from his stand for rotating the cutter held by the chuck with respect to the working face of the grinder, and feed mechanism for actuating said slide to carry the cutter toward and from the working face of the grinder, said mechanism having spaced right and left hand operating handles both accessible from the operator's stand.

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