

April 1, 1930.

E. C. OLIVER

1,752,961

UNIVERSAL GRINDER

Filed April 7, 1927

2 Sheets-Sheet 1

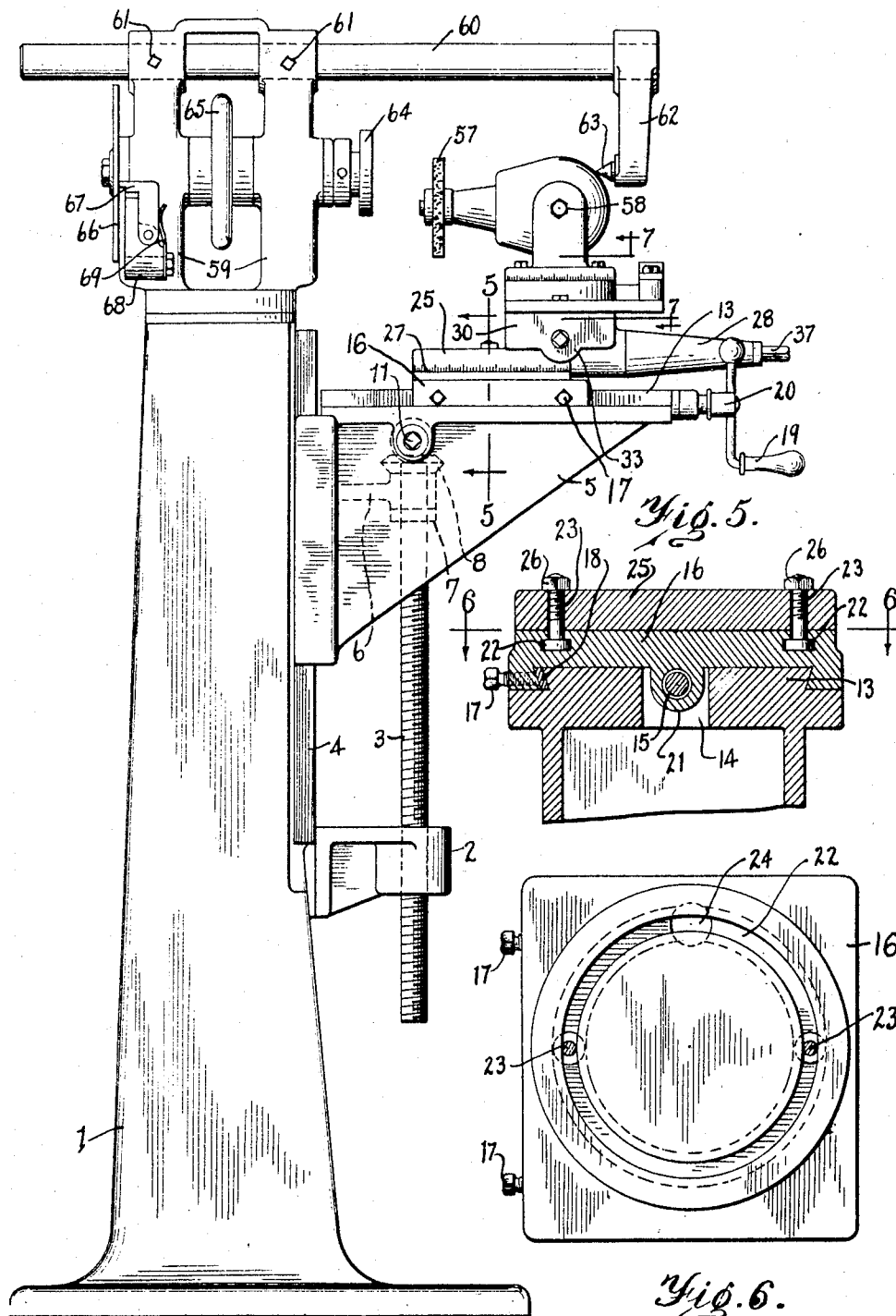


Fig. 6.

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Fig. 1

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2 Sheets-Sheet 2

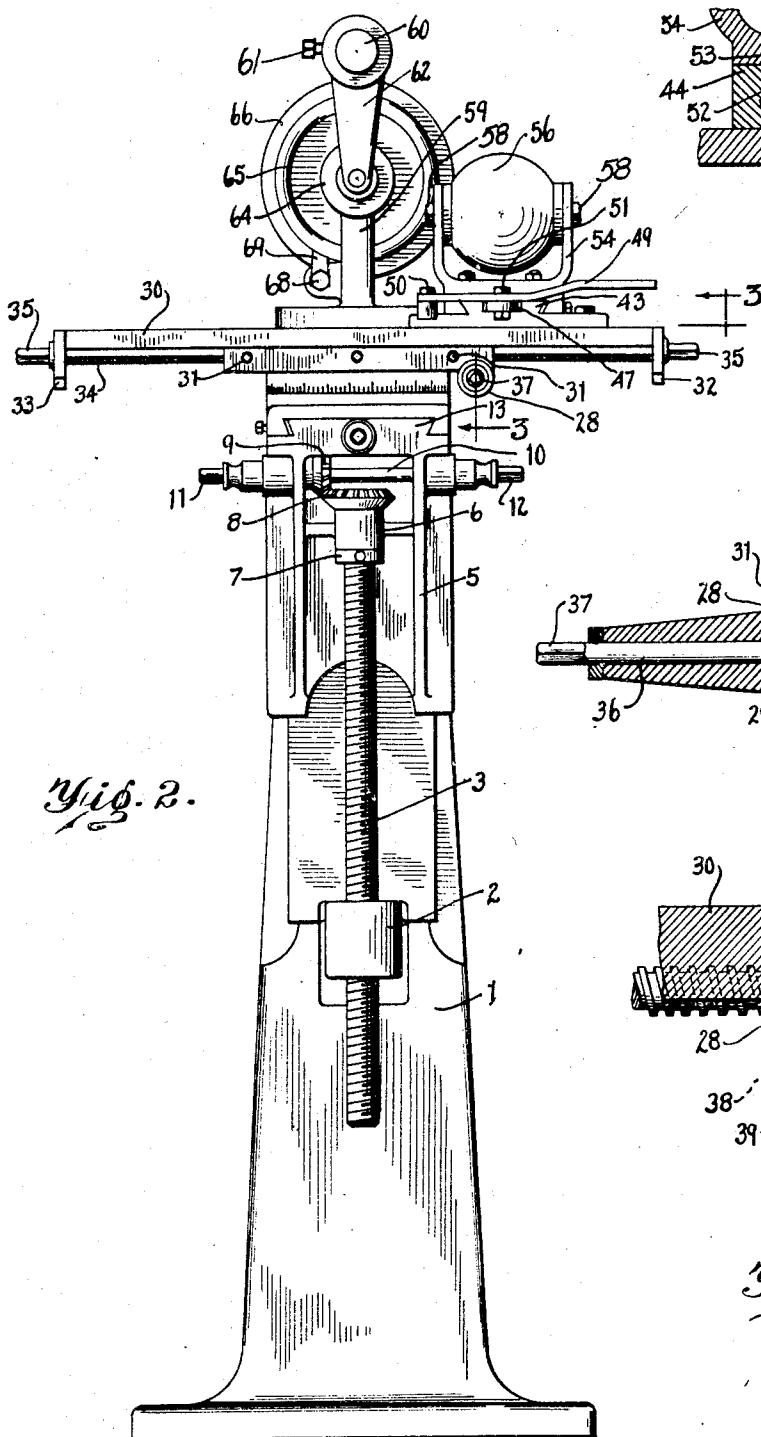


Fig. 2.

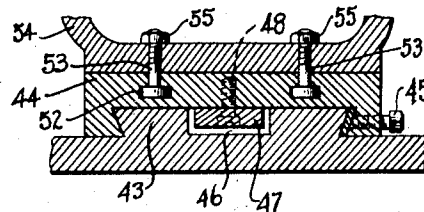


Fig. 7.

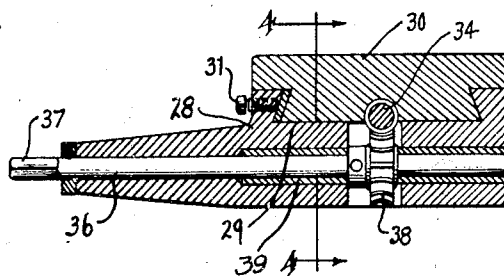


Fig. 3.

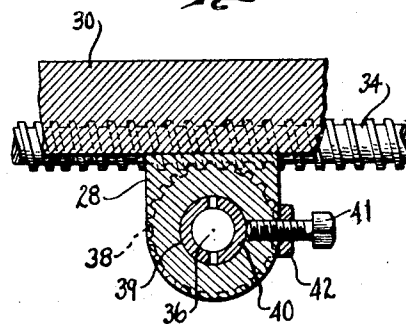


Fig. 4.

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UNITED STATES PATENT OFFICE

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UNIVERSAL GRINDER

Application filed April 7, 1927. Serial No. 181,722.

This invention relates to universal grinders and the object of the invention is to provide a grinder for grinding milling cutters, reamers, end cutters and the like and is adapted to grind pieces of peculiar shape having angular faces which cannot be ground with the usual type of grinder. Another object of the invention is to provide a universal grinder in which the grinding wheel may be set at practically any position in relation to the work. Another object of the invention is to provide a universal grinder in which the grinding wheel may be movable longitudinally of the work or may be moved longitudinally of any angular face of the work. A further object of the invention is to provide an index plate by which the work may be set and locked in position for grinding any particular face or for grinding each tooth of a cutter, the machine being provided with a hand wheel whereby the work may be turned during or subsequent to each grinding operation. A further object of the invention is to provide a universal grinder in which the lateral movement is combined in two controls one of which will give a fast lateral movement for a comparatively coarse adjustment and the other of which will give a comparatively slow lateral movement to allow fine adjustment. These objects and the several novel features of the invention are hereinafter more fully described and claimed and the preferred form of construction by which these objects are attained is shown in the accompanying drawings in which—

Fig. 1 is a side elevation of the grinder.

Fig. 2 is an end elevation thereof.

Fig. 3 is an enlarged section taken on line 3—3 of Fig. 2.

Fig. 4 is a section taken on line 4—4 of Fig. 3.

Fig. 5 is an enlarged section taken on line 5—5 of Fig. 1.

Fig. 6 is a section taken on line 6—6 of Fig. 5.

Fig. 7 is an enlarged section taken on line 7—7 of Fig. 1.

A standard 1 is provided as shown in Fig. 1 having a bracket 2 on the side thereof through which a vertical shaft 3 is threaded.

A bed 4 is provided on the side of the standard 1 and a table 5 is slidable vertically on the bed 4 and is provided with a bearing 6 for the upper end of the screw shaft 3 as shown in Fig. 2, the said screw shaft being provided with a collar 7 secured thereto on which the weight of the table 5 is supported. A bevel gear 8 is secured to the upper end of the screw shaft 3 and a bevel gear 9 meshes therewith and is secured to a horizontal shaft 10. This shaft 10 is provided with squared ends 11 and 12 by which the shaft 10 may be rotated to rotate the gears 8 and 9 which threads the shaft 3 up or down through the bracket 2 to raise or lower the table 5. The table 5 is provided with a horizontal bed 13 shown more particularly in Figs. 1, 2 and 5 and this bed 13 is provided with a longitudinal slot 14 as shown in Fig. 5 through which a screw shaft 15 extends. A swivel base comprising a plate 16 shown in Figs. 5 and 6 is slidably mounted on the bed 13 and is provided with a set screw 17 engaging a plate 18 for bindingly securing the base 16 at any position on the bed. A crank 19 is provided as shown in Fig. 1 having a square socket 20 adapted to fit the square end of the shaft 15 and by rotation of the crank 19 the threaded shaft 15 may be rotated to move the member 16 longitudinally thereof, the said shaft 15 being threaded through a depending lug on the member 16 provided in the longitudinal slot 14 as shown in Fig. 5. The plate 16 is provided with a circular inverted T shaped groove 22 into which bolts 23 may be inserted through the aperture 24 provided in the bottom of the said plate. These bolts 23 extend upwardly through a circular plate 25 and each bolt is provided with a nut 26 for binding the plate 25 in any position on the plate 16. The plate 25 is provided with graduations 27 as shown in Figs. 1 and 2 and a mark is provided on the edge of the plate 16 so that the plate 25 may be accurately set in position. The plate 25 is provided with an extension 28 at one side, as shown in Fig. 3, having a groove 29 provided with undercut sides in which a table 30 is slidably mounted and set screws 31 are provided by which the table 30 may be bindingly secured in the way 29.

The table 30 is provided with depending ends 32 and 33 in which a screw shaft 34 is rotatably mounted, the said screw shaft being provided with squared ends 35 on which the portion 20 of the crank 19 may be applied for rotating the screw shaft 34. A shaft 36 is rotatably mounted in the extension 28, as shown in Fig. 3, and is provided with a squared end 37 by which the shaft 36 may be rotated. A gear 38 is secured to the shaft 36 and meshes with the screw shaft 34 as shown in Figs. 3 and 4 and a split bushing comprising the two portions 39 and 40 shown in Fig. 4 is provided about the shaft 36. A set screw 41 is threaded into the portion 28 and engages the bushing 40 and by turning up the set screw 41 the bushings may be tightened to prevent rotation of the shaft 36, the set screw being provided with a lock nut 42 to hold the set screw at any adjustment. By loosening the set screw 41 the shaft 36 and gear 38 may be rotated to produce longitudinal movement of the screw shaft 34 and table 30 this arrangement providing a coarse adjustment for the table. By tightening the set screw 41 at this time the shaft 36 and gear 38 are held from rotation and by rotating the screw shaft 34 the threads thereon travel through the teeth of the gear 38 and provide a fine adjustment for the table 30. A bed 43 is secured to the table 30 as shown in Figs. 2 and 7 and a swivel base comprising a table 44 is slidably mounted thereon, adjusting screws 45 being provided for securing the table in any position on the bed. The bed 43 is provided with a longitudinal groove 46 and a pitman 47 extends into this groove and is pivoted to the member 44 by a screw 48. A lever 49 is pivoted to the base 43 at 50 and is pivoted to the arm 47 at 51 so that movement of the lever 49 moves the table 44 longitudinally of the bed 43. The table 44 is provided with a circular inverted T shaped groove 52 similar to the groove 22 shown in Fig. 6 and a pair of bolts 53 are mounted in this groove and extend upwardly through apertures provided therefor in a U shaped bracket 54 so that the said bracket may be turned on the table 44 and may be bindingly secured in position by the nuts 55. A casing 56 is pivotally mounted in the U shaped bracket 54 as shown in Figs. 1 and 2 and an electric motor is enclosed within the said casing and a grinding wheel 57 is secured to the end of the shaft of the electric motor. Any type of grinding wheel may be secured to the motor shaft depending upon the work to be done. By loosening the nuts 58 the electric motor and casing 56 may be turned in the U shaped bracket 54 to set the grinding wheel at any desired angle. On the upper part of the base 1 is a pair of brackets 59 and a guide rod 60 is slidably mounted in the upper end of these brackets, the set screws 61 being provided for securing the shaft 60

at any adjustment. An arm 62 is secured to the end of the shaft 60 and is provided with a dead center 63 which preferably extends on the longitudinal axis of the chuck plate 64. The work is mounted in a chuck which is secured to the chuck plate 64 and the end of the work is supported on the dead center 63. The chuck plate and chuck are rotatable by a hand wheel 65 and rotation of the hand wheel rotates the index plates 66 secured to the end of the hand wheel shaft which is rotatably mounted in the brackets 59. A dog 67, shown in Fig. 1, is pivotally mounted on one bracket 59 and engages the face of the index plate 66 which is provided with a series of apertures which are arranged circularly about the center of the index plate to receive the end of the dog 67. A lug 68 is provided on one bracket 59 and a spring 69 is mounted on the said lug and engages the dog 67 to hold the end thereof in engagement with one of the apertures in the index plate which prevents rotation of the index plate, and work being ground.

In operation by rotating the shaft 3 the grinding wheel may be moved vertically in either direction and by rotating the crank 20 the grinding wheel may be moved forward or away from the chuck plate 64. By loosening the nuts 26 the swivel base may be turned thus changing the angle of the beds mounted thereabove in relation to the work and by rotating the shaft 34 or 36 the grinding wheel may be moved transversely of the work and by moving the lever 49 the grinding wheel may be moved longitudinally of the work. When the swivel base 25 is turned the movement of the grinding wheel varies in relation to the work as the position of the beds 29 and 43 is varied and by turning the swivel base 44 and loosening the nuts 58 the grinding wheel may be presented to the work at any angle. With this construction the movement of the grinding wheel may be varied to any angle toward the work and the axis of rotation of the grinding wheel may be also varied to any position. By lifting the dog 67 out of the respective aperture in the index plate the hand wheel 65 may be turned to turn the work and index plate until the spring pressed dog 67 engages in the next succeeding aperture in the index plate. Different index plates may be used with this machine having apertures corresponding with the number of teeth to be ground so that each movement of the index plate presents a succeeding tooth or edge to be ground.

From the foregoing description it becomes evident that the device is very simple and efficient in operation, will not easily get out of order, is provided with a grinding wheel which may be adjusted to be fed from all angles and provides a device which accomplishes the objects described.

Having thus fully described my invention,

its utility and mode of operation, what I claim and desire to secure by Letters Patent of the United States is—

1. In apparatus of the character described,
 5 a standard, a table vertically adjustable on the side of the standard, a head secured to the standard and having a part extending over the table adapted to hold the work to be ground, a swivel base movable horizontally on
 10 the table parallel to the longitudinal axis of the work to be ground, a table movable horizontally on the swivel base, a second swivel base movable in a horizontal plane at a right angle to the movement of the horizontally
 15 movable table, a U shaped bracket mounted in vertical position on the second swivel base, an electric motor pivotally mounted in the said bracket to swing on a horizontal axis and provided with an extending shaft, a
 20 grinding wheel secured to the said shaft, manually operable means for turning the work while being ground, an index plate adapted to be turned with the work and provided with a series of apertures arranged
 25 in a circle about the center thereof, and a spring pressed dog adapted to engage in the said apertures to limit rotation of the work.

2. In apparatus of the character described, a standard, a table vertically adjustable on
 30 the side of the standard, a head secured to the standard and having a part extending over the table adapted to hold the work to be ground, a swivel base mounted to turn on a vertical axis and movable horizontally on the
 35 table parallel to the longitudinal axis of the work to be ground, a table movable horizontally on the swivel base, a second swivel base mounted to turn on a vertical axis and movable in a horizontal plane at a right angle to the movement of the horizontally movable
 40 table, an electric motor pivotally mounted on the second swivel base, and provided with an extending shaft, a grinding wheel secured to the said shaft, and manually operable means
 45 for turning the work while being ground.

3. In apparatus of the character described, a standard, a table vertically adjustable on the side of the standard, a head secured to the standard and having a part extending
 50 over the table adapted to hold the work to be ground, manually operable means for raising or lowering the table, a swivel base mounted to turn on a vertical axis and movable horizontally on the table parallel to the longitudinal
 55 axis of the work to be ground, manually operable means for moving the said swivel base, a table movable horizontally on the swivel base and provided with a longitudinal screw shaft, a shaft rotatably mounted in the swivel base extending at a right angle to the screw shaft, a gear on the said shaft meshing with the threads of the screw shaft, means for locking the gear and shaft from rotation, a
 60 second swivel base mounted to turn on a vertical axis and movable in a horizontal plane

at a right angle to the movement of the horizontally movable table, manually operable means for moving the second swivel base, a U shaped bracket mounted on the second swivel base, an electric motor pivotally
 70 mounted in the said bracket and provided with an extending shaft, and a grinding wheel secured to the said shaft.

4. In apparatus of the character described, a standard, a table vertically adjustable on
 75 the side of the standard, a head secured to the standard and having a part extending over the table adapted to hold the work to be ground, manually operable means for raising or lowering the table, a swivel base mounted
 80 to turn on a vertical axis and movable horizontally on the table parallel to the longitudinal axis of the work to be ground, manually operable means for moving the swivel base horizontally, a table movable horizontally on the swivel base, manually operable means for moving the said table, a second swivel base mounted to turn on a vertical axis and movable in a horizontal plane at a right angle to the movement of the horizontally movable
 85 table, manually operable means for moving the second swivel base, a U shaped bracket mounted on the second swivel base, an electric motor pivotally mounted in the said bracket and provided with an extending
 90 shaft, and a grinding wheel secured to the said shaft.

5. In apparatus of the character described, a standard, a table vertically adjustable on
 100 the side of the standard, a head secured to the standard and having a part extending over the table adapted to hold the work to be ground, a swivel base mounted to turn on a vertical axis and movable horizontally on the table parallel to the longitudinal axis of the work to be ground, a table movable horizontally on the swivel base, a second swivel base mounted to turn on a vertical axis and movable in a horizontal plane at a right angle to the movement of the said table, an electric
 105 motor pivotally mounted on the second swivel base and provided with an extending shaft, and a grinding wheel secured to the said shaft.

6. In apparatus of the character described,
 115 a standard, a table vertically adjustable on the side of the standard, a head secured to the standard and having a part extending over the table adapted to hold the work to be ground, a swivel base mounted to turn on a vertical axis and movable horizontally on the table parallel to the longitudinal axis of the work to be ground, a table movable horizontally on the swivel base mounted to turn on a vertical axis and a second swivel base movable in a horizontal plane at a right angle to the movement of the horizontally movable
 120 table, an electric motor pivotally mounted on the second swivel base to swing in a vertical plane and provided with an extending shaft
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and a grinding wheel secured to the said shaft and adapted to rotate in a vertical plane at a right angle to the vertical plane through which the electric motor is adapted to swing.

5 In testimony whereof I sign this specification.

EDD C. OLIVER.

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