Aug. 30, 1949. H. E. TRESIDDER 2,480,618

WORK HOLDER FOR GRINDING PROFILES

Filed June 27, 1946 5 Sheets-Sheet 1

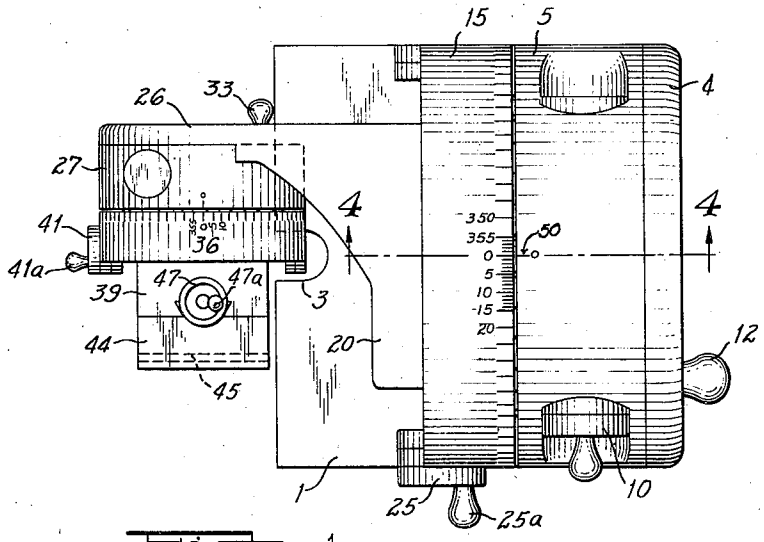


Fig. 1.

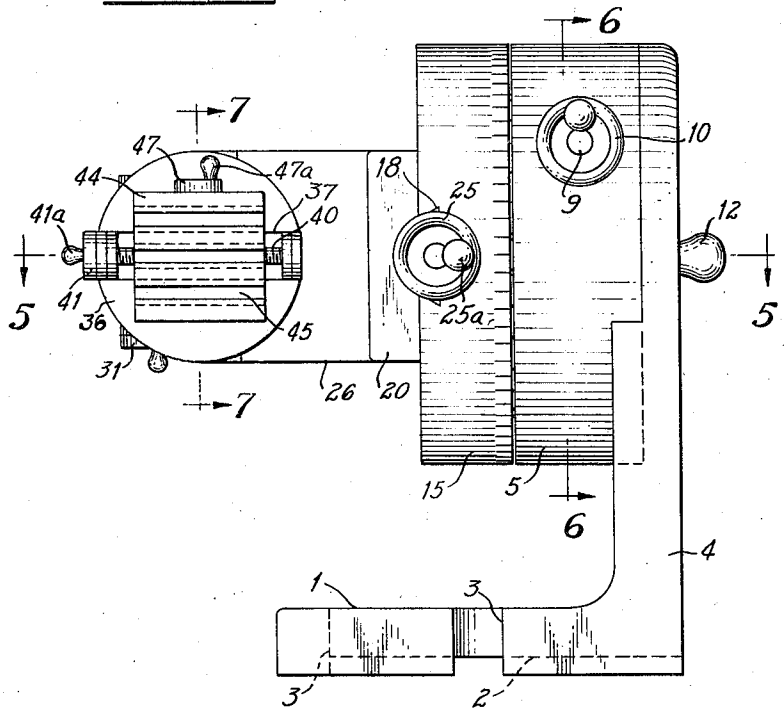


Fig. 2.

INVENTOR.
Herbert E. Tresidder
BY
J. S. Murray
ATTORNEY

Aug. 30, 1949. H. E. TRESIDDER 2,480,618

WORK HOLDER FOR GRINDING PROFILES

Filed June 27, 1946 5 Sheets-Sheet 2

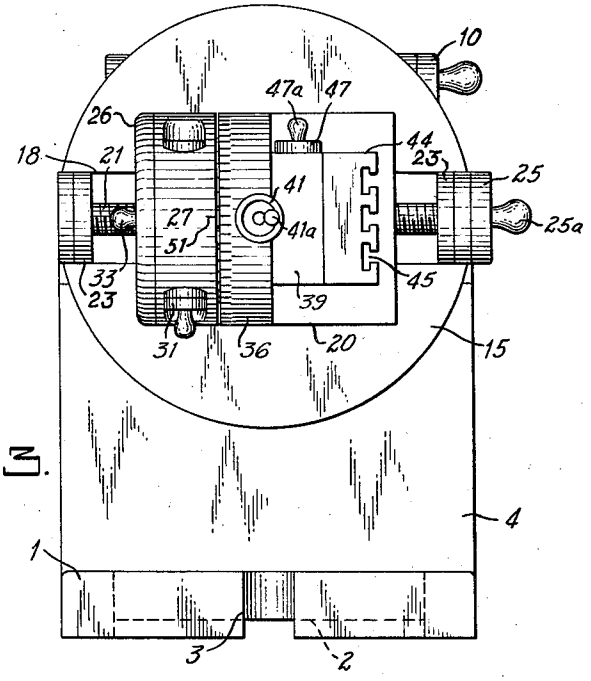


Fig. 3.

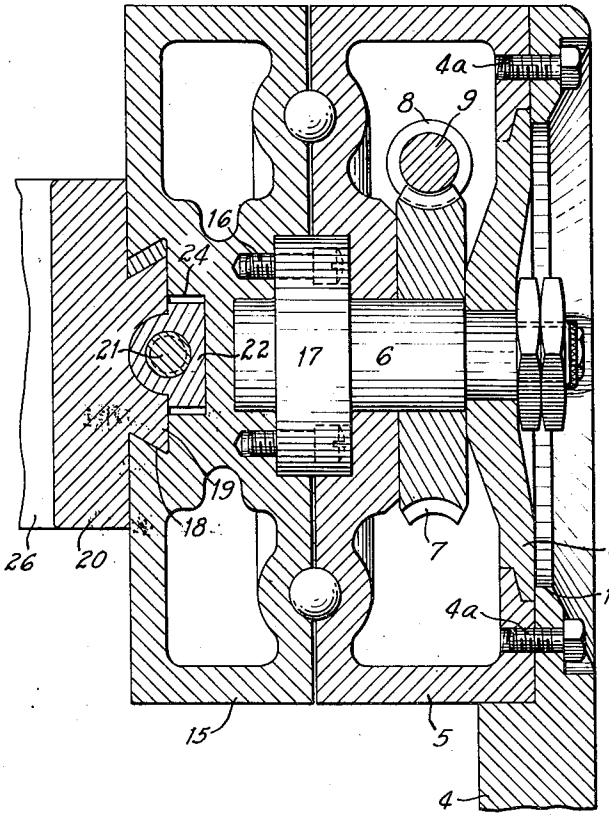


Fig. 4.

INVENTOR.
Herbert E. Tresidder

BY

J. S. Murray
ATTORNEY

Aug. 30, 1949. H. E. TRESIDDER 2,480,618

WORK HOLDER FOR GRINDING PROFILES

Filed June 27, 1946 5 Sheets-Sheet 3

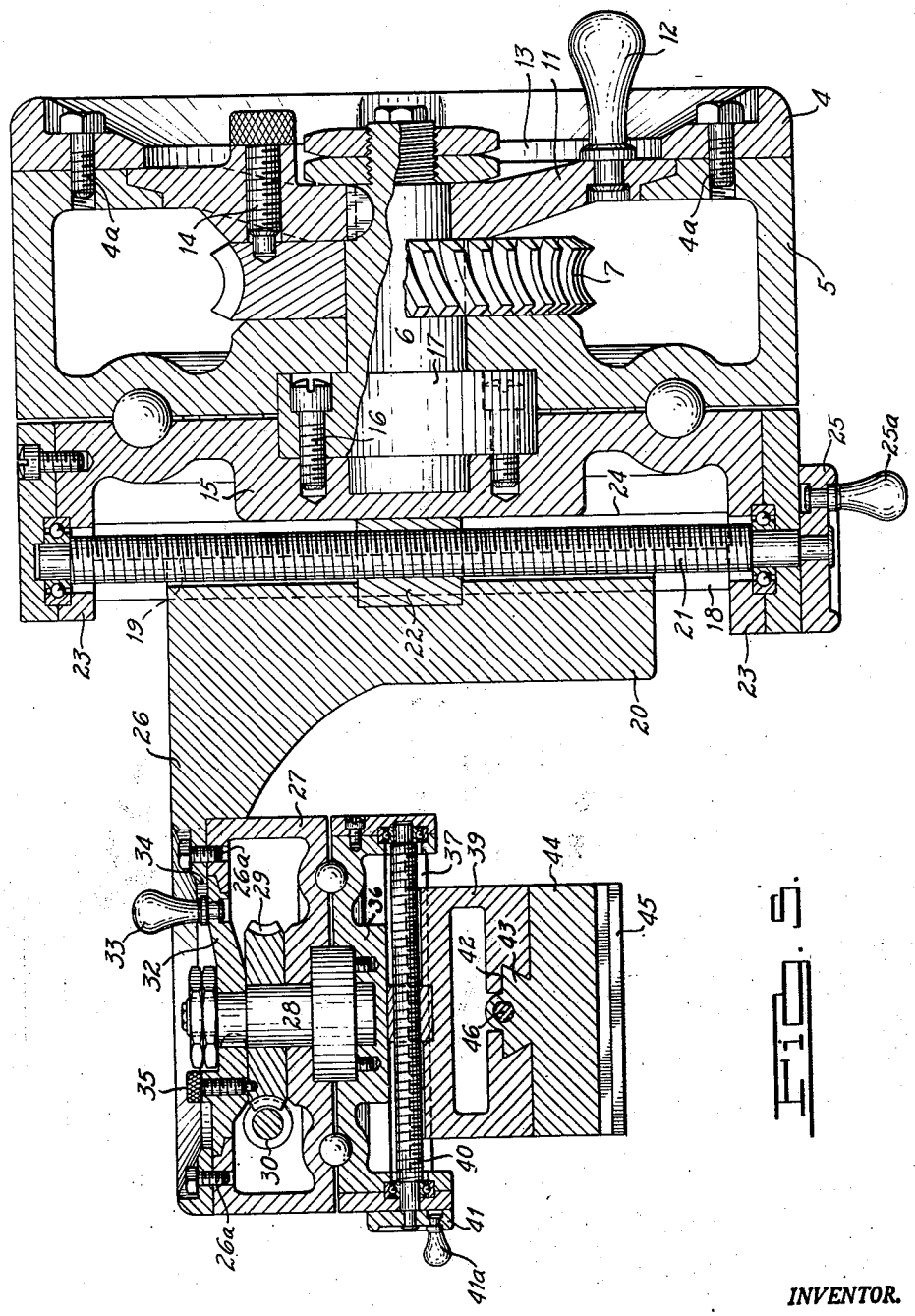


Fig. 5.

INVENTOR.
Herbert E. Tresidder
BY
J. S. Murray
ATTORNEY

Aug. 30, 1949. H. E. TRESIDDER 2,480,618

WORK HOLDER FOR GRINDING PROFILES

Filed June 27, 1946 5 Sheets-Sheet 4

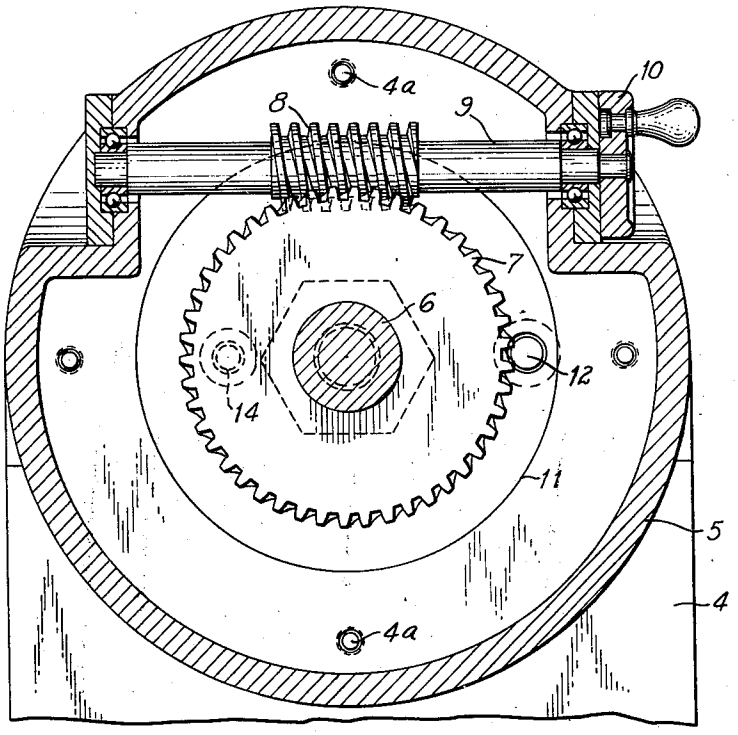


Fig. 6.

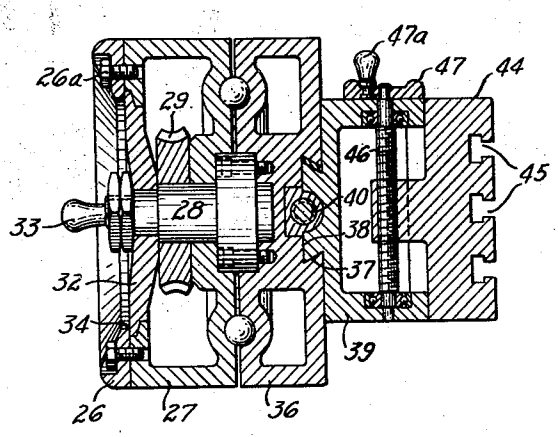


Fig. 7.

INVENTOR.
Herbert E. Tresidder
BY
J. S. Murray
ATTORNEY

Aug. 30, 1949. H. E. TRESIDDER 2,480,618

WORK HOLDER FOR GRINDING PROFILES

Filed June 27, 1946 5 Sheets-Sheet 5

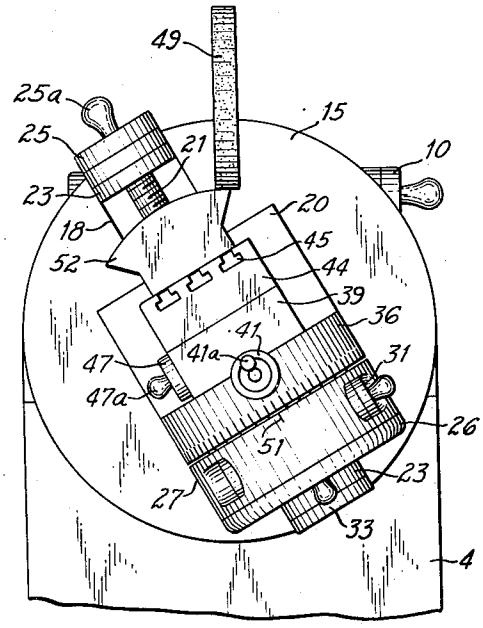


Fig. 8.

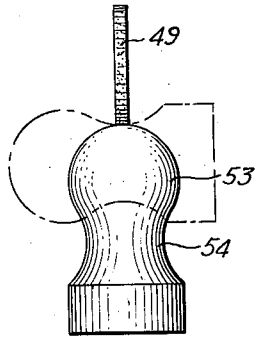


Fig. 11.

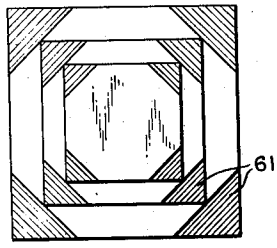


Fig. 12.

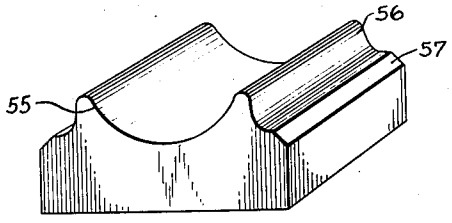


Fig. 9.

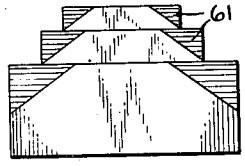


Fig. 13.

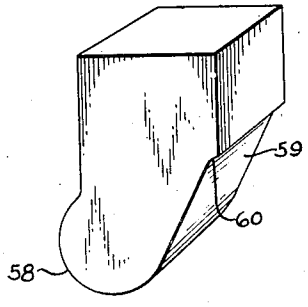


Fig. 10.

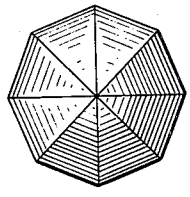


Fig. 14.

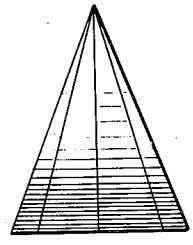


Fig. 15.

INVENTOR.
Herbert E. Tresidder
BY
J. S. Murray
ATTORNEY

Patented Aug. 30, 1949 2,480,618

UNITED STATES PATENT OFFICE

2,480,618

WORK HOLDER FOR GRINDING PROFILES

Herbert E. Tresidder, Royal Oak, Mich.

Application June 27, 1946, Serial No. 679,820

6 Claims. (Cl. 51—237)

1

This invention relates to adjustable work holders and particularly holders adjustable to vary presentation of work to a surface grinder.

The object of the invention is to provide a work holder having such extensive adjustments for variously presenting work to a grinding wheel as to largely eliminate the common practice of dressing grinding wheels to a profile determined by the work.

More specifically, the invention has for its objects, the provision of a holder adapted to undergo a wide range of diverse rotary and sliding motions with respect to a grinding wheel, such that almost any desired work profile may be ground by proper manipulation of the holder without departing from standard types of grinding wheels.

These and various other objects are attained by the construction hereinafter described and illustrated in the accompanying drawings, wherein:

Fig. 1 is a top plan view of my improved work holder.

Fig. 2 is a side elevational view thereof.

Fig. 3 is a front view of the holder.

Fig. 4 is an axial vertical sectional view taken on the line 4—4 of Fig. 1.

Fig. 5 is an axial horizontal section, taken on 5—5 of Fig. 2.

Fig. 6 is a vertical cross section taken on 6—6 of Fig. 2.

Fig. 7 is a vertical cross section taken on 7—7 of Fig. 2.

Fig. 8 is a front view differing from Fig. 3 as to the illustrated position of the work-holding slide and showing a work piece being ground.

Figs. 9 and 10 are perspective views of different types of profiled pieces, such as my work holder makes available.

Fig. 11 is an elevational view of another type of work piece suited to production by my work holder.

Figs. 12 and 13 are respectively a top plan view and a side view of a complex grinding job to which my holder is suited.

Figs. 14 and 15 are top and side views of another ground piece illustrating the possibilities of this work holder.

In these views, the reference character 1 designates a base plate adapted by keyways 2 and bolt holes 3, for rigid mounting on the table of a grinding machine (not shown). Integrally upstanding from a margin of the plate 1 is a plate 4, on the upper portion of which there is rigidly mounted by screws 4a a forwardly projecting circular casing 5, upwardly spaced from and axially

2

parallel with said base plate. The parts 1, 4 and 5 jointly form a mounting for mechanism now to be described. Journaled in said casing at its axis is a shaft 6 loosely mounting a wormwheel 7 adapted to be driven by a worm 8. The shaft 9 of such worm rigidly carries a crank disk 10 exposed through the outer periphery of the casing, to afford a manual drive to the worm. The drive to the shaft 6 through the worm and worm wheel is, of course, quite gradual, and it is desirable at times to turn said shaft rapidly. Hence there is fixed on the shaft a large crank disc 11, the handle 12 of which is accessible through and orbitally revoluble in a circular opening 13 in the top portion of the plate 4, such disk serving as a rotative closure for such opening. To afford actuation of the shaft 6 by the disk 11, it is necessary first to overcome the locking effect of the worm and worm wheel. This is accomplished by partially withdrawing from the disk 11 a screw 14 having its inner end normally socketed in the wormwheel and forming with said disk a drive connection from the wormwheel to the shaft.

Fixed on the shaft 6 and rotatively engaging the front of the casing 5 is a circular table 15, preferably equal in diameter to the casing. As illustrated, this table is secured by screws 16 to an annular flange 17 on the shaft. Diametrically extended across the front face of said table is a dovetail groove 18, slidably receiving a correspondingly shaped tongue 19 on a plate 20 seated against said table. The plate 20 is adapted to be fed along the grooved diameter of the table by a screw 21 engaging a nut 22 fixed on said plate, such screw being journaled at the ends of the groove 18 in lugs 23 on said table, the groove having a relatively deep mid portion 24 to accommodate the screw and nut. A crank disc 25 with handle 25a is fixed on an end of said screw for effecting the described feed.

Rigidly and marginally carried by the plate 20 and projecting forwardly therefrom is a support 26 to which is secured by bolts 26a a circular casing 27 axially transverse to the casing 5. The parts 20, 26, and 27 jointly form a slide adjustable across the table 15. At the axis of the casing 27 is journaled a shaft 28 mounting a wormwheel 29 in said casing. A worm 30 driving such wormwheel and journaled in the casing, carries an actuating crank disk 31 exposed through the outer periphery of the casing. To permit a relatively rapid rotative actuation of the shaft 28, the latter rigidly carries a crank disk 32 of which the handle 33 is accessible through and orbitally revoluble in a circular opening 34 in the support

26, said disk forming a closure for such opening. A screw 33 normally secures the wormwheel 29 to the disk 32 and may be withdrawn from the wormwheel when the disk is required to rotate the shaft independently of the worm and wormwheel.

Fixed on the shaft 28 and rotatively engaging the casing 27 is a second circular table 36 preferably equal in diameter to said casing. The face of such table remote from the casing is diametrically formed with a dovetail groove 37, slidably receiving a correspondingly shaped tongue 38 on a slide 39 adapted to be fed across the table 36 by a screw 40 recessed in such table and rotatable by a crank disk 41 having a handle 41*a*. The face of the slide 39 opposed to that engaging the table 36 is diametrically grooved as at 42 transversely to the tongue 38 of said slide to receive a tongue 43 on a work-receiving slide 44 formed with T slots 45 facilitating the rigid attachment of work to such slide. The slide 44 may be selectively shifted outwardly and inwardly from the axis of the circular table 36 by a screw 46 rotative by a crank disk 47 having a handle 47*a*, it being important to note that the radial shifting effected by the screw 46 is transverse to that effected by the screw 40.

In use of the described work holder, a piece of work such as is exemplified at 52 (Fig. 8), mounted on the slide 44 may be cylindrically ground by gradually rotating either of the tables 15 and 36 on its axis while such work engages a driven grinding wheel 49. The radius to which the wheel-engaging work face will be ground is determined by spacing of such face from the axis of rotation, such spacing being selectively established by turning of the corresponding feed screw. By such turning, the slide operable by said screw and all parts carried thereby are fed diametrically across such table. Manipulation of the screw 40 and resultant shifting of the slide 39 affords a somewhat finer adjustment than results from sliding the plate 20, since the latter is actuated by a relatively coarse feed screw, a larger grinding radius, however, being available from the last-mentioned screw. According as the surface to be profiled is shifted to one side or the other of the axis of work rotation, such surface is ground to a convex or concave cylindrical form, the arcuate extent of the area ground being regulated by the angle through which the table 15 or 36 is rotated. This angle may be very accurately controlled, since a scale of three hundred and sixty degrees is marked on the periphery of each rotary table and corresponding index lines 50 and 51 are marked respectively on the casings 5 and 27.

When a required work profile includes an arcuate surface merging tangentially into a plane face, the arcuate face is ground as has been described, by rocking one of the rotary tables through the proper arc, and the required tangential feed is then applied by shifting the slide mounted on such table a suitable distance. In this same manner, a series of arcs with intervening tangents may be ground, and merged perfectly one into the other.

Spherical surfaces may be ground by simultaneously rotating both tables 15 and 36 while engaging the work with the grinding wheel, the slides engaging such tables being adjusted to establish equal radii.

Sliding adjustability of the work-receiving slide with respect to its supporting slide 39 is primarily useful in permitting repetition on a piece of work, of a profile form for which one or both of

the slides 39 and 20, 26, 27 are set, as for example when a surface requires several spaced parallel arcuate beads or channels.

Setting up work is greatly facilitated by providing, when desired, for a rapid rotative adjustment of either table, as when the tables are turned by their crank handles 12 and 33. The much more gradual rotation derived from the worm and wormwheel drive is suited to the actual grinding of a radius.

The dressing of grinding wheels to a desired work contour generally requires considerable time and skill, in addition to a fairly costly machine, and a wheel dressed to a certain profile is unsuited for any other grinding uses. In many shops, a large number of dressed grinding wheels, each suited to a single profiling job occasionally required, represent a heavy investment. Hence a machine eliminating necessity for grinding wheel dressing affords a highly desirable economy. Necessity for dressing a grinding wheel works a particular hardship on a manufacturer or tool and die shop, when the piece to be profiled is required only in a small quantity.

While profiles are not necessarily produced by a dressed grinding wheel, the laborious and tedious matter of resetting the piece each time a different radius is employed or a tangent is required is generally less economical than the dressing operation.

Extensive range of profiles which the described work holder makes available is well shown by Figs. 8–15 inclusive. Fig. 8 shows a work piece 52 positioned for grinding of a convexly arcuate surface through rotary actuation of the table 15.

Fig. 9 perspectively shows a piece of work exemplifying the adaptability of my work holder to the grinding of smoothly merging reverse curves. Thus a channel 55 is formed between two ribs 56, the channel having a concave curvature merging into the relatively small radius convex curvatures of the ribs. The outer faces of the ribs are concavely curved to a radius differing from that of the other curves, and plane panels 57 at opposite sides of the ribs angularly intersect the concave outer faces of the ribs.

Fig. 10 perspectively shows a work piece ground to a cylindrical curvature at 58, such curvature merging smoothly into a plane face 59, which in turn merges into a relatively small radius concave surface 60.

Fig. 11 exemplifies a job entailing a convex spherical face 53, merging into a concavely circular face 54.

Fig. 12 is a top plan view and Fig. 13 a side elevation of a stepped frusto-pyramid of generally rectangular form but having the corners of its steps ground away to form triangular facets 61, similarly inclined to the vertical axis of the pyramid. This illustrates how the holder may rotatively index a piece to establish positions for forming equiangularly spaced faces, which may be inclined as desired to the axis about which the piece is indexed.

Figs. 14 and 15 are respectively a top plan view and side elevation of an equilateral eight-sided pyramid, further illustrating the adaptability of my work holder to derive an indexing function from one rotary table while the other provides a desired inclination to the axis of the piece for grinding lateral faces thereof. Any pyramidal or frusto-pyramidal form can be readily produced by the improved holder.

The high versatility of the described work holder is its primary advantage, there having been

no prior holder suited to produce either cylindrical convexities or concavities, with accurate tangents to either, and further suited to produce either spherical convexities or concavities. It is further believed original and highly desirable to permit a piece of work to be ground, without resetting, with arcuate surfaces having relatively transverse axes of curvature. It is moreover important to note that this holder permits of grinding many peculiar forms that cannot be achieved by dressing a grinding wheel.

What I claim is:

1. In a holder for work to be ground, a rotary table, a worm and wormwheel drive for the table, a crank disk coaxial with and forming an alternative drive for the table, a mounting for the table encasing said worm and wormwheel and comprising an opening closed by said disk, a handle disposed in said opening for rotating the disk, and means for attaching work to the table.

2. In a holder for work to be ground as set forth in claim 2, a drive connection from the wormwheel to the disk, releasable to afford actuation of the table by the disk, independently of the worm and wormwheel.

3. In a holder for work to be ground, a shaft, a rotary table fixed on said shaft, a wormwheel loose on the shaft, a worm meshing with the wormwheel, means for manually rotating the worm wheel, a mounting for said shaft encasing the worm and wormwheel, a crank disk fixed on said shaft for driving the table independently of the worm and wormwheel, and a releasable drive connection from the wormwheel to the disk, whereby the disk forms a means for driving the shaft from the wormwheel or for driving the shaft independently of the wormwheel, and means for attaching work to said table.

4. In a holder for work to be ground, a rotary table, a mounting for such table, means for manually rotating the table on its mounting, a slide mounted on the table, means on the table for guiding the slide across the axis of table rotation, a second rotary table mounted on said slide to rotate about an axis transverse to that of the first-mentioned table, a second slide mounted on and movable across the axis of the second table, and a work-receiving slide mounted on the second slide for travel transverse to that of the second slide.

5. In a holder for work to be ground, a rotary table, a mounting for such table, means acting

at the axis of rotation of said table for rotating the table on said mounting, a slide mounted on the table, a guideway for said slide carried by the table in a substantially diametrical relation to said axis of rotation, a speed-reducing means for actuating the slide along the guideway, a second rotary table mounted on said slide with its axis of rotation transverse to the first-mentioned axis, means acting at the axis of rotation of the second table for rotating such table, a second slide mounted on the second table, a guideway for the second slide carried by the second table in a substantially diametrical relation to the axis of rotation of such table, speed-reducing means for actuating the second slide along its guideway, and means for attaching work to the second slide.

6. In a holder for work to be ground, a rotary table, a mounting for such table, means for manually rotating said table on its mounting, a slide mounted on said table, means on said table for guiding the slide in a rectilinear travel diametrical to the axis of table rotation, a speed-reducing means for actuating the slide in such travel, a second rotary table mounted on said slide to rotate about an axis in fixed parallelism to said rectilinear travel, a second slide mounted on the second table, means on the second table for guiding the second slide in travel diametrical to the axis of rotation of such table, a speed-reducing means for actuating the second slide, and means for attaching work to the second slide.

HERBERT E. TRESIDDER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
767,387	Chard	Aug. 16, 1904
1,414,970	Nelson	May 2, 1922
1,783,540	Hogg et al.	Dec. 2, 1930
2,048,462	Orcutt	July 21, 1936
2,214,166	Hertlein	Sept. 10, 1940
2,286,709	Barcus	June 16, 1942
2,394,202	Pollard	Feb. 5, 1946

FOREIGN PATENTS

Number	Country	Date
344,811	Germany	Dec. 1, 1921