G. A. SQUIER.

MACHINE FOR TRUING GRINDING DISKS.

APPLICATION FILED MAR. 25, 1918.

1,309,264.

Patented July 8, 1919.

2 SHEETS—SHEET 1.

Fig. 1.

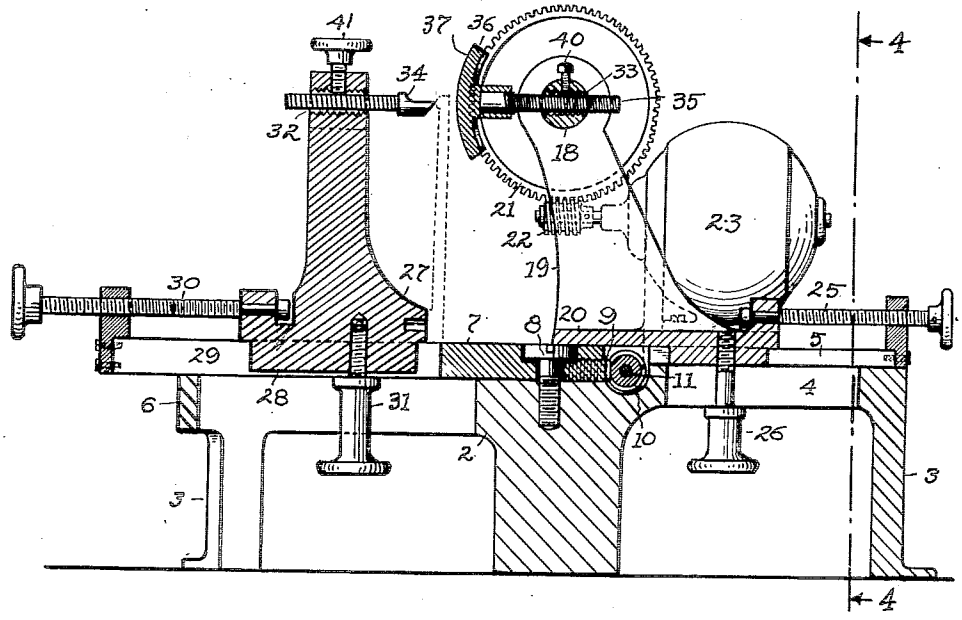
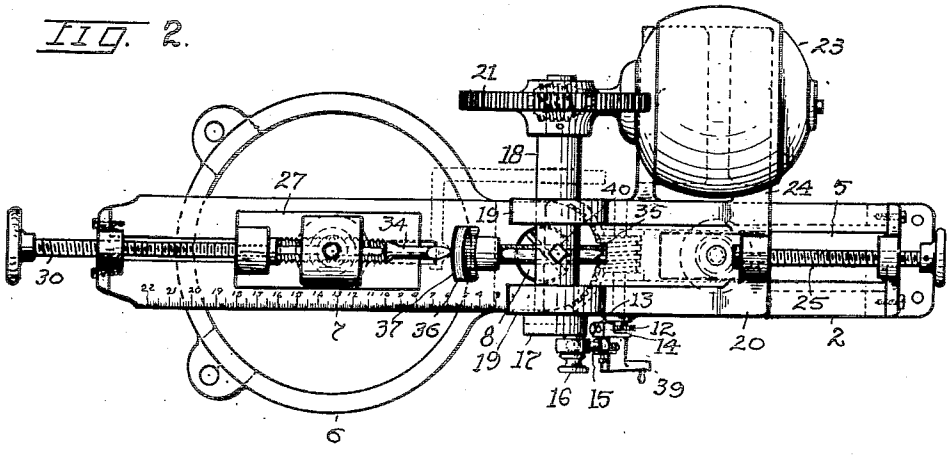


Fig. 2.



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2 SHEETS—SHEET 2.

FIG. 3.

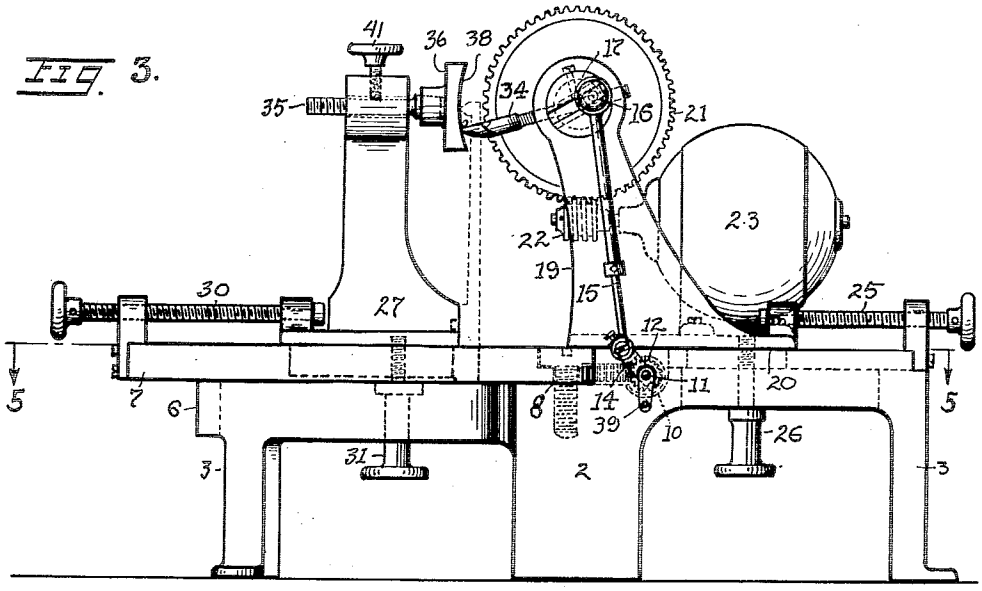


FIG. 4.

FIG. 5.

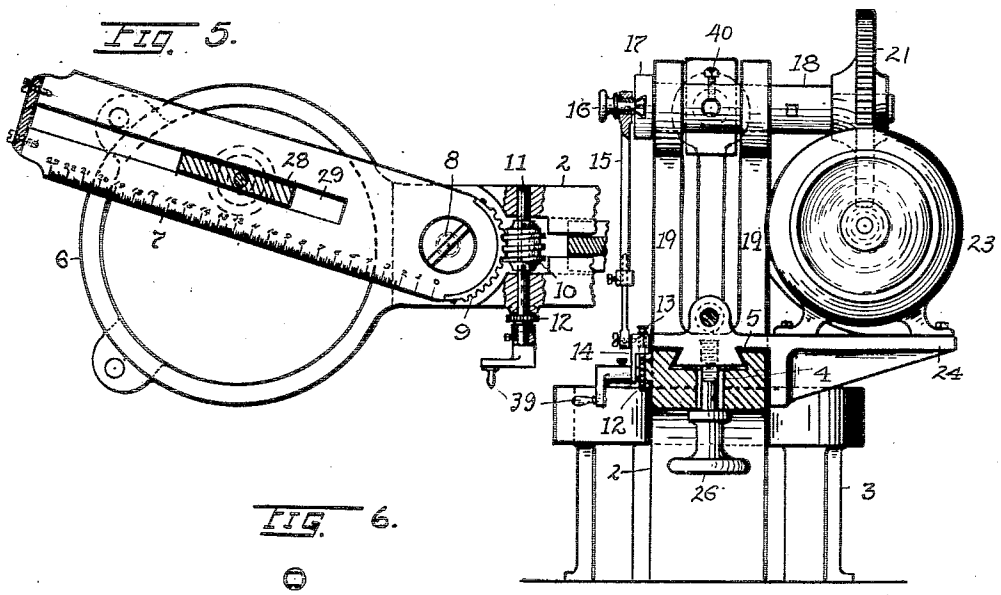


FIG. 6.

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MACHINE FOR TRUING GRINDING-DISKS.

1,309,264. Specification of Letters Patent. Patented July 8, 1919.

Application filed March 25, 1918. Serial No. 224,668.

To all whom it may concern:

Be it known that I, GEORGE A. SQUIER, citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Machines for Truing Grinding-Disks, of which the following is a specification.

This invention relates to a machine for truing grinding disks, and the machine is particularly constructed to produce either a concave or convex surface having a curvature of different radius in one plane than in another plane at right angles thereto, and means are also provided to adjustably position the work and the cutting tool relatively to each other and to given axes of rotation so that a curved surface of any desired radius may be produced in either of the two planes of curvature in the grinding disk.

The grinding disks used for grinding lenses for spectacles and eye glasses vary greatly in formation and are of great number, and the wholesale and retail optical establishments purchasing and using such disks have no accurate and satisfactory way of regrinding the curved surfaces thereof after the loss of their exactness of curvature caused by the employment of the abrasive used in grinding the lenses. As a result under present conditions, thousands of lenses are ground imperfectly because of the inability of optical establishments to regrind and true the grinding disks to the exactness required. The object of my invention is to overcome the conditions aforesaid and provide a simple and inexpensive machine adapted to be used by lens grinders to restore worn grinding disks to their original true curvature, regardless of the radius of curvature of any given disk or the difference in radii of two curved surfaces in different planes in any given grinding disk.

In the accompanying drawings, Figure 1 is a vertical section longitudinally through the center of the machine, and Fig. 2 is a top plan of Fig. 1, and in both figures the cutting tool is shown supported to swing in a horizontal plane and the grinding disk is of convex form and supported to rotate in a vertical plane. Fig. 3 is a side view of the machine, with the cutting tool supported to rotate in a vertical plane and with a concaved grinding disk supported to swing in a horizontal plane opposite the tool. Fig. 4 is a transverse section on line 4—4, of Fig. 1, and Fig. 5 is a plan view and section showing the turn-plate and worm gearing for producing a movement in a horizontal plane of the tool or work carried in and by the post on the turn-plate. Fig. 6 is an end view of the flat-sided shank used for the tool and also the work-holder.

The machine comprises a table or base 2 supported on suitable legs 3, and one end portion of this table is relatively narrow and elongated and provided with a slot 4 and a dove-tailed channel 5 longitudinally thereof, while the other end of the table is in the form of an open ring 6 having a level surface at its top lying in a lower plane than the upper flat surface of the main body of the table. A slotted bar or turn-plate 7 rests upon ring 6 and turns on a pivot 8 located midway on the longitudinal median line of the table. Turning of the plate is accomplished by a worm pinion 10 meshing with gear teeth 9 on the rounded edge of the plate, and this pinion is mounted on a rotatable shaft 11 extending transversely through the table. An intermittent rotation of the shaft is obtained by a ratchet wheel 12, a ratchet bolt or dog 13 carried on an arm 14 free to oscillate on shaft 11, and by a telescopic link 15 connecting said arm with an eccentric or crank pin 16 adjustably fixed in a disk 17 on one end of a shaft 18 rotatably mounted in a pair of upright arms 19 forming part of a slide 20 which is seated in the dove-tailed channel 5 of table 2. Shaft 18 carries a gear 21 in mesh with a pinion 22 driven by an electric motor 23 which rests on a side bracket 24 also forming part of slide 20 and therefore movable therewith, and for convenience of shifting and setting I employ a hand screw 25 in swiveled connection with the slide. A hand screw 26 is also used to fasten the slide after a fine adjustment has been obtained by screw 25, and it should be noted that the adjustment of the slide is in a direct line with the pivot 8 for the turn-plate 7, and that the latter also supports a slide 27 carrying a tool post or workholder. Slide 27 is seated on the turn-plate and has a straight rib 28 at its bottom operating in a slot 29 extending lengthwise of the turn-plate, and a longitudinal movement and a fine adjustment of holder 27 is obtained by a hand screw 30 in swiveled connection with said

slide. A hand screw 31 fixes the slide on its seat after adjustments, and the open space within the ring 6 affords all the clearance necessary for the set screw in its movement with the turn-table.

The post or standard on slide 27 has a screw-threaded opening 32 in its upper end lying in the same plane and coincident with the axis of a screw-threaded opening 33 extending crosswise through the rotatable shaft 18 carried by the first slide 20, and either one of these openings may be utilized to seat a cutting tool 34 therein or the screw-threaded stem 35 of a simple form of holder or chuck for a grinding disk 36 which may possess either a convex grinding surface 37 as shown in Fig. 1 or a concave grinding surface 38 as disclosed in Fig. 3.

In truing a convex disk the cutting tool 34 is secured in the holder 27 and the disk is affixed to the holder or chuck stem 35 secured in shaft 18. Then the disk-holding stem is rotated in its threaded seat in the shaft until the convex surface of the disk is placed at a predetermined distance from the shaft axis, this distance being measured by a suitable gage, see dotted lines, Fig. 2. The position of the disk relatively to the shaft axis determines the radius of curvature to be given to the grinding surface of the disk measured in the plane of rotation of the stem and disk, allowance being made for the depth of cut by the tool. The depth of cut may be fixed definitely by shifting slide 20 relatively to the tool, all without changing the radius of cut. But the curvature of the grinding surface transversely of the disk is of an entirely different radius than the curved surface longitudinally of the disk, excepting when the grinding surface is spherical. Consequently there must also be a common adjustment of both slides 20 and 27 relatively to the pivot 8 of the turn-plate 7 so that the cutting tool will traverse an arc at its cutting point corresponding exactly to the curvature desired or to be given to the grinding surface of the disk transversely thereof. By setting the tool holder or slide 27 or the tool 34 nearer pivot 8 the tool point will describe an arc of smaller radius than where said parts are placed farther from said pivot, in this way cutting or truing the grinding surface to any desired radius of curvature within the limits of the machine, regardless of the difference in the radius of curvature of the grinding surface longitudinally of the disk.

In grinding a concaved disk it is only necessary to transpose or exchange the respective positions of the tool and disk holder, and rotate the tool in one plane while moving the disk at intermittent intervals in another plane at right angles and in an arc having pivot 8 as the axis of movement. This setting of parts is shown in Fig. 3, and the respective slides supporting the tool and disk holding parts may be placed different distances from each other and from pivot 8, and the cutting tool may be adjusted radially inward or outward relatively to the axis of shaft 18, whereby the truing of the concaved surface of any grinding disk, having differences in radii transversely and longitudinally of the disk, may be accurately and efficiently performed.

The slides may be fed or adjustably shifted by any suitable means other than the screws 25 and 30, and gage marks 38 may be provided on the turn-plate and other parts to determine an accurate setting of the slides for truing any given grinding disk. A crank handle 39 may also be used to rotate gear-shaft 10 independently of the ratchet mechanism, and the threaded stems of tool 34 and the chuck or holder 35 may be flattened at one or more places and screws 40 and 41 used opposite thereto to lock them in any desired adjusted position.

What I claim is:

1. In a machine for producing curved surfaces of different radii in different planes, separate supporting devices for the cutting tool and the work mounted to rotate and turn in separate planes at right angles to each other and each adjustable relatively toward and away from each other and the axis of turning movement of one of said devices.

2. A machine for producing curved surfaces of different radii at right angles relatively to each other comprising a cutting tool, means to revolve said tool repeatedly in a circular path, an adjustable support for said means, a work-holder adjustably mounted opposite said tool and means to move said work-holder in a circular path lying in a plane at right angles to the plane of circular movement of said tool.

3. A machine for truing grinding disks comprising means to rotate either a cutting tool or a grinding disk in one plane of rotation, an adjustable support for said means, means to carry either a cutting tool or a grinding disk in a circular path in another plane lying at right angles to said first plane, and each of said means being capable of adjustment relatively toward and away from the other means.

4. A machine for truing grinding disks comprising means for holding and rotating either a cutting tool or a grinding disk about a horizontal axis and adjustably at variable distances therefrom, in combination with means for holding and turning either a cutting tool or a grinding disk about a vertical pivot and adjustably at variable distances therefrom.

5. A machine for truing grinding disks, comprising separate slides each adjustably positioned in respect to the other, means on

one slide adapted to rotate either a cutting tool or a grinding disk continuously, and means to impart an arc movement to said other slide opposite said rotating means.

6. A machine for truing grinding disks, comprising a slide and a rotatable shaft carried thereby, a pivoted plate and a slide mounted thereon, and separate means adjustably mounted on said shaft and last named slide for holding a cutting tool and grinding disk in operating relation at varying distances from the shaft.

7. A machine for truing grinding disks, comprising a shaft and means to rotate the shaft, an adjustable support for said shaft and means, a turn-plate and an adjustable holder on said plate, and means to secure either a cutting tool or a grinding disk adjustably on either said holder or shaft.

8. A machine for truing grinding disks, comprising a rotatable shaft and a turn-plate and means to impart an intermittent movement to said turn-plate during constant rotation of said shaft, said shaft and turn-plate being adjustable relatively to each other each having means to adjustably support either a cutting tool or a grinding disk thereon.

9. A machine for truing grinding disks, comprising a rotatable holding means and an adjustable support therefor, a second holding means adjustably supported relative to said rotatable means and adapted to turn on a pivot and traverse a circular path opposite said rotatable holding means, and means to adjustably secure either a cutting tool or a grinding disk in either of said holding means.

10. A machine for truing grinding disks, comprising a table, a slide adjustably mounted on said table, a turn-plate pivoted on said table opposite said slide, a second slide upon said turn-plate, a shaft carried by said first slide, means to rotate said shaft, mechanism operated by said shaft to actuate said turn-plate, and adjustable means on said second slide and also the shaft to hold either a cutting tool or a grinding disk.

11. A machine for truing grinding disks, comprising a table and a slide thereon carrying a motor and a rotatable shaft in gear with said motor, in combination with a turn-plate and gear mechanism to turn said plate having a take-up operating connection with said shaft.

Signed at Cleveland, in the county of Cuyahoga and State of Ohio, this 20th day of March, 1918.

GEORGE A. SQUIER.