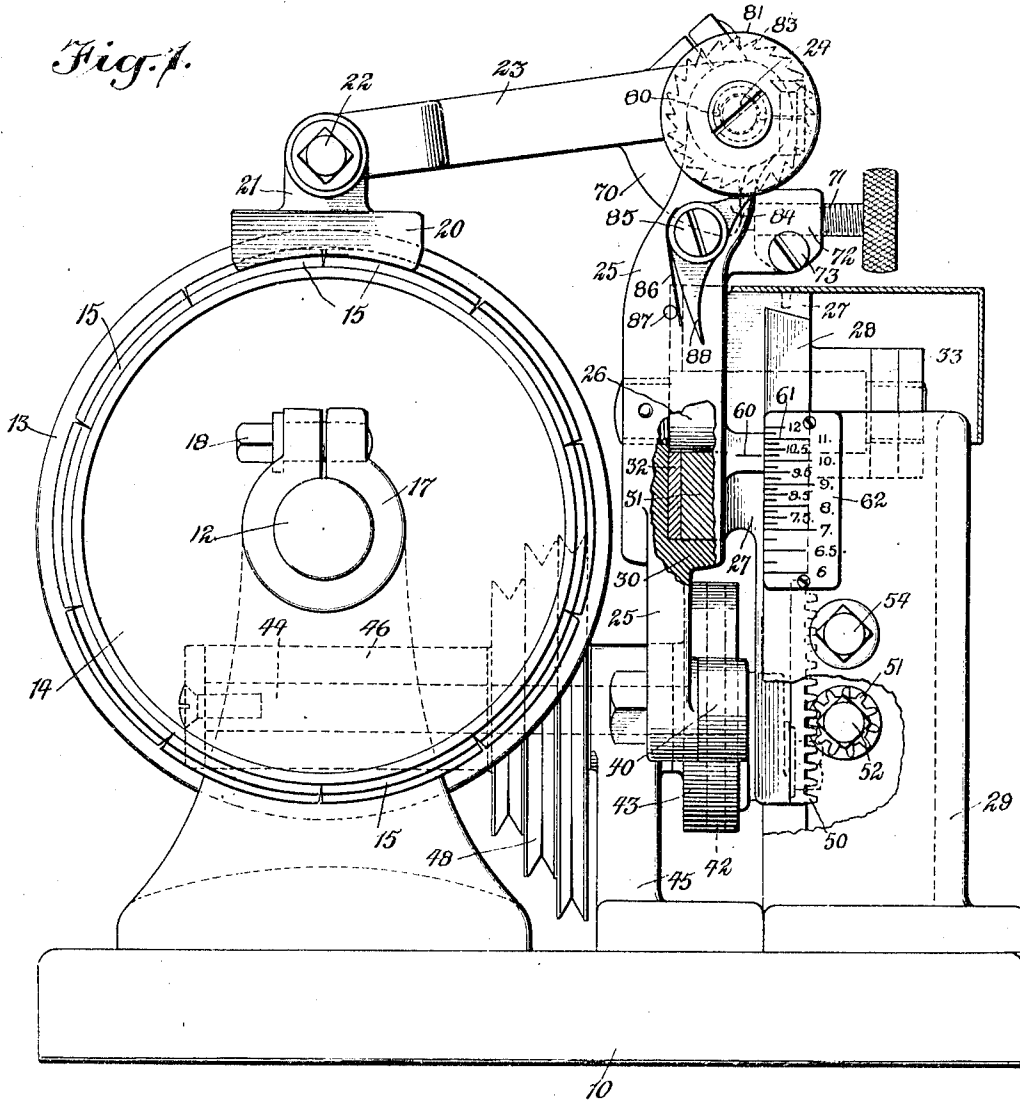


H. KRIEGER.
LENS GRINDING MACHINE.
APPLICATION FILED FEB. 18, 1919.

1,313,702.

Patented Aug. 19, 1919.
3 SHEETS--SHEET 1.



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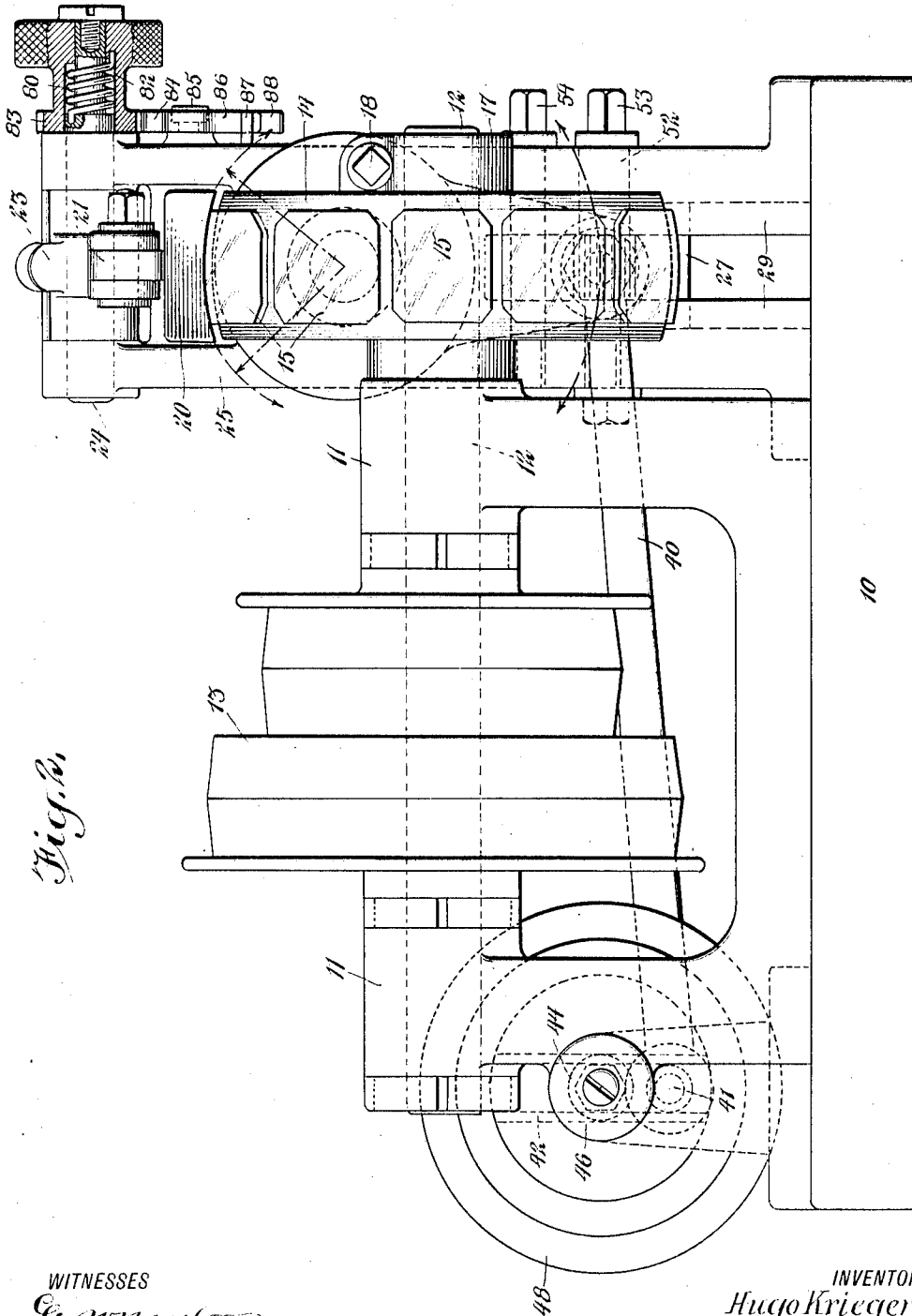


Fig. 2.

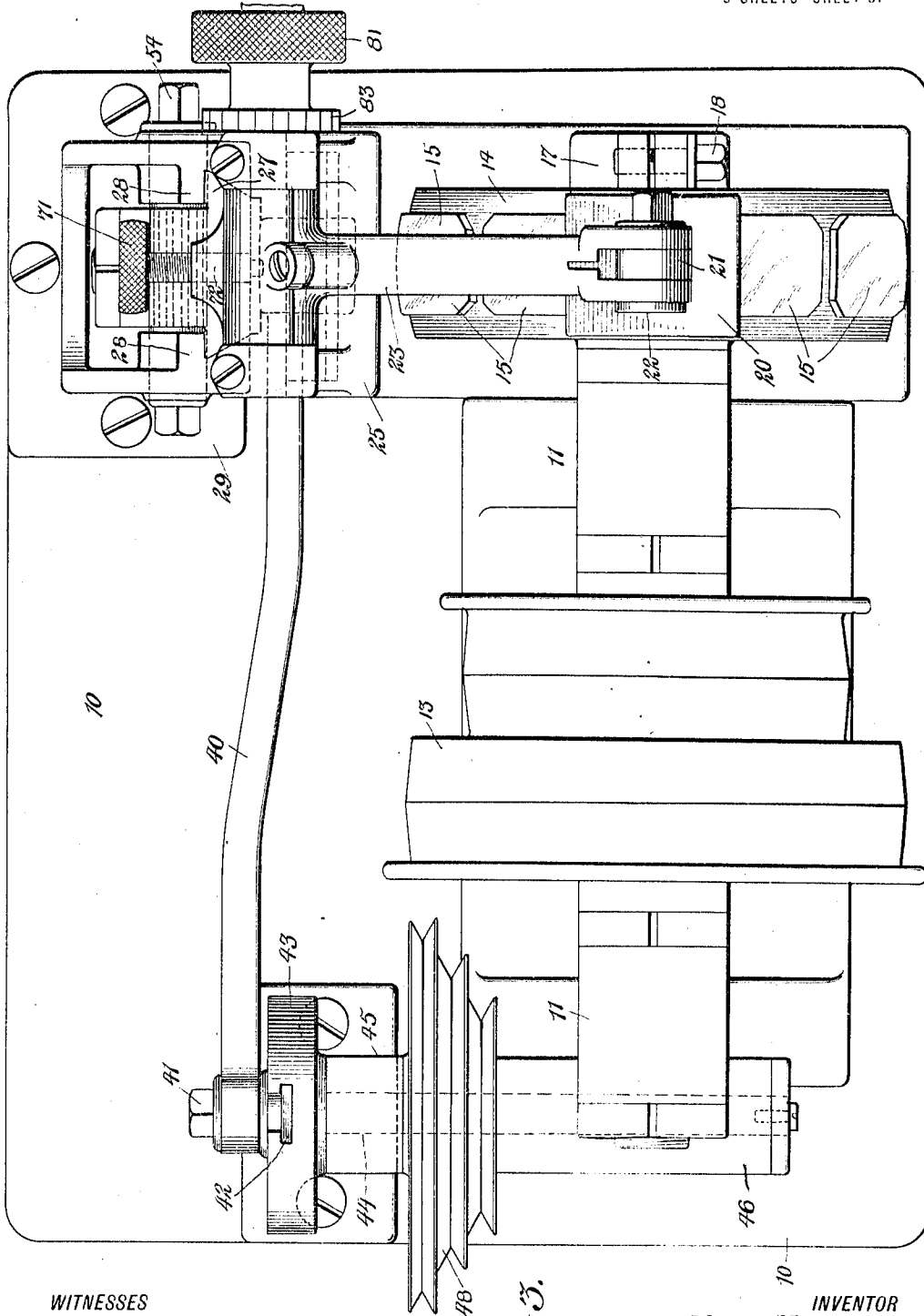
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3 SHEETS—SHEET 3.



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Fig. 3.

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UNITED STATES PATENT OFFICE.

HUGO KRIEGER, OF NEW YORK, N. Y.

LENS-GRINDING MACHINE.

1,313,702.

Specification of Letters Patent.

Patented Aug. 19, 1919.

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To all whom it may concern:

Be it known that I, HUGO KRIEGER, a citizen of Germany, having declared my intention to become a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Lens-Grinding Machine, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved lens grinding machine more especially designed for grinding toric lenses and arranged to grind a large number of lenses at one time without requiring any attention on the part of an operator. Another object is to permit of making convenient and accurate adjustment for grinding lenses of different curvature. Another object is to permit convenient adjustment for grinding lenses of different width.

With these and other objects in view, the invention consists of certain novel features of construction as hereinafter shown and described and then specifically pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a front elevation of the improved lens grinding machine with parts shown in section,

Fig. 2 is a side elevation of the same with parts broken out; and

Fig. 3 is a plan view of the same with the dust cap omitted.

On a suitably constructed base 10 are mounted spaced bearings 11 in which is journaled a grinding wheel shaft 12 provided with a stepped pulley 13 connected by a belt with other machinery for imparting a rotary motion to the grinding wheel shaft 12. On the front end of the grinding wheel shaft 12 is removably secured a grinding wheel 14 on the peripheral face of which are cemented or otherwise temporarily secured a row of lenses 15 to be ground, it being understood that the under faces of the

lenses 15 correspond to the peripheral face of the grinding wheel 14, and by using different sized wheels 14 lenses with different inner curvatures can be ground as herein after more fully explained. The grinding wheel 14 is provided with a split hub 17 fitting on to the shaft 12 and provided with a clamping screw 18 for clampingly fastening the hub 17 to the shaft 12. By the arrangement described the grinding wheel 14 after the lenses are ground can be readily removed from the shaft 12 and replaced by another one provided with a new set of lenses to be ground at the next operation.

The outer faces of the lenses 15 are engaged by a grinding or polishing tool provided with an upwardly extending lug 21 fastened by a bolt 22 to the forward end of an arm 23 mounted to swing on a pivot 24 held in the upper end of a lever 25 provided with a pivot 26 journaled in a slide 27 mounted to slide up and down in suitable guideways 28 attached to or formed on a standard 29 secured on the base 10. The lever pivot 26 has its axis adjustable up or down relative to the axis of the shaft 12 and the lever 25 rocks in a plane transverse to the plane of rotation of the grinding wheel 14. The lever 25 is provided with a socket 30 concentric with the pivot 26 and mounted to turn on a bearing 31 forming part of the slide 27. A wearing plate 32 is interposed between the back of the socket 30 and the front face of the bearing 31 to permit of replacing the wearing plate 32 by a new one whenever such wearing plate is appreciably worn down. The forward reduced end of the pivot 26 is screwed or otherwise secured to the lever 25 and the rear end thereof is provided with nuts 33 to properly hold the lever in contact with the wearing plate 32 to insure proper rocking of the lever without danger of wobbling. It is understood that the large socket 30 and the bearing 31 tend to reduce the wobbling motion to a minimum to insure accuracy in the grinding operation.

The lower end of the lever 25 is pivotally connected with a pitman 40 pivotally connected with a wrist pin 41 held adjustable in a radial groove 42 formed in a

crank disk 43 attached to a shaft 44 journaled in suitable bearings 45 and 46, of which the bearing 45 is mounted on the base 10 and the bearing 46 forms part of the left-hand bearing 11. On the shaft 44 is secured a stepped wheel 48 connected by a belt with other machinery for imparting a rotary motion to the shaft 44 which by the crank disk 43 and the pitmen 40 imparts a rocking motion to the lever 25.

The slide 27 is provided with a rack 50 in mesh with a pinion 51 secured on a shaft 52 journaled in suitable bearings arranged on the standard 29. The shaft 52 is provided at its forward end with a polygonal portion 53 for the application of a wrench or other suitable tool to permit of turning the shaft 52 and with it the pinion 51 with a view to move the rack 50 and consequently the slide 27 up or down according to the direction in which the shaft 52 is turned. After the desired adjustment has been made the slide 27 is clamped in place in its guideway 28 by clamping bolt 54 for drawing the guideways 28 in clamping contact with the slide 27 (see Fig. 3). On the slide 27 is arranged an indicating line 60 adapted to register with a graduation 61 representing the corresponding diameters to which the lenses 15 on the grinding wheel 14 are ground. As illustrated in the drawings the grinding wheel is six inches and the range of the transverse curvature given to the lenses is from six to twelve inches and subdivisions. It is understood that I do not limit myself to the sizes mentioned as machines with larger or smaller wheels and corresponding graduations may be provided. The graduation 61 is preferably formed on a plate 62 attached to or forming part of the standard 29 (see Fig. 1). It will be noticed that for grinding different curvatures on the lenses 15 of a grinding wheel 14, the slide 27 is correspondingly adjusted up or down until the indicating line 60 registers with the mark on the graduation 61 indicating the desired transverse curvature of the lenses to be ground at the time. Thus by the arrangement described the pivot 24 for the arm 23 is correspondingly raised or lowered to insure a proper relation of the grinding tool 20 with the wheel 14. As shown in Fig. 1, the machine is set for grinding the lenses to a transverse curvature corresponding to 10.25.

In order to limit the downward swinging movement of the arm 23 use is made of a lug 70 arranged on the pivotal end of the arm 23 and adapted to abut against a screw 71 screwing in a split bearing 72 forming part of the lever 25. The split bearing 72 is adapted to be clamped to the screw 71 after the latter is adjusted by a suitable clamping screw 73. It will be noticed that by the arrangement described the arm 23 is limited

in its downward swinging movement to prevent further grinding or polishing of the lenses after the same have been ground to the desired degree.

In order to cause the grinding tool 20 to bear down on the lenses 15 with the desired force, the following arrangement is made: One end of the pivot 24 is engaged by one end of a torsion spring 80 fastened at its other end in a knurled head 81 provided with a bore 82 into which extends the torsion spring 80. The inner end of the head 81 is provided with a ratchet wheel 83 engaged by a pawl 84 fulcrumed at 85 on the lever 25. A spring 86 is attached to the pawl 84 and bears against a pin 87 held on the lever 25, the spring 86 serving to firmly hold the pawl 84 in contact with the ratchet wheel 83 to prevent turning of the knurled head 81 by the action of the spring 80. By the use of the ratchet wheel 83 and the pawl 84 the desired tension can be given to the spring 80 to cause the latter to bear on the pivot 24 and hence on the arm 23 to hold the tool 20 in contact with the lenses 15 and with the desired force. The lower end of the pawl 84 is provided with a handle 88 adapted to be pressed by the attendant whenever it is desired to disengage the pawl 84 from the ratchet wheel 83 to allow reducing the tension of the spring by turning the knurled head 81 in a reverse direction.

The operation is as follows:

The lenses 15 of a given diameter at their inner faces are fastened to the peripheral surface of a wheel 14 of corresponding diameter and this wheel is then clamped to the shaft 12 by screwing up the clamping screw 18 on the split hub 17 of the wheel 14. The operator next adjusts the slide 27 up or down by correspondingly turning the shaft 52 until the indicating line 60 registers with the mark on the graduation 61 indicating the transverse curvature to which the lenses are to be ground. The screw 71 is adjusted to limit the downward swinging movement of the arm 23, that is, to stop further grinding of the grinding tool 20 on the lenses 15 after the same have been ground to the desired curvature.

It is understood that in starting the machine, the lug 70 is out of contact with the screw 71. The wheels 13 and 48 are now rotated to cause the grinding tool 20 to successively engage the lenses 15 held on the peripheral surface of the grinding wheel 14, and a sidewise oscillating movement is given to the arm 23 and consequently the grinding tool 20 by the action of the lever 25 is caused to oscillate by the pitman 40 connected with the crank disk 43. It will be noticed that the tool 20 is held with the desired force in contact with the lenses 15 by the action of the torsion spring 80, as above explained, and the grinding tool 20 is free

to rock on the arm 23 owing to the pivotal connection between the grinding tool and the arm 23. When the lenses are ground the lug 70 is in engagement with the screw 71 thus automatically stopping further grinding action of the tool relative to the lenses. It will also be noticed that after the machine is set and started for grinding the lenses to a desired curvature the machine requires no further attention and hence an operator may do other work or attend to a number of machines. In practice it usually takes about four hours for grinding a set of lenses.

15 Having thus described my invention, I claim as new and desire to secure by Letters Patent:—

1. In a grinding machine for grinding toric lenses, a revoluble lens carrying wheel adapted to carry on its peripheral face a row of lenses to be ground, a non-rotatable grinding tool on top of the said wheel and arranged in operative relation to the said lenses, an arm on which the said grinding tool is pivoted, a lever on which the said arm is mounted to swing up and down, a slide mounted to slide up and down and on which the said lever is mounted to swing in a plane at a right angle to the plane of the said lens carrying wheel, and a rack and pinion mechanism connected with the said slide to adjust the latter up or down, the said lever being in zero position whenever the axes of the grinding wheel and the lever are in the same horizontal plane.

2. In a grinding machine for grinding toric lenses, a revoluble lens carrying wheel adapted to carry on its peripheral face a row of lenses to be ground, a non-rotatable grinding tool arranged in operative relation with the top of the said wheel to grind the said lenses, an arm on which the said tool is pivoted, a lever on which the said arm is mounted to swing up and down, the said lever having a large socket, a slide mounted to slide up and down and provided with a bearing engaged by the said socket for the said lever to rock in a plane at a right angle to the plane of the said lens carrying wheel, and a rack and pinion mechanism connected with the said slide to adjust the latter up or down.

3. In a grinding machine for grinding toric lenses, a revoluble lens carrying wheel adapted to carry on its peripheral face a row of lenses to be ground, a non-rotatable grinding tool arranged in operative relation with the top of the said wheel to grind the said lenses, an arm on which the said tool is pivoted, a lever on which the said arm is mounted to swing up and down, the said lever having a large socket, a slide mounted to slide up and down and provided with a bearing engaging the said socket for the said lever to rock in a plane at a right angle to the

plane of the said lens carrying wheel, a rack and pinion mechanism connected with the said slide to adjust the latter up or down, a fixed graduation, and a pointer on the said slide indicating on the said graduation, the said lever being in zero position when the axes of the grinding wheels and the lever are in the same horizontal plane.

4. In a grinding machine for grinding toric lenses, a revoluble lens carrying wheel adapted to carry on its peripheral face a row of lenses to be ground, a non-rotatable grinding tool arranged in operative relation with the top of the said wheel to grind the said lenses, an arm on which the said tool is pivoted, a lever on which the said arm is mounted to swing up and down, the said lever having a large socket, a slide mounted to slide up and down and provided with a bearing engaging the said socket for the said lens to rock in a plane at a right angle to the plane of the said lens carrying wheel, a rack and pinion mechanism connected with the said slide to adjust the latter up or down, and actuating means for rotating the said lens carrying wheel and rocking the said lever in unison.

5. A grinding machine for grinding toric lenses, comprising a revoluble wheel adapted to carry on its peripheral face a row of lenses, an arm carrying a grinding tool arranged in operative relation to the said lenses, a lever carrying a pivot for the said arm to allow the latter to swing up and down, the fulcrum of the lever being adjustable relative to the axis of the said wheel, means imparting a rocking motion to the said lever, a torsion spring attached at one end to the said arm pivot, a head mounted to turn and engaged by the other end of the torsion spring, a ratchet wheel on the said head, and a pawl engaging the said ratchet wheel.

6. A grinding machine for grinding toric lenses, comprising a revoluble wheel adapted to carry on its peripheral face a row of lenses, an arm carrying a grinding tool arranged in operative relation to the said lenses, a lever carrying a pivot for the said arm to allow the latter to swing up and down, the fulcrum of the lever being adjustable relative to the axis of the said wheel, means imparting a rocking motion to the said lever, a torsion spring attached at one end to the said arm pivot, a head mounted to turn and engaged by the other end of the torsion spring, a ratchet wheel on the said head, a pawl engaging the said ratchet wheel, and a stop limiting the swinging movement of the said arm.

7. In a grinding machine for grinding toric lenses, a revoluble lens carrying wheel adapted to carry on its peripheral face a row of lenses to be ground, a non-rotatable grinding tool on top of the said wheel and

arranged in operative relation to the said lenses, an arm on which the said grinding tool is pivoted, a lever on which the said arm is mounted to swing up and down, a
5 slide mounted to slide up and down and on which the said lever is mounted to swing in a plane at a right angle to the plane of the

said lens carrying wheel, and manually controlled means connected with the said slide to adjust the latter up or down, the said 10 lever being in zero position whenever the axes of the grinding wheel and the lever are in the same horizontal plane.

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