Feb. 14, 1928.

1,659,277

A. E. MAYNARD

LENS SURFACING MACHINE

Filed June 28, 1924

3 Sheets-Sheet 1

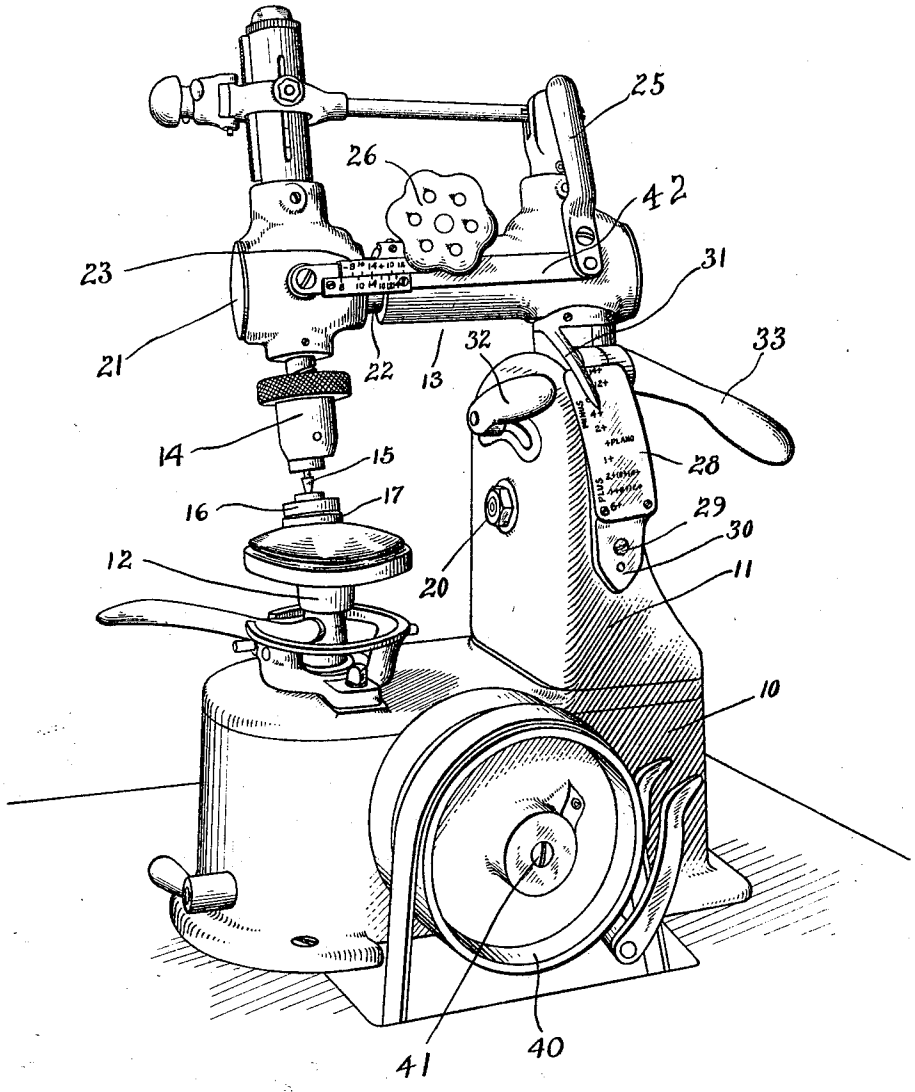


Fig. 1.

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3 Sheets-Sheet 2

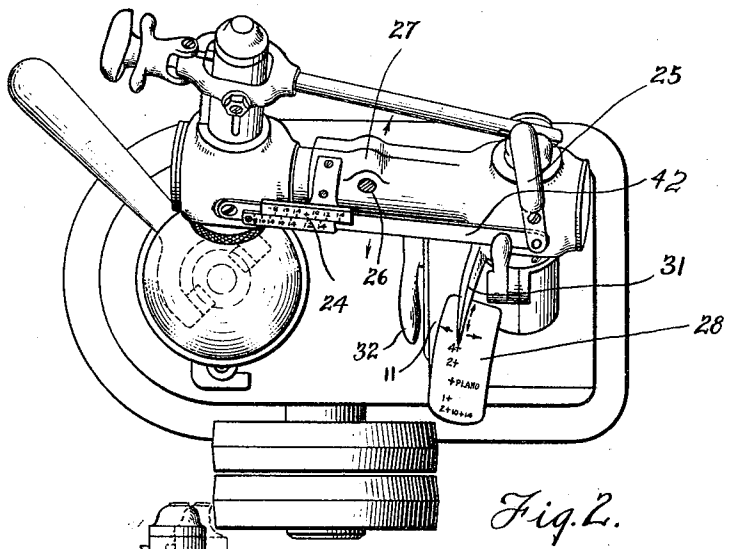


Fig. 2.

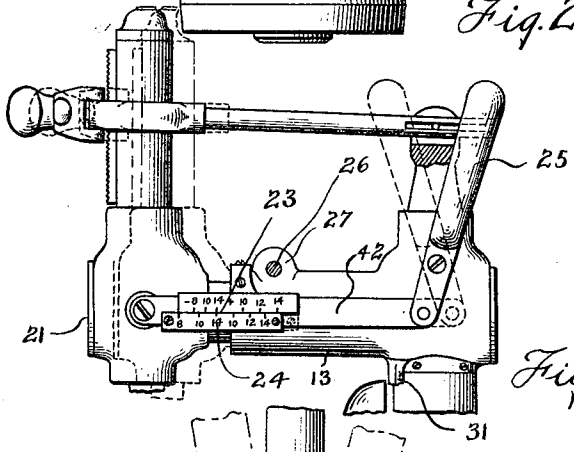


Fig. 3.

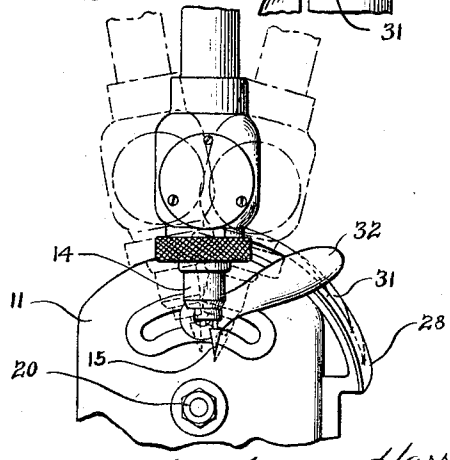


Fig. 4.

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3 Sheets-Sheet 3

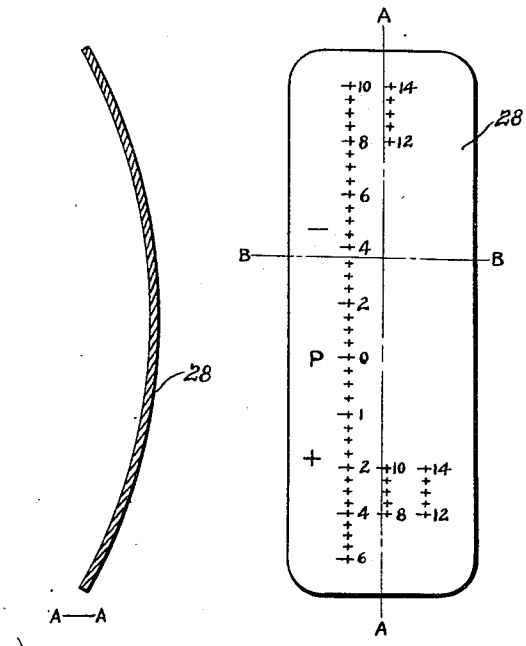


Fig. 5.

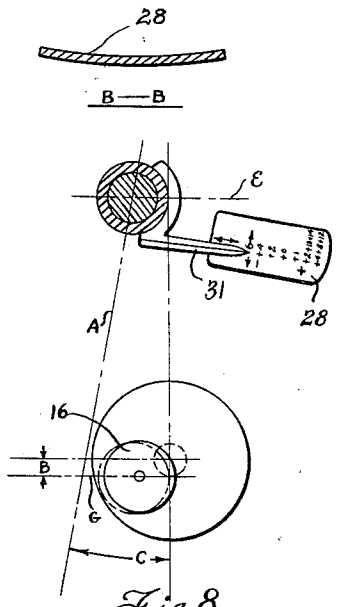


Fig. 8.

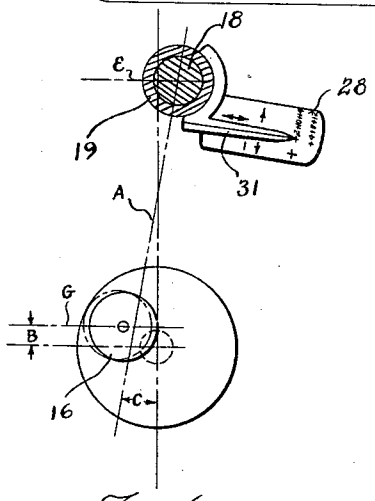


Fig. 6.

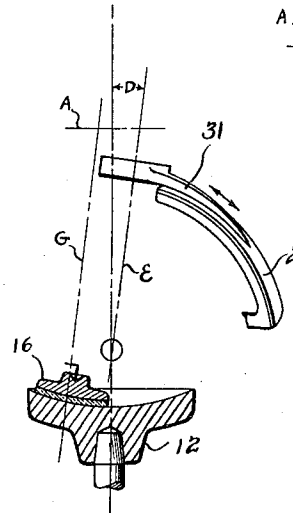


Fig. 7.

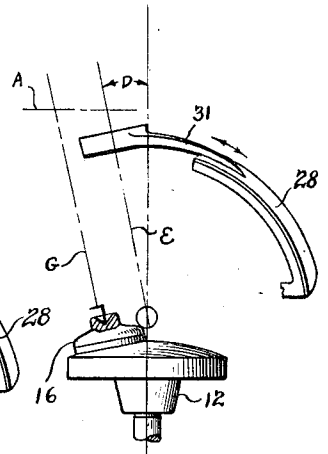


Fig. 9.

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UNITED STATES PATENT OFFICE.

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LENS-SURFACING MACHINE.

Application filed June 28, 1924. Serial No. 722,933.

The present invention relates to an improved ophthalmic lens surfacing machine, and has particular reference to a machine wherein a pair of opposed spindles are employed, one of which is adjustable with respect to the other, the said machine including means to indicate the relative position of the opposed spindles.

An important object of the invention is to provide a lens surfacing machine including indicating means to determine the relationship of the opposed spindles in such machine so that the machine can be accurately set up for grinding and polishing operations.

Another important object of this invention is to provide a machine that can be handled by experienced and inexperienced persons without any difficulty, in such a manner that an ophthalmic lens can be ground or polished accurately in a minimum amount of time.

Another important object of the invention is to provide a lens surfacing tool including a pair of opposed spindles, one of which is adjustable with respect to the other, having indicating means for determining the exact correct relative positions of the opposed spindles, both for the surfacing of positive and negative lenses.

Other objects and advantages of the invention will become apparent during the course of the following description.

In the drawings, wherein like numerals are employed to designate like parts throughout the same:

Figure 1 is a perspective view of a lens surfacing machine employing my invention;

Figure 2 is a top plan view thereof;

Figure 3 is a fragmentary elevation of a portion of the machine;

Figure 4 is a fragmentary detail showing the various adjustments of the machine;

Figure 5 shows the construction of one portion of the indicating means employed;

Figure 6 is a diagrammatic view of the indicating means;

Figure 7 is another diagrammatic view;

Figure 8 shows a different adjustment;

Figure 9 shows still another adjustment.

In the drawings, wherein for the purposes of illustration is shown the preferred embodiment of the invention, the numeral 10 designates the base of the machine which supports the standard 11 at one end and the rotary surfacing tool 12 at the other end. A pulley 40 is keyed to the shaft 41 which rotates the shaft, the said shaft having connection with the lap 12 to positively drive the same.

The standard 11 supports the cross arm 13, through which runs a shaft having connection with the lens driving portion 14 which carries the crank pin 15, having engagement with a block 16 adapted to support the lens 17 to be surfaced.

A shaft 18 runs through the sleeve 19, Figure 6, the said sleeve being pivotally connected to the standard by means of the pin 20, Figure 1. The shaft 18 is rotatably supported within the sleeve 19 and is also adapted to be swung with the sleeve 19, which is swung about the pivot point 20. To facilitate this swinging motion, a universal connection is employed in the shaft, the said connection not being shown.

The head 21 supports one end of the splined shaft 22 which shaft drives the crank pin 15. A suitable slide section 23 is carried by the cross arm 13 to which it is secured, which slide includes the graduations 24 to indicate units of movement of the head 21 with respect to the shaft 18. An operating lever 25 is employed to move the head 21 to and from the vertical shaft 18 through the link 42 which slides in the slide section 23, while the graduations 24 on the link 42 will indicate the exact adjustment of the head 21 with respect to the vertical shaft 18. The threaded shaft 26 is adapted to be run through the ears 27 to maintain this adjustment by tightening the member 13 on the shaft 22. The markings 24 on the members 13 and 42 are arranged to indicate the distance from the shaft 18 to the center of the shaft in the head 21. It will be noted that some of the figures of the scale are minus and some plus. If the scales be adjusted so that the plus 10 is aligned with the plus 10 on both scales the distance is correct for a plus 10 tool or curve that is to be ground. The other adjustments are made in a similar way, plus to plus or minus to minus, as required. The scale, therefore, indicates both the characters plus or minus and the power of the tool or curve to be made. When the head 21 is adjusted in this way there will be no chattering in the surfacing operation.

As is clearly shown in Figures 1 and 2 of the drawings, a concavo-convex plate 28 having preferably a spherical curved surface centered at 20, although if the axis of the shaft 20 and the axis of the shaft 18 do not intersect at some position the curvature need no be spherical to produce working conditions is carried on the standard 11, being held in position by means of the screw, or the like, 29 passing through the ear 30. The plate is disposed on the standard 11 at a slight angle, as is shown in the top plan view Figure 2. A pointer 31 is carried by the swinging cross head 13 and is adapted to be moved over the curved plate 28 but in slight spaced relation thereto. The plate 28 is marked as is clearly shown in Figure 5 of the drawings, so that the pointer can be moved to any one of the designations on the said plate as desired. The plate is so graduated that the end of the pointer 31 may be moved to any one of the indications thereon which will cause the spindle 18 to be rocked and twisted to the exact correct position for a lens to be ground or polished to the power designated on the plate 28. It is to be understood that the plate 28 is stationary, being mounted on the standard 11, while the pointer is adapted to be movable over the plate to the desired designation.

For instance, in Figure 1 the pointer is set for grinding or polishing a minus 4 diopter lens. It will further be understood that two adjustments are made in a single operation, namely, the necessary swinging of the sleeve and shaft 18 and 19, respectively, and also the necessary rotation of the vertical shaft 18 within the sleeve 19. A supplementary adjustment can be made by means of the slide 23 on the cross arm 13 and head 21. The graduations on the slide 23 are also such that they may be set, depending upon the power of the lens being ground or polished, but the power on the arm 23 should correspond to the setting on the plate 28.

With my construction the machine can be easily set for any desired power of lens by merely moving the pointer 31 over the desired graduation on the plate 28, at which adjustment the machine will be accurately positioned for that particular lens. After the necessary adjustment has been made the lock levers 32 and 33 are tightened so as to prevent accidental displacement of the spindles after the necessary relationship has been ascertained. Of course, the indicating mechanism above described is not necessarily restricted to the type of machine herein described, as it can be readily and easily modified to suit the particular needs on all similar machines.

In the diagrammatic views Fig. 5 shows a front view of the indicator plate and a longitudinal section on line A—A thereof, the center of curvature being about the center 20. Fig. 6 shows the indicator finger as related to the shaft 18 and positioned for a minus curve tool, whereas Fig. 8 shows a similar view but for a plus curve tool. The position shown in Fig. 6 is the position of the tool indicated in Fig. 7, while that shown in Fig. 8 is the position of the tool indicated in Fig. 9, the tool in Fig. 7 having a concave surface and the tool in Fig. 9 having a convex surface. In Fig. 5 the indications on the scale indicate positions for the various tool towards plus and minus.

Referring to Figures 6, 7, 8 and 9, A diagrammatically illustrates the arm 13, E the shaft 18, G the lens spindle in the head 21, and D indicates the angle at which the tool is set to the vertical. C indicates the amount of movement about the pivot 18 and D about the center 20.

In Figure 9 a concave lens is being ground, showing a different position of the pointer and plate.

To accurately grind or polish a lens the angle of the spindle driving the crank pin 15 should approximately intersect the center of curvature of the lap 12. Furthermore, to prevent chattering, the spindle should be offset from the center of the axis of rotation of the lap carrying spindle, as is clearly shown in Figures 6 and 8 of the drawings. The adjustment of the slide 23 gives the necessary offset position of the lens carrying spindle, while the adjustment of the pointer 31 and plate 28 will swing the spindle so that it approximately intersects the center of curvature of the surfacing tool employed.

By use of the above construction the quality and quantity of lenses turned out can greatly be improved, while the machine can easily be operated by almost anyone with very little difficulty.

It is to be understood that the form of the invention herewith shown and described is to be taken as the preferred embodiment of the same and that various changes in the size, shape and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. In a device of the character described, the combination with a lens surfacing machine, including a pair of opposed spindles, one of which is capable of being rocked angularly and swung laterally with respect to the other, of an indicator plate carried by said machine, said plate being curved and provided with a plurality of suitable designations, and means also carried by said machine and adapted upon movement of said movable spindle for selective registration with said designations, whereby to indicate the degree of both rocking and swinging movements of said spindle.

2. In a device of the character described, the combination with a lens surfacing machine including a pair of opposed spindles, one of which is capable of being rocked angularly and swung laterally with respect to the other, of an indicator plate carried by said machine, said plate having a curvature centered about the center on which the spindle is rocked angularly and is provided with position designations, and means also carried by said machine adapted upon movement of said movable spindle for selective registration with said designations to indicate the degree of both rocking and swinging movements of said spindle.

ALBERT E. MAYNARD.