

Aug. 16, 1927.

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1,639,012

SURFACING MACHINE

Filed Dec. 3, 1924

2 Sheets-Sheet 1

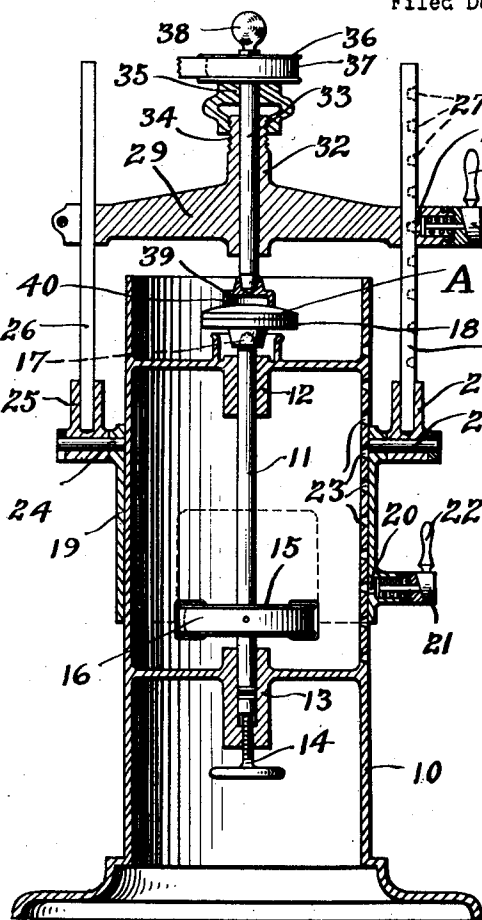


Fig. 1.

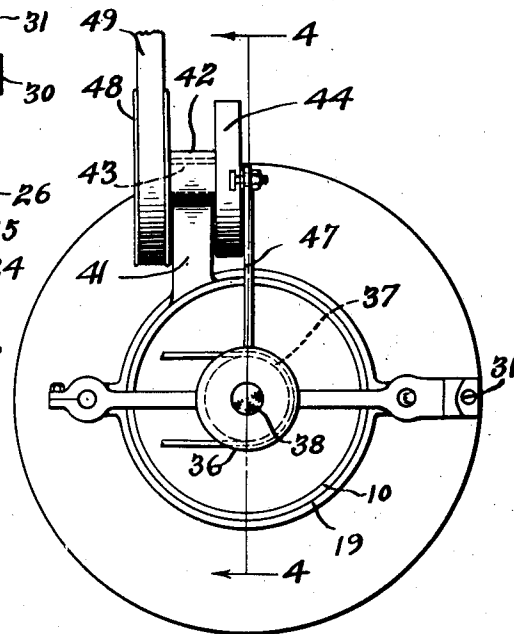


Fig. 3.

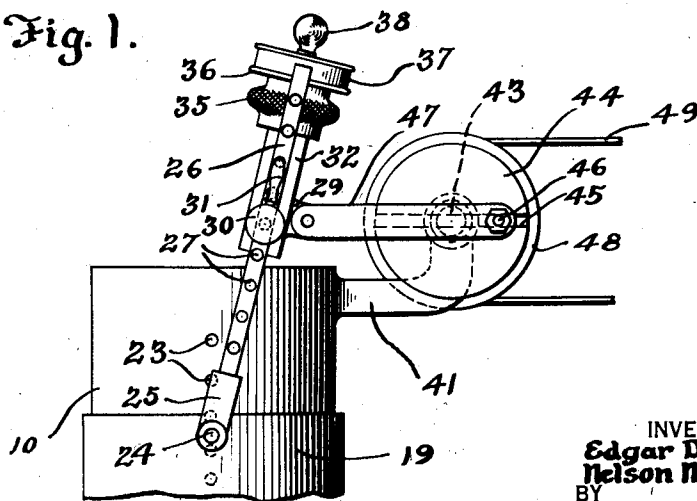


Fig. 2.

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2 Sheets-Sheet 2

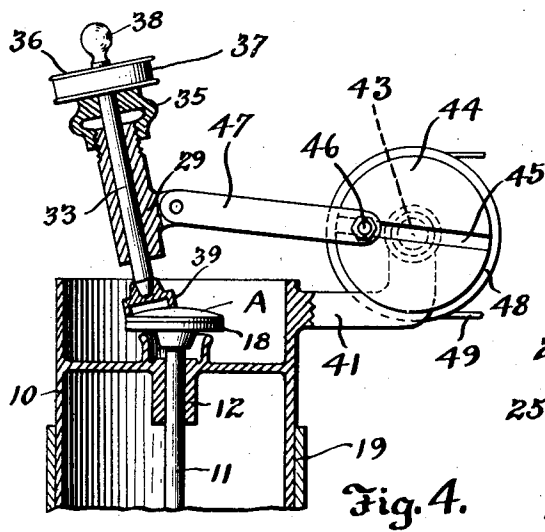


Fig. 4.

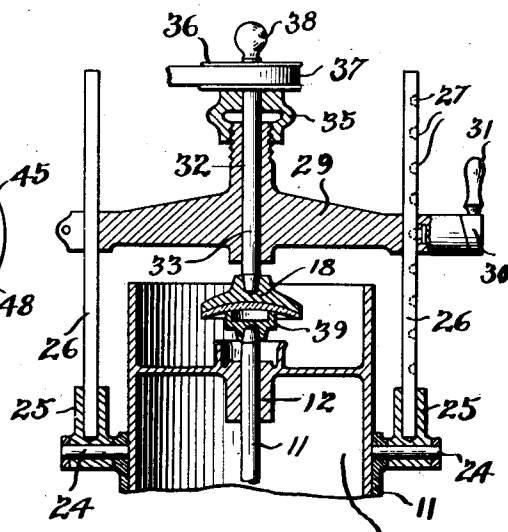


Fig. 5.

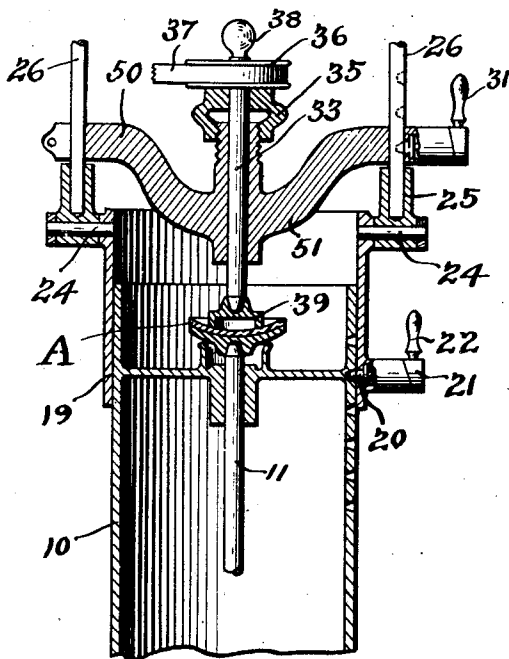


Fig. 6.

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SURFACING MACHINE.

Application filed December 3, 1924. Serial No. 753,650.

This invention relates to improvements in surfacing machinery and has particular reference to the provision of an improved machine for forming and finishing spherical surfaces on lenses and lens blanks.

An important object of the invention is to provide a lens surfacing machine in which the curvature of the lens surface is generated by relative movement of the parts.

Another object of the invention is to provide such a device which will be adapted for the production of curves of different radii without the necessity of changing the parts.

Another object is to provide such a device which may be used for producing either concave or convex surfaces of any desired radius.

Another object is to provide such a device which will be simple in construction, strong and durable in service and efficient in use.

Another object is to provide such a device with an annular abrading tool operated in such a way that a target blank may be produced with perfect optical properties and better than has been possible with prior art devices.

With these and other objects in view the invention resides in the novel features of construction, combination and arrangement of parts hereinafter fully set forth, illustrated in the accompanying drawings and specifically pointed out in the appended claims.

In the drawings forming a part of this specification

Figure 1 is a vertical longitudinal sectional view through a surfacing machine embodying the invention.

Figure 2 is a fragmentary side elevation thereof.

Figure 3 is a top plan view.

Figure 4 is a vertical sectional view on the line 4-4 of Figure 3.

Figure 5 is a fragmentary sectional view similar to Figure 1 showing the tool and lens in reversed position for the production of a concave lens surface.

Figure 6 is a fragmentary sectional view illustrating a modified form of tool support.

Referring particularly to Figures 1, 2, 3 and 4, it will be seen that a main frame 10 has been provided in the form of a pedestal in which is rotatable a spindle 11. The spindle 11 is mounted in bearings 12 and 13, the latter being a thrust bearing adjustable through the instrumentality of a screw 14 to compensate for wear of the parts. The spindle 13 carries a pulley 15 which is engaged by an ordinary power belt 16 of any desired form so that the same may be conveniently operated. The upper extremity of the spindle 11 is tapered as shown at 17 for the reception of a lens block 18 to which is secured in any desirable manner a lens blank A.

A sleeve 19 is adjustably supported upon the pedestal 10 and adapted for movement in a direction parallel with the axis of the spindle 11. In order to hold the sleeve in the desired adjusted position it is provided with a spring pressed plunger 20 which may be retracted through the instrumentality of a cam 21 operated by a handle member 22. The pedestal 10 is provided with a plurality of recesses 23 into which the plunger 20 is adapted to be selectively seated, the purpose of this adjustment being to govern the radius of the curve produced upon the lens.

Extending outwardly from opposite sides of the sleeve 19 to adjacent its upper end are a pair of pivotal shafts 24 carrying T shaped bearing members 25. Seated in the T shaped bearing members 25 and extending upwardly therefrom are a pair of arms 26, one of which is provided with recesses 27 adapted to receive a spring pressed plunger 28. A cross bar 29 connects the two rods 26, holding them in rigid relationship to one another, said cross bar being adjustable upon the rods 26 in a direction parallel with the axes thereof. The plunger 28 is mounted in a recess in the cross bar 29 and is operative by a cam 30 and handle member 31 so that by use of the cam and plunger the cross bar may be moved to different selective positions to compensate for axial adjustment of the sleeve 19 which has been previously described.

A bearing boss 32 is formed at the central portion of the cross arm 29 and rotatable and slidable therein in a second spindle 33 supported in opposed relation to the spindle 11. The outer end of the boss 32 is threaded as at 34 for the reception of an adjustable nut 35 which supports a pulley 36 carried by the spindle 33. The pulley 36 is rotatable by the belt 37 and is weighted down

by a ball or other suitable weight 38. The end of the spindle 33 adjacent the spindle 11 is suitably formed to receive an abrading tool 39 which is preferably formed with an annular working surface 40 of any suitable material. This abrading tool 39 may be formed of emery or it might be a metallic member charged with diamonds as is well known in the art, the latter being preferable for rough surfacing.

As best shown in Figures 2 and 4 an extension 41 is formed, preferably on the rear side of the pedestal 10, said extension forming a bearing 42 for the shaft 43. One end of the shaft 43 is equipped with a disk 44 having a diametric slot 45 therein for the reception of a crank pin 46. The crank pin 46 is adjustable in the slot 45 so that different throws may be had in accordance with the diameter of the lens or blank being operated upon. A pitman or link 47 connects the crank pin 46 to the cross arm 29 so that as the disk 44 is rotated, oscillating motion is imparted to the upper spindle 33 by rocking said spindle and its supporting structure about the centre of the pivoting shafts 24. The end of the shaft 43 opposite the disk 44 carries a pulley 48 driven by a belt or any other suitable power connection 49 for the purpose of rotating the same.

In the operation of the device, a lens or blank A is mounted upon a block 18 which in turn is positioned upon the end of the spindle 11. The sleeve 19 is then adjusted longitudinally to its proper position so that the distance from the centre of the pivoting shafts 24 to the finished surface of the lens will be equal to the required radius of curvature. The cross arm 29 and its cooperating parts is then correspondingly adjusted so that the annular abrading tool 39 will rest upon the surface of the lens blank A whereupon both the spindles 11 and 33 are rotated through their driving members, and the upper spindle 33, at the same time oscillated through the instrumentality of the disk 44 and link 47. As best shown in Figure 4 the abrading tool 39 at the extreme end of its oscillating stroke goes over to the very edge of the lens blank A, and at its opposite extreme position it overlies the opposite edge of the blank. Thus in the course of the operation, the annular tool goes completely past the centre of the lens blank so that there is no possibility of bad spots being left at that point. As the tool wears down, or as the grinding of the blank progresses, the member 33 may be screwed down so that the tool will be held in proper contact with the blank surface. From this it will be seen that the curvature of the lens is generated by the relative movement of the tool over the lens blank and is not dependent upon any angular position of the spindles in relation to one another.

One of the important results of this construction lies in the fact that the same abrading tool may be used for the production of any surface curvature merely by varying the position of the centre of oscillation. The amount of oscillation may be changed by altering the position of the crank pin 46 in the disk so that the rotatable abrading tool will not go too far beyond the edge of the lens blank when the latter is small in diameter.

In the device as illustrated in Figures 1, 2, 3 and 4, it is shown producing a convex lens surface. By referring now to Figure 5 it will be evident that concave surfaces may be formed with equally good results by reversing the operative parts, in other words, by mounting the abrading tool 39 upon the extremity of the spindle 11 and positioning the lens block 18 upon the extremity of the spindle 33. When the parts are thus associated it will be noticed that the lens block is oscillated over a tool whereas in the previous form the tool was oscillated over the lens blank.

Referring particularly to Figure 6, a modified form of construction is illustrated wherein a concave lens surface may be produced while the lens blank is still positioned upon the spindle 11, the advantage being that the surface being operated upon is visible and therefore open to the inspection of the machine operator; whereas in the device shown in Figure 5 the surface being generated cannot be so easily viewed. In this modification a cross arm 50 is shown as connecting the rods 26, the cross arm having its central portion offset as at 51, to a position below the points of connection of the rods 26. This construction makes it possible to get the pivotal shafts 24 in a position upon the lens blank A and still maintain a good firm bearing for the spindle 33. In this form the oscillation of the spindle 33 and its cooperating parts is produced in substantially the same way as in the previous form.

With the present invention, the objectionable features of the prior art surfacing machines have been overcome and it is now possible to produce either concave or convex surfaces of any desired radius with a high degree of accuracy. Also, such a machine as disclosed in the present application will perform rough grinding operations much more rapidly than has been possible with the prior art devices, especially when the annular abrading tool is formed of diamond charged material.

Obviously, changes may be resorted to in the minor details of construction and arrangement of parts, and the right is herein reserved to make such changes falling within the scope of the appended claims without departing from the spirit of the invention.

Having thus described the invention, what is claimed is:

1. In a device of the character described, a frame, a sleeve adjustably mounted thereon, a pair of spaced parallel arms pivoted to the sleeve, a crossbar firmly connecting the parallel arms, a rotatable spindle mounted in the frame, a second rotatable spindle mounted in the crossbar in opposed relation to the first spindle, one of the spindles being adapted to support a lens block, and the other a lens surfacing tool, and means for reciprocating the parallel arms so as to impart relative oscillatory motion between the spindles whereby to generate a spherical curve on the lens.
2. In a device of the character described,

a support, a slide movable on the support, means for locking the slide in desired adjusted position on the support, a pair of parallel arms pivoted on the slide, a cross member slidably mounted on the parallel arms, means for locking the cross member in desired adjusted position on the arms, a spindle mounted on the support, means to rotate said spindle, a spindle mounted on the cross member in alignment with the first spindle, means to rotate said spindle, a grinding tool on one spindle, means for holding the lens on the other spindle, and means to oscillate the parallel arms about their pivots as a center.

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