

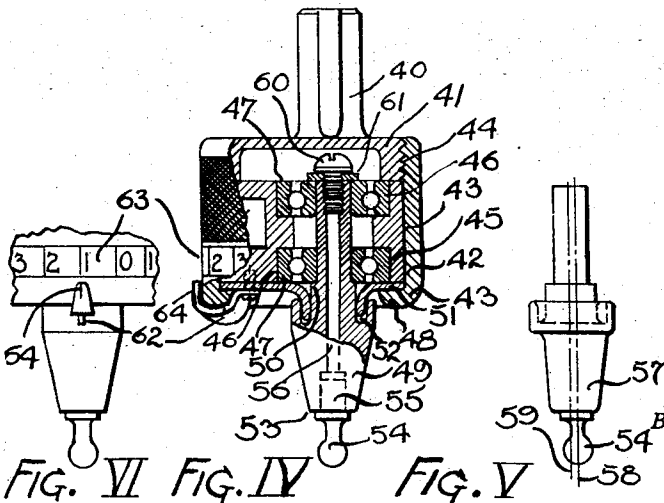
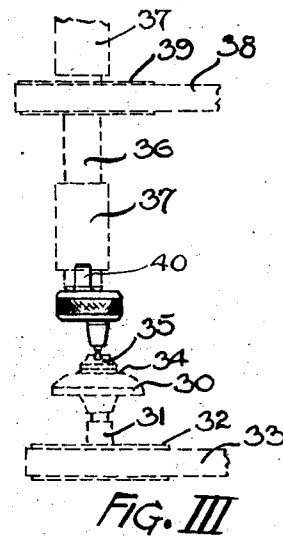
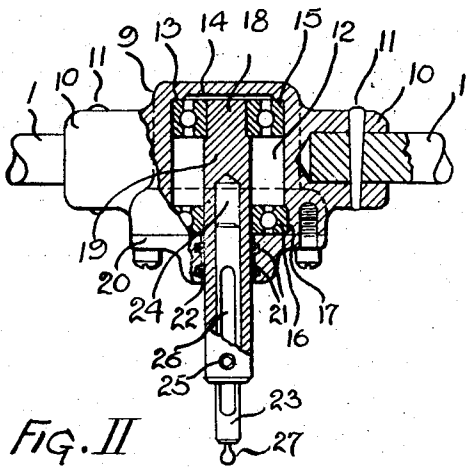
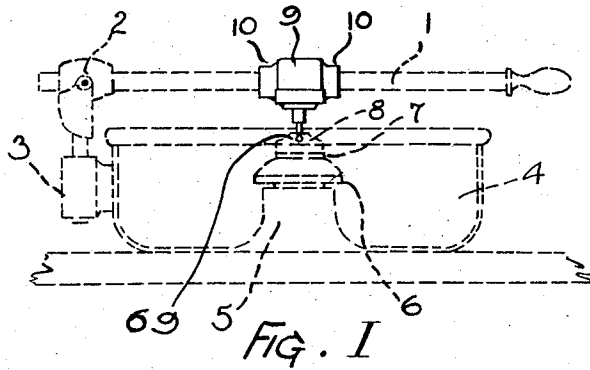
Feb. 28, 1933.

L. W. GODDU

1,899,862

ABRADING

Filed Nov. 6, 1929



LLOYD W. GODDU
INVENTOR

BY Harry H. Styll
ATTORNEY

UNITED STATES PATENT OFFICE

LLOYD W. GODDU, OF SOUTHBRIDGE, MASSACHUSETTS, ASSIGNOR TO AMERICAN OPTICAL COMPANY, OF SOUTHBRIDGE, MASSACHUSETTS, A VOLUNTARY ASSOCIATION OF MASSACHUSETTS

ABRADING

Application filed November 6, 1929. Serial No. 405,150.

This invention relates to improvements in abrading and has particular reference to an improved means of abrading ophthalmic lenses.

5 The principal object of the invention is to provide means for producing ophthalmic lenses free from aberration, waves and other irregularities.

10 Another object of this invention is to provide means in the abrading machine to reduce friction and resultant wear which causes irregularities in the lens surface.

15 Another object of this invention is to provide a simple break-up or eccentric motion for abrading machine in order that the lens will not travel continually in the same path.

Another object of the invention is to reduce the amount of spoiled work associated with abrading processes.

20 Other objects and advantages will become apparent from the following description taken in connection with the accompanying drawings and it will be apparent that many changes may be made in the details of construction and arrangement of parts without departing from the spirit of the invention as expressed in the accompanying claims. I, therefore, do not wish to be limited to the exact details shown and described as the preferred forms only have been shown by way of illustration.

Referring to the drawing:

Fig. I is a diagrammatic view of the invention applied to a hand-operated machine.

35 Fig. II is an enlarged sectional view of the device.

Fig. III is a diagrammatic view of a modified form applied to an automatic abrading machine.

40 Fig. IV is an enlarged sectional view of the modified form.

Fig. V is a front view of a further modification.

45 Fig. VI is a fragmentary side view of the modified form shown in Fig. IV.

In the abrading of ophthalmic lenses it is very important that friction and resultant wear be reduced to a minimum in order that only the desired path of travel will be followed by the lens and no wavy motion or

chatter will be transmitted to the lens surface destroying the desirable smooth surface. In the past this factor of friction has been more or less ignored and the abrading process has been a lengthy one in the endeavor to remove the irregularities in the lens surface caused thereby. In my invention I have employed means to eliminate the cause of most of the friction and thereby have eliminated the wavy surfaces, abrasion lines and other draw backs found in lenses abraded in prior machines. Referring to the drawings wherein similar characters of reference denote corresponding parts throughout the several views I have shown in Fig. I the invention applied to the usual type of hand-surfacing machine. This comprises the handle 1 pivoted for universal movement by the joint 2 which is supported by the arm 3 attached to an abrasive bowl 4. Centrally arranged in the bowl 4 is a support 5, carrying a lap 6 of the desired curvature driven from a suitable source of power (not shown). The lens 7 to be abraded is attached to the usual block 8 by suitable adhesive means. The block 8 has a ball-seat 69 for the reception of the driving means. The foregoing construction is the usual one for the hand surfacing of ophthalmic lenses and the parts have been shown in broken lines in the drawings. The improved means provided by my invention relates specifically to the driving means for the lens block 8 and in a novel manner eliminates the undesirable friction usually associated with this portion of the abrading machine.

The improved driving means is attached to the handle 1 above the lap 6 and comprises a housing 9 with hollow bosses 10 lying substantially normal to the axis of the housing 9 and carrying the two ends of the handle 1 as shown in Fig. II. The handle 1 is held in the bosses 10 by means of the taper pins 11 passing therethrough.

The housing 9 has a central bore 12 extending from its lower side to a seating 13 and is not carried completely through the housing 9 at the upper end. A clearance portion 14 is formed in the center portion of the seating 13. A ball bearing 15 is pressed into the

bore 12 and contacts with the seating 13. A second bearing 16 is fitted at the lower end of the bore 12 which has a recess 17 to receive it. The journal portion of the first bearing 5 15 is formed slightly smaller than the journal portion of the second bearing 16 in order that the reduced end 18 of the spindle 19 may fit therein with a shoulder portion resting against the bearing. The thrust from the 10 abrading process will therefore be counteracted by the shoulder portion coacting with the bearing journal.

A cap 20 serves to retain the lower bearing 16 in the recess 17 and prevents oil or grease 15 from exuding on to the lap 6 and the entrance of foreign matter. A pair of felt pads 21 or other non-abrusion means may be employed in the bore 22 of the cap 20 which is made slightly larger than the spindle 19 for clear- 20 ance purposes.

Driving means for the lens block 8 may consist of a peg 23 closely fitting into a suitable bore 24 in the spindle 19 and may be held therein by the set-screw 25 fitting in the 25 slot 26 in the peg 23. The height of the peg 23 may, of course, also be adjusted by the slot and screw means.

The end of the peg 23 is formed with a ball point 27 which fits into the ball seat 69 30 in the lens block and allows free movement of the block over the lap 8. It will be apparent that the bearings 15 and 16 will allow frictionless rotation of the spindle and block while taking up all the thrust applied by 35 the pressure on the handle 1 during the abrading operation. The block carrying the lens to be abraded may be moved freely over the surface of the lap 6 to prevent the formation of abrasion lines and no chattering or other 40 irregularities will appear to destroy a smooth surface owing to the close-fitting yet free-acting ball bearing drive far removed from the loose and shaky mechanism heretofore employed at this part of the abrading device.

The operation of the device described is of 45 a simple nature and consists of placing the lens block 8 and lens 7 in position on the lap 6. The ball pin 27 is then placed in seat 59 in the lens block 8 and the handle 1 used 50 to hold it in position. The machine may then be set in motion and the lap will rotate. The lens block 8 will also rotate from the friction between it and the lap 6 and the block 8 may be moved in the usual way over the lap 6 to 55 break up the abrasion lines. A suitable abrasive may be employed during this operation.

It will be apparent that the spindle 18 will 60 rotate with the lens block 8 and that the ball bearings 15 and 16 will serve to reduce the friction and resultant wear in the moving parts.

Having described the invention applied to 65 a hand surfacing machine I can equally as

well apply it to a power surfacing machine as shown in Figs. III and IV.

In this type the lap 30 is supported upon the driving shaft 31 which may be driven by the 70 pulley 32 and belt 33 from a suitable source. Other attachments such as bowl feeds for abrasive may be employed but are not strictly 75 pertinent to this invention. The lens 34 is mounted on the usual lens block 35 and held thereon by the weight of the upper driving means which may comprise a shaft 36, supports 37 and driving belt 38 running on pulley 39.

The lower end of the driving shaft 36 is bored to receive the shank 40 of the cap 41 80 which is threaded on its periphery 44. A housing 42 has the upper portion of its bore threaded to engage the threaded portion 44 of the cap 4. The smooth portion 43 of the housing bore is adapted to closely fit a hold- 85 ing member 45 having an eccentric bore therein with recesses 46 concentric with the eccentric bore and tightly engaging ball bearings 47. The lower bearing 47 and lower face of the holding member abut a dust cap 51 which 90 in turn abuts a flange 48 on the housing 42. It will readily be seen from Fig. IV that when the cap 41 is screwed into position the assembled holding member 45, bearings 47 and dust cap 51 will be pressed against the 95 flange 48 on the housing. The flange 48 is bored to permit the eccentric spindle 49 to be moved around therein, as will presently be apparent.

The dust cap 51 curves downwardly at its 100 center into pockets 52 formed for the purpose in the spindle 49. It will be apparent that by this construction no dust can enter the bearings 47 and that the whole interior of the 105 housing 42 may be filled with grease or other lubricating means without fear of it falling onto the lap 30 or work.

The eccentricity of the spindle 49 may be 110 adjusted to a definite amount by means of the trigger member 62 which is attached to the holding member 45 and dust plate 51. By moving the trigger 62 the member 45 and plate 51 will move in the housing carry- 115 ing the spindle 49 with them whereby it will readily be seen that the spindle 49 will be positioned at varying positions of eccentricity with the shank 40. An indicator scale 63 which may read from 0 to 6 and back is 120 marked around the outside of the housing 42 and a pointer 64 on the trigger member 62 indicates the amount of eccentricity. It will be apparent that in this way a definite amount of eccentricity may be set each time 125 a certain curvature of lens is being abraded; that is, it may be found that a six diopter lens is best obtained by setting the pointer to number 6 on the scale and in this way six diopter curves can be abraded at any time with this setting without further delay than 130 positioning the pointer 64 to the same num-

ber 6. The spindle 49 may also be set perfectly concentric with the shank 40 at one position on the scale which may be number 0. The setting may easily be accomplished by grasping the knurled portion and slightly loosening the housing 42 on the threaded cap 41 whereupon the pointer 64 may be rotated around the scale 63. The housing 42 is then tightened onto the cap 41 which serves to press the cap onto the bearings 46 and so lock the eccentric holding member 45 tightly in the position set.

It will be seen from the foregoing description that an eccentric motion has been imparted to the driving pin 54 around the lap 30 by means of the offset spindle 49. This motion is necessarily formed by offsetting said spindle to duplicate, as far as possible, the motion which may be applied without such offsets in the hand-operated machine previously described. In this manner the travel of the lens is never twice in exactly the same path on the abrading tool and no abrasion lines will be formed. To this feature I have added the absence of friction and resultant wear causing aberration and wavy surfaces by means of the smoothly running ball bearing in the manner described.

To provide a differential motion also in this device I have illustrated in Fig. V an eccentric spindle 57 which produces in the ball pin 54 an off-center effect by having the center line 58 of the pin offset from the centerline 59 of the spindle 57 at its point of juncture with the bearing 47. A break-up motion will be imparted to the lens in the lap and greatly assist in the production of improved lens surfaces.

The operation of these power driven devices is similar to the manually operated one inasmuch as in Fig. IV the ball pin 54 is seated in the lens holder 35 carrying the lens and is rotated therewith. The outer ring of the bearing will be engaged with the eccentric plate which is rotated by separate power means. The pin 54 will be given a rotating movement on its axis and an eccentric rotation round the lap as will be clear.

In Fig. V the pin 54 is also eccentric to the axis of its bearing 47 and so will have a further eccentric or break-up motion over the lap 30.

From the foregoing it will be apparent that I have provided means to apply a drive to lens surfacing machines which will greatly reduce the friction hitherto unavoidable, allow the block to spin freely over the lap and reduce the wear between the ball pin and lens holder socket which produces the irregularities such as waves and aberration.

Having described my invention, I claim:
1. In a device of the character described a detachable support having an eccentric portion, a housing attached to said eccentric portion, said housing having a rotatable bear-

ing support therein, said bearing support being rotatable about an axis offset from and extending substantially parallel with the longitudinal axis of the detachable support, a bearing in the bearing support offset from the axis of said bearing support and a rotatable pin member in said bearing, said pin member being adjustable to varying positions relative to the axis of the detachable support.

2. In a device of the character described, a detachable support having an eccentric portion, a housing attached to said eccentric portion, said housing having a rotatable bearing support therein, said bearing support being rotatable about an axis offset from and extending substantially parallel with the longitudinal axis of the detachable support, a bearing in the bearing support offset from the axis of said bearing support, and a rotatable pin member in said bearing, said pin member being adjustable to varying positions relative to the axis of the detachable support, the connection of the housing to the detachable support providing means whereby the said housing can be adjusted to clamp the rotatable bearing support against movement when the pin member is in desired adjusted position.

LLOYD W. GODDU.

70

75

80

85

90

95

100

105

110

115

120

125

130