

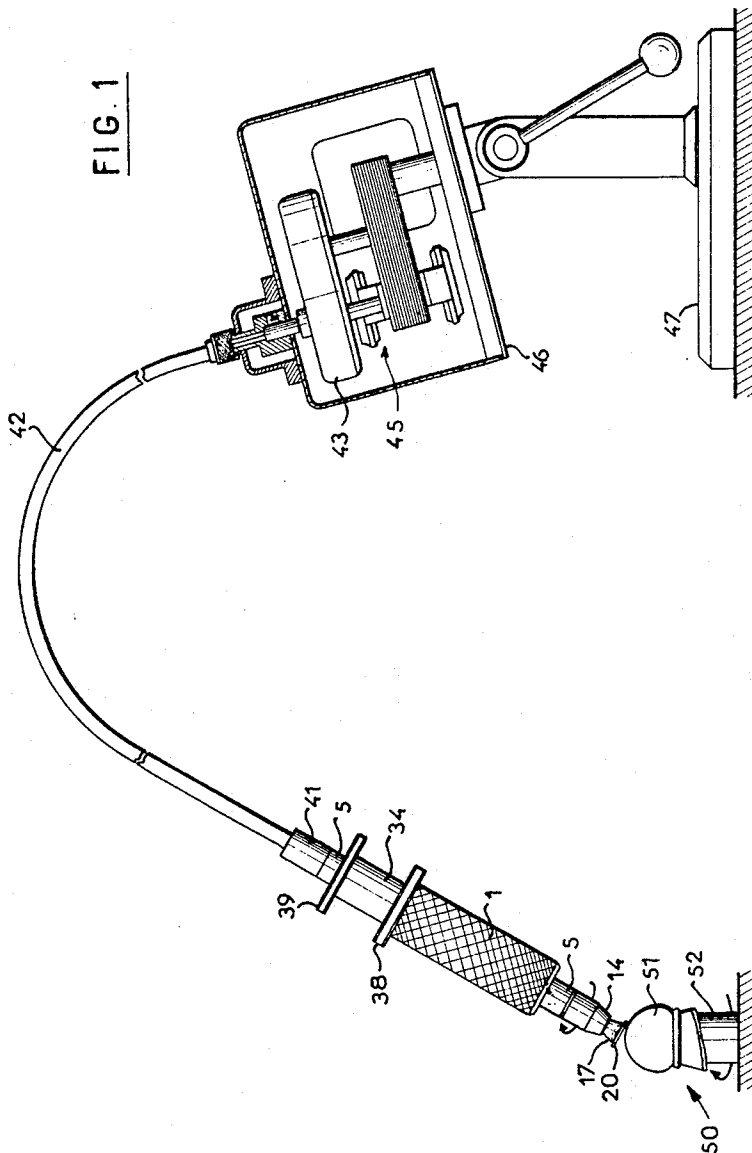
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P. M. ROCHER ETAL
POLISHING OF CORNEAL LENSES

3,274,737

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2 Sheets-Sheet 1



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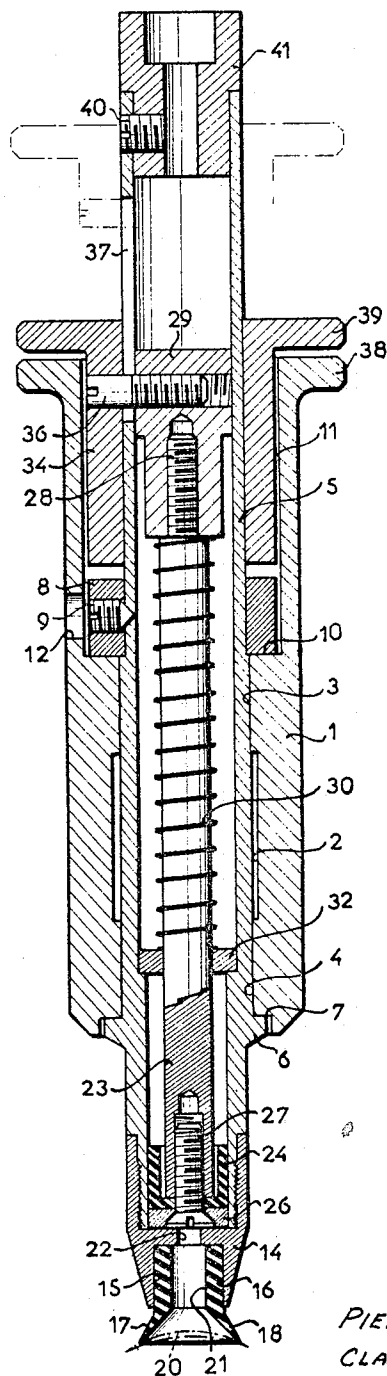
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FIG. 2



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POLISHING OF CORNEAL LENSES

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911,505

2 Claims. (Cl. 51-131)

This invention relates to the polishing of corneal lenses, and in particular to hand tools for use in polishing corneal lenses.

It is known that in the production of corneal lenses, the uniformity of the polishing of the inner curvatures and primarily of the edges, is of fundamental importance.

In the great majority of cases, the corneal lens is a spherical body of revolution about an axis which as a rule coincides with the optical axis, and in order to perform this polishing operation, the lens is secured by small suction cups of moulded rubber held in the hand and is brought into contact with a rotary polisher whilst imparting to it a rotary motion with the fingers.

The rotary motion thus imparted is necessarily irregular and since the contact pressure itself also varies in irregular manner, there is a risk of polishing for a longer time or more extensively at certain points to the detriment of others.

It is a main object of the present invention to improve the uniformity and quality of the polishing of the edges and inner curvatures of a corneal lens, and for this purpose the invention provides a hand tool which facilitates the gripping of the lens and its presentation to the polisher.

According to the invention there is provided a hand tool for use, in association with a conventional rotary polisher in polishing a corneal lens, comprising a handle at one end of which is mounted a device for gripping a corneal lens, which gripping device is associated with driving means and is rotatably mounted on the handle.

Since the lens may thus be brought into contact with the rotary polisher and is itself being driven in a regular rotary motion, a particularly uniform polishing of the lens is achieved.

In order that the invention may be more clearly understood an embodiment thereof will now be described, by way of example with reference to the accompanying drawings in which:

FIG. 1 is an overall view of a polishing installation for corneal lenses including a hand tool according to the invention, and

FIG. 2 is a view in longitudinal section of this hand tool.

In the embodiment illustrated in the drawings, a hand tool according to the invention comprises a handle 1 in which is formed an axial bore 2 having two annular journals 3 and 4 forming bearings for a tubular shaft 5. This tubular shaft is free to rotate in the bore 2 but is prevented from axial displacement in the handle 1 by two abutments, namely a shoulder 6 formed on the shaft 5 and bearing on a radial abutment 7 of the bore, and a removable ring 8 threaded on to the shaft 5 and made solid with the latter by means of a grub screw 9, and bearing against a radial abutment 10 of the bore 2. This abutment 10 is formed by the bottom of a cylindrical recess 11 co-axial with the bore 2, formed in the upper portion of the handle 1 and whose diameter, which is greater than that of the bore 2, permits the accommodation with radial clearance of the ring 8.

An aperture 12 in the side of the handle in alignment with the ring 8 makes it possible to insert and tighten the screw 9.

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In its lower portion, the tubular shaft 5 extends beyond the handle 7 and has a threaded outer surface on which is screwed a head or tip 14 whose freestanding end comprises a cylindrical axial recess 15 adapted to receive the stem or shank 16 of a rubber suction cup 17, this latter comprising a small bowl 18 with a thin rim open towards the bottom and adapted to receive the convex face of a corneal lens 20. A bore 21 traversing the stem 16 of the cup places the latter in communication with the inner space of the tubular shaft 5 through a bore 22 in the base of the recess 15.

A rod 23 is disposed axially in the shaft 5, with substantial radial clearance and at its lower part comprises a piston formed by a rubber packing piece 24 mounted with friction fit in the bore of the shaft 5 and secured to the extremity of the rod 23 by means of a washer 26 and a screw 27. The upper part of the rod is terminated by a threaded portion 28 on which is screwed a tip 29 having a cylindrical bearing surface of slightly smaller diameter than the inner diameter of the shaft 5. A coil spring 30 surrounding the rod 23 tends to push the rod upwards drawing the piston away from the suction cup 17, this spring bearing on the lower face of the tip 29 and on the upper face of a ring 32 surrounding the rod 23 with radial clearance and bearing on a step formed in the inner bore of the shaft 5.

A tubular sleeve 34 is slidable on the shaft 5 with a small radial clearance, in the upper part of this shaft extending beyond the handle 1, and is fixed to the rod 23 by means of a screw 36 positioned along a radius of the rod 23 and joining together the said rod and the sleeve 34 by passing through the side of the shaft 5 through an elongated opening 37 extending parallel to the axis of this shaft.

At rest, the spring 30 thrusts the rod 23 with the sleeve 34 upwards up to a position, shown by chain lines in FIGURE 2, in which the screw 36 is in abutment against the upper edge of the opening 37.

The length of this opening is determined so that it may be possible by acting on the sleeve 34 to thrust the rod 23 downwards against the spring 30 until the washer 26 is brought into contact with the bottom of the recess 15, the sleeve then being housed within the recess 11 with radial clearance.

In order to facilitate this last operation, an annular collar 38 may advantageously be provided on the upper part of the handle 1 and an identical annular collar 39 on the sleeve 34.

To the upper part of the shaft 5 there is fastened by means of a screw 40 a plug 41 for connection to one end of a flexible cable of a flexible drive 42 whose other end is connected through a reduction gear 43 of appropriate ratio to the output shaft of an electric motor 45.

The electric motor 45 is mounted within a casing 46 jointly secured on a base 47.

Rotation of the motor causes, through the reduction gear and the flexible drive, rotation of the shaft 5 within the handle 1, and as a result the suction cup 17 rotates. The transmission ratio of the gear is so chosen for example that the suction cup rotates at 200 r.p.m.

In order to secure a corneal lens which is to be polished, the piston is brought into the lower position by compressing the spring 30 as shown above, and the bowl 18 is brought into contact with the convex face of the corneal lens 20. The sleeve 34 is then released, and since the piston is impelled towards its upper position by the spring 30, the pressure is reduced in the space delimited by the lens 20, the inner side of the suction cup and of the bore of the shaft 5, and the piston.

Owing to the pressure difference prevailing between this space and the surrounding atmosphere, the lens is

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thus held against the suction cup and gripped in the cup and is rotated with the cup when the motor is started.

The polishing apparatus is completed by a polisher 50 which in this embodiment comprises a hemispherical head 51 made of expanded polyurethane foam for example, fitted on the extremity of a rotary shaft 52. A special polishing cloth is fitted on the head.

This apparatus makes it possible, by using the hand tool according to the invention which is easily placed in the desired position, to join in a very uniform manner the successive curvatures appearing between the concave and convex faces of the lens 20.

The regular rotation of this lens around its axis makes it possible to obtain particularly even polishing.

We claim:

1. Polishing apparatus for polishing the rim of corneal lenses, comprising, in combination, a rotary polisher and a hand tool for holding the lens to be polished and rotating it around its axis, said polisher comprising a head made of a resilient material, a rotary shaft on which is mounted said head, while said hand tool comprises a handle having an axial bore, a support spindle carried in bearings fitted in said axial bore of the handle, which bearings are adapted to prevent axial displacement of the spindle, a gripping device for holding the lens to be polished mounted at one end of the spindle, said gripping device being a suction cup made of a resilient material, the bottom of said cup being in communication with an internal axial bore in the support spindle, a piston sliding in said internal bore for moving towards and away from

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the cup, a rod disposed along the axis of said internal axial bore and fixed to said piston, an actuating sleeve surrounding the spindle and solid with the rod, a screw passing through an elongated opening formed lengthwise in the wall of the spindle and connecting the rod to the sleeve, a return spring disposed in the internal axial bore and surrounding said rod so as to tend to move said piston away from said cup, said apparatus further comprising driving means for the spindle, said driving means comprising a driving motor having an output shaft, a reduction gear connected to said output shaft, a flexible drive connecting said reduction gear to the end of the support spindle opposite to the cup.

2. Polishing apparatus as claimed in claim 1, in which said polisher head is part spherical, and a polishing cloth covering said head.

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