

[54] MOUNTING DEVICE FOR OPTICAL LENSES

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[58] Field of Search..... 51/216 LP, 216 T, 217 L, 51/124 L, 231, 232, 233, 237 R; 269/22, 20, 269/310; 279/16, 10, 1 Q

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[57] ABSTRACT

Mounting device for grinding optical lenses. There is provided a mounting plate by which the lens is held against the grinding tool, said mounting plate being driven through a ball joint. Pressure and consequent wear on the ball joint is minimized by associating said plate with a generally cup-shaped member movable with the driving side of the ball joint into which a pressure fluid is introduced for urging the mounting plate, consequently the lens, against the grinding tool. A U-shaped sealing device is provided between the flanges of the cup-shaped member and the mounting plate for both sealing the space therebetween against escape of the pressure fluid and also for effecting a driving of the mounting plate for rotation with the cup-shaped member. Thus, the actual control of the lens is through the ball joint, and the driving of same for rotation is through the U-shaped sealing device. As a result, the thrust of the lens against the grinding tool and the radial grinding motion is sufficiently assisted that wear on the ball joint is minimized.

6 Claims, 2 Drawing Figures

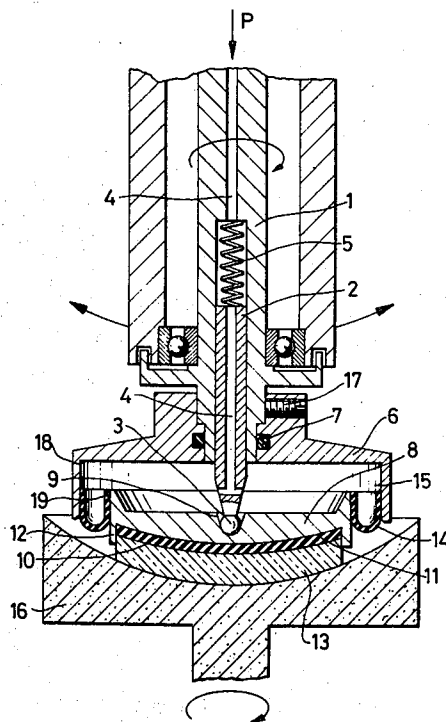
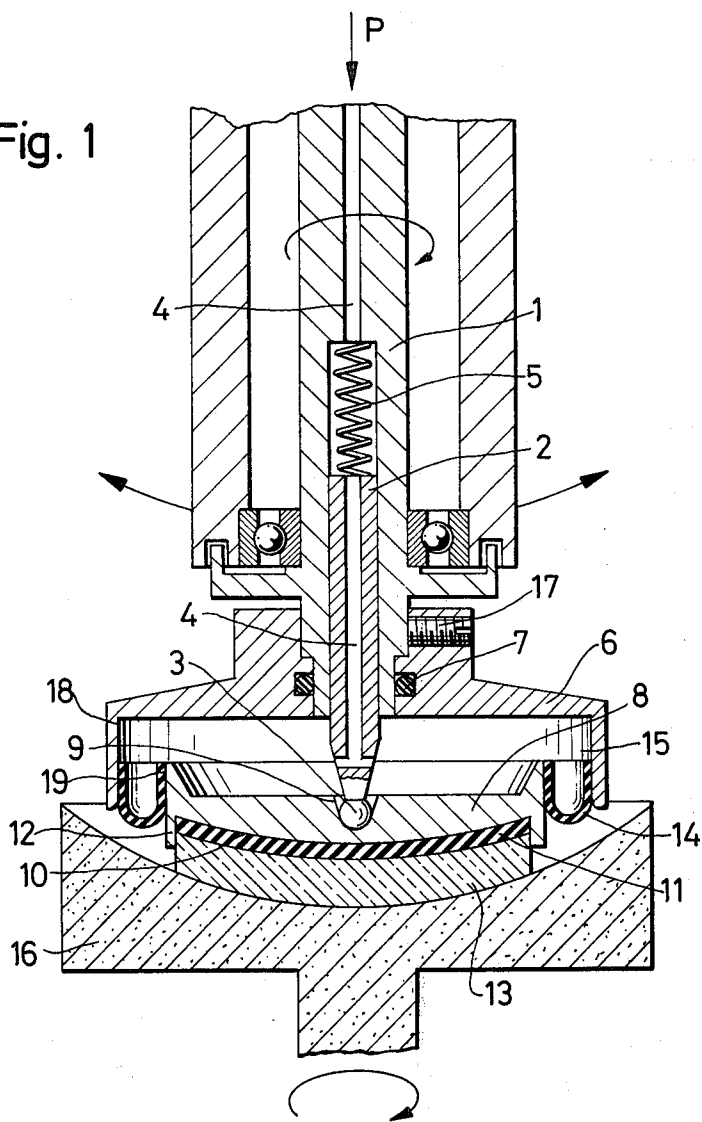
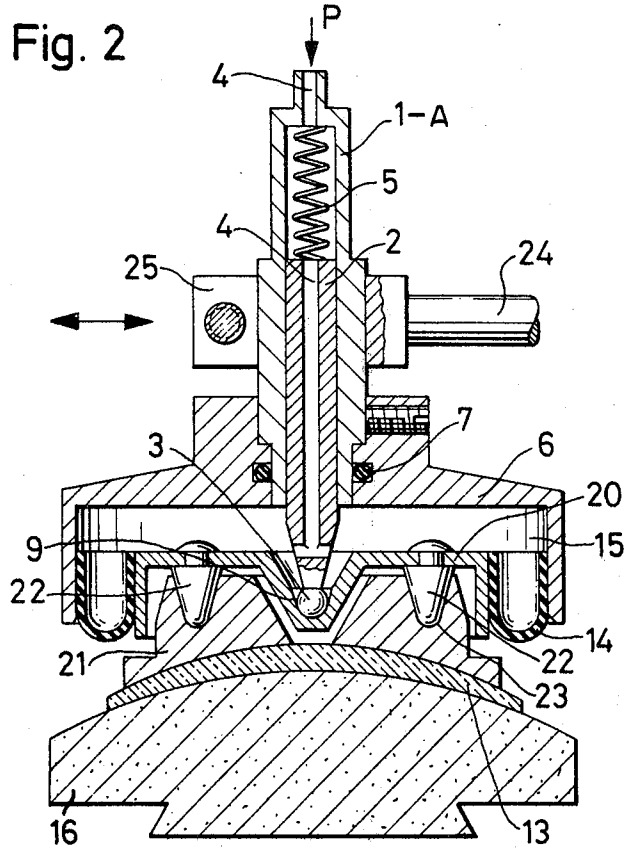


Fig. 1





MOUNTING DEVICE FOR OPTICAL LENSES

FIELD OF THE INVENTION

The invention relates to a mounting device for optical lenses for use in a grinding and polishing machine. The device comprises a lens holder which is connected through a universal joint fixed with respect to rotation to a rotatable or transversely movable rod.

BACKGROUND OF THE INVENTION

In the use of power means for the grinding and polishing steps during the manufacture of lenses, particularly lenses for eyeglasses, strong demands are made on the universal joints used therein. These universal joints are constructed in known mounting devices as ball-pin, spherical, surface bearings, and the operating pressure is conducted therethrough. In the known mounting devices, contact between the ball-and-socket joint and the grinding or polishing means cannot be avoided and this leads to rapid wear of the joint. The use of hard metal for parts of the joint, already suggested, can improve the tool life only insignificantly.

An exactly uniform transmission of rotary movements is not possible with the known joints and this leads to inaccuracies in the manufacture of lenses when operating methods are used in which the rotation of workpiece and tool must be synchronized.

The basic purpose of the invention is to construct a mounting device of the type mentioned above which under conditions of free adjustment around the universal joint will make possible a clearance-free, uniform-motion, coupling between rod and lens holder. In a further development of the invention, the mounting chuck is so constructed as to relieve the universal joint in whole or in part from the operating pressure.

This purpose is attained by arranging an annular part on the rod, which part is connected to the lens holder by a roll bellows which is stiff in a peripheral or circumferential direction.

By using a roll bellows which is stiff in a peripheral or circumferential direction, tilting movements about the universal joint are permitted, while on the other hand there is an exact clearance-free, uniform-motion or torque transmitting, coupling with the rod because of the stiffness of the roll bellows in a peripheral or circumferential direction. The uniform-motion joint can be manufactured extremely inexpensively because a roll bellows is not a precision part and does not require any special attention. In the case of working methods which require a synchronized rotation of tool and workpiece, the invention has the further advantage of avoiding the manufacturing errors which otherwise may result, as in known mounting chucks, from failure to obtain an exactly uniform-motion transmission of rotary movements.

The desired stiffness of the roll bellows in the peripheral or circumferential direction can be achieved for example by providing the roll bellows with a fabric insert.

A further development of the invention, which relieves the universal joint from the operating pressure, is characterized in that the annular part is constructed as a closed cover part and, in cooperation with the roll bellows and the lens holder against the pressure medium, closes a joint chamber in which the universal joint is located and has a conduit therein for the feeding of pressure medium into the joint chamber.

In a mounting device so constructed the operating pressure is exerted by the pressure medium to urge the lens holder away from the cover part. The universal joint then only needs to effect an exact centering of the lens holder and needs to absorb only relatively small forces. Thus the life of same is substantially increased because there is both a protection of the joint against contact with grinding means or polishing means and a substantial reduction of the stress on the joint.

Advantageously at least some parts are made of a light material in order to minimize the mass of the device and thus the mass forces.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments for a mounting device with means for admission of pressure medium for the lens holder are shown in the two exemplary embodiments of the invention illustrated in the drawings, in which:

FIG. 1 illustrates a mounting chuck for receiving spherical lenses and

FIG. 2 illustrates a mounting chuck for lenses having toric surfaces.

DETAILED DESCRIPTION

The mounting device which is illustrated in a diametrical cross section in FIG. 1 is secured on a ball bearing supported shaft 1. The mounting can be a part of a machine or otherwise. An axially movable pin 2 is supported in the shaft 1, which pin is ball-shaped at its forward end, as indicated by reference numeral 3. The pin 2 is movable longitudinally by a spring 5.

A bell-shaped cover 6 is secured on the shaft 1, which cover 6 has a central bore with an annular groove therein, in which groove lies a seal ring 7. The seal ring contacts the shaft 1. The cover 6 is held against relative rotation on the shaft 1 by an adjusting screw 17.

A lens holder 8 is connected to the cover 6. The lens holder has a recess 9 on its upper side, into which recess the ball 3 of the ball pin 2 is received. The front or lower side of the lens holder 8 has a recess 10 into which is inserted the lens 13 to be treated. An elastic intermediate layer 11 protects the lens against damage. The cylindrical outer periphery of the lens is supported on a centering flange 12 of the lens holder 8 and is thus secured against a circumferential shifting.

The connection of the lens holder 8 and of the cover 6 is accomplished according to the invention through a bellows 14 of elastic material, for example of rubber. The bellows 14 is fixedly connected to the lens holder 8 and the cover 6 which define therebetween a closed space 15, which latter can be termed a joint chamber because in this chamber the joint 3, 9 is located. The bellows is constructed as a so-called roll bellows. It is secured with one edge on the cylindrical inner side 18 of the bell-shaped cover 6 and with its other edge on the cylindrical outer side 19 of the lens holder 8. A deformable insert is recessed into the bellows 14, which insert permits tilting movement of the lens holder 8 but does not permit relative rotation between the cover 6 and the lens holder 8 and prevents inflating of the bellows 14 during a condition of excess pressure in the joint chamber 15.

In the embodiment illustrated in FIG. 2, corresponding parts are identified by the same reference numerals as in FIG. 1. In contrast to the embodiment of FIG. 1, the lens holder is here composed of two parts, namely a first lens holding part 20 and a second lens holding

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part 21. On the first lens holding part 20 there are provided two conical driving lugs 22 which engage corresponding recesses 23 in the second lens holding part 21 and thereby fix the axes of a toric surface in the desired position relative to the tool.

The lens 13 is here a lens with toric surfaces. The lens is conveniently secured by adhesively fastening the second lens holding part 21.

The part 1-A is in the embodiment of FIG. 2 not a rotatable shaft but a rod mounted for movement transversely of its longitudinal direction. To effect such transverse movement, there is provided a reciprocable rod 24 which is secured on the part 1-A by means of a clamp 25.

The mounting device operates as follows:

A pressure medium, preferably air, is conducted through longitudinal bores 4 in the part 1 (or 1-A) and the ball pin 2 with a desired excess of pressure into the joint chamber 15 of the mounting device. The pressure medium acts through the lens holder 8 or 20 and the bellows 14 to urge the lens 13 against the tool 16. The spring 5 holds the ball pin 2 in the recess of the lens holders 8 or 20 and prevents a lateral shifting of the lens holder and thus of the lens. The uniform-motion suspension of the lens holder 8 or 20 by the ball pin 2 and the bellows 8 permits the lens to effect an exact contact with the tool 16.

Although particular preferred embodiments of the invention have been disclosed above for illustrative purposes, it will be understood that variations or modifications thereof which lie within the scope of the appended claims are fully contemplated.

I claim:

1. In a mounting chuck for optical lenses for use in a grinding and polishing machine, comprising a movable rod and a lens holder which is connected to said movable rod through a universal joint, the improvement comprising an annular part mounted on said rod and movable therewith and a roll bellows having a characteristic of being generally stiff in a circumferential direction but flexible in an axial direction for connecting said lens holder to said annular part, said roll bellows being U-shaped in cross section and having a pair of legs, one disposed radially inwardly with respect to the other, a first leg being secured to said annular part, the second leg being secured to said lens holder, the bight portion connecting said pair of legs being rounded, said roll bellows effecting a torque transmission from said annular part to said lens holder.

2. The improved mounting chuck according to claim 1 wherein said roll bellows has a fabric insert to make said roll bellows more stiff in said circumferential direction.

3. In a mounting chuck for optical lenses for use in a grinding and polishing machine, comprising a movable rod and lens holder which is connected to said movable rod through universal joint means, the improvement comprising an annular part mounted on said rod and movable therewith and a roll bellows which is generally stiff in a circumferential direction but flexible in an axial direction for connecting said lens holder to said annular part, said roll bellows effecting a torque transmission from said annular part to said lens part and being sealingly engaged with said annular part and said lens holder to define a fluid tight chamber therebetween, said universal joint means being located in said fluid tight chamber and passageway means for supplying pressurized fluid to said fluid tight chamber to urge said lens holder axially away from said annular part so that said universal joint means only functions to center said lens holder and absorb very small radial and axial forces.

4. The improved mounting chuck according to claim 3, wherein said annular part is bell-shaped and has flange means for gripping over said lens holder, said roll bellows being secured on and between the mutually facing surfaces of a substantially cylindrical outer surface of said lens holder and a substantially cylindrical inner surface of said flange means.

5. The improved mounting chuck according to claim 3, wherein said rod has a pressure rod axially movable relative thereto mounted thereon and wherein said universal joint means includes a ball mounted on said pressure rod and a recess mounted on said lens holder, spring means for urging said ball into said recess and in engagement with the interior surface of said recess and wherein said passageway means includes a passageway through the center of said pressure rod and opening outwardly thereof inside said fluid tight chamber.

6. The improved mounting chuck according to claim 3, wherein said lens holder consists of a first lens holding part connected to said roll bellows and a second lens holding part which is connected to said first lens holding part for rotation therewith, said second lens holding part having a lens abutment surface thereon engaging a lens.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3 886 696 Dated June 3, 1975

Inventor(s) Erhard Brück

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Foreign Application Priority Data

Please change the Priority Date to October 26, 1972.

Column 4, line 7; delete "and" (first occurrence).

Signed and Sealed this

second Day of December 1975

[SEAL]

Attest:

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