Feb. 13, 1962 A. H. OLDFIELD ETAL 3,020,684

LENS BLOCKING DEVICE

Filed Dec. 26, 1957 3 Sheets-Sheet 1

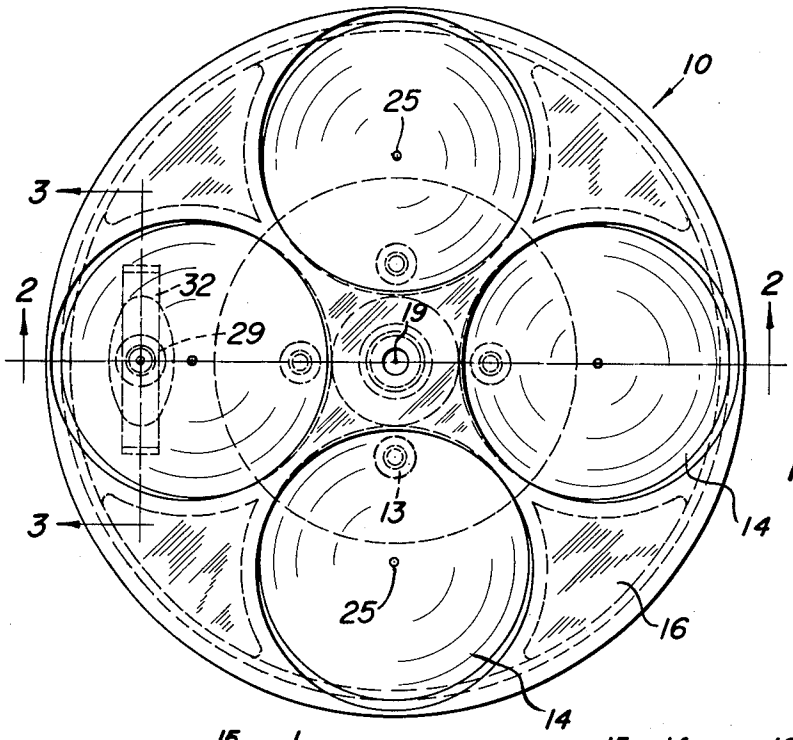


FIG. 1.

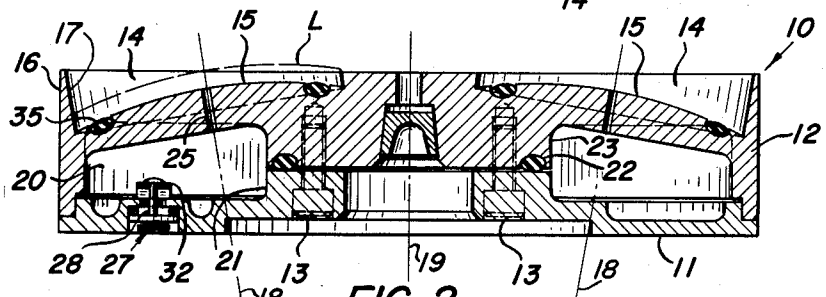


FIG. 2.

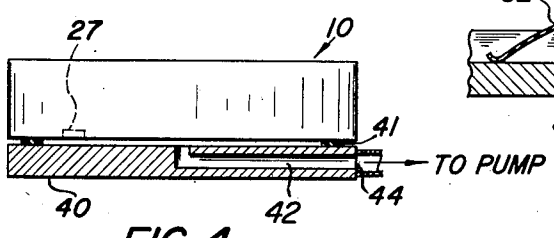


FIG. 4.

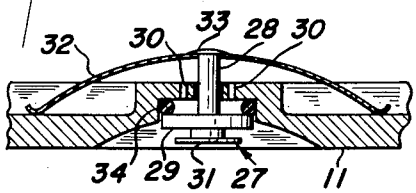


FIG. 3.

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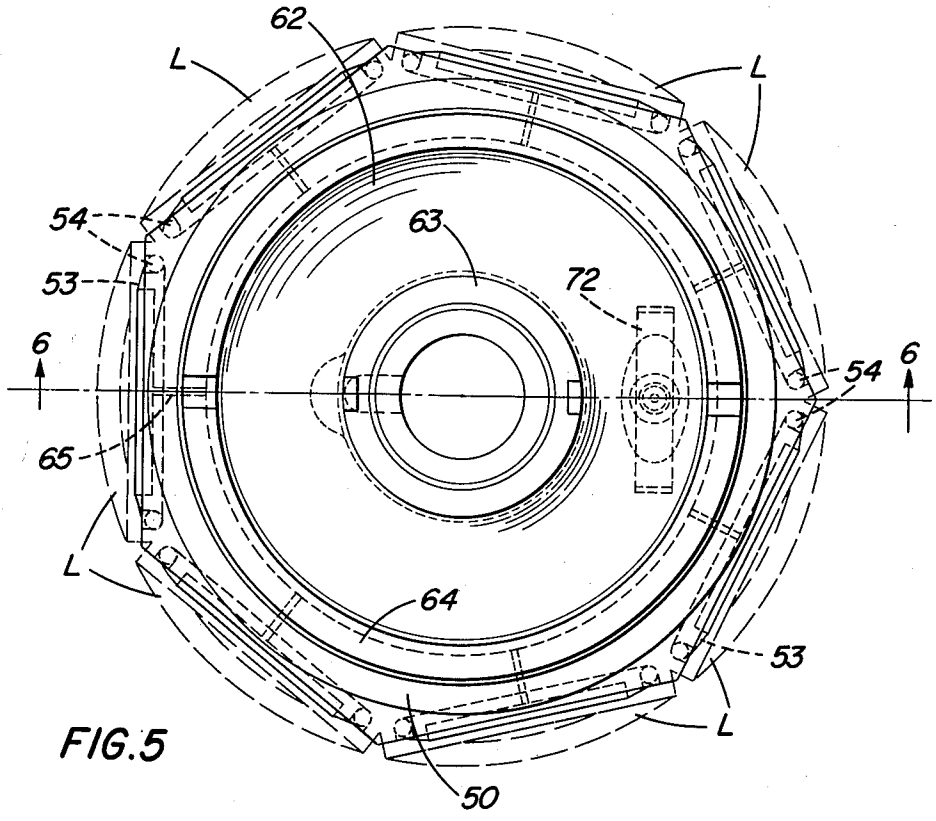


FIG.5

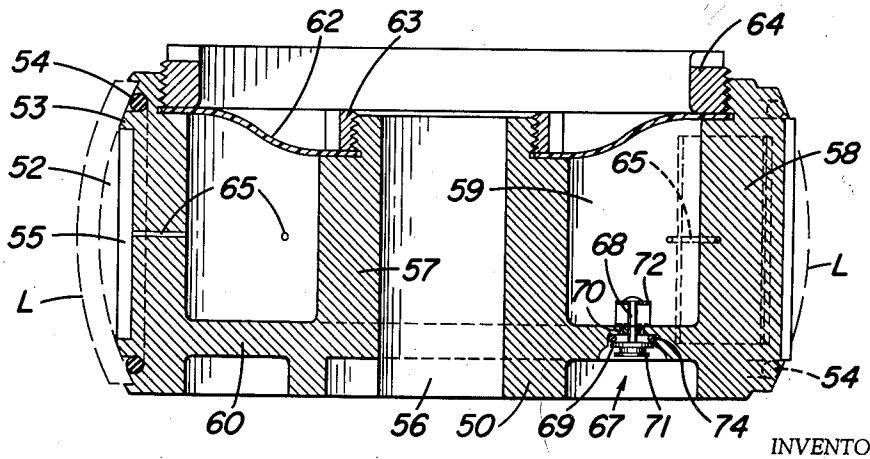


FIG.6

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LENS BLOCKING DEVICE

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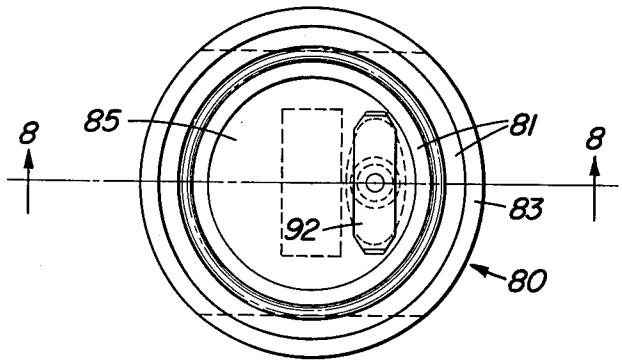


FIG.7

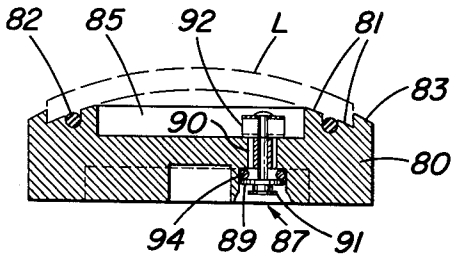


FIG.8

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3,020,684

LENS BLOCKING DEVICE

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2 Claims. (Cl. 51—235)

The present invention relates to lens blocking devices, and more particularly to an improved device for blocking ophthalmic lenses.

In the manufacture of an ophthalmic lens, a lens blank of molded glass is ground and polished on each of its two sides to produce precisely curved surfaces, the shapes and spatial relation of the two curved surfaces resulting in the optical refraction desired. In the various grinding and polishing operations, to which the blank is subjected in manufacture, it is customary to secure the blank by means of an adhesive, such as molten pitch, to a lens block which serves as a carrying means for the blank. With this block the blank may be chucked in the grinding or polishing machine, and may be handled during transfer from one machine to the other, etc.

There are many disadvantages to having to use pitch as a means for securing a lens to a lens block. Pitch is messy; and a solvent, or some other means, has to be employed to remove the lens from the block after the grinding or polishing operation has been performed on the lens. Moreover, the lens block itself has to be cleaned after use to keep the block free of undesirable pitch accumulations. However, prior to the present invention no satisfactory substitute had been devised for pitch as a means of fixing a lens to a lens block; and, therefore, pitch has almost universally been used for this purpose.

One object of the present invention is to provide a lens block to which a lens may be secured without the use of pitch or any other adhesive.

Another object of the invention is to provide a lens block so constructed that a lens blank can readily be affixed thereto, or removed therefrom.

Another object of the invention is to provide a general type of lens block which can be used in grinding or polishing lenses of various shapes.

Still another object of the invention is to provide a lens block on which a plurality of lenses may be mounted so that several lenses can be ground or polished in a single set-up.

A still further object of the invention is to provide a lens block to which a plurality of lenses can be attached simultaneously.

Still another object of the invention is to provide a lens block which will be simple in construction, and relatively inexpensive to manufacture and to use.

Other objects of the invention will be apparent hereinafter from the specification and from the recital of the appended claims, when taken in conjunction with the accompanying drawings.

In the drawings:

FIG. 1 is a plan view of a lens block constructed according to one embodiment of this invention;

FIG. 2 is a section through this block taken on the line 2—2 of FIG. 1, looking in the direction of the arrows;

FIG. 3 is a fragmentary section through the block, on an enlarged scale, taken on the line 3—3 of FIG. 1, looking in the direction of the arrows;

FIG. 4 is a more or less diagrammatic view, partly in section, illustrating how the lens block may be evacuated to effect chucking of lens blanks thereon;

FIG. 5 is a plan view of a lens block constructed according to a modification of the invention;

FIG. 6 is a diametral section through this modified form of block, taken on the line 6—6 of FIG. 5 looking in the direction of the arrows;

FIG. 7 is a plan view of a lens block made according to a still further modification of the invention; and

FIG. 8 is a diametral section taken on the line 8—8 of FIG. 7, looking in the direction of the arrows.

Referring now to the drawing by numerals of reference and first to the embodiment shown in FIGS. 1 to 4 inclusive, the blocking device or head 10 comprises a base 11, and a lens-receiving top or body portion 12. The two portions may be secured together in any convenient manner as, for instance, by the screws 13, which thread into the top portion 12 and whose heads seat in countersunk recesses in the bottom face of the base 11.

The top portion 12, in the embodiment of the invention shown, has four pockets or recesses 14 formed in its upper surface 16 in which four lens blanks can be placed. One of the lens blanks is shown at L in dotted lines in FIG. 2. Each of the pockets 14 has a bottom surface 15 shaped to conform to the adjacent surface of a particular semi-finished lens blank which is to be mounted in the pocket. The surface 15 may be convex, or concave, or of other suitable shape, depending upon the lens blank mounted in the pocket. In the embodiment illustrated, each pocket 14 is bounded by a wall 17 integral with the top portion 12 of the block and adapted to fit very closely around the periphery of the lens blank which is mounted in the pocket. The lens blank, however, might instead be held against lateral movement by pins or lugs secured in the portion 12 and spaced angularly from one another around the periphery of the lens blank.

The bottom surface 15 of each pocket 14 of the block 12 shown is convex and is inclined away from the axis 19 of the block, that is, the bottom 15 of each pocket is curved about a center lying on a line 18 which is inclined to the axis 19 of the block. Thus, when the block is secured toa generator or polisher, for instance, each lens will be in the proper position for grinding or polishing when the block is rotated to bring the lenses successively into engagement with the grinding or polishing tool.

The base portion 11 and the top portion 12 have aligned centrally disposed hub portions 21 and 23, respectively. The top portion 12 is provided with an annular recess on its under face around hub portion 23, which forms, with an opposed annular recess around the hub portion 21 of the base 11, when the base and top portion 12 are secured together, a chamber 20. an O-ring 22, or the like, is mounted in a recess in the bottom face of the hub portion 23 of the top member 12 between the opposed faces of the hub portions 21 and 23 to insure air tightness of the block when the parts 11 and 12 are secured together. A duct 25 connects the chamber 20 with each of the pockets 14. These ducts 25 are disposed centrally of the bottom faces 15 of the pockets and, in the embodiment shown are disposed radially of these surfaces 15.

Mounted in the base 11 of the block is a reciprocable valve member 27, whose stem 28 slides through an opening in the base 11. The base 11 is provided at opposite sides of stem 28 with ports 30 by which air may be admitted to or sucked out of the chamber 30. The valve member 37 is normally held in, and is constantly urged to closed position by a leaf spring 32 which is secured to the stem 28 of the valve by a rivet head portion 33 on the stem 28. The ends of this spring bear against the base 11. In closed position, the enlarged head 29 of the valve seats against an O-ring 34, which is mounted in a recess in the base around the ports 30.

To secure lens blanks to the lens block, a lens blank L is placed in each of the pockets 14, and suction is applied to the chamber 20 to suck the air out of this chamber and out of the ducts 25. An O-ring 35 is mounted in each recess or pocket 14 adjacent the pe-

riphery thereof. The lens blanks seat on these O-rings, which act as gaskets and insure that the full effect of suction will be exerted on the lens blanks.

To chuck the lenses on the block, the block may be mounted, as shown in FIG. 4 on a plate 40 with a ring type gasket 41 interposed between the opposed faces of the block 10 and the plate 40. The plate 40 has a right angle duct 42 in it which can be coupled to the suction line 44 of a pump (not shown) so as to evacuate the chamber 20. The suction of the pump will be sufficient, after the lens blanks have been placed in the several pockets 14, and the ducts 25 are thereby covered, to open the valve 27 against the resistance of the spring 32. Thus, when air is sucked from under the lens blanks and out of the chamber 20, the lens blanks will be secured to the lens block by suction.

As soon as the desired amount of suction has been achieved in the chamber 20, which can be measured by a suitable gauge (not shown) in the line 44, the pump can be shut off, and the lens block can be lifted off the plate 40. As soon as the suction is shut off, the spring 32 will return the valve head 29 to sealing position; and the lenses will continue to be held on the block by suction. The block can then be transferred to the generating machine for grinding or polishing of the lenses.

After grinding or polishing has been completed, and when it is desired to remove the lenses from the lens block, the operator needs only to grasp the knob or disc head 31 of the valve 27 and pull down against the resistance of the spring 32. This will permit air to enter into the chamber 20 through the ports 30; and the vacuum will be broken, releasing the lenses, which may then be lifted off their seats 15.

The embodiment of the invention shown in FIGS. 5 and 6 operates on the same principle as the modification shown in FIGS. 1 to 4. However, in the case of the embodiment shown in FIGS. 5 and 6 the lens blanks are secured around the periphery of the lens block instead of against one end face of the block.

Here 50 denotes the lens block. It is generally heptagonal in shape, having seven pockets 52 disposed around its periphery. In the embodiment illustrated each pocket has a convex seat 53 which is grooved to receive an O-ring 54, and which is centrally recessed as denoted at 55.

The block 50 has a central bore 56 and a hub portion 57 surrounding the bore. Surrounding the hub portion 57 and between the hub portion and the peripheral wall 58 of the block, the block is provided with an annular recess 59. This recess 59 is closed at one end by wall 60 integral with hub portion 57 and outside wall 58. It is closed at its other end by a neoprene or other non-porous, flexible diaphragm 62. This diaphragm is held in position at its radially inner end by a nut 63 which threads on the hub portion 57. It is held in place at its radially outer end by a nut 64 which threads into outer wall 58.

End wall 60 and diaphragm 62 form with the recess 59 a chamber which is connected by radial ducts 65 with the several pockets 52. A valve 67, exactly like valve 27, normally closes this chamber. This valve has a stem 68 which slides through an opening in wall 60; it is constantly urged to closed position by a leaf spring 72, like spring 32; it has an enlarged head at 69 which seats against an O-ring 74 which seats around ports 70; and it has a knob or head 71 by which it may be opened exactly as the valve 27.

Block 50 may be placed on a plate, like plate 40 (FIG. 4) and evacuated in the same way as block 10 to secure the several lens blanks L to it by suction; and these lens blanks may be released by opening valve 67, in the same way as in the embodiment shown in FIGS. 1 to 4. Block 60 may be mounted by means of bore 50 on a lens grinder or polisher and when it is rotated under a grinding or polishing wheel, toric surfaces will be ground or polished on the lens blanks carried by the block.

FIGS. 7 and 8 show a modification of the invention used where a single lens blank at a time is to be ground or polished with a spherical or toric surface. Here 80 denotes the lens block. It is formed at one end with a convex seat 81 for a lens blank; and it is recessed at said one end to receive an O-ring 82 against which the lens blank is held. A peripheral wall 83, surrounding the seat, holds the lens blank against lateral movement on the seat. The block 80 is also recessed on this one end centrally of the seat, as denoted at 85. When a lens blank is in place on the seat it forms with the recess 85 a chamber which can be evacuated to hold the lens blank on the seat. A valve 87, similar to valve 27, normally closes the chamber in the block. The spring 92 constantly urges this valve to closed position; and it may be opened by pulling on its head 91. Air is admitted to or evacuated from the chamber in the block through the holes 90 around the stem of the valve. O-ring 94 surrounds these holes and serves as a seat for the head 89 of the valve.

The block 80 can be placed on a plate, similar to plate 40, to evacuate its chamber, thereby to secure a lens blank to the block. Then, as before, it can be chucked on a suitable machine to grind or polish the lens. When the grinding or polishing operation is completed, the lens blank can be released to permit its removal from the block, by pulling on knob 91.

While the invention has been described in connection with several different embodiments thereof, it will be understood that it is capable of further modification, and this application is intended to cover any variation, uses, or adaptations of the invention following, in general, the principles of the invention and including such departures from the present disclosure as come within known or customary practice in the art to which the invention pertains and as may be applied to the essential features hereinbefore set forth, and as fall within the scope of the invention or the limits of the appended claims.

Having thus described our invention, what we claim is:

1. A portable lens block having a plurality of seats each of which is adapted to receive a lens blank, an annular, resilient sealing member forming part of each seat and positioned to engage the juxtaposed surface of a lens blank adjacent the periphery of the blank when the blank is positioned on the seat, said block having an interior chamber therein, a duct connected at one end to each seat radially within the sealing member of that seat and connected at its opposite end to said chamber, a port for connecting said chamber to the exterior of said block at a point outside of all said seats, a valve having an operative portion for closing said port, a seat on the outside of said block for said valve, said seat surrounding said port, and a spring positioned to constantly urge said valve to closed position against the last-named seat, whereby application of suction to said valve externally of an external source of said valve sufficient to overcome the resistance of said spring will open said valve and evacuate said chamber and the spaces within the several sealing members and between the several lens blanks and their associated seats, thereby to secure the several lens blanks to the lens block by suction on the insides of the blanks and by atmospheric pressure against the outsides of the blanks, said spring being of sufficient strength to close said valve immediately upon disconnection of said source of suction from said block thereby to retain the lens blanks on their associated seats by suction, and means connected to said valve for manually opening said valve against the resistance of said spring to admit atmospheric pressure into said chamber and against the insides of the lens blanks thereby to release

the suction to permit removal of the lens blanks from the block.

2. A portable lens block is claimed in claim 1 wherein said valve has a head portion and a stem portion, said head portion constitutes the operative portion of the valve and is adapted to engage the valve seat, said stem portion extends through a guide opening in the block, said spring is connected to said stem portion inwardly of said valve seat and inside said block to constantly urge said head portion into engagement with said valve seat to hold said valve closed, said stem portion has a gripping portion externally of said block for grasping manually to open said valve against the resistance of said spring, and said port is offset from said guide opening but within the area of said head portion.

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