

Feb. 26, 1946.

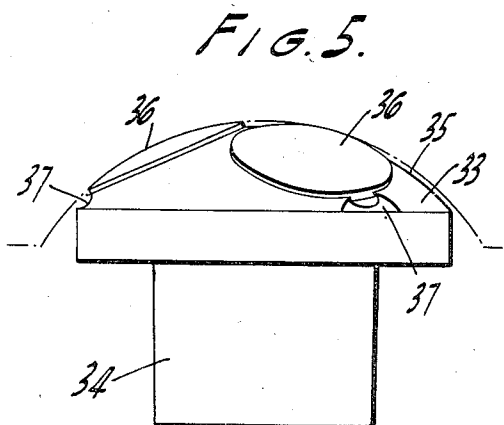
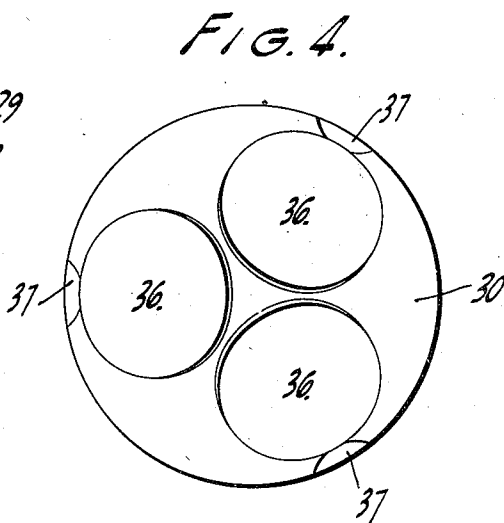
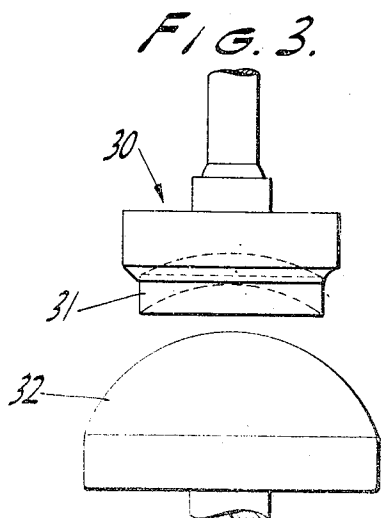
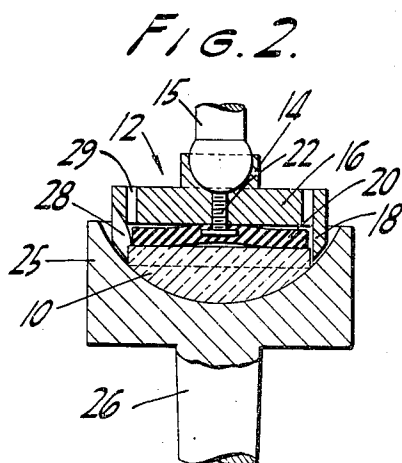
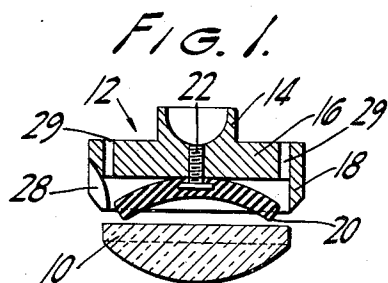
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2,395,700

METHOD AND APPARATUS FOR SHAPING OPTICAL OBJECTS AND THE LIKE

Filed March 23, 1943

2 Sheets-Sheet 1



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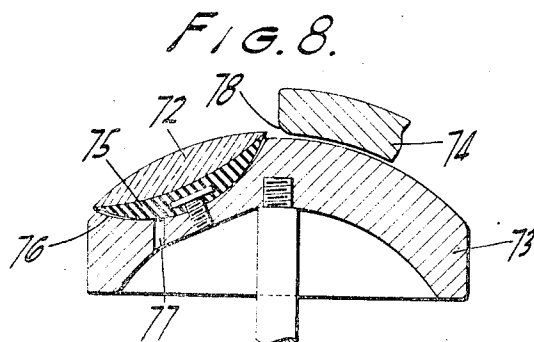
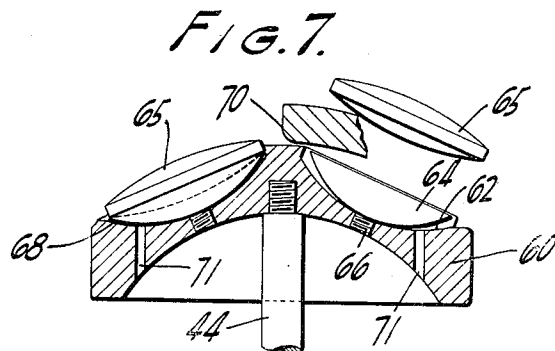
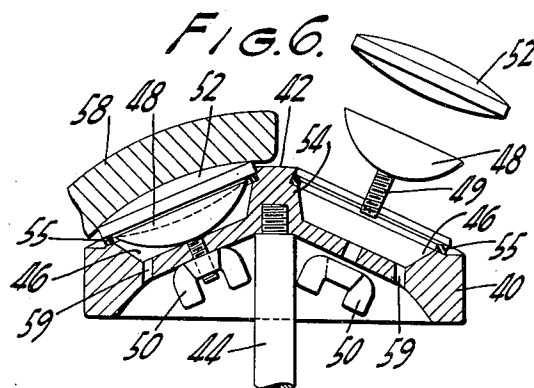
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METHOD AND APPARATUS FOR SHAPING OPTICAL OBJECTS AND THE LIKE

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2 Sheets-Sheet 2



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METHOD AND APPARATUS FOR SHAPING
OPTICAL OBJECTS AND THE LIKEVictor Walker, Fort Erie, Ontario, Canada, as-
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Application March 23, 1943, Serial No. 480,172

7 Claims. (Cl. 51-216)

This invention relates to a method and apparatus for dressing glass stock pieces into prescribed shapes and surface formations, and more particularly to a method and apparatus such as is adapted to provide improvements in the art of grinding and polishing optical devices such as lenses or the like.

For example, it has previously been conventional practice to mount lens blanks or prism blanks or the like upon spindle carried blocks for rotation thereof while being pressed against a grinding or polishing lap or the like and while providing relative oscillation and rotation between the work block and the grinding or polishing tool. In accord with such prior practices the work blanks are customarily fastened upon the spindle block to be firmly supported relative to the lap or other tool, as by means of some rigid mount device. A customary arrangement is to mount lens blanks upon spindles by means of a cementing substance such as pitch; and several cementing substances are known which will satisfactorily maintain the work blanks relatively fixed to the spindle blocks while being routed through a series of successively finer grinding and polishing operations. However, as a practical matter, the use of such rigid mounting systems precludes removal of the work blanks from the spindle blocks at stages intermediate of the complete grinding and polishing thereof, either because of the time and expense necessarily involved in breaking the work pieces away from a "set up" and subsequently recementing them into another "set up" or because of the difficulty met in trying to remount partially ground blanks upon rigid mount devices so as to be presented to the subsequent grinding operation at the same angle relative to the plane of relative movement between the spindle block and the tool. Also, the use of such pitch or other cementing substances for sticking work blanks upon the spindle block requires the application of special cleaning processes to the work pieces when they are removed from the blocks. Such cleaning processes customarily involve washing the work pieces in some chemical solution adapted to dissolve remnants of the pitch or other cementing substance which invariably adhere to the work pieces upon their removal from a cemented "set up." The necessity for such cleaning operations constitutes a further economic disadvantage, especially in connection with large scale manufacturing operations where even relatively small additional expenses per unit add up to large sums, both from the standpoint of additional

cost and from the standpoint of additional time required to complete the manufacture.

As a consequence of the considerations referred to hereinabove it is customary in the optical manufacturing arts to plan the progress of the manufacturing operation so as to avoid removal of the work pieces from their original "stick up" until completion of the block carried processes of the operation; and this type of work planing often necessarily involves a routine which cannot obtain optimum efficiencies and economies. However, it is often most necessary or desirable to process the work pieces under methods involving alternately setting up the work pieces on blocks and then unsetting them, and subsequently resetting them. For example, as explained in my earlier patent application Serial No. 442,198, it is particularly efficacious in connection with the manufacture of highest quality glass lenses or the like to alternately grind the lens blank and then to treat the ground surfaces with a stock piece reactive chemical solution to remove therefrom the debris of the prior grinding operations, and then to further reduce the lens with a finer abrasive to obtain either a fine ground or polished surface, as the case may require. In some instances, such grinding and chemical treating and regrinding and/or polishing processes may be carried on as a substantial number of alternate steps, and would require a corresponding number of "set ups" and "break offs" of the work pieces relative to the spindle blocks. Obviously, each resetting operation would require the application of great skill in order to obtain resetting of the work pieces at the same angle relative to the plane of relative movement between the spindle block and the tool so as to avoid unequal reductions of the stock pieces at different portions thereof, and in fact this is almost an impossibility. In any event the expense and loss of time incidental to such resetting processes would in most cases be prohibitive.

It is an object of the present invention to provide an improved method for setting up work pieces of the character referred to and for presenting them to the grinding or polishing tools, as the case may be; and to provide improved apparatus for use in conjunction therewith. More specifically, it is an object of the present invention to provide an improved method of presenting a work piece to the relatively moving tool, whereby the work piece will be adapted to automatically adjust itself to the plane of relative movement therebetween for optimum coordination between successive grinding or polishing operations in connection with different set ups of

the same work pieces. Another object of the invention is to provide an improved method for grinding or polishing work pieces of the character described, whereby complete equalization of grinding or polishing actions at all portions of the work piece surfaces will be provided.

Another object of the invention is to provide an improved apparatus for mounting work pieces of the character described to be presented to grinding or polishing actions of relatively moving tools. More specifically, another object of the invention is to provide an apparatus of the character described whereby large numbers of like work pieces may be readily processed in connection with a series of processing steps in improved manner. Another object of the invention is to provide an improved apparatus for the purpose described whereby successive work pieces will automatically center themselves upon the work support device, and will be presented thereby to the grinding or polishing tool in such manner as to be free floating or self-adjusting into accurate conformity with the disposition and operation of the tool so as to procure accurately coordinated successive grinding or polishing operations upon the work pieces. Another object of the invention is to provide the features and advantages referred to hereinabove in apparatus of structurally simple and rugged form, and without use of adjustment mechanisms or the like such as would unduly complicate the apparatus. Other objects and advantages of the invention will appear from the specification hereinafter.

In the drawings:

Fig. 1 is a disassembled view, in section, of a lens blank and holding chuck of the invention;

Fig. 2 is a view corresponding to Fig. 1 of the lens blank mounted upon the chuck and a grinding or polishing lap in conjunction therewith;

Fig. 3 is an elevation of a chuck and lap device of the invention for processing concave lens surfaces;

Fig. 4 is a plan of a multiple set-up chuck of the invention;

Fig. 5 is an elevation of the chuck of Fig. 4;

Fig. 6 is a section through a multiple set-up chuck of the invention, showing in one instance the chuck and a lens blank in disassembled relation, and in another instance the chuck and a lens blank in assembled condition; and

Figs. 7 and 8 are views similar to Fig. 6 of other forms of the chuck of the invention.

The invention is illustrated in the drawings as being applied to apparatuses for use in the manufacture of glass lenses or the like, but it is to be understood that the invention is not so limited and that the principles thereof are equally adaptable to the manufacture of other objects having either similar or dissimilar shapes. For example, whereas the drawings illustrate apparatuses employing work and tool carrying spindles arranged to relatively rotate and oscillate so as to produce spherical surfaces on the work pieces it will be understood that the work pieces and tools may be arranged to move relatively with only straight line displacements to produce flat surfaces on the work pieces; and that any other desired type of relative movement may be arranged for to produce any shape desired.

The invention contemplates temporarily mounting a work piece such as a glass lens blank as illustrated in Figs. 1-2 at 10, upon a holding device having novel characteristics, such as the chuck or block device which is designated generally at 12. The holder 12 comprises a hub 14

adapted to receive one end of a spindle 15; and it will be understood that the spindle 15 may be mounted upon any suitable type of rotating and oscillating support, as is well known in the optical trades for example in connection with work and tool carrying spindle arrangements for processing spherical surfaces. A body portion 16 extends from the hub 14 of the spindle concentrically thereof and is formed with an axially extending flange 18 concentrically of the axis of rotation of the holder. A resilient support member 20 of circular plan form is fixed at its center, as by means of a fastener 22, to the body portion of the holder so as to be carried thereby within its flanged portion. The support member 20 is preferably formed of some relatively soft and resilient material such as rubber or the like, and is shaped to normally have a set such as illustrated in Fig. 1, whereby the support member assumes a dish shape such that the work contacting surface thereof tends to contact the work piece only at the perimeter of the support member and recedes therefrom toward the center of the support member. Hence, the surface of the work support member may be slightly wetted and the work blank then pressed firmly thereagainst, so as to deform the support member to complement the contiguous surface of the work blank. Such pressing operation excludes the atmosphere from between the work blank and the support member, whereby an effect generally known as a vacuum or suction is established between the support 20 and the lens blank.

Thus, as illustrated by Fig. 2, the lens blank is now fixed upon the chuck 12 with the optical axis of the lens blank coincident with the axis of rotation of the chuck. As shown by the drawings, the chuck body and the work support members are so dimensioned and arranged that subsequent to mounting of the work piece upon the support 20 the work piece is supported to be partially embraced at the peripheral edge thereof by the flange structure 18 of the chuck. Hence, the lens blank is automatically centered upon the chuck while being supported thereby to be free to float relative to the chuck within a narrow range of possible movement relative to the chuck, whereby whenever a grinding or polishing lap as at 25 (Fig. 2) is pressed against the work piece in opposition to the forces of the spindle 15 the work piece will automatically adjust itself into perfectly matching conformity with the working face of the lap.

Fig. 2 illustrates the lap 25 as being carried by a spindle 26, and it will be understood that whenever the surface to be produced on the work piece is of a spherical nature the work carrying spindle 15 and the lap carrying spindle 26 will be arranged to provide simultaneously relative rotation and lateral oscillation between the holder 12 and the lap 25, as in accord with conventional optical grinding and polishing practice. Thus, as abrasive material is fed to the lap 25 the exposed surface of the work piece will be reduced by the action of the lap to produce the spherical surface form prescribed for the work piece. Due to the novel mounting of the work piece upon the holder 12 the work piece is minutely floatable and self-adjusting to the lap 25, whereby the bearing between the work blank and the lap will be automatically equalized over all areas of the work piece, and whereby unequal or otherwise inaccurate reduction of the work piece will be avoided.

As illustrated by Fig. 2, when the work blank is fixed upon the chuck the support member 20 is

thereby elastically deformed, whereby the support member thereupon resists to a substantial degree any tendencies toward further elastic deformation thereof. However, in event the resiliency of the support member is further overcome by forces from externally thereof, the support member will thereupon be forced against the body portion 16 of the holder to be firmly supported thereby. Hence, the softness or flowage characteristics of the material of the work support 20 will provide the only remaining flexibility of the work piece mount relative to the holder. Hence, the invention provides a work piece supporting means which is initially relatively easily deformable to provide free-floating adjustments of the work piece relative to the tool, and subsequently more firm support thereof against movements relative to the holder.

A notch is cut into a side wall portion of the flange structure of the holder, as indicated at 28; and the notch 28 is so proportioned and arranged as to enable the operator to thrust a finger nail through the notched portion of the chuck and in between the work support 20 and the work blank 10 so as to locally deform the elastic work support member 20 away from the blank 10. Thus, air may be admitted into the space between the work support and the work blank whereupon the work blank is freed of its connection with the holder. Sludge escape openings are preferably provided as indicated at 29 to enable the "mud" or sludge of grinding or polishing operations to escape from behind the support cup 20, so as to avoid possible interference thereby with proper supporting action of the member 20.

Fig. 3 illustrates a holder or chuck 30 of the invention for use in processing a concave surfaced work piece 31; and it will be understood that the chuck of Fig. 3 may be generally similar to the chuck of Figs. 1-2 in that the elastic work piece support device thereof will have its outer surface curved to a degree that is somewhat sharper than the degree of curvature of the contiguously placed surface of the stock piece. A convexly surfaced lap 32 is shown for use in conjunction with the holder 30.

Figs. 4 and 5 illustrate generally the external form that a holder of the invention for multiple lens blank set ups may assume. The holder is illustrated as being generally in the form of a spherically surfaced block 33 terminating in a hub portion 34 for connection to a spindle (not shown). The outer face 35 of the block 33 is shaped to a curve having a radius slightly less than the radius of the curve to which the work pieces 36 are to be shaped; and the work blank mounting portions of the block 33 are arranged to support the work pieces in such manner as to protrude from the block (Fig. 5) to complement the curvature of the lap to be brought into action against the work pieces. Finger nail notches as indicated at 37 are formed in the block 33 to facilitate upsetting of the vacuum connections between the work pieces and the respective holder cups.

Fig. 6 illustrates, by way of example, one method for mounting lens blanks upon a block generally similar to the block of Figs. 4-5. In Fig. 6 the block is illustrated as comprising a body portion 40 of metal or other suitable rigid material, having a spherically shaped outer surface 42 disposed concentrically of the axis of a spindle 44 extending rearwardly of the block face. The block is recessed, as at 46-46 at multiple posi-

tions throughout the block surface to generally accommodate the body portions of corresponding lens blanks and blank supporting cups 48-48. As in the case of Figs. 1-3, the supporting cups 48 are of elastically deformable material such as rubber or the like, and are cupped at their outer surface portions so as to cooperate with the back surfaces of the lens blanks to provide the suction mounting effect referred to hereinabove. Each cup 48 carries a threaded stub 49 adapted to be inserted through a corresponding perforation in the block 40 for threaded connection with a wing nut 50 disposed therebehind.

Thus, it will be understood that in order to mount a plurality of lens blanks 52 upon the block 40 the blanks are simply pressed against corresponding mounting cups 48 so as to be concentric thereof. The suction-united blank and cup unit is then inserted into a corresponding recessed portion 46 of the block so that the stub 49 thereof extends through the block. The corresponding wing nut 50 is then screwed upon the stub to draw the cup down into seated position relative to the block. The block and cup elements are so dimensioned and relatively arranged that when the wing nuts 50 are tightened upon the stubs 49 the corresponding cups 48 are pulled upon to seat the overhanging annular edge portions of the lens blanks firmly against complementarily shaped annular shoulder portions 54 of the block 40. An annular washer 55 of soft and resilient material such as rubber or the like is preferably disposed upon each shoulder 54 of the block to provide a resilient support for the corresponding lens blank when pulled into seated relation upon the block. Hence, it will be understood that each lens blank will be thereby mounted upon the block so as to be slightly tiltable relative to the block, and is minutely floating and self-adjustable into accurately matching conformity with the working face of the lap or other shaping tool when impressed thereagainst, as indicated at 58. However, the work blanks are at all times basically supported in firm manner by reason of the rigidity of the body of the block 40.

The block 40 and more specifically the recessed portions 46 thereof are so dimensioned and proportioned as to be adapted to support the lens blanks 52 in such manner that the marginal edges of the lens blanks are partially enclosed by the side walls of the recessed portions 46 of the block. Consequently, as the lens blank-cup units are pulled into the corresponding recessed portions of the block the lens blanks automatically center themselves within the recesses, and the block thereupon becomes enabled to maintain the lens blanks against lateral displacement relative to the block in response to forces transmitted through the processing tool 58. At the same time the lens blank is thereby supported to be minutely self-adjusting to the lap 58 while being basically supported by the body of the block 40 in positive manner, whereby the improved work piece supporting action referred to hereinabove is provided. Sludge escape openings are provided as indicated at 59 and finger nail notches will be employed if desired, for the purposes explained hereinabove.

Fig. 7 illustrates another form of a multiple block device of the invention wherein a block 60 which is generally similar to the block 40 of Fig. 6 is recessed as at 62 to receive in cradled relation therein a plurality of work piece supporting cups 64. The cups are externally faced

so as to be adapted to cooperate with the contiguous face portions of the corresponding work pieces 65 to procure the "vacuum" type mounting connections therebetween referred to hereinabove. Each cup support 64 is provided with a centrally extending stub 66 which may be permanently screwthreaded or otherwise connected into mounted relation upon the block 60. The recessed portions of the block and the cups 64 are so dimensioned as to adapt the cups to receive the work blanks 65 in vacuum fixed relation, as explained hereinabove, and to thereby support the work blanks to be partially embraced at their sides by the side walls of the block recesses to provide the self-centering or lateral guiding operation referred to. The cups 64 will be preferably so shaped as to assume the condition illustrated at the left of the spindle in Fig. 7 when the work blank is mounted upon the cup, whereby a slight gap will exist between the body of the block 60 and the rear surface of the cup 64, as indicated at 68. Hence, the work blank will be supported by the cup to be free to wobble to a slight degree relative to the block 60 for accurate adjusting of the work blank to the attitude of the lap 70 when pressed against the work blanks. However, as in the case of the previously described forms of the invention, the cups 64 will be supported basically in a firm manner, whereby efficient surfacing of the work blanks may be effected. Sludge escape openings are provided in the block 60, as indicated at 71, and finger nail notches are provided as explained hereinabove in connection with other forms of the holder.

Fig. 8 illustrates another form of the invention which is adapted for use in connection with the processing of sharp-edge lenses or the like; that is, lenses such as indicated at 72 wherein the optical face portions thereof merge directly into one another without having straight edge wall portions therebetween as in the case of the lens blanks illustrated by the other figures of the drawings. Thus, the type of lens blank illustrated by Fig. 8 must of necessity be supported by the block device of the invention in such manner that the knife-edge portion of the work blank is disposed externally of the block 73. This is required in order that the lap 74 may clear the surface of the block 73 while being effective against the work blanks 72. Consequently, the work blank support member is formed, as illustrated at 75 to be generally similar to the support cups 64 of Fig. 7 except that they are so dimensioned as to project the work blank edges beyond the contour of the block, as shown in Fig. 8. Again, the cups 75 are preferably arranged to provide slight gaps between the cups and the block, as indicated at 76, to enable the cup and work blank units to wobble slightly relative to the block for self-adjusting purposes. Sludge escape openings are provided as indicated at 77. In view of the fact that the work blanks are supported so as to be permitted to wobble somewhat relative to the block 72, it is preferable to slightly round the edges of the lap 74, as indicated at 78. Thus, even though the work blanks might assume unintended tilted attitudes relative to the block subsequent to uncovering movements of the lap 74, the work blanks will be easily cammed back by the nose portion 78 of the lap into proper position and attitude upon subsequent return of the lap 74 to work blank covering position.

Thus, it will be understood that the method and apparatuses of the invention provide im-

provements in the art of holding work pieces such as lens blanks or the like in bearing relation against grinding or polishing or other processing tools whereby the work blanks are adjustable to accurately match the attitude of the tools. Hence, processing of different portions of the work blanks to different degrees is avoided, and great economies with respect to time and labor costs involved in connection with setting and unsetting and resetting of the work blanks are effected.

It will also be understood that the method and apparatus of the invention provides further important improvements and advantages not previously referred to. For example, whenever the invention is employed in conjunction with the grinding or polishing of work pieces through use of successively finer grades of abrasive, as in the lens making arts, each block or chuck device of the invention may be retained in its designated abrasive department of the manufacturing operation. For example, one chuck or block of the invention may be designated to a "coarse" grinding department of the manufacturing operation, and quantities of lens blanks or the like may be successively mounted upon the holder and ground under a corresponding lap with the aid of an abrasive graded to the requirements of the department. Upon completion of such coarse grinding operations the work pieces may then be removed from the holding device and cleaned of remnants of the coarse grinding abrasives and then delivered to a "fine" grinding department. The work pieces will thereupon be mounted successively upon another holding device of the invention which has been designated to remain in operation in the "fine" grinding department. The corresponding grade of fine abrasive will then be employed in conjunction with a corresponding lap device, until the fine grinding is complete. Hence, it will be understood that in order to prevent contamination of successively finer grinding operations with remnants of coarse abrasives from preceding operations in connection with transfer of work pieces to successively finer grinding departments will require only the careful washing of the work pieces themselves. Inasmuch as it is relatively easy to clean a small lens blank or the like, while it is relatively difficult to clean an entire block or chuck device of adhering abrasive granules, it will be understood that the invention provides further an important safeguard to the manufacturing operation.

Another important feature and advantage which is provided by the invention resolves from the fact that the use of cementing pitch or the like is avoided. Consequently the use of a pitch dissolving solvent is likewise avoided, and it becomes unnecessary to store quantities of pitch and solvent substances at the factory, whereby the fire hazard factor of the operation is greatly reduced. Another important feature and advantage of the invention in conjunction with the multiple block form thereof is provided in view of the fact that defective work pieces may be removed from the block at any successive stage of the abrading operation. Hence, unnecessary processing of defective work blanks may be eliminated. Substitute work blanks may be mounted upon the block of the invention to replace defective work pieces so removed; or, the places previously occupied by the defective blanks may be simply left vacant. In any case the time and expense previously associated with unnecessary processing of defective work pieces as an incident

to completion of the satisfactory work pieces remaining on the block, is avoided.

It will be understood that although only a limited number of forms of the invention have been shown and described in detail, the invention is not so limited but that various changes may be made therein without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. In combination, an abrading lap, a holder for carrying a lens blank to be pressed against said abrading lap, said holder comprising a rigid body portion recessed to accommodate a lens blank in partially embedded relation therein to present one face portion of said lens blank exteriorly of said holder and to be laterally supported by the recessed portion of said body portion, a support member of elastic material fixed to said body portion interiorly of the recessed portion thereof and having a surface adapted to register with an inner face portion of said lens blank when disposed upon said holder, said support member surface being shaped so as to cooperate with the lens blank to provide a suction type mounting connection therebetween, said support member being adapted to flex to permit the lens blank when mounted thereon to rock relative to said holder for minor adjustments of the lens blank attitude relative to said lap when pressed thereagainst, said holder body portion being notched at one side of said recessed portion thereof to permit insertion of a prying tool therethrough for separating said lens blank and said support member at one side of the suction connection thereof.

2. In combination, an abrading lap, a holder for carrying a lens blank to be pressed against said abrading lap, said holder comprising a rigid body portion recessed to accommodate a lens blank in partially embedded relation therein to present one face portion of said lens blank exteriorly of said holder and to be laterally supported by the recessed portion of said body portion, a support member of elastic material fixed to said body portion interiorly of the recessed portion thereof and having a surface adapted to register with an inner face portion of said lens blank when disposed upon said holder, said support member surface being shaped so as to cooperate with the lens blank to provide a suction type mounting connection therebetween, said support member being adapted to flex to permit the lens blank when mounted thereon to rock relative to said holder for minor adjustments of the lens blank attitude relative to said lap when pressed thereagainst, said holder body portion being apertured in communication with the space behind said support member to provide a channel for escape of abrading sludge from between said support member and said holder body portion.

3. A holder for carrying a lens blank or the like to a grinding or polishing operation, said holder comprising a rigid body portion recessed to permit a lens blank to be inset therein so as to present one face of said lens blank exteriorly of said holder, a support member of elastic material fixed to said body portion and having a surface adapted to register with the inner face of said lens blank when carried by said holder, said support member surface being shaped so as to cooperate with the lens blank to provide a suction type mounting connection therebetween, said support member being adapted to flex toward and away from said holder body portion to freely permit the lens blank

when mounted thereon to float relative to said holder body portion for minor adjustments of attitude relative thereto, said holder body portion being apertured to provide a channel for escape of sludge from between said support member and said holder body portion.

4. In combination, an abrading lap, a holder for carrying a lens blank to be pressed against said abrading lap, said holder comprising a rigid body portion recessed to accommodate a lens blank to be inset therein so as to present one face of said lens blank exteriorly of said holder, a support member of rubber suction cup form fixed at its center to said body portion and having a cupped outer surface adapted to cooperate with the lens blank to provide a suction type mounting connection therebetween, said support member being normally retracted at its perimetral portion away from said holder body portion and adapted to flex to permit the lens blank when mounted thereon to float relative to said holder for minor adjustments of the lens blank attitude relative to said lap when pressed thereagainst, said holder body portion being notched at one side of said recessed portion thereof to permit insertion of a prying tool therethrough for separating said lens blank and said support member at one side of the suction connection thereof, said holder body portion being apertured in communication with the space behind said support member to provide a channel for escape of abrading sludge from between said support member and said holder body portion.

5. In combination, an abrading lap, a holder for carrying a plurality of lens blanks to be pressed against said abrading lap, said holder comprising a rigid body portion recessed to accommodate said lens blanks in partially embedded relation therein to present outer face portions of said lens blanks exteriorly of said holder while being laterally supported by the recessed portions of said body portion, a support member of elastic material fixed to said body portion interiorly of each of the recessed portions thereof and having a surface adapted to register with an inner face portion of a lens blank when disposed upon said holder, said support member surface being shaped so as to cooperate with the lens blank to provide a suction type mounting connection therebetween, said support member being adapted to flex to permit the lens blank when mounted thereon to rock relative to said holder for minor adjustments of the lens blank attitude relative to said lap when pressed thereagainst, said holder body portion being notched at one side of each of said recessed portions thereof to permit insertion of a prying tool therethrough for separating said lens blanks and said support members at one side of the suction connections thereof.

6. In combination, an abrading lap, a holder for carrying a plurality of lens blanks to be pressed against said abrading lap, said holder comprising a rigid body portion recessed to accommodate said lens blanks in partially embedded relation therein to present outer face portions of said lens blanks exteriorly of said holder and to be laterally supported by the recessed portions of said body portion, a support member of elastic material fixed to said body portion interiorly of each of the recessed portions thereof and having a surface adapted to register with an inner face portion of a lens blank when disposed upon said holder, said support member surface being shaped so as to cooperate with the lens blank to provide a suction type mounting connection therebetween,

said support member being adapted to flex to permit the lens blank when mounted thereon to rock relative to said holder for minor adjustments of the lens blank attitude relative to said lap when pressed thereagainst, said holder body portion being apertured in communication with each of the spaces behind said support members to provide channels for escape of abrading sludge from between said support members and said holder body portion.

7. A support device for holding a lens blank or the like against a grinding or polishing device whereby to permit surface-reducing of said lens blank about a symmetry axis extending normally to and centrally of the front surface of the blank, said support device comprising in combination, a base, an elastic cup member formed to peripherally abut the rear surface of the blank while being substantially coextensive with the marginal

confines thereof and adapted to be pressed thereagainst in vacuum-sealed connection manner while exerting an outward thrust thereagainst, and mounting means extending from only the central rear portion of said cup member for mounting connection of the latter upon said base, said base having a marginal ledge thereon encompassing the perimeter of said blank and normally in spaced relation therefrom for maintaining said blank against undue lateral displacement, whereby said blank may be pressure-attached upon said cup member to be connected thereby to said base and held thereby in operative position against a surface-reducing operation while being free to rock universally about said central mounting connection to permit surface-reduction of said blank symmetrically of said axis.

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