May 22, 1923. 1,455,863

L. W. BUGBEE

LENS EDGING MACHINE

Filed June 16, 1919 3 Sheets-Sheet 1

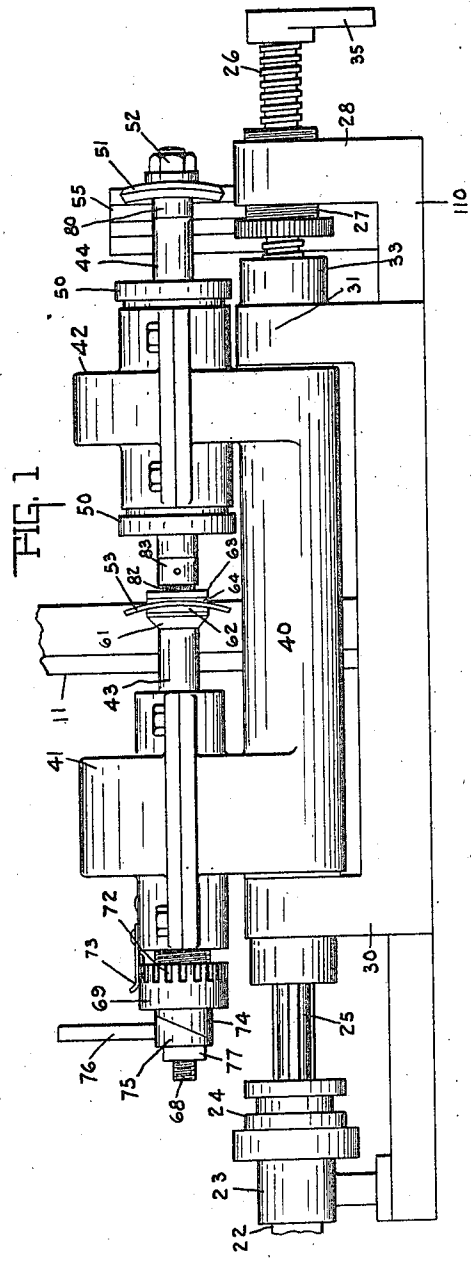


FIG. 1

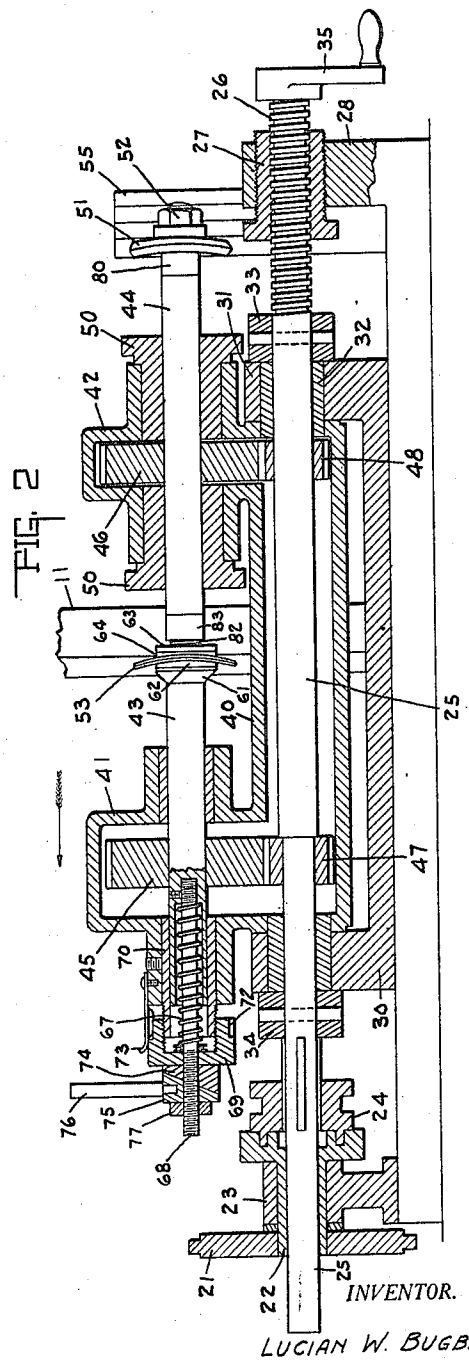


FIG. 2

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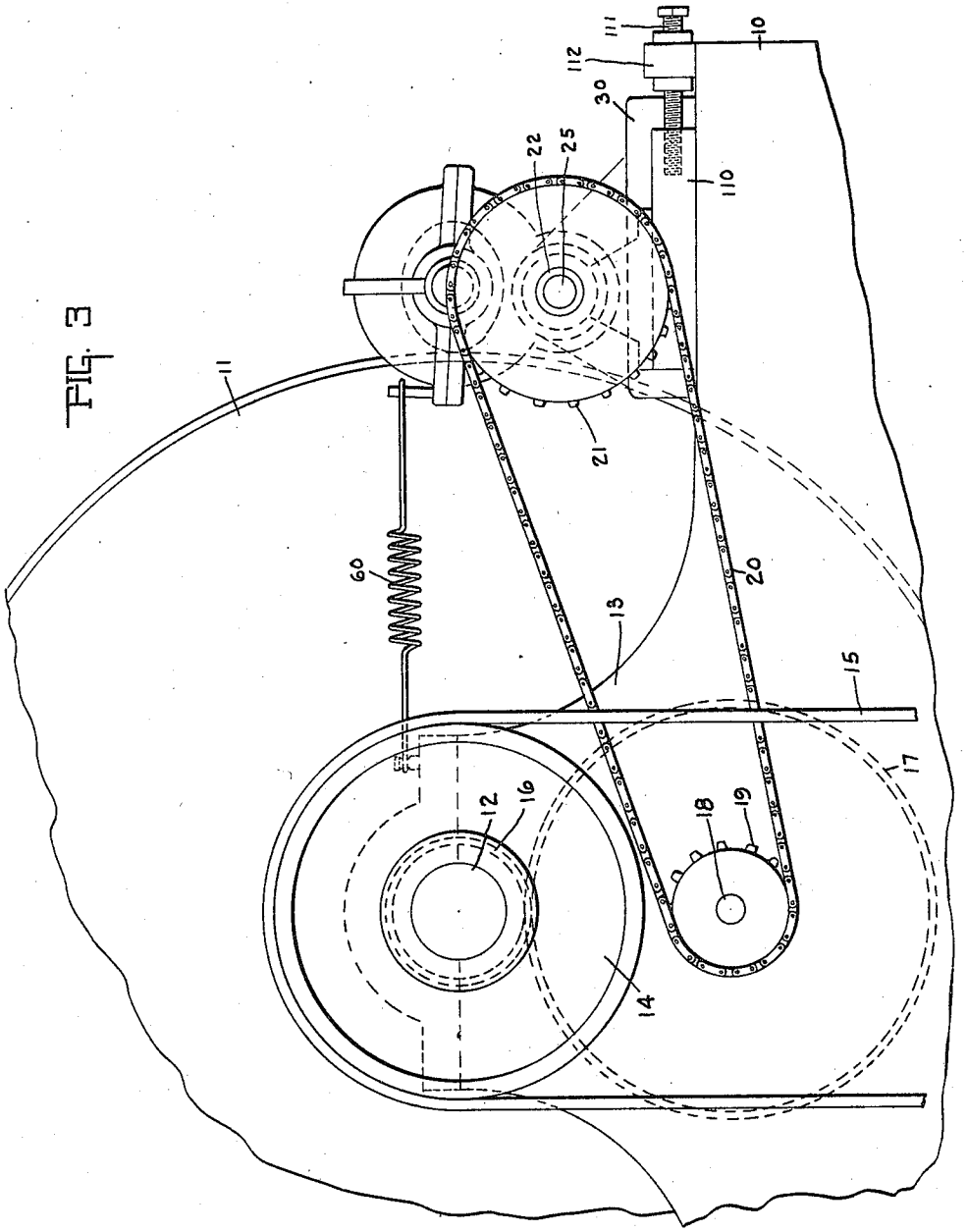
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FIG. 3



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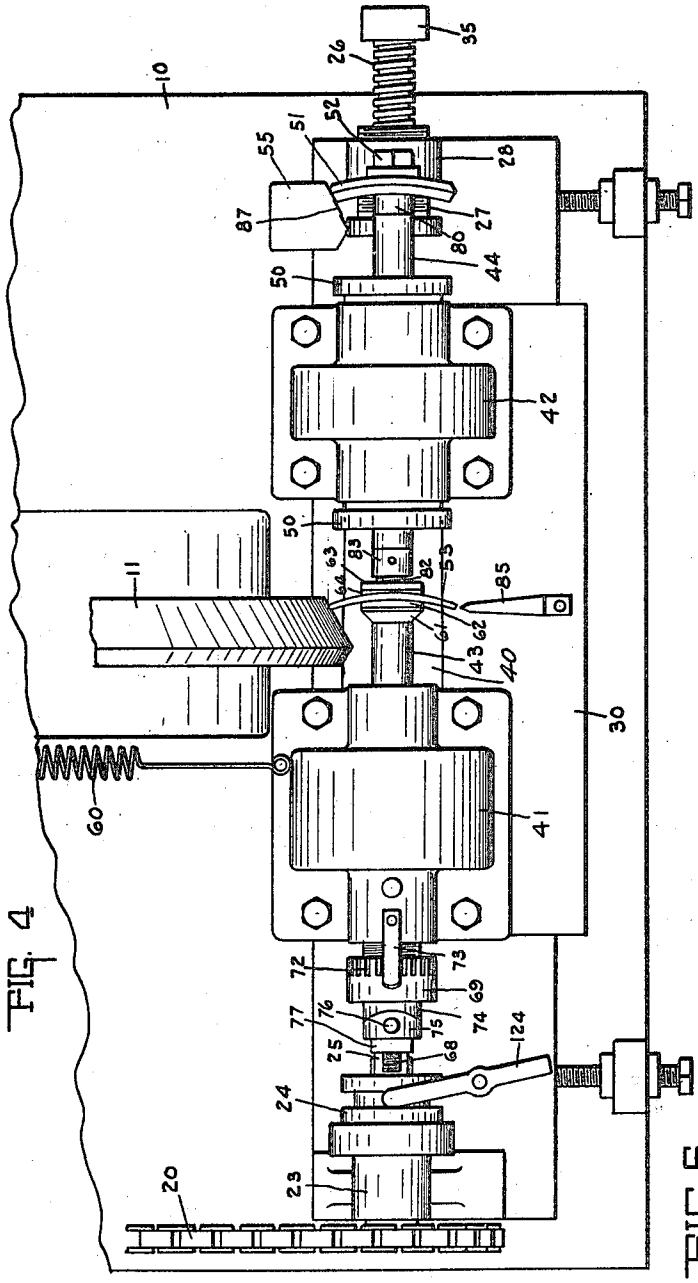


FIG. 4

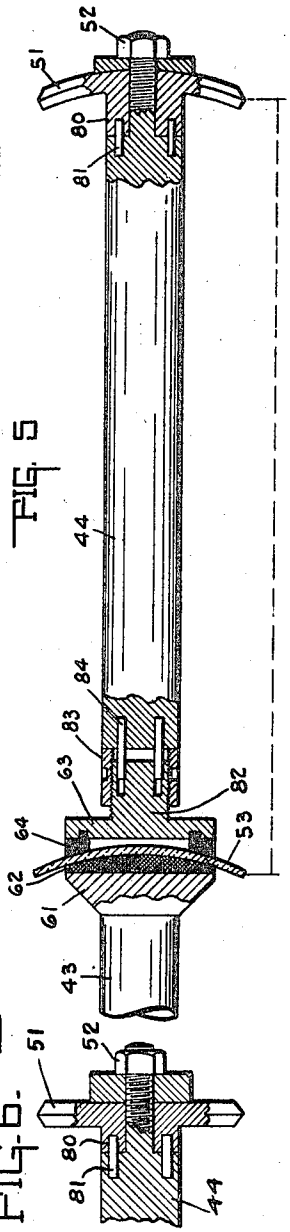


FIG. 5

FIG. 6.

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UNITED STATES PATENT OFFICE.

LUCIAN W. BUGBEE, OF INDIANAPOLIS, INDIANA, ASSIGNOR TO ONEPIECE BIFOCAL LENS COMPANY, OF INDIANAPOLIS, INDIANA, A CORPORATION.

LENS-EDGING MACHINE.

Application filed June 16, 1919. Serial No. 304,639.

To all whom it may concern:

Be it known that I, LUCIAN W. BUGBEE, a citizen of the United States, and a resident of Indianapolis, county of Marion, and State of Indiana, have invented a certain new and useful Lens-Edging Machine; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which like numerals refer to like parts.

The object of this invention is to improve machines for edging lenses so as to give them the desired contour and edge them accurately and preferably beveling or doubly beveling the edge thereof and accomplish such result rapidly and be readily adaptable for edging lenses varying in shape and size.

One feature of the invention consists in means for mounting and maintaining the controller form and the lens to be edged in corresponding positions and with a uniform distance between the corresponding parts of said controller form and lens, regardless of the size or shape of the controller form and finished lens. The uniform distance between corresponding parts of said controller form and lens is the distance between corresponding parts of the grinder and the guide block for the controller form. With this feature of the invention, the machine will operate accurately for edging lenses of various forms and sizes.

The object and necessity of the foregoing feature of the invention is to center the bevel at all points on the edge of the lens, that is, have the center ridge of the bevel centrally located between the sides of the lens regardless of the variations in the thickness of the lens at various parts of its edge. This is an extremely important feature in the operation and utilization of this invention.

Another feature of the invention consists in providing a pointer or indicator means for indicating the exact location of the lens when mounted on the machine so that there will be said uniform distance between corresponding parts of the lens and controller form, as above explained.

Another feature of the invention consists in means for readily mounting and removing the lens to be edged. This consists of two shafts in alignment, one of said shafts carrying the controller form and having no longitudinal movement and the other being longitudinally movable towards and away from the first shaft and the two ends of the shafts having heads for grasping and holding the lens, and the head on the first shaft being adjustably mounted so as to lengthen said shaft substantially and thus locate properly the lens so that corresponding parts of the lens and controller form will always be at uniform distances apart and so the lens will register with the indicator or pointer above mentioned.

Another feature of the invention consists in widening the first beveled surface of the grinder and also of the guide block for the controller form and providing said surface of the guide block with a series of stepped surfaces which are cut successively deeper in the face of said block so that the controller form will control the lens and enable it to be given a successive series of grindings in one operation of the machine and thus avoid the necessity of repeated operations of the machine for edging a lens, as heretofore.

The full nature of the invention will be understood from the accompanying drawings and the following description and claims:

In the drawings, Fig. 1 is a front elevation of the machine with parts broken away. Fig. 2 is a central longitudinal vertical section through the machine, as shown in Fig. 1. Fig. 3 is an elevation of the left-hand end of the machine shown in Fig. 1 with parts broken away. Fig. 4 is a plan view of the machine with parts broken away. Fig. 5 is a view partially in elevation and partially in section, of the means for holding the lens being edged and for controlling the position of the lens while being edged. Fig. 6 is the same as the right-hand end of Fig. 5 with an alternative controller form shown.

There is shown herein a stationary frame 10, see Fig. 3, and said frame carries a grinder 11 with a double bevel periphery and mounted on a shaft 12 in suitable bearings 13 and driven by a pulley 14 and belt 15 from any suitable source of power. There is a pinion 16 on the shaft 12 which meshes with a large gear 17 mounted on a shaft 18 carried by the frame 10. On the shaft 18 there is a small sprocket wheel 19 which drives a sprocket chain 20 that extends to and drives a sprocket wheel 21

mounted on a sleeve 22 in a bearing 23 (see Fig. 4) secured on a base plate 110 which is adjustably mounted on the main frame 10 and moved and held in adjusted position by set screws 111 operating through ears 112, as seen in Fig. 3. The sleeve 22 is clutched by a clutch mechanism 24 operated by a lever 124, with a feed shaft 25 mounted in said sleeve 22 at one end of the machine and at the other end of the machine provided with screw threads 26 operating in an internally threaded sleeve 27 which is externally threaded so as to be adjustably mounted in a bearing 28 on the base plate 110. This feed shaft 25 is mounted on the frame 10 so as to extend transversely of and be located near the periphery of the grinder 11.

A carriage or frame 30 is mounted on the base plate 110 so as to be slidable transversely of the grinder 11 by the feed shaft 25 which extends through said frame. Said frame has at each end upwardly extending bearing portions 31 which carry bearings 32 in which the shaft 25 is mounted, and stop blocks 33 and 34 are secured on the shaft 25 against the opposite ends of the carriage so that when the shaft 25 is moved longitudinally by the threaded mounting at the right-hand end of Fig. 2 while the shaft is being rotated, it will feed or slide the carriage 30 from the position shown in Fig. 1 to that shown in Fig. 2. When it reaches its limit of movement, the clutch is thrown out and the shaft given a reverse rotation by a handle 35, which causes the carriage to return to its right-hand limit of movement, which is a little further to the right than that shown in Fig. 1, and it moves a little further to the left than the position shown in Fig. 2.

A frame 40 is pivotally mounted upon the carriage concentric with the shaft 25 so as to rock transversely of the carriage but have no longitudinal movement independently of the carriage and to move along with the carriage. Said frame 40 has two bearing portions 41 and 42 for two shafts 43 and 44 on which there are secured gears 45 and 46 that are driven by pinions 47 and 48, respectively, which are secured on the shaft 25. It is obvious from this construction that when the shaft 25 is rotated in one direction by the sprocket wheel 21, it will rotate the two shafts 43 and 44 simultaneously in one direction and when the shaft 25 is reversed by the operation of the handle 35, it will turn the shafts 43 and 44 in the opposite direction.

The shaft 44 is mounted in two bearing sleeves 50, one on each side of the gear 46. At its right-hand end the shaft 44 carries a controller form 51 which is clamped in place on the end of the shaft by a screw and nut 52. The controller form 51 is a plate of metal with its shape made to conform with the finished form of the lens 53 when it is edged. This conformation requires the plate 51 to have exactly the same peripheral conformation, such as the double bevel shown, and the same shape diametrically. Thus it must be either round, if the lens be round, or oval if the lens be oval, and when the lens is oval, the corresponding diameters of the controller form 51 and lens must be identical.

A fixed block or post 55, secured to the adjustable base plate 110, extends up beside the controller form 51 and on the side thereof is a grinder, as shown in Figs. 1 and 4, and has a double beveled inner face next to the controller form similar to the face of the grinder 11 and adapted to be engaged by the edge of the controller form 51.

A spring 60, connected with the main frame 10 and the bearing 41 of the rocking frame 30, tends to rock the rocking frame towards the grinder 11 and, therefore, yieldingly holds the edge of the controller form against the beveled face of the block 55, as shown in Fig. 4. It is obvious that if the controller block 51 be oval, its revolution will cause the frame 30 to rock away from and towards the block 55 and grinder 11. As the shafts 43 and 44 are rotated, and as they rotate the controller form 51 and the lens, the frame 30 is fed or moved gradually to the left and the shafts 43 and 44 are rocked correspondingly away from the grinder as the controller form moves along the wide inclined faces of the block 55, and thus the lens which is held by shafts 43 and 44 is given the same edge conformation as the controller form. If that be a double bevel, as shown, the wide bevel of the grinder will give a beveled surface on the edge of the lens shown next to the concave side and the small beveled surface of the grinder will grind the other beveled surface of the lens.

The lens is held between the adjacent ends of the shafts 43 and 44, as shown in Figs. 1 and 5. On the adjacent end of shaft 43 there is a head 61 that has a rubber surface 62 to engage the concave surface of the lens shown. On the adjacent end of a shaft 44 there is mounted a head 63 that has a rubber ring 64 which engages the other or convex side of the lens shown. The lens is clamped between these two members by the action of a spring 67, see Fig. 2, which pushes the shaft 43 to the right. This spring surrounds a rod 68 which is secured to the left-hand end of the shaft 43 and extends through a cap 69 on a sleeve 70 in the left-hand portion of the bearing member 41. The spring lies between the shaft 43 and the cap 69. The cap 69 is adjusted to the proper position and held in such position by a spring

73 which is secured on the left-hand part of the bearing member 41 and engages one of the notches 72 of the cap 69 and prevents its turning of its own accord. There is a bevel faced block 74 secured to the left-hand end of the cap 69 and another beveled block 75 cooperating with it on rod 68, as shown in Figs. 1 and 2, and adapted to be turned by a handle 76. The rod 68 is not in threaded connection with these two blocks or with the cap 69, but has on it at its outer end a nut 77 bearing against the block 75. The result of this construction is that when the lever 76 is turned 180 degrees, it will draw the shaft 43 outward or to the left and disengage the lens so that it can be removed. Another lens can be put in place and the lever 76 be turned to the position shown in Figs. 1 and 2 and then the lens will be clamped in place, as heretofore specified.

It is important in the construction and operation of this machine, that the lens and controller form 51 be located in exactly accurate positions with reference to the grinder 11 and block 55 in order that the parts may cooperate. This is of vital importance when changes are made in the sizes and forms of the lenses and controller forms. The distance between the corresponding parts of the face of the grinder and the face of the block 55 is the controlling factor, for instance, the distance between the main ribs of those two members. That is a uniform distance which must be maintained between corresponding parts of the controller form 51 and the lens, as indicated by the line below Fig. 5. The distance from the rib on the form and the center of the corresponding part of the edge of the lens blank must always be uniform, and in grinding them, the form 51 and the lens must be arranged in corresponding positions so that this distance when the form is oval or irregular may be readily determined, with reference to the same points on the lens and form.

In order to accomplish this result in construction and operation, particular attention must be paid to the mounting of the controller form 51 and the lens. Thus, the controller form, as shown in Fig. 5, has what may be called a hub 80 that is locked with the body of the shaft 44 by pins 81 so the two will turn together. The distance between the line separating that hub and the shaft and any fixed part of the controller form, must always be the same regardless of the change of shape or size of the controller form. Thus the distance between the line separating the hub and the shaft on one hand and the line cutting the outermost points of the central rib of the controller form must in its long diameter always be the same regardless of the size or shape of the controller form.

Adjustable means for mounting the lens is provided for securing the correct distance between the lens controller form 51 and lens 53. The head 63 has a hub 82 which is externally threaded and carries a sleeve 83 that abuts against the shaft 44. The ends of the hub and shaft are recessed to receive locking pins 84. By turning the sleeve 83, the head 63, which holds the lens, can be moved slightly further away from or nearer to the end of the shaft 44. To enable the operator to quickly place his lens at the right distance from the controller form, a pointer 85 is secured to the frame 30, as shown in Fig. 4, and the lens is set so that the middle portion of its edge on its long diameter will register with the sharp end of the pointer, as seen in Fig. 4.

In order that the lens may not be too rapidly ground, so as to injure the edge, or to prevent it from being repeatedly ground, grinding a millimeter and then returning it and regrinding a millimeter until it is ground down, the first face of the grinder, which is engaged by the lens, is made relatively wide, as shown; that is, say three times as wide as it need otherwise have been, and three times as wide as the narrow beveled face at the left. This furnishes a longer grinding treatment of the edge of the lens by the first beveled face of the grinder, but to gain the benefit of this, it is desirable that the long beveled face of the block 55 shall be divided off into steps 87 of about equal width and set further back in succession, but in parallel planes. The first stepped surface to the right, which is engaged by the controller form, will cause the edge of the lens to be ground down one millimeter. The second stepped surface will cause it to be ground down another millimeter and the third stepped surface still another millimeter so that by the time the lens reaches the intermediate rib of the grinder, it will have been subjected to three grinding treatments equal to three repetitions of one grinding treatment with the grinding surface as narrow as the left-hand surface of the grinder. The effect of this construction is to enable the lens to be safely, properly and completely ground in one operation instead of a plurality of operations, as heretofore. For this reason the grinder 11 is provided with a similar wide bevel surface and each stepped surface 87 on the block must be beveled to agree exactly with the wide bevel surface on the grinder.

The invention claimed is:

1. A lens edging machine including a rotatable grinder with a double bevel grinding surface, a block having a double bevel face corresponding with the grinding surface of the grinder and in fixed relation thereto, rotatable means for holding a lens, means for mounting the lens holder so it may rock

away from and towards the grinder and hold the lens yieldingly against the grinding surface thereof and the grinding faces of said grinder being oblique to the axis of the lens holding means, a controller form having the desired contour of the lens with a double bevel edge and mounted in fixed relation to the lens holder and in position to engage the face of said block, and means for giving the lens holder and controller form corresponding lateral feeding movement during the edging operation.

2. A lens edging machine including a rotatable grinder, a block in fixed relation thereto, said grinder and block having corresponding double bevel faces with intermediate ribs between the bevel faces, a shaft for holding the lens to be edged mounted so as to be rocked towards and away from the grinder and having longitudinal feeding movement and the grinding faces of the grinder being oblique to the axis of said frame, and a controller form secured on said shaft and having the desired contour of the lens with a double bevel edge and with a rib between the bevel edges and in position for its edge to engage the face of said block and the distance between the ribs of the controller form and the lens to be edged when it is mounted on said shaft being equal to the distance between the ribs on the block and the grinder.

3. A lens edging machine including a grinder with a bevel grinding surface, a block located beside and spaced away from said grinder and having a bevel face corresponding with the grinding surface of the grinder and in fixed relation thereto, a frame slidable transversely of said grinder and block and mounted so as to rock towards and away from the same and the grinding face of the grinder being oblique to the axis of said frame, means for yieldingly rocking said frame towards the grinder, a shaft carried by said frame substantially equidistant from the bevel faces of the grinder and block, means on said shaft for mounting the lens to be edged, and a controller form on said shaft having a bevel edge and in position to engage the bevel edge of the block. the distance between corresponding parts of the edges of the controller form and the lens when mounted on the shaft being equal to the bevel surfaces of the grinder and block.

4. A lens edging machine including a grinder, a block located beside and spaced away from said grinder, said grinder and block having corresponding double bevel faces with intermediate ribs between the bevel faces, a frame slidable transversely of said grinder and block and mounted so as to rock towards and away from the same and the grinding face of the grinder being oblique to the axis of said frame, means for yieldingly rocking said frame towards the grinder, a shaft carried by said frame substantially equidistant from the bevel faces of the grinder and block, means on said shaft for mounting the lens to be edged, and a controller form on said shaft having a double bevel edge and with a rib between the bevel edges and in position for its edge to engage the face of said block and the distance between the ribs of the controller form and the lens to be edged when it is mounted on said shaft being equal to the distance between the ribs on the block and the grinder.

5. A lens edging machine including a rotatable grinder with a bevel grinding surface, a block having a bevel face corresponding with the grinding surface of the grinder and in fixed relation thereto, a shaft mounted substantially equidistant from the bevel face of said grinder and block so as to rock towards and away from the same and also have lateral movement with reference thereto, the end of said shaft near said block being reduced and threaded and shouldered, a controller form having the desired contour of the lens with a bevel edge and provided with a perforated hub adapted to fit on the reduced end of said shaft and abut against the shoulder thereof and so that the controller form will engage the bevel surface of said block, means for removably holding the controller form on said shaft against said shoulder, means for yieldingly forcing the rocking shaft towards the grinder, and means on the shaft for holding the lens to be ground, the grinding faces of the grinder being oblique to said shaft and the distance between the portions of said shaft carrying the controller form and the lens being substantially the same as the distance between corresponding portions of the bevel surfaces of the grinder and block.

6. In a lens edging machine of the kind described, two shafts in alignment with each other, one of said shafts having thereon a head for seating the lens to be edged, and a head connected to the adjacent end of the other shaft for clamping the lens to be ground in place, said head having a threaded end, means engaging said head and shaft from which the longitudinal adjustment may be had but not rotation independently of the shaft, and a threaded sleeve surrounding the threaded portion of the head and abutting against the end of the shaft for longitudinally adjusting the head without turning the same independently of the shaft.

In witness whereof, I have hereunto affixed my signature.

LUCIAN W. BUGBEE.