L. W. BUGBEE.

EDGING MACHINE.

APPLICATION FILED JUNE 4, 1915.

1,227,243.

Patented May 22, 1917.

3 SHEETS—SHEET 1.

Fig. I.

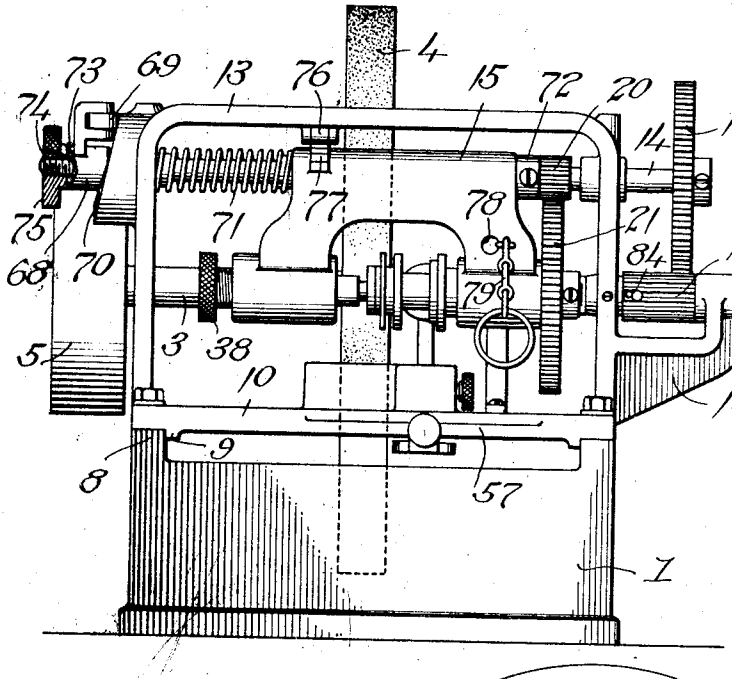


Fig. XII.

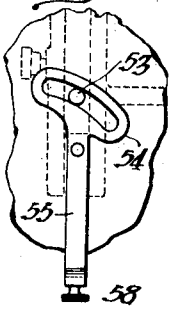
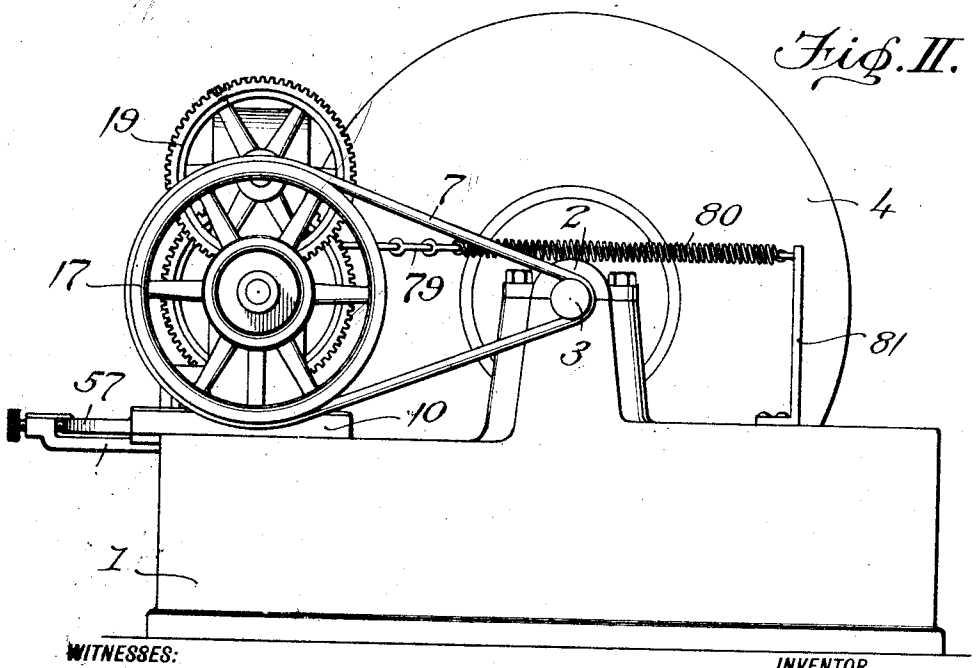


Fig. II.



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3 SHEETS—SHEET 2.

Fig. III.

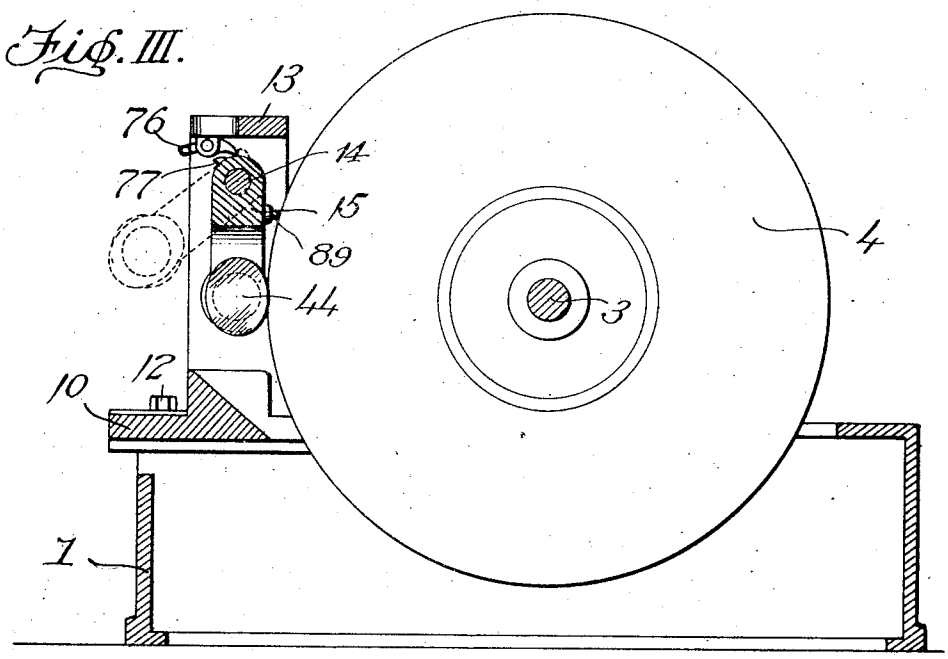
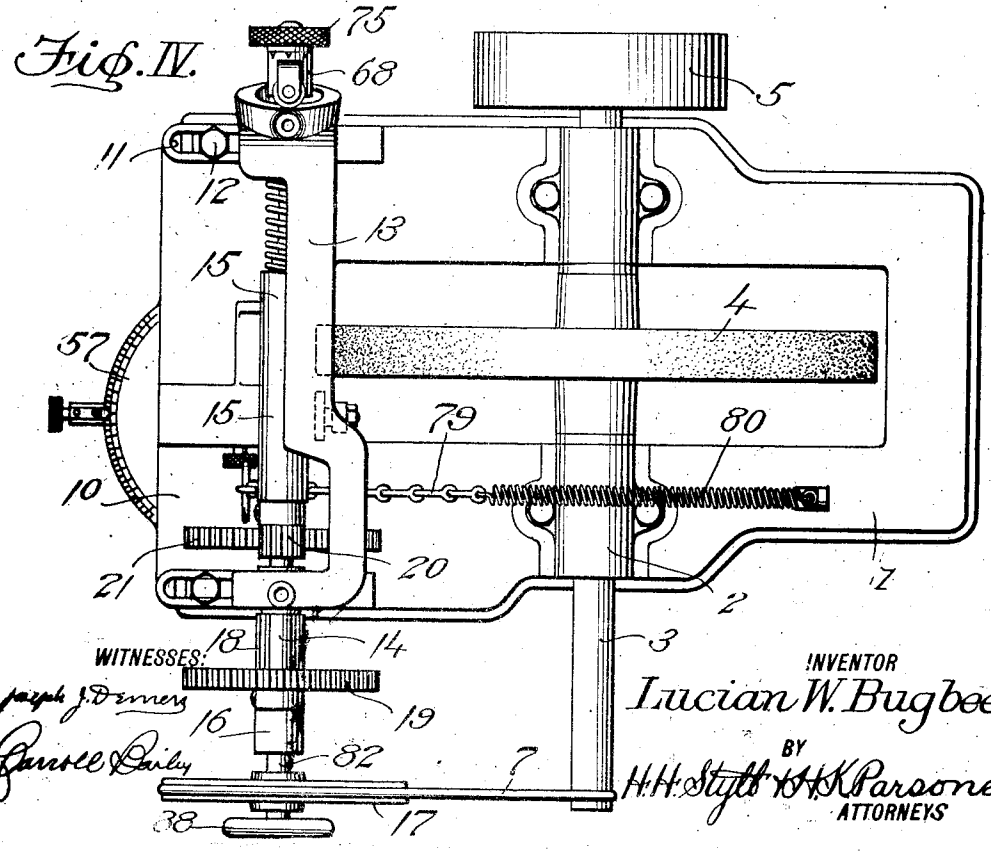


Fig. IV.



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3 SHEETS—SHEET 3.

Fig. V.

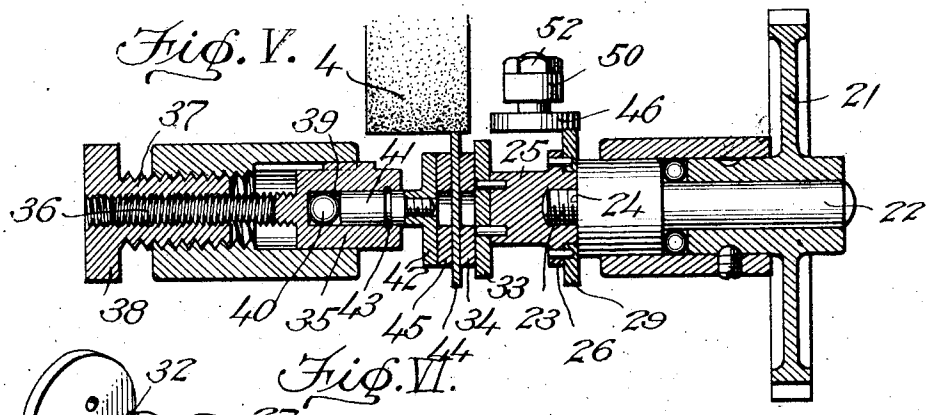


Fig. VI.

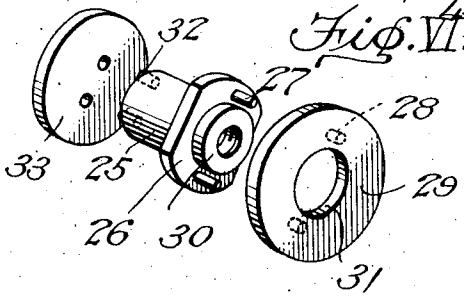
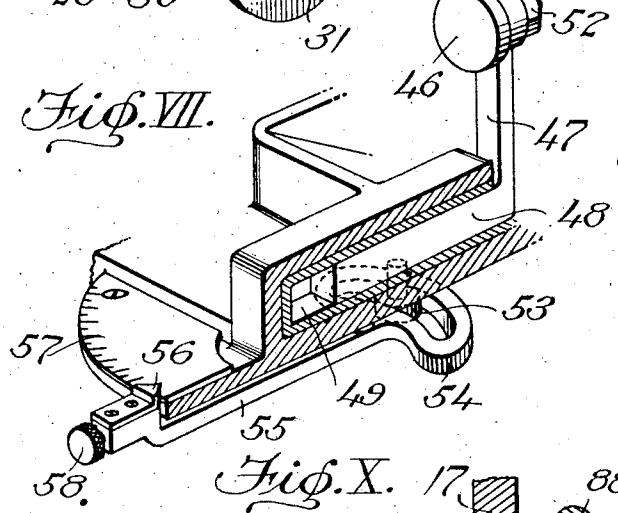


Fig. VII.



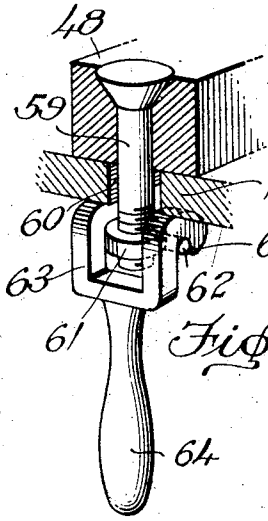
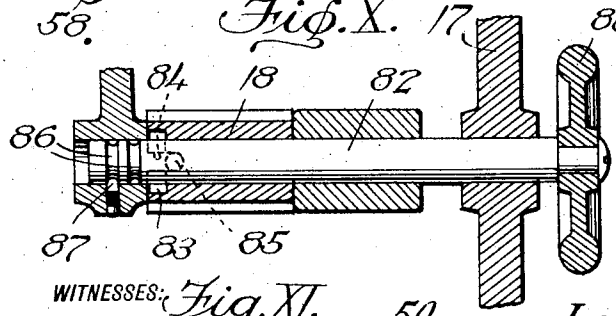


Fig. VIII.

Fig. X.



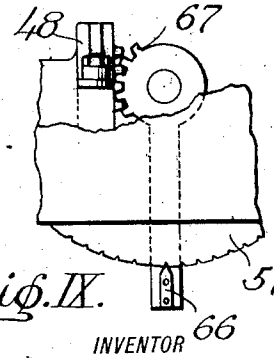
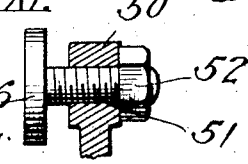


Fig. IX.

Fig. XI.



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EDGING-MACHINE.

1,227,243. Specification of Letters Patent. Patented May 22, 1917.

Application filed June 4, 1915. Serial No. 32,072.

To all whom it may concern:

Be it known that I, LUCIAN W. BUGBEE, a citizen of the United States, residing at Southbridge, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Edging-Machines, of which the following is a specification.

This invention relates to an improved edging machine and has particular reference to an improved form of machine adapted for use in grinding the edges of ophthalmic or similar lenses.

The leading object of the invention is the provision of an improved edging machine which shall be simple of construction, with but few parts, but which shall prove thoroughly efficient and accurate in operation.

Another object of the invention is the provision of an improved construction for absolutely insuring correct edging of the lens mounted therein with respect to its optical axis.

Other objects and advantages of the invention, including simplification of parts and reduction of number of parts of an ordinary machine of this character, should be readily apparent by reference to the following description taken in connection with the accompanying drawings, and it will be understood that various modifications in the specific details of construction shown and described within the scope of the appended claims may be made without departing from or exceeding the spirit of the invention.

In the drawings, wherein is illustrated the preferred embodiment of the inve

Figure I is a front view of the complete machine.

Fig. II is a side view thereof.

Fig. III is a central longitudinal sectional view with the carriage in raised position in dotted lines.

Fig. IV is a top plan view.

Fig. V is a longitudinal sectional view through the lens holding mechanism.

Fig. VI is a detail view of the device for insuring correct relative positioning of the lens and former.

Fig. VII is a detail view of the adjusting mechanism for regulating the final size of the edged lens.

Fig. VIII is a detail view of one form of device for locking the contact shoe in desired position.

Fig. IX is a detail view of another form of lock therefor.

Fig. X is a longitudinal sectional view through the clutch mechanism.

Fig. XI is a detail sectional view showing the adjustable construction of the shoe.

Fig. XII represents a fragmentary detail view of the lever for shifting the contact shoe.

In the drawings, in which similar characters of reference are employed to denote corresponding parts throughout the several views, the numeral 1 designates the base of the machine having the bearings 2 for the spindle or arbor 3 of the stone 4, said spindle 3 having on one end the driven pulley 5 by which power is applied to the entire machine and on the other end a driving groove connected by a belt 7 with the lens rotating mechanism. I may desire to use other means such as a chain and sprocket or a train of gears for operating the lens rotating mechanism and I do not wish to limit myself to any particular design of power transmission.

The frame 1 is provided on the forward portion at each side with a guide rib or flange 8, each of said guides having abutting the inner face thereof a flange 9 on the under side of the bed plate 10, whereby the bed plate is held in true alinement with the base. Longitudinal slots 11 are formed in the bed plate near the longitudinal edges thereof and extending through the slots and threaded into the base 1 are studs 12 which have the heads thereof bearing against the upper face of the bed plate for locking the plate in any desired adjusted position with respect to the stone 4.

Rising from the bed plate 10 is the yoke or inverted U-shaped member 13 having journaled therein near the upper portion thereof the shaft 14 on which is mounted the swinging carriage 15.

Disposed at one side of the yoke 13 is a bracket 16 forming a bearing for a shaft 82 which carries the pulley 17 driven by the

belt 7, and a pinion 18 which meshes with the gear 19 on the shaft 14 and thus serves to drive the said shaft. The shaft 14 is further provided with a pinion 20 meshing with the gear 21 on the lens driving spindle 22 which is journaled near the bottom of the carriage 15.

Said spindle 22 has a threaded inner portion 23 terminating at a shoulder 24, and screwed on the portion 23 is the sleeve or nut 25 having near its outer end the flange 26 bearing pins 27 adapted to fit in recesses 28 in the former plate 29, whereby correct axial positioning of the former plate relative to the member 25 is insured. The sleeve 25 has a cylindrical boss or projection 30 fitting snugly within the circular aperture 31 in the former 29 for properly centering the same.

In use the former 29 is mounted on the member 30, being positioned as previously mentioned by the pins 27 and the entire device is then threaded onto the threaded end 23 of the spindle 22 and tightened to clamp the former 29 between the shoulder 24 of the spindle 22 and the flange 26 of the member 25. The former is thus securely and rigidly retained in position on the machine while capable of ready removal and replacement by other formers of various shapes and sizes.

To insure correct positioning of the lens relative to the former 29 and in order that the lens may be ground with the exact desired relation of its optical and geometrical axes, the member 25 is provided on its inner end with a plurality of pins or similar projections 32 which are adapted for engagement in corresponding apertures in the lens pad 33 which is provided with the usual cushion 34.

Attention is invited to the fact that the pins 27 and 32 are preferably disposed in exactly the same plane so that the geometrical axes of the former 29 and the pad 33 irrespective of the interchangement of various parts, will always lie in exctly the same plane, and there can be no possible variation of the one relative to the other.

The advantages of the foregoing should be readily apparent to all those familiar with the use of edging machines, and it will be noted that by this improved construction the lens and pad may be placed in a suitable centering and axis finding device and the pad 33 located with its longer geometrical axis coincident with the desired optical axis of the lens, or in any desired relation to the optical axis of the lens, and with the pad and lens held in this desired predetermined relation it is merely necessary to place the pad on the position determining pins 32 and clamp the parts in place as hereinafter described, and allow the machine to operate on the lens, when the finished lens will be bound to have its geometrical axis in the exact desired relation to its optical axis.

It is to be noted that as illustrated the carriage 15 comprises a body portion and two depending arms, the mechanism just described being carried by one of said arms. Inasmuch as the present machine is designed primarily for grinding but a single lens at a time, it has been found unnecessary to drive both of the lens retaining spindles, the spindle 20 consequently being driven and the other clamping spindle being mounted for free rotation by a suitable type of thrust bearing.

In the form illustrated the opposite arm of the carriage 15 to that carrying the spindle 20 has suitably secured against rotation therein the sleeve 35, said sleeve having a threaded end 36 received in the right hand threaded interior of the tubular screw member 37, the exterior of said member being left-hand threaded and recived directly into the arm of the carriage, a knurled handle portion 38 being formed on the outer end of the member to facilitate rotation thereof. Consequently slight rotation of the member 37 will produce considerable longitudinal movement of the sleeve 35 on account of the action of the opposed threads.

The sleeve 35 has mounted within a longitudinal bore 39 formed therein a ball 40, a spindle 41 being mounted in the bore of the sleeve and having its inner end bearing against the ball, and its outer end provided with a lens clamping pad 42. A spring collar or the like 43 serves to suitably retain the spindle in position within the sleeve.

The operation of these parts should be readily apparent, and it will be seen that when the pad 33 has been placed in position on the pins 32 with a lens 44 thereon it is merely necessary to turn the handle or nut 38 until the pad 42 engages and securely clamps the lens in position. Power applied to the stone by means of the pulley 5 then serves to rotate the stone and at the same time the belt 7 transmits through the pulley 17, pinions 18, 19, 20 and 21, a rotative movement to the spindle 22 and thus to the lens. The pressure of the clamp against the lens and the adhesion of the cushions 34 and 45 thereto are sufficient to cause the lens clamp to rotate with the lens, the ball 40 serving as a thrust bearing and permitting of free and easy rotation of the spindle 41 within the sleeve 35.

It is to be understood that various forms of contact shoes for engagement with the former 29 may be employed to govern the size of the lens being edged. A preferred form of shoe 46 is illustrated in the drawings and is supported adjacent the stone 4 by the standard 47 carried on the slide 48 riding in a guide way 49 on the under side of the bed plate 10. The standard 47 is provided with an en-

larged head 50 which has an internal screw threaded aperture receiving the threaded shank 51 of the shoe 46, a lock nut 52 being threaded on the end of the shank and abutting the head 50 whereby adjustment of the shoe upon the standard may be made irrespective of any adjustment of the slide 48. In the preferred embodiment the slide 48 is provided on the under side thereof with a roller 53 which rides in a slot in the segment 54 which is carried on one end of the lever 55, the said lever being pivoted to the bed plate and having a forwardly extending arm terminating in a pointer 56 which rides over the segment 57 on the front of the bed plate, said segment being provided with suitable graduations to denote the in and out adjustment of the shoe 46.

By this construction it will be obvious that the size of the lens is determined through adjustment of the shoe 46 irrespective of the size of the former 29, the slide 48 being locked in any desired adjusted in and out position by means of a thumb screw 58 which is threaded into the end of the arm 55 and has the inner end thereof bearing against the edge of the segment 57.

It will be understood that the slot in the segment 54 is of such a shape and the graduations on the segment 57 are so arranged that by moving the pointer 56 over any one of the graduations an exact predetermined size of lens may be edged, and it will be further understood that the adjustment of the shoe 46 independently of the standard 47 is provided in order that wear in the stone 4 may be taken up and that such wear will have no effect upon the size of the lens as governed by adjustment of the arm 55.

Fig. VIII illustrates in detail one manner of locking the contact shoe 46 in desired adjusted position relative to the remainder of the machine. By reference to this figure it will be seen that secured in the slide 48 is the threaded member or bolt 59 which extends downward through the slot 60 in the bed plate 10 and has adjustably engaged on the lower end thereof the nut 61 having pins or trunnions 62 on which are mounted the arms of the yoke cam 63 which is provided with the actuating handle 64. The yoke cam may be of any desired construction but I preferably construct the same as illustrated in Fig. VIII, that is to say, in the form of a hook having the apertures or slots 65 to facilitate engagement of and removal of the cam from the trunnions. The advantage of this construction is that the handle may be removed when desired and the nut adjusted upon the bolt 59 and the handle then replaced.

The operation of this locking device should be readily apparent, and it will be seen that it is merely necessary to swing the handle from the horizontal to a vertical position or vice versa according to the disposition of the surfaces of the cam to cause the cam surfaces to bear against the under side of the frame and thus draw downward on the member 59 to tightly clamp the slide 48 against the bed plate, while movement of the handle in the reverse direction serves to disengage the cam sufficiently to permit of sliding movement of the member 48 to any desired position.

If desired, in place of or in addition to employing the cam locking device just described, a latch 66 may be mounted on the outer end of the lever 55 for coöperation with recesses in the edge of the segment 57 so that when the arm is swung to any desired adjusted position the latch 66 will engage with any one of the recesses to lock the arm in its adjusted position. The inner end of the arm in this instance is provided with segmental teeth 67 which engage with corresponding rack teeth on the slide 48 whereby swinging of the arm will move the slide to any desired adjusted position.

To keep the stone of an edging machine in the best possible condition it is advisable that there be a relative lateral movement between the stone and the work to be operated upon. This movement may be imparted either by a lateral movement of the stone, a lateral movement of the work, or both. In the present machine one form of attainment of this relative lateral movement is illustrated. Loosely mounted on the spindle 14 is a sleeve 68 which is provided with a radially extending arm carrying a roller 69 which is adapted to contact with the inclined cam 70 on the side of the yoke 13. A coiled spring 71 is disposed about the spindle 14 between the inner portion of the yoke 13 and the adjacent edge of the carriage 15 and normally acts to hold the carriage in a position with the opposite end thereof abutting against the collar 72 which is secured on the spindle 14.

Radial slots or recesses 73 are formed in the outer edge of the sleeve 68 and threaded on the end of the spindle 14 and having a projection 74 for engagement with any one of the recesses 73 is an adjusting nut 75. It will be seen that by pulling on the nut 75 against the action of the spring 71 the lug 74 will become disengaged from the recess 73 so that the nut may be adjusted upon the spindle 14 to permit of slight in and out movement of the sleeve 68 whereby the path of movement of the reciprocating carriage may be varied.

In operation as the spindle 14 is rotated the roller 69 will ride over and down the cam 70 and draw the carriage and thus the lens being operated on to the left, while as the roller moves up the cam the expansion of the spring 71 will force the carriage back again to the right, the carriage and the lens

thus being reciprocated across the face of the stone during operation of the machine, as should be best understood by reference to Fig. I of the drawings.

Attention is particularly invited to Figs. I and II of the drawings, from which one of the great advantages of the present machine will be readily apparent, and by reference to which it will be noted that when desired to place a lens in the machine it is merely necessary to swing the carriage upward so that the pawl 76 which is pivoted to the yoke 13 will engage any one of the teeth 77 on the carriage 15 to hold the carriage in a convenient position for the application or examination of a lens. On the other hand, when the carriage is in operative position the weight of the carriage itself serves to satisfactorily hold the lens against the stone and thus dispenses with the use of springs or other tension devices for securing correct pressure, also insuring the same pressure of the lens against the stone, whether being ground on the long or short axis.

Although the machine satisfactorily operates without the use of spring means, or other tensioning device for holding the lens in engagement with the stone, it is deemed advisable to provide means whereby in exceptional cases a strong pressure may be applied to hold the lens in engagement with the stone. A key-hole slot 78 is formed in one part of the swinging carriage 15 and has passing therethrough a chain 79 which is adapted to be shifted into the smaller portion of the slot in order that the spring 80 which is secured to the inner end of the chain may exert its tension against the carriage to hold the same in such a position that the lens will have a firm engagement against the stone, the opposite end of the spring 80 being secured in any suitable manner to the base of the machine, as through the medium of a bracket 81.

In order to stop the operation of the lens operating mechanism without entirely cutting off the power from the rest of the machine, I have provided a novel form of clutch means whereby the lens rotating and shifting mechanism may be stopped or started at will. The shaft 82 on which the pulley 17 and pinion 18 are mounted, and which is journaled in the bracket 16, has the inner end thereof positioned within a suitable bearing in the side of the yoke 13. The pinion 18 is loosely mounted on the shaft and is provided in its inner end with an annular groove 83 from which extends inwardly into the pinion the slot 84. A lug 85 is carried by the shaft 82 and is adapted to be moved into engagement with the slot 84 when it is desired that the pinion 18 be locked to the shaft, whereby rotation of the shaft will impart movement to the lens rotating mechanism, or is adapted to be moved into alinement with the annular groove 83 so that the pinion 18 will remain stationary irrespective of rotation of the shaft 82. A pair of annular grooves 86 are formed in the inner end of the shaft 82 and a spring pressed pin 87 is adapted to engage with either one of these grooves, so that the lug 85 will be held in engagement with the slot 84 or will be permitted to be freely movable in the groove 83, as desired, it being understood that a slight initial pressure upon the end of the shaft 82 will cause the pin 87 to recede and permit the shaft to be moved longitudinally.

A hand wheel 88 is loosely mounted on the outer end of the shaft in order to provide a convenient means for operating the said clutch mechanism. In use the machine operates as follows:

The carriage is first swung to a raised position, being held by the pawl 76 and the desired shape of former 29 is then placed on the sleeve 25. The lens to be ground is next placed against the cushion surface 34 with its optical axis in alinement with the axis of the former 29, and the lens pad 33. The clamping pad 42 is then brought into engagement with the lens whereby the same is held rigidly in its desired relation with the former and lens pad. The carriage is then lowered and the clutch mechanism operated to impart motion to the lens, the chain 79 having been first adjusted to attain the desired tension engagement between the lens and grinding wheel.

Operation of the rotating mechanism causes the carriage to be reciprocated by reason of the roller and cam and the spring 71, and at the same time the carriage is moved toward and away from the grind wheel by reason of the engagement of the former 29 against the shoe 46.

As shown in Fig. III of the drawings the carriage 15 may be provided on its inner face with a cutting tool 89, normally out of engagement with the stone, but being adapted to contact therewith upon backward movement of the shoe 46, and it will be obvious that when a circular former is substituted for the oval former 29 and the shoe is adjusted to permit the tool to engage the grind wheel, operation of the machine in the ordinary manner will cause the tool to engage with and true the cutting edge thereof, the tool being of any desired material but for the most efficient results a diamond preferably being employed.

From the foregoing description taken in connection with the accompanying drawings, it is thought that the advantages of construction and operation of the machine will be clearly understood, and while I have herein shown and described one specific form

of my invention I do not wish to be limited thereto, except as the claims may import.

I claim:

1. In an edging machine, lens holding means, grinding means, an operating spindle for said holding means, a sleeve mounted on said spindle, a former plate carried on said sleeve, a plurality of pins carried by said sleeve and a lens pad having a plurality of recesses for engagement on said pins.

2. In an edging machine, lens holding means, grinding means, an operating spindle for said holding means, a sleeve detachably mounted on said spindle, a former plate, a boss formed on said sleeve for engagement with a central aperture in said former plate, a pin and recess connection between said plate and said sleeve whereby correct axial positioning of the sleeve relative to the plate is insured, a lens pad and pins carried on the sleeve for engagement with recesses in the pad, the two sets of pins being disposed in alinement whereby the geometrical axes of the former and pad will at all times lie in the same plane irrespective of interchangement of various parts.

3. In an edging machine, lens holding means, grinding means, an operating spindle for said holding means, a sleeve mounted on said spindle, a former plate carried on said sleeve, a plurality of pins carried on said sleeve, a lens pad having a plurality of recesses for engagement on said pins, and adapted to have a lens positioned thereagainst and a second pad for engagement with the opposite face of the lens for clamping the same against movement, and means for shifting said second pad into and out of clamping position.

4. In an edging machine, a base, a grinding wheel, a frame on said base, a rotatable shaft journaled on said frame, lens supporting means loosely mounted on said shaft, a cam on said frame, a member threaded on said shaft, a cam engaging device loosely mounted on said shaft, and a locking engagement between said member and said cam engaging device, whereby a reciprocatory movement is imparted to the lens holding means during operation of the machine, and whereby the path of reciprocating movement of the lens may be varied.

5. In an edging machine, a base, a grinding wheel, a frame on said base, a rotatable shaft journaled in said frame, lens holding means loosely mounted on said shaft, a cam on said frame, a sleeve on said shaft having notches formed therein, a member threaded on said shaft, projections formed on said member for engagement with said notches whereby the member is locked to the sleeve, a cam engaging roller carried by the sleeve, a collar on said shaft to limit movement of the lens holding means in one direction and a spring for holding said holding means against said collar when the cam and roller coöperate to reciprocate the shaft.

6. In a machine of the character described, the combination with a lens clamp spindle, of an attachment therefor comprising a sleeve having a portion for engagement with the spindle, said sleeve having former engaging means formed at one end thereof and lens clamp positioning means formed at the opposite end thereof, whereby when a former and clamp pad are applied to the sleeve and machine the said former and pad will always occupy a predetermined relation one to the other, substantially as described.

7. In a machine of the character described, the combination with a base and a grinding wheel mounted on the base, of a swinging carriage mounted on the base, and means for controlling the swinging movement of the carriage, including a slide mounted on the base, an upright on the slide bearing a stop and a lever pivoted to the base and formed with a slot eccentric to its point of pivotance, the slide having a lug fitting into said slot, whereby pivotal movement of the lever will through the engagement of the lug and slot serve to shift the slide and stop into desired adjusted position relative to the base and carriage, exactly as illustrated.

8. In a lens edging machine, the combination with a lens holding carriage including a driven spindle, said spindle terminating in a reduced shouldered portion having a projecting tang, of a sleeve or clamp member adapted for engagement upon the tang, centering devices projecting from said member in the direction of the spindle and adapted to receive a former to position the former relative to the said member, whereby as the clamp member is secured on the reduced tang the former will be clamped between said member and the shoulder of the spindle, and means for detachably engaging a lens clamp pad at the opposite end of the member to secure the pad in predetermined relation to the former.

9. In an edging machine, the combination with a driven lens spindle having a reduced threaded inner end of a clamp nut having an internally threaded portion for engagement on the threaded end of the spindle, said clamp nut having the portion adjacent the spindle provided with a reduced hub flanked by guide pins or keys, a lens former having a central aperture adapted to fit the hub and having recesses or apertures to receive the pins or keys, whereby the interlocking engagement of the several parts will insure exact positioning of the former rela-

tive to the clamp nut and whereby the tightening of the nut on the threaded end of the spindle will securely clamp the former in position between the nut and the shoulder of the spindle, the nut being provided at its free end with projecting pins, and a lens clamp pad having apertures to receive the pins, whereby the lens clamp pad will be automatically positioned in predetermined relation to the former irrespective of the relation of the other parts of the machine to each other, substantially as and for the purpose described.

In testimony whereof I affix my signature in presence of two witnesses.

LUCIAN WILLIS BUGBEE.

Witnesses:
CARROLL BAILEY,
JOSEPH J. DEMERS.