Jan. 14, 1947. D. B. SEVIN 2,414,126

EDGING MACHINE

Filed May 21, 1945 2 Sheets-Sheet 1

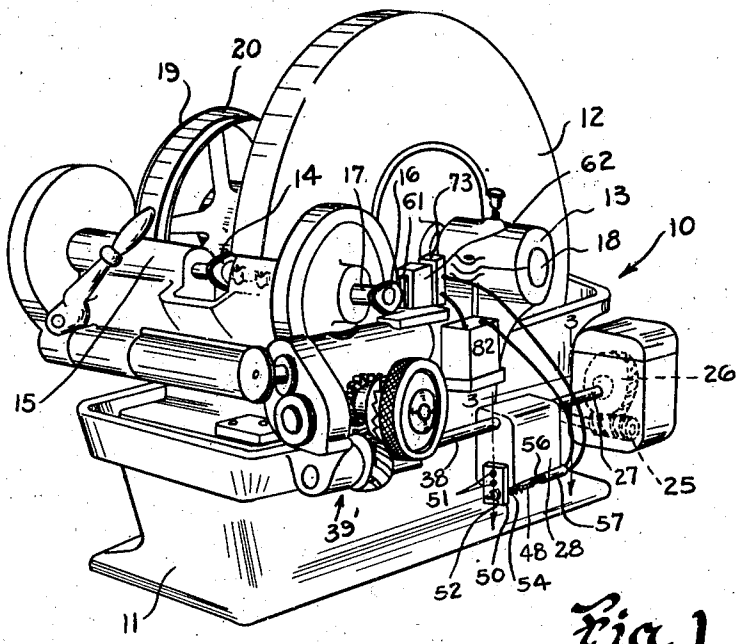


Fig. 1

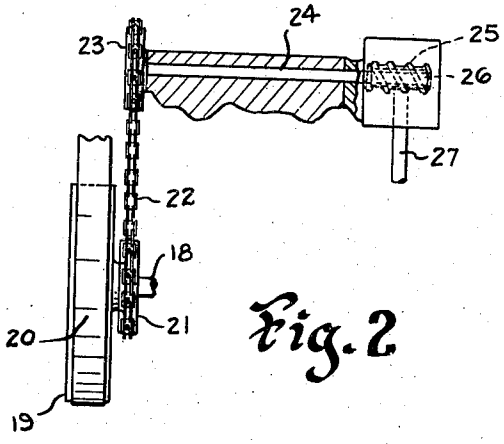


Fig. 2

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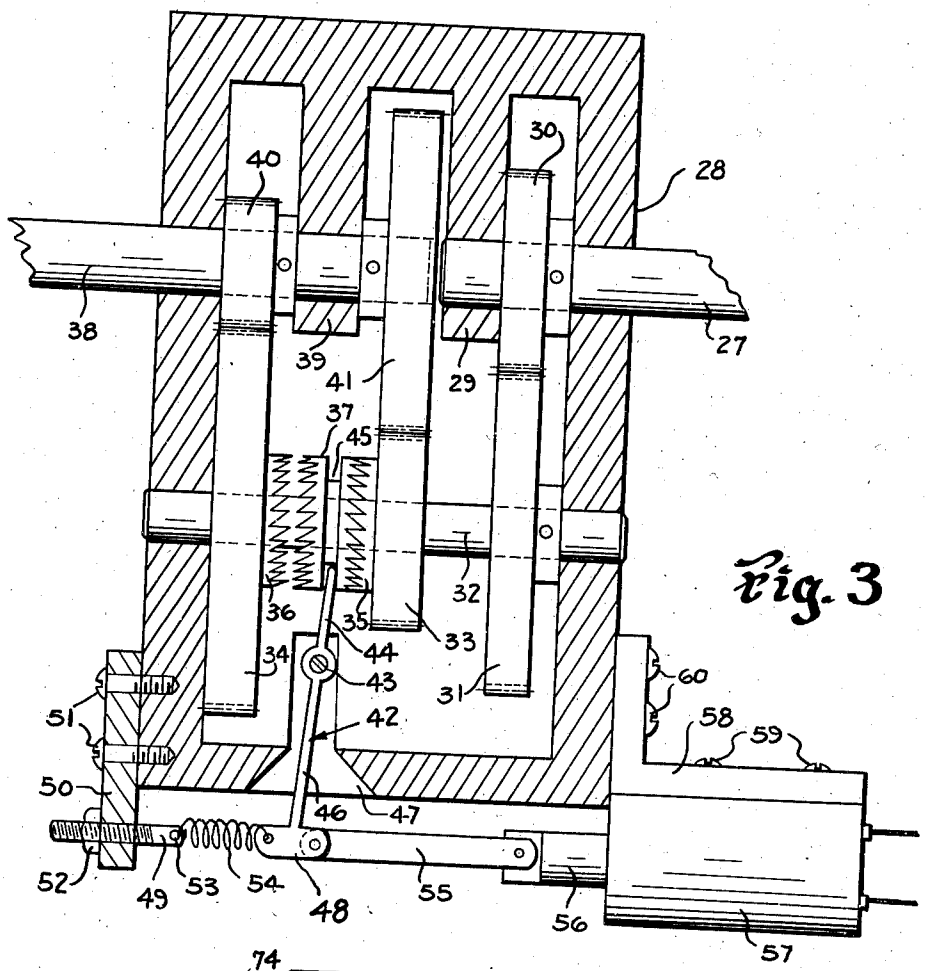


Fig. 3

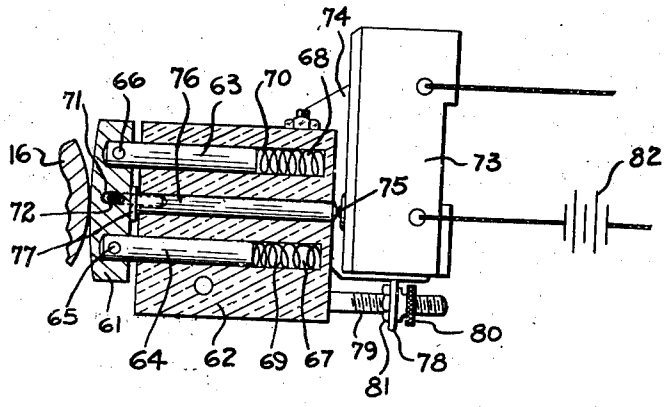


Fig. 4

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UNITED STATES PATENT OFFICE

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EDGING MACHINE

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Application May 21, 1945, Serial No. 595,013

8 Claims. (Cl. 51—101)

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This invention relates to improvements in lens edging machines and has particular reference to an attachment for controlling the speed of rotation of the lens.

One of the principal objects of the invention is to provide means whereby the time usually required for edging a lens is greatly reduced.

Another object is to provide automatic means whereby the speed of rotation of the lens holding spindle and lens may be varied while the lens is being edged.

Another object is to provide an attachment which may be quickly and easily connected to an edging machine.

Other objects and advantages of the invention will become apparent from the following description taken in connection with the accompanying drawings, and it will be apparent that many changes may be made in the details of construction and arrangement of parts shown and described, without departing from the spirit of the invention as expressed in the accompanying claims.

I, therefore, do not wish to be limited to the exact details shown and described as the preferred form only has been given by way of illustration.

Referring to the drawings:

Fig. 1 is a perspective view of an edging machine with the attachment connected thereto;

Fig. 2 is a fragmentary sectional view showing a portion of the drive mechanism for the lens holding spindle;

Fig. 3 is a sectional view of the attachment; and

Fig. 4 is a partial sectional view of the former shoe and micro-switch arrangement.

In the past when edging ophthalmic lenses the lenses being adged were rotated at a constant speed throughout the entire edging operation. In edging a lens it is well known that some portions of the periphery will become edged to the proper size before other portions. This is due to the fact that most lens blanks are round while the shape being formed may be other than round. Another factor is that hard spots may be encountered which will require longer time for edging. With this in mind it will be seen that if the lens is rotated at a constant speed throughout the edging operation, time will be lost while the portions already edged to size are rotated past the edging stone in order to cause the portions requiring more edging time to be reduced to size.

The present invention is adapted to overcome this and other difficulties found in the prior art machines by automatically increasing or decreasing the speed of rotation of the lens blank relative to the stone according to the amount of glass required to be removed from the portion of the blank in direct engagement with the stone.

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Referring more particularly to the drawings wherein like characters of reference designate like parts throughout the several views, the device embodying the invention as shown in Fig. 1 comprises broadly of an edging machine 10 which has a base 11 on which an edging stone 12 is rotatably supported by the bearings 13. The lens 14 to be edged is supported in a swinging head 15 which is pivotally attached to the base 11 and is adapted to be swung toward and away from the stone 12. The movement of the lens relative to the abrading surface of the edging stone is controlled by the former 16 which is attached to the end of the lens holding spindle 17, thus causing the lens to be edged to the shape of the former.

Power for the rotation of the edging stone 12 is applied to the stone shaft 18 through the pulley 19 and drive belt 20 which may be connected to any suitable source of power. The shaft 18 is further provided with a sprocket 21, see Fig. 2, for driving a sprocket chain 22 connected with a second sprocket wheel 23 mounted on and adapted to drive a shaft 24 at the rear of the machine. The shaft 24 is provided with a worm 25 meshing with the gear 26 on the forwardly extending drive shaft 27 to provide means for rotating the lens 14.

The drive shaft 27 extends into the gear box 28 as shown in Figs. 1 and 3 and is supported by the bearing 29. A driving gear 30 is attached to the shaft 27 between the bearing 29 and the side wall of the gear box 28 and is adapted to mesh with a gear 31 supported on a shaft 32 also supported in the gear box 28. The shaft 32 has the gears 33 and 34 freely mounted thereon in spaced relation with each other. The gears 33 and 34 are provided with toothed clutch plates 35 and 36 rigidly attached to the gears in face to face relation with each other. A toothed clutch 37 is slidably mounted on the shaft 32 between the clutch plates 35 and 36 by a key and spline or any other suitable arrangement which will cause it to rotate and yet permit the clutch to be moved into and out of engagement with either of the clutch plates depending upon which gear 33 or 34 is to be rotated. Mounted in the upper part of the gear box 28 and in substantial alignment with the drive shaft 27 is a shaft 38 supported in the bearing 39. This shaft is adapted to transmit power to the train of gears 39' which in turn rotate the lens driving spindle 17 in the conventional manner. Rigidly mounted on the shaft 38 are the gears 40 and 41 which are adapted to mesh with the gears 34 and 33 respectively. It will be seen that when the gear 33 is driven by the clutch 37, the gear 41 will drive the shaft 38 and when the

gear 34 is engaged by the clutch 37 the gear 40 will be the driver. The gears 33, 34, 40 and 41 are of such related sizes that when the different combinations are used it will change the speed of rotation of the shaft 38 thereby altering the speed of rotation of the lens holding spindle 17. Gears 34 and 40 will increase the speed and gears 33 and 41 will decrease the speed.

The clutch 37 is actuated on the shaft 32 by means of a lever 42 which is pivoted intermediate its ends to the gear box 28 by means of the screw or the like 43. The end 44 of the lever 42 is adapted to engage in a groove 45 in the clutch 37 with the end 46 on the opposed side of the pivot screw 43 extending through the opening 47 in the gear box 28 and terminating in a connection portion 48. A tension adjusting screw 49 is supported with one end thereof in adjacent relation with the connection end 48 of the lever 42 by a plate 50 which is connected to the gear box 28 by means of the screws 51. The tension adjusting screw 49 is adjustably extended through the plate 50 and is provided with a check nut 52 on one end thereof and has a hole 53 in its opposed end. The hole 53 is adapted to receive the end of a tension spring 54 which at its opposed end is attached to the connection end 48 of the lever 42. A link member 55 is pivotally connected to the connection end 48 of the lever 42 and is adapted to link the lever 42 to a solenoid plunger 56 of the solenoid 57. The solenoid is secured to the gear box 28 by means of an angled plate 58 through the screws 59 and 60.

It will be seen that the change of speed of the shaft 38 which controls the speed of rotation of the lens holding spindle 17 is accomplished by means of the solenoid plunger 56 which moves the lever 42 about the pivot 43 thereby shifting the clutch 37 from engagement with one set of gears 34—40 to the other 33—41.

To bring the above about the lens former shoe 61 is resiliently supported in a former shoe bracket 62 by means of the rods 63 and 64 which are attached at one end to the former shoe 61 by the pins 65 and 66. The other ends of the rods 63 and 64 are inserted in suitable holes or slideways 67 and 68 formed in the bracket 62 and springs 69 and 70 are inserted between the inner ends of the rods and the adjacent ends of the holes or slideways to exert an outward pressure on the said rods. The lens former shoe is provided with a slot 71 in which the end of a right angled pin 72 carried by the bracket 62 is adapted to be positioned. The pin 72 will limit the outward movement of the former shoe 61, caused by the springs 69 and 70, and will allow the said former shoe to be freely moved toward the bracket.

A micro-switch 73 is adjustably supported in adjacent relation with the former shoe bracket 62 by means of a supporting plate 74 with the switch button 75 positioned in alignment with an actuating pin 76. The actuating pin 76 is slidably mounted in the former shoe bracket 62 and is provided with an enlarged head 77 at one end thereof which is adapted to be engaged by the former shoe 61 with the opposed end in engagement with the switch button 75 so that when the former shoe is moved toward the bracket 62 it will cause the actuating pin 76 to compress the switch button 75. Adjusting means have been provided for the adjustment of the micro-switch relative to the former shoe bracket 62. This means is in the form of an arm 78 extending from the supporting plate 74 and further comprises an adjusting screw 79 extending from the former shoe bracket 62. The screw 79 is adapted to extend through the arm 78 and is provided with an adjusting nut 80 and check nut 81. With this arrangement it is possible to adjust the position of the micro-switch 73, and more particularly the switch button 75, in proper relation to the actuating pin 76.

The electrical energy needed for energizing the solenoid 57 may be derived from any suitable source, one of which is shown in the drawings in the form of a storage battery 82.

The operation of the device is as follows:

When the former 16 is disengaged from the contact shoe 61, the solenoid 57 will be de-energized thereby permitting the coil spring 54 to urge the lever 42 and the clutch member 37 into clutched relation with the gear 33. This causes the lens arbor to initially rotate at a relatively slow rate of speed. While rotating at this speed, the lens 14 is moved into engagement with the abrading wheel or stone 12. The slow rate at which the lens 14 is now rotating will permit the abrading wheel or stone to remove more of the material from the portion of the lens in immediate engagement with the stone. This slow rate of rotation is continued until a portion of the contour edge of the lens is reduced by an amount sufficient to permit the former 16 to engage and exert a pressure on the former contact shoe 61. This pressure on the former contact shoe will in turn cause the actuating pin 76 to be moved toward the switch 73 and will in turn actuate the switch button 75 and thereby cause the solenoid 57 to become energized. The energizing of the solenoid 57 will cause the core 56 of said solenoid to be drawn inwardly thereof and will in turn cause the lever 42 to be rocked on its pivot 43 and move the clutch member 37 into clutching relation with the gear member 34 and thereby cause the speed of rotation of the lens driving spindle to be increased according to the gear ratio of the gear members 34 and 40. This will cause the lens, upon its being reduced to size, at a particular portion thereof to be rotated at a greater speed than its initial speed of rotation during the time interval in which it is being reduced to size.

It is to be understood that this increased rate of speed will continue until the next proceeding portion of the lens which is moved into engagement with the surface of the stone and which has not been reduced to size comes in contact with the edging stone. This will cause the former to disengage the former shoe. The switch 73, through the relieving of the pressure on the actuating pin 76, will through its self operation de-energize the solenoid 57 whereupon the coil spring 54 will then move the lever 42 in the opposite direction and cause the clutch member 37 to clutchingly engage the gear 33 and thereby cause the lens driving spindle to return to the slow speed of rotation.

The above function is repeated until the lens is reduced to the desired contour shape and size throughout its entire contour.

It is to be understood that the supporting plate 74 is provided with a suitable connection with the bracket 62 which may be loosened to permit the adjustment of the switch 73 and which may be tightened after said adjustment to hold the parts rigidly in place.

From the foregoing description, it will be seen that simple, efficient and economical means and method have been provided for accomplishing all of the objects and advantages of the invention,

particularly that of providing a machine which will edge lenses faster and more economically than prior art constant speed edgers.

Having described my invention I claim:

1. In a device of the character described the combination of a rotating abrading wheel, a rotatable spindle for supporting work to be abraded by the abrading wheel, said spindle having a former thereon for simultaneous rotation with the work, means for moving the work and former in a direction toward the abrading wheel, a contact shoe for engagement by said former for limiting said movement, positive drive means having portions introducing varied speed controls for varying the speed of rotation of the work supporting spindle and means responsive to the engagement and disengagement of the former with the contact shoe for shifting the driving connection from one speed control portion to another.

2. In a device of the character described the combination of a rotating abrading wheel, a rotatable spindle for supporting work to be abraded by the abrading wheel, said spindle having a former thereon for simultaneous rotation with the work, means for moving the work and former in a direction toward the abrading wheel, a contact shoe for engagement by said former for limiting said movement, positive drive means embodying drive gears of different ratios for introducing varied speed controls for varying the speed of rotation of the work supporting spindle and means responsive to the engagement and disengagement of the former with the contact shoe for shifting the driving connection from one set of gears to the other.

3. In a device of the character described the combination of a rotating abrading wheel, a rotatable spindle for supporting work to be abraded by the abrading wheel, said spindle having a former thereon for simultaneous rotation with the work, means for moving the work and former in a direction toward the abrading wheel, a contact shoe for engagement by said former for limiting said movement, drive means, a train of gears interposed between said drive means and said work supporting spindle for rotating said work supporting spindle, said train of gears embodying portions having different gear ratios, driving connection means for interconnecting the positive drive means with one or the other of the portions of different gear ratios and means responsive to the engagement and disengagement of the former with the contact shoe for shifting the driving connection from one gear ratio to the other.

4. A device for use with an abrading machine embodying a rotating abrading wheel, a rotatable spindle for supporting work to be abraded by the abrading wheel, said spindle having a former thereon for simultaneous rotation of the work, means for moving the work and former in a direction toward the abrading wheel, a contact shoe for engagement by said former for limiting said movement and positive drive means for rotating said work supporting spindle, said device embodying a gear box adapted to be interposed between the positive drive means and the work supporting spindle, said gear box embodying drive gears of different speed ratios, means for shifting the driving connection of said positive drive means from one set of gears of one speed ratio to another and means responsive to the engagement and disengagement of the former with the contact shoe for shifting said driving connection from one gear ratio to the other according to the speed of rotation desired of the work supporting spindle.

5. A device of the character described comprising the combination of a rotating abrading wheel, rotatable means for supporting work to be abraded by the abrading wheel, said means having a former thereon for simultaneous rotation with the work, means for moving the work and former in a direction toward the abrading wheel, contact means adapted to be engaged by the former for limiting the movement of the work toward the abrading wheel, driven means, means embodying sets of gears of different ratios, means to be driven associated with said sets of gear means and means responsive to the engagement and disengagement of the former with the contact means for shifting the driving action of the driven means from one set of gears to the other.

6. A device of the character described comprising the combination of a rotating abrading wheel, rotatable means for supporting work to be abraded by the abrading wheel, said means having a former thereon for simultaneous rotation with the work, means for moving the work and former in a direction toward the abrading wheel, contact means adapted to be engaged by the former for limiting the movement of the work toward the abrading wheel, driven means, means embodying sets of gears of different ratios, means to be driven associated with said sets of gear means, clutch means for engagement and disengagement with the respective sets of gears for selective interconnection of the driven means with said sets of gears and means responsive to the engagement and disengagement of the former with the contact means for shifting said clutch member.

7. A device of the character described comprising the combination of a rotating abrading wheel, rotatable means for supporting work to be abraded by the abrading wheel, said means having a former thereon for simultaneous rotation with the work, means for moving the work and former in a direction toward the abrading wheel, contact means adapted to be engaged by the former for limiting the movement of the work toward the abrading wheel, driven means, means embodying sets of gears of different ratios, means to be driven associated with said sets of gear means, clutch means for engagement and disengagement with the respective sets of gears for selective interconnection of the driven means with said sets of gears, a lever associated with said clutch means, a solenoid connected with said lever and means responsive to the engagement and disengagement of the former with the contact means for energizing and de-energizing the solenoid and to in turn rock the lever and shift the clutch means.

8. An attachment for an abrading machine having a rotating abrading wheel, a rotatable spindle for supporting work to be abraded by the abrading wheel and a former on the spindle for simultaneous rotation with the work, together with means for moving the work and former in a direction toward the abrading wheel and a contact shoe adapted to be engaged by the former for limiting the movement thereof, said attachment comprising positive drive means having portions for introducing varied speed controls so as to vary the speed of rotation of the work holding spindle and means responsive to the engagement and disengagement of the former with the contact shoe for shifting the driving connection from one speed control portion to another when said attachment is in position of use on the abrading machine.

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