Nov. 29, 1927. 1,651,182

L. W. BUGBEE

LENS GRINDING MACHINE

Filed Nov. 24, 1925 2 Sheets-Sheet 1

FIG. 1

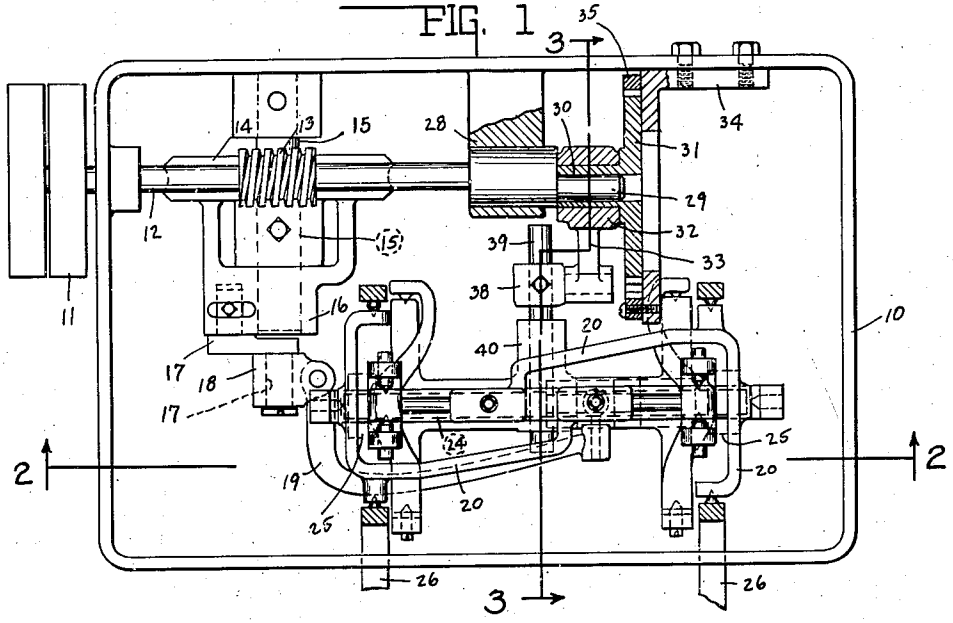
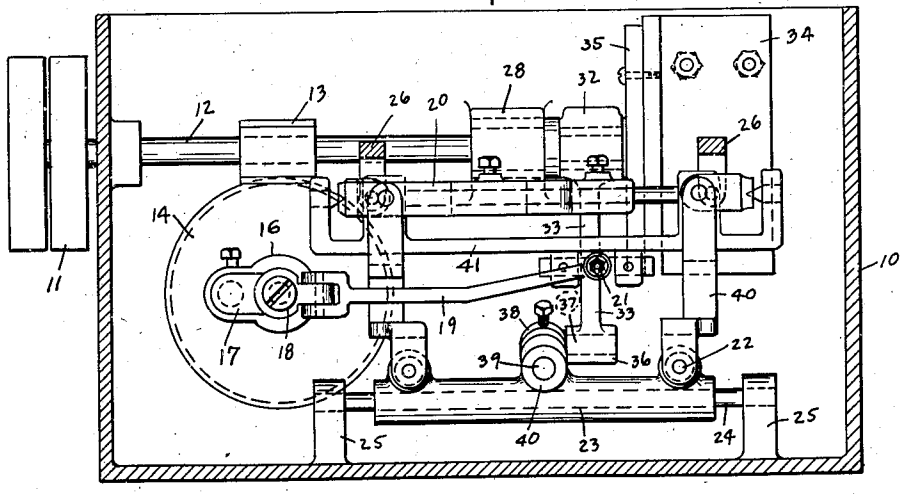


FIG. 2



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Filed Nov. 24, 1925 2 Sheets-Sheet 2

FIG. 3

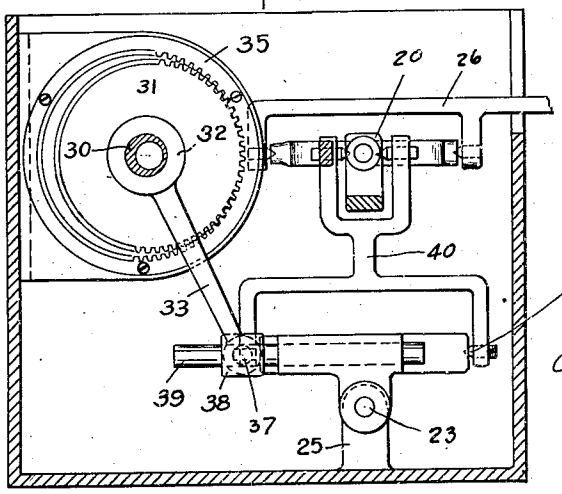


FIG. 4

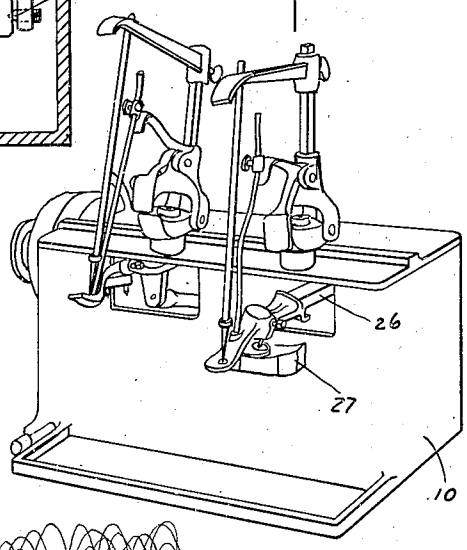


FIG. 5

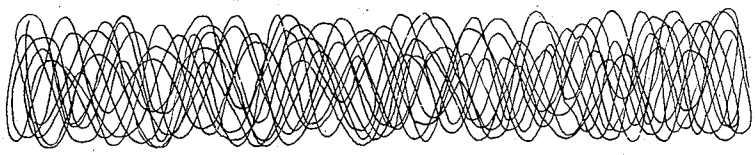
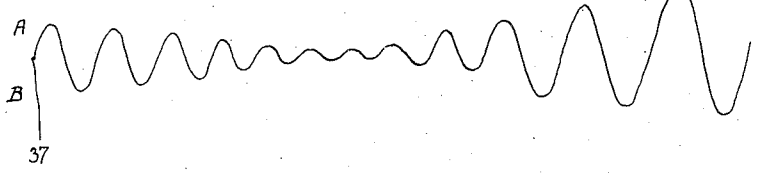


FIG. 6



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UNITED STATES PATENT OFFICE.

LUCIAN W. BUGBEE, OF INDIANAPOLIS, INDIANA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO CONTINENTAL OPTICAL CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE.

LENS-GRINDING MACHINE.

Application filed November 24, 1925. Serial No. 71,260.

This invention pertains to lens grinding machines, and particularly that type of machine for grinding the surface of optical lenses through the medium of a grinding tool and button.

Heretofore machines of this character caused the grinding button to move over the surface of the lens in a predetermined path, remaining substantially constant, a back and forth movement being imparted to the button during its more gradual lateral movement. This provides a wave-like line generated by a given point on the button, such point on the button always following the same path. The result of such structures as heretofore employed, is that the button in following the same path may produce furrows in the lens which become pronounced by reason of its repeated passage over the same line of movement, producing a wavy surface on the lens and thereby detracting materially from its quality.

It is the object of this invention to provide such machines with an additional movement, and the mechanism for causing the same, which will cause a given point on the button to always follow a different path during a plurality of cycles of movement. By reason of this invention, the furrowing effect heretofore produced is practically eliminated since any single furrowing particle or element on the button or rouge will follow different paths of movement in successive oscillations to and fro which will effect a more even grinding and cause the entire surface within a given area to be covered thereby rather than a single line.

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

In the drawings, Figure 1 is a plan view looking down on the machine. Fig. 2 is a section taken on the line 2—2 of Fig. 1. Fig. 3 is a section taken on the line 3—3 of Fig. 1. Fig. 4 is a front elevation of the machine in perspective. Fig. 5 is a diagrammatical illustration of the path of movement of the grinding button caused thereby. Fig. 6 is a diagrammatical illustration of the variable movement of one of the parts.

In the drawings there is shown a grinding tool, the greater portion of which is of the usual type. The housing 10 encases the mechanism driven from a pulley 11 mounted upon a shaft 12 supported in suitable bearings within the casing. The shaft 12 is provided with a worm 13 adapted to drive the worm wheel 14 that is loosely mounted on a fixed shaft 15. Said shaft is secured by a set screw 115 in a boss 215 that is integral with the housing 10. A yoke 16 that is integral with the worm 14 is loosely mounted on the shaft 15 and carries a crank 17 pivotally connected by a sleeve 18 with a crank arm 19, whereby the rotation of said wheel and crank imparts through arm 19 a lateral movement to the frame 41. The frame 41 is pivotally mounted at 22 upon a rocking member 23, which is in turn pivotally and slidably mounted through the rods 24 upon the upwardly projecting ears 25 mounted on said frame.

Pivotally suspended from the frame 20 that is supported by frame 41 there is a pair of outwardly extending arms 26 upon which the grinding buttons are mounted in position to grind a lens adjustably supported by a tool 27 upon the outer face of the casing 10. From this structure it will be obvious that the wheel 14 will impart a lateral movement to the grinding buttons which will also be permitted to have a lateral swinging movement.

The shaft 12, having its free end supported by the projection 28 extending from the rear of the frame, is formed with an eccentric crank pin 29. The crank pin 29 extends into the bore of a hub 30 formed integral as a part of a gear 31, the bore of the hub being concentric with said gear, but the outer periphery thereof being eccentric to said gear and bore. The outer face of the hub is adapted to receive a bearing 32 mounted on the end of a crank arm 33, whereby the rotation of the shaft 12 will impart a rotary movement to the gear 31 and crank shaft bearing 32, which in turn will impart a reciprocating movement to the crank arm 33. Rigidly secured to the rear inner face of the casing there is a bracket 34 upon which is fixedly mounted an internal gear 35 with which the gear 31 is adapted to mesh. The internal diameter of the fixed internal gear 35 being greater than the diameter of the rotating gear 31 meshing therewith, will permit of the rotation of said gear internally thereof and in

mesh with its internal gear teeth through the rotary action imparted thereto by the crank pin 29.

The internal gear 35 being formed with a greater number of teeth than the gear 31, in addition to the rotary movement of said gear therein, it will be gradually bodily turned so that its position with respect to the fixed internal gear will be gradually altered, whereby the eccentric hub bearing surface of the hub 30 will be gradually turned about the crank pin 29. This will have the effect of varying the position of the crank arm bearing 32 with respect to the crank pin 29. A variable movement of the crank arm 33 will accordingly be provided in addition to its reciprocating movement. Whereas the rapid rotation of the crank pin 29 will cause the relative rapid reciprocation of the crank arm 33, the relatively slow variation of the position of the hub 30 with respect to the movement of the pin 29 will cause the crank arm 33 to take varying positions during its reciprocating movement. During one cycle, wherein the gear 31 will return to its starting point, there will be innumerable reciprocating movements of the crank arm 33, each of which will be in a slightly different position.

The crank arm 33 terminates at its lower end in a bearing 36 in which a crank pin 37 extends, said crank pin being mounted on a collar 38 which in turn is mounted on a rod 39. The rod 39 extends through a collar 40 formed integral with the rocking member 23. It will be obvious, therefore, that the reciprocating movement of the crank arm 33 will cause the member 23 to rock back and forth which in turn will cause the arms 40 of the frame 20 and the arms 26 pivotally suspended therefrom, to likewise move back and forth. The combination of this back and forth rocking movement as well as the lateral reciprocating movement imparted thereto by the wheel 14 and its eccentric, both movements having differently timed relation, will impart to the grinding button a movement which will be uniform in effect; except that there will be a number of back and forth movements of the button to each lateral movement.

However, in view of this invention, by reason of the gear 31 and internally toothed gear 35, as well as the eccentric hub of the gear 31, the extent of the back and forth movement will be varied so that the combined movement will be slightly but constantly altered so that during one cycle the same point on the button will not pass over the same surface of the lens, but each time will take a different path as shown by the diagram in Fig. 5. This movement results from the varying eccentric due to the eccentric hub with the meshing gears having a different number of teeth. Such variable movement is imparted directly to the crank pin 37 and may be illustrated by the layout of the movement of said crank pin 37, as shown in Fig. 6. This figure illustrates that whereas the center of the crank pin would normally oscillate or reciprocate between the two lines of normal movement A and B, the extent of this movement will be altered by the variable relations between the positions of the crank pin 29, the eccentric hub 30 and the gear 31 with respect to the internal gear 35 so that the extent of oscillation of the pin 37 will be variable as illustrated in Fig. 6. The variable reciprocating movement of the pin 37, as above described, will have a like effect upon the grinding button by reason of the action with said pin 37 therewith, through the rod 39, rocking member 23, frame 20 with its arms 40 and the arms 26.

The invention claimed is:

1. In a lens grinding machine, a grinding button, actuating mechanism for imparting a lateral movement thereto, mechanism for imparting a reciprocating movement thereto, means for simultaneously driving said mechanisms including a shaft having a crank pin, a gear concentrically mounted in said crank pin having an eccentric hub, a crank arm connected with said reciprocating mechanism in which said pin and eccentric hub are mounted, and an internal gear with which said first-mentioned gear is in mesh and adapted to vary the relative positions of said crank pin and eccentric portion of said hub, whereby a variable movement will be imparted by said crank arm in addition to the reciprocable movement.

2. In a machine of the character described, an operating member, means for imparting an oscillatory movement thereto including a driving shaft having a crank pin, a fixed internal gear, a rotary gear mounted therein of smaller diameter and adapted to mesh therewith, said fixed gear having a larger number of teeth than said rotary gear, a hub eccentrically mounted on said rotary gear and having a bore concentric with said gear into which said crank pin is adapted to extend, and a bearing member mounted in said eccentric hub and connected with said actuating mechanism, whereby the rotary movement of said shaft will cause said rotary gear to revolve in mesh with said stationary gear and vary the position of said eccentric hub for imparting a variable movement to said actuating mechanism.

In witness whereof, I have hereunto affixed my signature.

LUCIAN W. BUGBEE.