L. G. SIMPSON.

LENS GRINDING MACHINE.

APPLICATION FILED FEB. 1, 1919.

1,381,247. Patented June 14, 1921.

Fig-1-

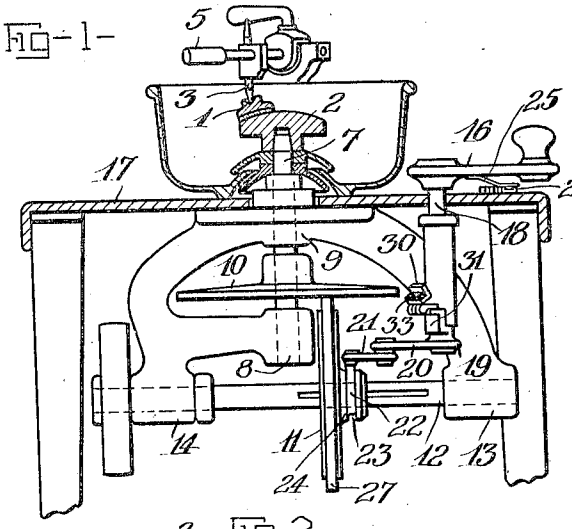


Fig-3-

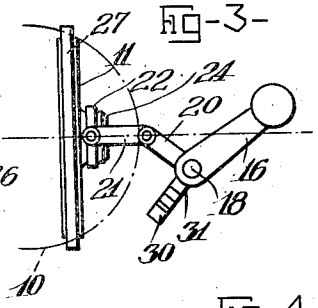


Fig-4-

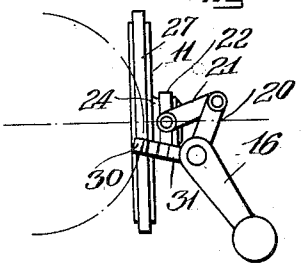


Fig-2-

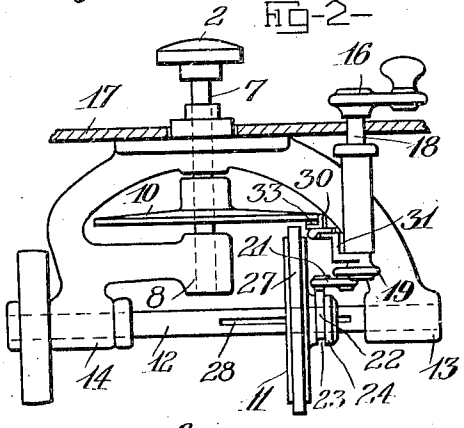


Fig-5-

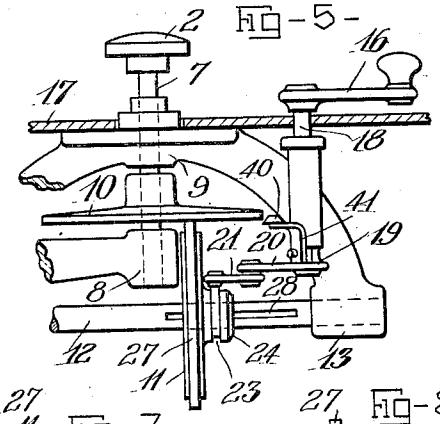


Fig-6-

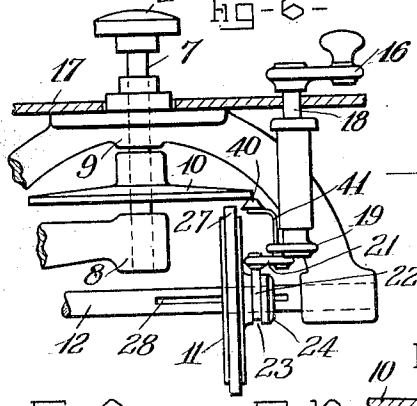


Fig-7-

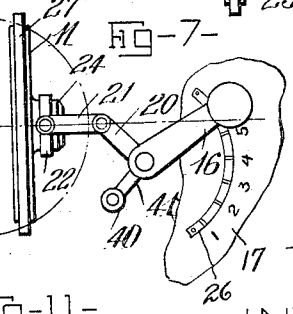


Fig-8-

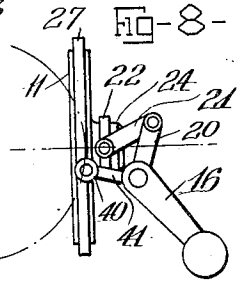


Fig-9-

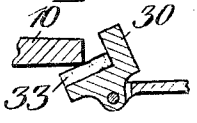


Fig-10-

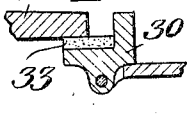
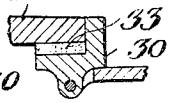


Fig-11-



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UNITED STATES PATENT OFFICE.

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LENS-GRINDING MACHINE.

1,381,247. Specification of Letters Patent. **Patented June 14, 1921.**

Application filed February 1, 1919. Serial No. 274,516.

To all whom it may concern:

Be it known that I, LEON G. SIMPSON, a citizen of the United States, residing at Rochester, in the county of Monroe, State of New York, have invented certain new and useful Improvements in Lens-Grinding Machines; and I do declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the reference numerals marked thereon.

My invention relates to that class of lens grinding machines known as prescription lens grinding machines.

The object of the present invention is to operate and to control the movement of the abrading mechanism of a lens grinding and polishing machine. Another object of the invention is to provide a convenient and reliable means for varying or controlling the speed of a driven shaft adapted to carry and rotate an abrading shell or lap or instantly stopping the same. And a further object of my invention is to provide means for varying the speed of the abrading shell comprising a wheel adjustable on a counter shaft to engage a driven wheel at varying distances from its center.

In the drawings:

Figure 1 is a front elevation, partly in section of a lens grinding and polishing machine embodying my invention, the abrading shell driving mechanism with its controlling mechanism being shown in high speed relation, while the stop mechanism is shown inoperative.

Fig. 2 is a view similar to Fig. 1 showing the driving mechanism and its control moved somewhat beyond their low speed relation and showing the stop mechanism in operation.

Figs. 3 and 4 are diagrams showing in plan view the operation of the speed control linkage and stop mechanism in respectively similar positions to those in which they are shown in Figs. 1 and 2.

Figs. 5, 6, 7, and 8 are respectively similar to Figs. 1, 2, 3 and 4 but showing a modified form of stop mechanism.

Figs. 9, 10, and 11 are detail views on an enlarged scale showing progressive steps in the operation of the stop mechanism.

Similar reference characters throughout the figures of the drawings refer to the same parts.

The abrading mechanism which in Fig. 1 is shown in the act of surfacing a lens blank mounted on a lens carrier 1, is of a well known type and comprises a rotatable abrading shell 2 against which the lens on the lens carrier is held and over which it is moved by a lens carrier spindle 3 carried on the laterally swinging and vertically movable lens carrier arm having a handle 5 whereby the arm and spindle and thus the lens carrier is manipulated during the surfacing of a lens.

The most efficient abrading speed, that is, the surface speed of the abrading surfaces, and the driving effort required to maintain abrasion, is dictated by different characteristics of the laps and lens blanks and by different conditions arising during the surfacing operations. Therefore it is highly desirable that the operator be able to vary at will, and without having to interrupt the surfacing operation, the velocity and torque of the abrading lap. To this end I provide a vertical lap spindle 7 having a conically tapered upper end designed to support and rotate any one of a variety of abrading shells 2, and on this spindle, which is journaled in bearings 8 and 9, I mount so as to be longitudinally and rotatably immovable thereon, the driven face wheel 10, which due to the thrust forces of weight and abrading pressure, bears vigorously against the peripheral frictional facing of the peripheral driving wheel 11 that is mounted to be positively rotatable with but longitudinally slidable along a counter-shaft 12 supported with its axis perpendicular to and intersecting the axis of rotation of the driven wheel 10, in the bearings 13 and 14 wherein it is longitudinally immovable but freely rotatable at a constant speed by the driving pulley.

Since (neglecting slippage and angular deflection) the torque ratio of the lap spindle relatively to the counter-shaft varies directly and its velocity ratio relatively to the counter-shaft varies inversely as the distance between the point of engagement between the peripheral wheel and the face wheel and the axis of rotation of the latter, the relative torque and velocity ratio is simultaneously varied by sliding the peripheral wheel 11 along the counter or driv-

ing shaft 12, by means of a control mechanism manipulated by a crank handle 16, arranged on the table 17 within easy reach of the operator.

The control mechanism through which the crank handle operates comprises a vertical, longitudinally immovable rock shaft 18 to the upper end of which the crank handle is fixed and to the lower end of which is fixed the hub 19 of the crank arm 20 having its horizontal swinging end connected, by means of the link 21 to the forked yoke 22 embracing the peripheral circular groove 23 in the hub 24 of the driving wheel 11.

The linkage employed for shifting the driving wheel along its shaft, it will be noticed, is reversible, and therefore for the purpose of preventing the crawling of the driving wheel across the face of the driven wheel I provide on the under side of the crank arm, a yielding detent arm 25 having a free end designed to lodge in the intervals between the radial teeth 26 arranged in an arcuate row formed on or attached to the table top, and thus hold the mechanism in the position in which the operator has set it. The intervals between the teeth also serve as a guide to the operator in gaging approximately the speed at which the driving mechanism is set to drive the abrading shell 2 and this process may be facilitated by applying legends or numerals to various intervals such as indicated in Figs. 7 and 8 and later more fully referred to.

In order to make the drawing engagement of the wheels 10 and 11 more positive, the periphery of the wheel 11 may be provided with a frictional surface 27 of felt, leather, or the like. The hub of the wheel 11 is provided with a key which coöperates with a slot 28 in the shaft 12 whereby the wheel 11 is connected to the shaft to rotate therewith but is free to be moved longitudinally thereon. When the wheel 11 is in position to engage the wheel 10 near its center as in Fig. 1, the greatest speed will be imparted to the grinding lap, which is reduced as the wheel 11 is moved toward the periphery of the wheel 10.

Means are provided for frictionally engaging the wheel 10 at or near its periphery when the wheel 11 has been moved to engage the wheel 10 at its periphery. Referring first to Figs. 1 to 4 and 9 to 11 of the drawings, said means comprises a brake member 30 hinged or pivoted on a bracket 31 projecting upwardly and inwardly from the hub 19 of the rockshaft 18. The member 30 is L-shaped and normally rests in an inclined position as shown in Figs. 1 and 9, and when moved into engagement with the wheel 10 wedges under its edge and raises it slightly in its bearings. If desired the working face of the brake member 30 may be provided with a frictional member 33 of fibrous material such as leather, felt, or the like.

The engagement of the wheel 10 by the brake 30 takes place at a time when the wheel is revolving at its slowest rate of speed and by its frictional engagement with the wheel quickly stops the same and the grinding lap rotating therewith.

In the Figs. 5, 6, 7 and 8 is illustrated a modified form of brake member in the form of a frusto-conical friction device 40 mounted in position to engage the periphery of the driven wheel 10 on an arm 41 mounted on the tub 19 of the rock shaft 18 and extending upwardly and inwardly therefrom.

Although for purposes of illustration my invention has been shown embodied in a device in which the grinding lap 2 is located below the lens carrier, it will nevertheless be appreciated that the invention is also applicable to those machines old in the art in which a reversal of parts occurs and the lens carrier is situated below the grinding lap.

I claim as my invention:

1. In a grinding machine the combination with a work holder and tool, of an operating mechanism therefor comprising a driving shaft and wheel, a driven wheel and spindle, one of said wheels being slidable on its shaft to vary the speed of the driven spindle and a single control device adapted to change the speed of the driven spindle, separate the driving and driven wheels and apply a brake to the driven wheel.

2. In a grinding machine, the combination of a work carrier, a tool coöperating therewith, a spindle on which the tool is carried, a wheel on the spindle, a countershaft, a wheel on the countershaft coöperating with said wheel to rotate the spindle, a shaft having an arm for moving the wheel on the countershaft to vary the speed of rotation of the spindle, and a brake member on said shaft for stopping the spindle.

3. In a grinding machine, the combination of a work carrier, a tool coöperating therewith, a spindle on which the tool is carried, a wheel on the spindle, a countershaft, a wheel on the countershaft coöperating with said wheel to rotate the spindle, a shaft having an arm for moving the wheel on the countershaft to vary the speed of rotation of the spindle, and a brake member connected to said shaft adapted to separate the spindle wheel from the wheel on the countershaft, and to engage and stop the wheel on the countershaft.

4. In a grinding machine, the combination of a work carrier, a tool coöperating therewith, a spindle on which the tool is carried, a wheel on the spindle, a countershaft, a wheel on the countershaft coöperating with said wheel to rotate the spindle, a shaft having an arm for moving the wheel on the countershaft to vary the speed of ro-

tation of the spindle, a bracket arm on said shaft, and a brake member pivoted on said bracket and having a friction pad adapted to frictionally engage the under surface of the wheel on the countershaft, and raise said wheel and spindle from contact with the wheel on the countershaft.

5. In a grinding machine the combination with a supporting table, of a frame attached thereto below the table-top, a driven wheel, a spindle containing the driven wheel and journaled in the frame below the table-top, a tool on the spindle above the table, a driving shaft journaled in the frame, a wheel slidable on the driving shaft for frictionally driving the first mentioned wheel, a control shaft journaled on the frame, a handle on said shaft located above the table and juxtaposed to the tool, a lever on said control shaft for sliding the driving wheel on its shaft, and a brake member also on the control shaft adapted to separate the driving and driven wheels and apply a friction surface to the outer or peripheral portion of the driven wheel to suddenly stop the same.

LEON G. SIMPSON.