No. 646,672. Patented Apr. 3, 1900.

A. WAGNER.

COMPOUND LENS GRINDING MACHINE.

(No Model.) (Application filed Oct. 24, 1899.)

3 Sheets—Sheet 1.

Fig. 2.

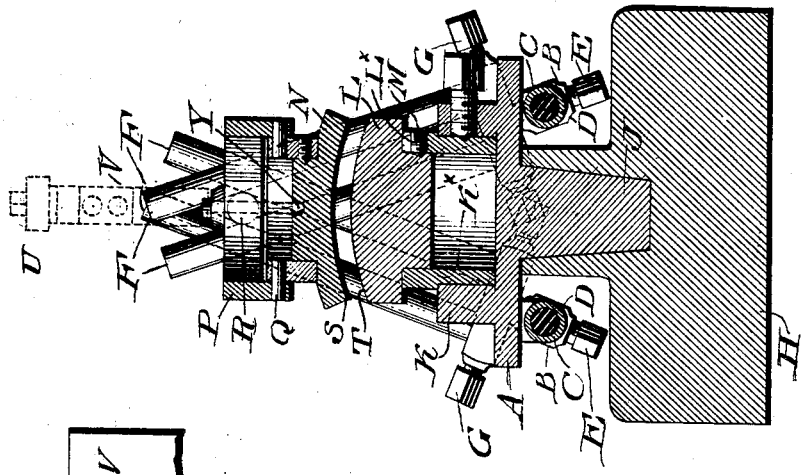

Fig. 1.

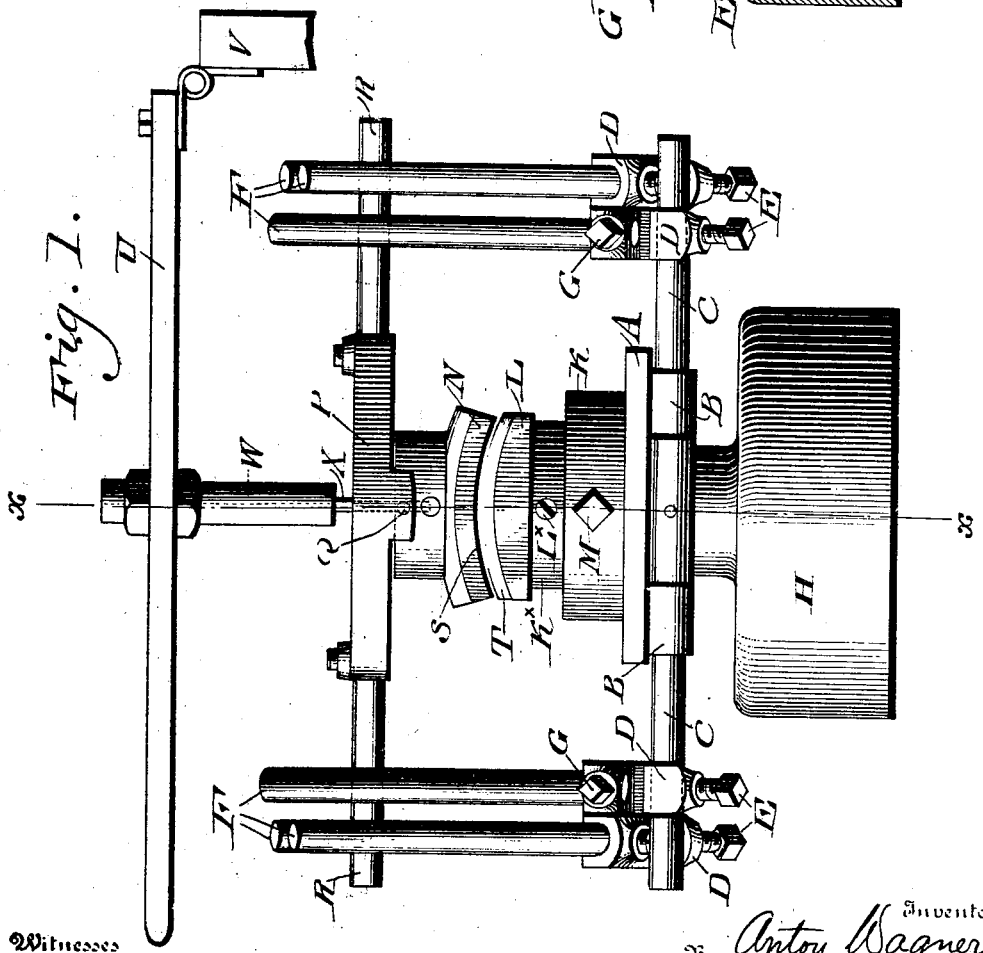

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Fig. 4.

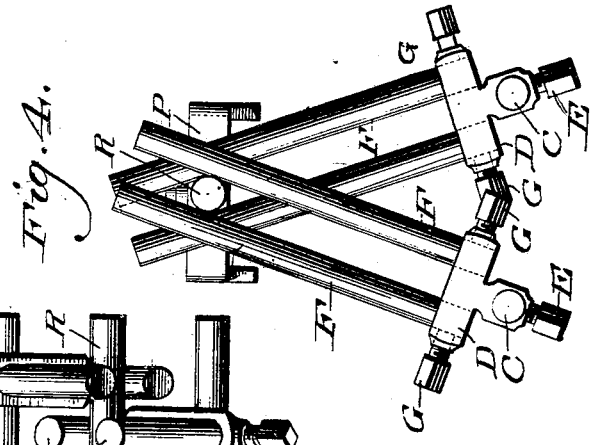

Fig. 3.

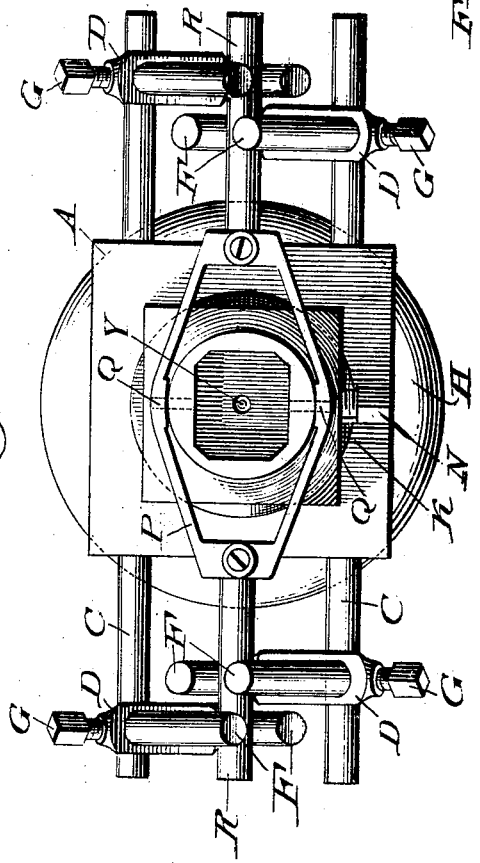

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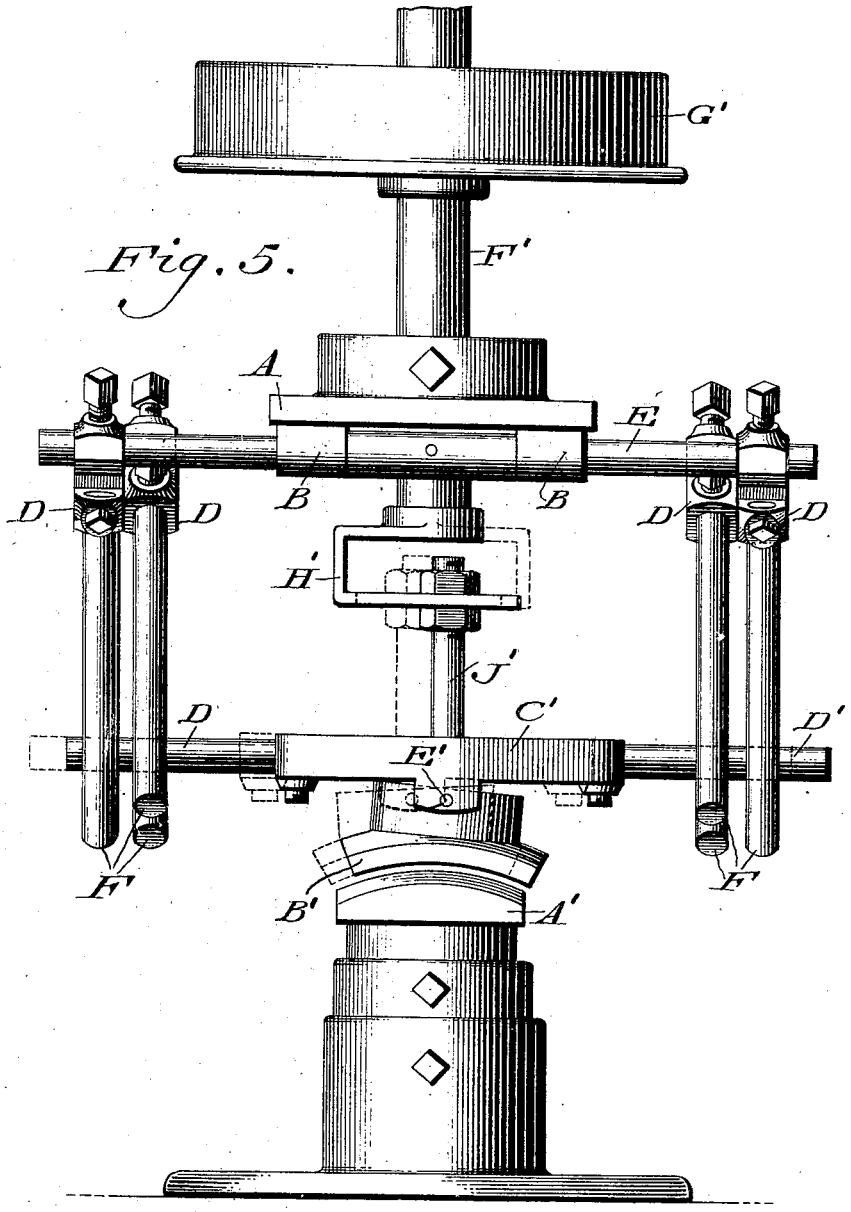
Fig. 5.



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UNITED STATES PATENT OFFICE.

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COMPOUND-LENS-GRINDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 646,672, dated April 3, 1900.

Application filed October 24, 1899. Serial No. 734,628. (No model.)

To all whom it may concern:

Be it known that I, ANTON WAGNER, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Improvement in Compound-Lens-Grinding Machines, which improvement is fully set forth in the following specification and accompanying drawings.

My invention relates to an improved construction of a machine for grinding lenses; and it consists of novel devices whereby the grinding-tools are caused to operate accurately and effectively.

It further consists of novel details of construction, all as will be hereinafter fully described, and particularly pointed out in the claims.

Figure 1 represents a side elevation of a machine for grinding lenses embodying my invention. Fig. 2 represents a section on line *x x*, Fig. 1. Fig. 3 represents a plan view of Fig. 1. Fig. 4 represents an end elevation of Fig. 1. Fig. 5 represents a side elevation of a machine similar to Fig. 1, but showing the power applied to the upper grinding-tool, the lower tool being stationary.

Similar letters of reference indicate corresponding parts in the figures.

Referring to the drawings, A designates a plate having bearings B thereon, in which the rods C are movably mounted, each of said rods having attached thereto a pair of heads D, which are secured in position by means of the set-screws E or similar fastening devices, each of the heads D having seated therein the substantially-parallel rods F, which are held in position by means of the set-screws G or similar fastening devices.

H designates a chuck in which the center J of the plate A is inserted, said plate having the socket K, in which the ring $K^{\times}$, carrying the lower grinding-tool L, is seated, said ring being held in position by means of a suitable fastening device M and said grinding-tool being secured by the screw $L^{\times}$. The upper grinding-tool N is pivotally supported upon the yoke P by means of the pins Q, said yoke having the rods R projecting from either end thereof, and each of said rods being adapted to be inserted between a contiguous pair of the parallel rods F, as will be best understood from Figs. 3 and 4, whereby it will be apparent that the curved faces S and T of the upper and lower grinding-tool will be juxtaposed to each other under all conditions and the grinding of the lens will be effected in a rapid and expeditious manner, the axis of the lens being straight under all conditions.

U designates a lever which is pivotally supported on the post V and has the arm W depending therefrom and carrying the pin X, which is adapted to engage the seat Y in the upper grinding-tool N.

It will thus be seen that in its operation of grinding a lens, power having been imparted to the chuck in any suitable manner, the rods C and the upright rods F will be rotated in unison, as will also the rods R, carrying the yoke P and its adjuncts. The lens to be ground is suitably secured between the curved faces S and T, and during the rotation of the grinding-tools the operator moves the lever U laterally to the desired extent, whereby a rocking motion is imparted to the upper grinding-tool, since the latter is pivotally supported in its yoke, which is itself capable of an axial movement by reason of its attachment to the rods R and on account of the novel manner in which the latter are supported between the crossed pairs of rods F, the axis of the lens which is being ground being always in a straight line.

The structure seen in Fig. 5 embodies, substantially, the same principle as that seen in the preceding figures, except that the lower grinding-tool, which is now designated as A′, is stationary, the upper grinding-tool B′ being pivotally mounted by means of the pins E′ in the yoke C′, having the rods D′ attached thereto. The rods D′ are held between the crossed pairs of rods F, which are secured in the heads D, which are mounted on the rods C, which are secured in the bearings B on the plate A, substantially as already described, said plate being secured to the shaft F′, which is caused to rotate upon the application of power to the pulley G′.

H′ designates a crank which is adapted to rotate in unison with the plate A and its adjuncts and to actuate the stem J′, which is secured to the yoke C′, so as to cause said

yoke and upper grinding-tool to have a reciprocating motion simultaneously with its rotary motion, the axis of the lens always remaining the same by reason of the engagement of the rods D' with the rods F, the relative positions the parts assume during rotation being understood from the dotted lines seen in Fig. 3 and it being apparent that the upper grinding-tool (seen in Figs. 1, 2, 3, and 5) has by reason of the novel arrangement of its supporting devices a rotary, a reciprocatory, and an oscillatory movement with respect to the lower stationary grinding-tool, the advantage of which will be apparent to those skilled in the art.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a lens-grinding machine, a yoke having rods extending from the ends thereof, a grinding-tool pivotally supported in said yoke, means for rotating said yoke and tool, and means for imparting an oscillatory movement to said tool.

2. In a lens-grinding machine, a pair of laterally-extending rods suitably supported and substantially parallel to each other, two pairs of upright rods supported upon each of said first-mentioned rods and adapted to have their ends crossed, a yoke having a grinding-tool pivotally attached thereto, rods extending from the ends of said yoke and engaging the spaces between the crossed ends of said upright rods, and means for actuating said yoke and the grinding-tool carried thereby.

3. In a lens-grinding machine, a pair of laterally-extending substantially-parallel rods, heads mounted upon the ends of each of said rods, parallel upright rods mounted on said heads, the upper ends of said rods being crossed, a yoke having rods extending from its ends and supported between the crossed ends of said upright rods, a grinding-tool pivotally supported upon said yoke, and means for actuating the latter.

4. In a lens-grinding machine, a yoke, having rods extending from the ends thereof, a grinding-tool pivotally supported in said yoke, two pairs of upright rods suitably supported and adapted to have their ends crossed, and means for actuating said yoke and grinding-tool.

5. In a lens-grinding machine, a plurality of substantially-parallel upright rods suitably supported, the upper ends of said rods being crossed, a yoke having rods projecting from its end and supported between the crossed ends of said upright rods, a grinding-tool pivotally supported upon said yoke, and means for actuating the latter.

6. In a grinding-machine of the kind specified, pivoted guides capable of relative movement, and a grinding-tool having a pivot movably mounted in said guides, the axes of the pivots of said guides and grinding-tool being practically parallel.

7. In a grinding-machine of the kind specified, pivoted guides capable of relative movement, and a grinding-tool having a pivot laterally and longitudinally movable in said guides, the axes of the pivots of said guides and grinding-tool being practically parallel.

8. In a grinding-machine of the kind specified, pairs of pivoted guides, the guides of each pair being connected together to move in unison, and having their axes in alinement, the axes of the pairs of guides being parallel, and a grinding-tool having pivots engaging a guide of each of said pair of guides.

9. In a grinding-machine of the kind specified, a rotatable member, pivoted guides mounted thereon and capable of relative movement, a grinding-tool having a pivot movably mounted in said guides, the axes of the pivots of said guides and grinding-tool being practically parallel, means for oscillating said grinding-tool relative to said rotatable member, and a companion grinding-tool.

10. In a grinding-machine of the kind specified, a rotatable member, pivoted guides mounted thereon and capable of relative movement, a grinding-tool having a pivot movably mounted in said guides, the axes of the pivots of said guides and grinding-tool being practically parallel, means for oscillating said grinding-tool relative to said rotatable member, and a companion grinding-tool mounted upon said rotatable member.

11. In a grinding-machine of the kind specified, a rotatable member, coacting grinding-tools mounted upon and rotatable with said member, and means for imparting an oscillatory movement to one of said tools.

12. In a grinding-machine of the kind specified, a rotatable member, coacting grinding-tools mounted upon and rotatable with said member, one of said grinding-tools being rigid with said member, the other grinding-tool being movably mounted upon said member, and means for imparting an oscillatory movement to said last-mentioned grinding-tool.

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