

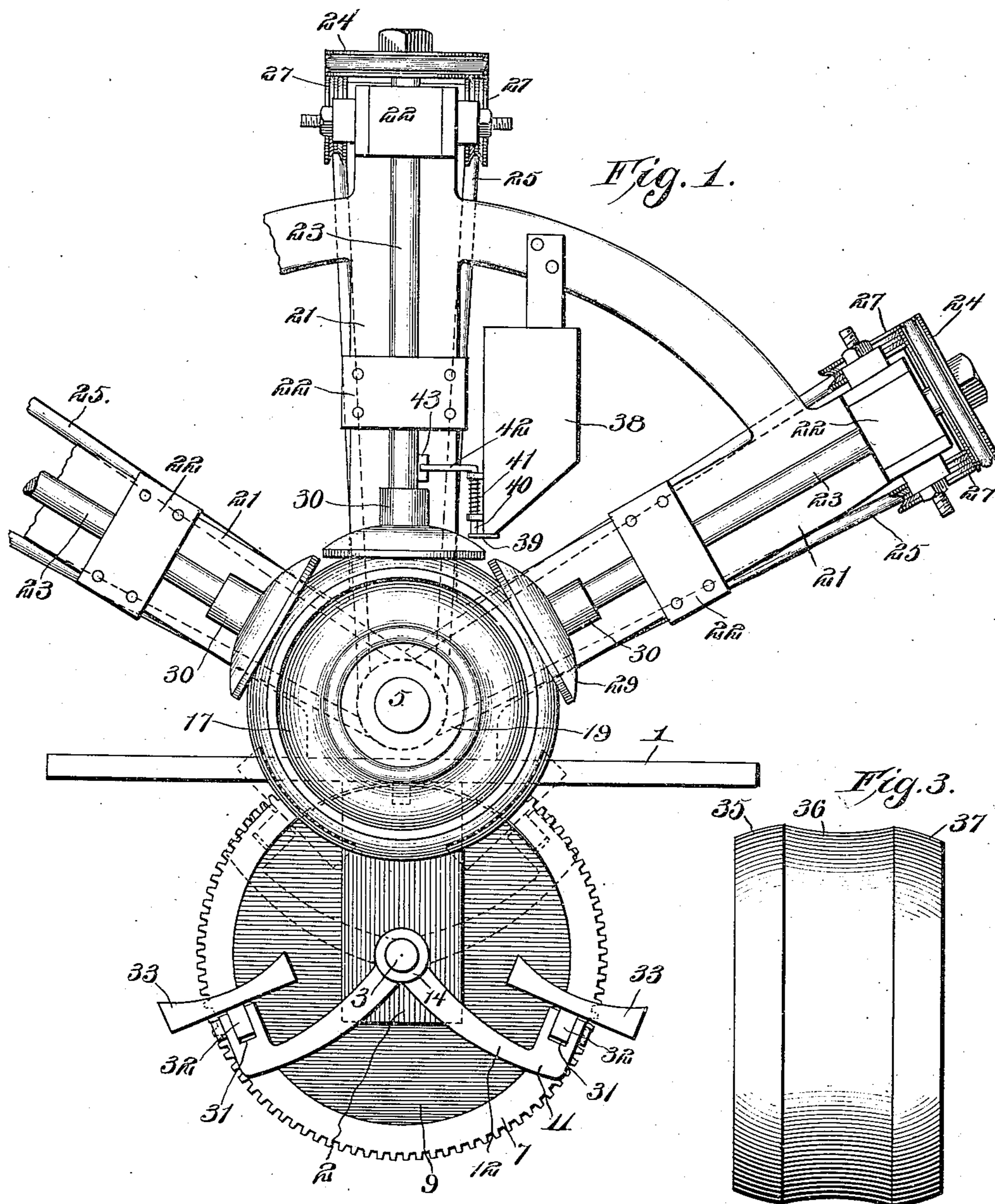
No. 886,212.

PATENTED APR. 28, 1908.

W. F. HOFFMAN.
LENS GRINDING AND POLISHING MACHINE.

APPLICATION FILED SEPT. 12, 1906.

2 SHEETS—SHEET 1.



Witnesses

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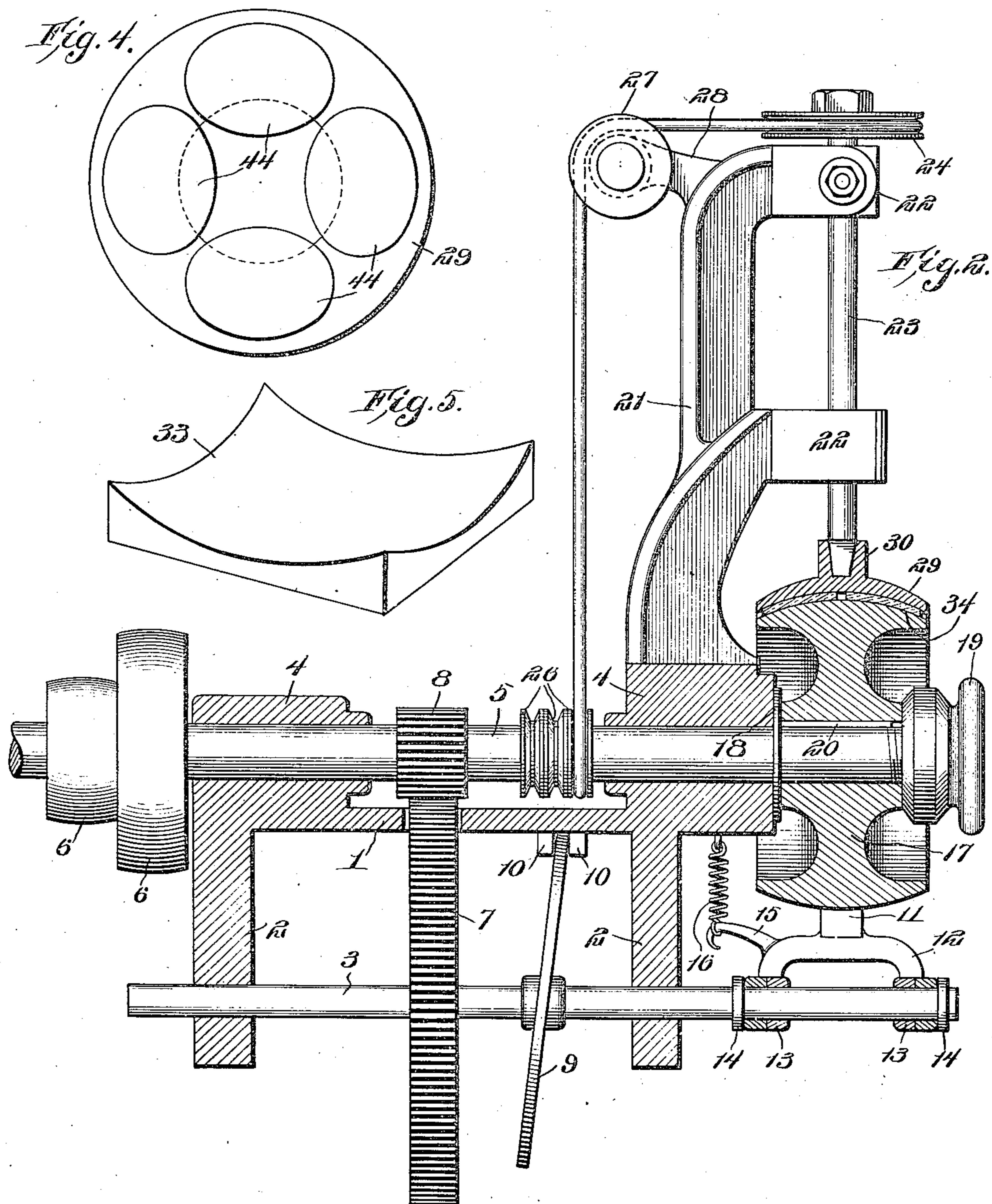
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UNITED STATES PATENT OFFICE.

WALTER F. HOFFMAN, OF MINNEAPOLIS, MINNESOTA.

LENS GRINDING AND POLISHING MACHINE.

No. 886,212.

Specification of Letters Patent.

Patented April 28, 1908.

Application filed September 12, 1906. Serial No. 334,332.

To all whom it may concern:

Be it known that I, WALTER F. HOFFMAN, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented new and useful Improvements in Lens Grinding and Polishing Machines, of which the following is a specification.

This invention relates to machines for grinding and polishing optical lenses, such as toric, spherical, bifocal, trifocal and cylindrical lenses; and it has for its object to provide an organized machine, of simple and inexpensive construction, whereby a considerable number of lenses may be simultaneously ground or polished in any desired manner, with convex or concave surfaces, and with focuses of any desired and predetermined radius.

A further object of the invention is to provide a simple and efficient machine whereby multifocal, such as bifocal or trifocal lenses, may be ground and polished in such a manner that the weaker and the stronger curves shall blend into one another in imperceptible lines and curves, making these curves with a true optical center, and without the objectionable prismatic effect common to such lenses, said lines and curves being practically invisible.

A further object of the invention is to provide simple and improved means for automatically supplying the needed abrading material to the grinding and polishing surfaces, thereby saving the work of an attendant and enabling a number of the machines to be operated with the services of but one attendant.

Further objects of the invention are to simplify and improve the construction and operation of this class of machines.

With these and other ends in view which will readily appear as the nature of the invention is better understood, the same consists in the improved construction, arrangement and combination of parts which will be hereinafter fully described, and particularly pointed out in the claims.

In the accompanying drawings has been illustrated a simple and preferred form of the invention; it being, however, understood that no limitation is necessarily made to the precise structural details therein exhibited, but that changes, alterations and modifica-

tions within the scope of the invention may be resorted to, when desired.

In the drawings: Figure 1— is a front elevation of a lens grinding and polishing machine embodying the principles of the invention. Fig. 2— is a vertical longitudinal sectional view of the same. Fig. 3— is a plan view showing a form of grinding wheel having various curves. Fig. 4— is a face view of one of the horizontal rotary disks used in connection with the invention, showing several lenses in position for bifocal grinding by a wheel of the character shown in Fig. 3. Fig. 5— is a perspective detail view of one of the reciprocatory disks or holders for grinding toric or cylindrical lenses.

Corresponding parts in the several figures are denoted by like characters of reference.

The improved machine, in the simple and preferred form shown in the drawings, includes a table or bed-plate, 1, having depending brackets, 2, 2, that constitute bearings for a shaft, 3, which is longitudinally slidable in said bearings. The table or bed-plate is also provided with bearings, 4, upon its upper side for a driven shaft, 5, having pulleys, as 6, whereby it may be driven at the requisite speed from any convenient source of power.

The shaft 3 has a gear-wheel, 7, meshing with a pinion, 8, upon the driven shaft 5, from which the said shaft 3 is thus driven at reduced speed; the pinion 8 being of sufficient length to permit the shaft 3 to reciprocate longitudinally, as will be presently shown, without danger of becoming disengaged from, or out of mesh with the spur-wheel 7.

Secured upon the shaft 3, in an inclined position, is a cam-wheel or disk, 9, the periphery of which engages between a pair of lugs, 10, 10, upon the under side of the bed plate, thus serving, when the shaft 3 is rotated, to impart to said shaft a longitudinal reciprocatory movement, the extent of said movement or throw being governed by the inclination of the disk or cam wheel.

The shaft 3 carries near its front end brackets, 11, having bifurcated arms, as 12, provided with terminal eyes, 13, whereby they are hingedly mounted upon the shaft; the latter being provided with annular flanges or collars, 14, whereby longitudinal displacement of the brackets is prevented. The

brackets are provided with hooks, 15, adapted to be connected with springs, 16, depending from the bed-plate, for the purpose of retaining the brackets resiliently in a raised position, as will be presently more fully described.

The driven shaft 5 projects at the front end of the frame of the machine, and upon the projecting front end there is detachably mounted a wheel, 17, which may be used either as a grinding and polishing wheel, or for the purpose of holding lenses that are to be ground and polished, according to the character of the lenses that are to be manufactured. The washer, 18, is interposed between the wheel 17 and the front end of the frame, in order to effect a reduction of friction; and the wheel, which is held in position upon the shaft by a nut, 19, threaded upon the latter, is held against rotation by a key or spline, 20.

The bed plate or frame of the machine is provided with a plurality of radially extending arms, 21, having boxes or bearings, 22, in which are journaled shafts, 23, which are disposed radially with relation to the driven main shaft 5. The shafts 23 are provided near their outer extremities with pulleys, 24, connected by means of belts or bands, 25, with pulleys, 26, upon the shaft 5, from which motion will in this manner be transmitted to the shafts 23; the driving belts or bands 25 are guided over guide pulleys, 27, journaled in brackets, 28, upon the rear sides of the arms 21. It will be understood, that within the scope of the invention any well known mechanical means other than that which has been described and illustrated, may be employed for the purpose of transmitting motion from the shaft 5 to the shafts 23.

Upon the inner ends of the shafts 23 there are mounted disks, 29, which will serve as lens holders or for grinding or polishing purposes, according to the kind of lenses that are to be manufactured. The disks 29 are preferably of circular contour, as will be best seen in Fig. 4 of the drawings, and they are turned, planed, or otherwise formed with curved or concave faces of any desired predetermined radius. The disks 29 have been shown provided with sockets, 30, adapted for engagement with the non-circular inner extremities of the shafts 23, upon which the said disks may thus be conveniently mounted in such a manner as to be readily detached for the substitution, when desired, of other of a different shape, or having faces of a different curvature.

The brackets 11 are socketed at their outer extremities, as will be seen at 31, for the reception of shanks, 32, formed upon disks, 33, which are thereby mounted detachably upon the said brackets; said disks being utilized, like the disks 29, for grinding or polishing purposes or for the purpose of holding lenses to be operated upon. These disks, which

are preferably of square contour, as will be best seen in Fig. 5 of the drawings, have concave faces which are turned, planed or otherwise formed with reference to grinding toric or cylindrical lenses.

The wheel 17 may be provided with a curved face of any desired radius, as will be seen at 34 in Fig. 2; or the face of said wheel may be formed with a plurality of curves, 35, 36, 37, as seen in Fig. 3; the latter being the construction employed when multifocal lenses are to be concavely ground or polished. In like manner the faces of the disks 29 may be formed with a plurality of curvatures, for the purpose of grinding or polishing convex multifocal lenses.

The frame of the machine carries a suitably supported receptacle or hopper, 38, constituting a container for the abrading material used for grinding or polishing purposes, and equipped with a gate, 39, carried by a pivoted stem, 40, which is actuated by a spring, 41, whereby the gate is held, normally, in a closed position. The stem 40 is provided with a radial arm, 42, lying in the path of a lug, 43, upon one of the shafts 23, the rotation of which will thus serve intermittently to open the gate 39 for the escape of a small quantity of abrading material to the face of the wheel 17 which rotates beneath the hopper or receptacle. By this simple device the abrading material is fed automatically, the quantity being readily governed by properly regulating the size of the escape opening. The services of an attendant to supply the abrading material will thus be dispensed with, and this part of the work will be performed with absolute regularity and uniformity.

From the foregoing description taken in connection with the drawings hereto annexed the operation and advantages of this invention will be readily understood by those skilled in the art to which it appertains.

The wheel 17 as well as the disks 29 and 33, are used interchangeably for grinding and polishing purposes, and for the purpose of holding and supporting the glasses or crystals that are to be operated upon; the same being cemented in the usual manner upon the faces of the wheel or the disks, as the case may be. It will be understood, that when concave surfaces are to be ground and polished, the crystals will be supported upon the disks; when convex surfaces are to be ground and polished, the crystals will be cemented upon the face of the wheel 17; the faces of the disks as well as the wheel being formed with regular predetermined curves of any desired shape. As will be seen in Fig. 4, the disks are preferably made of a capacity to hold a plurality of lenses, or crystals, which have been indicated by 44 in said figure. The disks 29 are pressed radially against the face of the wheel 17 by the ten-

sion of the driving bands or belts 25, or, if preferred, by suitable independent means provided for the purpose; and, being rotated against the face of the wheel, and the faces of the wheel and the disks having been properly constructed, multifocal lenses will thus be formed in which the various curves will be imperceptibly blended, and the prismatic effects, usually present in this class of lenses, avoided. It will also be seen, that by this machine, a large number of crystals may be simultaneously ground or polished, thus greatly reducing the expense of manufacture, while the quality of the product is in nowise impaired, but, on the contrary, vastly improved, especially as regards the quality of the multifocal lenses. Another important advantage of this invention is that by this improved machine a large number of lenses of different kinds, and with different curvatures, may be simultaneously prepared, thus largely reducing the expense of manufacture.

Having thus described my invention, I claim and desire to secure by Letters Patent of the United States:—

1. In a machine of the class described, a vertically disposed wheel supported for rotation, disk-carrying shafts supported for rotation radially to the wheel, a receptacle or hopper supported to discharge its contents in the direction of the face of the wheel, a gate for said hopper having a spring actuated stem whereby said gate is held normally closed, an arm extending radially from the gate stem, and a lug upon one of the radial shafts for intermittent engagement with said arm.

2. In a machine of the class described, a vertically disposed grinding and polishing wheel supported for rotation, a bracket supported for reciprocation in a plane parallel to the axis of the wheel, a disk carried by the bracket, and means for forcing the latter resiliently in the direction of the face of the wheel.

3. In a machine of the class described, a driven main shaft, a counter-shaft slidably supported parallel thereto and receiving motion therefrom, means for imparting longitudinal reciprocatory motion to the counter-shaft when the latter is rotated, a wheel supported detachably upon the main shaft, disk carrying brackets supported hingedly upon the counter-shaft, collars upon the latter to prevent displacement of the brackets, and means for forcing the disk-carrying brackets resiliently in the direction of the face of the wheel.

4. In a machine of the class described, a grinding and polishing wheel supported for rotation, a bracket supported for reciprocation, a disk carried by the bracket, and means for forcing the disk in the direction of the face of the wheel.

5. In a machine of the class described, a grinding and polishing wheel supported for rotation, a bracket supported for reciprocation in a plane parallel to the axis of the wheel, a disk carried by the bracket, and means for forcing the disk in the direction of the face of the wheel.

6. In a machine of the class described, a main shaft, a wheel supported upon the main shaft, a counter shaft slidably and revolubly supported, means for rotating the counter shaft, means for reciprocating the counter shaft when it is rotated, and a disk carrying bracket mounted upon the counter shaft.

7. In a machine of the class described, a main shaft, a wheel supported upon the main shaft, a counter shaft slidably and revolubly supported, means for rotating the counter shaft, means for reciprocating the counter shaft when it is rotated, a disk carrying bracket mounted upon the counter shaft, and means for forcing the disk carrying bracket in the direction of the face of the wheel.

8. In a machine of the class described, a driven main shaft, a wheel supported upon the main shaft, a counter shaft slidably and revolubly supported, said counter shaft receiving rotary motion from the main shaft, means for reciprocating the counter shaft when it is rotated, and a disk carrying bracket mounted upon the counter shaft.

9. In a machine of the class described, a grinding and polishing wheel supported for rotation, a bracket supported for reciprocation, and a disk carried by the bracket.

10. In a machine of the class described, a wheel supported for rotation, a disk carrying shaft supported for rotation, a receptacle or hopper supported to discharge its contents in the direction of the face of the wheel, a gate for the hopper, and means carried by the shaft for intermittently opening the gate.

11. In a machine of the class described, a table or bottom plate, a driven or main shaft journaled on the table or bottom plate, a counter shaft journaled upon the table or bottom plate for rotary and slidable motion, a pinion upon the shaft, a gear wheel upon the counter shaft and meshing with the pinion, a pair of relatively spaced lugs upon the table or bottom plate, a cam wheel mounted upon the counter shaft and having its periphery disposed between the lugs, a wheel mounted upon the main shaft, a disk carrying bracket mounted upon the counter shaft, and means for forcing the disk carrying bracket in the direction of the face of the wheel.

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

WALTER F. HOFFMAN.

Witnesses:

JOHN DWAN,

HATTIE E. SWAILES.