June 15, 1926. 1,588,435

C. A. ADAMS

LENS GRINDING APPARATUS

Filed Dec. 31, 1923 2 Sheets-Sheet 1

FIG. 1

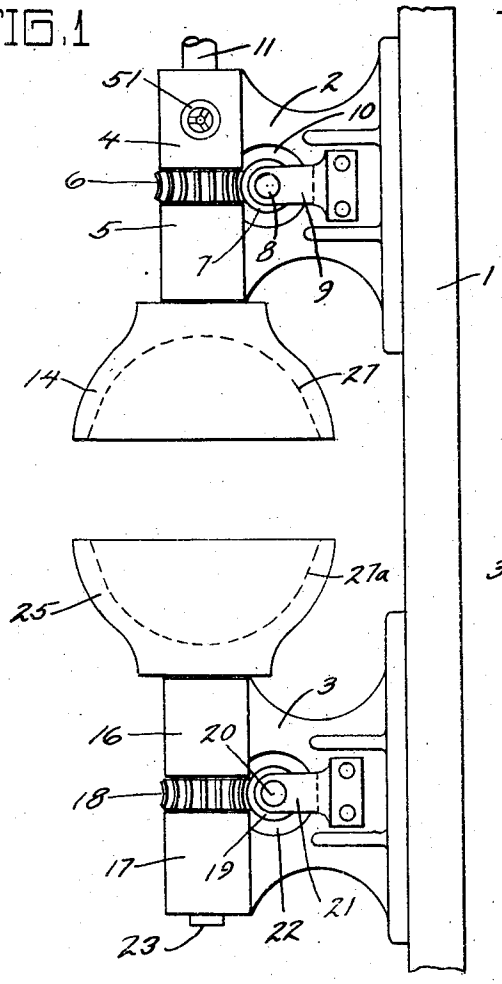


FIG. 2

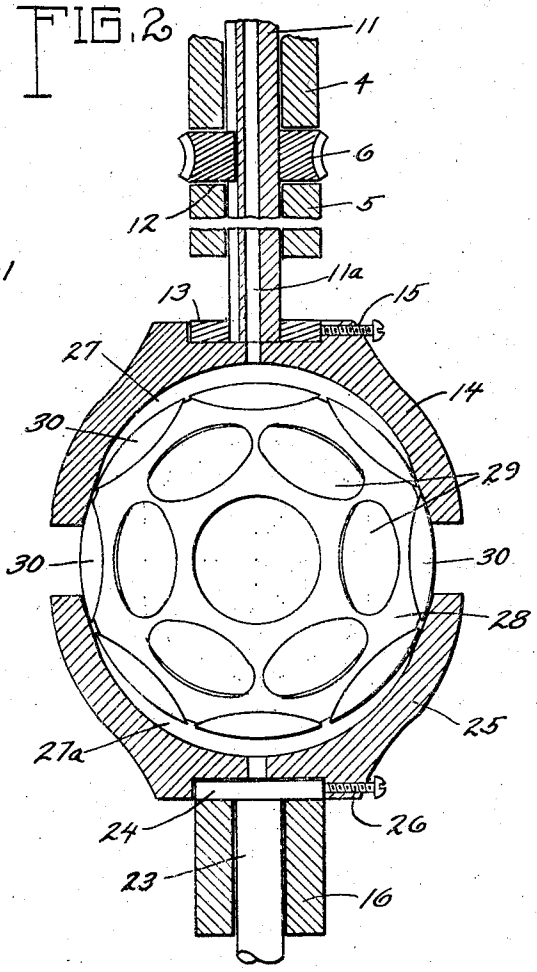
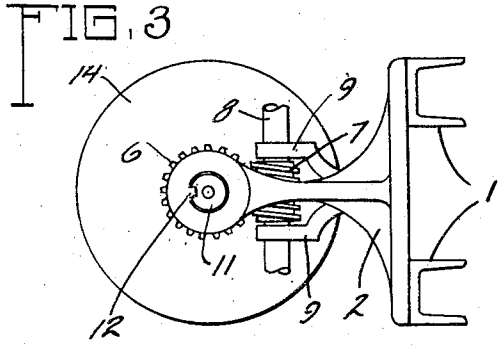


FIG. 3



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FIG. 4

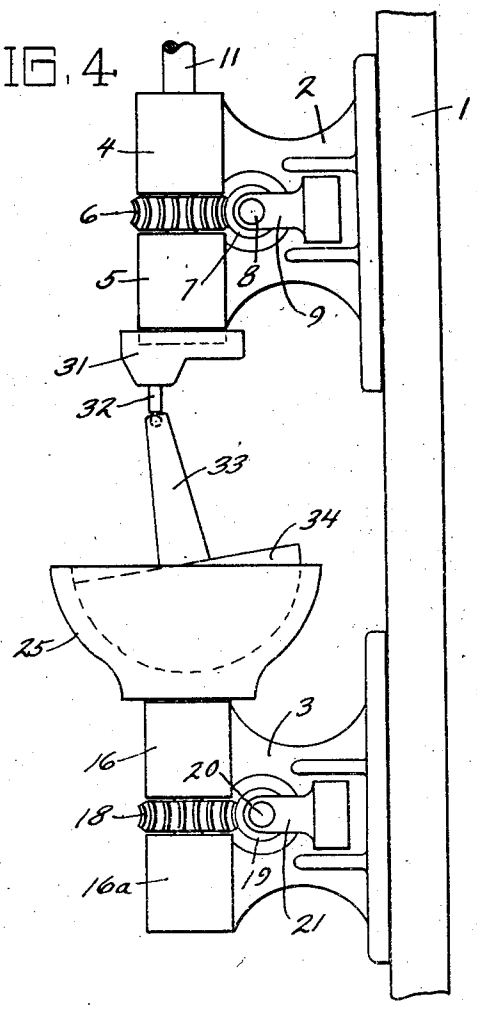


FIG. 5

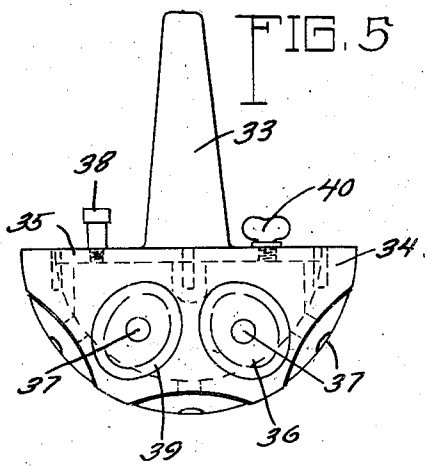


FIG. 6

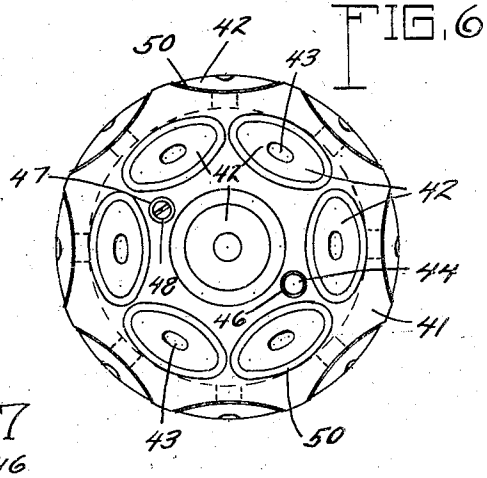


FIG. 8

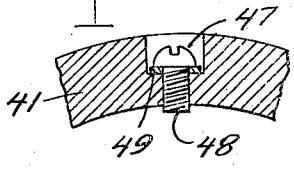
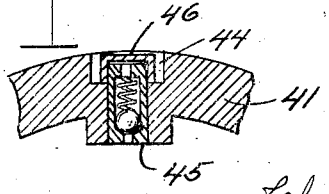


FIG. 7



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Patented June 15, 1926. 1,588,435

UNITED STATES PATENT OFFICE.

CHARLES A. ADAMS, OF DAVENPORT, IOWA.

LENS-GRINDING APPARATUS.

Application filed December 31, 1923. Serial No. 683,694.

My invention pertains to lens grinding apparatus, and has for its chief purpose to simplify the operation of producing optical lenses, and increase the output thereof.

One of the objects of the invention is to form a blocker of increased capacity, together with a special form of machine with which the same may be used.

Another object thereof is to produce a blocker of a hollow formation, from which the air may be exhausted, and provided on its outer surface with "spots" to receive the lenses, which spots are in communication with the interior of the blocker, so that the lenses can be caused to adhere thereto by the vacuum in the interior of the blocker.

The above named, and other features and advantages of the invention, will more fully appear from the following specification, reference being had to the accompanying drawings, in which:

Fig. 1 is a side elevation of a machine forming a part of the invention.

Fig. 2 is a vertical section thereof, with a blocker in place therein.

Fig. 3 is a plan view thereof.

Fig. 4 is a view similar to Fig. 1, showing a modified use of the machine.

Fig. 5 is a side elevation of a modified form of blocker.

Fig. 6 is a view of a spherical blocker of a similar formation as the one shown in Fig. 5.

Fig. 7 is a detail of the air-valve 45, in section.

Fig. 8 is a similar view of the vent 47.

Referring first to the first three figures of the drawings, the reference number 1 indicates a pair of uprights, to the sides of which is attached a pair of brackets 2 and 3, the first of which is mounted at a distance above the other. Supported by the bracket 2 are twin bearings 4 and 5, spaced apart to provide room for a worm-gear wheel 6, in mesh with a worm 7 on a shaft 8, rotatably mounted in a pair of arms 9 secured to the bracket 2. The shaft 8 and worm thereon are accommodated in an opening 10 in the bracket, and power may be applied to said shaft to impart rotation to the worm 7 and gear wheel 6. Under some manufacturing conditions the shaft 8 would comprise a line shaft, with a number of the machines connected therewith. The gear-wheel 6 is held in position by means of a vertical shaft 11, rotatable with the wheel, but vertically movable with relation thereto by means of a rib and channel formation shown at 12.

On the lower end of the shaft 11 is a disk 13, to which is attached a bowl-shaped member 14, commonly called a "tool", by means of a set-screw 15. In the rotary movement of the shaft 11 the tool 14 is caused to revolve therewith.

The bracket 3 supports a pair of bearings 16 and 17, spaced apart to provide room for a worm-gear wheel 18, in mesh with a worm drive 19, fixed on a shaft 20, journaled in the ends of arms 21, attached to the bracket 3. A space 22 is provided in said bracket for the shaft 20 and worm drive thereon, and said shaft also is designed to have power applied thereto, to cause a rotation thereof in a direction opposite to the rotation of the shaft 8. The wheel 18 is fixed to a vertical shaft 23, rotatable in the bearings 16 and 17, and at the upper end of the shaft 23 is a disk 24, to which is fixed a tool 25, by means of a set-screw 26. The tools 14 and 25 are hollowed out, forming semi-spherical recesses 27 and 27^a, the edges of which are flared outwardly at the rims of the tools.

In Fig. 2 the machine is shown with a spherical blocker 28 contained in the tools 14 and 25, said blocker having spots 29 formed in its surface, adapted to hold lenses, as shown at 30. These spots are formed in the manner set forth in a companion application filed in the United States Patent Office by applicant on the 26th day of December, 1923, Serial No. 682,693, and as set forth therein, the lenses are held in position in the spots by a thin layer of pitch or similar adhesive. The diameter of the blocker corresponds with that of the recesses in the tools 14 and 25, and when the lenses are perfectly ground the outer faces thereof conform to the curvature of the blocker, so that the blocker and lenses thereon will conform to the inner shapes of the recesses 27 and 27^a. The lower tool is provided with a quantity of abrasive material in the usual manner, and by reason of the tools 14 and 25 being rotated in opposite directions the position of the blocker 28 is constantly changing therein, so that all of the lenses are submitted to the grinding operation. As the work proceeds the tool 14 is moved gradually downwardly by force of gravity, until the blocker is finally contained within the recesses in the tools, with its face in contact with the walls thereof. When

the blocker is first placed in the tool, on account of the increased diameter caused by the lenses positioned thereon, it is in contact with the flaring faces of said recesses, as shown in Fig. 2.

A special advantage is gained by the use of the spherical blocker, which has been impossible heretofore on account of the manner of preparing the blocker for operation, which consisted in providing its surface with a layer of pitch, with spots formed thereon. With this method it was only possible to make use of a semi-spherical blocker, with a limited number of spots thereon, a portion of the blocker near the edge thereof being blank, or waste space. By the use of the spherical blocker it is not only possible to double the number of spots which are found on a semi-spherical blocker, but an additional row of spots can be provided along the line of the greatest diameter of the sphere. This increases the capacity of the blocker by approximately fifty per cent. The grinding operation is also speeded up to a considerable extent by the use of the two tools 14 and 25, operating in opposite directions.

The shaft 11 is shown provided with a central channel 11^a, which is continued downwardly through the tool 14, through which water may be introduced to the center of the tools during the grinding operation, to keep the abrasive material in a desired moist condition, and to prevent the parts from becoming overheated from the friction resulting from the grinding operation.

In Fig. 4 the tool 14 is replaced by a crank member 31, carrying a pin 32, eccentrically positioned, for engagement with the shank 33 of a blocker 34. This blocker is of the shape of those now in use, but is of a hollow formation, the flat side thereof being closed by a plate 35. In the curved surface of the blocker are spots 36, cut therein in the manner hereinbefore set forth, and provided with central openings 37, communicating with the space within the blocker. By providing the spots with a plurality of lenses, and exhausting the air from the block, the suction on the inner faces of the lenses will cause them to adhere tightly to the spots, enabling them to pass through the grinding operation. Air may be exhausted from the blocker through a tube 38, containing a check-valve, (not shown) which prevents the return of the air to the inner space. To prevent leakage of air round the edges of the lenses, gaskets 39 are provided, the outer portions of the spots being channelled to receive the same, so that the lenses will be in their proper positions for grinding.

To position the lenses on the blocker, such blocker is inverted, and the lenses laid upon the spots, being first preferably dipped in water, to cause them to adhere slightly until the air is exhausted from the blocker. This may be done by an air pump or similar machine. The blocker is then placed in the tool 25 and rotated in the usual manner. After the lenses have been sufficiently ground and polished, they can be released from the blocker by admitting air to the interior thereof through an opening in the plate 35 normally closed by a thumb-screw 40.

In Fig. 6 is shown a blocker 41 of spherical form, for use in the machine hereinbefore first described, but constructed after the manner of the blocker 34, the sphere being hollow, and having spots 42, with central openings 43 communicating with the interior. The lenses are positioned on the spots 36 the same as in the blocker 34, and the air exhausted from the blocker. This can be done through an opening 44 in one side of the blocker, fitted with a tube 45, provided with a check-valve preventing return of air inwardly through the tube. The outer end of the tube projects into the opening 44, for suitable connection with an air-pump, and said projection is normally closed by a cap 46, which is within the curve of the blocker. After being provided with a plurality of lenses the blocker 41 is placed in the machine, in the same manner as with the blocker 30, and the lenses reduced to the desired convexity. The air suction can be released by means of an opening 47 in the shell of the blocker, fitted with a screw 48, seated on a gasket 49, the head of the screw being below the surface of the blocker. Upon the air being returned to the blocker, the lenses can be removed therefrom. The spots 42 are provided with gaskets 50, to prevent the passage of air between the lenses and faces of the spots.

Upon occasion the shaft 11 can be held in an elevated position by means of a hand-screw 51 in the bearing 4.

What I claim, and desire to secure by Letters Patent, is:

1. In a device of the class described, a pair of lens-grinding tools, mounted to operate in opposition, in opposite directions; and provided with semi-spherical recesses; and a spherical blocker provided on its face with lens retaining spots, of a diameter corresponding with that of said recesses.

2. In a device of the class described, a spherical blocker having a plurality of lens spotting depressions formed on its surface.

3. In a device of the class described, a spherical blocker having a plurality of lens spotting depressions formed on its surface and means for seating and securing lens blanks within such depressions.

4. In a device of the class described, a pair of lens grinding tools mounted to oper-

ate in opposite directions and provided with semi-spherical depressions, and a spherical blocker provided on its face with lens retaining depressions.

5. A device of the character described comprising a pair of opposed lens grinding tools having recesses formed therein, a blocker adapted to have a plurality of lenses mounted thereon, said blocker adapted to be received in the recesses of the opposed tools, and means for rotating the tools in opposite directions, the rotation of the tools causing the blocker to be rotated within the recesses relative to the tools to bring the lenses carried thereby into engagement with different portions or surfaces of the tools.

6. A device of the characted described comprising a pair of opposed lens grinding tools having recesses formed therein, a blocker having lens receiving spots formed around its surface, said blocker adapted to be received in the recesses of the opposed tools, means for securing the lenses in the spots in the blocker, and means for rotating the tools in opposite directions, the rotation of the tools causing the blocker to be rotated within the recesses relative to the tools.

In testimony whereof I affix my signature.

CHARLES A. ADAMS.