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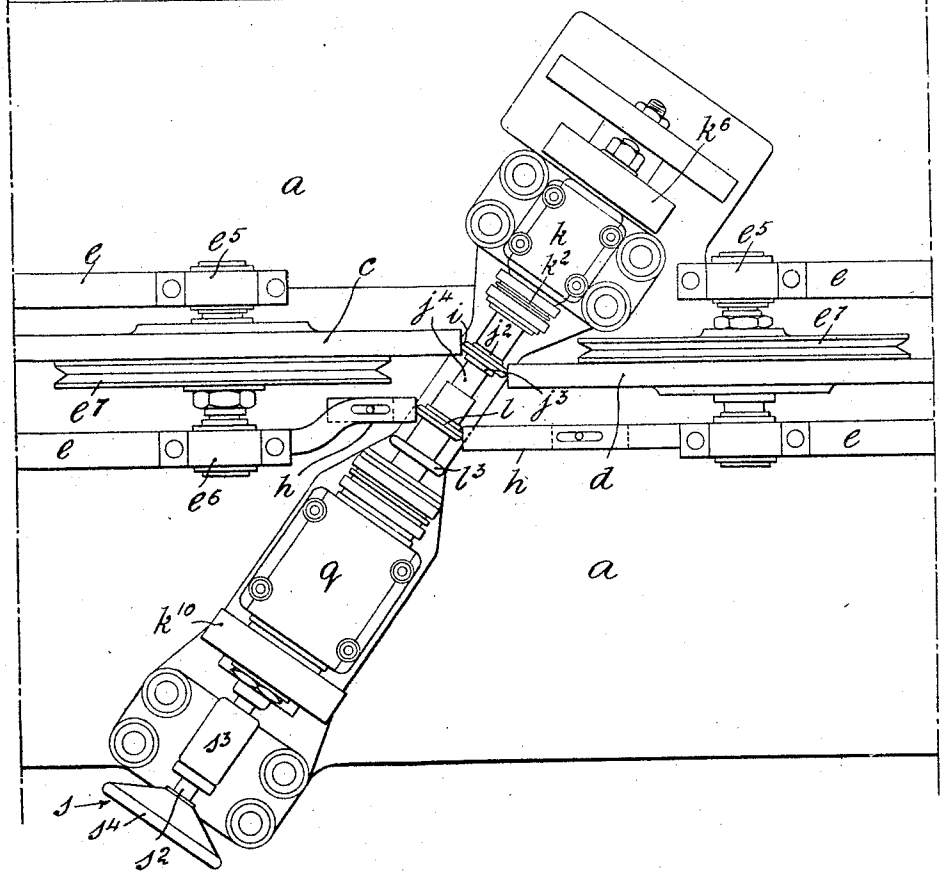
GRINDING MACHINE FOR BEVELING THE EDGES OF EYEGLASS LENSES AND OTHER PIECES.

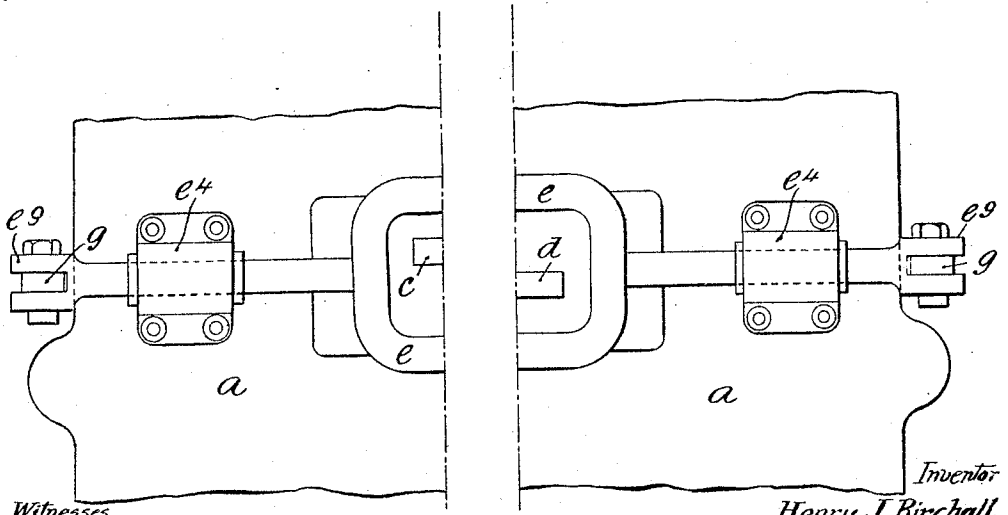
APPLICATION FILED DEC. 30, 1919.

1,365,448. Patented Jan. 11, 1921.

4 SHEETS—SHEET 1.

Fig. 1.




Witnesses
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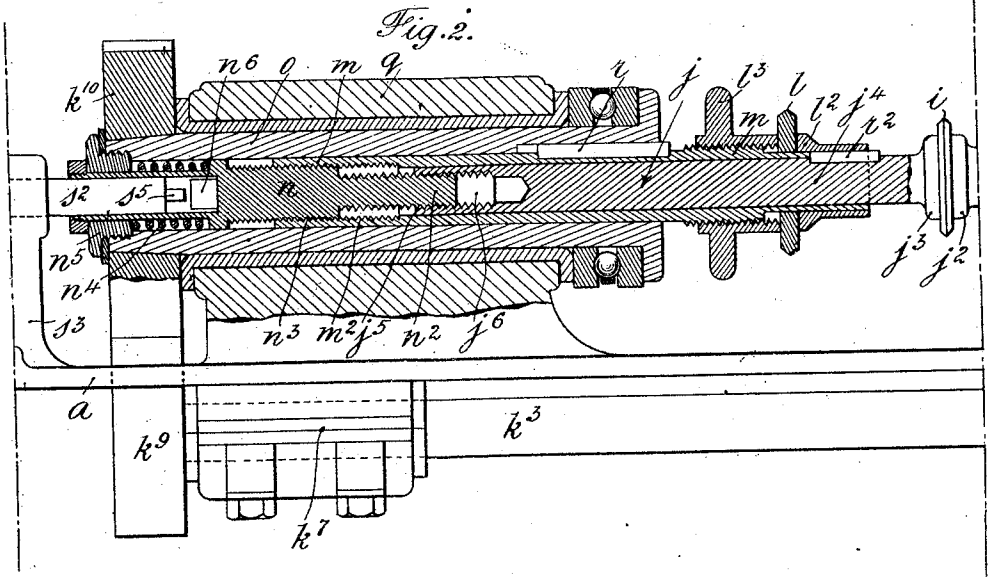
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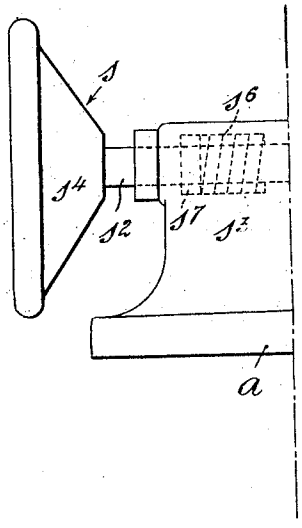
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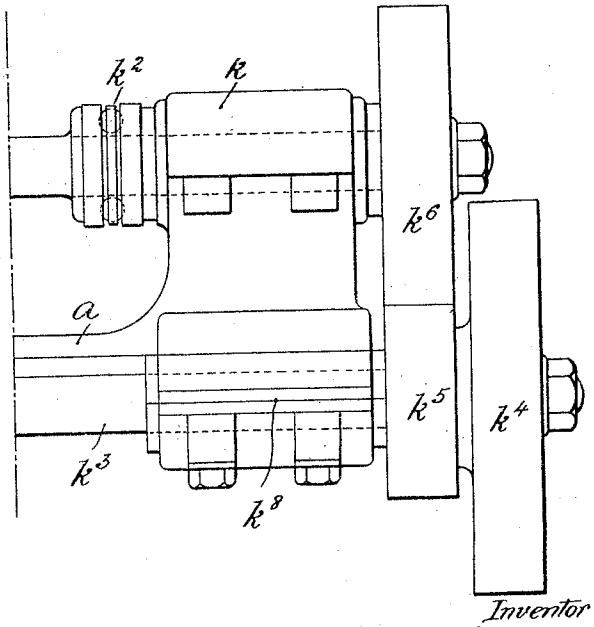
1,365,448. Patented Jan. 11, 1921.

4 SHEETS—SHEET 2.

Fig. 2.




Witnesses

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GRINDING MACHINE FOR BEVELING THE EDGES OF EYEGLASS LENSES AND OTHER PIECES.

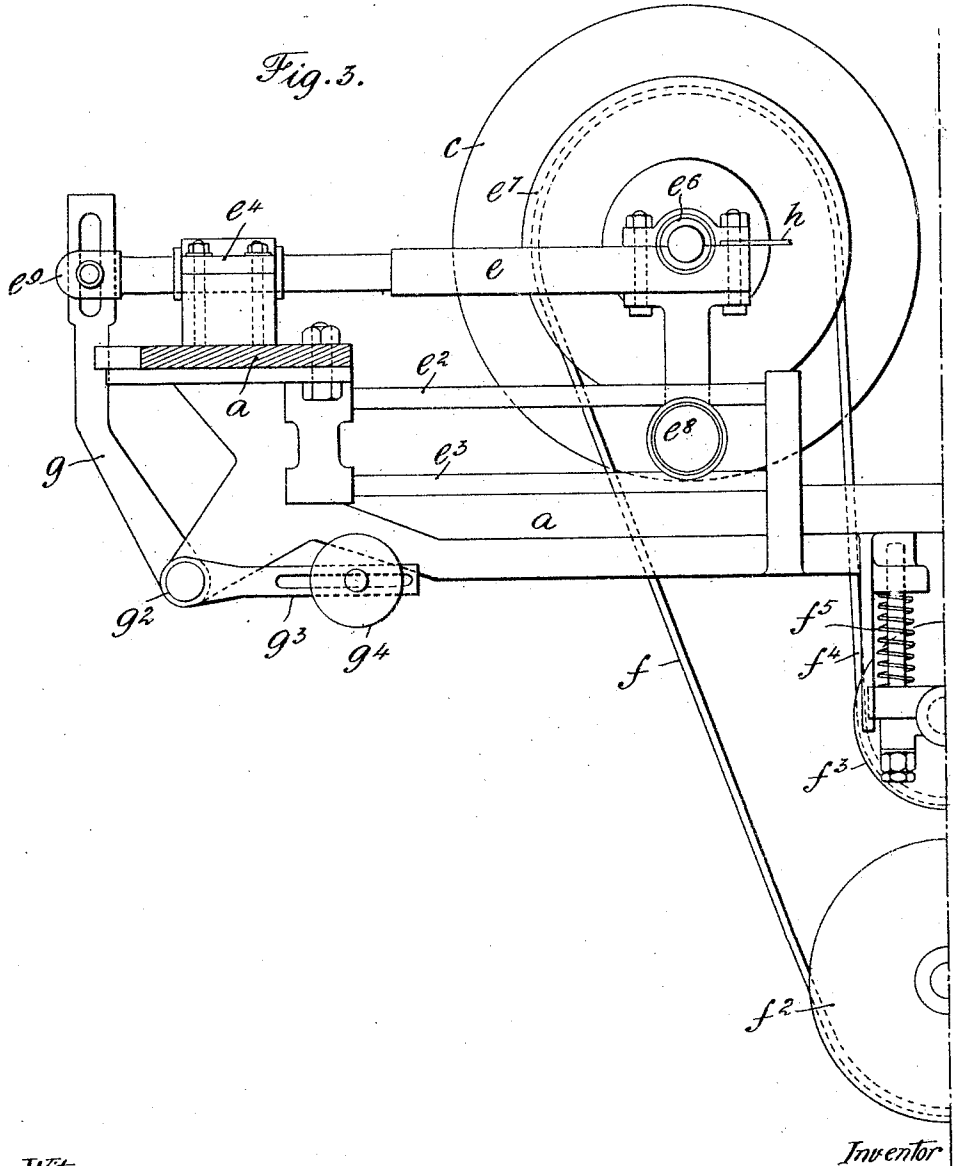
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**1,365,448.**

**Patented Jan. 11, 1921.**

4 SHEETS—SHEET 3.

*Fig. 3.*




Witnesses

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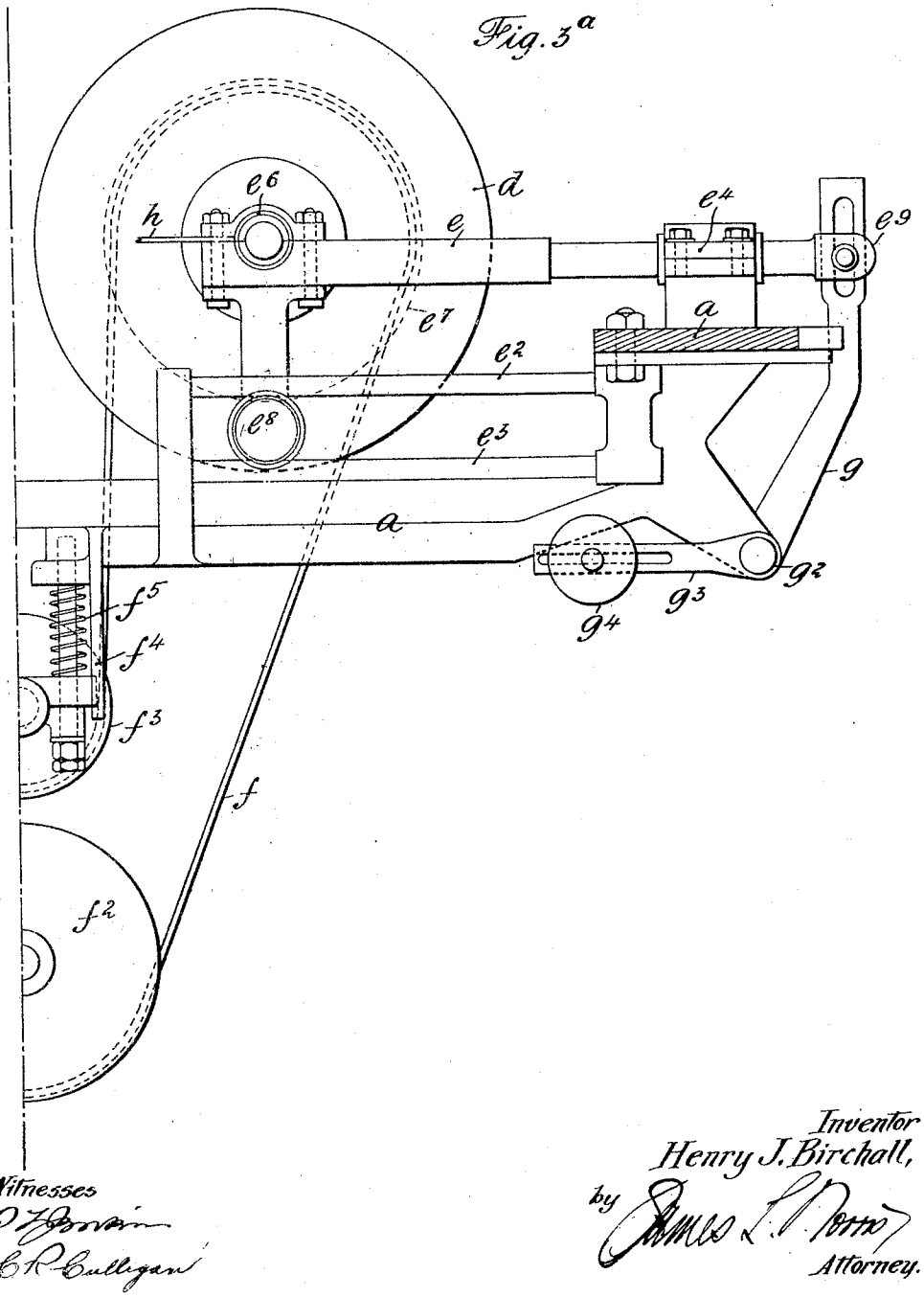
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1,365,448. Patented Jan. 11, 1921.

4 SHEETS—SHEET 4.

Fig. 3a




Witnesses

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# UNITED STATES PATENT OFFICE.

HENRY JAMES BIRCHALL, OF BIRMINGHAM, ENGLAND.

## GRINDING-MACHINE FOR BEVELING THE EDGES OF EYEGLASS-LENSES AND OTHER PIECES.

1,365,448. Specification of Letters Patent. Patented Jan. 11, 1921.

Application filed December 30, 1919. Serial No. 348,277.

*To all whom it may concern:*

Be it known that I, HENRY JAMES BIRCHALL, subject of the King of Great Britain, residing at 23 Victoria road, Acocks Green, Birmingham, England, formerly of 78 Wheelwright road, Erdington, near Birmingham, England, have invented certain new and useful Improvements in Grinding-Machines for Beveling the Edges of Eyeglass-Lenses and other Pieces, of which the following is a specification.

The invention provides the hereinafter described and claimed improved grinding machine for double, or V beveling the edges of eye-glass lenses and other pieces.

The type of machine to which the invention relates is one in which the lens or piece to be beveled is separately revolved between the opposed peripheries of two grinding stones which in addition to revolving are moved, by the effect of weights under control of a former, to advance and retire them as they grind the lens or piece to the shape of the former. Said former revolves with the lens or piece on a shaft directed obliquely between the grinding stones, the one grinding stone grinding the one bevel on the lens edge, and the other grinding stone simultaneously grinding the other bevel on said edge.

In a grinding machine of this type the invention combines an arrangement whereby the axial position of the former on the shaft carrying it can be adjusted relative to the thickness of lens or glass piece held, so that the apex of the V beveling of any thickness of lens shall always be in the center of the lens thickness. This relative adjustment may be made by hand through micrometer-like gear operating between a clamping means for the lens and a carrier for the former; but more particularly the invention arranges so that said relative adjustment is automatically made by the act of clamping the lens in position for grinding. The lens is gripped between the opposed ends of a divided shaft to hold it in the machine, and one of said ends is fixed except for revolution and the other end movable axially in addition to revolution, and the former is mounted over a shaft portion of this movable end, and geared to it and to a hand wheel device, by screw gearing, so that the position of the former is changed to an extent half the difference in the thickness of lens gripped. The hand wheel gear automatically moves out of action when released, so that the clamping of the lens cannot be accidentally disturbed. Followers connect the carrier frames of the grinding stone with the former so that combined with the weights, aforesaid, for moving said frames the grinding stones, except for revolution, are entirely under the control of the former, particularly for the whole of the finish of the grinding which is to exact size and shape.

The frames carrying the grinding stones are movable on guiding rails, and the followers are fitted to them in an adjustable manner to set up to different sizes of formers which may be used in the machine.

The drawings herewith show a convenient adaptation of machine according to the invention suitable for V grinding the edges of eye-glass lenses.

Figure 1 is a general plan of the machine.

Fig. 2 is a longitudinal section through the divided shaft carrying the lens and the former.

Figs. 3 and 3ª, read together, are a view, partly in side elevation and partly in section, of the grinding stones, their carrying frames, and the means for moving them and for tensioning their driving belt.

The bed or table of the machine is represented at *a*, same providing a general carrier for substantially mounting the whole of the parts of the machine and being itself in any way suitably supported from legs or uprights, not shown.

The two grinding stones are at *c* and *d* each being revolubly fitted to a carrier frame *e*, movable in a straight line between guiding rails $e^2$, $e^3$ and within a bearing, $e^4$, rigidly secured on the table *a*. The spindles of the grinding stones revolve in bearings $e^5$, $e^6$ of the frames, and grooved pulleys $e^7$ are mounted thereon to drive the two stones together by an endless belt *f* which passes around the two pulleys, around the driving pulley $f^2$, and around a tensioning pulley $f^3$, whose bearings slide in guides $f^4$, of the table and are spring pressed, at $f^5$, to automatically tighten the belt. The fore-part of each frame *e* rides on the rails $e^2$, $e^3$ by wheels $e^8$ depending from said frame each side, to make the straight line movement of the frame antifrictional. The rear part of the frame rides quite freely through the bearing

$e^4$, and at its end, $e^9$, is jointedly connected with a first-order lever $g$ fulcrumed at $g^2$ and weight influenced on its arm $g^3$, the position of the weight $g^4$ on said arm being adjustable to determine the cut of the stones on the lens being ground. Each stone is similarly mounted, moved and revolved and the peripheries of the two stones are opposed and together operative upon the lens which is positioned for grinding between said peripheries. Each frame $e$ is fitted with a follower $h$ which after being set on said frame in relation to the former connects said former with the frames and moves said frames from the rotation of the former.

The lens $i$ to be V beveled is securely held while operated upon with its thickness between the opposed ends $j^2$, $j^3$ of a divided shaft $j$ which is slowly and uniformly revolved while obliquely disposed between the opposed peripheries of the two grinding stones.

The opposed end $j^2$ except for revolution is immovable, the shaft portion carrying it being mounted and revolved in the bearing $k$ provided at $k^2$ with a thrust abutment, and driven from an undershaft $k^3$ revolved from a toothed wheel $k^4$ by toothed gear $k^5$, $k^6$, the toothed wheel $k^4$ being in any way suitably driven. The undershaft $k^3$ has bearings at $k^7$, $k^8$ on the frame $a$, and at its opposite end, by gear wheels $k^9$, $k^{10}$ twins to the ones $k^5$, $k^6$ drives the end $j^3$ of the divided shaft $j$ in the manner hereinafter described, so that said shaft $j$, although divided, revolves as one shaft at all times.

The opposed end $j^3$, aforesaid, is movable axially of the shaft to clamp different thicknesses of lenses $i$ between the opposed ends $j^2$, $j^3$. The shaft portion $j^4$, carrying the end $j^3$ indirectly forms a carrier for a former $l$ which is interchangeably mounted upon a sleeve $m$ surrounding the shaft portion $j^4$ to always revolve therewith but to be independently slidable upon said shaft portion $j^4$ to adjust the axial position of the former $l$ upon the shaft in relation to the thickness of lens $i$ held between the opposed ends $j^2$, $j^3$. The shaft portion $j^4$ extends inwardly to $j^5$, and is internally screw-threaded at $j^6$ for the engagement of the screw-threaded shank $n^2$ of an axially arranged revoluble plug $n$ which is additionally externally screw-threaded at $n^3$ to engage the screw-threaded bore $m^2$ of the sleeve $m$. The gear wheel $k^{10}$ is applied to a second sleeve $o$ within which the sleeve $m$ is slidably fitted, and which sleeve $o$ is the main revolving part applied to the stationary bearing $q$ of this shaft portion $j^4$. The revolving plug $n$ is independently slidable within the second sleeve $o$, is rotated independently of said second sleeve, and its screw-threaded engagements with the shaft portion $j^4$ and the sleeve $m$ are differential and so that when the opposed ends $j^2$, $j^3$ are separated 1/16 of an inch the axial position of the former $l$ is changed 1/32 of an inch in the same direction as the end $j^3$ moves, to do which the pitch of the screw-threads $n^3$, $m^2$ is half the pitch of the screw-threads $n^2$, $j^6$. The plug $n$ is maintained axially in one direction by the pressure of a coil spring $n^4$ operating between a collar of the plug, and indirectly, the end of the second sleeve $o$, for instance, against the stop nut $n^5$. The sleeve $m$ and the second sleeve $o$ are revolubly connected by a key $r$, and the sleeve $m$ and the shaft portion $j^4$ are revolubly connected by the key $r^2$.

Applied to the plug $n$ is a hand-wheel gear $s$ for revolving said plug. This gear provides a shaft, $s^2$, revolubly and slidably fitted to a stationary bearing, $s^3$, and provided with a hand-wheel $s^4$. The inner end of this shaft $s^2$ slidably and revolubly fits a bore of the plug $n$, and carries a key $s^5$ for engagement with a gap $n^6$ of the plug $n$ when said plug is to be revolved from the hand-wheel $s^4$, the engagement being brought about by sliding the shaft $s^2$ inwardly against the action of the coil spring, $s^6$, suitably provided in the bearing, $s^3$, between said bearing and a collar $s^7$ of the shaft.

The former $l$ is clamped upon the sleeve $m$ between an immovable collar $l^2$ of said sleeve and a clamping screw-threaded collar $l^3$ also carried by the sleeve, said former being made in halves to facilitate the positioning of it over the sleeve between the two collars. Said former always revolves with the shaft portion $j^4$ and the sleeve $m$, but is independently slidable over said shaft portion with said sleeve $m$.

Fig. 2 shows a lens $i$ clamped between the opposed ends $j^2$, $j^3$.

Assuming the thickness of this lens to be 3/16 of an inch and the former $l$ to be in the correct position in relation to the staggered peripheries of the grinding stones to accurately grind the lens with a central apex to the V beveling, and that the 3/16 of an inch lens is replaced by a lens $\frac{1}{4}$ of an inch in thickness, the end $s^5$ of the shaft $s^2$ is made to engage the gap $n^6$ of the plug $n$, and then the hand-wheel is revolved anti-clockwise to revolve said plug and pull inwardly both the shaft portion $j^4$ and the sleeve $m$, using the nut $n^5$ as a pulling-in abutment. This separates the opposed ends $j^2$, $j^3$ so that the $\frac{1}{4}$ of an inch lens can be put between them, after which the hand-wheel $s^4$ is operated clockwise to cause the shaft portion $j^4$ to clamp the lens between the opposed ends. When the lens is securely clamped the opposed ends will be 1/16 of an inch farther apart than when clamping the 3/16 lens, and the former $l$ will have been axially moved on the sleeve $m$ 1/64 of an inch inwardly, that is to say half the difference of the thickness of

lens gripped. Similarly when a thinner lens is gripped the former is advanced half the difference in the lens thickness.

The spring $n^4$ operates immediately the grip of the lens between the ends $j^2$, $j^3$ takes place to effect the clamping pressure which is never above the power of the spring $n^4$.

The followers $h$ are re-adjusted to the former $l$ when a different sized former is used, but for the change in the thickness of the lens held to be ground, the shifting of the former automatically controls the positions of the grinding stones relative to the edge of the lens being ground.

Having now described my invention what I claim and desire to secure by Letters Patent is:—

1. A grinding machine combining two grinding stones mounted on frames in staggered relation to advance and retire to and from each other, a divided shaft arranged between the peripheries of the two stones at an angle to said peripheries to carry and revolve the piece to be ground and a former, clamping devices for securing the piece between the ends of the divided shaft, means for adjusting the position of the former on the shaft relative to the thickness of piece held by the shaft, and means for connecting the grinding stone frames to the former so that they advance and retire under control of the former, substantially as described.

2. A grinding machine combining two grinding stones mounted on frames in staggered relation to advance and retire to and from each other, a divided shaft arranged between the peripheries of the two stones at an angle to said peripheries to carry and revolve the piece to be ground and a former, means for securing the piece between the ends of the divided shaft and for simultaneously and automatically adjusting the position of the former on the shaft relative to the thickness of piece held, and means for connecting the grinding stone frames to the former so that they advance and retire under control of the former, substantially as described.

3. A grinding machine combining two grinding stones mounted on frames in staggered relation to advance and retire to and from each other, a divided shaft arranged between the peripheries of the two stones at an angle to said peripheries to carry and revolve the piece to be ground and a former, means for securing the piece between the ends of the divided shaft in the form of differential screw devices which also automatically adjust the position of the former on the shaft relative to the thickness of piece held, and means for connecting the grinding stone frames to the former so that they advance and retire under control of the former, substantially as described.

4. A grinding machine combining two grinding stones mounted on frames in staggered relation to advance and retire to and from each other, a divided shaft arranged between the peripheries of the two stones at an angle to said peripheries to carry and revolve the piece to be ground and a former, one opposed end of said shaft being immovable except for revolution, and the other opposed end axially movable in addition to revolution, means for securing the piece between the opposed ends of the divided shaft and for automatically adjusting the position of the former on the shaft relative to the thickness of the piece held, and means for connecting the grinding stone frames to the former so that they advance and retire under control of the former, substantially as described.

5. A grinding machine combining two stones mounted on frames in staggered relation to advance and retire to and from each other, a divided shaft arranged between the peripheries of the two stones at an angle to said peripheries to carry and revolve the piece to be ground and a former, one opposed end of said shaft being immovable except for revolution and the other opposed end axially movable in addition to revolution, means for securing the piece between the opposed ends of the divided shaft and for automatically adjusting the position of the former on the shaft relative to the thickness of the piece held, and means comprising adjustable followers and adjustable weight devices for connecting the grinding stone frames to the former so that they advance and retire under control of the former, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

HENRY JAMES BIRCHALL.

Witnesses:
JOHN PHILLIPS FUERY,
G. H. GIFFORD.