C. E. QUIMBY.

GRINDER.

APPLICATION FILED APR. 1, 1916.

1,274,591.

Patented Aug. 6, 1918.

3 SHEETS--SHEET 1.

FIG. 1

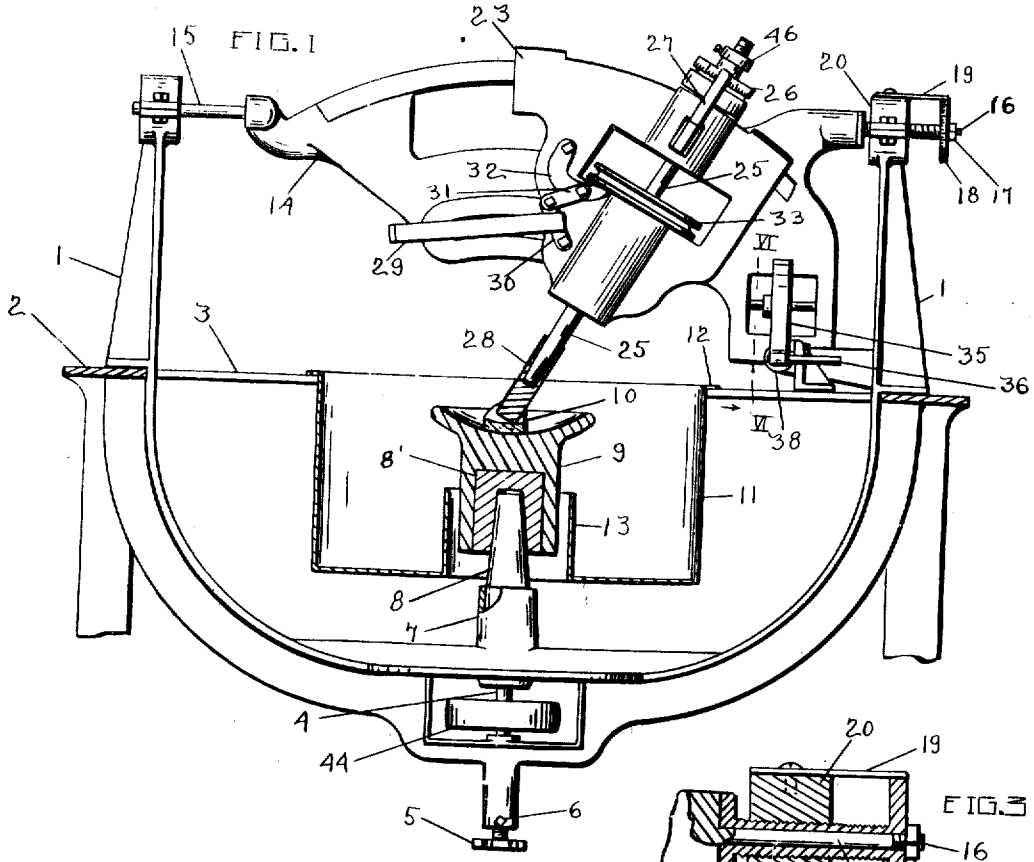
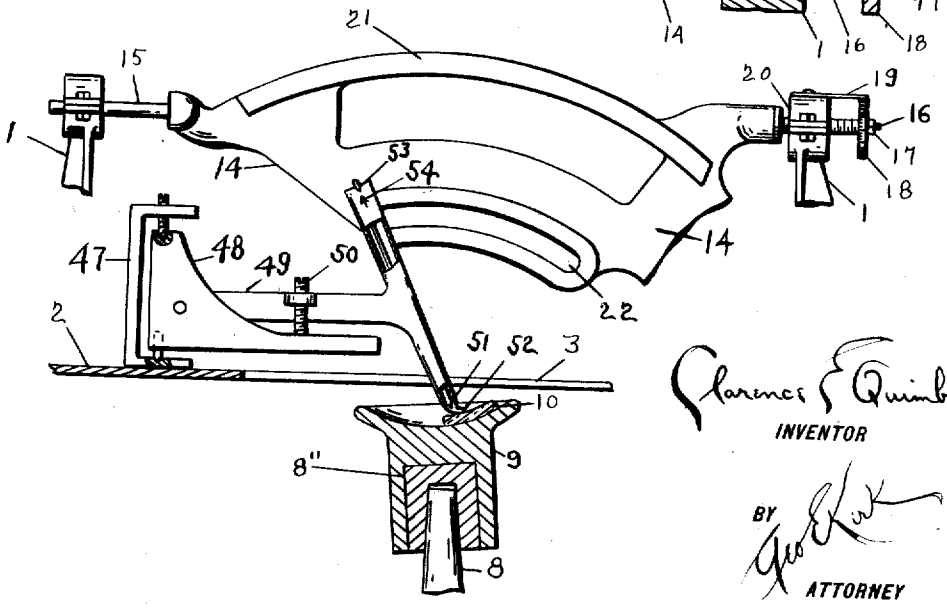


FIG. 3

FIG. 2



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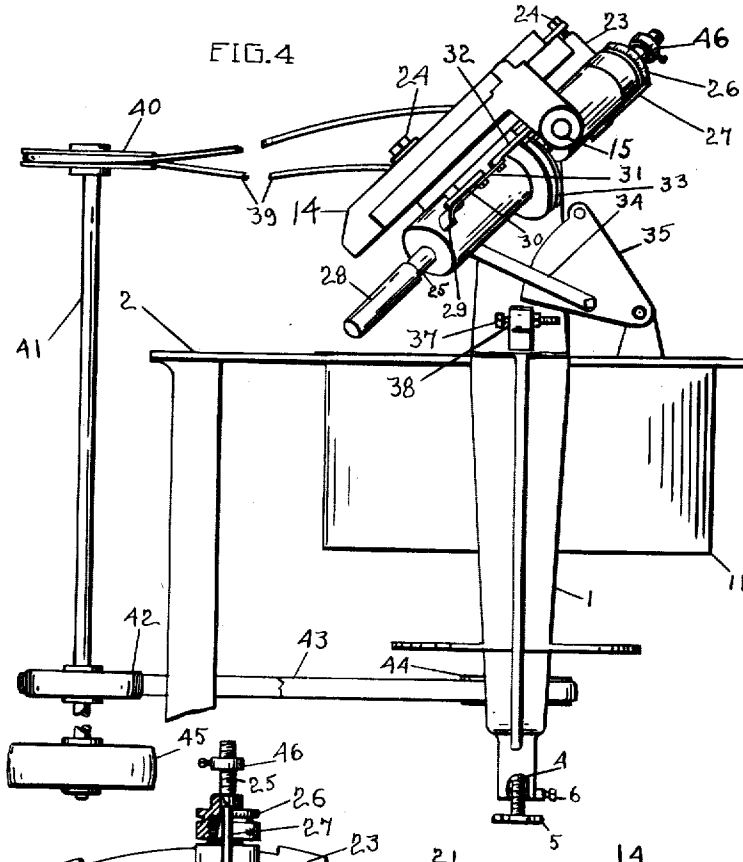
3 SHEETS—SHEET 2.

FIG. 4



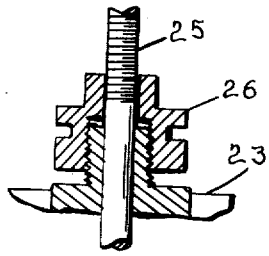


FIG. 7

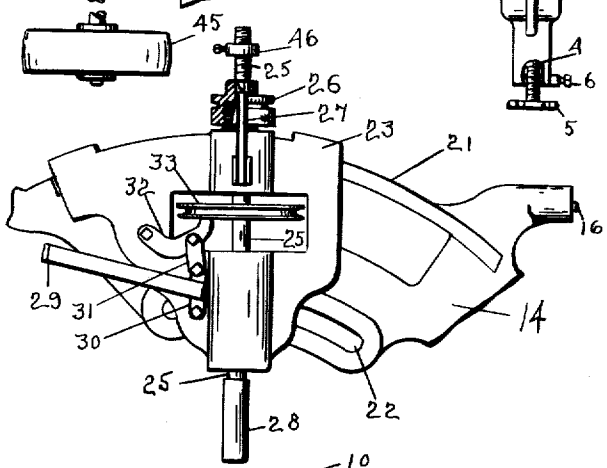


FIG. 5

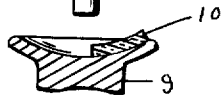
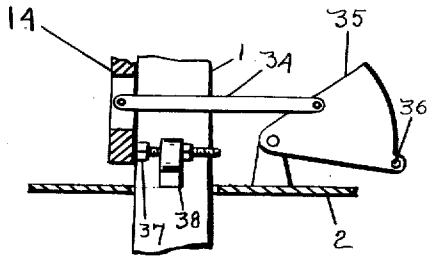


FIG. 6



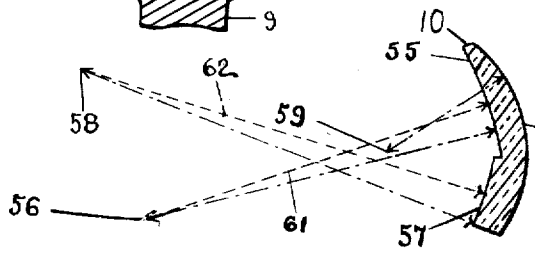


FIG. 8

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3 SHEETS—SHEET 3.

FIG. 9

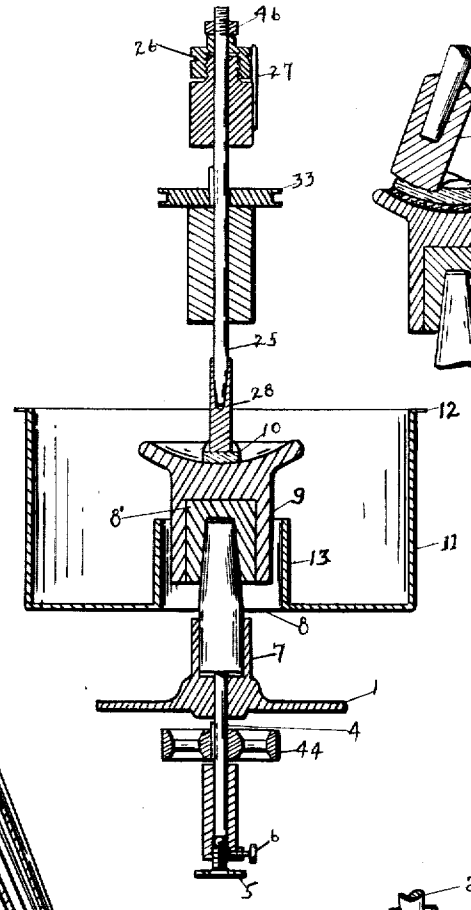


FIG. 10

FIG. 12

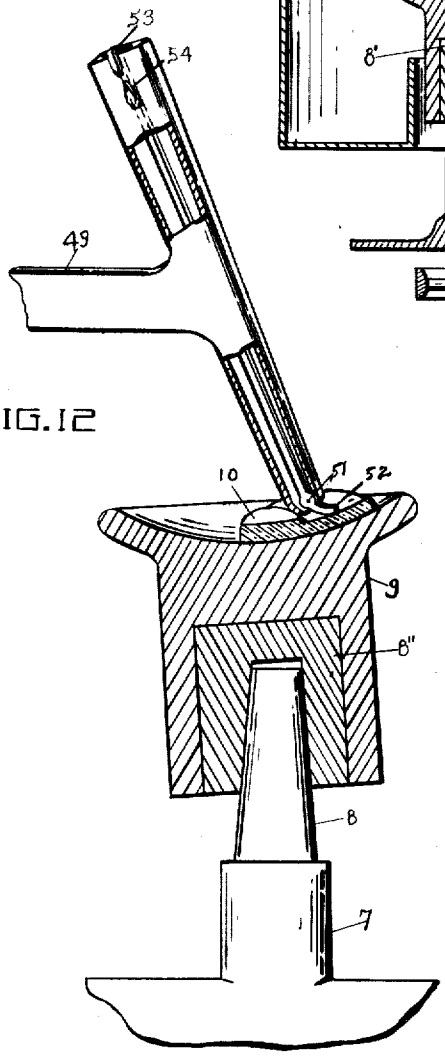
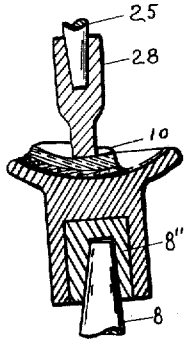


FIG. 11



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UNITED STATES PATENT OFFICE.

CLARENCE E. QUIMBY, OF TOLEDO, OHIO, ASSIGNOR TO THE CONTINENTAL LENS COMPANY, OF TOLEDO, OHIO, A CORPORATION OF OHIO.

GRINDER.

1,274,591. Specification of Letters Patent. Patented Aug. 6, 1918.

Application filed April 1, 1916. Serial No. 88,252.

To all whom it may concern:

Be it known that I, CLARENCE E. QUIMBY, a citizen of the United States of America, residing at Toledo, Lucas county, Ohio, have invented new and useful Grinders, of which the following is a specification.

This invention relates to shaping and finishing materials by relative movement.

This invention has utility in the rough grinding and finishing of hard materials, as glass for lenses, especially of the bifocal type, which may be quickly and accurately made with only casual attention to the machine, practically eliminating skilled labor in the production of high grade articles.

Referring to the drawings:

Figure 1 is a side elevation of an embodiment of the invention, parts being broken away, in a lens grinder;

Fig. 2 is a fragmentary view of the device, with the upper holder removed and the gage shown in working position;

Fig. 3 is a detail in section of adjustable support for the upper holder mounting;

Fig. 4 is a view at right angles to the showing in Fig. 1, with one of the supports for the upper holder removed, and with the holder rocked away from working position;

Fig. 5 is a fragmentary view of the upper holder and mounting, the holder being in lifted or inoperative position as distinguished from the dropped or working position of Fig. 1;

Fig. 6 is a section on the line VI—VI, Fig. 1, looking in the direction of the arrow, showing the positive holding means for the rocking mounting of the upper holder;

Fig. 7 is a detail of the tool stem adjustment;

Fig. 8 is a section through a lens crystal after the minor curve has been formed thereon upon the same side of the material as the major curve, but of different extent, the line of demarcation between the two curves being shown as abrupt, and the crystal, accordingly, of different thicknesses where the independent radius curves join;

Fig. 9 is a fragmentary vertical section through the machine at right angles to the showing in Fig. 1 with the tool and work holders in alined vertical position;

Fig. 10 is a detail sectional view of the tool and work holder elements in an inclined coacting position, for major curve generation;

Fig. 11 is a view similar to Fig. 10, with the tool and work holders coacting for minor curve generation, the inclination in these Figs. 10 and 11, being somewhat exaggerated for illustrative purposes, but the center of the finished face of the minor curve is coaxial with the axis of rotation of the work holder in both positions; and

Fig. 12 is a fragmentary view on an enlarged scale of the gage in coacting position.

The U-frame comprising the pair of spaced supports 1 is mounted in the bench or table 2 having transverse opening 3 between the supports or uprights 1, which opening is centrally enlarged and circular over the work holder rotatable driving shaft 4. the vertical position of which may be fixed by the screw stem hand wheel 5 and locked by the set screw 6. The U-frame has the guide sleeve 7 out of the upper end of which protrudes the taper seat 8 of the driving shaft 4. On this seat 8 snugly fits the sleeve 8′ for the work holder 9 to which may be made fast the glass or crystal 10 to be operated upon.

The pan 11 fits in the enlarged portion of the opening 3 in the table 2 and is sustained in such position by its top outwardly extending flange 12, while its central upwardly extending throat 13 about the work holder 9 serves to retain liquid and abrasive as emery dust supplied with water, or other grinding and polishing materials in the machine operation.

Transversely of the work holder 9 and thereover is the rockable member or mounting 14 having a trunnion 15 mounted for rocking and axial reciprocation in a support 1, while diametrically opposite thereto the trunnion 16 (Figs. 1, 2, 3) has its threaded terminus engaged by a nut 17 for snugly fitting thereon the collared sleeve 18 having medially of its length a threaded portion. The outer collar of this sleeve 18 has graduations movable past the fixed index 19 on the block 20 internally threaded to interfit with the sleeve 18. Rotation of the sleeve 18 serves through its threaded portion to actuate the trunnion 15 in its bearing and move the member 14 transversely of the axis of rotation of the work holder 9.

The member 14 has an upper arc shaped guide 21 and a lower concentric arc shaped guide slot 22 with which the upper or tool holder guide 23 may slidingly coact to be

locked in various inclined or angular positions as to the work holder 9 by the nuts or bolts 24 (Fig. 4). This holder member 23 carries the rotatable shaft or tool holder 25. Set screw locked in various positions on the threaded tubular upper extension of the guide 23 is the adjusting nut 26 rotatable as to the fixed index 27. The nut 26 has graduations thereon readable adjacent the index 27.

Mounted on the tapered seat of the lower end of the tool holder 25 is the tool 28.

For raising the tool 28 off the work 10, handle 29 extends to the link 30, forming with the link 31 a toggle for moving the finger 32 toward or from the driving wheel 33 fast on the stem or shaft 25, and serves when the handle 29 is up (Fig. 5), to hold the tool away from the work, while in the opposite direction of shift (Fig. 1), the tool is free to feed to the work 10.

In addition to this raising and lowering of the tool for quickly clearing the work, the mounting member 14 is rockable in the supports 1 backward away from over the work by the link 34 and weighted arm 35 having the handle 36. Upward movement of this handle 36 throws the mounting 14 with the tool holder 25 back to provide readily ample clearance above the work for inspection or other duties. In the bringing of the member 14 back to working plane, the adjustable bumper 37 in the bracket 38 positively limits this travel to the working plane, and the position of the arm 35 holds this working plane position for the member 14. In the rocking away from working plane position, the arm 35 contacts the bracket 38 and holds the member 14 back in work clearing position.

The tool holder 25 has its driving pulley 33 rotated by the belt 39 from the pulley 40 on the shaft 41 which also carries the pulley 42 acting through the belt 43 and the pulley 44 on the work holder shaft 4 for rotating the work holder 9. The driving shaft 41 is rotated by the driving pulley 45 thereon (Fig. 4).

The tool holder 25 is free in operation to slide downward through the guide 23 as the work 10 wears down or the tool 28 wears off to an adjusted limiting position as determined by the set screw locked adjusting nut 46 abutting the adjusting nut 26.

In the generation of different curves the accuracy of each curve face generated by the relatively inclined holders is determined by maintaining the adjusted position of the axes. The self or gravity feeding of the tool holder 25 through the guide 23 automatically cares for the wearing away of the tool in its relative movements as to the work, as abrading material may be fed thereto in operation to supplement the cutting, grinding or finishing operations upon the work. However, to maintain this working position and its radius of action as to the relatively rotating work 10 fixed, adjustments of the work holder 9 are effected by means of the hand wheel 5.

The determination of these work adjustments may be speedily and most accurately made by lifting the tool through the handle 29 off the work, rocking the tool away from the work by actuating the handle 36 to bring the arm 35 to rest on the bracket 38. The handle 29 maintains the tool lifted, for the toggle 30, 31, is carried past its dead point and automatically locks the tool in the up position.

With the space above the work 10 cleared, the gage is quickly and accurately swung into position. Mounted on the table 2 is the bracket 47 having pivoted therein for swinging in a horizontal plane the arm 48, in which is pivoted for swinging in a vertical plane the arm 49, the position for action of which is determined by the adjusting screw 50. Mounted on the pivot pin 51 in the lower free end of this T-arm 49 (Figs. 2, 12) is the gage lever having its work contacting short arm 52, while the upwardly extending long arm 53 of this gage lever is movable in the hollow cross portion of the arm 49 past the index 54. Adjustment of the hand wheel 5 to bring the work 10 so that the pointer arm 53 registers with the gage 54 insures maintenance of the work position for the curve face for which the gage is set and the tool is inclined.

There may be shifting of the tool to various eccentric positions by the adjustment of the member 23. Interchangeable elements or sleeves 8′, 8″, concentric and of various degrees of eccentricity, may be used for throwing the work from central to off center or eccentric positions as to the axis of the work.

Rocking the member 14 back out of working position, loosens the belt 39 and thus automatically stops the driving or rotation of the tool.

In the production of a bifocal lens with the machine of this disclosure, the piece of material or crystal 10 may have the surface 55 generated thereon by relative rotation of the tool and work. In this generation, the point 56 is the curve center, equidistant from every point of the face 55 and lies in the axis of generation of this face. The distance of the point 56 from the curve face 55 is the radius of the sphere of which the face 55 is a portion. Adjacent this major surface 55 is the minor curve surface 57, shown in this instance as having every part thereof equidistant from the point 58. Accordingly this point 58 is the center of the sphere of which the face 57 is a portion, and this point 58 lies in the axis of generation of the face 57. The radial distance of

the point 58 from its surface 57 is greater than the distance of the point 56 from its surface 55. The opposite side of the lens may have the point 59 as the center of the sphere of which its face 60 forms a part.

In the development of the bifocal lens faces on the crystal 10, the relative inclinations of the axis of the work and axis of the tool determine an axis of generation 61 for the face 55. In the drawings, these inclinations are shown exaggerated. By readjustment of the same machine, or mounting with a different sleeve 8″, having changed eccentricity, there may be provided a second axis 62, herein shown as relatively inclined as well as eccentric to the first axis 61. This axis 62 is the axis of generation for the face 57.

Lenses may accordingly be produced with eccentric or widely varying axes of generation, as well as with axes which are concentric. The eccentric generation permits a more uniform thickness of the minor lens. This gives a more close approximation of the center line of vision as to the eye and minor lens in usual use, for the medial radius of the minor lens in its short range use has its optical center approach the center of this minor lens extent. This gives the operative condition of the minor curve appearing as a true prism throughout its used region.

The sleeves 8′, 8″ variously designed for alternative use, may have their fitting faces eccentric or inclined to bring about various axes of eccentricity in the face development of the work. With a piece of work mounted in the holder, rotation of the holder on its axis results in a different axis of development of the next face on the work.

This machine is one which may be accurately operated by unskilled labor to produce superior results, for a determined adjustment is readily had. Such determined adjustment of the work may be effected by selecting and firmly positioning the desired sleeve 8″ for the work. For positioning the tool, the member 23 may be locked in its transverse position and at the desired inclination. These adjustments may be accurately fixed over a wide range, even to the production of the relatively eccentric axis bifocal lens herein disclosed.

What is claimed and it is desired to secure by Letters Patent is: ,

1. A surface forming apparatus embodying a frame providing a pair of spaced bearings and an intermediate bearing, a rotatable member in said intermediate bearing, a holder carried by said member, an opposing rockable support mounted in the pair of spaced bearings, a rotatable member carried by the rockable support, a holder carried by said rockably supported rotatable member and directable toward the other holder for tool and work coöperation therebetween, and a quick throw device for shifting one holder away from the other independent of movement of the rockable support so that the rockable support may swing its holder freely past the other holder.

2. A surface forming apparatus embodying a frame providing a pair of uprights and an intermediate bearing, a rotatable member in said intermediate bearing, a holder carried by said member, an axially adjustable rockable support mounted in the uprights, a guide carried by the rockable support, a rotatable member mounted in the guide, quick throw means for axially shifting the member in the guide, and a holder carried by said rockably supported rotatable member and directable toward the other holder by the guide for tool and work coöperation therebetween.

3. A surface forming apparatus embodying a frame providing a pair of spaced bearings and an intermediate transversely extending bearing, a rotatable member in said intermediate bearing, a holder carried by said member, an opposing rockable support mounted in the pair of bearings, means for adjusting the rockable support axially of its bearings, a rotatable member carried by the rockable support, a holder carried by said rockably supported rotatable member and directable toward the other holder for tool and work coöperation therebetween, and mounting means for shifting the position of one holder as to its rotatable member.

4. A surface forming apparatus embodying a frame providing a pair of spaced bearings and an intermediate tranversely extending bearing, a rotatable member in said intermediate bearing, a holder carried by said member, an opposing rockable support mounted in the pair of bearings, means for adjusting the rockable support as to its pair of bearings, a rotatable member carried by the rockable support, a holder carried by said rockably supported rotatable member and directable toward the other holder for tool and work coöperation therebetween, and mounting means for shifting the position of the intermediate bearing mounted holder as to its rotatable member.

5. A surface forming apparatus embodying a frame providing a pair of spaced alined bearings and an intermediate transversely directed bearing, a rotatable member in said intermediate bearing, a holder carried by said member, an opposing rockable support mounted in the alined bearings, a rotatable member carried by the rockable support, a holder carried by said rockably supported rotatable member and directable toward the other holder for tool and work coöperation therebetween, and mounting means for shifting the position of one holder as to its rotatable member and for shifting the other holder with its rotatable member,

these mounting means shiftings being independent of shifting the rockable support.

6. A surface forming apparatus embodying a frame providing a pair of spaced bearings and an intermediate bearing, two rotatable members, one of said rotatable members being mounted in the intermediate bearing, a holder carried by the intermediate bearing mounted member, a support mounted by the pair of bearings and carrying the other rotatable member, said support being rockable in the bearings and its rotatable member being directable toward the other member, and an additional holder carried by the other rotatable member for tool and work coöperation between said holders, there being means for shifting the rockable support carried member as to said support.

7. A surface forming apparatus embodying a frame providing a pair of uprights having alined spaced bearings, there being a transversely extending bearing intermediate said uprights, a rotatable member in said intermediate bearing, an opposing support mounted in the alined bearings, a rotatable member carried by the support, and opposing tool and work mounting means carried by said members, said alined bearings carried support having means for adjusting its rotatable member axially of the support mounting and axially of the member carried by the support.

8. A frame embodying a holder for work to have a surface formed thereon, means carried by said frame for forming the surface on work held by the holder, said means movable away from the work, and a self-adjusting device also mounted on the frame and movable into position as to the work, said device being provided with a scale and freely swingable pivoted means coacting with the scale and work for disclosing the surface position of the work, and means for adjusting the work holder to bring the work into position.

9. A frame embodying a pair of holders for the tool and work, each susceptible to wearing off, means connected to the frame for establishing relative movement therebetween, an indicating device adjustably mounted on the frame, said device being provided with a scale and freely swingable pivoted means coacting with the scale and work for disclosing the surface position of the work, one of said holders being movable to permit the device to coact with a holder, and adjusting means for bringing one of the holders to determined working position as disclosed by the device.

10. A surface forming machine embodying a frame having a central upright holder, a pair of uprights upon opposite sides of the holder, a support swingable in said uprights across said central holder, a second holder provided with arc adjustment mounting in the support to direct this second holder at different angles toward the first holder, and driving means for rotating the holders.

11. A surface forming machine embodying a frame having a central upright holder, a pair of uprights upon opposite sides of the holder, a support swingable in said uprights across said central holder, a second holder provided with arc adjustment mounting in the support to direct this second holder at different angles toward the first holder, means coacting to lift the second holder away from the central holder, and driving means for rotating the holders.

In witness whereof I affix my signature.

CLARENCE E. QUIMBY.