Jan. 2, 1923.

1,440,795

M. O. REEVES.
GRINDING MACHINE.
FILED MAY 19, 1919.

3 SHEETS-SHEET 1

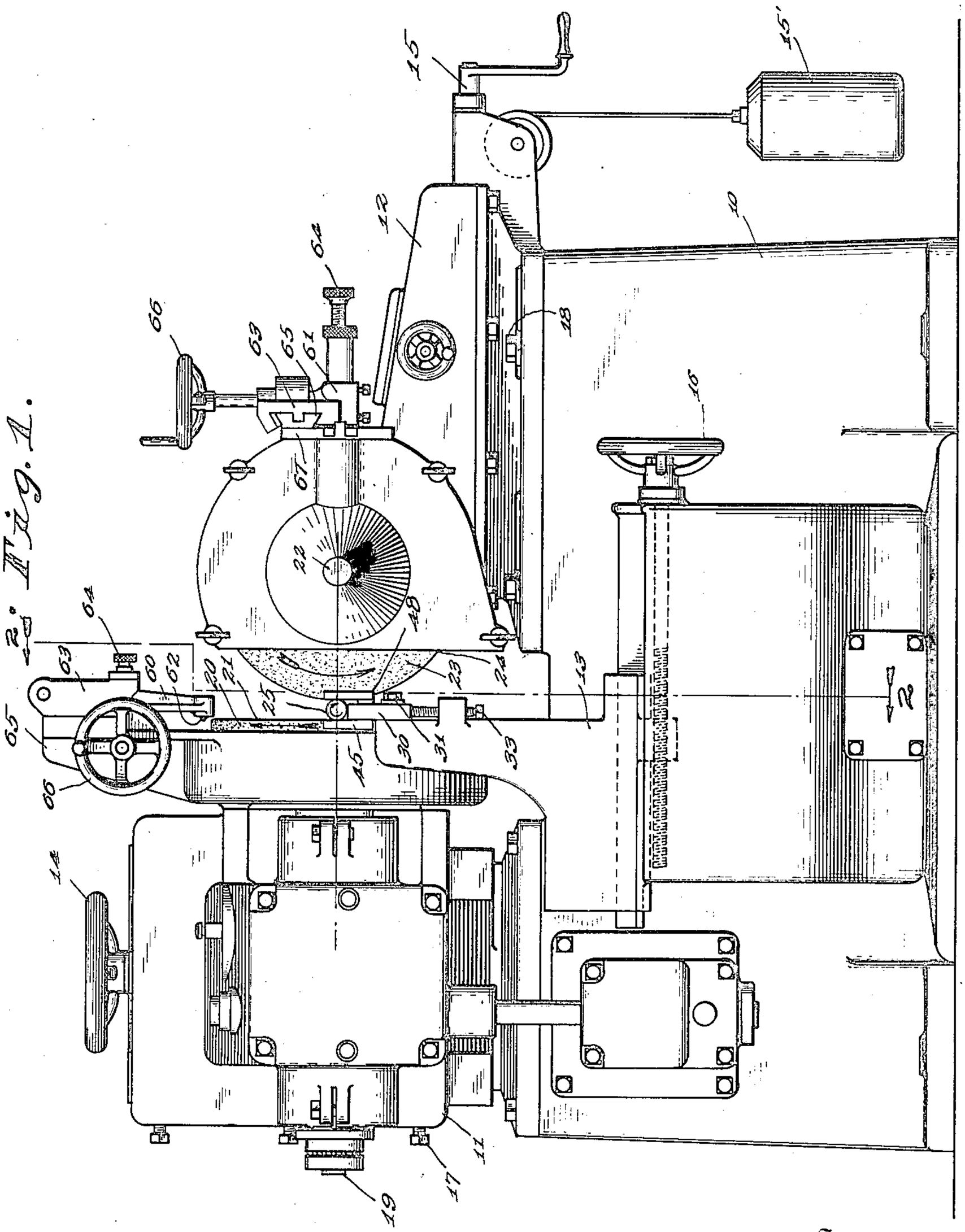

Fig. 1.

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3 SHEETS-SHEET 2

Fig. 2.

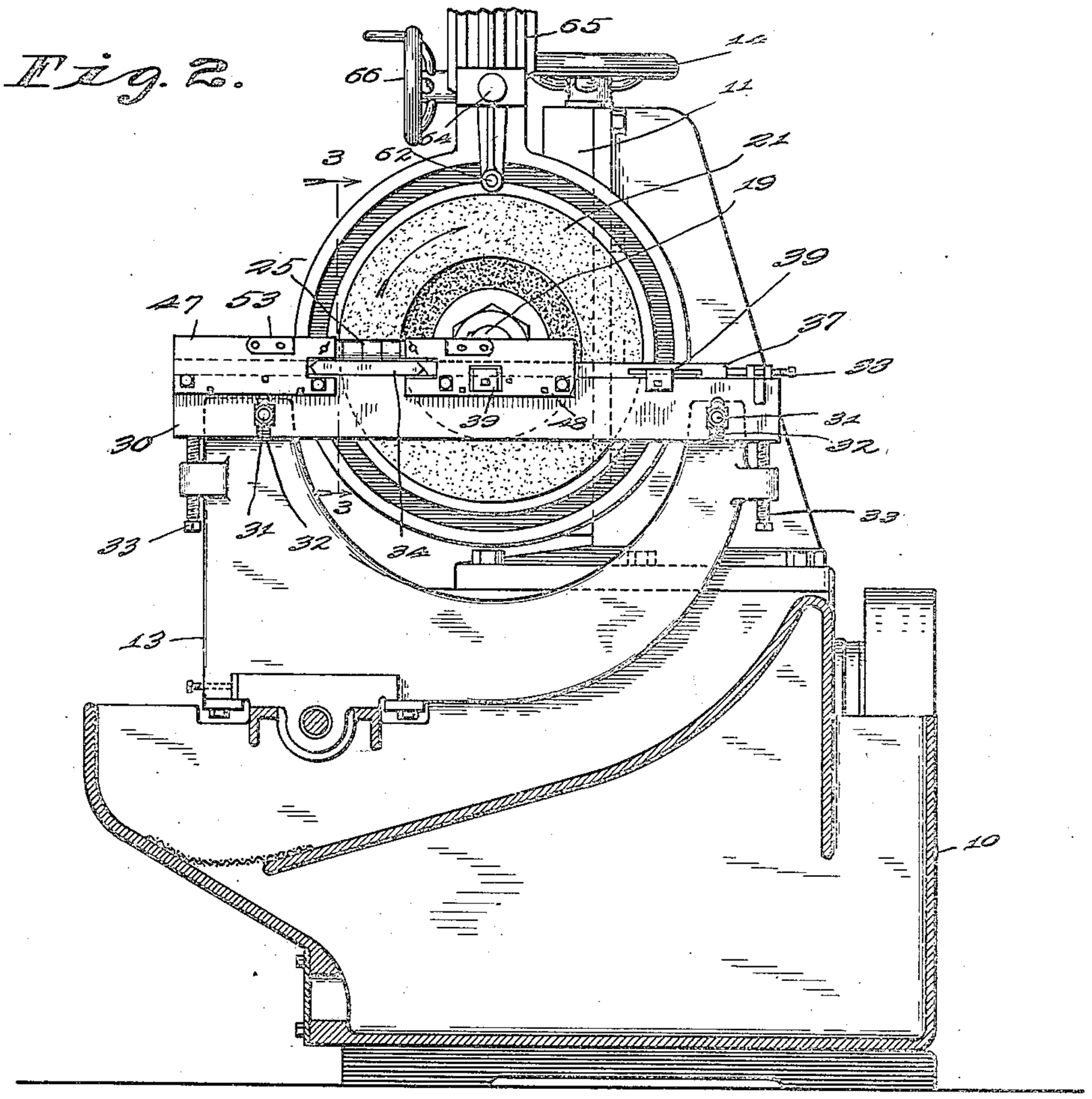
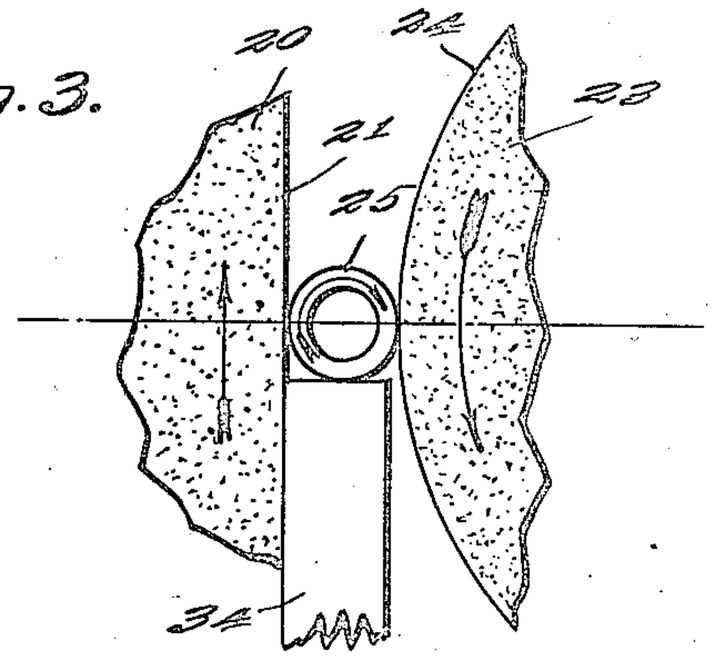


Fig. 3.



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3 SHEETS-SHEET 3

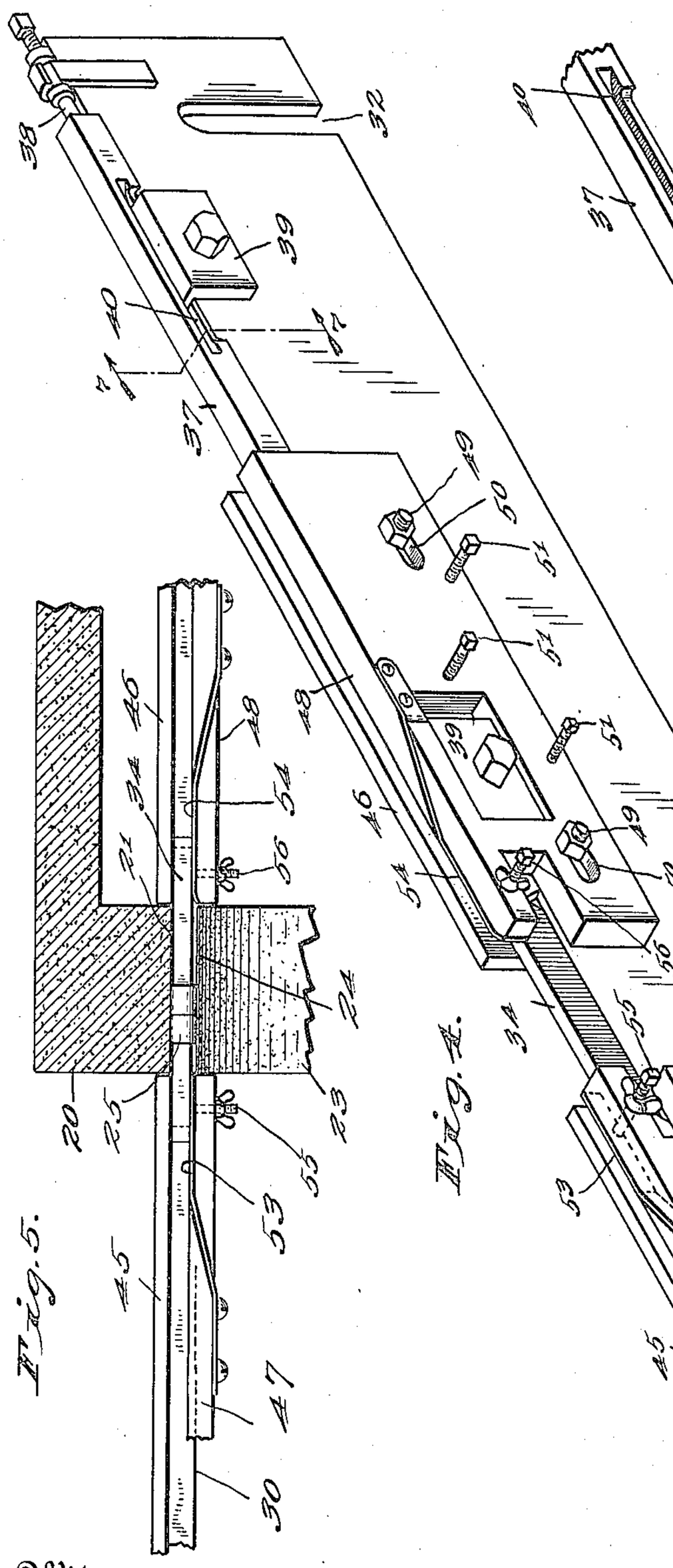

Fig. 5.

Fig. 4.

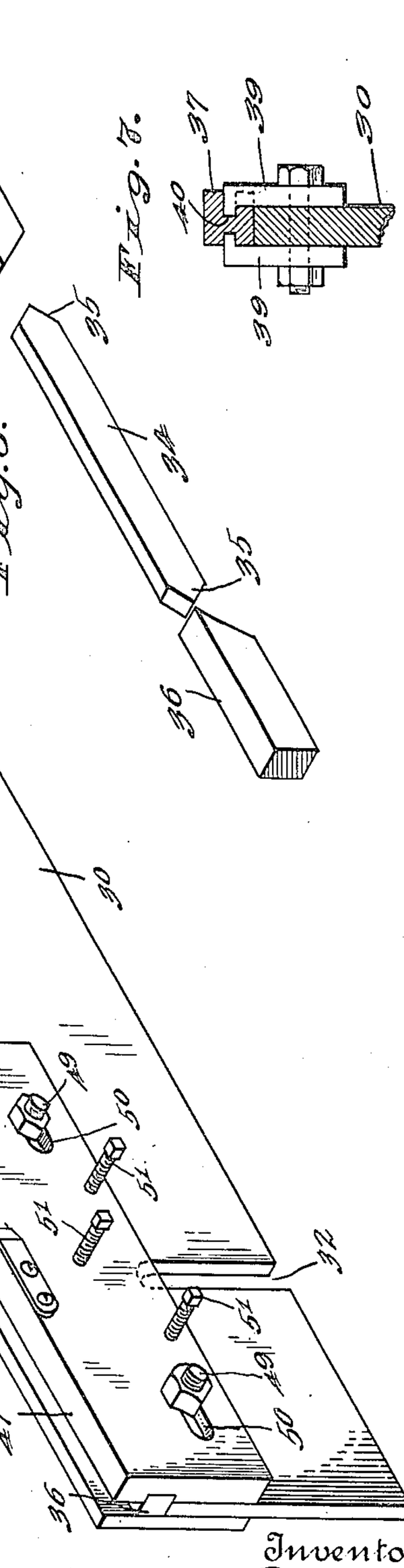

Fig. 6.

Fig. 7.

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Patented Jan. 2, 1923. 1,440,795

UNITED STATES PATENT OFFICE.

MILTON O. REEVES, OF COLUMBUS, INDIANA, ASSIGNOR TO REEVES PULLEY COMPANY, OF COLUMBUS, INDIANA, A CORPORATION OF INDIANA.

GRINDING MACHINE.

Application filed May 19, 1919. Serial No. 298,007.

To all whom it may concern:

Be it known that I, MILTON O. REEVES, a citizen of the United States, residing at Columbus, in the county of Bartholomew and State of Indiana, have invented a new and useful Grinding Machine, of which the following is a specification.

It is the object of my invention to provide a grinding machine for accurately grinding round articles, of any size, with precision and quickness; and especially one wherein such round articles may be accurately fed into and through grinding position without distortion, and wherein the abrasive surfaces may be accurately dressed with the parts in adjusted position.

The present invention is largely a development of that set forth in my prior Patent No. 1,264,129, granted April 23, 1918.

The accompanying drawings illustrate my invention. In such drawings, Fig. 1 is a front elevation of a grinding machine embodying my invention; Fig. 2 is a section substantially on the line 2—2 of Fig. 1; Fig. 3 is an enlarged fragmentary section substantially on the line 3—3 of Fig. 2; Fig. 4 is a perspective detail view of the feed-bar on which the round articles to be ground are carried through the grinding throat; Fig. 5 is an enlarged fragmentary detail of the structure at the grinding throat, showing the feed wheel in horizontal section and viewing the whole from above; Fig. 6 is a perspective view of the removable wear-bar, and the ends of its associated clamping members; and Fig. 7 is a fragmentary section on the line 7—7 of Fig. 4.

On the base 10 are carried three adjustable frames 11, 12, and 13, the first of which is adjustable vertically by an adjusting wheel 14 and the other two of which are independently adjustable longitudinally of the base 10 by a crank 15 and a hand wheel 16 respectively. The frames 11 and 12 are arranged to be clamped in adjusted position by suitable clamping screws 17 and 18 respectively. The vertically adjustable frame 11 carries a longitudinally extending horizontal shaft 19 which on its end toward the frame 12 has mounted thereon a wheel 20, preferably an abrasive wheel, which on one end has an annular face 21. The wheel 20 is the feed wheel, and in the grinding operation is driven at a comparatively slow speed in the direction of the arrow. The longitudinally adjustable frame 12 is adjustable toward and from the feed wheel 20 by the crank 15, and for accuracy of adjustment, to take up all lost motion, is associated with a weight 15′ which tends to move it away from the feed wheel and so holds it to one limit of the lost motion which would otherwise be permitted by its adjusting mechanism. This frame 12 carries a horizontal shaft 22 transverse to the direction of adjustment of such frame and to the shaft 19. The shafts 19 and 22 are driven in any suitable way which allows the adjustment of the frames 11 and 12; but as this driving arrangement is no part of the present invention, it is unnecessary to show it or to describe it in detail. The shaft 22 carries an abrasive wheel 23, having a peripheral grinding face 24, and is driven at comparatively high speed in the direction of the arrow. The abrasive wheel 23 is the grinding wheel. The peripheral face 24 of the grinding wheel 23 where it moves downward opposes the annular working face 21 of the feed wheel 20 where it moves upward, to provide between them a grinding throat in which the grinding of the round articles 25 occurs. The width of this grinding throat is adjustable by shifting the frame 12 by the crank 15. The narrow point of the grinding throat is in the horizontal plane through the axis of the grinding wheel 23 when the face 21 is flat, as I usually have it, as such plane is then perpendicular to the working face 21 of the feed wheel 20 at the grinding throat. The height of the shaft 19 with respect to this horizontal plane is adjustable by the hand wheel 14, to get any desired variation from vertical in the direction of movement of the face 21 at such plane in order to get a desired feed component of such movement along the grinding throat.

The round articles 25 to be ground are carried through the grinding throat on a feed bar 30, which is shown in perspective in Fig. 4. This feed bar is carried by the longitudinally adjustable frame 13, on which both ends of the feed bar are supported. To obtain this support, the frame 13 is in the shape of an inverted horseshoe, as is apparent from Fig. 2. The feed bar, as shown, is clamped to one face of the frame 13 by clamping bolts 31 extending through vertical slots 32 in the feed bar; and it rests on

temper screws 33 at its two ends so that by the adjustment of such temper screws the feed bar may be vertically adjusted to any desired height, to bring the axes of the articles 25 to be ground into the plane of the narrow point of the grinding throat, the feed bar when adjusted being clamped in adjusted position by the bolts 31. At the grinding throat, the feed bar 30 is provided with a wear bar 34, on which the articles 25 rest while they are being ground. This wear bar catches many of the abrasive particles from the abrasive wheels 20 and 23, and so is subject to considerable wear. In consequence, I not only make this wear bar as hard as possible, and in some instances even use glass, but also make it removable and reversible top for bottom, so that when worn it may be reversed or replaced by another wear bar. To this end, I provide the wear bar 34 with doubly tapered ends 35 whereby it may be clamped and held down tight to the body of the feed bar by two clamping bars 36 and 37 having their adjacent ends taperingly undercut to engage the upper tapers of the ends 35 of the wear bar. The clamping bar 36 is fixed to the body of the feed bar 30, and the clamping bar 37 is adjustable by a temper screw 38 along the upper edge of the body of such feed bar and is held to such upper edge by flanged holding plates 39 bolted to the two sides of the feed plate 30 and at their upper edges having flanges which extend into longitudinal grooves 40 in the side faces of the adjustable clamping bar 37 so that such bar 37 may be slid longitudinally. The articles 25 to be ground slide along the upper faces of the bars 36, 34, and 37.

In order to guide the articles 25 into the grinding throat, the feed plate 30 has bolted thereto guide plates 45 and 46 on the side toward the feed wheel 20 and guide plates 47 and 48 on the side toward the grinding wheel 23. These guide plates project upward above the upper surfaces of the bars 36, 34, and 37, and are adjustably clamped to the feed bar 30 by clamping nuts on studs 49 which project from the feed bar through longitudinal slots 50 in the guide plates. The guide plates 45 and 46 bear firmly against the face of the feed bar, or against accurate parallel shims placed between them and such feed bar. In order to adjust these guide plates 47 and 48, each of them is provided with push screws 51, bearing against the body of the feed bar partly above and partly below the line of the bolt 49, so that by the adjustment of said push screws, with such adjustment of the bolts 49 as may be necessary, such guide plates may be adjusted as desired. The guiding faces of the guide plates 45 and 46 are set, by adjustment of the hand wheel 16, so that the articles 25 to be ground may pass without tilting from the guiding face of the plate 45 to the working face 21 and thence to the guiding face of the plate 46. In order to hold the articles 25 firmly in engagement with the guiding faces of the plates 45 and 46 as such articles pass therefrom and thereto respectively, the guide plates 47 and 48 carry leaf springs 53 and 54 the free ends of which are close to the side faces of the grinding wheel 23, which is located between the adjacent ends of such guide plates 47 and 48. The leaf springs 53 and 54 in the form shown extend through oblique slots in the upper edges of such guide plates to the outer faces thereof, to which outer faces they are attached; and the free end of the spring 54 is bent back slightly away from the wheel 20 so that it will not catch on the articles 25 as the latter pass into the space between the guide plate 46 and such leaf spring. The free ends of the springs 53 and 54 may be adjusted by suitable temper screws 55 and 56 so that they bear with the desired pressure against the articles 25 and hold such articles flat against the guiding faces of the plates 45 and 46, especially as such articles are passing into and out of engagement with the abrasive faces 21 and 24. By reason of these springs, the articles 25 pass through the grinding throat without tilting, so that they are ground with the desired true round surfaces, without distortion such as they would have if the articles were tilted as they passed into and out of engagement with the abrasive surfaces 21 and 24.

The articles 25 are fed into the grinding throat in any suitable manner, as by being supplied to the upper surface of the bar 36 from some suitable slideway or slide rod. This, however, is no part of the present invention, and is not shown. When the articles 25 reach the grinding throat, they are caught between the feed surface 21 and the grinding surface 24, and are slowly rotated by the action of the feed wheel 21 and ground to true round form by the grinding wheel 23 as they rotate. In addition to their rotation, I may give the articles 25 a forward feeding movement through the grinding throat, from the outside toward the center of the feed wheel 20, by having the axis of such feed wheel 20 slightly lower than the axis of the articles being ground, so that such articles in addition to being rotated are moved along their axes by the re-action thereupon of the feed wheel. When the articles have passed through the grinding throat, they may be removed from the feed bar in any suitable manner. With this arrangement, the articles 25 come out of the grinding throat ground to true cylinders within an exceedingly small margin of error.

The vertically adjustable frame 11 and the longitudinally adjustable frame 12 are

provided with suitable dressing devices 60 and 61 respectively, for dressing the working surfaces 21 and 24 of the wheels 20 and 25 for any position of such frames, so that such dressing may be done without disturbing the adjustment of such wheels. Each of these dressing devices comprises a cutting diamond 62, carried in a suitable movable frame 63 so that the depth of cut may be adjusted by an adjusting screw 64 and the movable frame may be moved along a suitable slideway 65 by a hand wheel 66 to cause the cutting diamond to travel across the face 21 or 24 to true it. By having these dressing devices mounted on the frames 11 and 12 the working faces 23 and 24 may be dressed whenever necessary, without requiring removal of either wheel; and after such truing only the width of the grinding throat requires any re-adjustment, and this is slight and may be got by merely a slight manipulation of the crank 15.

The mechanism set forth in this application is primarily intended for grinding cylindrical articles. A machine suitable for grinding either cylindrical or conical articles, and having many features in common with that shown in this application, is set forth in my co-pending application Ser. No. 298,008, of even filing date herewith.

I claim as my invention:

1. In a grinding machine, the combination of a grinding wheel, and a feed wheel, said two wheels forming a grinding throat between them for grinding and automatically rotating round articles therein, said grinding wheel being adjustable toward and from the feed wheel to vary the width of said throat, and said feed wheel being vertically adjustable to vary the relation of its axis to the plane of such throat.

2. In a grinding machine, the combination of a grinding wheel, a feed wheel, said two wheels forming a grinding throat between them for grinding and automatically rotating round articles therein, and a feed bar for supporting articles to be ground in said throat, said feed bar projecting at both ends beyond said throat and being provided with a removable wear bar at such throat.

3. In a grinding machine, the combination of a grinding wheel, a feed wheel, said two wheels forming a grinding throat between them for grinding and automatically rotating round articles therein, and a feed bar for supporting articles to be ground in said throat, said feed bar projecting at both ends beyond said throat and being provided at such throat with a removable wear bar and at the ends of such wear bar with two relatively longitudinally slidable clamping members for clamping said wear bar between them.

4. In a grinding machine, the combination of a grinding wheel, a feed wheel, said two wheels forming a grinding throat between them for grinding and automatically rotating round articles therein, and a feed bar for supporting articles to be ground in said throat, said feed bar projecting at both ends beyond said throat and being provided at such throat with a removable wear bar and at the ends of such wear bar with two clamping bars one of which is longitudinally adjustable so as to clamp the wear bar between it and the other clamping bar, the abutting ends of said clamping bars and said wear bar being tapered to position the wear bar and hold it down tight against the body of the feed bar.

5. In a grinding machine, the combination of a grinding wheel, a feed wheel, said two wheels forming a grinding throat between them for grinding and automatically rotating round articles therein, a feed bar for supporting articles to be ground in said throat, said feed bar projecting at both ends beyond said throat, and two guide plates mounted on the feed-wheel side of said feed bar and projecting above said feed bar and at opposite ends of said throat close to said feed wheel to guide articles into and out of said throat.

6. In a grinding machine, the combination of a grinding wheel, a feed wheel, said two wheels forming a grinding throat between them for grinding and automatically rotating round articles therein, a feed bar for supporting articles to be ground in said throat, said feed bar projecting at both ends beyond said throat, two guide plates mounted on the feed-wheel side of said feed bar and projecting above said feed bar and at opposite ends of said throat close to said feed wheel to guide articles into and out of said throat, and two leaf springs opposing the guiding faces of said respective guide plates to hold in contact with such guiding faces the articles passing into and out of said throat.

7. In a grinding machine, the combination of a grinding wheel, a feed wheel, said two wheels forming a grinding throat between them for grinding and automatically rotating round articles therein, a feed bar for supporting articles to be ground in said throat, said feed bar projecting at both ends beyond said throat, two guide plates mounted on the feed-wheel side of said feed bar and projecting above said feed bar at opposite ends of said throat close to said feed wheel to guide articles into and out of said throat, two other guide plates opposing the first two guide plates so as to form a way for the articles to be ground, said second set of guide plates being located on opposite sides of and close to the working face of the grinding wheel.

8. In a grinding machine, the combination of a grinding wheel, a feed wheel, said two

wheels forming a grinding throat between them for grinding and automatically rotating round articles therein, a feed bar for supporting articles to be ground in said throat, said feed bar projecting at both ends beyond said throat, and two guide plates mounted on the feed-wheel side of said feed bar and projecting above said feed bar and at opposite ends of said throat close to said feed wheel to guide articles into and out of said throat, two other guide plates opposing the first two guide plates so as to form a way for the articles to be ground, said second set of guide plates being located on opposite sides of and close to the working face of the grinding wheel, said guiding plates being adjustable toward and from the feed bar.

9. In a grinding machine, the combination of a grinding wheel, a feed wheel, said two wheels forming a grinding throat between them for grinding and automatically rotating round articles therein, a feed bar for supporting articles to be ground in said throat, said feed bar projecting at both ends beyond said throat, two guide plates mounted on the feed-wheel side of said feed bar and projecting above said feed bar at opposite ends of said throat close to said feed wheel to guide articles into and out of said throat, two other guide plates opposing the first two guide plates so as to form a way for the articles to be ground, said second set of guide plates being located on opposite sides of and close to the working face of the grinding wheel, and leaf springs carried by said second set of guide plates on their faces toward the other guide plates and close to the throat and tending to hold articles to be ground in engagement with the guiding faces of the first guide plates as such articles pass into and out of said throat.

10. In a grinding machine, the combination of a grinding wheel, a feed wheel, said two wheels forming a grinding throat between them for grinding and automatically rotating round articles therein, a feed bar for supporting articles to be ground in said throat, said feed bar projecting at both ends beyond said throat, and a guide plate mounted on the feed-wheel side of said feed bar and projecting above said feed bar and located at one end of said throat close to said feed wheel to guide articles relative to said throat.

11. In a grinding machine, the combination of a grinding wheel, a feed wheel, said two wheels forming a grinding throat between them for grinding and automatically rotating round articles therein, a feed bar for supporting articles to be ground in said throat, said feed bar projecting at both ends beyond said throat, a guide plate mounted on the feed-wheel side of said feed bar and projecting above said feed bar and located at one end of said throat close to said feed wheel to guide articles relative to said throat, and a leaf spring opposing the guiding face of said guide plate so as to hold in contact with such guiding face the articles passing into said throat.

12. In a grinding machine, the combination of a grinding wheel, a feed wheel, said two wheels forming a grinding throat between them for grinding and automatically rotating round articles therein, a feed bar for supporting articles to be ground in said throat, said feed bar projecting at both ends beyond said throat, a guide plate mounted on the feed-wheel side of said feed bar and projecting above said feed bar and located at one end of said throat close to said feed wheel to guide articles relative to said throat, and a guide plate opposing the first guide plate so as to form a way for the articles to be ground, said second guide plate being located close to the working face of the grinding wheel.

13. In a grinding machine, the combination of a grinding wheel, a feed wheel, said two wheels forming a grinding throat between them for grinding and automatically rotating round articles therein, a feed bar for supporting articles to be ground in said throat, said feed bar projecting at both ends beyond said throat, a guide plate mounted on the feed-wheel side of said feed bar and projecting above said feed bar and located at one end of said throat close to said feed wheel to guide articles relative to said throat, a guide plate opposing the first guide plate so as to form a way for the articles to be ground, said second guide plate being located close to the working face of the grinding wheel, and a leaf spring carried by said second guide plate on its face toward the other guide plate and close to the throat and tending to hold articles to be ground in engagement with the guiding face of the first guide plate as such articles pass into said throat.

14. In a grinding machine, the combination of a grinding wheel having a peripheral grinding surface, a feed wheel having a flat annular article engaging surface, said two wheels being arranged so that their opposed faces form a grinding and article-rotating throat, an article-supporting bar lying between said wheels beneath the throat, and means for adjusting said feed wheel transversely to the axes of the two wheels.

15. In a grinding machine, the combination of a grinding wheel having a peripheral grinding surface, a feed wheel having a flat annular article-engaging surface, said two wheels being arranged so that their opposed faces form a grinding and article-rotating throat, an article-supporting bar lying between said wheels beneath the throat, means for adjust-

ing said grinding wheel axially of said feed wheel to vary the width of said throat, and means for adjusting said feed wheel transversely to the axes of the two wheels.

16. In a grinding machine, the combination of a grinding wheel, a feed wheel, said two wheels forming a grinding throat between them for grinding and automatically rotating round articles therein, a feed bar for supporting articles in said throat, and a laterally adjustable guide plate projecting upward at the side of said feed bar.

17. In a grinding machine, the combination of a grinding wheel, a feed wheel, said two wheels forming a grinding throat between them for grinding and automatically rotating round articles therein, a feed bar extending through beneath said throat for supporting articles to be ground in said throat, said feed bar projecting beyond said throat, a guide plate projecting up from the side of said feed bar so as to position thereon the articles to be ground, and a leaf spring opposing the guiding face of said guide plate to hold such articles in contact with said guiding face.

18. In a grinding machine, the combination of a grinding wheel, a feed wheel, said two wheels forming a grinding throat between them for grinding and automatically rotating round articles therein, a feed bar for supporting articles to be ground in said throat, said feed bar projecting beyond said throat, a guide plate projecting up from the side of said feed bar so as to position thereon the articles to be ground, and a leaf spring opposing the guiding face of said guide plate to hold such articles in contact with said guiding face, said leaf spring being adjustable.

In witness whereof, I have hereunto set my hand at Indianapolis, Indiana, this 15th day of May, A. D. one thousand nine hundred and nineteen.

MILTON O. REEVES.