Aug. 25, 1925. 1,551,156

C. E. JOHNSON

GRINDING MACHINE

Filed April 4, 1924 4 Sheets-Sheet 1

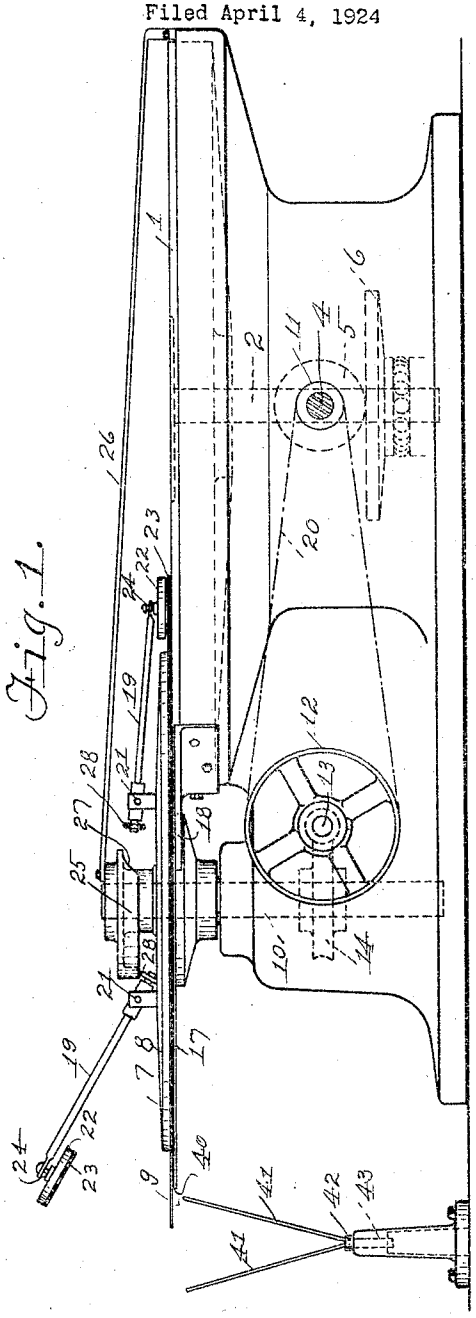


Fig. 1.

Witness:
Geo. L. Chapel

Inventor:
Charles E. Johnson
by Cyrus W. Rice
Attorney.

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GRINDING MACHINE

Filed April 4, 1924 4 Sheets-Sheet 2

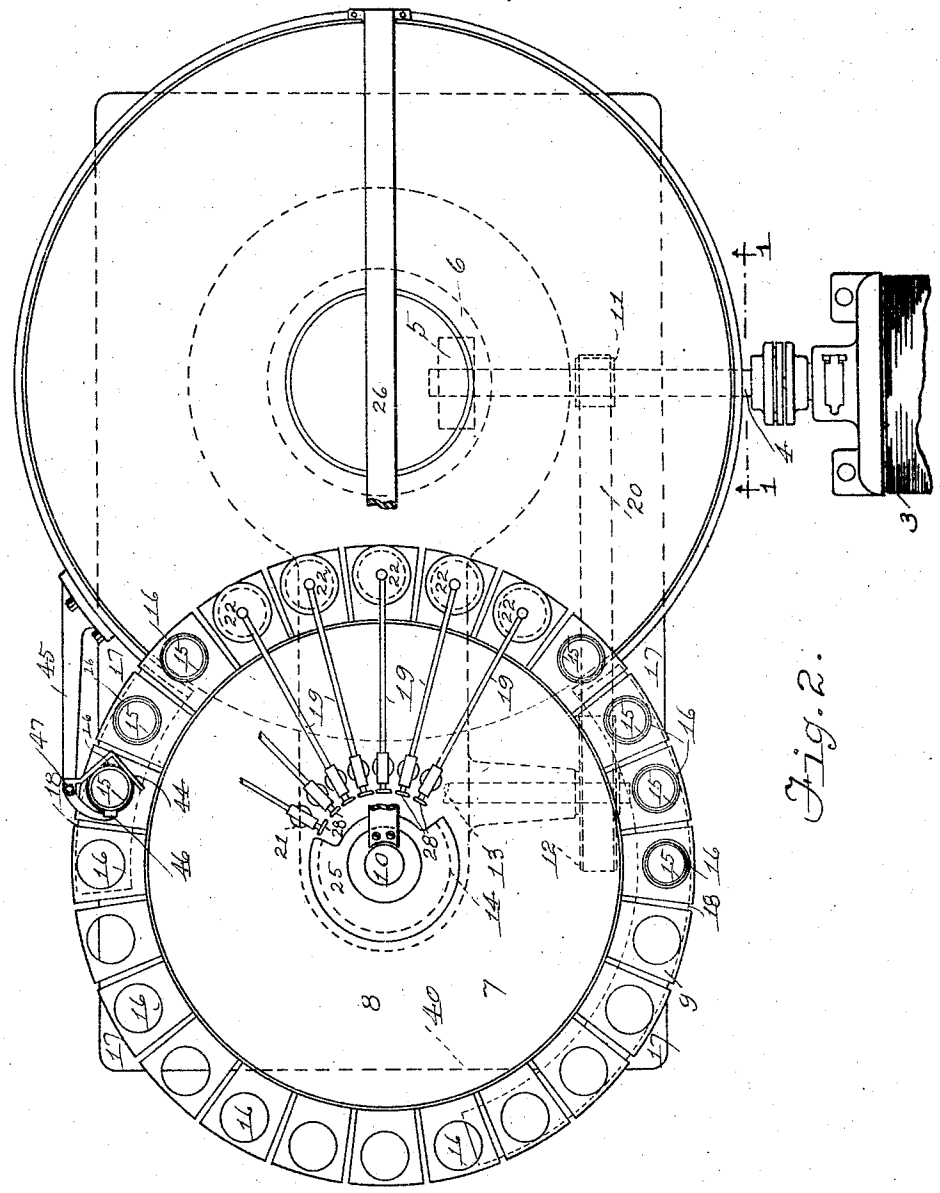


Fig. 2.

Witness:
Geo L. Chapel

Inventor:
Charles E. Johnson
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Attorney.

Aug. 25, 1925. 1,551,156

C. E. JOHNSON

GRINDING MACHINE

Filed April 4, 1924 4 Sheets-Sheet 3

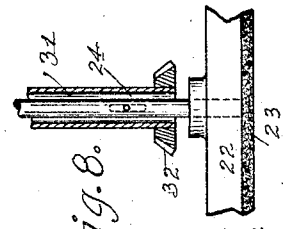


Fig. 8.

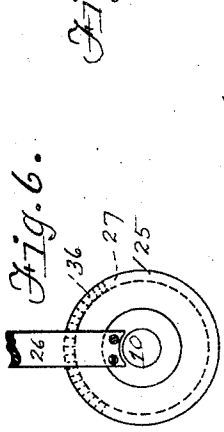


Fig. 6.

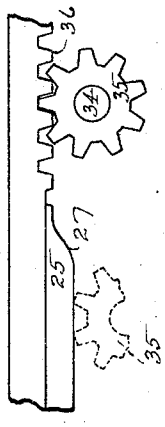


Fig. 7.

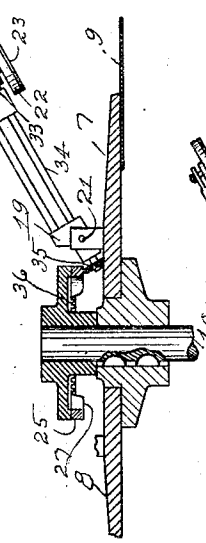


Fig. 5.

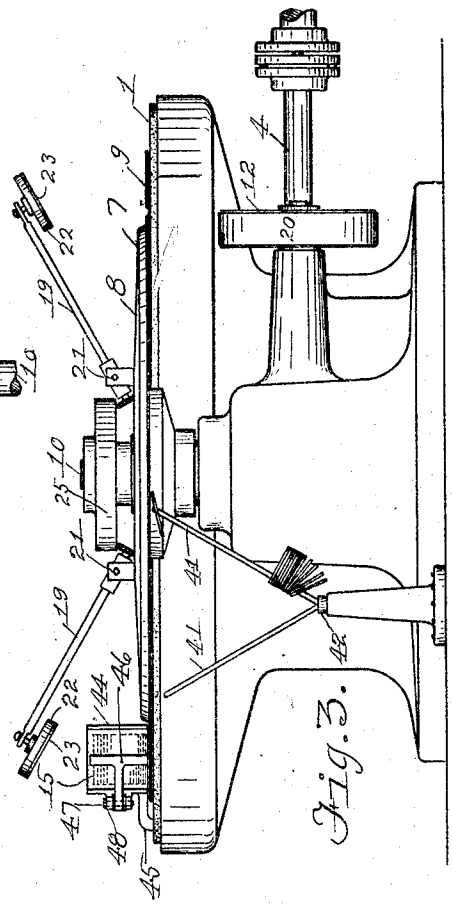


Fig. 3.

Witness:
Geo. L. Chapel

Inventor:
Charles E. Johnson
by Cyrus W. Rice
Attorney

Aug. 25, 1925. 1,551,156

C. E. JOHNSON

GRINDING MACHINE

Filed April 4, 1924 4 Sheets-Sheet 4

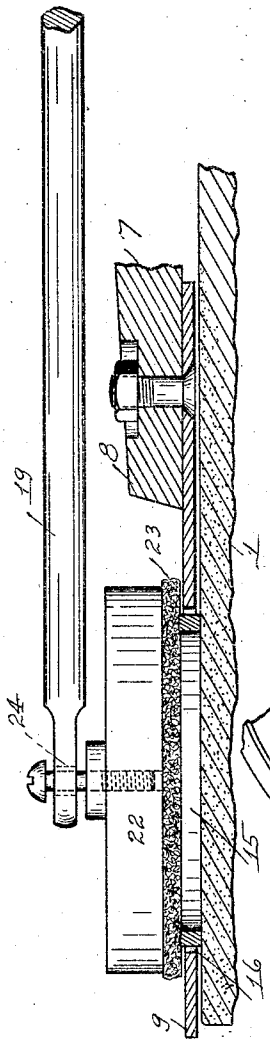


Fig. 4.

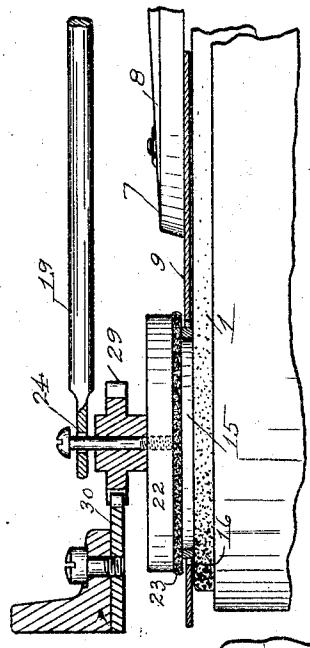


Fig. 10.

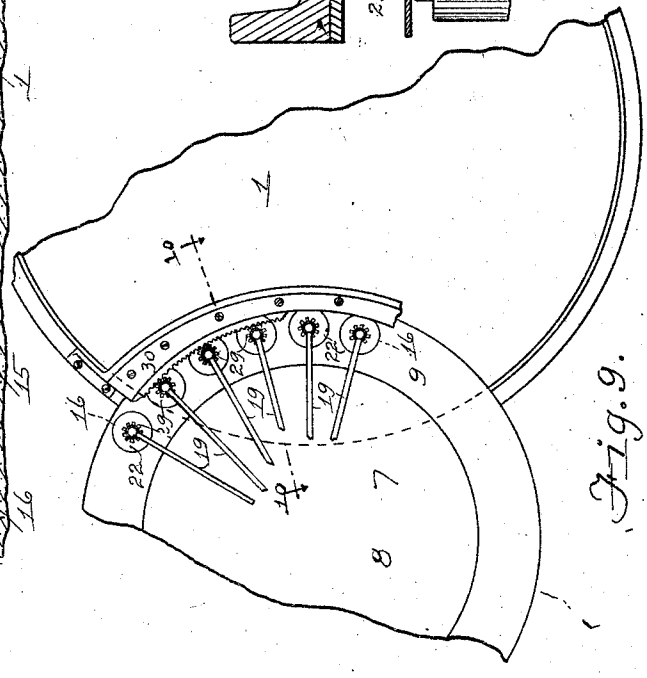


Fig. 9.

Witness:
Geo. L. Chapel

Inventor:
Charles E. Johnson
by Cyrus W. Rice
Attorney

Patented Aug. 25, 1925. 1,551,156

UNITED STATES PATENT OFFICE.

CHARLES E. JOHNSON, OF MUSKEGON, MICHIGAN.

GRINDING MACHINE.

Application filed April 4, 1924. Serial No. 704,166.

To all whom it may concern:

Be it known that I, CHARLES E. JOHNSON, a citizen of the United States, residing at Muskegon, in the county of Muskegon and State of Michigan, have invented new and useful Improvements in Grinding Machines, of which the following is a specification.

The present invention relates to grinding machines, particularly such as are employed for grinding the sides of circular bodies, as piston rings and the like; and its object is, generally, to provide a machine of that character improved in certain respects hereinafter appearing; and, more particularly, to provide in such a machine improved means for holding the work and pressing the same yieldingly into grinding contact with the grinding element of the machine; and further, to provide improved means for rotating the work during the grinding thereof; and further, to provide improved specific means whereby such objects may be accomplished.

These and any other objects hereinafter appearing are attained by, and the invention finds preferable embodiment in, the structure hereinafter particularly described in the body of this specification and illustrated by the accompanying drawings, in which:—

Figure 1 is a side view of a grinding machine, its driving shaft being sectioned on line 1—1 of Figure 2;

Figure 2 is a top plan view thereof;

Figure 3 is a left-hand end view of the same;

Figure 4 is a side view (enlarged) of a rotatable member carried by a lever arm; certain adjacent parts being shown in central vertical section;

Figure 5 is an axial sectional view of a modified construction of certain parts, illustrating means for rotating said member;

Figure 6 is a top plan view of a gear and cam element of said construction;

Figure 7 is a development of a portion of said element;

Figure 8 is an axial sectional view of one of the gears of said construction, and showing adjacent parts;

Figure 9 is a top plan view of another modified construction, illustrating other means for rotating said rotatable member; and

Figure 10 is a side view (enlarged) of a portion of the same, certain parts being sectioned vertically on line 10—10 of Figure 9.

In the embodiment of the invention chosen for illustration by the drawings and for detailed description in the body of this specification, a grinding wheel 1 is shown, rotatable on its vertical shaft 2 by suitable means, as the motor indicated at 3 whose shaft 4 carries a wheel 5 frictionally contacting and driving the wheel 6 carried by the shaft 2 of the grinding wheel. A carrier 7 comprising a head 8 carrying a thin circular disk 9 is rotated in a horizontal plane by its shaft 10 driven by suitable means, as by the belt 20 carried by the pulley 11 on shaft 4 and by pulley 12 on the worm 13 meshing with the worm wheel 14 on the shaft 10.

This carrier's plate or disk 9 has means for holding the work pieces (the piston rings 15) freely-turnably therein, such means being the openings 16 through said disk. The work pieces are held from falling from these openings 16 by resting on the horizontal table portion 17 of the machine's frame, (or the extension 18 of said table), and are travelled into and out of grinding contact with the wheel 1 by the rotation of the carrier.

Inasmuch as the openings 16 in the disk 9 are of larger diameter than the work pieces 15, it is evident that the work pieces are freely turnable in such openings, during the grinding of the work pieces' under sides by their contact with the upper side of the grinding wheel 1 during their travel thereover.

Means are provided for yieldingly pressing the work pieces into such grinding contact with the wheel 1 and for releasing them from such pressed contact therewith. In the construction illustrated, such pressure means comprises lever arms 19 (one lever arm being provided for each opening 16), fulcrumed at 21 on the carrier and having at their outer ends members 22 preferably furnished with yielding pads 23, of felt or the like, which contact the upper sides of the work pieces in the downwardly swung position of the lever arms as seen in Figure 4. These members 22 are loosely mounted, as seen at 24, on the outer ends of the

lever arms so that the pads 23 may closely contact the upper sides of the work pieces. The outer ends of the lever arms are swung upwardly to permit the insertion of the work pieces into the openings 16 by suitable means, as by the cam element 25 fixed (as by the bar 26) against rotation, whose cam under surface 27 is engaged by the inner ends of the lever arms, said ends being preferably furnished with antifriction rolls 28.

Various means for rotating the work pieces during the grinding thereof may be provided, several examples of such means being shown: In Figures 9 and 10, the members 22, rotatably mounted at 24 on the lever arms 19, have gears 29 which mesh in the rotation of the carrier with the gear rack 30 carried by the frame of the machine and are thus rotated while the gears are thus in mesh.

In the construction shown in Figures 5, 6, 7 and 8, the members 22, rotatably mounted on the lever arms at 31 have gears 32 meshing with gears 33 on shafts 34 rotatable on the lever arms and having gears 35 meshing with a rack segment 36 of the fixed cam element 25. When the gears 35 pass beyond this segment, they ride up on the cam surface 27, whereby the members 22 are withdrawn from the work pieces.

Although in the construction seen in Figures 1, 2, 3 and 4, the members 22 are not rotated but serve merely to yieldingly press the work pieces into contact with the grinding wheel, the desirability of rotating said members (by means shown in other views) to frictionally carry the work pieces rotatably with them is manifest, for by such rotation, inequalities in the thickness of the work piece are eliminated by the grinding operation.

When the finished work pieces are travelled by the carrier beyond the edge 40 of the table 17, they are free to fall from the machine and are received by the upwardly extending rod 41. Double rods 41, 41 may be united at their bases in the spindle 42 which turns in a bearing 43.

Suitable means should be provided for feeding the work pieces to the carrier. In Figures 2 and 3, such means (omitted from other views) comprise a cross-sectionally angular vertically-disposed member 44 supported as by a bracket 45, and an opposite member 46 pivotally mounted at 47 and secured in adjusted position by the nut 48, the work pieces being slidable by gravity between these members 44 and 46 and fed one by one into the openings 16.

The invention being intended to be pointed out in the claims, is not to be limited to or by details of construction of the particular embodiment thereof illustrated by the drawings or hereinbefore described.

I claim:

1. In a machine of the character described: a grinding wheel; a carrier having means for holding a work piece freely-turnably therein, and movable to travel the work piece into and out of grinding contact with the wheel; means for yieldingly pressing the work piece against the wheel; means rotatable on an axis eccentric to the wheel's axis for rotating the work-piece in the carrier and in contact with the wheel.

2. In a machine of the character described: a grinding wheel; a carrier having means for holding a work piece freely-turnably therein, and movable to travel the work piece into and out of grinding contact with the wheel; means for yieldingly pressing the work piece against the wheel; means for rotating the work-piece in the carrier and in contact with the wheel.

3. In a machine of the character described: a grinding wheel; a carrier having means for holding a work piece freely-turnably therein, and movable to travel the work piece into and out of grinding contact with the wheel; a lever arm carrying a rotatable member adapted in one position of the lever arm to frictionally rotate and yieldingly press the work piece on the wheel.

4. In a machine of the character described: a grinding wheel; a carrier having means for holding a work piece freely-turnably therein, and movable to travel the work piece into and out of grinding contact with the wheel; a lever arm carrying a rotatable member adapted in one position of the lever arm to frictionally rotate and yieldingly press the work piece on the wheel; means for swinging the lever arm to withdraw said member from the work piece.

5. In a machine of the character described: a grinding wheel; a carrier having means for holding a work piece freely-turnably therein, and movable to travel the work piece into and out of grinding contact with the wheel; a lever arm carrying a rotatable member adapted in one position of the lever arm to frictionally rotate and yieldingly press the work piece on the wheel; means comprising a fixed cam for swinging the lever arm to withdraw said member from the work piece.

6. In a machine of the character described: a grinding wheel; a carrier having means for holding a work piece freely-turnably therein, and movable to travel the work piece into and out of grinding contact with the wheel; a lever arm carrying a rotatable member adapted in one position of the lever arm to frictionally rotate and yieldingly press the work piece on the wheel; means comprising gearing for rotating said member.

7. In a machine of the character described: a grinding wheel; a carrier having

means for holding a work piece freely turnably therein, and rotatable to travel the work piece into and out of grinding contact with the wheel; a lever arm fulcrumed on the carrier and having a member adapted in one position of the lever arm to yieldingly press the work piece on the wheel; means for swinging the lever arm to withdraw said member from the work piece.

8. In a machine of the character described: a grinding wheel; a carrier having means for holding a work piece freely-turnably therein, and rotatable to travel the work piece into and out of grinding contact with the wheel; a lever arm fulcrumed on the carrier and having a member adapted in one position of the lever arm to yieldingly press the work piece on the wheel; means for swinging the lever arm to withdraw said member from the work piece; means for rotating said member.

In testimony whereof I have hereunto set my hand at Grand Rapids, Michigan, this 31st day of March, 1924.

CHARLES E. JOHNSON.