No. 759,112. PATENTED MAY 3, 1904.

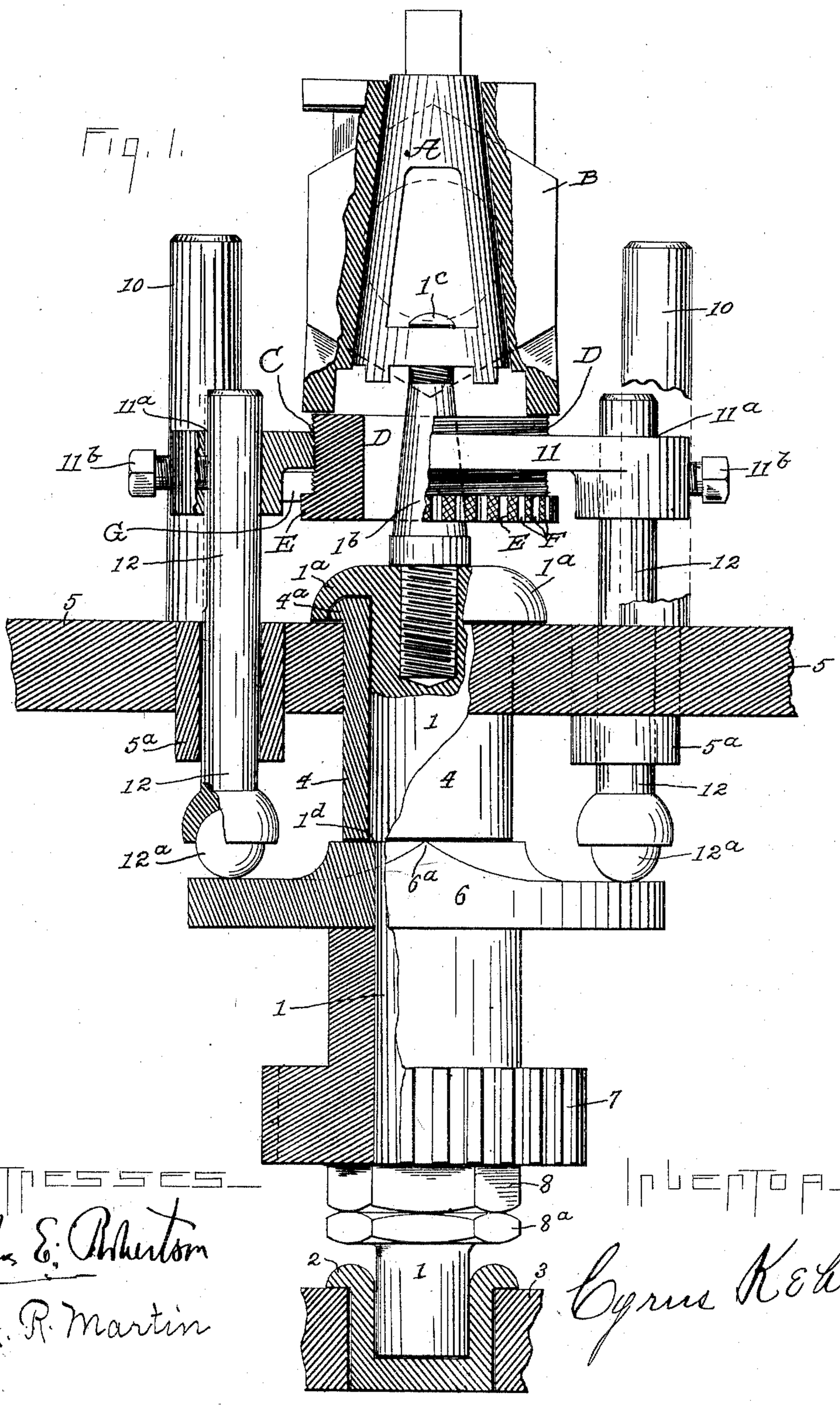
C. KEHR.

GRINDING MACHINE.

APPLICATION FILED OCT. 24, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.



Witnesses

Thos. E. Robertson

J. R. Martin

Inventor

Cyrus Kehr.

No. 759,112. PATENTED MAY 3, 1904.

C. KEHR.

GRINDING MACHINE.

APPLICATION FILED OCT. 24, 1903.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2.

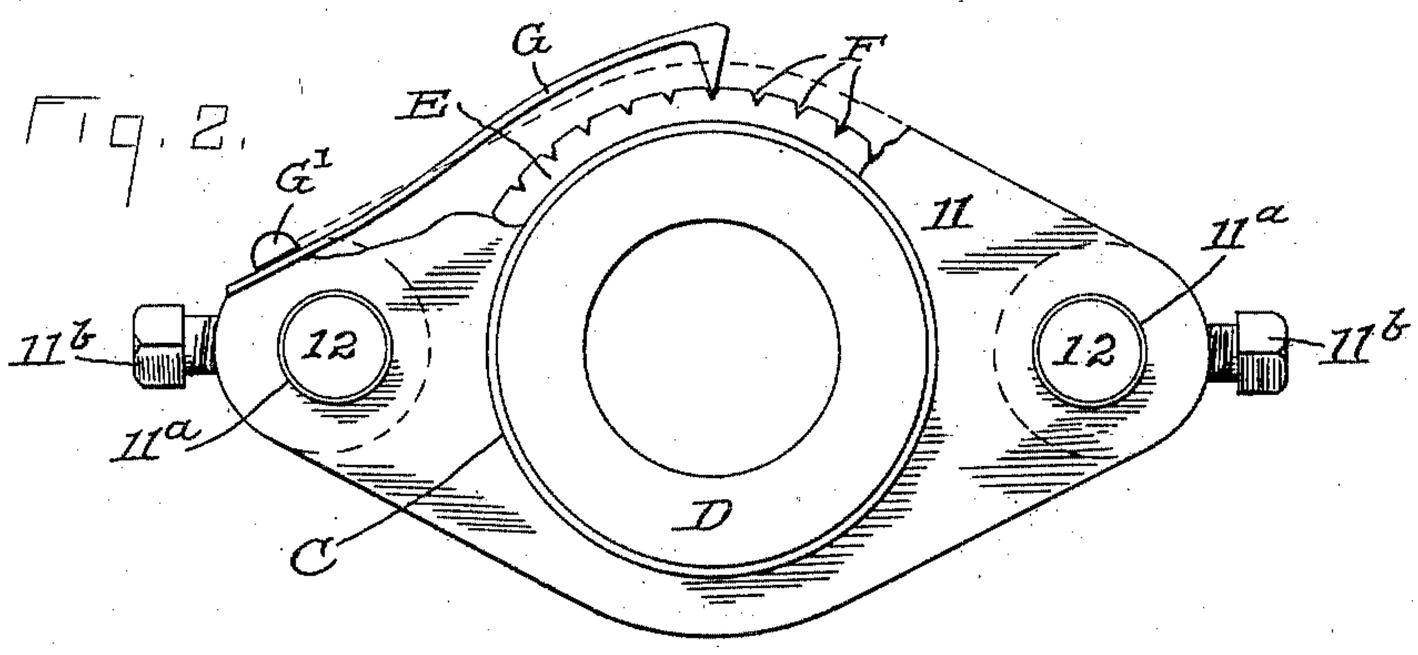


Fig. 3.

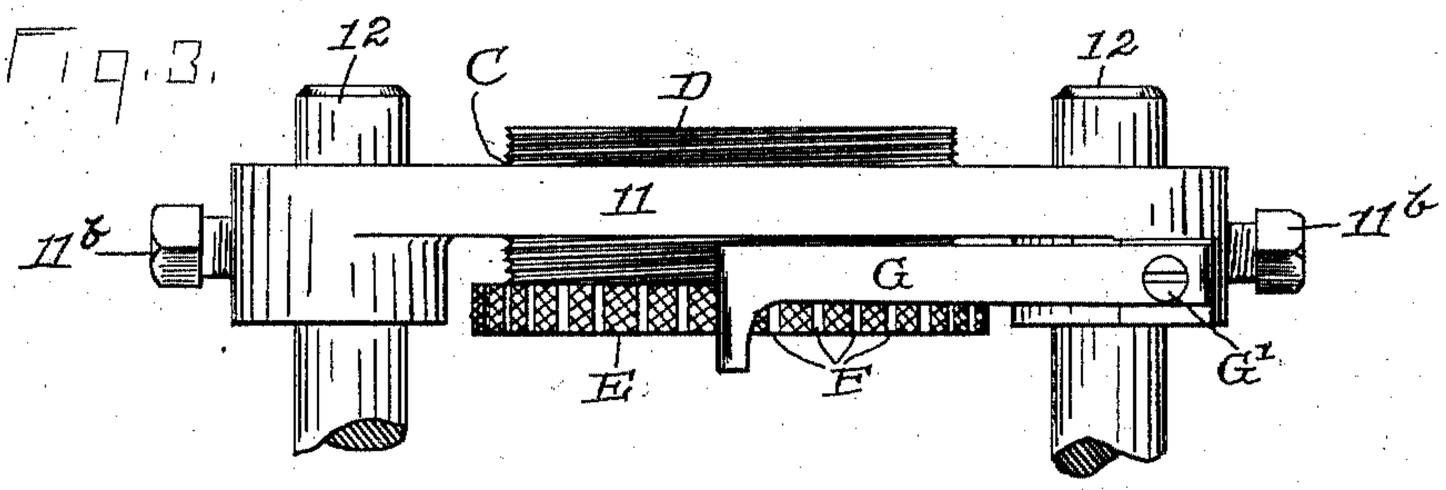
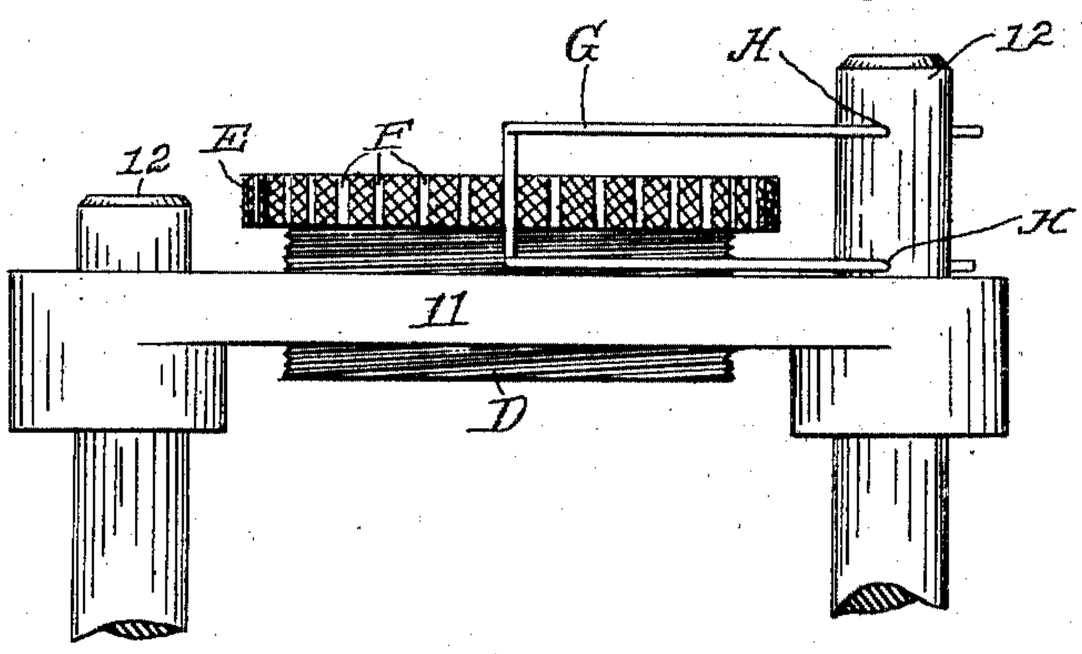


Fig. 4.



Witnesses—

Thos. E. Robertson

J. R. Martin

Inventor—

Cyrus Kehr

No. 759,112. Patented May 3, 1904.

UNITED STATES PATENT OFFICE.

CYRUS KEHR, OF KNOXVILLE, TENNESSEE, ASSIGNOR TO JOHN B. MICHAEL AND THOMAS P. ROBERTS, OF KNOXVILLE, TENNESSEE.

GRINDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 759,112, dated May 3, 1904.

Application filed October 24, 1903. Serial No. 178,333. (No model.)

To all whom it may concern:

Be it known that I, CYRUS KEHR, a citizen of the United States, residing at Knoxville, in the county of Knox and State of Tennessee, have invented a new and useful Improvement in Grinding-Machines, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates particularly to machines for grinding the meeting faces of the members of the rotary valves or cocks—such, for example, as are used for cutting off the flow through air, steam, and water pipes.

My invention has been practically applied to a machine for grinding the cocks used in air-brake equipments, and it is an addition to the machine described in Letters Patent of the United States No. 720,946, granted to John B. Michael and Thomas P. Roberts on February 17, 1903. Such valves or cocks consist of a body or casing having a longitudinal passage and also a transverse passage conforming to a truncated cone and a key or plug in the form of a truncated cone and adapted to fit into said transverse passage. In the manufacture of such cocks the transverse passage in the body or casing and the exterior of the key or plug are formed in a lathe or similar machine with such exactness as is practicable. Then for the purpose of securing a closer fit the key or plug is placed in the casing and the members relatively rotated, oil and emery-powder or similar gritty material being placed between said plug and casing. By this means said members are made to conform closely to each other.

The machine to which my improvement relates carries on the grinding process automatically, so that one operator may attend a plurality of machines or the machine may be constructed in multiple form, so that on the same machine a plurality of cocks may be undergoing the grinding operation simultaneously, and the operation of the machine is such as to grind with accuracy.

In the accompanying drawings, Figure 1 is a sectional elevation of a machine embodying my improvement. Fig. 2 is a detail plan of the supporting-table. Fig. 3 is a rear elevation of the table shown in Fig. 2. Fig. 4 is a rear elevation of a modified form.

Referring to said drawings, 1 is a rotary shaft or mandrel journaled at its lower end in the cup-formed bearing or step box 2 and at its upper end in the bushing 4. Said cup-formed bearing and said bushing are suitably supported, respectively, by plates 3 and 5. The upper end of said bushing 4 is preferably provided with a flange 4^a, and the upper end of the shaft 1 is provided with a corresponding flange 1^a, extending over and around the flange 4^a, whereby said bearing is protected against the entrance of particles of grit, metal, and similar matter falling from the valve supported above said bearing. Rising from the upper end of said shaft 1 is a spindle 1^b. Said spindle may be integral with the shaft; but it is in some cases preferable to make it a separate piece provided with a screw-threaded shank 1^c, tapped vertically and axially into the upper end of said shaft. The upper end of said spindle is screw-threaded, and the key or plug A of the valve which is to be ground has in its base an axial aperture similarly threaded, so that said plug can be screwed rigidly upon said spindle in the manner and position shown in Fig. 1.

B is the second member or casing of the valve. This rests normally upon the plug A by its weight. A stop-post 10 rises from the plate 5 near enough to the spindle 1^b to stand in the path of rotation of said casing or body B. The purpose of said stop-post is to prevent the rotation of said casing. It is to be observed that the drawings present an end view of said casing and that the length of said casing is sufficient to extend to said post 10 when said casing is partially rotated. The drawings show two such posts for each spindle 1^b. It is obvious that in many cases one such post will be sufficient and that other similar devices may be used for preventing the rotation of said casing.

The shaft 1 is contracted from 1^d downward, so that an annular shoulder (with its face directed downward) is formed at 1^d. Immediately below said annular shoulder a cam-plate

6 surrounds said shaft and bears against said shoulder. Upon its upper face said cam-plate has one or more extensions 6^a, and immediately below said cam-plate is a spur gear-wheel 7, surrounding said shaft and bearing against said cam-plate. Below said spur gear-wheel are a pair of jam-nuts 8 8^a, surrounding said shaft and bearing upward against said spur gear-wheel, whereby said wheel and said cam-plate are bound against the shoulder 1^d, so that said cam-plate and said gear become fixed upon and rotate with the shaft 1. Said cam-plate and gear-wheel may be suitably keyed to secure them more firmly to the shaft 1.

Power may be applied in any suitable manner to the gear-wheel 7.

For the greater portion of the grinding operation the mere rotation of the plug within the casing by the rotation of the shaft 1 is sufficient, and this portion of the operation can be carried on by merely rotating the spindle 1^b and the plug mounted upon said spindle and holding said casing against rotation while it rests by gravity or with only slight pressure upon said plug; but to cause a shifting of the grinding material between the meeting faces of said plug and the casing provision is made for the periodical vertical reciprocation of said casing. It is obvious that the same result could be attained by the vertical reciprocation of said plug, and if the axial line of said members is not vertical then said reciprocation is not vertical, but on said axial line. For convenience the movement in the direction whereby the members are brought into engagement with each other is herein termed "over each other," while the movement in the opposite direction is termed the "separating" of the members. By shifting the position of said grinding material the forming of horizontal channels or grooves around said plugs and around the interior of said casing is prevented, and the meeting faces of said plug and casing are made to conform to each other so closely as to prevent the passage of air, steam, or water under pressure. For the reciprocation of said body or casing B a supporting yoke or table 11 is provided. This loosely surrounds the spindle 1^b immediately below said casing. Said table is supported by standards 12, extending from said table downward through the plate 5 to the upper face of the cam-plate 6. In order that the table may be vertically adjustable, said standards pass through vertical apertures 11^a and are bound at any chosen elevation by set-bolts 11^b. Suitable bushings 5^a may surround said standards in the plate 5. The lower portion of each standard 12 may be suitably expanded and recessed to receive an antifriction-ball 12^a.

Since the standards 12 are in the vertical position and seated in the vertical bushings, they are limited to a vertical movement. Said standards are located at opposite sides of the shaft 1, as are also the cam extensions 6^a. Hence with each half-rotation of the shaft 1 said cam extensions will pass beneath and lift said standards and again allow them to fall. Thus with each half-rotation of the shaft 1 and the plug A said standards and the table 11 are lifted and again permitted to fall. Each time said table is lifted it bears against and lifts the body or casing B of the valve, whereby the grinding material located between said plug and said casing is permitted or compelled to shift position vertically. Thus said grinding material is not allowed to move in the same horizontal line more than a portion of a half-rotation. Hence the forming of horizontal grooves or the grinding to undue depth is entirely avoided.

The table 11 may be so set as to almost touch the lower face of the casing when the grinding operation begins. Then the grinding stops as soon as the members have been cut enough to allow the casing to descend and rest upon the table. If it is then found that the parts need further grinding, the table may be adjusted a little lower. Thus said table constitutes a means for limiting the movement of the members of the valve over each other.

As thus far described, said machine is not different from the machine set forth by the above-mentioned Letters Patent No. 720,946. In said machine the vertical adjustment of the table 11 is made by loosening the two set-bolts 11^b and then manually raising or lowering said table and again tightening said set-bolts. Said adjustment is therefore a manual and not a screw adjustment. I have applied to said table a single screw adjustment which can be operated by the hand without the aid of a wrench or other tool and without releasing the table from the standards 12. The central aperture C in the table 11, through which the spindle 1^b extends, is interiorly screw-threaded, and an exteriorly-threaded tubular table-section D loosely surrounds the spindle 1^b and is fitted into said aperture. The upper end of said section presents a suitable area to form a rest for the body B of the valve when the table is elevated. Said section has an axis parallel to and approximately coincident with the axis of the valve, and because it is screw-threaded in said table it may be adjusted toward and from the valve by rotation on its axis. One end of the section D may be provided with an annular flange E, having radial notches F and having the faces between said notches milled or otherwise roughened to facilitate engagement with the hand. In Figs. 1, 2, and 3 said flange is applied to the lower portion of said section, and a spring-presser G is secured by one end to the plate 11 by a screw G′ and bears by its inturned opposite end into one of said notches. The sides of said notches are suitably beveled

to permit the release of said presser when the section is forcibly rotated. The function of said presser is to lock the section against accidental rotation due to jarring during the operation of the machine.

In Fig. 4 the flange E is applied to the upper end of the section, and the spring-presser G is composed of wire folded upon itself to form parallel arms, and said arms extend through and are secured in openings H in the standards 12.

It will be observed that the table 11 may be set approximately to the desired position for engaging the body B when the table is lifted, and then the section D may be turned in the proper direction to raise or lower it for a precise adjustment, and as the operation of grinding progresses said section may be lowered more and more. It will be observed that by this means a very accurate adjustment may be made. This practically amounts to a micrometer adjustment, for a rotation of the section sufficient to change the spring-presser from one notch to the next adjacent notch will change the vertical position of said section a distance equal to only a small fractional part of the distance between said two notches.

It will be understood that various modifications of the parts associated with the herein-described adjusting mechanism may be made without departing from my invention.

I claim as my invention—

1. In a grinding-machine, a rotary support adapted to sustain the two members of a cock, one of said members resting by its weight in engagement with the other, means for preventing the rotation of the upper member with the lower member, automatic mechanism for periodically separating said members in a direction parallel to the axis of said support, and screw mechanism applied to the last-mentioned mechanism and operating parallel to the axis of said support, for varying the distance said members may move over each other, substantially as described.

2. In a grinding-machine, a rotary support adapted to sustain the two members of a cock by engaging the plug while the casing rests by its weight upon said plug, means for preventing the rotation of the casing with the plug, automatic mechanism for periodically separating said members in a direction parallel to the axis of said support, and screw mechanism applied to the last-mentioned mechanism and operating parallel to the axis of said support, for varying the distance said members may move over each other, substantially as described.

3. In a grinding-machine, a rotary support adapted to sustain the two members of a cock by engaging the plug while the casing rests by its weight upon said plug, means for preventing the rotation of the casing with the plug, automatic mechanism for periodically lifting the casing, and screw mechanism applied to said last-mentioned mechanism and operating parallel to the axis of said support, for varying the engagement of said casing, substantially as described.

4. In a grinding-machine, mechanism for supporting the two members of a cock or valve axially in line when in engagement with each other by the weight of one of said members and relatively rotating said members, mechanism for limiting the movement of said members over each other and periodically separating said members, and screw mechanism applied to said last-mentioned mechanism to operate parallel to the axis of said supporting mechanism, for varying the engagement of said last-mentioned mechanism, substantially as described.

5. In a grinding-machine, mechanism for supporting and rotating one member of a cock or valve and mechanism for holding the other member relatively non-rotatably upon the first-mentioned member, mechanism for limiting the movement of said members over each other in one direction and for periodically moving said members from each other on their axial line, and screw mechanism applied to said last-mentioned mechanism to operate parallel to the axis of said supporting mechanism, for varying the engagement of said last-mentioned mechanism, substantially as described.

6. In a grinding-machine, mechanism for supporting and rotating one member of a cock or valve, and mechanism for holding the second member against rotation but leaving it free for parallel movement on its axial line in one direction, mechanism for periodically moving said second member in one direction and limiting its movement in the opposite direction on the axial line of said members, and screw mechanism applied to said last-mentioned mechanism to operate parallel to the axis of said supporting mechanism, for varying the engagement of said last-mentioned mechanism, substantially as described.

7. In a grinding-machine, a vertical rotary spindle for supporting the key or plug of a rotary valve or cock, a periodically-reciprocating, horizontal yoke or table adjacent to said spindle, said table having a central screw-threaded section, and a stop for preventing the rotation of the casing of the valve, substantially as described.

8. In a grinding-machine, a vertical rotary spindle for supporting the key or plug of a rotary valve or cock, a periodically-reciprocating, adjustable horizontal yoke or table adjacent to said spindle, said table having a central screw-threaded section, and a stop for preventing the rotation of the casing of the valve, substantially as described.

9. In a grinding-machine, the rotary shaft, 1, the table, 11, screw-threaded section, D, in said table, standards, 12, and mechanism for supporting and periodically lifting said stand-

ards, and mechanism for holding the valve-casing against rotation, substantially as described.

10. In a grinding-machine, the rotary shaft, 1, the adjustable table, 11, screw-threaded section, D, in said table, standards, 12, and mechanism for supporting and periodically lifting said standards, and mechanism for holding the valve-casing against rotation, substantially as described.

11. In a grinding-machine, the rotary shaft, 1, the table, 11, screw-threaded section, D, in said table, standards, 12, and a cam-plate secured to said shaft for supporting and periodically lifting said standards, and mechanism for holding the valve-casing against rotation, substantially as described.

12. In a grinding-machine, the combination of a rotary shaft, 1, bearing the cam-plate, 6, the table, 11, screw-threaded section, D, in said table, the standards, 12, extending through said table and through suitable guides to the cam-plate, set-bolts securing said standards to said table, and a stop for preventing the rotation of the valve-casing, substantially as described.

13. In a grinding-machine, a vertical rotary spindle for supporting the key or plug of a rotary valve or cock, a periodically-reciprocating, horizontal table adjacent to said spindle, said table embodying a screw-threaded central section and yielding means for locking said section against rotation, and a stop for preventing the rotation of the casing of the valve, substantially as described.

14. In a grinding-machine, a vertical rotary spindle for supporting the key or plug of a rotary valve or cock, a periodically-reciprocating, horizontal yoke or table adjacent to said spindle, said table embodying a central screw-threaded, radially-notched section and yielding mechanism for engaging said notches, and a stop for preventing the rotation of the casing of the valve, substantially as described.

15. In a grinding-machine, a vertical rotary spindle for supporting the key or plug of a rotary valve or cock, a periodically-reciprocating, horizontal yoke or table adjacent to said spindle, said table comprising a central screw-threaded and radially-notched section, and a spring-presser for engaging the notches on said section, and a stop for preventing the rotation of the casing of the valve, substantially as described.

In testimony whereof I have signed my name, in presence of two witnesses, this 14th day of August, in the year 1903.

CYRUS KEHR.

Witnesses:
CHAS. HAYS BROWN,
CARRIE R. IVY.