(No Model.)

R. BIRKHOLZ.

ROLL FOR GRINDING MILLS.

No. 256,628. Patented Apr. 18, 1882.

Fig. 1.

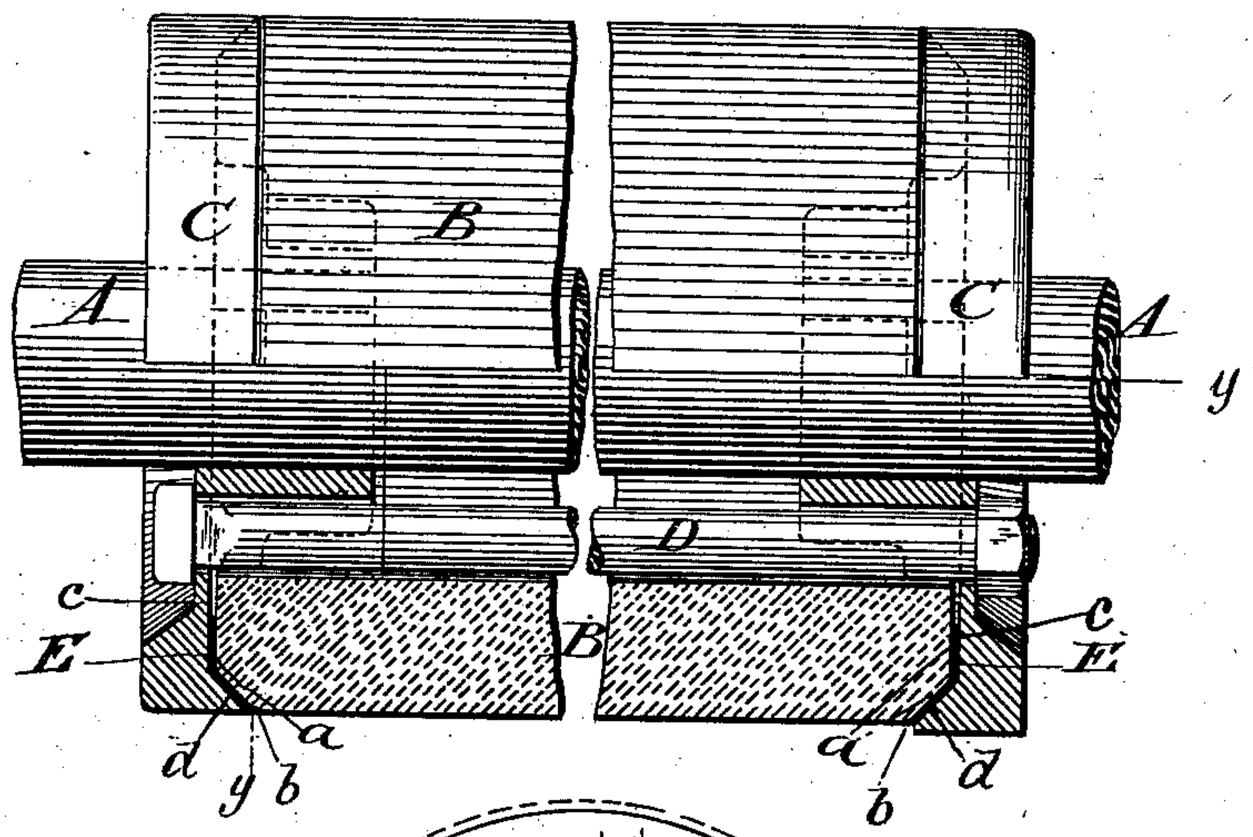


Fig. 2.

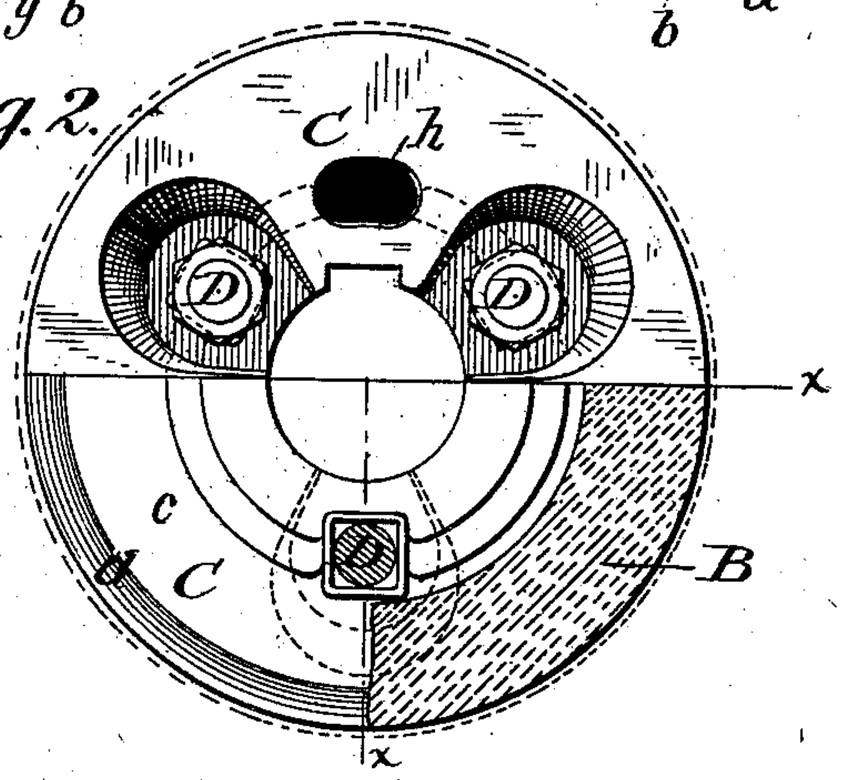
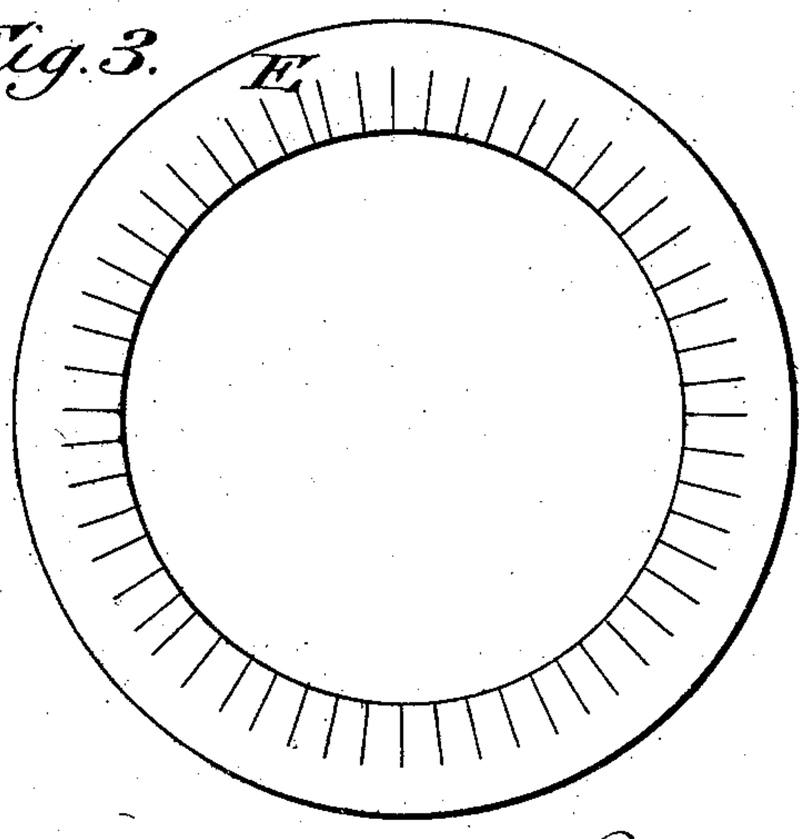


Fig. 3.



WITNESSES

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ROLL FOR GRINDING-MILLS.

SPECIFICATION forming part of Letters Patent No. 256,628, dated April 18, 1882.

Application filed December 6, 1881. (No model.)

To all whom it may concern:

Be it known that I, RICHARD BIRKHOLZ, of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain Improvements in Rolls for Grinding-Mills, of which the following is a specification.

My invention relates to that class of grinding-rolls now in general use in flouring-mills, in which a tubular body or shell of porcelain is mounted on and carried by a central driving-shaft. The requirements are that the surface of the porcelain shall run with the highest attainable degree of accuracy, that the porcelain shall be free from danger of displacement under the strain and pressure encountered in action, that it shall be free from liability to fracture when being fastened in place or when heated by use, that it shall be capable of ready removal from the shaft, and that it shall be as free as possible from a tendency to heat and remain heated when in action. Owing to the extremely brittle and friable character of the porcelain, it is of the greatest importance that the formation of incisions, recesses, and angles in the porcelain shall be avoided, it being found in practice that when they exist the porcelain will, upon receiving the slightest unequal or excessive strain, be fractured, the fracture beginning in the angle or recess.

Various methods of securing the porcelain body have been used with different degrees of success; but all are found open to serious objection. One plan was that of having the square or flat ends of the porcelain body held between flat plates or collars on the shaft. Practice has shown that this would not retain the shell in its concentric position unless an excessive and highly dangerous pressure was applied, and therefore the space around the shaft within the shell was filled with cement, which added to the expense and weight, rendered the removal of the body practically impossible, and caused the roll to heat easily and remain heated, thereby impairing the grinding action and endangering a fracture of the rolls. Another plan proposed was that of clamping the body between plates having conical hubs entering the center of the body. The conical hubs, if fitted to be of service, were very liable to split the porcelain, a very slight heating and expansion of the iron being fatal. Another plan proposed was that of beveling the ends of the porcelain body and forming therein numerous angular recesses or depressions, and then clamping the same between plates or collars provided with beveled faces and with studs to enter the recesses. A complicated and expensive construction of the clamping-plates was shown, and an expensive and unreliable system of keys suggested for securing them in place. Cement was to be introduced in the center to hold the body against radial displacement. This plan is expensive. It involves the use of the dangerous and expensive recesses in the porcelain, and it renders the accurate adjustment by the keys practically impossible.

My invention consists in providing the porcelain body with smooth, unbroken end surfaces beveled off around the outer edge, in combining therewith corresponding end plates mounted on the shaft and provided with unbroken inner faces recessed or beveled inward to fit the ends of the porcelain, and in securing said plates by tie-rods or equivalent means against the porcelain with a sufficient pressure to sustain and carry the same by friction. The beveling of the faces causes the parts to be accurately centered and prevents the body from being displaced or forced out of position. The engagement of the beveled faces over and around the porcelain compresses and binds the same together so as to avoid fracture. By seating the collars or end plates directly and closely upon the shaft, accuracy of adjustment is insured and the difficulties and dangers incident to intermediate keys, collars, &c., avoided.

Instead of filling or closing the interior space of the body of the roll, I leave the same vacant and perforate the end plates, as at *h*, permitting air to circulate freely through the interior and preventing the body from heating.

In order to give additional friction between the body and end plates, I introduce washers of paper or equivalent material, constructed as hereinafter described.

Referring to the accompanying drawings, Figure 1 represents a side elevation of my roll, a portion being shown in section on the line *x x*, Fig. 2. Fig. 2 is an end elevation of the

roll, a portion being shown in section in the line *y y*, Fig. 1.

A represents the central shaft or roller; B, the hollow cylindrical body, of porcelain or equivalent material, made complete in one piece; C C, the end plates or collars; and D D, the tie rods or bolts passing longitudinally through the body and through the end plates, drawing the latter against the body.

Each end of the porcelain shell or body is squared or flattened around the center, as represented at *a*, and the outer edge beveled or tapered, as shown at *b*, the end of the body having, in other words, the form of a truncated cone. It is to be particularly noted that the end surfaces of the roll are continuous, smooth, and unbroken, and that there are no angles or corners therein. Each of the end plates has its inner side recessed and provided, as shown, with the flat and beveled faces *c d*, adapted to fit snugly the end faces, *a b*, of the roll.

The tie-rods are provided at one end with heads and squared necks to prevent them from turning, and at the opposite end with nuts, by turning which the rods are caused to draw the two end plates with great firmness against the body or shell, producing a sufficient friction to insure the rotation of the body by the plates.

It will be observed that the tapered or conical surface *d* of the end plate surrounds the tapered end of the body, thereby forcing the body to and holding it firmly in a position exactly concentric with the shaft. It will also be noted that, as the end of the roll is seated in and surrounded by the conical recessed plate, the plate applies more or less compression to the body, binding the same together and enabling it to resist severe strains without cracking or breaking.

In order to increase the friction and avoid dangers to the porcelain in the event of an uneven pressure being applied, the washers E, of paper or like material, are seated between the porcelain and the end plates, as shown. It is preferred to have these washers bear between both the inclined and the flat surfaces. This is best secured by constructing the washers, as shown in Fig. 3, by providing a ring of paper of suitable size and making radial incisions in its inner edge, as shown. This permits the packing to bend and assume an angular form in cross-section, as shown in Fig. 1. The end plates or collars are seated directly upon the shaft and secured by splines, as shown, or equivalent devices, to prevent them from turning thereon. While it is preferred to use the tie-rods, other suitable means adapted to force the end plates inward positively may be used.

As to any matters and things herein shown and described but not specifically claimed, the right is reserved to make the same the subject-matter of future application.

Having thus described my invention, what I claim is—

1. In a grinding-roll, the tubular porcelain body having the smooth, unbroken ends with beveled faces, in combination with the recessed end plates having corresponding unbroken surfaces, and the means for drawing said plates firmly against the ends of the body, as described and shown, whereby the body is maintained in a central position and prevented from fracturing.

2. The combination of the shaft, the end plates mounted and secured against rotation upon the shaft and provided with smooth tapered recesses, the porcelain body having smooth tapered end, and the tie-rods extended through the body and the end plates, as shown.

3. As a new article of manufacture, a tubular cylindrical porcelain body having on its end the unbroken, squared, and beveled surfaces *a b*, as shown and described.

4. The combination of the porcelain body having the flat and beveled surfaces at its ends, the smooth recessed end plates, the fastening devices, and the washers inserted between the body and end plates and bearing between both the flat and the beveled surfaces, as shown.

5. The porcelain roll having smooth conical ends, seated in and driven by frictional communication with correspondingly recessed end plates urged forcibly toward the roll, substantially as described and shown.

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Witnesses:

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