No. 849,781. PATENTED APR. 9, 1907.

J. W. FULLER, Jr.

METAL RING FOR PULVERIZING OR GRINDING MILLS.

APPLICATION FILED JAN. 26, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

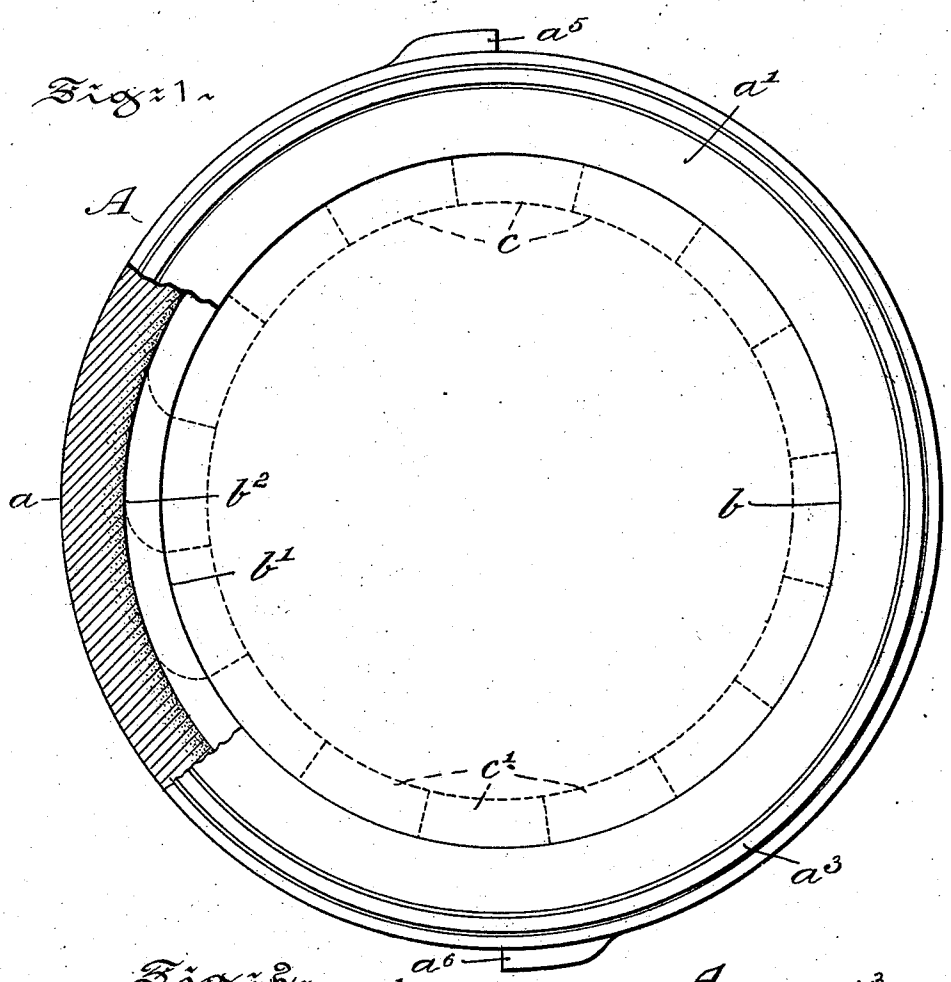
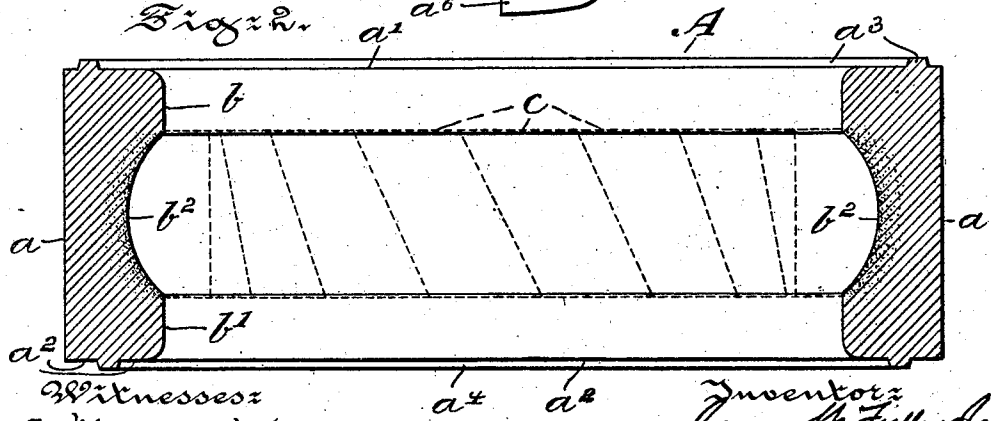


Fig. 2.



Witnesses:
Wilhelm Voigt
Thomas M. Smith

Inventor:
James W. Fuller Jr.,
By J. Walter Douglass
Attorney.

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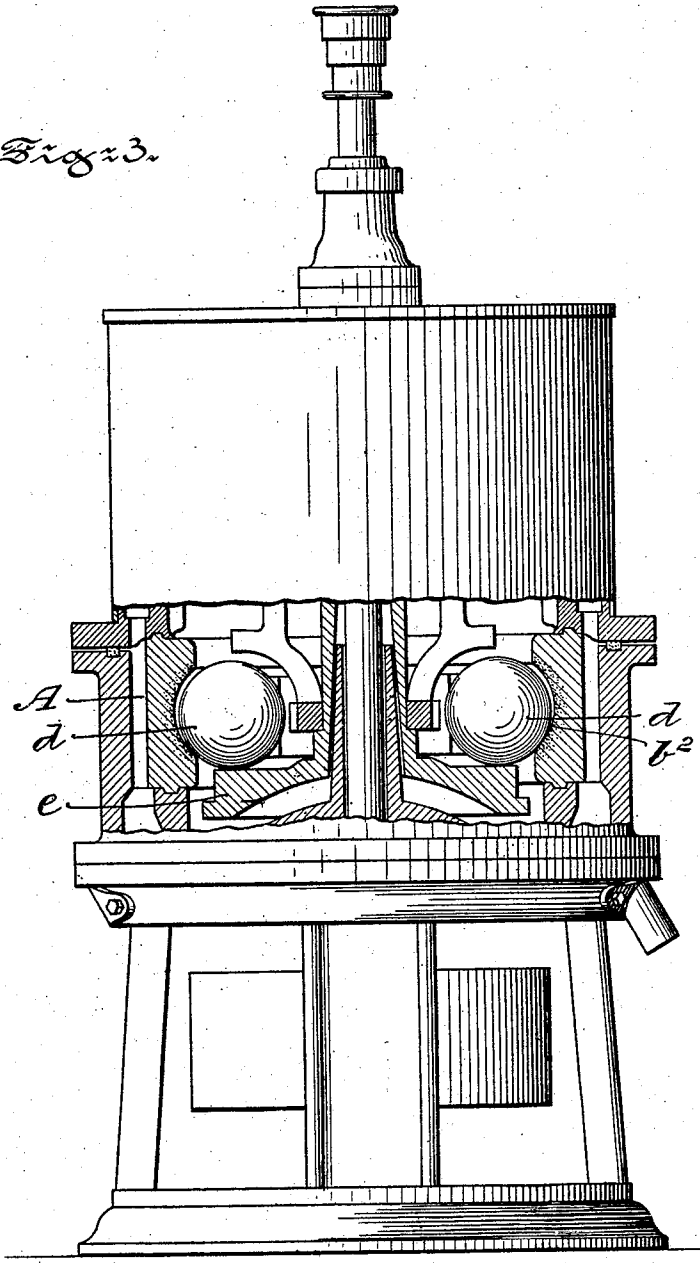
2 SHEETS—SHEET 2.

Fig. 3.



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Inventor:
James W. Fuller Jr.
By J. Walter Douglas.
Attorney.

UNITED STATES PATENT OFFICE.

JAMES W. FULLER, JR., OF CATASAUQUA, PENNSYLVANIA.

METAL RING FOR PULVERIZING OR GRINDING MILLS.

No. 849,781. Specification of Letters Patent. Patented April 9, 1907.

Application filed January 26, 1906. Serial No. 297,930.

To all whom it may concern:

Be it known that I, JAMES W. FULLER, JR., a citizen of the United States, residing at Catasauqua, in the county of Lehigh and State of Pennsylvania, have invented certain new and useful Improvements in Metal Rings for Pulverizing or Grinding Mills, of which the following is a specification.

This invention relates to pulverizing or grinding mills, and more particularly to the metallic rings employed therein for forming the surface upon which the roll or rollers operate. It has been proposed to employ metallic rings for this purpose having a working surface which is quadrantal in cross-section and is chilled excepting at the upper or substantially vertical portion of the quadrant to prevent uneven wear by spherical balls working thereon.

The object of the present invention, however, is to provide a ring which will not crack when the wearing-surface is chilled, or afterward while in use, and according thereto the ring is formed with the actual pulverizing-surface, which may be of any desired shape, wholly chilled and extending at both sides onto unchilled and non-pulverizing portions of the ring.

Referring now to the accompanying drawings, in which is illustrated one convenient form and application of the improved ring, Figure 1 illustrates, partly in top or plan view and partly in horizontal central section, the ring or annulus. Fig. 2 illustrates in vertical central section the ring or annulus having a curved chilled central portion merging into projecting unchilled portions; and Fig. 3 illustrates, partly in elevation and partly in vertical central section, a pulverizing or grinding mill with a ring or annulus of my said invention shown in application thereto.

Referring to the drawings, A represents a wide body-ring or annulus, substantially oblong in cross-section, and preferably of cast-iron. The ring or annulus is provided with a straight exterior surface a and flat upper and lower surfaces a' and a^2. In the example shown the ring or annulus is provided with ribs a^3 and a^4, projecting from the surfaces a' and a^2 thereof and preferably integral with the ring or annulus A. In addition thereto the ring or annulus may be provided with locking-lugs a^5 and a^6. The inner or wearing surface of the ring or annulus is divided into three portions, whereof the upper or lower portions b and b' are straight in outline, while the intermediate portion b^2 is curved or substantially semicircular in cross-section.

In order to impart to the metal forming the inner surface different degrees of hardness or density, the intermediate surface b^2 is subjected to a chilling operation during the casting of the ring or annulus in a mold. (Not shown.) In the mold are placed chilling means, consisting of blocks or sections c, of rhomboidal outline having an outwardly-curved portion formed complementally in outline to that of the curved portion b^2 of the formed ring or annulus A. These sections c are held in the mold in a position in which when the ring or annulus is cast the molten metal will be brought into contact with the sections c, and the contacting surface of the metal about them will thus be chilled. Hence the metal forming the portion b^2 of the ring or annulus A will be of greater hardness or density than the portions b and b' thereof which have been left unchilled in the formation or casting of the said ring or annulus.

The process of chilling the ring or annulus shown and described forms no part of my present invention.

From the foregoing description it will be readily understood that a ring or annulus A is formed or cast, the inner surface of which is composed of metal of differing degrees of hardness or density—that is, that portion of the surface which is directly engaged by the crushing or pulverizing means is of a hardness to readily resist and retard the excessive wearing strain to which such surface is subjected. The unchilled portions b and b' merging into the chilled portion b^2 being not directly engaged by the crushing or pulverizing means do not require to be of the same degree of hardness or density as the intermediate portion b^2 of the ring or annulus A. The surrounding of the chilled portion b^2 by unchilled portions b and b' has proven to be beneficial in the formation or casting of the ring or annulus in that the same will prevent cracking, and thus formation of fissures therein, which takes place when the whole of the inner surface is chilled. Furthermore, the unchilled portions b and b' impart to the ring or annulus a greater degree of elasticity, which during expansion of the ring in use has demonstrated that cracking of the chilled portions b^2 is thereby prevented. The wearing-surface b^2 of the ring or annulus instead of being curved, as shown and described, may be straight, so as to adapt such a ring for

use in various types of pulverizing or grinding mills.

One mode of application of the ring or annulus A is shown in Fig. 3 to a pulverizing or grinding mill such as described in the specification of my concurrent application, Serial No. 297,929, filed January 26, 1906. In this type of mill balls *d* are employed, which by means of a carrier *e* are held with one portion in contact with the chilled portion b^3 of the ring or annulus A.

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

The combination, in a pulverizing or grinding mill, of a metal ring or annulus provided with a concave wholly chilled central portion and unchilled portions on both sides thereof and balls operatively arranged and maintained in contact with the central portion only of said ring, and means adapted to prevent turning and displacement of said ring under the action of said balls and materials acted upon thereby, substantially as and for the purposes described.

In testimony whereof I have hereunto set my signature in the presence of two subscribing witnesses.

JAMES W. FULLER, JR.

Witnesses:
A. J. KAPP,
FERD HEIMPEL.