(No Model.) 2 Sheets—Sheet 1.

E. C. GRIFFIN.

ROLL FOR PULVERIZING MILLS.

No. 520,958. Patented June 5, 1894.

Fig: 1.

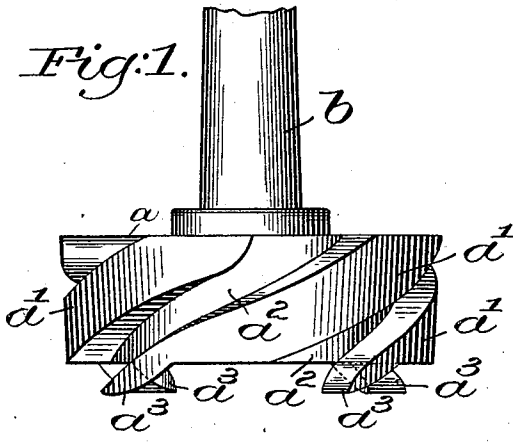


Fig: 3.

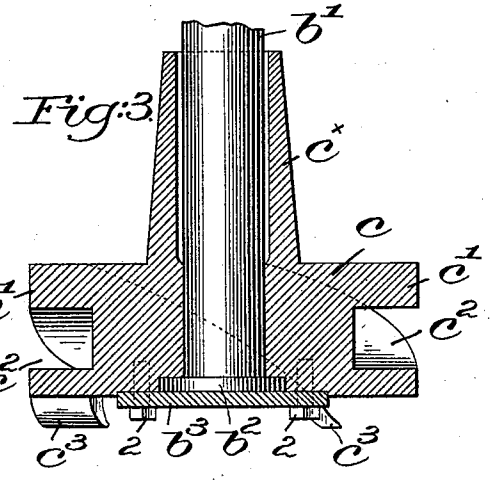


Fig: 2.

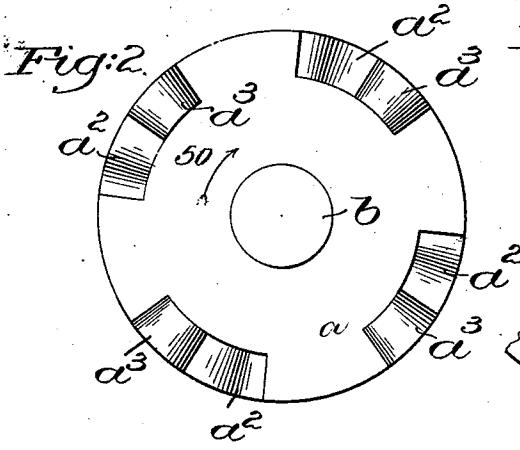


Fig: 4.

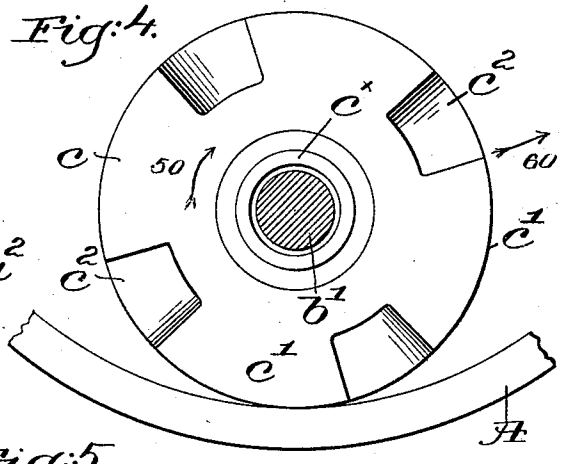
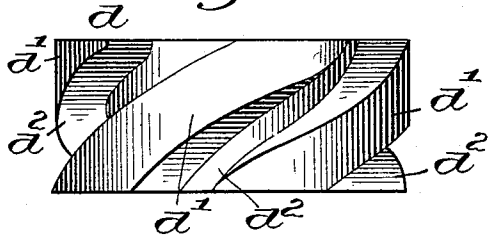


Fig: 5.



Witnesses.
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Louis N. Gowell

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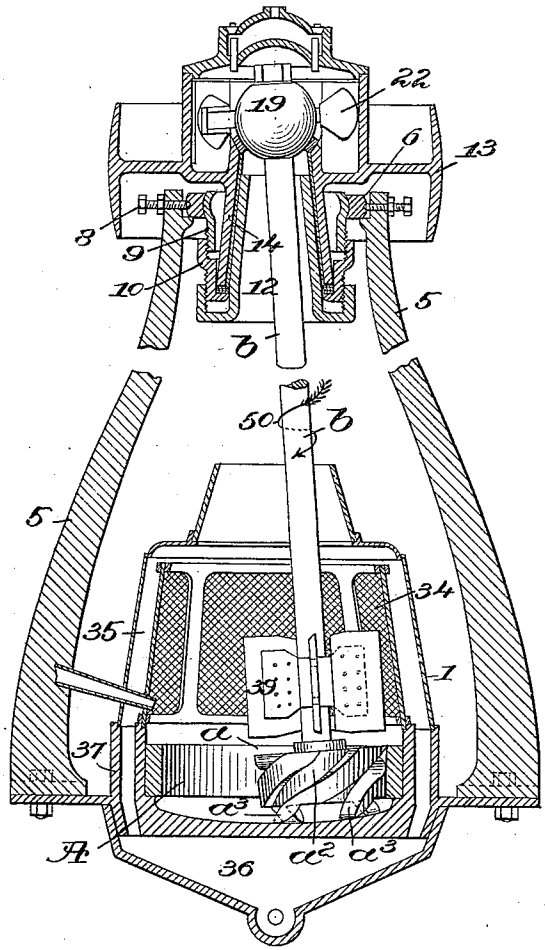
(No Model.) 2 Sheets—Sheet 2.

E. C. GRIFFIN.

ROLL FOR PULVERIZING MILLS.

No. 520,958. Patented June 5, 1894.

Fig: 6.



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UNITED STATES PATENT OFFICE.

EDWIN C. GRIFFIN, OF NEWTON, MASSACHUSETTS.

ROLL FOR PULVERIZING-MILLS.

SPECIFICATION forming part of Letters Patent No. 520,958, dated June 5, 1894.

Application filed June 30, 1893. Serial No. 479,228. (No model.)

To all whom it may concern:

Be it known that I, EDWIN C. GRIFFIN, a subject of the Queen of Great Britain, residing at (West) Newton, county of Middlesex, State of Massachusetts, have invented an Improvement in Rolls for Pulverizing-Mills, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention relates to pulverizing mills wherein the reduction and pulverization of ore or other substances is accomplished by the revolution of a roll or rolls within and against the surface of rings or annular dies, as in United States Patent No. 449,118, dated March 31, 1891, to which reference may be had. In said patent the rolls are held in contact with the rings or dies by centrifugal force when in operation, the contacting surface of the rolls being smooth.

My present invention has for its object the production of an improved form of roll for use in mills of the class described, whereby the operation of the mill is improved, and the work performed more rapidly and satisfactorily. In accordance therewith my invention consists in the combination in a pulverizing mill, of a grinding chamber, and an annular die or ring therein, with a roll having its peripheral crushing surface grooved or channeled, and means to rotate said roll, whereby it is carried around said die and held in contact therewith by centrifugal force, substantially as will be described.

Figure 1 is an elevation of a roll embodying my invention. Fig. 2 is an under side view thereof showing the plows or shoes. Fig. 3 is a vertical sectional view of a modified form of my invention. Fig. 4 is a top view thereof, with a portion of the ring or die against which it rotates. Fig. 5 is a modification to be referred to, and Fig. 6 is a central vertical section of a crushing mill provided with my improved roll.

Referring to Fig. 6, the casing 1 of the grinding chamber, supporting frame 5, centering screws 8, annular support 9 and its extension 10, cylindrical stud 12 supporting the wheel or pulley 13, journal box 14, ball or sphere 19 firmly attached to roll shaft 6, journals 22, screen 34, annular chamber 35 between it and casing 1, hopper 36, passages 37 therefor, and the fans or vanes 39 are and may be all as in United States Patent No. 449,118 referred to, to which reference may be had, like parts having similar reference characters.

The ore is fed into the grinding chamber, herein shown as containing an annular die or ring A, against the inner surface of which a roll, as *a*, is caused to gyrate, the rotary movement and centrifugal force of the roll crushing and pulverizing the material against the die, the arrows 50 in Figs. 2, 4 and 6 showing the direction of rotation of the roll on its own axis, while the arrow 60 in Fig. 4 indicates the direction of travel of the roll relative to the annular die A.

As shown in Figs. 1, 2, and 6 the roll *a* is secured rigidly to the shaft *b*, which may be rotated as in the patent referred to or in United States Patent No. 464,500, dated December 8, 1891, or in any other desired manner, to give the roll a gyrating motion. The peripheral crushing surface *a'* of the roll is grooved or channeled at a^2 in a direction inclined with relation to the axis of rotation or spirally, the said grooves or channels extending preferably from the bottom to the top of the roll, said grooves, as herein shown, being rectangular in cross section and spiral. By thus grooving the crushing surface of the roll the material to be reduced is more thoroughly and effectively distributed between the crushing surfaces, for the rotation of the roll causes the material to pass up through said grooves or channels into the path of the roll, to be acted upon thereby, until the desired degree of fineness is obtained.

The grinding chamber is provided with suitably arranged outlet openings 34, see Fig. 6, through which the material passes when the required degree of fineness is obtained, and the inclined grooves or channels greatly assist in conveying the pulverized material in the direction of the outlet openings through which it is discharged. A finer grinding than required is also obviated thereby, for the discharge is hastened by the steady and continuous passage of the finished material through the grooves.

In Figs. 3 and 4 the roll *c* is adapted to turn on the shaft *b'*, the crushing surface *c'*

of the roll having inclined or spiral grooves or channels c^2. A sleeve or collar $c^\times$ secured to or forming a part of the roll surrounds the shaft and prevents dirt and ground material entering between the shaft and roll. The roll is recessed at its under side to receive the flange or headed portion b^2 of the shaft, over which a cap plate b^3 extends and is secured to the roll by suitable bolts 2, see Fig. 3.

In Fig. 4 a portion of the ring or die A is shown, with the roll in position against it, the roll being shown in elevation and the die partly in section in Fig. 6.

The shaft may be actuated in any suitable manner, as for instance, as shown in United States Patent No. 325,804, the pressure of the roll against the ring or die rotating it upon its shaft.

I have shown in Figs. 1, 2, 3 and 6, the crushing surface as extended below the bottom of the roll, between the grooves, to form plows or shoes a^3, c^3, which stir up the ore or other material below the roll and direct it up into the grooves or channels.

In Figs. 1 to 4 inclusive I have shown the rolls as provided with four grooves, the under side or bottom of each being continued to the plows or shoes. The pitch or inclination of the spiral, or the number or size of the grooves may be varied, according to the character of the work to be done, and so also the shape of the grooves in cross section can be altered.

In the modification shown in Fig. 5 the roll d is not provided with plows or shoes, the top and bottom being plane surfaces, the crushing surface d' having spiral grooves or channels d^2 formed therein for the purposes hereinbefore described.

United States Patent No. 236,497, granted to W. H. Howland January 11, 1881, shows one method of driving a roll such as shown in Fig. 5, that is, a roll with a plane top and bottom, a series of such rolls being loosely supported on end on the bottom of a flanged or pan-like vessel, which is rotated by suitable mechanism, thereby causing the series of rolls to rotate on their own axes and also around the axis of the pan.

I claim—

1. The combination in a pulverizing mill, of a grinding chamber, and an annular die or ring therein, with a roll having its peripheral crushing surface grooved or channeled, and means to rotate said roll, whereby it is carried around said die and held in contact therewith by centrifugal force, substantially as described.

2. In a mill, an annular die located in the pulverizing chamber, combined with a roll having its peripheral crushing surface provided with inclined grooves or channels, and means to rotate said roll, whereby it is carried around said die, and held in contact therewith by centrifugal force, substantially as described.

3. In a mill, an annular die located in the pulverizing chamber, combined with an inclosed roll eccentric thereto and having its peripheral crushing surface provided with a series of spiral grooves or channels extending from the bottom to the top thereof, and means to rotate said roll whereby it is carried around said die and held in contact therewith by centrifugal force, substantially as described.

4. The combination with an annular die located in the pulverizing chamber of a mill, of a roll eccentric thereto and having a grooved peripheral crushing surface, plows or shoes for said roll at the bottom thereof, and means to rotate said roll whereby it is carried around said die and held in contact therewith by centrifugal force, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDWIN C. GRIFFIN.

Witnesses:
JOHN C. EDWARDS,
FREDERICK L. EMERY.