

Apr. 10, 1923.

1,451,472

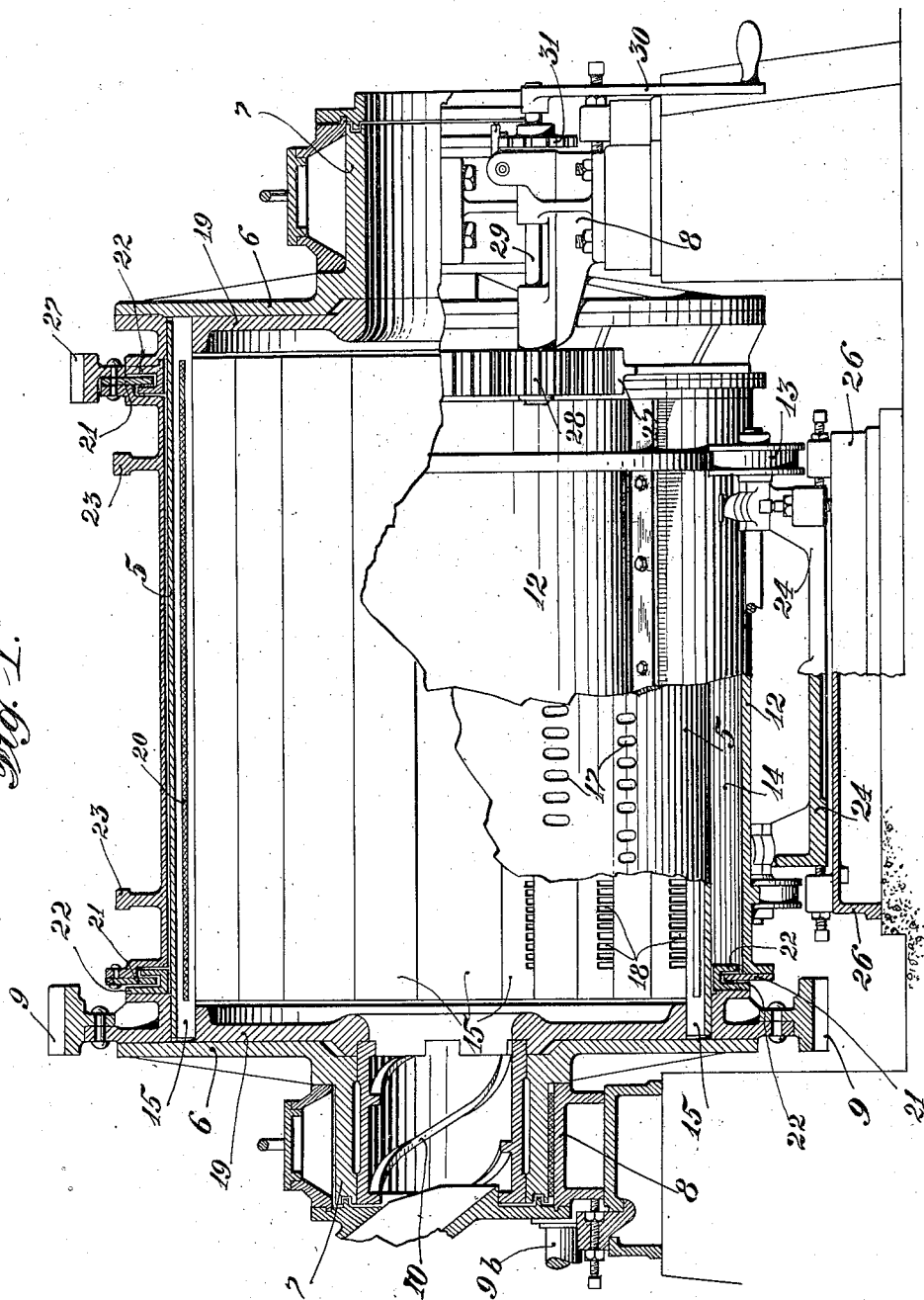
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PULVERIZING MILL

Filed June 1, 1921

2 sheets-sheet 1

Fig. 1.



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Fig. 5.

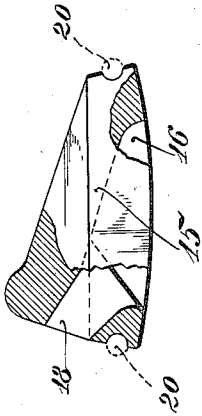


Fig. 3.

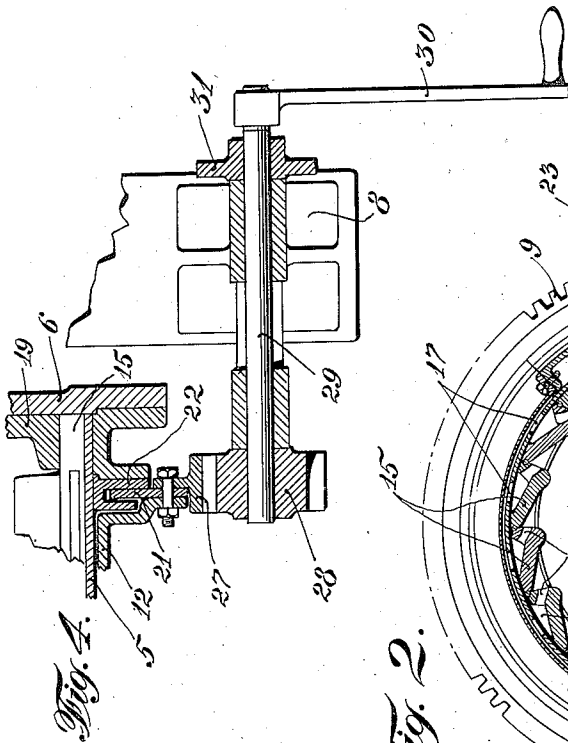
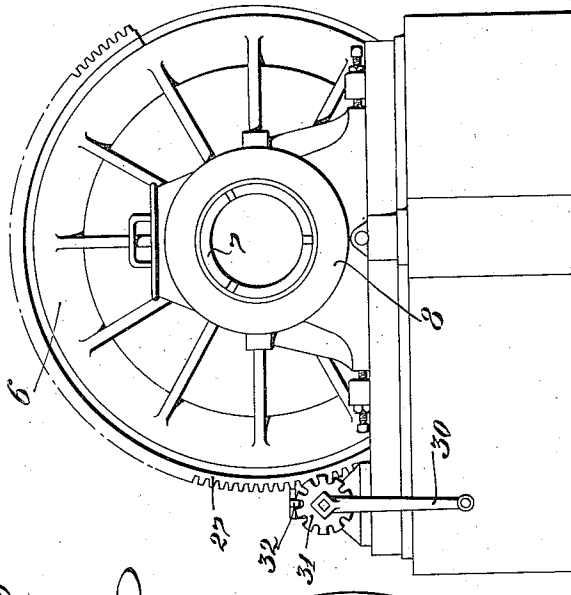
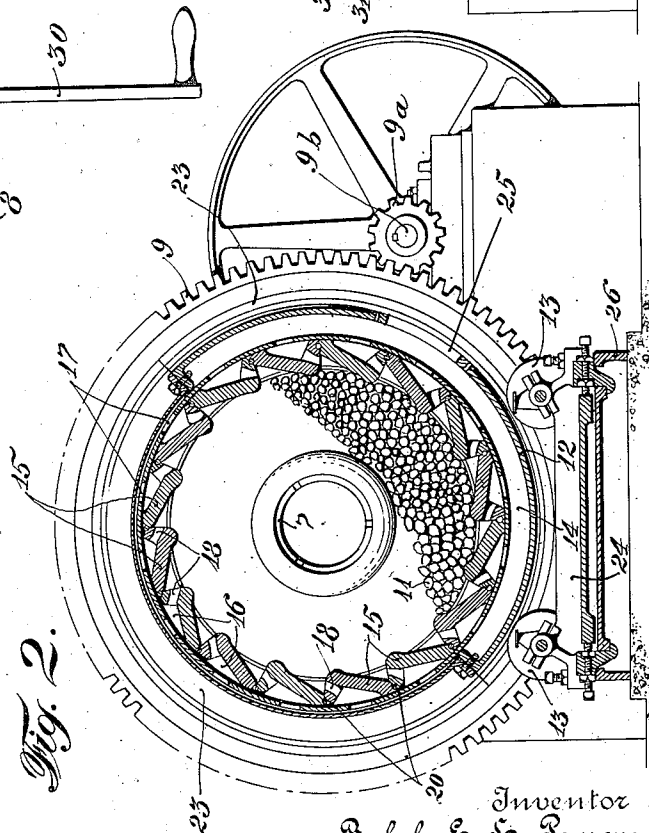


Fig. 2.



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# UNITED STATES PATENT OFFICE.

RALPH E. H. POMEROY, OF CANTON, OHIO.

## PULVERIZING MILL.

Application filed June 1, 1921. Serial No. 474,079.

*To all whom it may concern:*

Be it known that I, RALPH E. H. POMEROY, a citizen of the United States, residing at Canton, in the county of Stark and State of Ohio, have invented a certain new and useful Improvement in Pulverizing Mills, of which improvement the following is a specification.

This invention relates to pulverizing mills of the rotary type in which the material to be ground is introduced into a rotatable shell containing a mass of loose tumbling devices, such as balls, pebbles, blocks, rods, or bars of iron, steel, or other hard material, and adapted to be tumbled about during the rotary movement of the shell to effect the grinding action upon the material to be pulverized.

In my prior application, filed June 30, 1920, Serial No. 393,147, there is shown and described a pulverizing apparatus of this type, in which a current of air is conducted inward through perforations in the periphery of the rotatable shell, and out at one of the hollow trunnions for carrying off the finer particles of the material as the same becomes pulverized, the air being introduced through a stationary casing surrounding the rotatable shell and having partitions for directing the air through that portion of the shell usually occupied by the tumbling mass during the operation of the mill.

According to one of the features of my present improvement, means are provided for adjusting or varying at will the portion or area of the periphery of the rotatable shell at which the air may be introduced, and this, preferably, comprises a movable air chamber or casing adjustably mounted at the outside of the shell and communicating with a portion of the perforations therein. Another feature of my present improvement relates to the lining for the rotatable shell, and comprises improved liners formed in longitudinal sections, each containing an air chamber or chambers communicating with the perforations in the shell and having a series of air ports discharging through a face of the liner into the pulverizing chamber of the mill.

In the accompanying drawings: Figure 1 is a view, partly in elevation, but mainly in vertical longitudinal section, of a pulverizing mill embodying my improvement; Fig. 2, a transverse section of the same; Fig. 3, an end elevation; Fig. 4, a sectional view of

the adjusting mechanism for the air chamber; and, Fig. 5, a view, partly in end elevation and partly in section, of a liner.

According to the preferred construction shown in the drawings, the improved pulverizing mill comprises the rotatable shell, 5, preferably cylindrical, and connected to suitable heads, 6, having hollow trunnions, 7, rotatably mounted in fixed bearings, 8, supported upon suitable bases. Various means may be employed for rotating the shell, such as a driving gear, 9, attached to one of the heads, 6, and engaging a gear, 9<sup>a</sup>, on a power shaft, 9<sup>b</sup>. A feeding mechanism, such as a hollow screw conveyor, 10, mounted in a hollow trunnion, may be employed for feeding the material to be pulverized into the chamber within the shell, which also contains a quantity of loose grinding devices, 11, such as balls, pebbles, rods or bars of hard material, adapted to be tumbled about with pulverable material which is crushed and pulverized by the grinding action of said devices during the rotation of the shell.

The interior surface of the shell is covered with a lining, preferably composed of a series of longitudinal sections or liners, 15, of metal, extending substantially the full length of the shell, and each having one or more air chambers, 16, and ports, 18, leading therefrom through an inclined face of a raised portion of the liner extending above the base of the adjoining section. The base portions of the liners are formed with radial surfaces so as to fit together in the form of a cylindrical arch within the shell, and may be keyed together by metal retaining strips, 20, located in adjoining grooves formed in the engaging faces of adjacent liners. Slots, 17, are formed in the shell to supply air to the chambers, 16, in the liners, 15. End lining plates, 19, may also be fitted to interlock with the ends of the side liners, 15, for protecting the heads, 6, of the mill.

For the purpose of supplying a current of air through a portion of the slots, 17, of the shell, and for adjusting the place at which the air is introduced, I provide an adjustable air chamber, 14, outside of the shell, and this chamber may be formed of a casing, 12, surrounding the shell and rotatably supported independently thereof upon the wheels or rollers, 13. A portion of the casing, 12, is formed to fit upon the outside of the shell, 5, with only sufficient clearance to permit of the free movement of

the rotary shell, while the remainder of casing, 12, preferably about one-half of the cylinder, is made of larger diameter to form the annular space for the air chamber, 14, which then communicates with the slots, 17, over about one-half of the cylindrical surface of the rotary shell.

While the air chamber may be designed in various ways and be adjusted by any suitable means, I have shown the casing, 12, provided with circular flanges or track rails, 23, formed integral with the sections of casing, 12, and adapted to be supported by and roll upon the pairs of wheels or rollers, 13, mounted in a frame, 24, which may be adjustably supported upon a suitable base, 26, beneath the mill. The casing, 12, and the rotary shell, 5, are provided with interlocking or overlapping circular flanges, 21 and 22, respectively, at the opposite ends of the cylinder to serve as an air seal and prevent an excessive leakage of air between the shell and the casing. Air is introduced into the chamber, 14, through the inlet opening, 25, and the air current may be created in any desirable manner, either by a blower discharging into the inlet opening, or by a suction fan (not shown) connected to the outlet through the hollow trunnion, 7, opposite the feeding mechanism.

For the purpose of adjusting the position of the air chamber, 14, circumferentially upon the rotary shell, I have shown a segmental rack, 27, attached to the casing, 12, and meshing with a pinion, 28, on shaft, 29, having a manually operated crank, 30. The casing may then be locked in any desired position by the latch, 32, engaging the notched wheel, 31, fixed on the shaft, 29.

When the mill is in operation with the shell partly filled with the material to be pulverized, and the loose grinding devices, 11, the tumbling mass assumes a position at the lower right hand segmental portion of the shell, as indicated in Fig. 2, and in order that the current of air may be introduced through the peripheral slots, 17, throughout that portion of rotating shell, the casing, 12, is usually adjusted to bring the chamber, 14, to this position, as shown in Fig. 2 of the drawings. The current of air then passes inward from chamber, 14, through the slots, 17, in that portion of the rotating shell occupied by the tumbling mass, through the mass itself and out at the hollow trunnion, 7, carrying with it the fine pulverized material which is then collected by suitable separators in the usual way.

If, owing to different conditions of the material or to speed of operation, it be desired to shift the point at which the air current enters the periphery of the shell, or to vary the admission of air, the outer casing, 12, may be readily adjusted by means of the crank, 30, to shift the position of the air

chamber, 14, circumferentially upon the shell so as to direct the air supply to any desired portion of the shell.

By means of this adjustable feature, the amount of air supplied through the tumbling mass may be regulated, and the portion of the shell at which the air current is introduced may be shifted to suit different conditions, and produce the most efficient operation of the mill.

The improved construction of liners in which the base portions are formed with radial surfaces adapted to fit together as a true cylindrical arch greatly strengthens the lining of the mill and results in more durable and efficient operation.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a pulverizing apparatus, the combination of a rotatable shell having perforations in its periphery and having therein loose tumbling devices for assisting in grinding the material, means for supplying a current of air inward through said perforations, and adjustable means for shifting said air supply relative to the shell so as to be admitted to different portions of the shell.

2. In a pulverizing apparatus, the combination of a rotatable shell having perforations in its periphery and having therein loose tumbling devices for assisting in grinding the material, an air supply chamber on the outside of said shell, and means for moving said chamber to different positions upon the shell.

3. In a pulverizing apparatus, the combination of a rotatable shell having perforations in its periphery and having therein loose tumbling devices for assisting in grinding the material, an air supply chamber on the outside of the shell, and adjusting means for shifting said chamber circumferentially upon the shell.

4. In a pulverizing apparatus, the combination of a rotatable shell having perforations in its periphery and adapted to contain loose tumbling device for assisting in grinding the material, an air supply chamber covering the exterior of a segmental portion of the shell, and means for moving said chamber circumferentially upon the shell.

5. In a pulverizing apparatus, the combination of a substantially horizontal rotatable cylindrical shell having perforations in its periphery, an air supply chamber adjustably mounted on the outside of said shell, and means for shifting the position of said air chamber circumferentially relative to the shell.

6. In a pulverizing apparatus, the combination of a rotatable cylindrical shell having perforations in its periphery, a casing surrounding the shell and having an air

chamber for supplying a current of air to said perforations, and means for shifting said air supply to different portions of the shell.

5 7. In a pulverizing apparatus, the combination of a rotatable cylindrical shell having perforations in its periphery, a casing surrounding the shell and rotatably supported, said casing having an air supply chamber communicating with a portion of  
10 said perforations, and means for shifting said casing circumferentially relative to said shell.

8. In a pulverizing apparatus, the combination of a rotatable cylindrical shell having perforations in its periphery, a casing surrounding said shell, and rotatably supported independently thereof, said casing  
15 having an air supply chamber communicating with a portion of said perforations, and means for shifting said casing relative to said shell.

9. In a pulverizing apparatus, the combination of a rotatable cylindrical shell having perforations in its periphery, a casing surrounding said shell and having an air supply chamber communicating with a portion of said perforations, rollers for rotatably supporting said casing independently  
25 of the shell, and means for adjusting the position of the casing upon the rollers.

10. In a pulverizing apparatus, the combination of a rotatable cylindrical shell having perforations in its periphery, a casing surrounding the shell and rotatably supported, said casing having an air supply chamber communicating with a portion of

said perforations, and a rack and pinion for shifting the position of said casing. 35

11. In a pulverizing apparatus, the combination with a rotatable shell having perforations in its periphery, of hollow liners formed in longitudinal sections each comprising a base portion having radial surfaces adapted to fit together in a circular arch, and a raised portion between said radial surfaces, and having an inclined longitudinal face, said sections having air discharge ports extending through said inclined face. 40 45 50

12. In a pulverizing apparatus, the combination with a rotatable shell having perforations in its periphery, of hollow liners formed in longitudinal sections each comprising a base portion having radial surfaces adapted to fit together in a circular arch, retaining strips between adjoining sections, said sections also having air chambers communicating with said perforations and discharge ports from said chambers to the interior of the shell. 55 60

In testimony whereof I have hereunto set my hand.

RALPH E. H. POMEROY.