Jan. 18, 1927.

1,614,899

A. M. READ

PULVERIZING MACHINE

Filed March 31, 1921

3 Sheets-Sheet 1

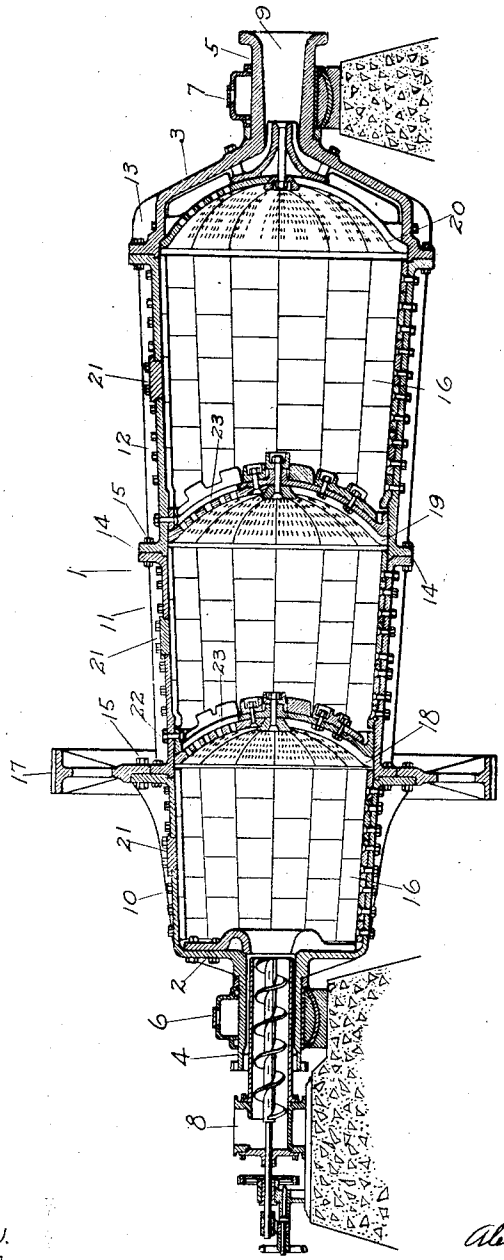


Fig. 1.

WITNESSES.
R. D. Nichols.
Dudley F. Fisher.

INVENTOR
Alexander M Read
BY
H & H Bliss
ATTORNEY

Jan. 18, 1927. 1,614,899

A. M. READ

PULVERIZING MACHINE

Filed March 31, 1921 3 Sheets-Sheet 2

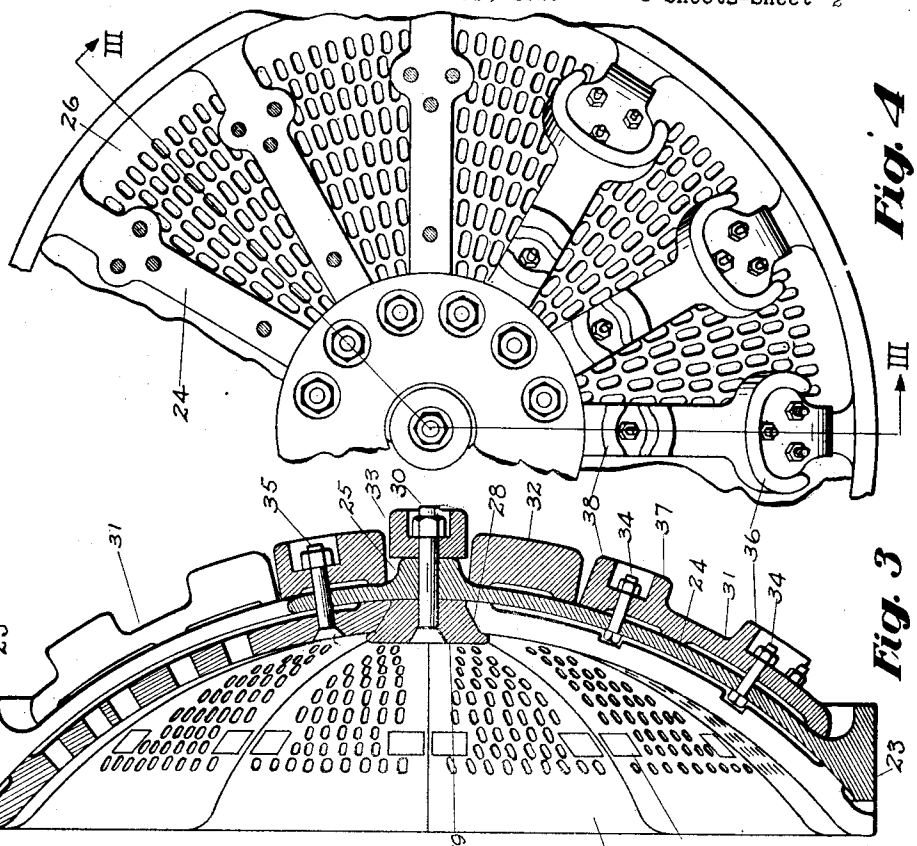


Fig. 4

Fig. 3

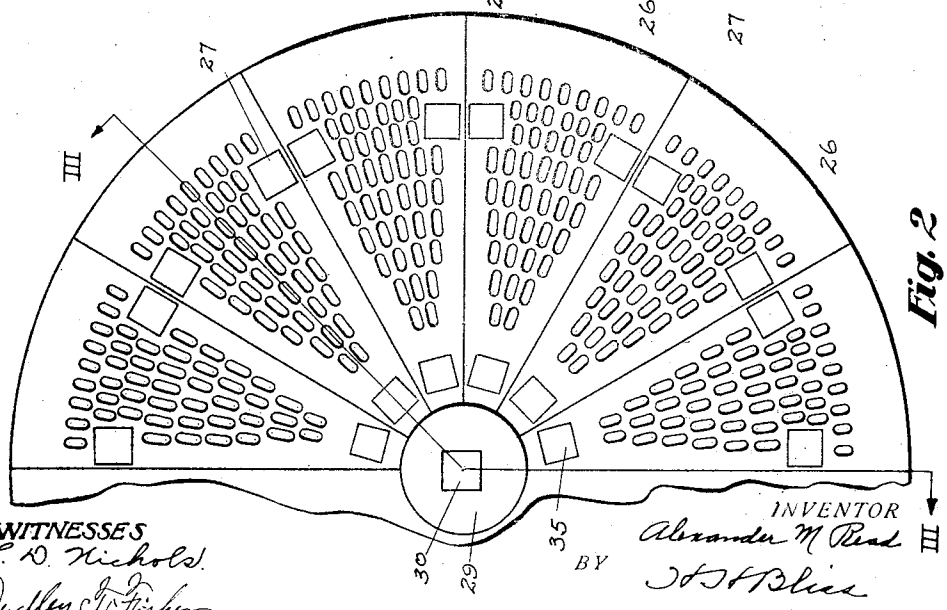


Fig. 2

WITNESSES
L. D. Nichols
Dudley K. Fisher

INVENTOR
Alexander M Read
BY
H. H. Bliss
ATTORNEY

Jan. 18, 1927. 1,614,899

A. M. READ

PULVERIZING MACHINE

Filed March 31, 1921 3 Sheets-Sheet 3

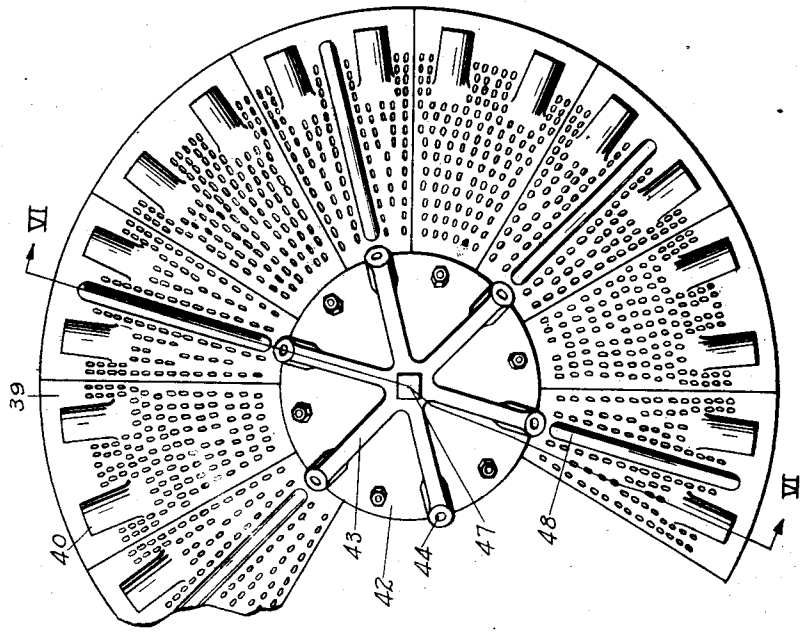


Fig. 5

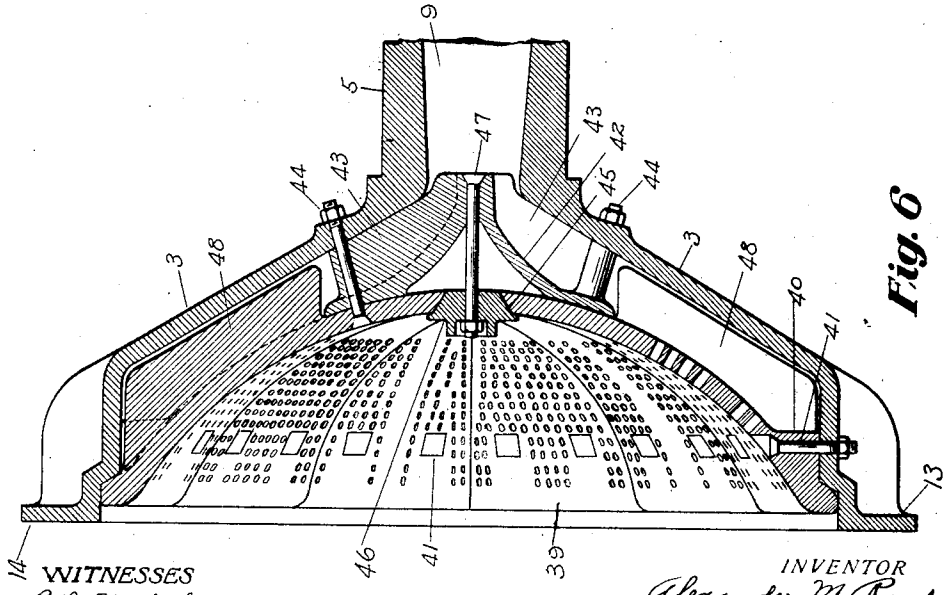


Fig. 6

WITNESSES
R. D. Nichols
Dudley J. Fisher

INVENTOR
Alexander M. Read
BY
W. H. Bliss
ATTORNEY

Patented Jan. 18, 1927. 1,614,899

UNITED STATES PATENT OFFICE.

ALEXANDER M. READ, OF COLUMBUS, OHIO.

PULVERIZING MACHINE.

Application filed March 31, 1921. Serial No. 457,176.

The present invention relates to certain new and useful improvements in pulverizing machines of the class in which each consists of a rotatable barrel wherein the material to be pulverized may be tumbled about with freely movable crushing bodies to be pulverized by contact therewith.

In my co-pending application, Serial No. 348,506, filed December 31st, 1919, I have disclosed a pulverizing machine embodying some of the features of this invention.

It is the especial object of this invention to provide improved devices whereby the finished product will be promptly removed from the interior of the mill.

Another object is to provide an improved arrangement of parts whereby the screens and linings may be conveniently renewed.

Another object is to provide means to protect the screen supporting devices from the erosive action of the material in the pulverizing chambers.

These and other objects will appear in the following specification wherein is set forth the preferred embodiment of my invention, reference being had to the accompanying drawings of which

Fig. 1 is a sectional view taken along the central longitudinal vertical plane of the mill.

Fig. 2 is a fragmentary front elevation on an enlarged scale of one of the screens by which the interior of the mill is divided into a series of pulverizing chambers.

Fig. 3 is a section taken along the line III—III of Fig. 2.

Fig. 4 is a fragmentary rear elevation of the screen illustrated in Figs. 2 and 3, certain parts being removed to reveal other parts.

Fig. 5 is a fragmentary rear elevation of the final screen by which material is removed from the pulverizing chamber.

Fig. 6 is a section taken along the line VI—VI of Fig. 5 to which has been added the parts necessary to show the relation of this screen with the rear end wall of the mill.

Like numerals refer to similar parts in the several figures.

As shown in Fig. 1 my improved pulverizing mill consists of an elongated conical barrel 1 the ends of which are closed by the forward end wall 2 and the rearward end wall 3. Formed on the end walls 2 and 3, concentric with the longitudinal axis of the barrel, are the trunnions 4 and 5 which are rotatably mounted in suitable journal bearings 6 and 7 to support the mill. The forward trunnion 4 is provided with a central aperture through which projects the feeding mechanism 8 by which material is introduced to the interior of the mill, and the rearward trunnion 5 is provided with a central aperture 9 through which the finished product may escape. For convenience of manufacture the barrel 1 is formed of a plurality of sections 10, 11, 12 and 13 which are joined together by suitable abutting flanges 14 through which extend the attachment bolts 15. These sections are preferably formed of steel castings the inner surfaces of which are protected by refractory lining plates 16 in the manner well understood in the grinding art. Attached to one of the flanges 14 is a spur gear wheel 17 adapted to be connected through a train of power transmitting mechanism with any convenient source of power to rotate the mill. At suitable intervals along the length of the mill are positioned transverse screens 18, 19 and 20 which are concave on the side towards the advancing material. The screens 18 and 19 divide the interior of the mill into a plurality of pulverizing chambers in which the material to be pulverized is tumbled about with a multiplicity of grinding bodies and is classified during pulverization relative to the size of its constituent fragments, and the screen 20 is adapted to permit the escape of the finished product while retaining the grinding bodies and unpulverized material within the pulverizing chamber. Each of the sections 10, 11 and 12 is provided with a convenient man hole having a removable cover 21 for the convenience of inspection and repair of the interior parts of the mill.

As the screens 18, 19 and 20 are exposed to the erosive action of the material in the several pulverizing chambers, I have provided a peculiar construction adapted to the convenient renewal of the worn or broken parts, and by which the supporting elements, fastenings, etc., are protected from the direct action of said material and grinding bodies.

As the construction of the screens 18 and 19 are similar, a description of one will apply to both. Secured to the walls of the barrel 1 in any suitable manner, as by the attachment bolts 22, is a spider 23, formed

with a marginal supporting portion 23' which rests upon the inner wall of the barrel, and having radially extending arms 24 and a central hub portion 25, and to this spider are attached the sectoral perforated plates 26 which constitute the screen above referred to. These screen plates 26 are preferably formed of a highly refractory alloy of iron, and they are secured to the arms 24 of the spider by attachment bolts 27 the heads of which are countersunk into the material of the screen plates 26 in such manner as to expose the least possible surface of the bolt head to the erosive action of the material as it slides over the surface of the screen. At their inner ends the plates 26 are cut off to form the beveled edges 28 which are engaged by a conical wedge member 29 adapted to hold the screen sections securely in place. The wedge 29 is secured to the hub portion 25 of the spider by a suitable draw bolt 30 the head of which is suitably countersunk into the material of the wedge. The rearward surfaces of the spider are protected by the shield members 31, 32 and 33, composed of refractory material similar to that of the linings of the mill, and secured in position by the bolts 30, 34 and 35. The shield member 31 is provided with outwardly projecting flanges 36, 37 and 38 which screen the nuts upon the attachment bolts from the direct action of the material, and recesses are formed in the shield members 32 and 33 which similarly protect the nut upon the bolts 30 and 35.

The final screen 20 at the end of the pulverizing chamber is formed of sectoral plates 39 at the outer ends of which are formed the bosses 40 through which extend the attachment bolts 41 to secure said screen segments to the wall of the final section 13 of the barrel. Attached to the end wall 3 of the mill, concentric with and extending into the discharge aperture 9, is a conical deflecting member 42 the purpose of which will presently appear. Formed on the rearward surface of the deflecting member 42 are rearwardly extending blades 43 which contact with the inner surface of the end wall 3, and through apertures in these blades extend the attachment bolts 44, the heads of which are countersunk in the material of the screen segments 39. These attachment bolts securely hold the segments 39 and the deflecting member 42 in operative relation with the end wall 3 of the mill. The inner ends of the screen segments 39 are cut off to form beveled edges 45 which are engaged by a conical wedge member 46 secured to the deflecting member 42 by the draw bolt 47. Formed on the rearward surface of the screen plates 39 are radially extending blades 48 in alignment with the blades 43 of the deflecting member 42, and these blades project outwardly into close proximity with the end wall 3 of the mill. By these radial blades the space between the final screen 13 and the end wall 3 is divided into sectoral compartments adapted to receive the fully pulverized material as it flows through the apertures of the screen from the pulverizing chamber. As the barrel revolves the material in each of these sectoral compartments is carried upwardly by the radial blades 43—48 and slides downwardly and rearwardly over the rearward surfaces of the screen plates 39 and deflecting member 42 into the discharge aperture 9. The inner surface of the discharge aperture 9 is formed conical and expands outwardly to cause the material discharged from said sectoral compartments to travel outwardly and be discharged at the rearward end of the trunnion 5.

In operation each of the pulverizing chambers is provided with a quantity of grinding bodies, preferably composed of a highly refractory alloy of iron, the size and number of which bears a definite relation to the size of the fragments constituting the material which is being ground in the respective chambers. Relatively coarse material is fed into the first chamber by the feeding mechanism 8, and as the size of its constituent fragments is reduced it travels longitudinally of the mill through the successive screens and is finally discharged at the rearward end of the mill in the manner above described.

What I claim is:

1. In a machine of the class described, the combination with a substantially horizontal barrel adapted to revolve about its longitudinal axis, of a transverse partition dividing the interior of the barrel into pulverizing compartments, said partition comprising radially extending arms attached to said barrel and sectoral perforated plates secured to said radial arms, and means to protect said arms from the erosive action of material and grinding bodies within the compartments as the barrel revolves.

2. In a machine of the class described, the combination with a substantially horizontal barrel adapted to revolve about its longitudinal axis, of a transverse partition dividing the interior of the barrel into pulverizing compartments, said partition comprising a spider having a central hub portion and radially extending arms attached to said barrel and sectoral perforated plates secured to said spider, and means to protect said spider from the erosive action of material and grinding bodies within the compartments as the barrel revolves.

3. In a machine of the class described, the combination with a substantially horizontal barrel adapted to revolve about its longitudinal axis, of a transverse partition

dividing the interior of the barrel into pulverizing compartments, said partition comprising a screen support, a screen, means to attach said screen to said support, and means to protect said support and said attachment means from the erosive action of material and grinding bodies within the compartments as the barrel revolves.

4. In a device of the class described, the combination with a substantially horizontal barrel adapted to revolve about its longitudinal axis, of a transverse screening partition dividing the interior of the barrel and comprising a plurality of sectoral plates and means to secure said plates in fixed relation in said barrel, said means comprising a spider-like supporting member having a rim portion resting upon the inner wall of the barrel and a hub connected to said rim by radial arms, and means for securing the plates to said arms.

5. In a device of the class described, the combination with a substantially horizontal barrel adapted to revolve about its longitudinal axis, of a transverse screening partition dividing the interior of the barrel and comprising a plurality of sectoral plates and means to secure said plates in fixed relation in said barrel, said means comprising a spider-like supporting member having a rim portion resting upon the inner wall of the barrel and a hub connected to said rim by radial arms, means on the barrel engaging said rim to hold the member in fixed position, and means for securing the plates to said arms.

6. In a device of the class described, the combination with a substantially horizontal barrel adapted to revolve about its longitudinal axis, of a transverse screening partition dividing the interior of the barrel and comprising a plurality of sectoral plates and means to secure said plates in fixed relation in said barrel, said means comprising a spider-like supporting member having a rim portion resting upon the inner wall of the barrel and a hub connected to said rim by radial arms, means for securing the plates to said arms, said securing means passing through the arms, and means on the arms for shielding the same and said securing means from the erosive action of the material within the barrel.

7. In a device of the class described, the combination with a barrel adapted to revolve about its longitudinal axis, of a transverse partition dividing the interior of the barrel and comprising a plurality of sectoral perforated plates, a spider-like member for supporting said plates in fixed position and rigidly secured within the barrel, said member having radially extending arms, means passing through the arms and serving to secure the plates thereto, and devices upon the rear surfaces of said arms for protecting the same against the erosive action of the material within the barrel.

8. In a device of the class described, the combination with a barrel adapted to revolve about its longitudinal axis, of a transverse concave partition dividing the interior of the barrel and comprising a plurality of sectoral perforated plates, a spider-like member for supporting said plates in fixed position and rigidly secured within the barrel, said member having radially extending arms, means passing through the arms and serving to secure the plates thereto, and devices upon the rear surfaces of said arms for protecting the same against the erosive action of the material within the barrel, said devices being provided with sockets for receiving and shielding the said securing means.

In testimony whereof, I affix my signature.

ALEXANDER M. READ.