

April 28, 1931.

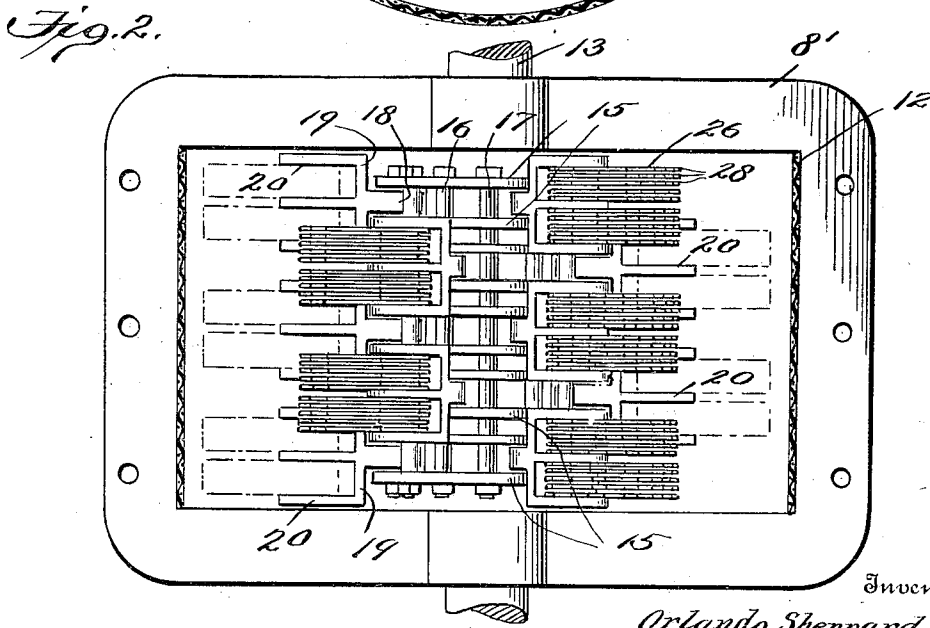
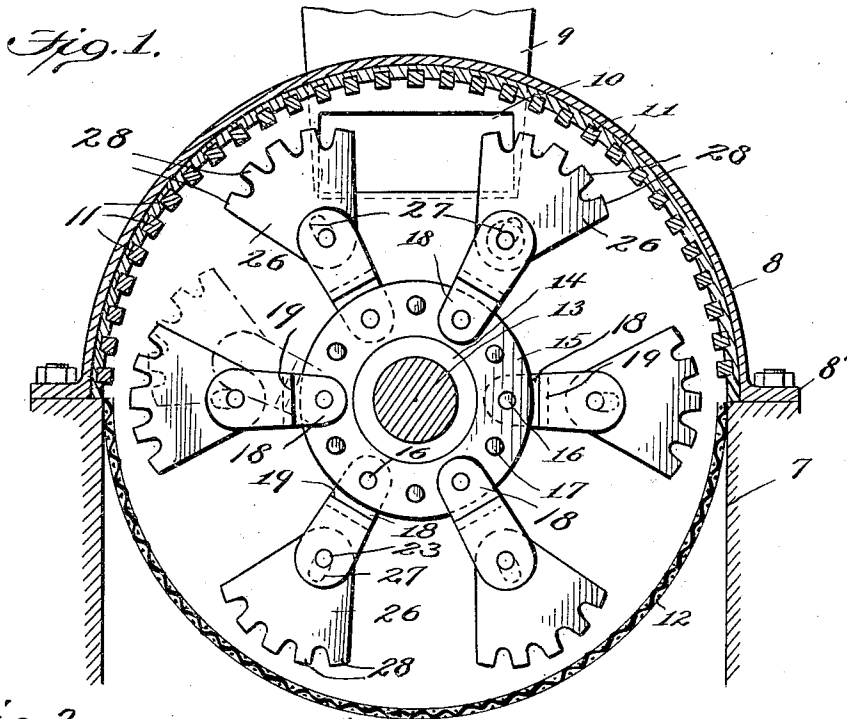
O. SHEPPARD, JR

1,803,148

GRINDING MACHINE

Filed Feb. 19, 1929

2 Sheets-Sheet 1



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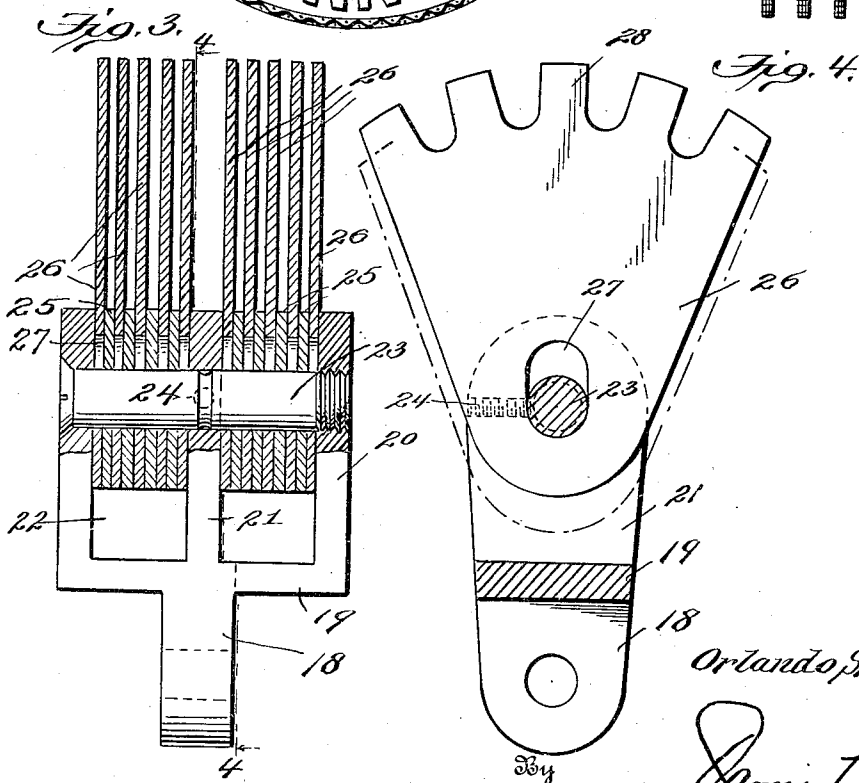
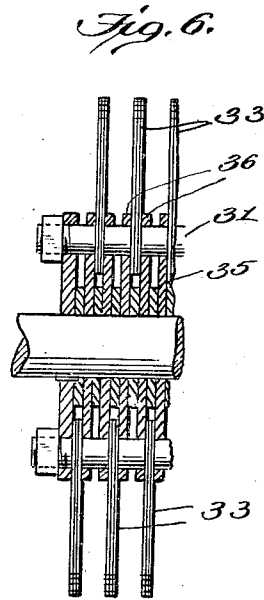
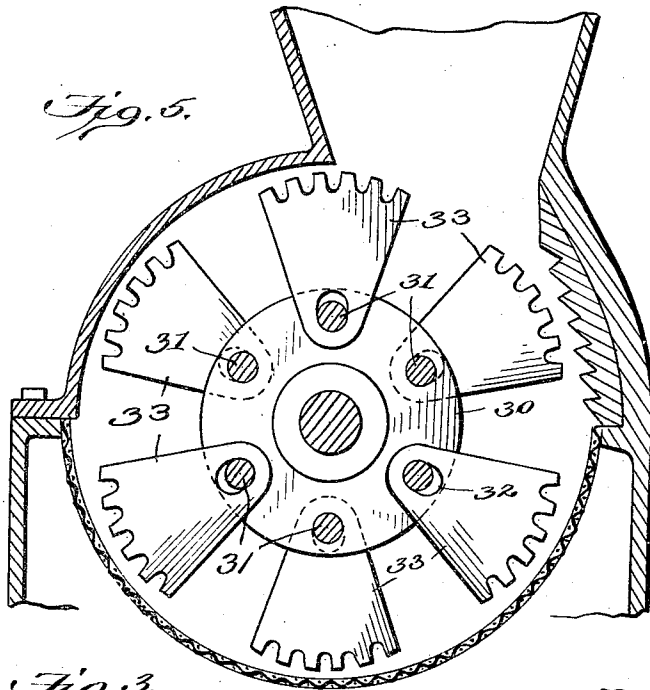
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2 Sheets-Sheet 2



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# UNITED STATES PATENT OFFICE

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## GRINDING MACHINE

Application filed February 19, 1929. Serial No. 341,119.

The present invention relates to improvements in grinding machines, one object of the invention being the provision of a machine of this character which is especially designed for grinding feed, in which at some time foreign substances are introduced which tend to injure the grinding elements, the movable elements in the present structure being so arranged as to give when too rigid an object is encountered, so that there is no danger of injuring the rotating part or the fixed part of the present machine.

Another object of this invention is the provision of a novel mounting of rotor-carried element, the element of which is mounted for independent swinging movement in the circumferential line of the rotor, and also a slight radial movement, there being provided means for limiting the swinging movement of said element.

A still further object of this invention is the provision of a segmental blade for a grinding machine of this type, the arcuate edge of which is provided with teeth and which is constructed with a novel method of pivoting the same so that the blade has the desired swinging movement due to the rotation of the rotor, and also due to the meeting of any unusual obstruction within the machine, said blades being adapted to be arranged in proper order throughout the periphery of the rotor so as to produce the best grinding effect in a machine of this character.

In the accompanying drawings:—

Figure 1 is a vertical sectional view through the grinding machine showing the rotor in side elevation with broken lines indicating the position of one of the blade members when engaging a foreign body;

Figure 2 is a top plan view with the upper portion of the casing and fixed grinding element removed, showing the rotor in top elevation;

Figure 3 is an enlarged detail view, partially sectional, and elevational, of one of the blade-carrying members of the rotor with the blades positioned thereon;

Figure 4 is a section taken on line 4—4 of Figure 3;

Figure 5 is a view similar to Figure 1 showing a modified form of blade mounting; and

Figure 6 is a section through the rotor shown in Figure 5.

Referring to the drawings, and more particularly to Figures 1 to 4, the numeral 7 designates the base or support for the present grinding machine, which consists of the semi-cylindrical upper portion 8 having the attaching flange 8' and with the feeding hopper 9 which opens at 10 into the casing to deliver the material to be ground. The inner surface of the portion 8 of the casing is provided with the transversely disposed and fixed grinding elements or slats 11, while carried in the lower portion of the machine and within the space 7 thereof is a semi-cylindrical screen 12 through which the pulverized or ground material is delivered.

The shaft 13 extends transversely of the grinding machine and has fixed thereto the rotor 14 which is composed of a plurality of spaced disks 15 secured together by means of the retaining rods 16 and 17, said rods 16 and 17 being arranged alternately throughout the circumference of the disks, and in addition to acting as tie-rods, also act, as will presently appear, for supporting the pivoted grinding elements and for acting as a limiting means for the swinging movement thereof. Each grinding element which is carried by the rotor consists of an apertured leg or tongue 18 adapted to be pivoted between the disks 15 and upon the respective rods 16 of the rotor, the same being permitted circumferential swinging movement during the rotation of the rotor and provided with the bar or bridged portion 19 which, as shown in dotted lines in Figure 1, coacts with the periphery of one of the disks 15 to limit the swinging movement of the complete element in either direction.

Formed integral with the bar or bridged portion 19 are three supports or fingers 20, 21 and 22 which, in turn, are apertured to receive the screw 23, said screw being locked against rotation through the instrumentality of the set screw 24 mounted in the support 21. Disposed upon this screw between the respective supports or fingers 20, 21 and 22 are a

plurality of alternating disks 25 and blades 26, these blades 26 being mounted for independent swinging movement upon the bolt or screw 23 so as to assume independent positions during the rotation of the rotor should they individually engage foreign substances, such as gravel, metal, or the like, during the grinding of the material.

Each one of these blades 26, as clearly illustrated in Figure 4, is made segmental in outline and is provided with the elongated opening 27 which fits upon the bolt 23, and thus, in addition to permitting the blade to have individual swinging movement, permits a longitudinal movement thereof so that the toothed periphery 28 of the blade may assume the respective full and dotted line positions as shown in Figure 4 during the rotation of the complete mechanism.

By making the blade-carrying member 18 as illustrated, the same can be positioned between the disks 15 by the removal of the tie-rods or bolts 16, and in operation it is preferable that these members be staggered, as illustrated in Figure 2, so that they do not interfere one with the other during the independent movements imparted thereto by the rapid rotation of the rotor and the engagement of the respective blades of these members with any foreign hard substances that would normally interfere with the normal grinding action.

It will also be noted that each blade has independent movement separate from the carrying member and that, therefore, smaller substances that would tend to bend or break the blade or jam the machine will be accommodated.

In the structure shown in Figures 5 and 6, the rotor is composed of a plurality of disks 30 carrying the tie-rods or bolts 31, the spacing washers 35 and the enlarged disks 36, said disks 36 being arranged in pairs so as to receive therebetween, and for oscillatory movement upon the tie-rods or bolts 31, the respective segmental blades 33, the apertures 32 of which are similar to those shown in Figures 3 and 4, except that the blades are mounted directly upon the rods and are not carried by the independent carrying members.

From the foregoing description, taken in connection with the drawings, it is evident that with a rotor constructed according to and embodying the present invention, the grinding elements are of the hammer type and are so mounted and constructed as to have independent circumferential swinging movement and radial sliding movement with regard to the fixed grinding elements of the machine, thereby accommodating themselves to any hard foreign substances that may enter the grinding chamber with the material to be ground, thus producing a machine with the minimum liability of breakage due to the

introduction of foreign substances during the grinding operation.

What is claimed is:—

1. A grinding element for hammer mills, comprising a bar having a plurality of fingers projecting from one of its faces, and having on its opposite face means for attaching it to the rotor of a hammer mill, and a plurality of flat, relatively close, substantially segmental plates mounted adjacent their rear ends between the fingers of said bar to individually slide longitudinally and to individually swing relatively to one another and to said fingers, each of said plates having the edge of its outer end serrated and formed as the arc of a circle.

2. A grinding element for hammer mills, comprising a blade carrier including a bar having a tongue formed integrally therewith adapted for pivotal connection to a rotor and projecting from one of the faces of said bar and a plurality of fingers formed integrally with said bar and projecting from its opposite face, said fingers having aligned transverse apertures and said tongue having an aperture parallel to the apertures of said fingers, a plurality of relatively close, substantially segmental flat plates mounted side by side between the fingers of said blade carrier, each of said plates having an elongated aperture adjacent one of its ends in alignment with the apertures of the other plates and having the edge of its opposite end serrated and formed as an arc of a circle, and a pin extending through the apertures of said fingers and of the blades mounted therebetween and on which said blades are individually free to slide longitudinally and individually free to swing relatively to one another and to said fingers.

In testimony whereof I have hereunto set my hand.

ORLANDO SHEPPARD, JR.