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ATTRITION MILL PLATES.

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984,664. Patented Feb. 21, 1911.

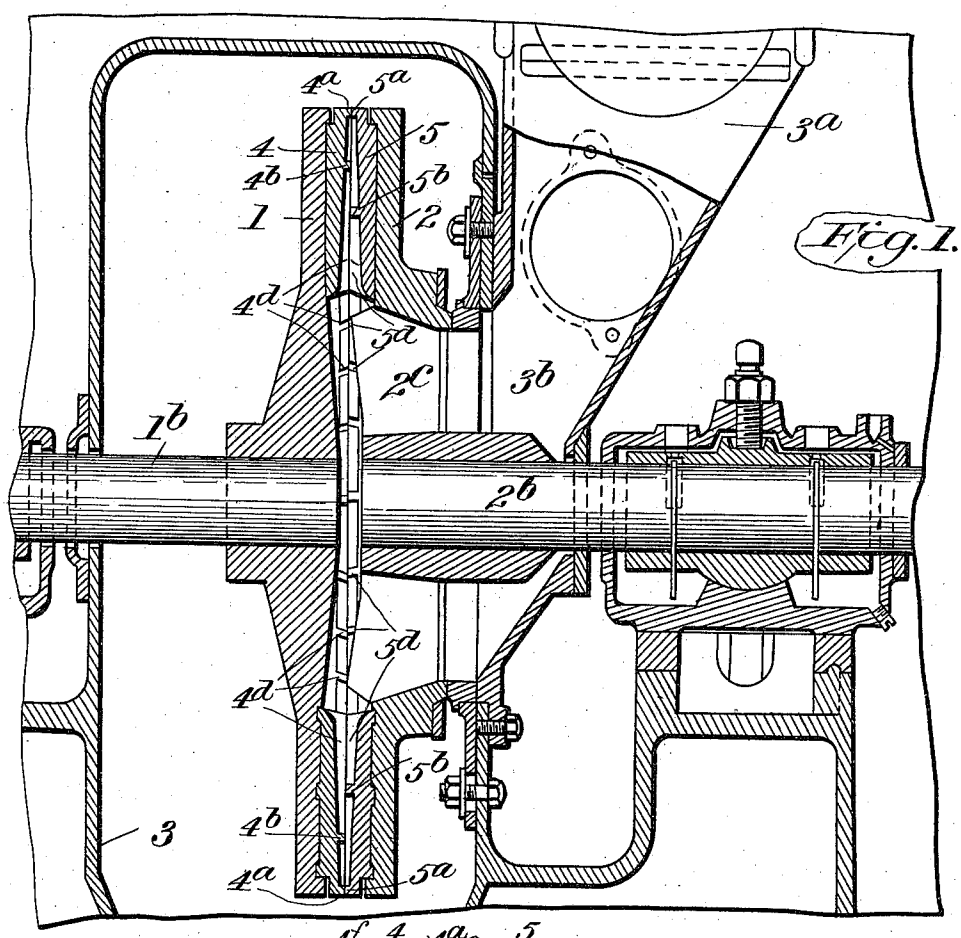

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Witnesses

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ATTRITION-MILL PLATE.

984,664. Specification of Letters Patent. Patented Feb. 21, 1911.

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To all whom it may concern:

Be it known that I, BENJAMIN W. HARRIS, of Muncy, in the county of Lycoming and State of Pennsylvania, have invented certain new and useful Improvements in Attrition-Mill Plates; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

This invention is an improvement in attrition mills for grinding feed and the like, and has particular reference to the grinding plates used in said mills. Its object is to so construct the ribbed grinding plates that coarse material will readily enter therebetween at the "eye", and will be effectively and continuously reduced as it passes toward the outer circumference of the plate.

An essential feature of the invention is so constructing the plates that the depth of the pockets, and corresponding relative height of the adjacent ribs, of the grinding plates lessens from the eye to the skirt, or outer periphery of the plates, and this causes the material to be more evenly distributed over the entire surface of the plates, increases the grinding capacity of the mill and lessens the power required to operate same.

The invention practically consists in tapering the inner opposed faces of the plates from the "eye" to the "skirt", and providing such tapered faces with radial and circumferentially disposed ribs as hereinafter described and claimed, so that while material can readily enter between the plates at the eye and will feed quickly toward the skirt of the plates, it will be effectively ground or reduced in such passage between the plates.

The invention is illustrated in the accompanying drawings which show one practical form of mill embodying the invention and in which—

Figure 1 is a detail sectional elevation of an attrition mill, of a well known type, equipped with grinding plates embodying my invention. Figs. 2 and 3 are detail inner face views of parts of the opposite grinding plates, showing the arrangement of the ribs and pockets thereon; and Figs. 4 and 5 are respectively sectional views of such grinding plates on lines 4—4, Fig. 2, and 5—5, Fig. 3.

In Fig. 1 of the drawings, 1 and 2 designate opposite runner heads keyed to shafts 1^b, 2^b, suitably journaled in bearings on the frame of the machine and which may be rotated in opposite directions by any suitable means; for example such as shown and described in the patent to Robinson #805,933 of November 28, 1905. To said runner heads are respectively attached my novel grinding plates 4 and 5 hereinafter described.

The runner head 2 has an eye or opening 2^c through which the stock is fed into the space between the runner heads from a spout 3^b leading to a feed hopper 3^a. These said parts may be constructed substantially as shown and described in said patent to Robinson or in any other suitable manner so that in operation material fed from the hopper 3^a passes to and between the runner heads 1 and 2, and after being ground between the grinding plates is discharged at the periphery or skirt thereof by centrifugal action into a casing 3.

The particular construction of the mill forms no part of the present invention which resides entirely in the construction of the opposed annular grinding plates 4 and 5, which are respectively secured to the opposed inner faces of the runner heads 1 and 2.

The body of the plate 4, (see Figs. 1, 2 and 4) is thinner at its "eye" or inner side adjacent the shaft, and thicker at its "skirt" or outer periphery; in other words the body of the plate is tapered on its inner side from the eye toward the skirt; as shown in Figs. 1 and 4. In the inner side and at the skirt edge of the plate 4 is an annular rib 4^a and intermediate the rib 4^a and the eye is a second annular rib 4^b. These annular ribs are connected by radially disposed ribs 4^c. Radially disposed grinding ribs 4^d extend from the rib 4^b inwardly to the eye of the plate; and intermediate these ribs 4^d are shorter radially disposed ribs 4^e. The inner edges or surfaces of the flanges 4^a, 4^b and the ribs 4^c, 4^d, 4^e of the plate 4 are all in the same plane, and are preferably parallel with the back, or outer surface, of said plate, so the total thickness of the plate and ribs at any point between its back, or outer surface, and the inner surface of any rib or flange thereon would be the same at any point. But the spaces between these ribs and flanges, which spaces are termed pockets, gradually diminish in depth from the inner edge or eye of the plate to the outer edge or

skirt thereof. The plate 4 may be provided on its back with shallow flanges or bosses 4^f for the purpose of enabling the inner surface of the plate to be trued by grinding the said bosses 4^f to level the back of the plate. The plate 4 may also be provided at suitable points, as indicated in Fig. 2, with openings 4^g for the passage of bolts by which it may be fastened to the runner head 1. The inner edge of the plate 4 adjacent the eye is also preferably beveled or rounded as indicated at 4^h, to increase the depth of the pockets at their inlet ends, or eye of the plate.

The opposed grinding-plate 5 is constructed similarly, but oppositely, to the plate 4 so that when said plates 4 and 5 are opposed in working position—as in Fig. 1—the pocket spaces between said plates will be tapered or wedge-shaped from the eye to the skirt. The plate 5 is provided with a skirt flange 5^a, an intermediate flange 5^b connecting radial ribs 5^c; long radial ribs 5^d and short radial ribs 5^e substantially corresponding in thickness and operation with flanges 4^a, 4^b, and ribs 4^c, 4^d, 4^e, of plate 4, as above described; but the flange 5^b is preferably set nearer the eye of plate 5 than is the flange 4^b on plate 4, so that the material being ground can pass flange 5^b, as the material moves outward toward the periphery of the grinding plate. In other words the intermediate flanges 4^b, 5^b on the opposed grinding plates should alternate so they will not prevent material passing between the plates. Plate 5 may also be provided with rear flanges or bosses 5^f and with bolt openings 5^g, similar to the bosses 4^f and openings 4^g on plate 4.

When the plates 4 and 5 are suitably secured to their runner heads 1 and 2, the inner surfaces of the ribs and flanges thereon are parallel (see Fig. 1) but owing to the taper of the body of the plates the spaces or pockets therebetween are much wider at the eye than at the skirt; which will allow coarse material to readily enter between the plates at the eye, and be gradually reduced by the action of the opposed ribs on the plates 4 and 5, and pass toward the outer circumference or skirt of the plates; and as the material is reduced in size the depth of the pockets is also lessened, and therefore the material being ground will be evenly distributed over the surfaces of the plates, and I obtain a uniform finish or grade of material at the skirt edge of the plates. This construction of grinding plates enables the machine to operate at maximum capacity with a minimum amount of power. The plates can be readily adjusted to or from each other so as to reduce the material to any fineness desired, and the wear on the ribs is practically uniform and the pockets will be kept practically crowded with material from the eye to the skirt when in operation. The pockets being deeper or wider at the eye than at the skirt makes it possible for coarse stock to readily enter between the ribs at the eye, without checking or clogging, and any product, such as corn cobs, cotton seed cakes or kernels of a size suitable to feed into an attrition mill, will readily enter the pockets between the plates; and the first reduction of such material is made by the ribs 4^d, 5^d, until all the pockets at the eye are filled, and such material is successively and more rapidly broken up by the co-action of the ribs 4^e, 5^e. As the ribs taper in width reversely to the pockets, the coarser parts of the stock enter readily between them and the first reduction takes place before the stock reaches the first circular check flange 5^b, where the material is further reduced; and it is further reduced by ribs 4^e, 5^e as it passes from flange 5^b on to the second check flange 4^b, and the final reduction of material is made by ribs 4^c, 5^c as it passes from the flange 4^b to flanges 4^a, 5^a.

What I claim is:

1. In an attrition mill, a grinding plate tapered on its inner face and having projecting radially disposed ribs on its tapered face, and annular flanges intersecting said ribs, the outer surfaces of said ribs and flanges being substantially in one plane, and the spaces between the adjacent ribs forming pockets which gradually increase in depth from the skirt toward the eye of the plate.

2. In an attrition mill, the combination of a pair of opposed metallic grinding plates provided with radiallly disposed grinding ribs on their opposed faces, and annular flanges intersecting the ribs, the spaces between adjacent ribs forming pockets, which decrease in depth from the eye toward the skirt of the plates while the faces of the opposed ribs are parallel.

3. In an attrition mill, the combination of opposed grinding plates tapered on their inner faces from the eye toward the skirt of the plate, each plate having projecting concentric annular flanges on its tapered surface, and radially disposed grinding ribs between the flanges and radially disposed ribs between the innermost flange and the eye of the plate, the inner surfaces of said ribs and flanges being substantially in the same plane, and the spaces between adjacent ribs forming pockets which gradually decrease in depth from the eye to the skirt of the plate, in accordance with the taper of the inner surface of the plate.

In testimony that I claim the foregoing as my own, I affix my signature in presence of two witnesses.

BENJAMIN W. HARRIS.

Witnesses:
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