

May 5, 1925.

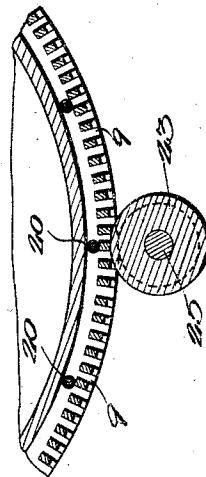
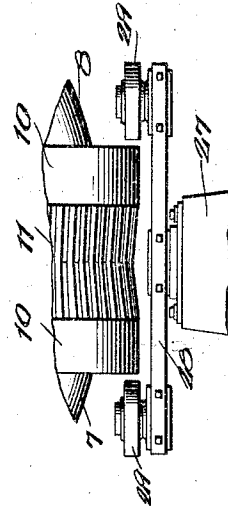
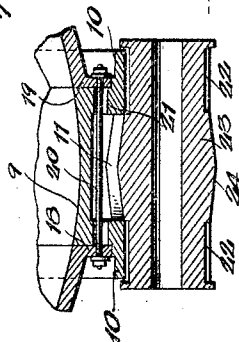
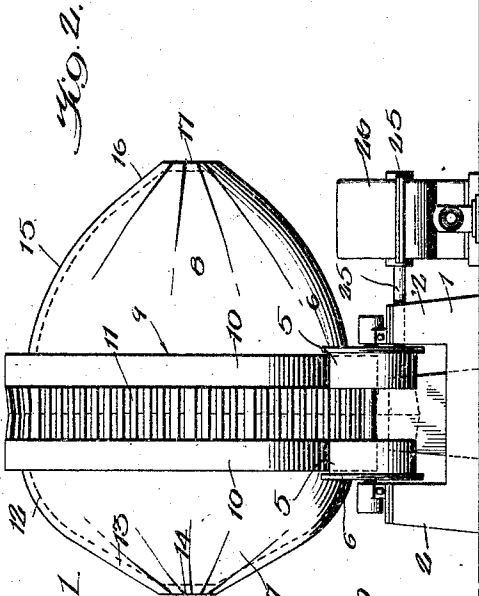
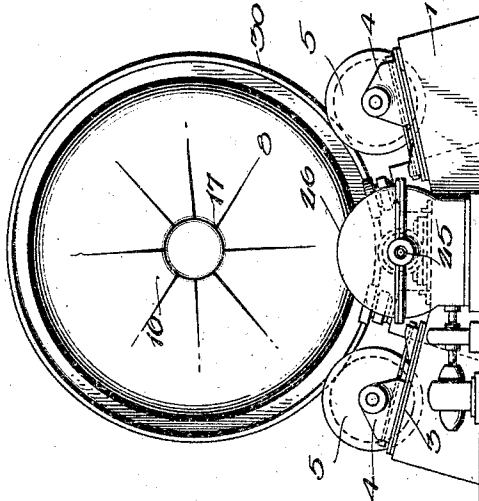
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PEBBLE MILL

Filed Feb. 2, 1924

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WITNESSES

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INVENTOR

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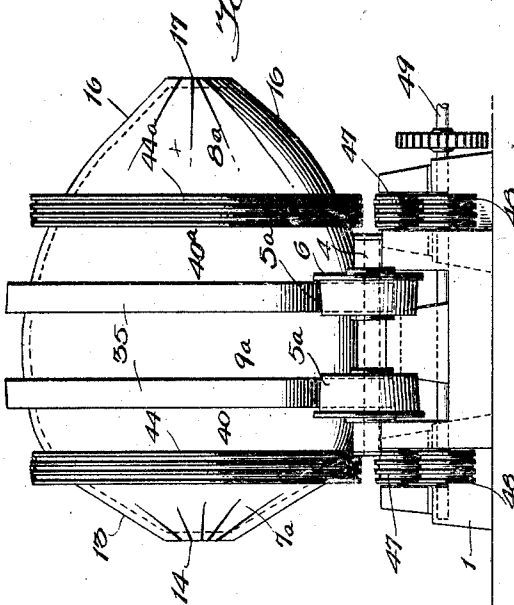
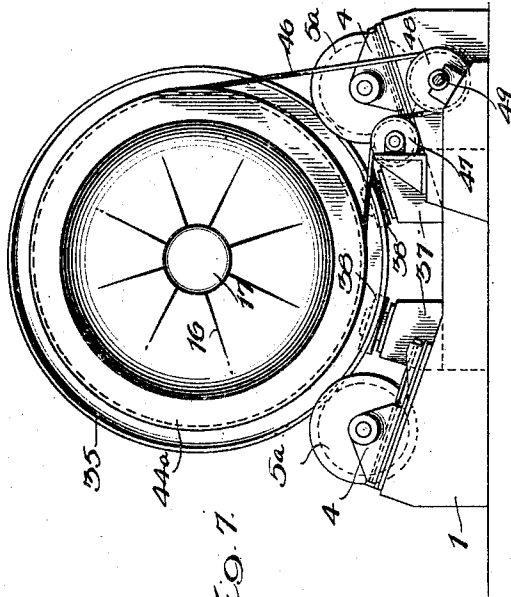
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WITNESSES

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Fig. 6

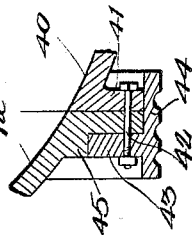


Fig. 14



Fig. 10

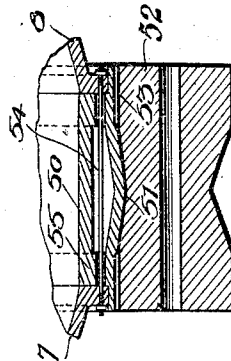


Fig. 9

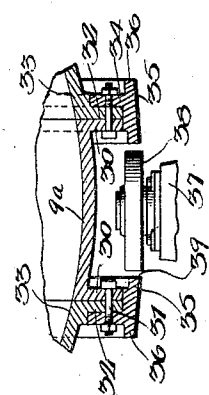


Fig. 8

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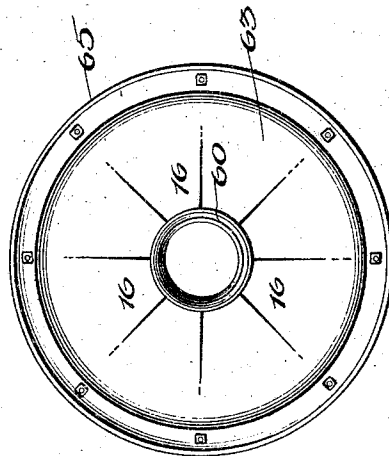
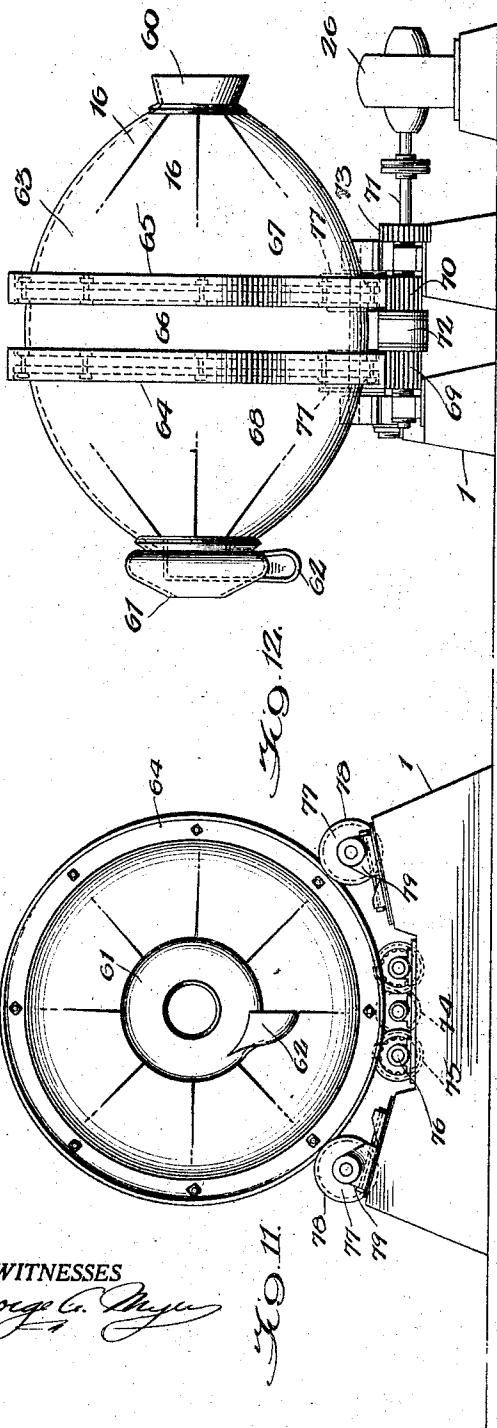
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Patented May 5, 1925.

1,536,491

UNITED STATES PATENT OFFICE.

CHARLES JOSEPH GUNDEROTH, OF COPPERHILL, TENNESSEE.

PEBBLE MILL.

Application filed February 2, 1924. Serial No. 690,314.

To all whom it may concern:

Be it known that I, CHARLES JOSEPH GUNDEROTH, a citizen of the United States, and a resident of Copperhill, in the county of Polk and State of Tennessee, have invented certain new and useful Improvements in Pebble Mills, of which the following is a specification.

This invention relates to pebble mills and has for its object the provision of a device composed of a plurality of sections whereby the shell may be readily assembled or disassembled when it is desired to replace any of the parts.

A further object of the invention is the provision of a pebble mill in which the usual driving gears and ring gears ordinarily employed in connection with such type of mills and which are liable to breakage during transportation, are eliminated.

A still further object of the invention is the provision of a pebble mill having a removable driving section and cooperating rollers to prevent tilting of said mill when in operation.

Another object of the invention is the provision of a pebble mill having a grate-like section located intermediate the ends of the mill and cooperating with a revolving element for driving said mill.

This invention will be best understood from a consideration of the following detailed description, in view of the accompanying drawings forming a part of the specification; nevertheless it is to be understood that the invention is not confined to the disclosure, being susceptible of such changes and modifications which shall define no material departure from the salient features of the invention as expressed in the appended claims.

In the drawings:

Figure 1 is a view in side elevation of a pebble mill constructed in accordance with my invention.

Figure 2 is a front end of the mill shown in Figure 1.

Figure 3 is a transverse vertical section of the driving mechanism for the mill shown in Figures 1 and 2.

Figure 4 is a transverse vertical section taken at right angles to the section shown in Figure 3 of the driving mechanism.

Figure 5 shows a fragmentary view in detail of the mechanism for preventing tilting of the mill.

Figure 6 is a side elevation of a modified form of the pebble mill shown in Figure 1.

Figure 7 is a rear end view of the mill shown in Figure 6.

Figure 8 is a transverse vertical section of the fragmentary view of the riding rings and also showing a modified form of the anti-tilting device.

Figure 9 is a transverse vertical section of a similar view showing the modified form of the riding ring.

Figure 10 is a sectional view similar to Figure 9 showing a further modified form of the riding ring.

Figure 11 is an end view of a barrel-shaped mill.

Figure 12 is a side view of the barrel-shaped mill.

Figure 13 is an end view of the discharge side of the mill shown in Figures 11 and 12.

Figure 14 is an enlarged detail showing a section of Figure 2 disclosing the manner of connecting the riding ring to the barrel sections.

Referring more particularly to the drawings, 1 designates a base member having a centrally and longitudinally disposed channel thereby providing at the opposite ends of said base pairs of spaced uprights 2, the upper faces of these uprights are inclined inwardly as shown at 3 and upon which are mounted bearing blocks 4. Journaled in the upper ends of the spaced bearing blocks 4 are pairs of spaced pulleys 5. Each pulley is provided with an annular flange 6 disposed laterally from its cylindrical face and for a purpose which will be presently described. Four of these pulleys are employed and adapted to support the shell or revolving pebble mill.

The shell comprises a casting formed of three parts, a head section 7, a tail section 8 and a ring 9 forming the intermediate section and to which the inner ends of the head and tail sections are bolted. The ring section 9, shown in Figure 1, is provided with peripherally disposed annular ribs from which are projected annular lateral flanges 10. A concaved annular grate-like section or web 11 formed integrally with and between said ribs comprises the intermediate or ring portion 9 and includes the flanges 10. The web or grate-like section is formed by distorting the cylindrical ring 10 either concavely or convexly as will be presently described.

The tail section has a circular portion shown at 12 while the outer reduced end is composed of a plurality of polygonally shaped flat faces 13. These faces gradually decrease in width until limited by an inlet opening 14, and through which the material is fed to the mill. The head end 8 has a curved section as shown at 15 merging into a plurality of flat faces 16 which terminate at the discharge end 17 of the mill.

As shown more particularly in Figure 3, the inner wall of the ring section 9 is curved so that the intermediate portion of the shell, which includes the ring 9 and portions of the head and tail section, is circular and forming a concavity in which the heavier feed is maintained during the pulverizing operation of the mill. The flat surfaces permit the material to be readily fed into the mill and likewise to be readily discharged from the same.

It will be noted that the head section 7 is provided with an annular flange 18 at its inner end while the tail section 8 has an annular flange 19 on its inner section. These flanges are perforated and adapted to receive tie rods 20 which pass through aligned passages 21 in the ribs of the ring section 9 whereby the head and tail sections are rigidly secured to the ring section.

The broad faces of the flanges 10 form the two elements which are engaged by the spaced grooved cylindrical faces 22 on the driving roller 23. The portion 24 enclosed between the cylindrical portion of the roller 23 is convexed coincident to the concavity of the grate-like section 11 of the ring 9 and is adapted to engage said section while the outer faces of the flanges 10 are in engagement with the cylindrical portion 22 of the roller 23. Rotation of the roller 23 causes rotation of the shell. The roller is mounted upon a shaft 25 driven by a motor 26. The section 11 presents an irregular engaging surface to the driving roller to provide a frictional drive between said roller and the section 11.

The flanges 6 of the supporting pulleys 5 are adapted to be in engagement with the outer edges of the riding flanges 10 and aid in maintaining the mill in its horizontal position. Located centrally of the base member 1 are a pair of posts 27 upon which is rigidly mounted a cross bar 28. Upon the opposite ends of the cross bar are mounted idlers 29 which are adapted to engage the side edges 30 of the riding flanges 10 and adapted to prevent tilting of the mill.

It will be seen from the construction just described that the device when desired may be readily disassembled by merely removing the nuts off the ends of the tie rods 20 whereby the three sections may be separated. Furthermore, the shell which comprises the head, tail and intermediate sections may be

readily lifted from the idling pulleys 5 and away from the anti-tilting rollers 29.

The grate-like section 11 not only functions to decrease the weight of the ring section 9 but likewise aids in causing the convexed portion 24 of the driving roller 23 to a better frictional engagement with said pulley. It will be noted that the cylindrical portions 23 are likewise grooved and adapted to engage the smooth flat surface of the riding flanges 10 whereby a greater frictional engagement will be had between these portions of the driving roller 23 and the riding flanges 10.

Referring more particularly to Figures 7 and 8 the head section 7^a and tail section 8^a are of similar construction to the form shown in Figure 1, while a slight modification has been made in the ring or intermediate section 9^a. The ring is provided with annular lateral ribs 30 which are perforated to receive bolts 31. The head and tail sections adjacent the flanges 32 are provided with shoulders 33 adapted to receive the inner periphery of an annular rib 34 formed upon the inner face of a riding flange 35. The flanges 32 on the head and tail sections and ribs 34 are provided with perforations aligning with the perforations in the ribs 30 and through which the bolts 31 are passed for securing the riding flanges 35 and the head and tail sections to the intermediate ring 9^a.

It will be noted that the outer annular faces of the riding flanges 35 are inclined inwardly and adapted to be received upon the coincidently inclined engaging faces of the idling pulleys 5^a. The pulleys are provided with flanges 6 adapted to engage the side edges 36 of the riding flanges 35 and aid in preventing tilting of the shell when in operation. The pulleys 5^a are mounted upon shafts which are carried by the bearing box 4 mounted upon the base member 1.

In order to prevent lateral tilting of the shell I have a pair of posts 37 on the base member 1 carrying at their top an idling roller 38 which is adapted to engage the inner edges 39 of the riding flanges 35. It will be seen in Figure 7 that the rollers 38 are inclined at an angle to the horizontal and are located within the pocket formed by the lateral flanges or rods 30 and 32 of the head and tail sections and the riding ring.

Between the ring section 9^a and the head section 7^a is mounted an annular section 40 having a laterally extending flange or rib 41 to which is secured a flange 42 formed on the inner end of the head section 7^a, and a rod 43 projecting inwardly from the inner face of the grooved riding flange 44. The head section 7^a is provided with an annular shoulder 45 adjacent the rib or flange 42 upon which the inner periphery of the rib 43 is seated. The tail section 8^a is likewise provided with a ring section 40^a similar to the

ring section 40 of the head section and a grooved riding flange 44 is secured to the tail section 8^a and the ring 40^a.

As shown more particularly in Figure 7, cables 46 are entrained around the grooved rings 44 and 44^a and over a pair of idling grooved pulleys 47. The cables are further entrained over a pair of grooved driving pulleys 48 mounted on the shaft 49. The shaft is driven in any suitable manner.

As shown in Figure 9, a modified form of the riding ring 50 is disclosed. The ring 50 is provided with a convexed portion 51 adapted to be received within the corresponding concave portion of a driving pulley 52. The cylindrical portions of the ring, as shown at 53, are grooved and adapted to engage the smooth cylindrical surface of the driving pulley 52. A tie rod 54 is passed through perforations in the spaced ribs 55 of the ring and the flanges 56 of the respective head and tail sections 7 and 8.

A still further modified form of the driving ring is shown in Figure 10. This ring is provided with an outer grate-like section 57 which is of less width than the grate-like section shown in Figures 3 and 5, and of a less degree of concavity.

A form of which my mill is susceptible is shown in Figures 11 to 13 inclusive. This modified form of mill is barrel shaped and has the flat sections 16 at its opposite ends which are similar to the flat sections of the other forms. A frusto-conical nozzle 60 is secured to the discharge end while a drum 61 having a pending scoop 62 forms the feed structure of the mill. As the barrel 63 is revolved the scoop 62 is likewise revolved and periodically feeds the mill. The barrel is provided with annular tracks 64 and 65 which are bolted to the flanged ends of an intermediate member 66 of the mill and of the flanges of the end sections 67 and 68 of said mill. The manner of securing the tracks 64 and 65 to the abutting flanges of the intermediate member 66 and the end members 67 and 68 is similar to the construction shown in Figure 8. The faces of the tracks are smooth while the faces of the driving members 69 and 70 are corrugated whereby the driving members will more positively engage the tracks 64 and 65. Located between the driving members 69 and 70 and on the same shaft 71 is a drum 72 which is of greater diameter than the members 69 and 70 and of a width sufficient to snugly fit between the tracks 64 and 65 and engage the inner peripheries of the tracks and maintain the barrel 63 from displacement from the driving connections.

As shown more particularly in Figure 11 the gear 73 drives the intermediate gear 74 which is in mesh with gear 75 on the shaft 76 for driving a second pair of members 69 and 70 and a second drum on the shaft 76 similar to the drum 72.

Pairs of spaced rollers 77 are mounted in brackets 79 at the opposite ends of the base-member 1 and are provided with flanges 78 adapted to engage the outer peripheries of the tracks 64 and 65 and cooperate with the drum 72 to prevent displacement of the barrel 63 when revolving.

What I claim is:

1. A pebble mill comprising a shell formed of a plurality of sections, the end sections providing head and tail sections, the head and tail sections having flat portions and a circular portion merged into the flat portion, an intermediate section, and means for connecting the intermediate section with the end section, said intermediate section being provided with supporting rings.

2. A pebble mill comprising a shell formed of a plurality of sections, the end sections providing head and tail sections, the head and tail sections having flat portions and a circular portion merged into the flat portion, an intermediate section, the intermediate and end sections having upwardly and outwardly projecting flanges adapted to abut, and means for securing the flanges together, the intermediate sections being provided with supporting rings.

3. A pebble mill comprising a shell formed of a plurality of sections, the end sections providing head and tail sections, the head and tail sections having flat portions and a circular portion merged into the flat portion, an intermediate section, the intermediate and end sections having upwardly and outwardly projecting flanges adapted to abut, and means for securing the flanges together, the intermediate sections being provided with supporting rings, said rings having inturned annular flanges connected to the abutting flanges of the end and intermediate sections.

4. A pebble mill comprising a base member, a shell provided with annular tracks, a web connecting said tracks and having a central portion depressed below the cylindrical peripheries of the tracks, a driving drum having a grate-like section engaging the tracks and a portion offset complementary to the web and in engagement with the web, the rotation of the drum causing rotation of the shell.

CHARLES JOSEPH GUNDEROTH.