

Jan. 17, 1928.

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J. B. C. SCHERBAUM

GRINDING MILL

Filed Feb. 11, 1927

Fig. 1.

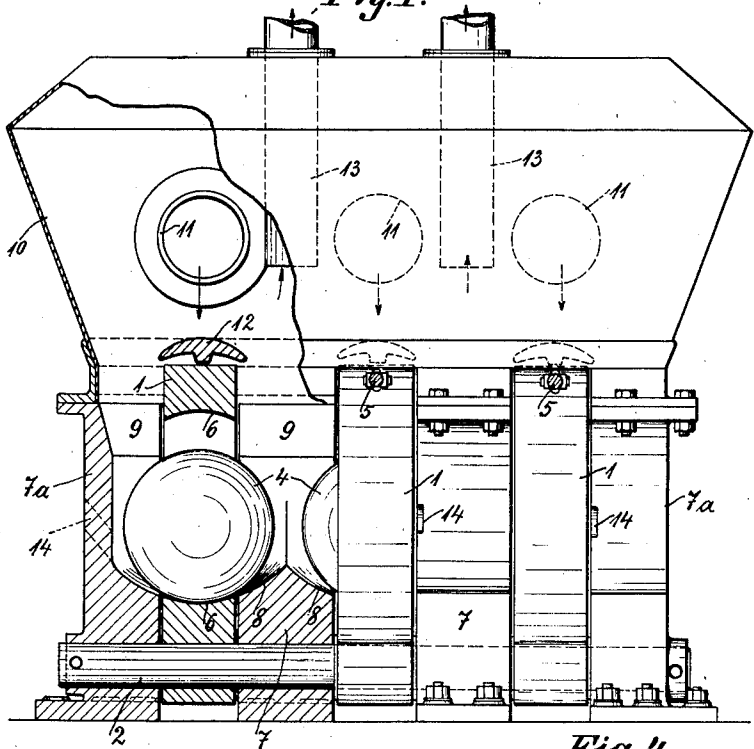


Fig. 2.

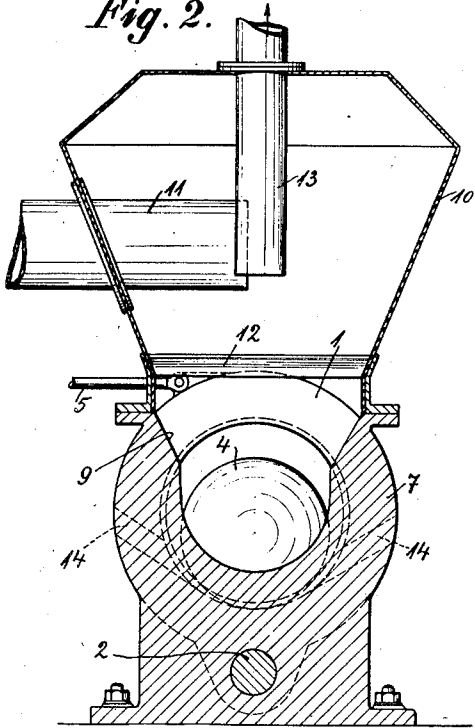


Fig. 4.

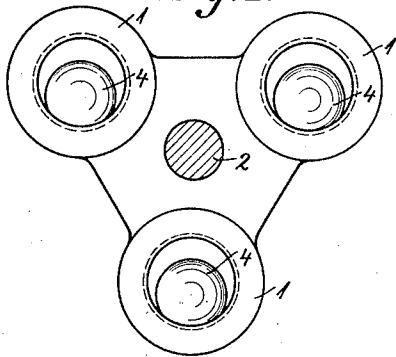
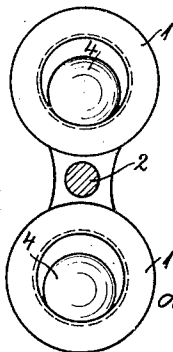


Fig. 3.



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GRINDING MILL.

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The present invention refers to a grinding mill of the type in which within a grinding ring or mantle one or more round bodies roll and which differs from the known mills of this kind inasmuch as the generally fixed or unmovable grinding ring or mantle is adapted to oscillate transversally to the axis either in a straight or curved path at such a stroke and in such frequency that the rolling bodies (balls) are set to roll. As has been proved by experiments by the aid of such a mill, which in other respects is distinguished by unusual constructive simplicity, nearly all kinds of material, whether they are soft or hard can be disintegrated not only to a coarse but also to a very fine powder. The surface pressure of the rolling bodies, which solely roll under the action of the centrifugal force, may be extraordinarily increased, and nevertheless the power required to operate the mill is very small.

By the drawing several modes of construction of a mill of this kind are shown.

Fig. 1 is a front elevation of the mill partly in section, and

Fig. 2 is a side elevation also partly in section.

Figs. 3 and 4 are diagrammatical views of modified grinding rings.

In the example shown the mill is provided with three grinding rings 1, which are adapted to oscillate about a common axis or shaft 2. The axis 2 need not be arranged at the lower part as shown, but might be arranged on top as may be gathered from Fig. 3 so that the rings are suspended therefrom. The same, the principle of the invention will not be altered by arranging the grinding rings 1 in a horizontal plane or, no matter in which position they are applied, they may be connected with one another to form a common drum-like mantle. Within the grinding rings 1 are placed the rolling bodies 4, which in the construction shown are represented by balls. These balls or rolling bodies, as is shown in the drawing, may have a diameter, which is larger than the radius of the inner face of the grinding rings or drum-like grinding mantle, however, they may as well have the same diameter, or may be smaller than the radius of the said inner surface.

According to the invention the rolling bodies (balls) are set to roll by the grinding rings 1 or the common grinding mantle oscillating about the axis 2, which oscillations

being of such length and repeated to such frequency, that the oscillatory motion of the balls while overcoming their gravitation is converted into a rotating or rolling movement. Only very little power is necessary to accomplish this operation. The oscillatory movement of the grinding ring 1 may be effected by way of example by the aid of a pitman 5 engaging one of the rings or the common mantle at a distance from the oscillatory shaft or axis 2, the pitman being operated or set to oscillate or reciprocated by the aid of any convenient means, for instance by an eccentric drive operated electrically, or the like. Instead of compelling the grinding rings or the common grinding mantle to oscillate in a curve they may be given a straight-line reciprocating movement. Even in such case the rolling bodies will be set to rotate or roll in the manner desired. Preferably every grinding ring has a spherical inner circumferential surface 6, which thus forms a rolling path for the balls 4. Each grinding ring may also have two or more rolling paths 6 according to the size of the balls 4 used. A common grinding mantle will also be provided preferably with such rolling paths.

In the example shown the grinding rings 1 are arranged at a distance from one another and the intermediate spaces are filled up by filling pieces 7 through which the shaft or axis 2 passes, and which are given such a shape as to form guide faces 8. These guide faces form a continuation of the rolling paths 6, and have the result, that in the starting and in the stopping of the mill the balls 6 are guided within the rings 1.

The diameter of the balls may, as shown in the drawing, surpass the breadth of the rolling rings 1, however this is not an absolute necessity. The upper parts of the filling pieces 7 are expanded funnel-like at 9 (Fig. 2), and merge into a casing 10 which is preferably closed on top, communicating with all inner spaces of the grinding rings 1 and the filling pieces 7 which by the outer walls 7^a are connected with one another to form a closed chamber. By the feeding openings or pipes 11 the material to be ground will be allowed to enter the casing 10. From these orifices the material falls down over the baffle plates 12 on both sides of the grinding rings 1 and is guided by the guide faces 8 into the rolling paths 6. The comminuted or ground material is led away

preferably by the aid of suction pipes 13, in which a vacuum is created while air is allowed to enter by air ports 14 into the filling pieces 7 and the walls 7*. The air thus entering these pipes is saturated within the mill with the fine, powdered grinding material and then drawn away by the pipes 13.

As is shown in Figs. 3 and 4 a plurality of grinding rings 1 may be arranged. Thus in Fig. 3 two grinding rings 1 and in Fig. 4 three grinding rings are firmly connected with one another and arranged to oscillate on a common shaft 2. Even in this case the balls 4, as soon as the grinding rings firmly connected with one another are set to oscillate at the necessary stroke and frequency will roll no matter whether the oscillation path of the rings is horizontal or vertical or at an angle.

I claim:—

1. A grinding mill comprising a grinding ring, a freely rolling body within said grinding ring, the grinding ring being mounted to oscillate transversally to its axis to such an extent and with such frequency that the rolling bodies are compelled to roll, and means for oscillating said ring.

2. A grinding mill comprising a plurality of grinding rings mounted at a distance from one another, a freely rolling body within each ring respectively, filling pieces between

the grinding rings, guide surfaces on said filling pieces merging into the inner surface of the grinding rings and adapted to lead the material into the inner space of the grinding ring, the grinding rings being mounted for oscillatory movement, whereby the rolling bodies are actuated therein.

3. A grinding mill comprising a plurality of grinding rings mounted at a distance from one another, a freely rolling body within each ring respectively, filling pieces between the grinding rings, guide surfaces on said filling pieces merging into the inner surface of the grinding rings and adapted to lead the material into the inner space of the grinding ring, the inner spaces of the filling pieces communicating with the inner spaces of the grinding rings to form a common chamber, the grinding rings being mounted for oscillatory movement, whereby the rolling bodies are actuated therein, a casing on the top of said chamber also communicating therewith and provided with feeding and outlet orifices.

4. A grinding mill according to claim 1, characterized by this that the grinding ring is set to oscillate about an axis at a distance from the centre line of the ring.

In testimony whereof I have signed my name to this specification.

JOHANN BERNHARD CHRISTIAN SCHERBAUM.