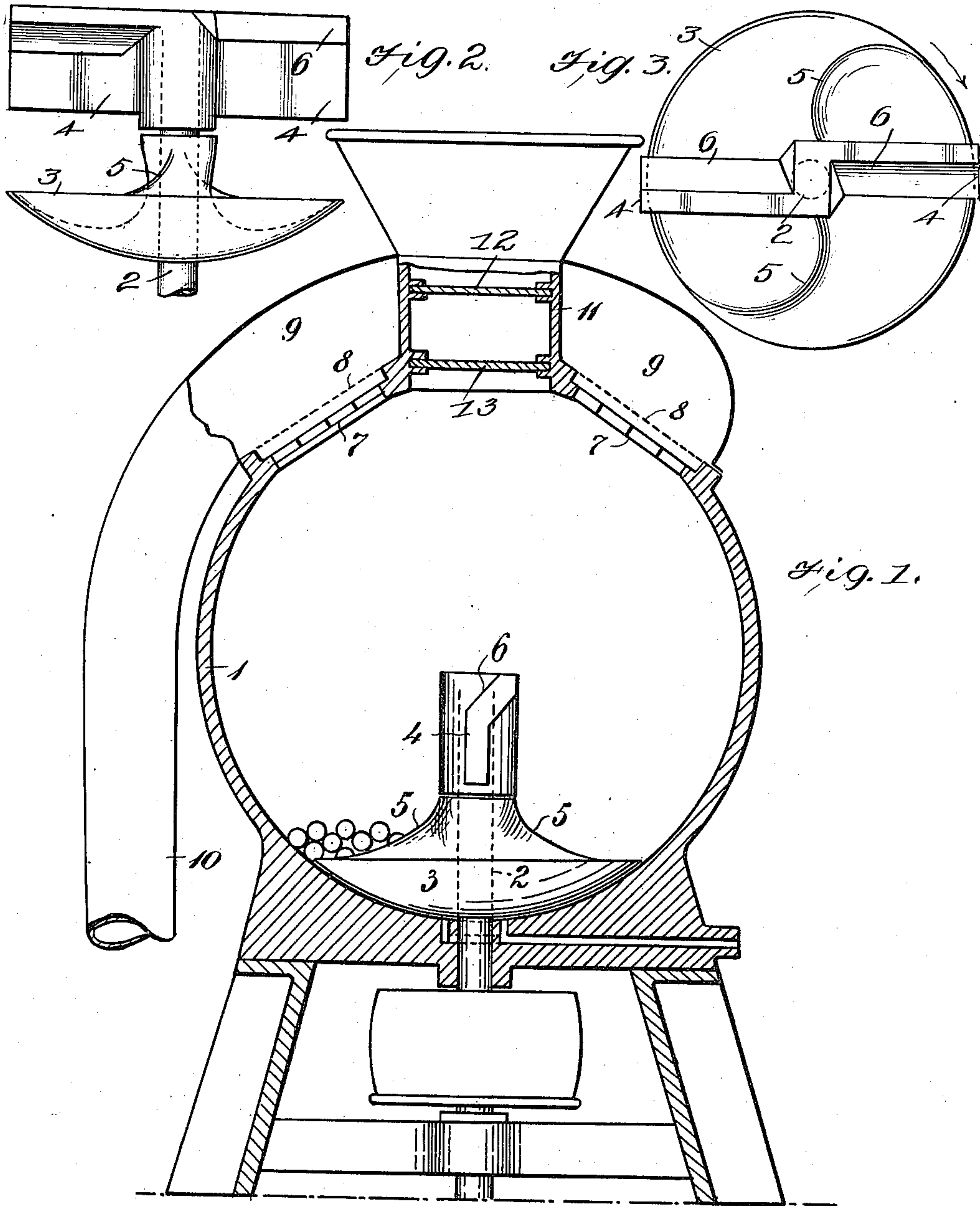


L. HOFFMANN.
ROLLING BALLS GRINDING MILL.
APPLICATION FILED JUNE 10, 1910.

975,864.

Patented Nov. 15, 1910.



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LOUIS HOFFMANN, OF VIENNA, AUSTRIA-HUNGARY.

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975,864.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, LOUIS HOFFMANN, a subject of the Emperor of Austria-Hungary, residing at Vienna, Empire of Austria-Hungary, have invented certain new and useful Improvements in Rolling-Balls Grinding-Mills; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to rolling balls grinding mills having a revolving ball dish and a stationary grinding surface.

According to my invention the top side of the ball dish resembles generally speaking the shape of one, two or more sectors of co-axial helical surfaces, the axis of revolution of the ball dish being the common axis of the said sectors. Above this ball dish and adjacent thereto beating wings are provided on the shaft of the ball dish. Owing to this arrangement, the material fed to the mill as also those particles of the material being ground which are not yet sufficiently fine, come on falling down into the path of the beating wings and are disintegrated by them and thrown downward against the ball dish. On the other hand the balls coming on the ball dish are thrown not only outward, but also upward against the stationary grinding surface, and on striking against the latter and against each other they bring about a very efficient and fine disintegration or comminution of the material which they encounter.

In the annexed drawings I have shown by way of example a preferred construction of a mill embodying my invention.

Figure 1 is a vertical section of the same, some parts being shown in side elevation, Fig. 2 is a front elevation of the ball dish and beating wings; and Fig. 3 is a plan of Fig. 2.

1 is the stationary grinding surface, preferably spherical in shape and constituting the casing of the mill.

2 is a shaft extending through the casing and suitably journaled in the same. This shaft is driven from the outside and carries inside the casing the ball dish 3, and above the latter the beating wings 4. The top side of the ball dish is formed of two or more sectors of co-axial helical surfaces, the rear edges 5 of which are in plan view in the form of arcs of spirals. The rear sides of

the sectors (as counted in the direction of revolution of the ball dish) rapidly fall down toward the base of the ball dish, that is to say, nearly parallel to the axis of the helix and merge into the said base by a suitable curve as is seen from the drawing.

The beating wings 4 are preferably provided with inclines 6 which are inclined relatively to the axis in the same direction as the sectors of the helical surfaces. The lower part of the beating wings is preferably plane and radial to the axis.

The bottom of the ball dish fits as closely as possible the adjacent part of the grinding surface without coming into actual contact therewith. Air under pressure is blown in the well known manner through the space between the bottom side of the ball dish and the grinding surface, such air being supplied from a suitable source to channels leading to the inside of the casing and ending in close proximity to the shaft below the ball dish. The air under pressure thus escapes between the ball dish and the inside of the casing and thus prevents any choking of the space between the two. The upper part of the grinding surface is provided as usual with grates 7 on which sieves or bolting cloth 8 are mounted and which establish communication with a chamber 9 in which the ground material is collected and from which it is removed by a tube 10.

The current of air passing between the ball dish and the casing carries the ground material toward the sieves or bolting cloth 8, through which the material sufficiently finely comminuted escapes into the chamber 9, while the coarser particles fall back into the grinding chamber. The material to be ground is introduced through the hopper 11 into the grinding chamber in the well known sluice fashion manner, in order to prevent air under pressure from escaping through the hopper 11. That is to say there are provided two parallel sliding gates 12, 13 in the channel leading from the hopper into the grinding chamber. When it is desired to introduce a fresh portion of material, the upper gate 12 is opened while the lower gate 13 is closed. The material thus falls into the space between two gates. Then the upper gate 12 is closed and the lower gate 13 is opened, so that the material falls from the said space into the interior of the grinding chamber.

The operation of my improved mill is the

following: The material introduced is on falling down first encountered by the beating wings and thus broken and thrown against the stationary grinding surface. By the action of the helical surfaces on the upper side of the revolving ball dish, the balls are not only thrown outward (owing to centrifugal force) but also upward and strike against each other and against the stationary grinding surface, thus comminuting very efficiently the material which they encounter and then fall again on the ball dish and so on.

It will be seen that the mill hereinbefore described operates continuously, rapidly and efficiently.

Claims:

1. In a rolling balls grinding mill the combination of a plurality of loose balls, a ball dish, a stationary grinding surface inclosing the ball dish and balls, means comprising a shaft for revolving the ball dish, the top side of the said ball dish being formed of a plurality of sectors of helical surfaces co-axial with the said shaft and the bottom of the ball dish conforming to the shape of the grinding chamber, said dish being slightly raised to form a space between the same and the wall of the grinding chamber and means for forcing air through said space, beating wings secured to the said shaft above the ball dish, a collecting chamber fast on the grinding surface and means for sifting, establishing communication be-

tween the inside of the grinding surface and the said collecting chamber, substantially as and for the purpose described.

2. In a rolling balls grinding mill the combination of a plurality of loose balls, a ball dish, a stationary grinding surface inclosing the ball dish, means comprising a shaft for revolving the ball dish, the top side of the said ball dish being formed of a plurality of sectors of helical surfaces co-axial with the said shaft and the bottom of the ball dish conforming to the shape of the grinding chamber, said dish being slightly raised to form a space between the same and the wall of the grinding chamber and means for forcing air through said space, beating wings secured to the said shaft above the ball dish, each of such beating wings being provided with a part inclined to the said shaft in the same direction as the sectors of the helical surfaces and with a plane part radial to such shaft, a collecting chamber fast on the grinding surface and means for sifting, establishing communication between the inside of the grinding surface and the said collecting chamber, substantially as and for the purpose described.

In testimony whereof, I affix my signature, in presence of two witnesses.

LOUIS HOFFMANN.

Witnesses:

ARTHUR BAUMANN,
AUGUST FUGGER.