Oct. 8, 1957 A. J. MULDER 2,808,997

BEATER OR HAMMER MILL

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FIG. 1

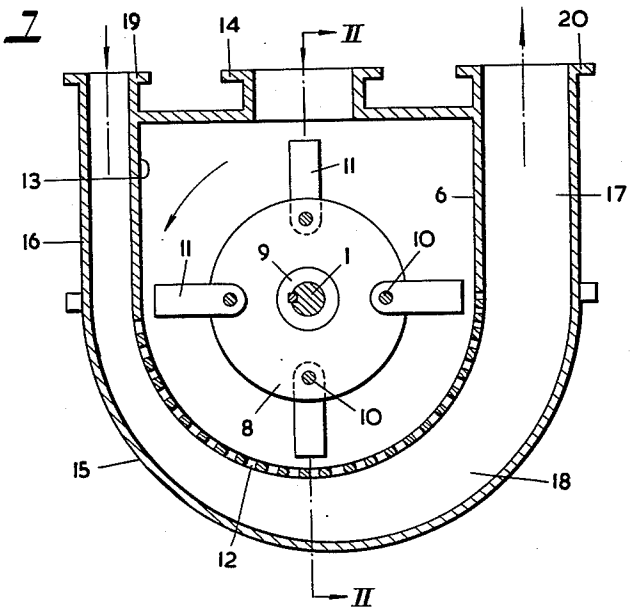
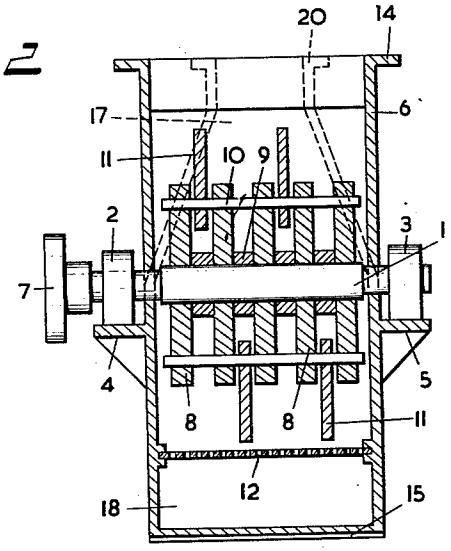


FIG. 2



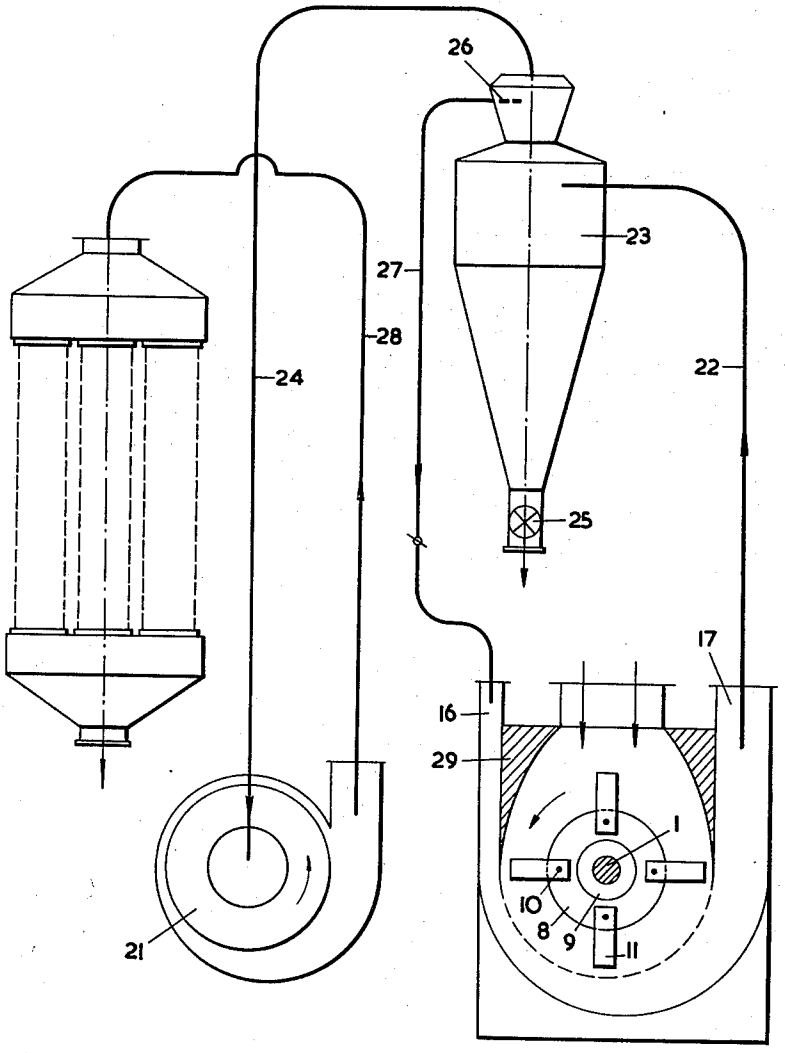
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Fig. 2



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BEATER OR HAMMER MILL

Arend Jan Mulder, Groningen, Netherlands

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2 Claims. (Cl. 241—60)

This invention relates to a beater or hammer mill for grinding cereals, seed, cattle-cakes, shells and other soft to semi-hard products.

A grinding machine is known, which comprises a rotor provided with beating means and mounted for rotation in a casing composed of a cylindrical inner wall provided with perforations and a spirally curved closed outer wall surrounding said inner wall, the arrangement being such that a scroll shaped casing is formed. When the rotor of said known grinding machine has been set rotating, air together with material to be ground will axially enter the grinding space through a lateral inlet, to leave said grinding space more or less radially through the perforations in the cylindrical inner wall and to subsequently tangentially flow through the scroll shaped casing to an outlet located at the wide end of said scroll shaped casing. A disadvantage of such a beater in which the flow of air is created by the rotor itself consists i. e. in that the air in the grinding space undergoes a drastic change in direction, which gives rise to undesirable turbulences and concomitant resistances to flow.

The object of this invention is to eliminate this disadvantage, which is attended by a relatively large power consumption, and in addition to give the grinding machine a compact construction by no longer using the rotor as a means for sucking in the conveying air. To that end a beater or hammer mill according to the invention comprising a rotor provided with beating means in a casing having an inner wall surrounding the rotor which inner wall is provided with perforations and a closed outer wall eccentrically surrounding said inner wall, is characterized in that opposite a perforated portion of the otherwise closed inner wall, which portion is concentric with the rotor shaft and which surrounds the lower half of the rotor, the grinding space is provided with a supply branch for the material to be ground and in that the jacket or suction space between the inner and the outer wall is connected to a conveying air-inlet branch at the one side of said material supply branch and to a conveying air-outlet branch at the other side of said material supply branch, said air-inlet branch being located at the narrow end and said air-outlet branch at the wide end of said jacket, the rotor being intended to rotate in the direction, in which the conveying air sucked in by an external sucking device flows through the suction space.

In a beater or hammer mill of this type, therefore, material to be ground enters the laterally closed grinding space from the top thereof in a direction more or less normal to the rotor shaft, the material entering separately from the conveying air, and the ground material is more or less radially sucked out of the grinding space and tangentially entrained through said jacket by the conveying air which flows through the jacket in the direction of rotation of the rotor.

The invention is elucidated in the accompanying drawings showing an embodiment of a beater shown separately and shown incorporated in a grinding plant.

In said drawings:

Fig. 1 is a vertical cross-section of a beater or hammer mill according to the invention;

Fig. 2 is a vertical axial section of said mill on the line II—II in Fig. 1;

Fig. 3 is a diagram of a grinding plant having a beater or hammer mill according to the invention incorporated therein.

The beater or hammer mill according to Figs. 1 and 2 comprises a rotor, the horizontal shaft of said rotor being designated by the reference numeral 1; said shaft is supported in bearings 2 and 3 respectively on brackets 4 and 5 respectively provided at the outside of a casing 6. The shaft 1 is adapted to be driven at 7. The shaft 1 carries a plurality of discs 8 spaced from each other by spacer rings 9. Four rods 10 are passed through said discs 8, on which rods beaters 11 are mounted for rotation and in axially staggered relationship. The casing 6 has an inner wall whose semi-cylindrical lower part 12, which is concentric with the shaft 1, is perforated and whose upper portion 13, which extends vertically, is closed. Said inner wall in conjunction with a horizontal upper wall provided with a central material-inlet-branch 14 forms a grinding space, in which the rotor is rapidly rotatable.

The inner wall is surrounded in spaced relationship by an entirely closed outer wall 15, located eccentrically relatively to the axis of the shaft 1 in such a manner that a relatively narrow conveying air inlet duct 16 of constant cross-sectional area merges into a relatively wide conveying air outlet duct 17 likewise of a constant cross-sectional area, via a suction space 18, the cross-sectional area of which gradually increases from the inlet side to the outlet side in the direction of rotation of the rotor shown by an arrow. The conveying air inlet duct 16 ends at the outside in a conveying air inlet branch 19 and the conveying outlet duct 18 ends in a conveying air outlet branch 20. The rotor provided with the beaters effects the grinding of the material supplied through the supply branch 15 in a manner known per se for hammer mills.

For completeness' sake Fig. 3 schematically shows how conveying air and ground material is sucked by an exhauster 21 via a line 22 into a cyclone 23, from which the conveying air and dust pass to the exhauster via a line 24, the ground material being discharged through a sluice 25. At 26 a return air line 27 is branched off, which return line leads to the conveying air inlet 16. Conveying air and dust from the exhauster 21 are passed to a filter via line 28.

The grinding space of the hammer mill shown in said Fig. 3 is rounded off at the upperside in order to avoid dead corners.

The air, which together with material supplied through the inlet branch 14 enters the grinding space, is naturally to be distinguished from the conveying air. Experiments have shown that the air which together with the material supplied enters the grinding space does not increase the power consumption of the fan.

I claim:

1. A hammer mill comprising, in combination, a casing formed by a pair of substantially parallel side walls, an inner wall interconnecting said side walls and having a perforated semi-cylindrical lower portion, and an outer wall interconnecting said side walls in spaced relation to said inner wall and having a lower portion eccentric to the lower portion of said inner wall; a top wall interconnecting said side walls and inner wall, said side walls, inner wall and top wall defining a grinding chamber, and said side walls, inner wall and outer wall defining a jacket surrounding said grinding chamber; a rotor extending between said side walls concentric with the lower portion of said inner wall; and beater means carried by said rotor

within said grinding chamber; said top wall having a central material inlet opening for said chamber; said jacket including a tangential inlet duct extending perpendicularly to the diametric plane including the ends of the lower portion of said inner wall, from one end of the latter, for tangential supply of conveying air to said chamber, and a tangential outlet duct extending perpendicularly to the diametric plane including the ends of the lower portion of said inner wall, from the other end of the latter, for tangential discharge of conveying air with ground material; said jacket, between said ducts, progressively increasing in cross-sectional area from said inlet duct toward said outlet duct.

2. A hammer mill as claimed in claim 1 in which said inlet and outlet ducts have a substantially constant cross-sectional area outwardly from the ends of said lower portion of said inner wall.

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