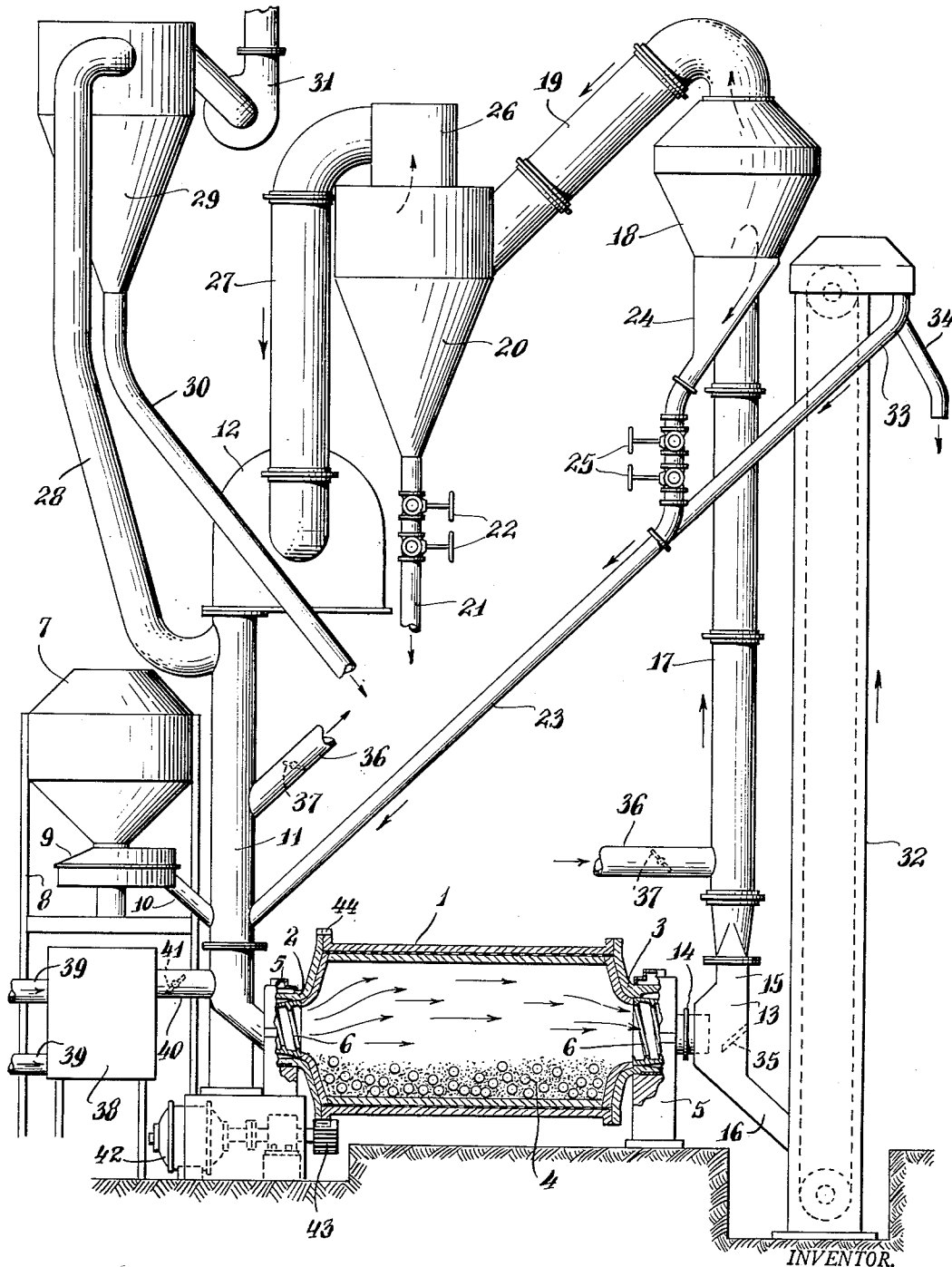


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J. E. KENNEDY
DISINTEGRATING APPARATUS HAVING A DISCHARGE
ARRANGED TO SEPARATE OVERSIZED MATERIAL
FROM THE AIR-BORNE MATERIAL
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INVENTOR.
J. E. Kennedy
BY
John A. Seifert
ATTORNEY.

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DISINTEGRATING APPARATUS HAVING A DISCHARGE ARRANGED TO SEPARATE OVERSIZED MATERIAL FROM THE AIR-BORNE MATERIAL

Joseph E. Kennedy, New York, N. Y.

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6 Claims. (Cl. 241—48)

This invention relates to apparatus for disintegrating certain types of materials, such as asbestos, wherein it is desired to dry and grind and separate the material with a minimum dusting of the finished product.

Heretofore it has been customary to grind said material either in an air-swept tube mill or an overflow or gravity discharge tube mill. In an air-swept tube mill, the entire charge is swept out of the mill by the air-stream including oversized material. At various points in the discharge conduit of said mill where a change in the air velocity occurs, the oversized material will drop out of the air-stream and return to the discharge end of the mill where it is re-ground to finer size. This regrinding of the oversized material at the discharge end of the mill will produce the objectionable dust that is a hazard when combined with the originally ground material suspended in the air-stream.

In an overflow or gravity discharge mill, the material is worked through the mill by the differential in the gradient and is discharged by gravity at the discharge end of the mill. In this type of grinding certain materials, such as asbestos fibers, are subjected to excessive grinding which damages the fiber.

It is an object of the invention to combine both of these forms of grinding by grinding the material in an air-swept rotatable mill having the discharge end arranged to separate the oversized material from the air-borne material, whereby the oversized material cannot be returned to the discharge end of the mill.

Another object of the invention is to return the oversized material to a conduit conveying the raw material to the charging or feed end of the mill whereby the oversized material is re-introduced into the mill intermingled with the raw material.

Tests in our test plant indicate that this method of handling the material increases the capacity of an air-swept tube mill by approximately 33 1/3 percent. The air-swept tube mill is shown in my Patent No. 1,809,902 issued June 16, 1931.

Other objects and advantages of the invention will be described hereinafter.

The drawing accompanying and forming a part of this application is an elevational view of an air-swept rotatable mill arranged to carry out the present invention.

The air-swept rotatable mill includes a drum 1 having hollow trunnions 2 and 3 at the opposite ends and grinding media, such as balls or any form of grinding media 4, occupying the lower portion of the drum when the drum is not rotating. The drum trunnions are rotatably mounted on bearings 5 to rotatably support the drum in a horizontal plane. The trunnions 2 and 3 are arranged with screws 6 to facilitate feeding of the material through the trunnions into and out of the drum 1. The drum 1 is rotated by a motor 42 having a pinion 43 meshing with an annular gear 44 on the drum.

The raw material to be disintegrated is removed from a bin 7 supported in elevated position by a framework 8 and said bin having a discharge at the bottom to a

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feeder 9 supported by the framework and having a discharge conduit or chute 10 connected in communication with a conduit 11 having one end discharging the material into the drum trunnion 2. The opposite end of the conduit 11 is connected to the outlet of pneumatic means comprising a fan, not shown, housed in a casing 12, whereby the material discharged into the conduit 1 by the feeder 9 is conveyed into, through and out of the drum 11 by the air-stream produced by the fan in casing 12 and flowing through the conduit 11 and drum 1, as indicated by the arrows.

The material disintegrated by the grinding media 4 is carried by the air-stream through the trunnion 3 into a discharge box 13 having an inlet connected to the trunnion 3 by a tubular extension 14 of said trunnion. The discharge box 13 is arranged with an upwardly extending outlet 15 and a downwardly extending outlet 16. The finely disintegrated material is conveyed by the air-stream through the outlet 15 into a conduit 17 connected at the inlet end to the outlet 15 and connected at the outlet end to the inlet of a radial-flow classifier or separator 18. The finely disintegrated material is further separated into fine and coarse materials in the separator 18 with the separated fine material discharged into a conduit 19 to be transferred to a cyclone collector 20 for removal of the air from the separated fine material. The finally separated fine material is discharged from the collector 20 through a conduit 21 having means 22 in the connection between said conduit 21 and collector 20 to control the discharge of said material from the collector to a place of storage or use, not shown, and to prevent the upward movement of air into the cyclone.

The coarse material separated from the fine material in the separator 18 is returned to conduit 11 by means 25 at the outlet pipe 24 for discharging the material from the separator and preventing the upward movement of air into the separator. The coarse material is conveyed by means 23 connected at inlet end to means 25.

The air separated from the material in the cyclone collector 20 is expelled through outlet 26 and conduit 27 to the inlet of the fan casing 12. The air-stream leaving the fan casing is divided and a large percentage is delivered through a conduit 28 to a filter 29 having an outlet for the fine material to be delivered by a conduit 30 to the place of storage. The air in the filter 29 is exhausted into the atmosphere by a fan 31.

The coarse material being discharged from the drum 1 partially by the air-stream and the screw 6 in the trunnion 3 drops by the force of gravity into the outlet 16 which delivers said coarse material to the lower end of an elevator 32 having a discharge at the upper end arranged with a conveying means 33 connected to the conveying means 23 for the return of said material to the conduit 11 and an outlet 34 for taking samples and weighing the coarse material. To prevent return of the coarse material to the drum through the trunnion 3, a baffle 35 is provided in the discharge box 13 declining from a wall of the discharge box 13 to a point spaced from the lower portion of the trunnion extension 14.

The air-stream in the conduit 11 may be conveyed around the drum and directly to the discharge conduit 17 through a pipe 36 having the inlet end connected to a portion of the conduit 11 between the fan casing 12 and the connections with the conduits 10 and 23 and the outlet end connected in communication with a portion of the conduit 17 between the outlet 15 and separator 18. The flow of the air-stream in pipe 36 is controlled by valves 37 in said pipe.

To facilitate the drying and disintegration of certain materials, such as asbestos fiber, the air-stream entering the drum trunnion 2 is heated by a hot-air-furnace 38 having inlets 39 and an outlet 40 connected to the conduit 11

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adjacent to the connection of the conduit 11 with the drum trunnion 2. The flow of hot-air to the conduit 11 is controlled by a valve 41 in the outlet 40, and means not shown, for automatically regulating temperature of hot gases required for drying.

Having thus described my invention, I claim:

1. In disintegrating apparatus, a revolving drum having charging and discharge openings at the opposite ends, a fan directly connected to the charging opening of the drum to force a stream of air and material to be disintegrated into the charging opening and through the drum and discharge opening, and a discharge box communicating with the discharge opening of the drum to receive all of the disintegrated material from the drum and having an upwardly extending outlet connected in communication with the fan for the disintegrated material suspended in the air-stream and a downwardly extending outlet for material dropping from the air-stream.

2. Disintegrating apparatus as claimed in claim 1, wherein the discharge box is arranged with a partition separating the upwardly and downwardly extending outlets and said partition spaced from the discharge opening of the drum.

3. In disintegrating apparatus as claimed in claim 1, a separator interposed between the upwardly extending outlet of the discharge box and the fan to receive the disintegrated material suspended in the air-stream, and a conveyor arranged to receive the material from the downwardly extending outlet of the discharge box and deliver said material to the charging opening of the drum.

4. In disintegrating apparatus, revolvable drum having charging and discharge openings at the opposite ends, a conduit connected at one end in communication with the charging opening of the drum, pneumatic means having an inlet and an outlet directly connected to the opposite end of the conduit to force an air-stream through the drum from the charging opening to the discharge opening, feeding means for the material to be disintegrated having a discharge connected in communication with an intermediate portion of the conduit to deliver the material into the air-stream to be intermingled with the air and conveyed by the air-stream through the drum, and a discharge box having an inlet connected in communication with the discharge opening of the drum to

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receive all of the disintegrated material from the drum, an upwardly extending outlet for the disintegrated material suspended in the air-stream connected in communication with the inlet of the pneumatic means and a downwardly extending outlet for the material dropping out of the air-stream.

5. In disintegrating apparatus as claimed in claim 4, a separator having an inlet connected in communication with the upwardly extending outlet of the discharge box to receive the disintegrated material suspended in the air-stream and two outlets, one outlet for the material of desired size and the other outlet for oversized material being connected to the intermediate portion of the conduit in opposed relation to the connection of the feeding means with said intermediate portion to intermingle said oversized material with the material to be disintegrated.

6. In disintegrating apparatus as claimed in claim 5, means for elevating having the lower portion connected in communication with the downwardly extending outlet of the discharge box to receive the material dropped from the air-stream and an outlet at the upper portion connected to the connection of the separator outlet for the oversized material with the conduit to deliver the material dropped from the air-stream to the conduit.

References Cited in the file of this patent

UNITED STATES PATENTS

252,080	Dalton	Jan. 10, 1882
1,427,322	Pomeroy	Aug. 29, 1922
1,454,491	Soper	May 8, 1923
1,491,841	Bell	Apr. 29, 1924
1,589,740	Bonnot	June 22, 1926
1,609,298	Kennedy	Dec. 7, 1926
1,627,766	Bergman	May 10, 1927
1,708,195	Stebbins	Apr. 9, 1929
1,889,436	De Coursey	Nov. 29, 1932
1,905,780	Ahlmann	Apr. 25, 1933
1,933,111	Hardinge	Oct. 31, 1933
2,136,445	Kramer	Nov. 15, 1938
2,398,989	Agthe	Apr. 23, 1946
2,595,117	Ahlmann	Apr. 29, 1952

FOREIGN PATENTS

918,556	France	Oct. 28, 1946
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