No. 778,452. PATENTED DEC. 27, 1904.

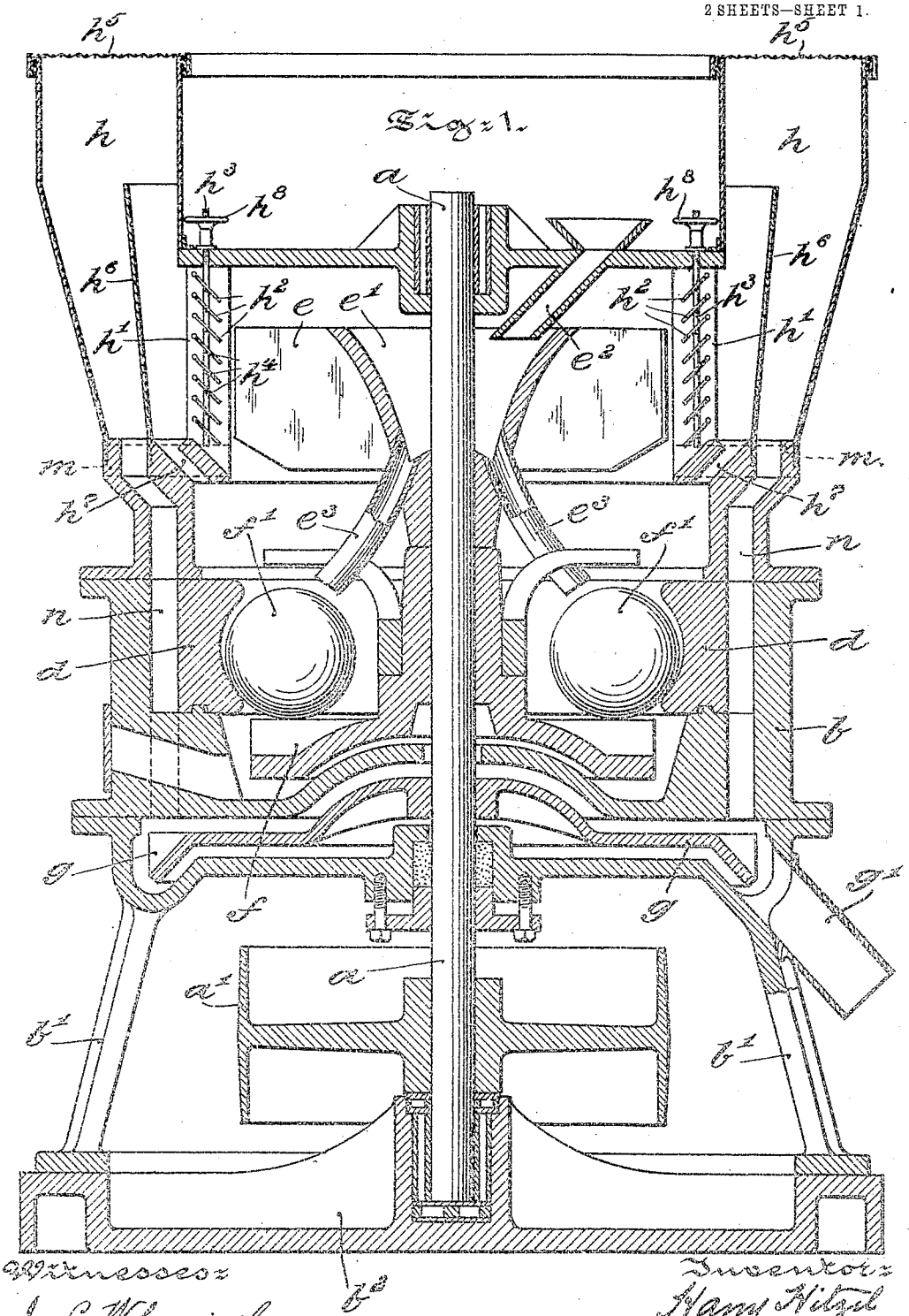
H. HITZEL.

AIR SEPARATOR FOR CEMENT GRINDING MILLS.

APPLICATION FILED APR. 5, 1904.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
Jas. C. Wisnewski.
Henry E. Evanding.

Inventor:
Harry Hitzel
By J. Walter Douglas
Attorney

No. 778,452. PATENTED DEC. 27, 1904.

H. HITZEL.

AIR SEPARATOR FOR CEMENT GRINDING MILLS.

APPLICATION FILED APR. 5, 1904.

2 SHEETS—SHEET 2.

Fig. 2.

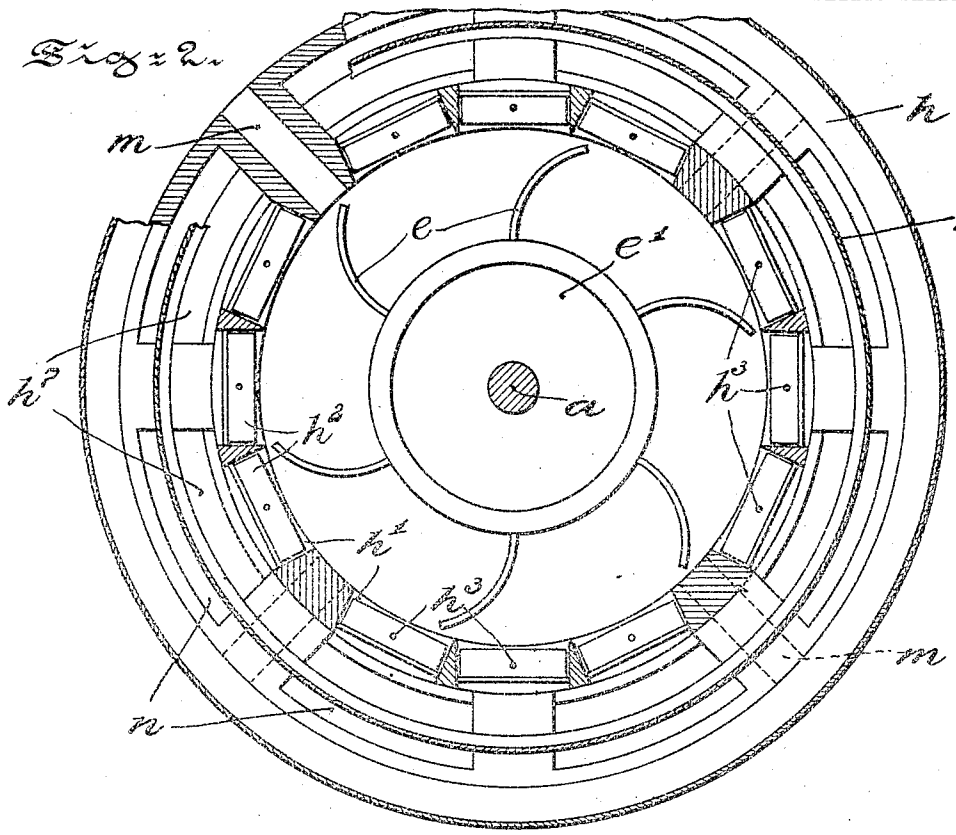
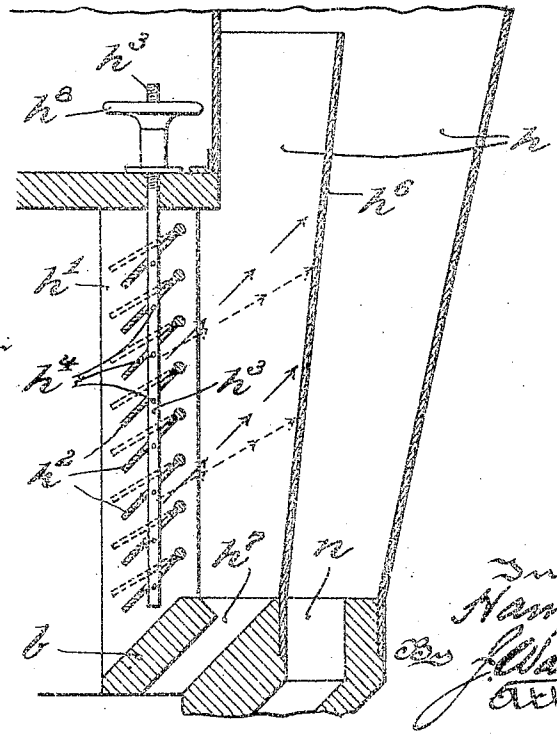


Fig. 3.



Witnesses:
Jas. C. Wilmsmith.
Henry E. Everding.

Inventor:
Henry Hitzel,
By J. Walter Douglas
Attorney.

No. 778,452. Patented December 27, 1904.

UNITED STATES PATENT OFFICE.

HARRY HITZEL, OF ALPHA, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO LEHIGH PULVERIZER MILL COMPANY, OF CATASAUQUA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

AIR-SEPARATOR FOR CEMENT-GRINDING MILLS.

SPECIFICATION forming part of Letters Patent No. 778,452, dated December 27, 1904.

Application filed April 5, 1904. Serial No. 201,655.

To all whom it may concern:

Be it known that I, HARRY HITZEL, a citizen of the United States, residing at Alpha, in the county of Warren and State of New Jersey, have invented certain new and useful Improvements in Air-Separators for Cement-Grinding Mills, of which the following is a specification.

My invention has relation to a cement-grinding mill of the type wherein the materials are ground by balls or rolls passing over the surface of an annulus or ring; and in such connection it relates to an improved means for separating the finely-divided or pulverized materials and conveying the same away from the grinding mechanism, as well as to the construction and arrangement of parts of such a machine, substantially as hereinafter described and claimed.

The principal objects of my invention are, first, to utilize efficiently, economically, and simply an air-exhaust to withdraw the fine cement particles from the grinding-path and to pass the same into a separating or settling chamber; second, to provide means whereby the cement-laden air lifted by the air-exhaust may be discharged at varying angles against a partition in the settling-chamber to vary the degree of fineness of the particles entering said chamber, and, third, to utilize the air-exhaust not only as a separating means, but also to set up in the grinding-path induced air-currents to properly season the cement in the grinding operation.

The nature and scope of my invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, in which—

Figure 1 is a vertical sectional view of a cement-grinding mill embodying main features of my invention. Fig. 2 is a horizontal sectional view, partly broken away, of the mill; and Fig. 3 is an enlarged vertical sectional view of the settling-chamber and of the deflector-plates for regulating the escape of cement-laden air into said chamber.

Referring to the drawings, a represents the driving-shaft, preferably arranged vertically, and a' the driving-pulley for the shaft. Within a casing b, traversed by the shaft a, is arranged the annulus or grinding-ring d. Arranged to rotate with the shaft a are respectively the exhaust-fan e, the frame or carrier f for the grinding-balls f', and the disk-like platform g, upon which the fine particles from the mill are collected after separation and prior to their discharge through the spout or outlet g'. The casing b is supported by a framework b', resting upon a bed-plate b^2 of the mill, and the casing b supports on its exterior an annular chamber h, which, as hereinafter described, is the settling-chamber, into which the materials of requisite fineness pass. The exhaust-fan e is of ordinary construction in that its body e', from which the fan-blades radiate, is hollow or concave, and this hollow body e' is utilized in the present invention as a hopper or receptacle for the unground materials, a chute or inlet-opening e^2 conducting the materials from the exterior of the mill to the hollow body e'. The annular settling-chamber h has the base of its innermost wall open, as at h', directly opposite the fan e, and this opening h' is screened or guarded by superposed plates h^2, arranged as illustrated in Fig. 2 and grouped in polygonal form around the fan e. These plates h^2, as clearly shown in Fig. 3, are hinged at one edge to fixed portions of the casing b and are free to drop at the other edge. A stem h^3 passes through each plate in series and carries pins h^4, which serve as supports for the plates h^2. An adjusting-nut h^5 serves to raise or lower the stem h^3, and thereby opens or closes the space between adjacent plates h^2, as well as alters the angular position of the plates, substantially as in the case of a Venetian blind or register. It follows that the adjustment of the stems h^3 will serve to increase or decrease the inlet-opening h' into the settling-chamber h and to vary the angle of said plates, and thus the exhaust created by the fan e can be augmented or decreased to compensate for higher or lower speeds of said fan

e, as well as regulate the fineness of the cement particles to be exhausted, and the direction of the exit of the cement-laden air may be varied. From the hollow body e' pipes or tubes e^3 extend below the base of the fan-blades to convey the materials to the balls or rolls f'. The materials are ground between the balls f' and the annulus d, and the exhaust-fan e, arranged directly above the grinding-path, elevates the finer particles therefrom and discharges the same through the damper-plates h^2 into the chamber h. Air-inlet ports m conduct air from the exterior of the mill into the casing b below the fan e and above the grinding-path, and hence a constant circulation of air within the casing b is maintained above the grinding-path by the suction action of the fan e and the expansion of the air in the casing b as it enters through the ports m. This circulation sets up induced currents of air around the balls f' and annulus d, and the annulus and balls are cooled by said currents. The induced currents also traverse the ground materials and properly season the same before they enter the settling-chamber h. The top of the chamber h is covered with netting, bolting-cloth, or other suitable equivalent means h^5 to permit of the escape and expansion of the air, but not of the particles of cement with which the air is laden, as it enters the chamber h. The chamber h has also an internal partition h^6, acting as a baffle-plate to break the force of the cement-laden air passing through the deflector-plates h^2. By reason of this screened upper end h^5 to the chamber h and the partition h^6 the particles of fine cement enter the main body of the chamber h in a relatively quiescent state, so as to respond to the influence of gravity, and pass downward therein to the annular outlet-passage n, formed in the walls of the casing b. The passage n discharges upon the disk-like delivery-platform g, which as it revolves drops the fine cement into the outlet or spout g'. The partitions h^6 serve also to return the coarser-ground particles through the passage-way h^7 at the base of the partition h^6 to the interior of the casing b and to the balls f'. By guarding the inlet to the settling-chamber h with the deflector-plates h^2, as described, and arranging said chamber h and plates h^2 so that the cement particles may be directed with more or less angularity upon the partition h^6, as indicated in full and dotted lines in Fig. 3, the air enters the main body of the chamber h with little or no force and is discharged under the influence of gravity therefrom, and the use of bolting-cloth is obviated. As is well known, such constructions as of necessity depend upon bolting-cloth to regulate the fineness of the cement particles escaping from the mill and upon an air-blast to force the particles through the cloth are defective in that the bolting-cloth is speedily perforated by coarser particles of cement forced therethrough by the blast, and the leakage through the cloth thus occasioned results in the passage of mixed materials, which require rebolting and reseparation before the product can pass the tests required.

The particular construction and arrangement of parts described and illustrated may be varied without departing from the spirit of my invention.

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a cement-grinding mill, a casing having peripheral outlets, a grinding mechanism located within the casing below the outlets, a settling-chamber located outside the casing and surrounding said outlets, an air-exhausting apparatus located within the casing adjacent to the outlets and above the grinding-path and means for controlling the outlets from the casing.

2. In a cement-grinding mill, a casing having peripheral outlets, an air-exhausting apparatus arranged within the casing above the grinding-path and adjacent to the outlets, a settling-chamber surrounding said outlets, an inlet for air from the exterior of the casing, arranged below the outlets from the casing and above the grinding-path and means for controlling the outlets from the casing.

3. In a cement-grinding mill, a casing having peripheral outlets, a grinding mechanism arranged in the casing below said outlets, an air-exhausting apparatus arranged within the casing adjacent to the outlets and above the grinding-path, a settling-chamber surrounding the outlets from the casing and adjustable means for controlling the outlets from the casing.

4. In a cement-grinding mill, a casing having peripheral outlets, a grinding mechanism located within the casing below said outlets, an air-exhausting apparatus located within the casing above the grinding-path and adjacent to the outlets, a settling-chamber surrounding said outlets, a series of superposed deflector-plates guarding each outlet, and means for moving said deflector-plates in the casing to vary the angle of discharge through said outlets.

5. In a cement-grinding mill, a settling-chamber arranged at the top of the mill and outside of the mill proper, an air-exhaust apparatus located within the mill above the grinding-path and arranged to discharge cement-laden air into the settling-chamber, an air-inlet located below the exhaust apparatus and above the grinding-path, a partition within the settling-chamber against which the air from the inlets is discharged by said exhaust apparatus, and a cover of fine netting for the top of said settling-chamber.

6. In a cement-grinding mill, an air-exhaust

apparatus arranged within the mill above the grinding-path, means for introducing external air into the mill below the air-exhaust apparatus, a grinding mechanism arranged below the air-introducing means, and a settling-chamber located outside the mill proper and having a screened top through which the air from the exhaust apparatus is discharged.

In testimony whereof I have hereunto set my signature in the presence of two subscribing witnesses.

HARRY HITZEL.

Witnesses:
W. H. WALTERS,
A. F. GERSTELL.