No. 745,075. PATENTED NOV. 24, 1903.

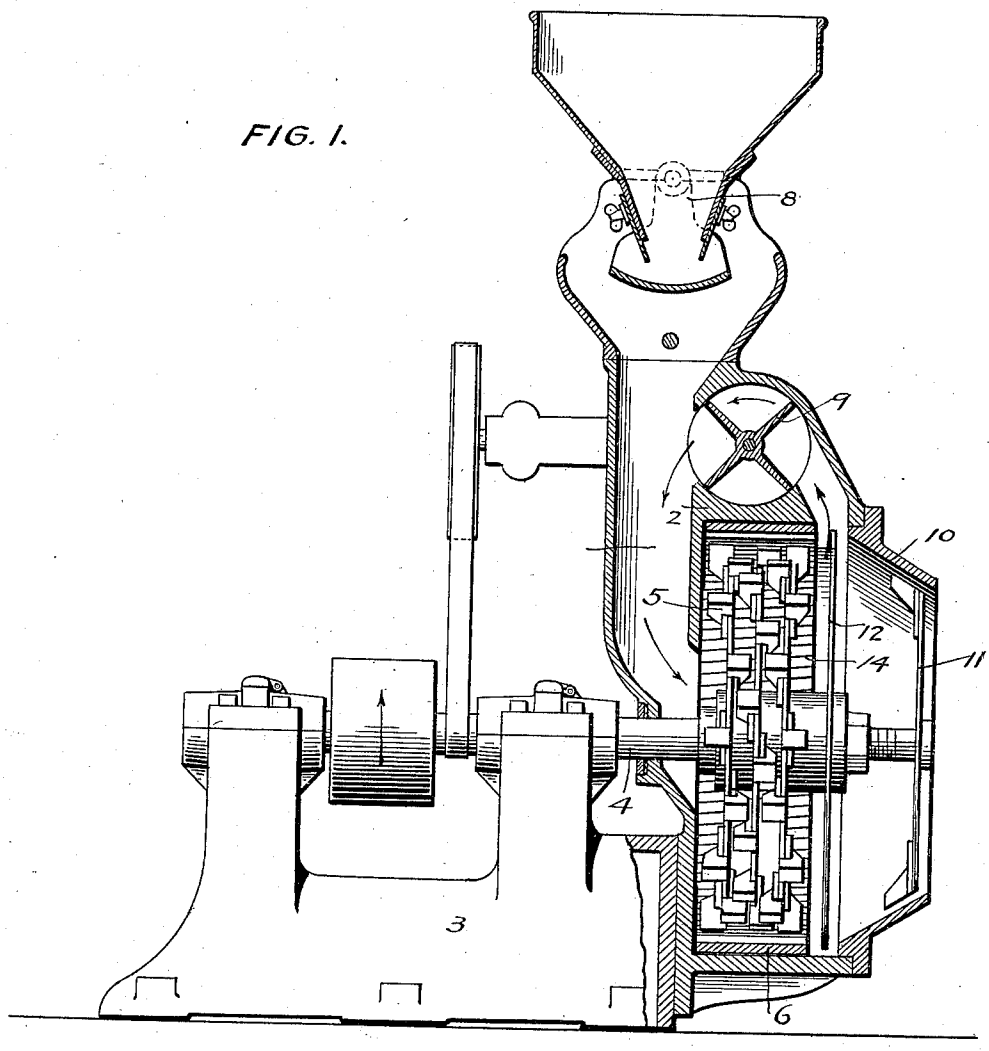
J. M. SCHUTZ.

CORRUGATED LINING FOR PULVERIZERS.

APPLICATION FILED JUNE 7, 1900.

NO MODEL. 2 SHEETS—SHEET 1.

FIG. 1.



WITNESSES

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CORRUGATED LINING FOR PULVERIZERS.

APPLICATION FILED JUNE 7, 1900.

NO MODEL. 2 SHEETS—SHEET 2.

FIG. 2.

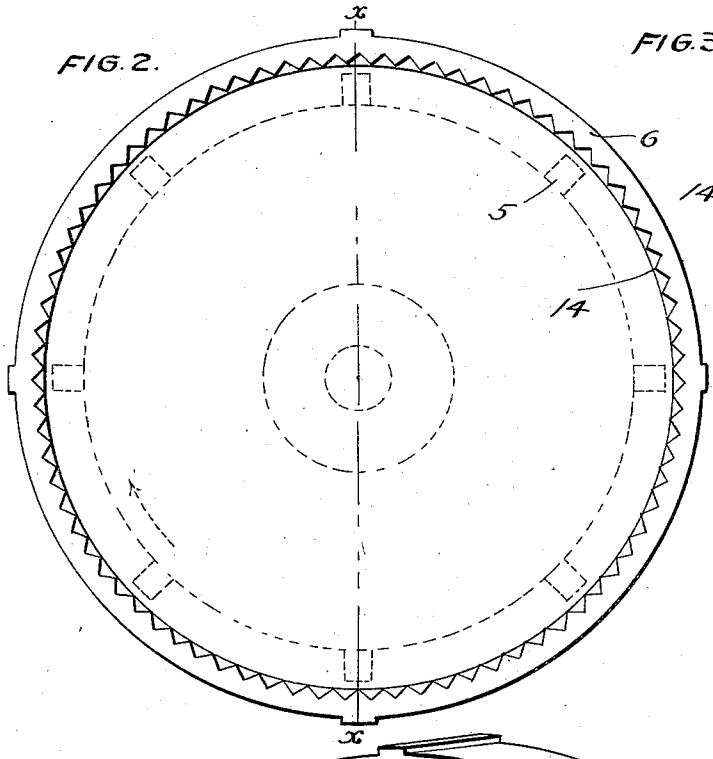


FIG. 3.

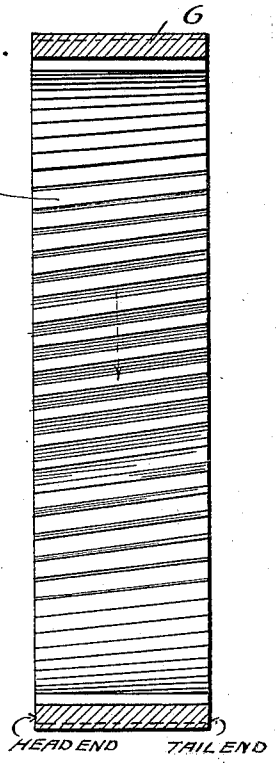
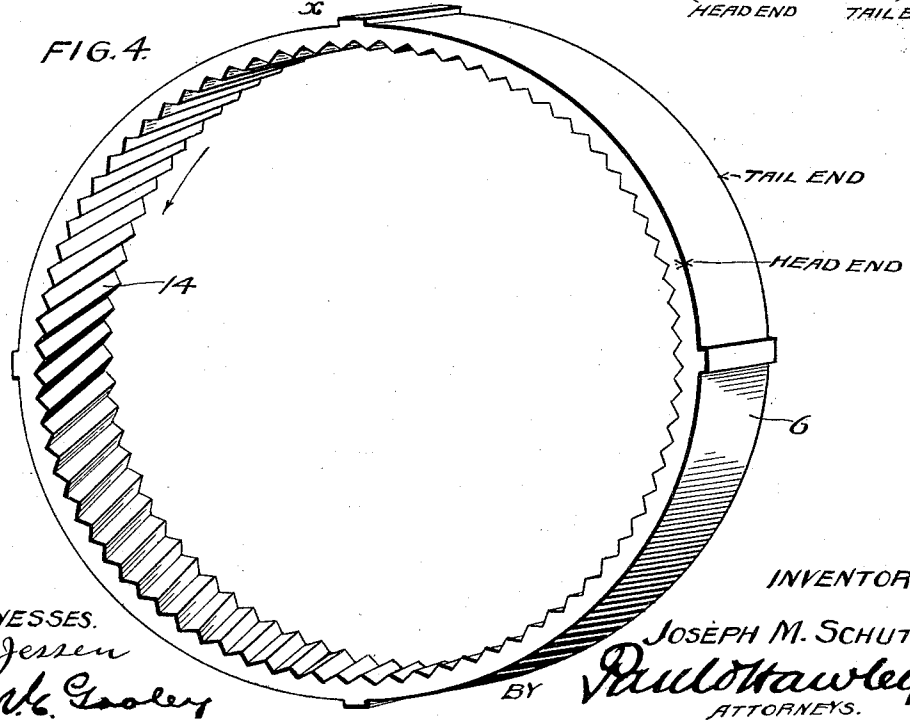


FIG. 4.



WITNESSES.

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No. 745,075. Patented November 24, 1903.

UNITED STATES PATENT OFFICE.

JOSEPH M. SCHUTZ, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR TO THE SCHUTZ-O'NEILL COMPANY, OF MINNEAPOLIS, MINNESOTA, A CORPORATION OF MINNESOTA.

CORRUGATED LINING FOR PULVERIZERS.

SPECIFICATION forming part of Letters Patent No. 745,075, dated November 24, 1903.

Application filed June 7, 1900. Serial No. 19,345. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH M. SCHUTZ, of the city of Minneapolis, county of Hennepin, State of Minnesota, have invented certain new and useful Improvements in Corrugated Linings for Pulverizers, of which the following is a specification.

This invention relates to the corrugated surfaces or linings of grinding or pulverizing mills. It has been the practice heretofore to make such linings slightly conical, with the small end for the discharge. The purpose of this has been to retard the movement of the material to the tail or discharge end of the machine in order to insure the pulverization of the material; but machines so designed have met with less success than those having cylindrical linings or even having linings that are tapered in the other direction, for the reason that a back pressure of air or a retardation of the air-current in the machine has always been set up to such an extent as to interfere with the equality of the air-currents in the different parts of the machine, resulting in lack of uniformity in the product.

The object of my invention is to provide a pulverizer of little length but large diameter, in which the progress of the material toward the discharge end of the machine will be so far retarded as to insure the complete pulverization of material fed to it without in any way disturbing or breaking up the rotary and longitudinally-progressing body or column of air within the machine.

To this end my invention consists in a pulverizing or grinding mill comprising a casing and rotary beaters or breakers in combination with a corrugated lining or grinding-surface wherein the corrugations are arranged at a slight pitch or inclination to the axis of the mill, said corrugations being opposed to the beaters with respect to the direction of rotation thereof and adapted to retard the material and give the same a backward-moving tendency.

The invention will be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is a vertical section of a pulverizer or grinding-mill embodying my invention. Fig. 2 is an enlarged end view of the lining removed from the mill. Fig. 3 is a section thereof on the line $x\,x$ of Fig. 2. Fig. 4 is a perspective view of the lining.

As shown in the drawings, 2 is the casing of the machine. This is attached to the base 3, which carries the shaft 4 for the beater 5, that rotates within the casing of the machine and within the lining 6 therein.

7 is the feed-trunk, opening into the head end of the casing.

8 is a feeder at the top of the trunk 7, and 9 is a conveyer through which coarse material remaining unground at the tail or discharge end of the machine is returned to the feed-trunk.

10 is the separating-cone of the machine, with which the disk 11 on the end of the shaft 4 coöperates in making the desired separation of the fine material.

12 is the inner disk of the machine, mounted upon the shaft 4 just at the end of the corrugated lining 6 and permitting the discharge of air and material only at the periphery of the casing.

The beater or breaker may be of any desired construction, but is preferably made up of a large number of hammers mounted upon arms or disks fixed to the shaft 4, and said beater rotates at a high speed within the casing, setting up centrifugal action in both the air and the material within the casing. In this way a strong blast of air rotating at a high speed is caused to progress through the mill, keeping the same cool and aiding in the separation of fine from coarse particles, as well as aiding the grinding process by tending to hold the material upon the corrugated surface of the casing. When the corrugations in the grinding-surface or lining of the machine extend parallel with the axis or shaft, the material entering at the head of the machine is struck by the beaters and progresses rapidly toward the discharge end of the machine. There are many materials that may be ground satisfactorily with such corrugations in the mill; but there are many more materials that do not pulverize readily and with which I have experienced an overloading of the tail end of the machine to such an

extent as to make the return of large quantities necessary and sometimes resulting in the heating of the mill and also in the improper separation of the material. To avoid this very serious difficulty and at the same time avoid back pressure of air in the mill, I make the corrugations 14 in the lining 6 at a slight inclination to the axis of the shaft 4 and all planes including said axis. The corrugations are opposed to the beaters, making slightly-obtuse angles with tangents from the beaters and the inclination being toward the head of the machine, whereby particles of material that strike in the corrugations will be directed or bounced backwardly, and thus tend to check the feed or forward progress of the material toward the discharge end of the machine. The corrugations may be of any desired shape in cross-section and may be made in the shell or casing of the machine instead of in a separate lining, as shown in the drawings. The inclined corrugations are preferably confined to a cylinder with just enough taper to permit the casting of the lining by a single pattern. If desired, the lining may be smaller at the head end than at the discharge end of the machine, in which case the corrugations would be pitched or inclined still more than shown in the drawings. The drawings illustrate a machine the beater of which rotates toward the left. For a right-hand machine the corrugations would be pitched in the opposite direction. It is obvious that if the corrugations were pitched toward the tail end of the machine the material would be urged forward very rapidly. Hence when it is desired to grind material roughly and very rapidly I simply change the direction of rotation of the beaters.

Obviously the inclined corrugations while of particular value in a combined mechanical and air pulverizer and separator are of proportional value for machines that are not dependent upon air circulation or currents.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A pulverizer or grinding-mill of the class described comprising the cylindrical casing, in combination with the corrugated ring or lining provided therein and having internal inclined corrugations, said ring being shorter than said casing, the shaft, the beaters provided thereon, the disk 12 carried by said shaft and located between the end of said ring and the end of the casing, the return-duct, the feed-trunk, the separator-cone 10 and the end disk 11 thereof, substantially as described.

2. A pulverizer or grinding-mill of the class described, comprising the cylindrical casing in combination with the cast-metal ring or lining provided in said casing and shorter than the same, the rotary beaters, the shaft 4 thereof, the disk 12 upon said shaft, the tailings or return duct leading from said casing, the separator-cone 10 forming the end of said casing, the disk 11 provided upon said shaft and having whizzers or vanes and suitable means for feeding material through the opposite end of said casing, substantially as described.

In testimony whereof I have hereunto set my hand this 24th day of May, 1900, at Minneapolis, Minnesota.

JOSEPH M. SCHUTZ.

In presence of—
C. G. HAWLEY,
M. E. GOOLEY.