Nov. 22, 1927.

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1,649,813

GRINDING CEMENT MATERIAL, ETC

Filed July 30, 1926

Fig. 1.

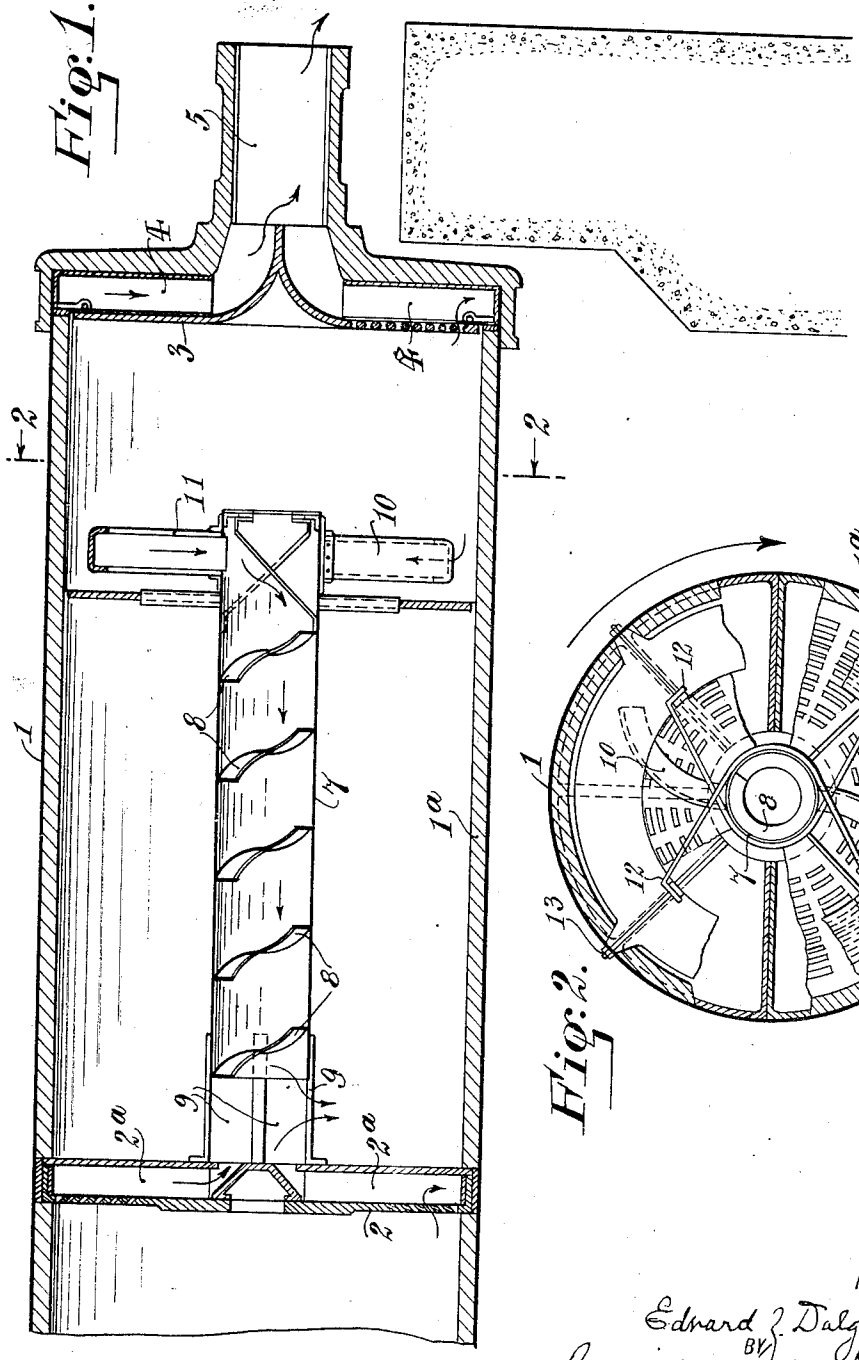


Fig. 2.

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Patented Nov. 22, 1927. 1,649,813

UNITED STATES PATENT OFFICE.

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GRINDING CEMENT MATERIAL, ETC.

Application filed July 30, 1926, Serial No. 125,872, and in Denmark August 14, 1925.

In the grinding of cement material it has been found that for some purposes highly desirable results are secured by very fine grinding of the cement material. It has been found also, on the other hand, that in grinding cement material to an extreme degree of fineness in ball mills or tube mills which rotate on a substantially horizontal axis and in which the charge of grinding bodies and material is subjected, by reason of the rotation of the mill, to a continuous tumbling and grinding action, there is an increasing tendency of the very finely ground material to adhere to the grinding bodies and to form upon each of them a pellicle which considerably decreases the grinding efficiency of the grinding bodies, with a consequent decrease in the output of the mill. In accordance with this invention, such coating of the grinding bodies with a film of the finely divided material, at least to an injurious degree, is prevented without stopping the operation of the mill by freeing the grinding bodies, as they approach the discharge end of the mill, from the accumulating pellicle and returning them to the mill, preferably at or near the feed end, for further action upon the material. Such cleansing of the grinding bodies can be accomplished, if the accumulation of material has not been allowed to proceed too far, by any one of several different methods, as by passing the grinding bodies through a suitable chemical bath or by subjecting them to a blast of air or preferably, as explained hereinafter, by returning them from the discharge end of the mill, where the material has been reduced to the utmost fineness, to the feed end of the mill where, by the attrition of the coarser particles of material, found at the feed end of the mill, the incipient film of material is removed.

The invention will be explained more fully hereinafter with reference to the accompanying drawing, in which is illustrated one form of apparatus adapted for the practice of the method by the attrition of the relatively coarse particles of material and in which:

Figure 1 is a view in longitudinal central section of so much of a grinding mill as is necessary to enable the invention to be understood.

Figure 2 is a view in transverse section on the plane indicated by the line 2—2 of Figure 1 looking in the direction of the arrows.

The mill itself, except as hereinafter indicated, may be of any usual or suitable construction, being shown as having a metallic shell 1 and a lining 1^a of suitable material, and, as usual in such mills, rotates on a substantially horizontal axis, so that the charge of grinding bodies and material is subjected, by reason of the rotation of the mill, to a continuous tumbling and grinding action. The mill is shown as having at the feed end a double wall 2 with radially disposed lifters 2^a by which the material is fed into the grinding chamber and as having at the discharge end a double wall 3 equipped with suitably disposed lifters 4 by which the finely ground material is delivered into the discharge trunnion 5. Supported centrally within the shell by any convenient means, such as the straps 12 and bolts 13 is a tube 7 which rotates with the shell of the mill and is equipped internally with a worm conveyor 8 which is so disposed with reference to the direction of rotation of the mill that the bodies delivered into the tube at its forward or right-hand end will be caused to travel through the tube and to be delivered therefrom through openings 9, provided near the feed end of the mill, into the grinding chamber at or near the feed end. At the forward or right-hand end of the tube, which is close, the tube is equipped with lifters 10 which lift the grinding bodies together with a relatively small proportion of the material, thereby effecting a partial separation of the grinding bodies from the material at or near the right-hand or discharge end of the mill and return the same through openings 11 into the tube 7 so that they may be transferred to the grinding chamber at the feed end. The grinding bodies which, in their progress through the grinding chamber, become slightly coated with the adhering finely ground material, are thus transported from the discharge end of the grinding chamber through the tube 7 and are returned to the grinding chamber near the feed end of the same, where the material being operated upon has not yet been reduced to a very fine condition but consists of relatively large pieces, by the attrition of which the grinding bodies are freed of the

adhering film and are therefore placed again in condition for operation with maximum efficiency.

It will be understood that so far as the invention finds expression in a method, it can be practiced in ways other than that specifically described herein and that so far as it finds expression in apparatus, the apparatus may be varied to suit different conditions of use or the convenience of the manufacturer or the user.

I claim as my invention:

1. The improvement in the method of fine grinding with grinding bodies in substantially horizontal rotating mills, which consists in feeding at one end the coarse material which is to be ground, progressively and continuously subjecting the material operated upon to the action of the grinding bodies through a movement of rotation, separating the grinding bodies from the material within the mill, freeing the grinding bodies from the adhering pellicle of finely ground material within the mill by attrition with the coarse material, and continuing the grinding with the grinding bodies thus freed from the pellicle of finely ground material.

2. A grinding mill for grinding with grinding bodies comprising a substantially horizontal rotating grinding chamber, means to deliver into the same at the feed end the material to be ground, means to discharge the finely ground material at the other end, and means to separate the grinding bodies from the material in the grinding chamber near the discharge end and return them within the grinding chamber to a point in the chamber near the feed end to be mingled there with the relatively coarser material.

3. A grinding mill for grinding with grinding bodies comprising a substantially horizontal, rotating cylindrical grinding chamber, means to deliver thereto at the feed end the material to be ground, means to deliver therefrom at the discharge end the finely ground material, means to separate the grinding bodies from the material in the grinding chamber near the discharge end, a conveyor within the chamber, means to deliver to the conveyor such grinding bodies, and means to deliver such grinding bodies from the conveyor within the grinding chamber at a point near the feed end thereof.

4. A grinding mill for grinding with grinding bodies comprising a cylindrical shell forming a grinding chamber, means to deliver to the grinding chamber at its feed end the material to be ground, means to discharge from the grinding chamber at the other end the finely ground material, a conveyor tube supported centrally within the cylindrical shell and rotating therewith, means to deliver grinding bodies from the grinding chamber near its discharge end to the conveyor tube, and means to discharge such grinding bodies from the conveyor tube into the grinding chamber near its feed end.

This specification signed this 7th day of July, A. D. 1926.

EDVARD ZEUTHEN DALGAARD.