Feb. 24, 1931. P. T. LINDHARD 1,793,499

METHOD OF FEEDING CEMENT MATERIAL TO KILNS

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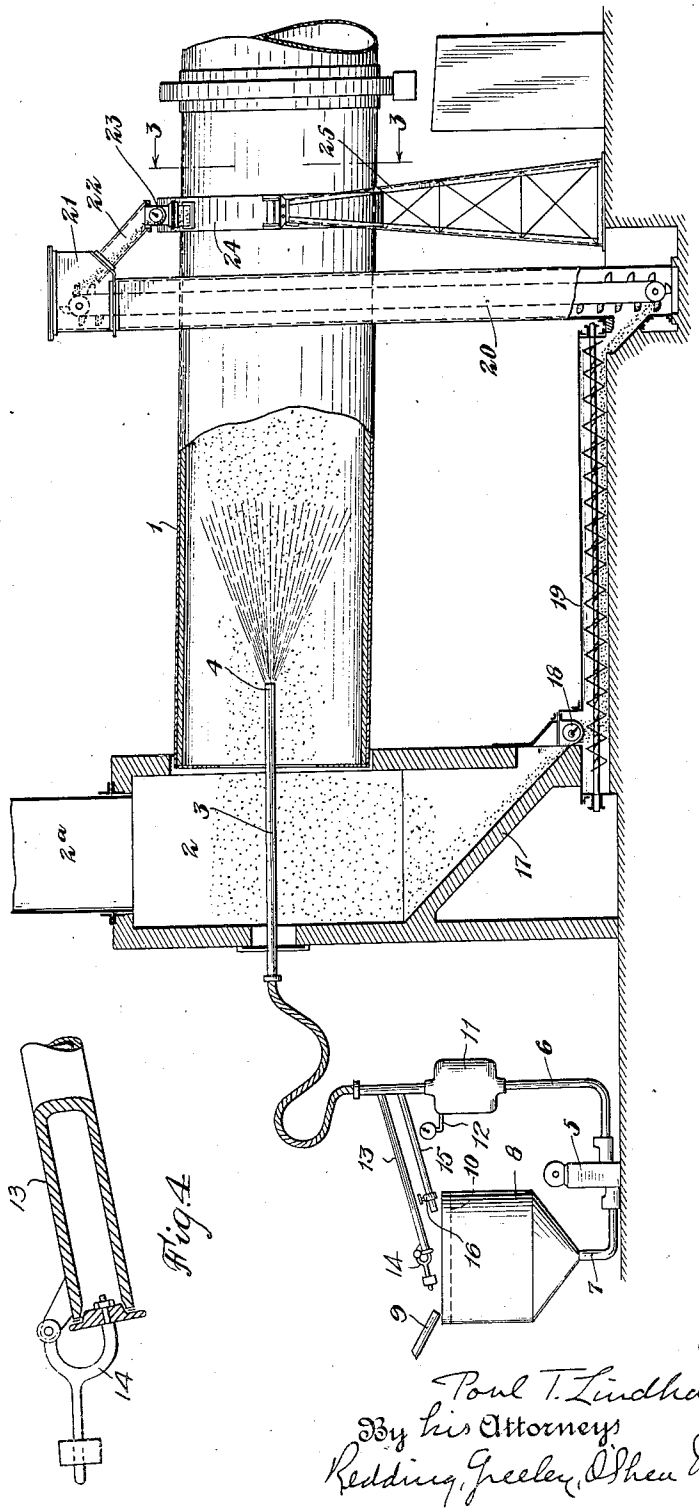


Fig. 1.

Fig. 4.

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Fig. 2.

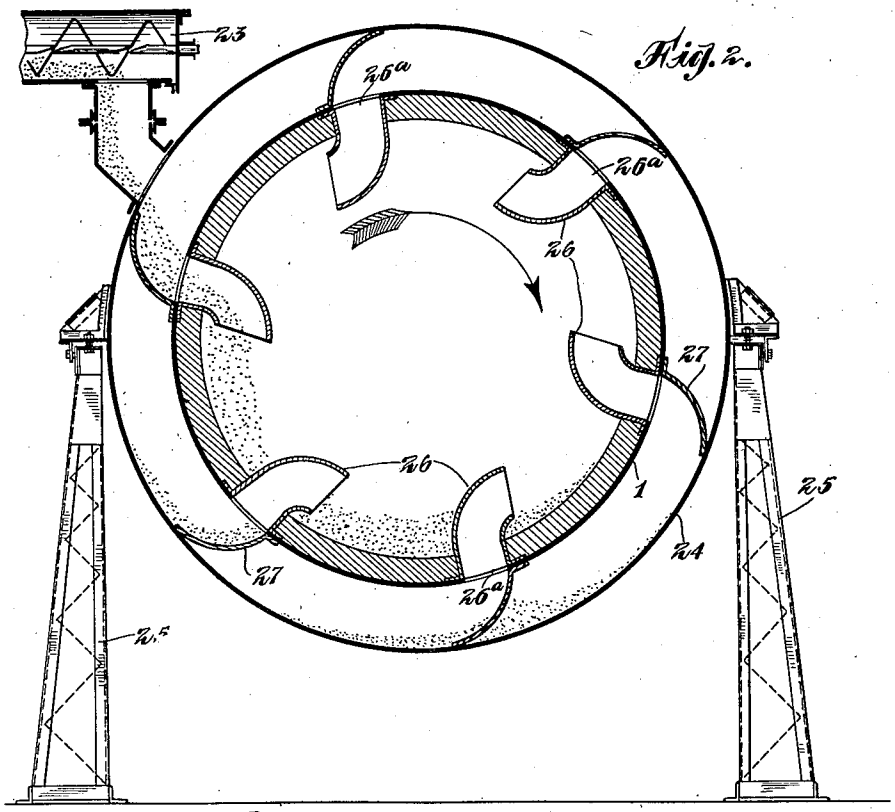
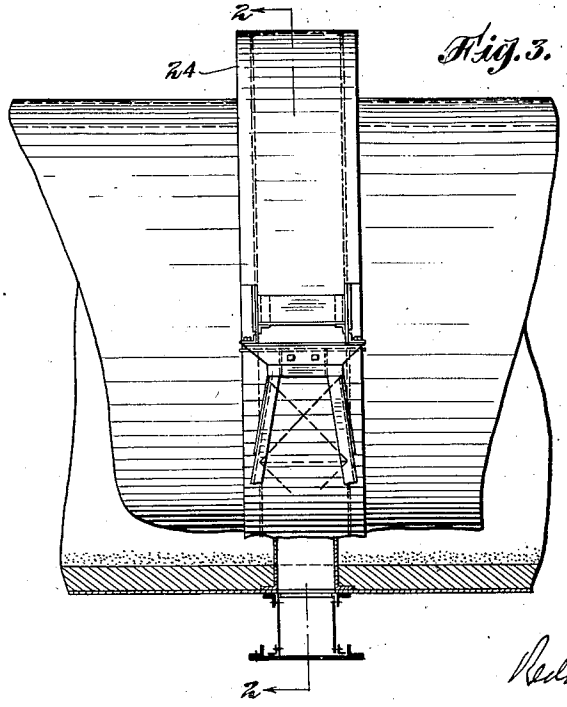


Fig. 3.



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UNITED STATES PATENT OFFICE

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METHOD OF FEEDING CEMENT MATERIAL TO KILNS

Application filed November 5, 1927. Serial No. 231,342.

In an application of Niels Nielsen for Letters Patent of the United States, Serial No. 136,147, filed September 17, 1926, assigned to the assignee herein, there is described a method of and an apparatus for recovering and returning to the kiln, to which slurry is fed by atomization, the dust which is blown from the kiln. As there described, the dust which is separated from the hot gases in the dust chamber is discharged directly into the path of the atomized slurry where it enters the kiln at the upper end thereof. The purpose of that invention was to overcome the objections to the otherwise desirable feeding of slurry by atomization, which objections were based upon the previous loss of cement material due to the rapid drying of the minute drops of slurry and the discharge of the dust so formed with the hot gases, the old method being thereby rendered uneconomical. The method described in the application referred to has been found to be effective in recovering a large part of the dust discharged from the kiln in the practice of the atomization method, but continued study of the subject has disclosed the fact that some of the dust which is discharged into the path of the atomized slurry at or near the upper end of the kiln fails to be caught up by the slurry and is immediately blown out of the kiln, with a consequent economical disadvantage. It has been found further, in the development of the present invention, that this disadvantage can be overcome by returning the dust to the kiln at a point somewhat remote from the nozzle through which the slurry is discharged in an atomized condition, the place of discharge of the dust into the kiln being preferably located at about the plane where the cone of atomized slurry substantially fills the diameter of the kiln and where the slurry itself is already somewhat thickened by evaporation. Under these conditions the dust is more completely taken up and incorporated with the slurry and little or none of the dust which is returned to the kiln is again blown out of the kiln. In accordance with the invention, the slurry is fed to the kiln by atomization as before, and the dust is separated from the kiln gases by precipitation and is returned to the kiln at a point somewhat remote from the point of discharge of the slurry, that is, at a point where the slurry has been subjected to the heat of the kiln and substantially fills the cross sectional area of the kiln.

The invention will be more fully explained hereinafter with reference to the accompanying drawings, in which:

Figure 1 is a partial view in longitudinal sectional elevation of an apparatus adapted for the practice of the invention.

Figure 2 is a partial view in transverse section on the plane indicated by the broken line 2—2 of Figure 3, but on a larger scale than that of Figure 1.

Figure 3 is a partial view, partly in side elevation and partly in section on the plane indicated by the broken line 3—3 of Figure 1.

Figure 4 is a detail view on a larger scale of the safety valve indicated at 14 in Fig. 1.

In the apparatus represented in the drawing, the upper or feeding end of the kiln 1, from which the hot gases escape, is extended as usual into a dust chamber 2 which communicates with the usual stack 2^a. The slurry is discharged into the heating and drying zone of the kiln, in a condition of fine spray or atomization, through a pipe 3, provided at its extremity with a nozzle 4, of suitable form, adapted to deliver the slurry as an expanding zone of fine spray. The slurry may be delivered from its source of supply, indicated by the pipe 9, through a screen 10, provided for the purpose of preventing the passage of particles of solid material large enough to block the atomizer or spray nozzle, into a tank 8, from which it is drawn through a supply pipe 7 by a suitable pump 5 and is delivered through a discharge pipe 6 suitably connected with the injecting pipe 3.

The dust which is carried out of the kiln with the hot gases is separated therefrom by precipitation in the dust chamber 2, from which it may be discharged continuously by the inclined bottom 17 to a cross conveyor 18, of ordinary construction, and thence to a longitudinal conveyor 19, also of ordinary construction. The dust delivered by the conveyor 19 is discharged by an elevator 20, of

ordinary construction, into a hopper 21, from which it is delivered by a chute 22 and a conveyor 23 to a fixed housing 24 which encircles the kiln and is supported by suitable pillars 25. Within the housing 24 the kiln shell has a circumferential series of openings 26ª with interior guards 26 and exterior scoops or shovels 27 whereby, in the rotation of the kiln, the dust delivered within the housing 24, is transferred into the kiln itself.

The housing 24 is located in a position which, for convenience, may be somewhat remote from the upper end of the kiln and the nozzle 4, that is, at such a distance that the cone of slurry spray from the nozzle 4 will substantially fill the interior of the kiln and that the slurry itself will have been subjected to the heat of the kiln sufficiently to thicken it somewhat. Under these conditions practically all of the dust delivered to the kiln will be taken up by and incorporated with the slurry. Of the dust which is thus returned to the kiln but little free dust remains to be blown out of the kiln, such dust as is delivered to the dust chamber originating largely between the housing 24 and the upper end of the kiln, where it is set free from the slurry through the rapid drying of the same and being carried thence into the dust chamber.

The invention is not particularly concerned with the means for delivering the slurry, but in the arrangement illustrated in the drawing it is delivered by the pipe 6 to a pressure equalizing vessel 11 provided with a pressure gauge 12, and from the vessel it is discharged through the pipe 3 above mentioned. An overflow pipe 13 provided with a safety valve 14 permits the return of surplus slurry to the tank 8 and for the purpose of regulating the pressure and also the volume of slurry discharged into the kiln there may be provided another overflow pipe 15, equipped with an adjusting valve 16, by means of which the return of the slurry to the tank 8 may also be permitted.

It will be understood that the mechanical features may be varied to suit different conditions of use and that the invention is not restricted to the particular construction shown and described herein.

I claim as my invention:

The method of feeding cement material to a kiln, which consists in delivering cement material to the kiln in the form of slurry by atomization, in a spray cone, separating from the kiln gases the dust carried therewith and returning such dust to the kiln at a point where the cone of atomized slurry substantially fills the diameter of the kiln.

This specification signed this 2nd day of November, A. D. 1927.

POVL T. LINDHARD.