

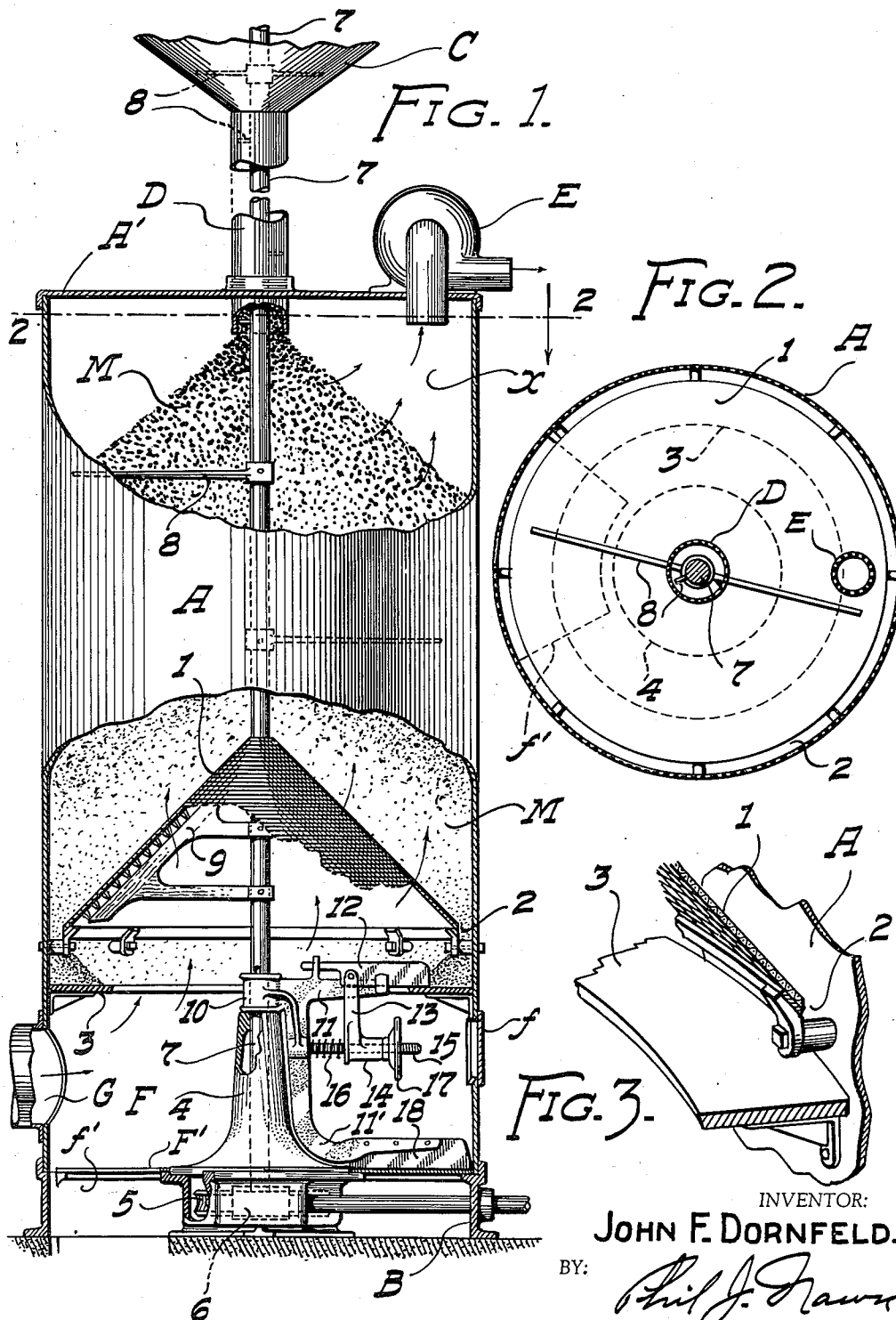
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DRYING APPARATUS

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DRYING APPARATUS

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3 Claims. (Cl. 34—34)

This invention relates to drying apparatus employed in the disposal of spent grains or similar products requiring an aerating treatment for removing moisture.

5 The objects of the invention are:—

The providing of an equipment suitable in the art concerned for progressively advancing granular products through a continuous drying process whose de-hydrating efficiency will permit a comparatively small and economical structure to dispose of a relatively large volume of material.

10 The providing of an apparatus whereby the moisture driven off is not permitted to re-enter the outgoing or finished material but passes through the oncoming product to an exhaust located in advance of the assembly's discharge.

15 The providing of an apparatus whose output can be manipulated in a way that uniformly graded product is a selectively attained feature through the synchronizing of the drying medium's input, the exhaust of this same medium, and the regulating of the means controlling the discharge volume.

20 Other advantages will be noted throughout the particular description; the novel features being pointed out in the appended claims; both divisions of this application referring to the accompanying drawing which latter is a part thereof. The several views of the drawing are indexed as follows:—

Fig. 1 is a vertical sectional-elevation of the assembled apparatus.

Fig. 2 is a sectional-plan view taken on line 2—2 of Fig. 1.

35 Fig. 3 is a perspective view of the discharge opening that forms a principal feature in this invention.

40 The drawing is somewhat diagrammatic but is of the general design preferred. It is here observed that slight departures due to manufacturing economy may be introduced without departing from the spirit of the invention.

Similar characters of reference apply to like parts throughout the several views.

45 Referring to the drawing, a shell or container A supported by a base portion B is provided with an airtight cover A'. The shell A is cylindrical form the bottom of which is fashioned to offer a conical and perforated screen element 1 adapted for supporting the product M in process of curing. The said screen's base diameter is intentionally less than the circular diameter of the shell A in order to arrange an annular opening 2 for passage of the material M when same is dried. Directly beneath the opening 2 and spaced to be

opposed thereto is a shelf-like annular ledge 3 which arrests the flow of dried products passing through said opening. The shell A is in communication with a product storage C by means of a connecting tube D whose length will coincide with any preferred arrangement of the elements A and C. This tube taps the shell A axially thereof and terminates to leave its lowermost end adjacent to the airtight cover A' provided for the aforesaid shell. Located on the cover A' is an exhaust blower E that functions as a suction fan which affects the air-currents passing upwardly through the apparatus as arrows indicate. This exhaust-means E acts to effect a partial vacuum in the area X within the shell A. Beneath the screen 1 and concentric with the said shell is provided a chamber F wherein is housed the mechanism necessary to the apparatus. This chamber is in communication with a suitable source of heated-air by means of a conduct G. Axially central upon the floor F' of the chamber is located a standard or base 4 which houses and provides the journalling requisites for a worm-wheel 5, a worm 6, and an upright shaft 7, the latter extending vertically throughout the entire apparatus; the shaft's lower terminus being keyed to the aforesaid worm-wheel. Above the screen 1 the said shaft will be fitted with suitable stirring or beater arms 8. Beneath the said screen this shaft carries a brush 9, fixed to rotate with the shaft, to sweep the under side of the aforesaid screen. Also keyed to the said shaft is a dually armed collar 10 whose upper arm 11 supports a slidable blade or scraper 12. The said blade is attached to an upstanding arm 13 which is integral with a bored sleeve 14 adapted to admit a threaded stem 15 projecting from the lower collar-arm 11'. The said sleeve is disposed between an outwardly thrusting spring 16 and an adjusting-nut 17, the latter offering hand-wheel facilities for regulating the scraper blade 12 radially with respect to the annular shelf 3, there being an appropriate opening f arranged in the wall of chamber F. The dried products swept from the ledge shelf 3, and the same passing through the screen 1 fall upon the floor F' of the chamber F. The arm 11' follows closely the contour of the standard 4 and terminates as a support to which is attached a radially disposed raking blade 18 which sweeps the said products around to a discharge opening f' which action ends the drying process here concerned.

The storage feature C may be an upper floor of a building wherein the apparatus is installed or any other appropriate hopper means of like

character. The shaft 7 may extend into the storage in order to disturb products stored therein or the products may be agitated in any suitable way that will induce same to flow down the tube D. The important work of drying the treated material M takes place within the container A, the products descending the tube act as a seal against the escape of air through this element and the said products leaving said tube assume a conical aspect whose apex is the tube's orifice. Thus is provided the area X which assumes the characteristics of a vacuum chamber because of the effect upon same set up by the suction of the exhausting fan E. The effect upon the general mass of product passing through the element A is indicated as to moisture content by the rendering of the drawing, the darkest portion symbolizing that which is wet, which condition gradually changes to what is entirely dry at the screen I.

The aerating element or warm air entering through the conduit G, lowers in temperature in passing through the material M, so that, when same reaches the area X all of its drying value has been dissipated. In this manner no heat units are wasted; nor are any of the wet products permitted to affect that portion already dried. The air currents move upwardly under the vacuum influence of the exhausting blower E. The moisture of the incoming mass cannot descend to again change what has already been de-hydrated. The process can be lengthened or shortened by arranging the stay of the material within the container A to be of any desirable period of time. This is accomplished by manipulating the hand-wheel 17 to adjust the blade 12 inwardly or outwardly to rake more or less products off the shelf 3, which action permits greater or lesser amount of material to crowd through the opening 2 directly over the annular shelf. The said shelf is spaced from said opening in order to allow a determined angular aspect to obtain thereat which permits of adjusting the blade 12 for taking very small, and very appreciable quantities off the aforesaid shelf.

The apparatus is a compact assembly that does not require inordinate room for its installation. The operation is a continuous process which is continuously effective in contradistinction to those forms of drying apparatus which tumble the material together while exposing the mass to air passing haphazardly through these structures and escape without expending all of the heat units such currents carry. The present invention compels the heat units to be used up within the mass before being allowed to exhaust.

The cone screen I may be, it is here remarked, a flat floor provided with means for discharging the lower strata of products at intervals. Also

the stirring arms or at least those in the compartment A, could be fitted with end blades arranged to scrape the compartment wall for removing adhering material, should this ever become a desirable item.

Having described the invention, what is desired to protect by U. S. Letters Patent, is:—

1. A drying apparatus having a vertical axial shaft equipped with stirring arms, a tube conveying an agitated product, said tube inclosing said shaft, a cylindrical processing chamber which is supplied through said tube with a product to be processed, a compartment aligned with and similar to said chamber disposed beneath said chamber, a perforated and upstanding conical plate separating said chamber and said compartment, a product-agitating means functioning with said shaft in said processing hopper chamber, said shaft extending throughout said apparatus, and a brush element rotatable with said shaft arranged to sweep the conical under surface of said plate.

2. A drying apparatus having a drying chamber, replenishing conduit therefor, a compartment functioning as an air disseminating area beneath said chamber, a cone screen separating said compartment from said chamber, means for discharging heated air below said screen, said screen acting to diffuse upwardly moving heated air through a mass of material supported by said screen, an axial shaft common to said chamber and said compartment armed with radial stirring blades for agitating said mass, an annular shelf around the interior wall of said chamber adjacent the plane of the screen's conical base, an apertured floor in said compartment, a pivoted scraper blade sweeping the aforesaid shelf, a sweeping blade for clearing the floor in said compartment, both aforesaid blades actuated by a bifurcated arm element rotating in unison with said shaft.

3. A drying apparatus comprising cylindrical means forming a processing chamber, a shaft concentric with said processing chamber, stirring means on said shaft, an upwardly extending perforated floor below said processing chamber, a second chamber below said floor, drying medium conducting means opening into said second chamber, gearing for said shaft in said second chamber, feeding means for material to be dried at the top of said processing chamber, suction means adjacent said feeding means and above the material in the processing chamber, and an annular shelf below said floor functioning as a baffle to direct the drying medium into the area below said floor, said drying medium passing through the material in said processing chamber to said suction means.

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