

March 12, 1935.

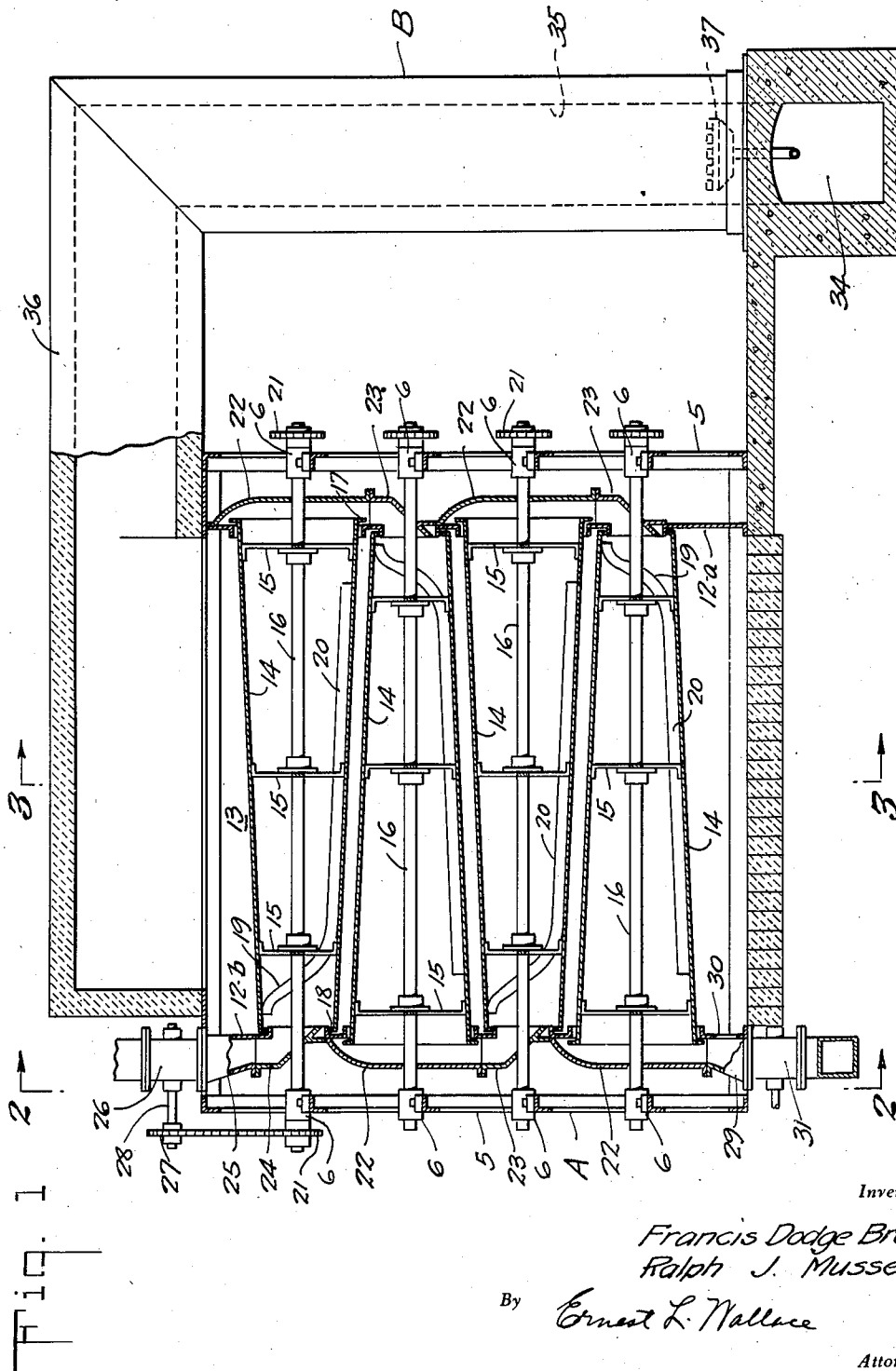
F. D. BROWN ET AL

1,994,083

DRIER

Filed July 30, 1932

2 Sheets-Sheet 1



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DRIER

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2 Sheets-Sheet 2

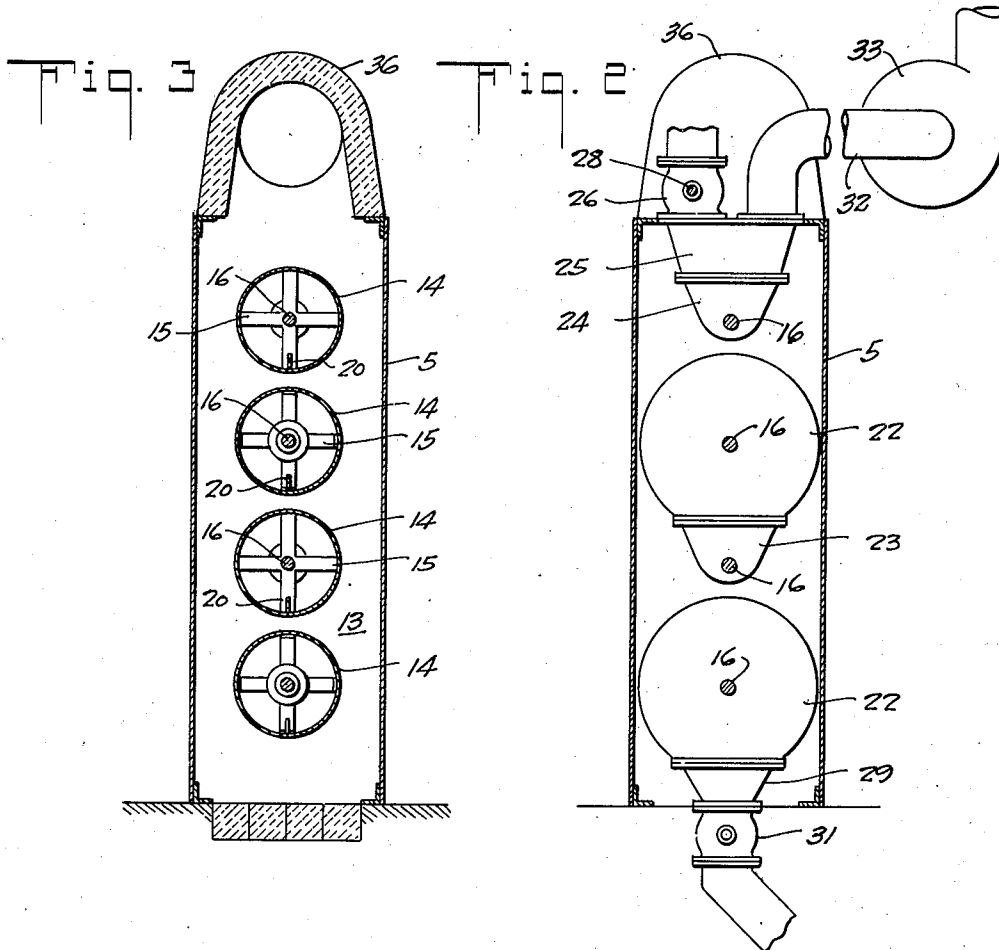
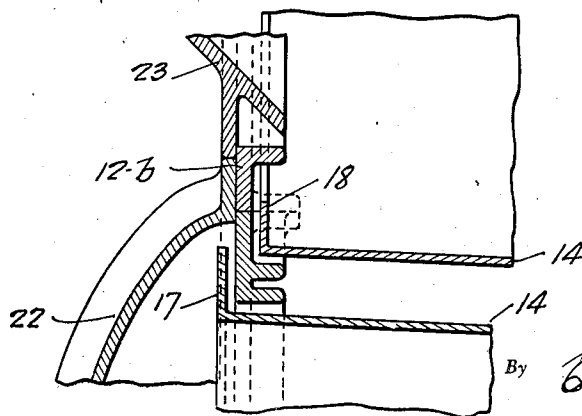


Fig. 4



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UNITED STATES PATENT OFFICE

1,994,083

DRIER

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Application July 30, 1932, Serial No. 626,374

2 Claims. (Cl. 34—5)

This invention relates to a drier for loose material such as poultry and live stock food pellets. In the embodiment shown herein, it is adapted for drying and dehydrating pellets formed of mash and to effect some degree of predigestion. However, it is not limited to such use.

The objects of this invention are to provide a drier which is compact and wherein the material being treated passes continuously through the drier from an inlet to an outlet. Another object of this invention is to provide a drier having a high thermal efficiency. More specific objects of this invention are to provide a drier wherein there is a long path of travel for the material in a very compact space; a series of rotatable conical drums for the material to pass through in seriatim, heat being supplied by radiation, convection and conduction from the exterior to the interior of the drums and heat being supplied directly to the interior of the drums by passage of hot gases including those of combustion there-through; and details of structure, arrangement and association of the various elements contributing to attainment of the broad objects of invention.

These objects together with other objects and corresponding accomplishments are obtained by means of the embodiment of our invention illustrated in the accompanying drawings, in which:—

Fig. 1 is a vertical section through a complete drier unit; Figs. 2 and 3 are sections as seen on the lines correspondingly numbered in Fig. 1; and Fig. 4 is an enlarged view of a fragment of the section shown in Fig. 1.

Referring more particularly to the drawings, the drier comprises a drying section A and a heat generator B. Although a tier of four conical drums are shown, it will be obvious as the description proceeds that a number of tiers side by side are within the scope of the invention.

The drying section comprises a casing 5 having end frames provided with bearings 6 for drum shafts. The casing may be constructed in any suitable manner and preferably has walls of heat insulating material. These may be arranged with hinged panels. However, the specific form of the casing is no part of our invention and the details thereof are not shown. End walls for the casing are provided by castings 12a and 12b and form a chamber 13 within the casing.

Conical drums preferably of sheet metal are denoted by 14. Within each of the drums are three spiders 15, the hubs of which are secured to shafts 16. The large ends of the drums are provided with outwardly extending flanges 17 best

shown in Fig. 4, to overlap the outer faces of the castings 12a and 12b at the margins of openings and prevent the material discharged from the drums passing into chamber 13. The small ends of the drums have inwardly directed flanges 18 to overlie the inner walls of castings 12a and 12b at the margins of openings for the small ends of the drums and seal the drums from the chamber 13 against loss of the material being dried. At the small ends of the drums are short spiral ribbons or flights 19 which form starting flights and initiate movement of the material into the drums. Extending from the inner ends of the flights 19 are lifters 20 in the form of ribs. On the shaft 16 are sprocket wheels 21 for gearing to sprocket chains to effect rotation of the cones. The ends of adjacent drums are placed in communication by cast housings. Each cast housing comprises a dome section 22 and a hopper action 23. The dome portions extend over the large ends of the drums and the hopper portions extend over and into the small ends of the drums. These housing sections may be bolted or otherwise secured to the castings 12a and 12b. At the small end of the upper drum is a hopper housing section 24 which is connected to a hopper section 25 leading from a material feeder 26. The feeder is of a type well known in the art for positively feeding material and is driven from a sprocket wheel 27 mounted on its shaft 28. At the bottom of the tier of drums and at the large end of the last drum is a casting 29 having an opening communicating with chamber 13. There is a discharge feeder 31 below the casting 29 and in communication therewith. It will be noted that the drums are connected in zigzag formation so that material may be fed from the feeder 26 into the upper drum and pass progressively through the drums to the bottom feeder 31. On the casting section 25 is an outlet for hot gas to which a pipe 32 is connected. This pipe leads to a suction fan 33 which draws spent hot gases from the drier. The bottom of the drier is formed by a wall or floor of refractory material.

The heat generator comprises a fresh air intake 34 leading to a combustion chamber 35. This combustion chamber is vertical and separate from the drying section. It is preferably lined with refractory material and at the top a flue 36 of similar material extends over the casing and forms a top arched wall for the casing. Within the combustion chamber is a burner 37 and as shown may use gas or oil.

In the operation of the drier, burner 37 is lighted and the fan 33 started. The material to be

dried such as wet poultry or live stock food pellets is fed into the small end of the upper drum by means of feeder 26. The drums may be geared together by the sprockets 21 and sprocket chains 5 and are driven by any suitable source of power. The material to be dried passes into the uppermost drum at its small end and is started through the drum by the flights 19. The material is carried upward in the drums by rotation of the latter and turned over. This agitates and turns 10 over the material so that aeration and more effective drying is accomplished. Due to centrifugal action, the pellets are caused to travel toward the large end of the drum. The lifters 20 raise 15 and turn over the material aiding in aeration and drying. After the material passes from the large end of a drum it falls into a hopper section 23 and is delivered to the small end of the nearest lower drum. This continues so that the material 20 travels through a long path in a very compact space, is in contact with a large drying area and finally reaching the outlet. Heat from the combustion chamber passes upwardly to the flue 35 and thence downwardly over the outside of the drums to the opening 30 and thence upwardly 25 through the drums in reverse direction to the path of travel of the pellets, the spent gas finally being drawn out by the fan 33. The interiors of the drums are sealed from the exteriors. The top 30 drum receives the greatest amount of heat from the chamber 13 being closest to the intake from flue 36. Heat is transferred to the material within the drums through the shells by radiation, convection and conduction. The hot gases passing 35 through the cones directly contact material. The gases of combustion are such as to prevent oxidation of the mash pellets and aid them in retaining their initial color.

What we claim is:—

40 1. A dehydrator and drier for loose friable material comprising a drying section including a casing, a tier of rotatable conical drums therein disposed on substantially horizontal axes side by 45 side with the large end of each drum contiguous to the small end of its adjacent drum, housings for the contiguous ends of the drums placing them progressively in communication in zigzag formation, an intake in said housing at the top whereby

material to be dried may be fed into the small end of the uppermost drum and pass to its large end and thence in seriatim travel through all said drums, a discharge outlet at the bottom of said casing, means to rotate said drums and thereby 5 to turn over the material and by centrifugal action cause travel longitudinally through said drums, there being a hot gas inlet for said casing whereby hot gas may be passed into said casing 10 and about said drums, there being a communication passage between the space in said casing about said drums opening to said housings adjacent said discharge outlet whereby the hot gas 15 may pass from said casing to and through said drums in a path of travel opposite to said material, and there being a spent gas outlet communicating with said housings adjacent said intake.

2. A dehydrator and drier for loose friable material comprising a drying section including a casing, a tier of rotatable conical drums therein 20 disposed on substantially horizontal axes side by side with the large end of each drum contiguous to the small end of its adjacent drum, housings for the contiguous ends of the drums placing them in communication in zigzag formation, an 25 intake in said housing at the top whereby material to be dried may be fed into the small end of the uppermost drum and pass to its large end and thence in seriatim through all said drums, a discharge outlet at the bottom of said casing, 30 means to rotate said drums and thereby to turn over the material and by centrifugal action cause travel longitudinally through said drums; a hot gas generator, a flue leading from said generator to the top of said casing whereby hot gas may be 35 passed into said casing and downwardly about said drums, there being a communication passage between the space in said casing about said drums opening to said housings adjacent said discharge 40 outlet whereby the hot gas may pass from said casing to and thence through said drums in a path of travel opposite to said material, and a suction fan connected to said housings adjacent said intake to induce passage of the hot gas 45 through said drying section.

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