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McGehee

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[54] **ROTARY DEHYDRATOR HAVING ANTI-DISCHARGE STRUCTURE FOR MOISTURE-LADEN MATERIALS**

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[52] **U.S. Cl.** **34/132,** 34/56, 34/135, 222/556, 259/30

[51] **Int. Cl.** **F26b 11/02**

[58] **Field of Search** 110/14; 432/117; 34/133, 34/141, 142, 132, 135, 56; 222/556, 459; 259/3, 30–34

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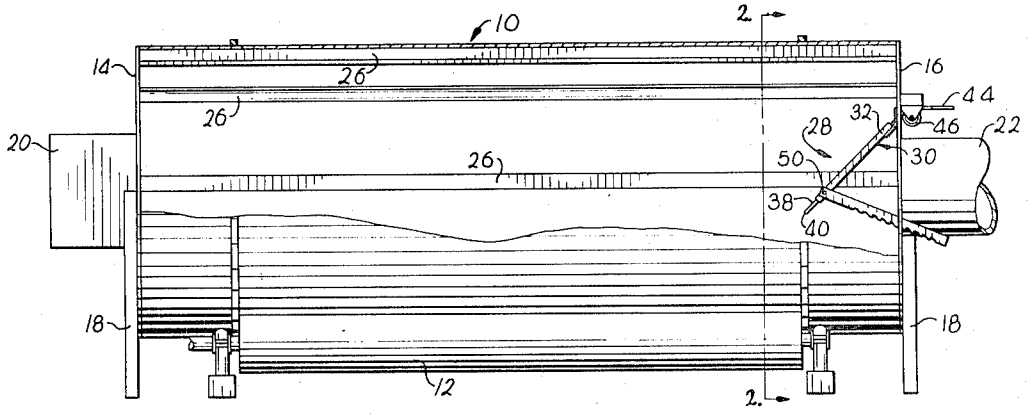
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[57] **ABSTRACT**

A rotary dehydrator advances moisture-laden materials from an inlet of a rotating drum toward an outlet thereof while simultaneously lifting and tumbling the materials into and through a heated airstream flowing axially through the drum. An inclined baffle overlying the outlet obstructs access to the latter by the tumbling materials and by those materials entrained within the airstream so that only the materials which have been dehydrated to the desired extent can overcome the obstruction and be carried from the dehydrator by the discharging airstream. The baffle is extensible and may be adjusted angularly with respect to the outlet whereby to provide selectivity in controlling the specific gravity of the materials being discharged.

2 Claims, 4 Drawing Figures



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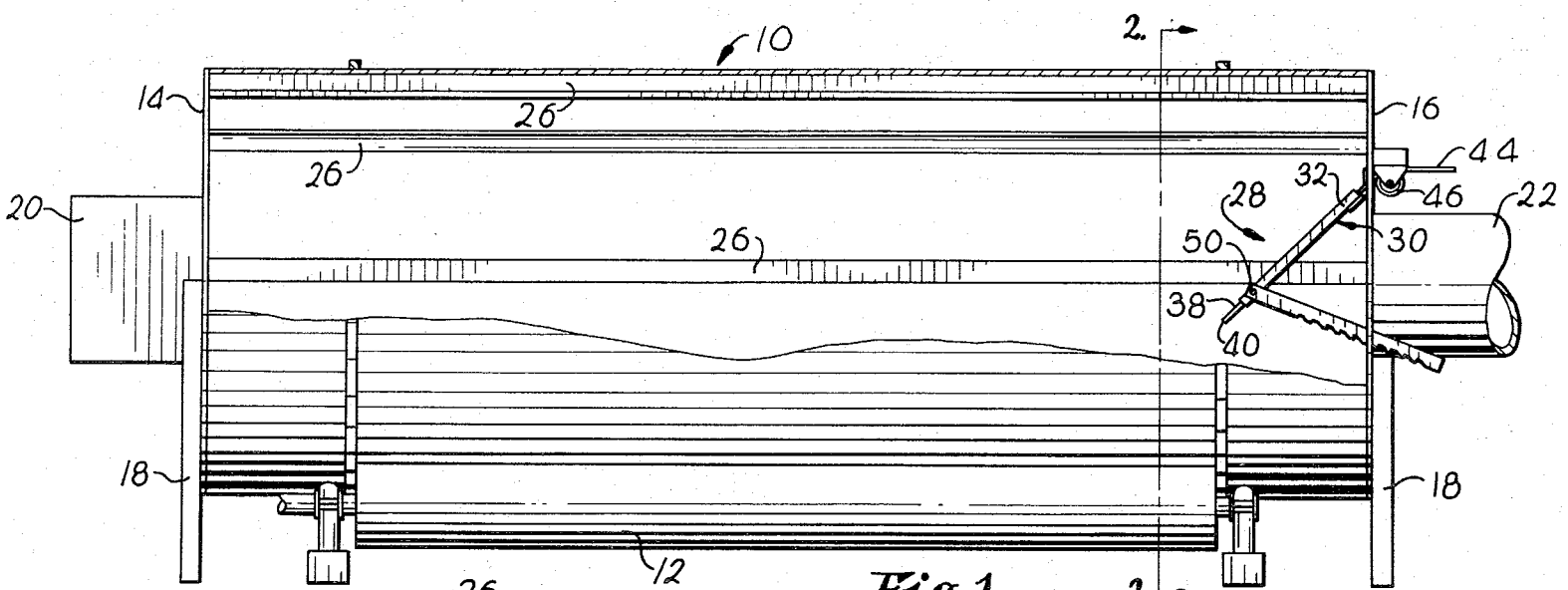


Fig. 1.

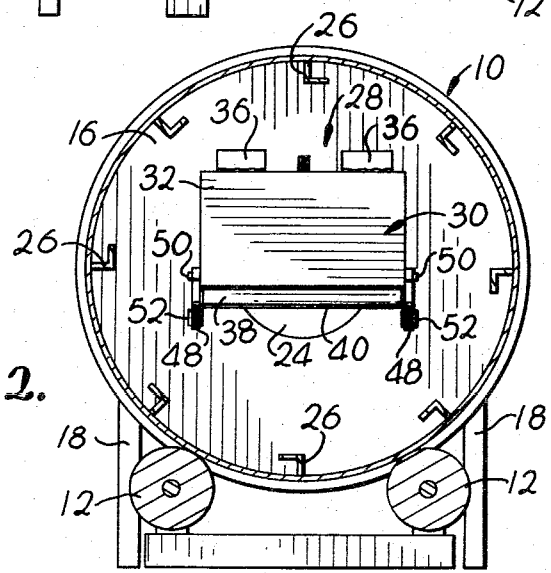


Fig. 2.

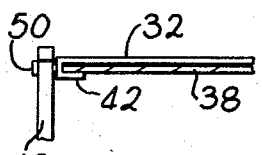


Fig. 4.

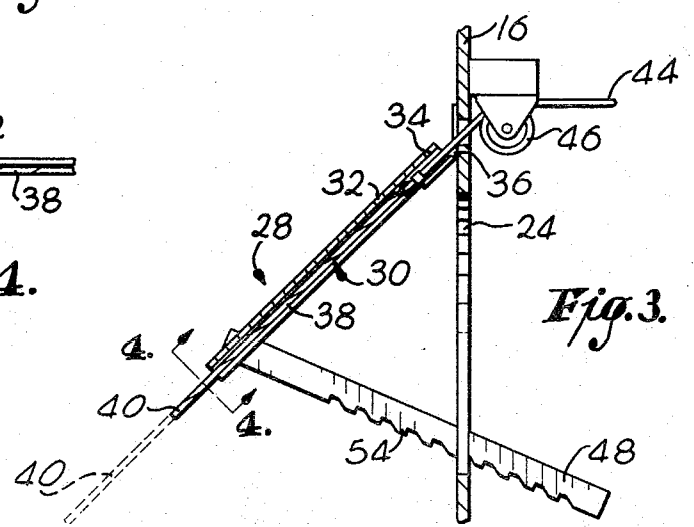


Fig. 3.

ROTARY DEHYDRATOR HAVING ANTI-DISCHARGE STRUCTURE FOR MOISTURE-LADEN MATERIALS

This invention relates to the dehydration of moisture-laden materials which may take various and sundry forms, such dehydration being best carried out by simultaneously tumbling the materials within a rotary drum while repeatedly introducing and reintroducing the same to a heated airstream moving through the drum. It is important that a degree of control be provided over the materials at the discharge end of the dehydrating process so that those materials which are not yet fully dehydrated are retained for further processing, while those which have their moisture removed to the desired level are discharged. Certain materials may dry more or less rapidly than others and may also be more or less easily entrained within a stream of heated air flowing through the dehydrator than others, thus requiring discharge control that can be regulated in accordance with the characteristics of the materials involved.

One means of accomplishing such control is illustrated in my earlier U.S. Pat. No. 2,617,529 which issued on Nov. 11, 1952. The dehydrator illustrated in this Patent utilized a telescopically shiftable discharge tube associated with the outlet of the dehydrator for the air-entrained, dehydrated materials, and a laterally disposed escape passage for heavier moisture-laden materials. By varying the position of the end of the tube with respect to the lateral escape passage, the specific gravity and thus the moisture content of the materials leaving through the discharge tube could be closely controlled. By positioning the end of the tube closer to the escape passage, the heavier, moisture-laden materials could be carried by the airstream into the tube, but by disposing the tube a greater distance from the escape passage, the moisture-laden materials might be too heavy to be carried such a substantial distance to the tube, thereby gravitating to the escape passage instead of being carried out through the tube.

The present invention provides an alternative to the discharge control structure disclosed in my aforementioned Patent and has, as its primary object to provide a non-complex, virtually maintenance-free and highly reliable means for controlling the specific gravity and thus the moisture content of materials being discharged from the dehydrator.

Another important object of this invention is to provide selectivity in the control of the materials being discharged from the dehydrator so that different material characteristics and variations in the desired moisture content of the materials being discharged can be accommodated.

Pursuant to the foregoing objects, a further important aim of this invention is to provide inclined baffle structure overlying the outlet of a rotary dehydrator wherein the baffle structure can be extended and retracted to the extent necessary to properly position the lower end thereof with respect to the outlet in accordance with the characteristics of the materials being processed and the desired end moisture content.

An additional important object of this invention is to provide baffle structure as aforesaid which can be adjusted angularly with respect to the outlet to provide an additional means of controlling selectivity.

In the drawing:

FIG. 1 is an elevational view of a dehydrator constructed in accordance with the teachings of the present invention, the upper half of the rotary drum thereof being broken away to reveal details of construction;

FIG. 2 is a vertical cross-sectional view through the dehydrator taken along line 2—2 of FIG. 1;

FIG. 3 is an enlarged, fragmentary, vertical cross-sectional view through the discharge end of the dhydrator showing details of the special baffle structure; and

FIG. 4 is a fragmentary, cross-sectional view of the baffle structure taken along line 4—4 of FIG. 3.

The dehydrator has an elongated, tubular drum **10** that is supported at the bottom thereof by a pair of drive rolls **12** for rotating the same in a clockwise direction viewing FIG. **2.** The drum **10** is closed at its opposite ends by a pair of stationary end walls **14** and **16** supported by frame apparatus **18,** the end wall **14** having an inlet conduit **20** coaxially disposed with drum **10** for admitting heated air and moisture-laden materials into the latter, and the opposite end wall **16** having an outlet conduit **22.** The outlet conduit **22** registers with an outlet opening **24** in end wall **16** (FIG. **3**), and it is to be understood that although not shown, a similar opening is provided in end wall **14** for inlet conduit **20.** It is to be further understood that the inlet conduit **20** is coupled with a source of heated air, while the outlet conduit **22** is coupled with means for drawing such heated air through drum **10** axially of the latter in a steady stream.

A series of longitudinally extending, circumferentially spaced, L-shaped lifters **26** are secured to the interior wall of drum **10** for repeatedly lifting and tumbling the materials that are introduced into drum **10** through conduit **20.** Thus, the lifters **26** repeatedly introduce the materials to the heated airstream that is flowing through drum **10** in order to continuously expose the materials to the effects of such airstream.

The discharge end of the drum **10** has structure broadly denoted by the numeral **28** for controlling the moisture content of the materials leaving drum **10** through outlet opening **24** and conduit **22.** Specifically, the structure **28** includes a sectionalized baffle **30** that overlies opening **24** in an inclined attitude to present an obstruction to the exiting airstream and to the materials that are tumbling within drum **10** adjacent opening **24.** The baffle **30** is rendered extensible by virtue of its sectionalized construction, there being an upper section **32** having an upper terminus **34** that defines the upper end of baffle **30** and which is secured to end wall **16** by a hinge **36,** and a lower section **38** slidable within upper section **32** for shifting between the solid and dotted-line positions illustrated in FIG. **3.** The lower section **38** has a terminus **40** that defines the lowermost end of baffle **30,** the position of such lowermost end being varied with respect to opening **24** by retracting or extending lower section **38.** As illustrated in FIG. **4,** the upper section has inturned flanges **42** along the underside thereof that slidably support the lower section **38.** Suitable means such as a cable **44** looped over a pulley **46** and connected to lower section **38** may be used to shift the latter between its variable positions.

Angular adjustment of baffle **30** is provided for by a pair of shiftable support members **48** disposed on opposite sides of baffle **30** and pivotally secured to the upper section **32** by pivots **50.** Each of the members **48** extends through an aperture **52** (FIG. **2**) in end wall **16**

and has a series of teeth **54** which may be selectively engaged with the lower extremity of the aperture **52** to releasably lock the baffle **30** in its selected position. Adjustment of such position may be easily carried out by simply raising the outermost ends of the members **48** to disengage their teeth **54,** and then shifting the members **48** longitudinally in the appropriate direction to swing baffle **30.** Reengagement of the teeth **54** in their apertures **52** once again locks the baffle **30** against swinging.

As earlier set forth, while the drum **10** is being rotated by the rolls **12,** a strong current of heated air is drawn through drum **10** axially thereof by way of the conduits **20** and **22.** Moisture-laden materials are fed into drum **10** through inlet conduit **20,** whereupon they are repeatedly lifted and tumbled by the lifters **26** to be continuously exposed to the heated airstream. The combined effects of the tumbling action and the airstream advance the materials progressively toward outlet opening **24** and outlet conduit **22** and, ideally, by the time the materials approach end wall **16** they are sufficiently dehydrated to be entrained within the airstream and carried out of drum **10** through conduit **22.**

By virtue of the control structure **28,** it is possible to closely regulate the moisture content of the materials that are carried out of drum **10** by the airstream. In this respect, the baffle **30,** by virtue of its overlying relationship to the opening **24,** functions as an obstruction to the otherwise unimpeded access to opening **24,** thus momentarily diverting the airstream out of its otherwise truly axial path of travel. Such deviation of the airstream may be sufficient to cause those particles which are barely entrained in the airstream to lose their momentum and be deflected out of the airstream, gravitating into the bottom of drum **10** for re-tumbling and reintroduction into the airstream. This action results in further dehydrating of the blocked particles until such time as they can be once again entrained in the airstream and have sufficient energy to overcome the obstruction presented by baffle **30.** Of course, those materials which are sufficiently dehydrated in the first instance to overcome the effects of baffle **30** will simply remain entrained within the airstream and leave drum **20** through conduit **22.**

The presence of baffle **30** also prevents the escape from drum **10** of those materials which are tumbling adjacent end wall **16** but have not as yet been fully entrained within the airstream. In this respect, it will be appreciated that the suction force closely adjacent opening **24** can be greater than that at the center of drum **10,** for example, and thus, while the moisture-laden materials might be too heavy to become entrained in the airstream near the center of drum **10,** they might undesirably be sucked out of drum **10** when they gravitate across opening **24** without the presence of baffle **30.** Because of the inclined nature of baffle **30,** when such still moist materials drop from near the top of drum **10** to pass across opening **24,** they instead engage the top of baffle **30** and roll down the same toward lower terminus **40,** at which point they are too far removed from opening **24** to be affected by the strong suction at that location.

By varying the extent of projection of lower section **38** from upper section **32,** the moisture content of the materials being carried out of drum **10** by way of conduit **22** can be regulated. When, for example, the lower section **38** is extended to its dotted line position as illustrated in FIG. **3,** the horizontal distance between the point at which the airstream is released from the obstruction presented by baffle **30,** and the opening **24** is substantially greater than the distance between the same two points when the lower section **38** is in its solid line position of FIG. **3.** Accordingly, the materials which are entrained within the airstream when the lower section **38** is so extended must overcome an effectively greater obstruction than before and must travel a greater distance after such obstruction than before, thereby permitting only those materials having lower moisture content to be carried from drum **10.** By selectively positioning the lower section **38** between the two extreme locations illustrated in FIG. **3,** intermediate moisture levels can be obtained as a function of the distance between lower terminus **40** and the opening **24.**

In a similar manner, adjustment of the lower section **38** controls the departure of those materials which are too moist to be entrained within the airstream at a point remote from opening **24,** but which drop past the latter during their tumbling action and might be accidentally sucked out of drum **10** at that point. By extending lower section **38** beyond the solid line position thereof in FIG. **3,** the point at which the moist materials drop off baffle **30** and are exposed to the direct suction at opening **24** can be spaced further from the latter as necessary or desirable.

The adjustability of baffle **30** in an angular respect is also quite beneficial in that such adjustment, effected through the members **48,** also causes horizontal displacement of the terminus **40** of section **38.** Therefore, at a selected extension of section **38** as determined by cable **44,** the terminus **40** may be shifted arcuately in the direction and to the extent desired to displace terminus **40** horizontally in accordance with the characteristics of the specific materials being dehydrated. Thus, by combining the angular adjustment of baffle **30** with the extensible adjustment thereof, a very precise and highly selective control over the moisture content of the materials leaving drum **10** can be effected.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In a rotary dehydrator:
an elongated, tubular drum mounted for rotation about its longitudal axis;
a pair of stationary end walls for said drum,
one of said end walls having an inlet to the interior of said drum for introducing moisture-laden materials and a heated stream of air into the drum,
the opposite end wall having an outlet from the drum for discharging dehydrated materials entrained within said airstream from the drum;
means within said drum for repeatedly lifting and tumbling the materials into and through said airstream as said drum is rotated and as the materials advance toward said opposite end wall; and
an inclined baffle overlying said outlet for obstructing access to the latter by the tumbling materials and those entrained within said airstream for preventing the discharge of those materials not sufficiently dehydrated to be carried out the outlet with said airstream,
said baffle having an upper and a lower end,

said baffle being extensible for varying the position of said lower end with respect to said outlet.

2. In a rotary dehydrator as claimed in claim **1** wherein said baffle is hinged at said upper end thereof to said opposite end wall for swinging movement of said lower end toward and away from said opposite end wall, and wherein means is provided for supporting the baffle in any one of a number of angled positions along the path of swinging movement thereof.

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