TURN-TABLE TYPE DRIER FOR GRANULAR MATERIAL


Filed Mar. 16, 1962, Ser. No. 180,260
Claims priority, application Great Britain, Mar. 28, 1961, 11,293/61
1 Claim. (Cl. 34—185)

This invention relates to that kind of drier which is employed for drying powdered, granular or gelatinous material in solid or slurry form.

It is an object of the invention to provide a drier for that kind of material which is particularly but not exclusively suitable for drying radioactive or toxic material.

According to the invention a drier of the hereinafter specified kind has a rotatable table, a position at which material to be dried can be fed to the table, means for removing dried material from the table at a position angularly displaced from the feed position, and means for heating the material during its carriage by the table as the latter is rotated.

An embodiment of the invention will now be described by way of example with reference to the accompanying drawings wherein:

FIGURES 1A and 1B together form a plan view split into two parts on the line A-B.

FIGURE 2 is a side view in section on lines II—II of FIGURES 1A and 1B.

FIGURE 3 is a side view in section on lines III—III of FIGURE 1B, and FIGURE 4 is a side view in section on lines IV—IV of FIGURE 1A.

Referring to the drawings, in the construction of drier shown therein we provide between a top casing 105 and a bottom casing 106 a turntable 101 rotatable about an axis 102. The turntable 101 comprises an annular plate 103 and a radiating plate 103a and an upwardly inclined peripheral lip 104. The plate 103 is carried on a shaft 107 which is connected by a coupling 112 to a gear box 113, and journaled in plain bearings 108, 109 supported in a sleeve 110. A distance piece 111 separates the bearings 108, 109. A housing 114 provided for the coupling 112 has an external flange 115. The sleeve 110 is suspended between this flange 115 and a flanged tubular member 116 surrounding the sleeve 110 and carrying the top casing 105. An oil seal 118 is provided between the sleeve 110 and shaft 107 and is fitted to the sleeve 110 by a wire-locked pin 119. An O-ring seal 120 is provided between the sleeve 110 and the tubular member 116. Shims 121 between the sleeve 110 and tubular member 116 govern the clearance between the turntable and the top casing 105.

The top casing 105 and bottom casing 106 are secured together at their edges by bolts 136; a sealing ring 137 is provided between the casings. The top casing 105 is provided with support webs 122 and 123 sealed in frames 126 by means of seals 150. Above each window 125 is an infra-red heater 123 but only one heater 123 is shown for the sake of clarity. Heating mats 124 with handles 130 between the webs. Bosses (not shown) but similar to the bosses 157 are secured to the underside of the bottom casing 106 and the heating mats 124 are held in position through by means of hand-nuts 168. T-bolts 169 and washers 154 acting similarly to the hand-nuts 162, T-bolts 159 and washers 164. Adjustable feet 131 are screwed on to the T-bolts 169.

A feed pipe 139 is provided to extend through the top casing 105 above a roller assembly 140 for distributing material to be dried over the dished part 103a of the turntable 101. The roller assembly 140 comprises a roller 141 mounted in a housing 142 on a shaft 143 which rotates in bushes 144 and is keyed to a flexible coupling 145 connected to a gear-box 146. The roller 141 extends through an aperture 147 in the top casing 105 and the housing 142 is sealed about the aperture by means of a seal 148. Oil seals 149 are fitted on the shaft 143. Angularly displaced from the feed pipe 139 and roller assembly 140 is a take-off pipe 151 extending through the bottom casing 106. A plough blade 152, mounted on a member 173 and loaded into contact with the base of the dished part 103a by a spring 155, is positioned across the dished part 103a of the turntable 101 so as to divert dried material on the turntable into the take-off pipe 151. The spring 155 acts between a shoulder 171 on the member 173 and an internal flange 170 on a body part 156 housing the spring 155, the body part extending through a window 153 in the casing 105 above the plough blade 152 and being sealed therein by joint rings 172, washer 174 and flanged nut 175. The member 173 extends through the body part 156 and is sealed thereto by an O-ring 177 and gland nut 176. A wing-nut 178 screw-threaded on the member 173 above the gland nut 176 provides means for raising the plough blade 152 against the action of the spring 155. The member 173 is carried on an arm 179 which is connected through a tension spring 181 to a post 180 mounted on the casing 105. The spring 181 urges the plough blade 152 against the flow of dried material on the turntable 101 so that the position of the blade across the dished part 103a is maintained.

To assist in diverting material to the take-off pipe 151 twelve scraper blades 132 are fitted at equal intervals around the bottom casing 106 (only one such scraper being shown) and similarly twelve scraper blades 133 are fitted to the turntable 101 beneath the lip 104. Further, four scrapers 134 are fitted to the underside of the top casing 103 and four similar scrapers 135 are fitted to the underside of the top casing 105, the layout of the scrapers 134, 135 being identical and shown in FIGS. 1A and 1B.

A vent pipe 182 communicating with an extractor system (not shown) extends through the top casing 105 adjacent to the feed pipe 139. An inlet pipe 183 is provided on the opposite side of the casing 105 to the extract pipe 182 for bleeding air into the system. A flooding probe 184 indicates when slurry is being fed to the turntable too fast.

In operation the turntable 101 is rotated through a motor connected to the gear box 1[1] and material to be dried is fed to the plate 103 through the feed pipe 139, the roller 141, driven through the gear box 146, distributing the material over the dished part 103a of the plate. As the turntable rotates the material to be dried is exposed to infra-red radiations passing through the windows 125 from the heaters 123 and the rate of rotation of the drier is so arranged that the material is dried to the content required by the time it reaches the take-off pipe 151 to which it is diverted by means of the plough 152. Material which works its way into the space between the plate 103 and top casing 105 is returned to the dished part 103a by the scrapers 135. Material working its way over the lip 104 and possibly into the space be-
between the plate 103 and the bottom casing 106 is swept into the take-off pipe 151 by the scrapers 135 and the blades 132, 133. Thermocouples as indicated at 138 for example, may be inserted through the casing 105 to control the heating of the turntable 1 and the material thereon. The heating mats 124, 129 reduce the differential between the temperature of the dished part 183a and the temperature of the remainder of the plate 103.

The hereinbefore described drier is particularly suitable for the drying of fissile or fissile-bearing material in that it can be constructed to dimensions which would preclude the formation of critical conditions even though build-up of material were to occur on mal-functioning.

We claim:

A drier for drying powdered, granular or gelatinous 15 material in solid or slurry form, said drier comprising a rotatable turntable, means for feeding material to be dried to said table at a first position, means for removing dried material from the table at a second position angularly spaced from said first position, a sealed casing enveloping the table, a series of windows of heat transmitting material in the upper part of the casing, said windows being spaced about the circumference of said table between said first and second positions, infra-red heaters disposed above the casing and positioned to direct heat through the windows for drying material on the table, a roller rotatable about its axis and disposed between the table and the feeding means so as to distribute material fed to the table, and scrapers provided between the casing and the faces and side edges of the table whereby dried material is diverted to the means for removing it.

References Cited by the Examiner

UNITED STATES PATENTS

<table>
<thead>
<tr>
<th>Patent Number</th>
<th>Date</th>
<th>Inventor</th>
<th>Citation</th>
</tr>
</thead>
<tbody>
<tr>
<td>620,139</td>
<td>2/99</td>
<td>Hysore</td>
<td>34—187</td>
</tr>
<tr>
<td>943,691</td>
<td>12/09</td>
<td>Marshall</td>
<td>34—185</td>
</tr>
<tr>
<td>1,967,470</td>
<td>7/34</td>
<td>Fitzgerald</td>
<td>34—187 X</td>
</tr>
<tr>
<td>2,337,956</td>
<td>12/43</td>
<td>Yerrick</td>
<td>34—187</td>
</tr>
<tr>
<td>2,392,283</td>
<td>1/46</td>
<td>Ferre</td>
<td>34—187</td>
</tr>
</tbody>
</table>

FOREIGN PATENTS

<table>
<thead>
<tr>
<th>Patent Number</th>
<th>Date</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>18,268</td>
<td>1897</td>
<td>Great Britain</td>
</tr>
<tr>
<td>22,640</td>
<td>6/07</td>
<td>Sweden</td>
</tr>
</tbody>
</table>

NORMAN YUDKOFF. Primary Examiner.