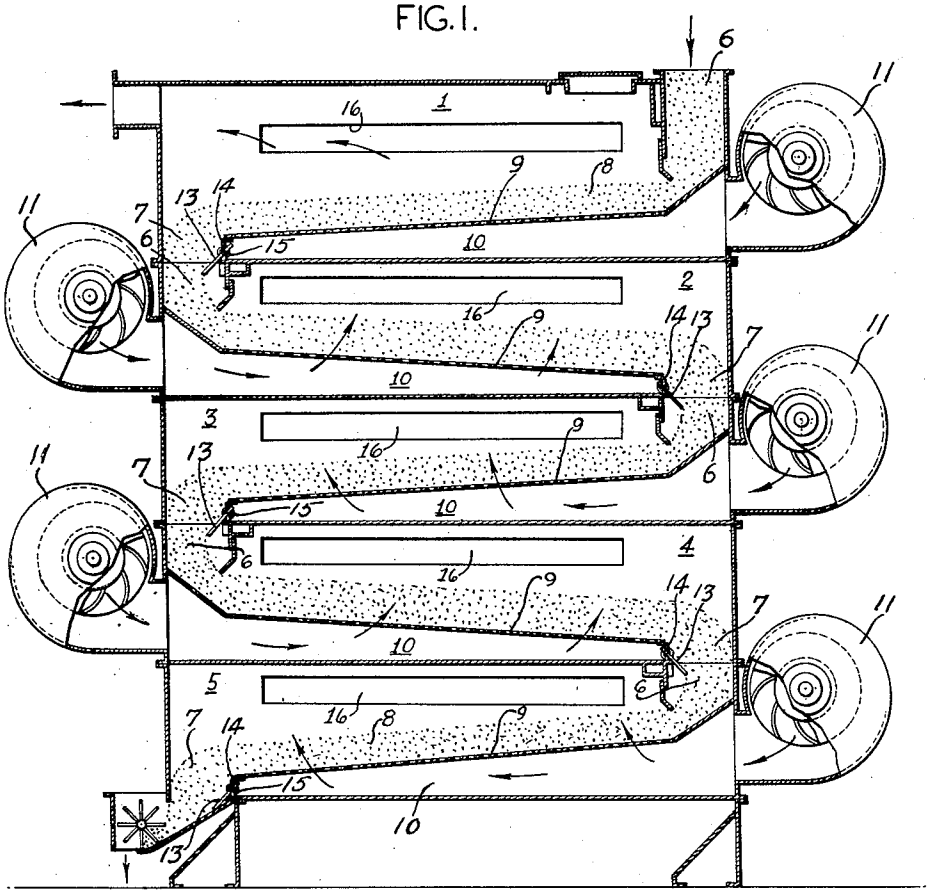
Nov. 24, 1964 S. W. WALLIN ETAL 3,158,448

DRIER WITH GAS-MOVED BED OF MATERIAL

Filed Sept. 1, 1960

FIG. 1.



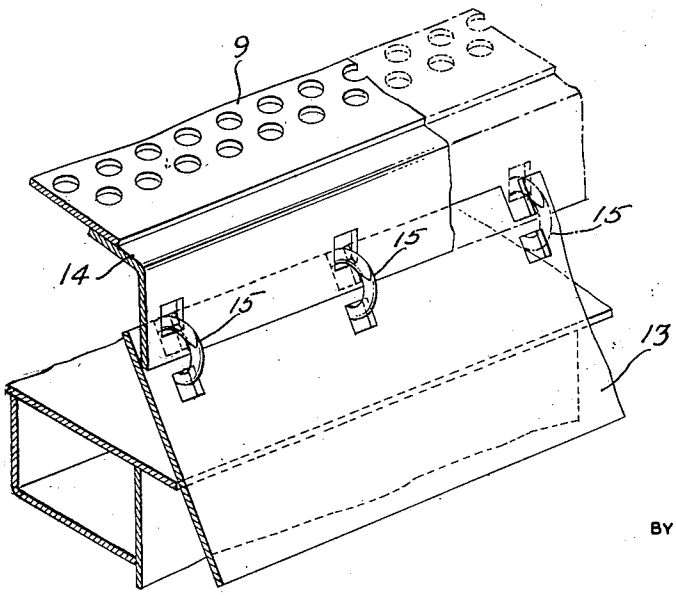


FIG. 2.

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DRIER WITH GAS-MOVED BED OF MATERIAL

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2 Claims. (Cl. 34—85)

The present invention relates to an improvement in driers of the type described in U.S. Patent No. 3,060,589 for drying or other fluid treatment of loose fluent materials in the form of grains, lumps or fibers, wherein a gaseous fluid treating medium is caused to pass through said material while the material is conveyed as a continuous bed in zig-zag passageways through a number of superimposed units. The units are uniform in size and shape but every succeeding unit is reversed endwise relative to the next preceding unit. Each of said units is a closed rectangular box equipped with an inlet shaftway at one end and an outlet shaftway at the opposite end, said shaftways being connected to the preceding and the succeeding units, respectively.

Each unit is provided with a substantially horizontal, perforate intermediate bottom wall functioning as a slightly inclined conveying plane or floor for the material and extending between said inlet and outlet shaftways, thereby partitioning off a lower space or distributing box or gas duct to which is connected a fan for supplying the treating medium. Each of said units is also provided with a discharge opening for the treating medium, said discharge opening being arranged above the intermediate bottom wall at a distance greater than the height of the bed.

During the treatment of material in driers of the above-mentioned type it is impossible to prevent impurities, such as dust and small particles from passing through the perforated separate bottom walls, which function as carrying planes, and collecting in the underlying air distributing spaces. The drying apparatus must therefore, as disclosed in the above-mentioned application, be equipped with small cleaning doors for the removal of said impurities. Especially when it is intended to treat materials of other kinds or qualities, such a cleaning of the above-mentioned spaces is necessary to avoid mixing different impurities in the material being treated.

The primary object of the invention is to make possible an automatic cleaning of the lower spaces by blowing air through said spaces in connection with emptying the drier after finishing treatment of one material. More specifically, the invention is characterized by a cleaning opening in the lower space of each unit at the end opposite to its connection to the fan, said opening being equipped with a suspended small swinging door which is engaged and maintained in its closed position by the material when the treatment is in progress and which, when the unit has been emptied of material, automatically opens to discharge dust and other impurities from said space by blowing the treatment medium therethrough.

The apparatus according to the invention is designed so that the cleaning opening connects the lower space with the discharge shaftway.

Since the cleaning is carried out at the same time as the material is discharged from the treatment unit it is possible to discharge the impurities following the last part of the material, the last material blown out consisting of impurities from all the treatment units, so that the impurities can be collected separately. Because of this, it is not necessary to use any special arrangements for discharging impurities from each treatment unit.

The invention will now be described more in detail with reference to the accompanying drawing showing one form of apparatus embodying the invention and wherein:

FIG. 1 is a vertical longitudinal section through a drier with a moving bed of material; and

FIG. 2 is an enlarged isometric view of a detail, with portions broken away and shown in dot-and-dash lines to more clearly show the structure.

As shown in the drawing the drier comprises a number of superposed treatment chambers or units **1**, **2**, **3**, **4** and **5**. Each treatment unit is provided with inlet and outlet openings or shaftways **6** and **7** respectively at the opposite ends for the material **8** to be treated. A substantially horizontal perforate separate bottom wall **9** functions as a carrying plane for the material **8**. A space **10** is provided below said bottom wall **9** which is used as a distributing box for the treatment medium, air or other gaseous fluid, supplied by fans **11**. Discharge openings **16** are provided in the treatment chambers for the egress of treatment medium from the fans.

In order to make possible the cleansing of said distributing boxes **10**, said space of each treatment unit is in accordance with the invention equipped with a cleaning opening arranged in the end wall **14** located opposite the fan **11**. In the opening there is located a pivotally suspended small door **13** which during the running of the drier is engaged by the material **8** in the shaftway **7** and is kept in closed position. The door is automatically opened by the air pressure in the box when the treatment unit is emptied. When this small door **13** is opened the impurities collected in the box **10** are blown out to the discharge shaftway **7** by the treatment medium supplied by the blower **11** and the impurities thus accompany and follow the last part of the discharged material. In order to insure entirely dependable operation of the door **13**, it is preferably fastened to the end plate **14** of the distributing box by means of rings **15**, as is evident from FIG. 2.

It will be noted, especially in FIG. 2, that means are provided for holding the lower edge of the door out at an angle, the better to hold it closed by passing material.

It is thus seen that the invention provides simple and substantially automatically acting means for cleaning material out of the blower chambers at each cessation of the steady flow of material through the apparatus.

While one embodiment of the invention has been disclosed for purposes of illustration it is to be understood that there may be other embodiments and modifications within the general scope of the invention.

We claim:

1. Apparatus for treating and moving a bed of loose fluent material by a gaseous medium under pressure, comprising in combination: a housing having extended vertical side walls and end walls defining an enclosure for a plurality of separate treatment units; each treatment unit comprising an imperforate horizontal top wall extending from a connected end at one housing end wall to an end at a point spaced a short distance from another and opposite housing end wall, an imperforate horizontal bottom wall extending from a connected end at said other housing end wall to a point spaced from said one housing end wall, and a perforate intermediate slightly inclined material supporting floor wall extending from a connected end at said other housing end wall to a point spaced from said one housing end wall; the connected end of said floor wall being spaced vertically below the spaced end of said top wall, and the spaced end of said floor wall being spaced vertically above the spaced end of said bottom wall; a vertical shaftway wall connecting the spaced end of said floor wall with the spaced end of said

bottom wall and defining with the adjacent housing end wall and side walls a vertical shaftway down which advancing material falls; said floor wall and said bottom wall defining, with the housing side walls, a fluid duct for a gaseous medium beneath said perforate floor wall; means for introducing a gaseous medium into the housing end wall-connected end of said duct under sufficient pressure to flow through the openings of said floor wall and the bed of material and lift material thereon to cause it to flow down said inclined floor wall and down said shaftway; said shaftway wall having an opening at the end and bottom of said duct leading into said shaftway; and a closure for said duct opening hinged at the top and inclined inward into the shaftway so as to be held closed when material is flowing thereover as it falls down said shaftway but opening by the pressure of said gaseous medium when material is not passing over the closure to permit the gaseous medium to blow dust and other

refuse from the duct into said shaftway; each treatment unit being reversed in endwise disposition, floor wall inclination, and shaftway location relative to the treatment unit or units next adjacent thereto.

2. Apparatus as set forth in claim 1, in which the end of said bottom wall extends a short distance into said shaftway and in which the lower portion of said closure extends down below the end of said bottom wall to hold additional downflowing material thereon to hold it closed.

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