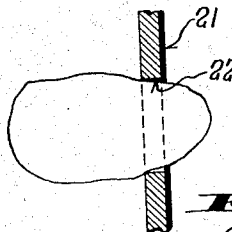
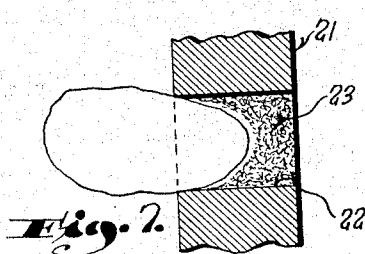
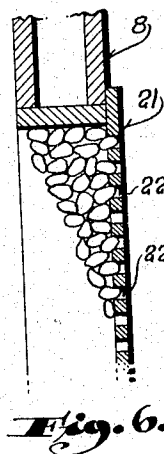
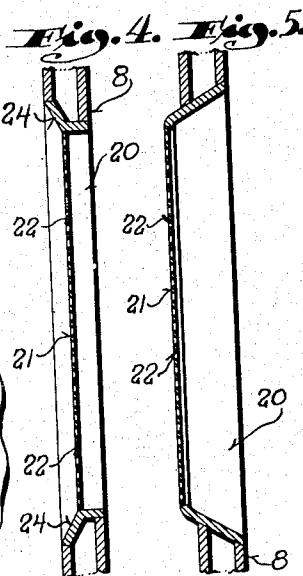
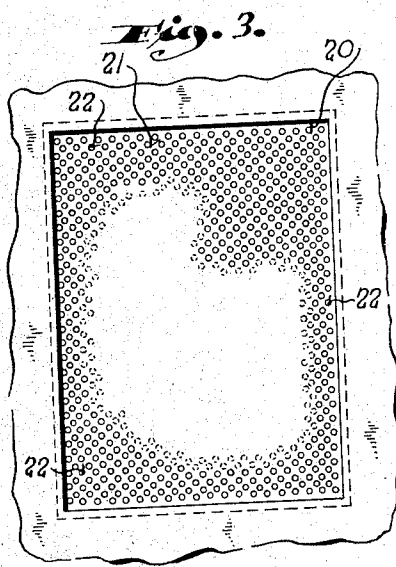
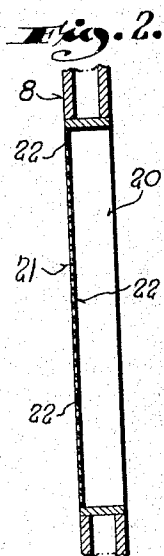
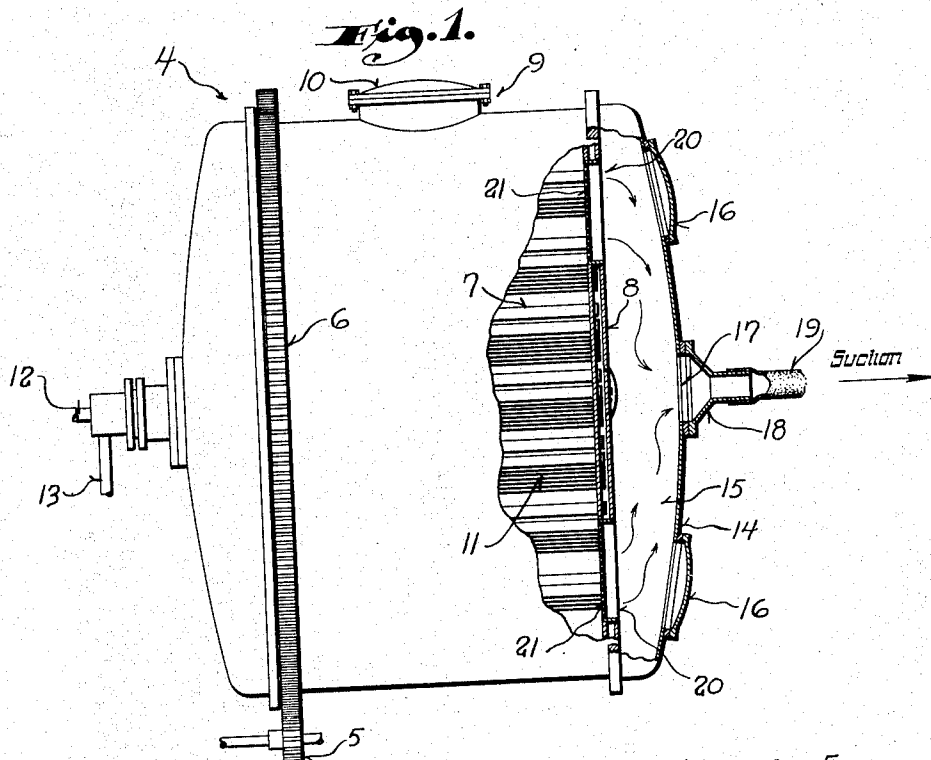


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D. DALIN
SCREEN FOR DRIERS
Filed Dec. 10, 1934

2,086,699



Inventor
David Dalin
By *Edmund J. Jones*
Attorney

UNITED STATES PATENT OFFICE

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SCREEN FOR DRIERS

David Dalin, Milwaukee, Wis.

Application December 10, 1934, Serial No. 756,799

4 Claims. (Cl. 34-5)

This invention relates to driers and refers more particularly to vacuum driers of the type forming the subject matter of Letters Patent No. 2,034,860, issued to David Dalin, March 24, 1936, with particular reference to the construction of the screens which cover the openings communicating the material receiving compartment with the vapor chamber or suction compartment.

Heretofore, the keeping of these screens clean presented a very perplexing problem and as the efficiency of the drier depends to a great extent upon maintaining unrestricted flow of the gases and vapors from the drying materials, this problem was of primary importance. The difficulty of keeping the screens clean in the earlier vacuum type driers led to the adoption of expensive and complicated so-called "self cleaning" screens.

Generally, these so-called "self cleaning" screens incorporated blades arranged for movement across the screen plates or between sets of screen plates for the intended purpose of cutting away or sweeping the screen plates clean during the operation of the apparatus. These devices obviously were complicated and expensive, and in practice did not function satisfactorily.

The screen which the so-called "self cleaning" screen superseded, consisted of a perforated plate welded or otherwise secured to the outside face of the wall having the openings through which the communication was established between the material containing compartment and the vapor chamber. These perforated plates were purposefully placed on the outside face of the wall dividing the two compartments on the theory that by keeping the screen out of contact with the material being dried, clogging would be avoided. In some cases, the openings through the end walls were even provided with outward extensions to locate the screens as far from the plane of the inside face of the wall as was compatible with accepted design.

Practice, however, demonstrated the fallacy of this theory for regardless of how far the screens were moved outwardly of the inner face of the end wall, the material always contacted the screens and the perforations were soon clogged, not only by having the individual grains lodge in the perforations, but by the fine powdered mealy substance which inevitably forms in the drier during operation.

Consequently, this earlier type of screen, to be at all useful, required constant cleaning which entailed the shutting down of the entire apparatus.

As hereinbefore noted, the failure of this earlier

type of screen led to the adoption of the complicated and expensive so-called "self cleaning" screens, which as has been seen, did not in anywise minimize the problem.

With these objections to past screen constructions in mind, it is therefore an object of this invention to provide an improved screen particularly adaptable to vacuum driers of the type described, which is so constructed that manual attention is entirely obviated.

More specifically it is an object of this invention to provide a screen which is automatically kept clean by the action of the material being dried.

In the past where a perforated plate was employed for the screen, the plate was generally of substantial thickness. This was another source of difficulty as the mealy powdered material would accumulate in the outer ends of the perforations from which it could not be removed except by manually cleaning the same, which entailed getting into the suction chamber.

It is therefore a further object of this invention to provide a screen which is sufficiently thin so that accumulations of powdered material in the perforations thereof are removed by the material itself projecting through the perforations.

With the above and other objects in view which will appear as the description proceeds, this invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

The accompanying drawing illustrates several complete examples of the physical embodiment of the invention constructed according to the best modes so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a view in side elevation with parts broken away and in section of a vacuum type of drier embodying this invention;

Figure 2 is an enlarged cross section view through one of the screened openings;

Figure 3 is a plan view of said screened opening;

Figures 4 and 5 are cross section views through modified embodiments of this invention;

Figure 6 is an enlarged cross section view through a screen construction illustrating the objectionable features of past designs; and

Figures 7 and 8 are magnified cross section views through a portion of the screen to illus-

trate the comparison between a thick screen plate and a thin screen plate.

Referring now more particularly to the accompanying drawing in which like numerals indicate like parts throughout the several views, the numeral 4 designates generally the drum of a vacuum type drier rotatably mounted in any suitable manner and caused to oscillate by means of a pinion 5 meshing with a ring gear 6, the pinion being driven alternately first in one direction and then in the other by suitable driving means (not shown).

The drier drum has a material receiving compartment 7 closed at one end by a hollow bulkhead 8. The compartment 7 is adapted to be charged and discharged through an opening 9 provided with a removable cover 10. As brought out more in detail in the aforesaid copending application, a heat exchanger indicated generally by the numeral 11 and comprising a plurality of hollow tubes communicating with the interior of the hollow bulkhead 8, extends through the compartment 7 to heat the material. The heat exchanger is supplied with a suitable heating medium through an inlet pipe 12, and the spent heating medium is exhausted from the heat exchanger through an exhaust pipe 13.

The hollow bulkhead 8, as stated closes one end of the material receiving compartment 7, and cooperates with the adjacent end wall 14 to define a vapor chamber or suction compartment 15 which may be provided with a normally closed opening 16 through which access may be had to the interior thereof.

The end wall 14 has an axial opening 17 over which a nipple or discharge nozzle 18 is secured. A rubber duct 19 connected with an evacuator of any suitable design (not shown) is attached to the nipple 18 to provide for the evacuation of the vapor chamber without disturbing the oscillation of the drum.

The hollow bulkhead 8 has a plurality of openings 20 closed only by screens 21 so that the interior of the material receiving compartment 7 is communicated with the vapor chamber to be evacuated to draw off the vapors and moisture from the material being dried and thus promote the drying process.

Obviously, if the efficiency of the drier is to be maintained, the screens 21 must be kept clean to allow unrestricted passage of the vapors from the material receiving compartment into the vapor chamber 15. It is to this purpose that the present invention is directed.

As pointed out hereinbefore, the earlier type of screen consisted of a perforated plate mounted on the outside surface of the partition wall, which in this instance is provided by the hollow bulkhead 8. In the present instance, the screen also consists of a perforated plate but in this case, it is mounted on the inside face of the hollow bulkhead, as shown.

Preferably the inside surface of the screen plate 21 is flush with the inside surface of the hollow bulkhead 8 so that there is no restriction to the free movement of the material across the inside surface of the screen plate.

It is also to be observed that the plate 21 is thin. It is comparatively thinner than the plates forming the walls of the hollow bulkhead or the other parts of the drum. The thickness of the plate and the size of its apertures 22 is determined from the nature of the material which the drier is designed to handle.

The purpose of restricting the thickness of the

plate is illustrated by the comparative disclosures in Figures 7 and 8. As shown in Figure 7, if the plate is comparatively thick the individual kernels which will project into the openings 22 during the operation of the drier will not extend sufficiently far to dislodge the accumulation of fine powdered or mealy material 23 which is an inevitable development of the drier in operation; whereas, if the plate is comparatively thin, as shown in Figure 8, such accumulation of powdered or mealy material is constantly removed by the projection of the kernels through the openings 22. It is, of course, to be appreciated that the openings 22 are of such size as to prevent the complete passage of the individual kernels therethrough.

As hereinbefore pointed out, the screen plate is preferably flush with the inner surface of the bulkhead so that the material being dried is permitted to sweep unrestrictedly across the surface of the screen plate. Consequently, the individual kernels which project into the perforations of the screen are dislodged by the inherent action of the material itself. This action, as distinguished from the condition which exists where the screen plate is mounted on the outside surface of the bulkhead, may be appreciated from reference to Figure 6.

As shown in Figure 6, where the screen is removed outwardly from the plane of the inner surface of the wall to which it is attached, a substantial portion of the screen will always be covered and the kernels will be allowed to lodge securely in the perforations so that the effective area of the screen is materially reduced.

From the foregoing description taken in connection with the accompanying drawing, it will be readily apparent to those skilled in the art to which this invention appertains, that the salient features of this invention reside in so mounting the screen plate that the material being dried has an unrestricted sweep across its inner surface, and in utilizing a plate sufficiently thin to allow individual kernels to project through and beyond the outer face of the plate. Obviously, these features of the invention may be embodied in different mechanical constructions and in Figures 4 and 5 two modified embodiments of the invention are illustrated.

In Figure 4, the screen plate is shown located medially of the thickness of the wall in which the screened opening is located, but the inner periphery of the wall to allow the contents of the drier to sweep across the entire surface of the screen, is beveled as at 24, and in Figure 5, the screen plate is shown projected into the material containing compartment.

In each instance, the plate is comparatively thin and is mounted so as to permit an unrestricted flow of material across its inner surface.

What I claim as my invention is:

1. In a grain drier of the vacuum type, a movably mounted container having a compartment to receive material to be dried, means through which air may be exhausted from the container to establish a vacuum therein, means for moving said container to cause material contained therein to move across one wall of the material receiving compartment, said wall having an opening through which vapors may be drawn from the material being dried, and a screen plate covering said opening to prevent the passage of the material being dried through the opening, said screen plate comprising a thin perforated plate whose perforations are of a size to prevent the passage thereof of individual pieces of the material

being dried, and whose thickness is such that individual pieces lodged in the perforations project beyond the outer face of the plate so as to dislodge possible accumulations of mealy matter in the perforations, and said plate being mounted so that the material moving within the container is free to sweep unrestrictedly across the inner surface of the plate so as to dislodge individual pieces of the material from the perforations.

2. In a vacuum type grain drier, a container to hold a quantity of material to be dried, means through which air may be exhausted from the container to establish a vacuum therein, means for moving the container to cause motion of the material across one wall of the container, said wall having an opening to allow for the passage of gases therethrough, and a screen covering said opening to prevent the escape of the material being dried through said opening, said screen comprising a thin perforated metal plate mounted so that the material moving across said wall has an unrestricted sweep across the inner surface of the perforated plate to dislodge particles of the material being dried from the perforations in the plate and the thickness of the plate being such that individual particles of the material may project entirely through the perforations to dislodge accumulations of mealy matter from the perforations.

3. In a device for treating granular material under vacuum, a movably mounted container for the material, means through which air may be exhausted from the container to establish a vacuum therein, means for moving the container to cause the contents thereof to move back and

forth across one of its walls, said wall having an opening through which gases may escape from the material, and a screen over said opening comprising a perforated metal plate mounted substantially flush with the inner surface of said wall so as to allow the contents of the container to sweep unrestrictedly across the screen plate, and said plate being of such thickness with respect to the size of the individual kernels of the granular material that such individual kernels will project entirely through the apertures of the plate to dislodge any accumulations of mealy material in the perforations.

4. In a vacuum type grain conditioning apparatus, a container having a compartment for material to be treated, means through which air may be exhausted from the container to establish a vacuum therein, a partition wall defining one wall of the material receiving compartment and having an opening therein through which gases and vapors incidental to the treatment of the material may escape from the material, and a screen across said opening to prevent the passage of material through the opening, said screen comprising a perforated plate sufficiently thin to enable part of a kernel of grain to project through its openings to dislodge any accumulated mealy matter and mounted so that the material within the container is free to sweep unrestrictedly across its entire inner surface, said opening and consequently the screen being considerably smaller than the full area of the partition wall so that the material may sweep across the screen with considerable velocity.

DAVID DALIN.