Oct. 18, 1966 R. W. BLANTON, JR 3,279,094

APPARATUS FOR CONTROLLING FLOW OF GASES

Filed March 18, 1963 2 Sheets-Sheet 1

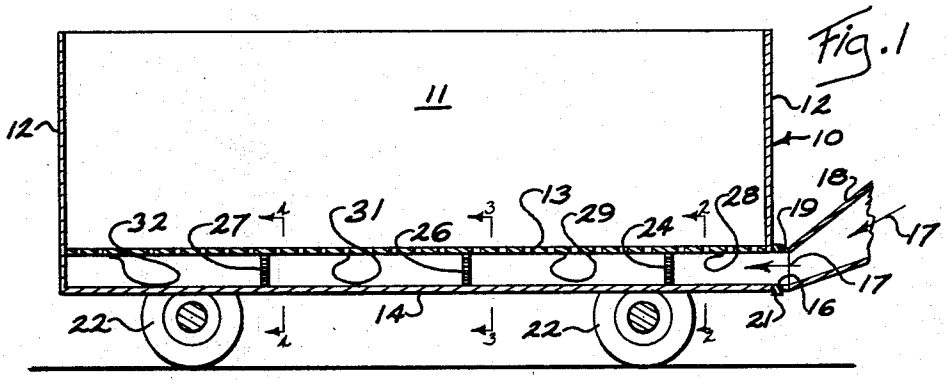


Fig. 1

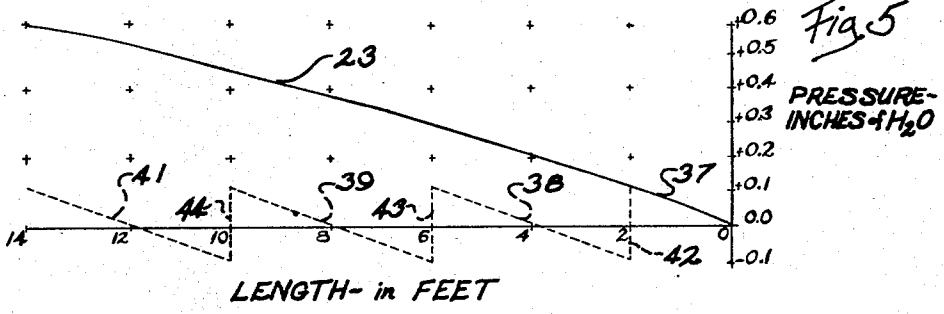


Fig. 5

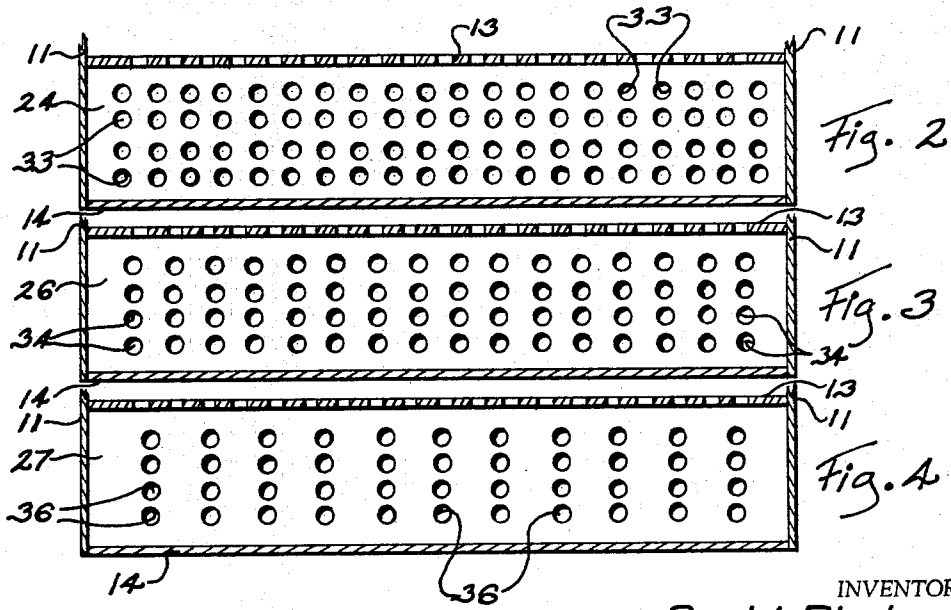


Fig. 2

Fig. 3

Fig. 4

INVENTOR.
Roy W. Blanton, Jr.
BY Jennings, Carter & Thompson
Attorneys

Oct. 18, 1966 R. W. BLANTON, JR 3,279,094

APPARATUS FOR CONTROLLING FLOW OF GASES

Filed March 18, 1963 2 Sheets-Sheet 2

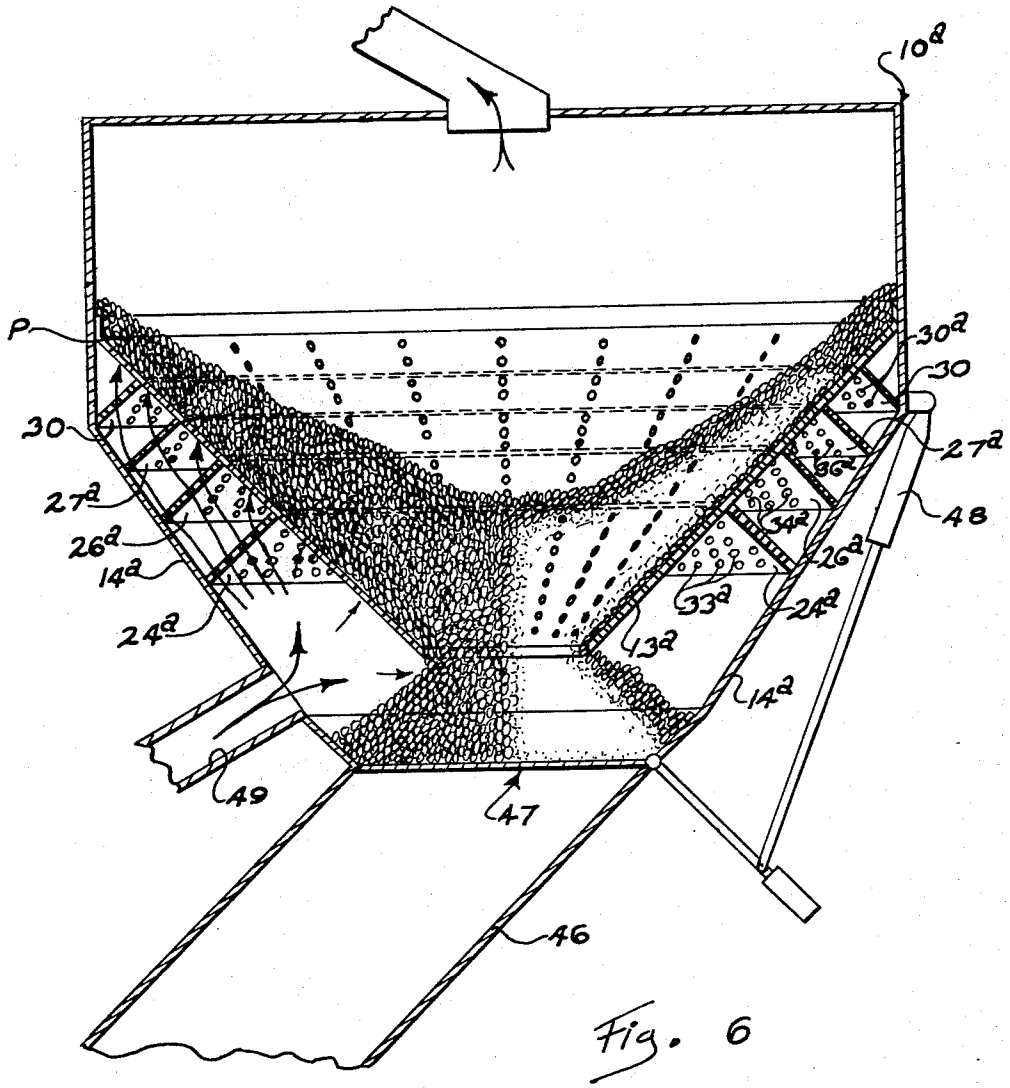


Fig. 6

INVENTOR.
Roy W. Blanton, Jr.
BY Jennings, Carter, Thompson
Attorneys

United States Patent Office

3,279,094

Patented Oct. 18, 1966

3,279,094

APPARATUS FOR CONTROLLING FLOW OF GASES

Roy W. Blanton, Jr., P.O. Box 703, Albany, Ga.

Filed Mar. 18, 1963, Ser. No. 265,677
2 Claims. (Cl. 34—233)

This invention relates to apparatus for controlling the flow of gases and more particularly to such apparatus which shall be adapted to treat or dry a mass of materials, such as peanuts, uniformly.

An object of my invention is to provide apparatus for drying peanuts and the like in which substantially controlled amounts of drying gases are passed upwardly through all portions of the mass of peanuts or the like.

Another object of my invention is to provide apparatus of the character designated in which the drying gases are introduced into a closed chamber subjacent a perforated drying chamber and means is provided to restrict the flow of the gases through the closed chamber whereby the pressure throughout the enclosed chamber is substantially equal to thereby cause equal amounts of the drying gas to flow laterally through the perforated wall into the drying chamber.

A further object of my invention is to provide apparatus of the character designated which shall be simple of construction, economical of manufacture and one which may be readily adapted for use with conventional type drying apparatus for peanuts and the like.

As is well known in the art to which my invention relates, various types of drying equipment have been employed to dry peanuts and the like. However, such apparatus has been unsatisfactory due to the fact that a uniform flow of the drying gases is not obtained throughout the mass of peanuts. That is to say, in certain areas of the drying equipment, the peanuts are overdried or burned while in other areas the peanuts contain too much moisture whereby they cannot be stored without spoilage. It is essential that the peanuts be dried uniformly for the reason that if the peanuts are too dry they will not shell properly. On the other hand, if the peanuts contain too much moisture, the peanuts will deteriorate or spoil quickly after storage.

To provide a uniform flow of the drying gases throughout the entire mass of peanuts, I provide a plenum chamber subjacent a perforated wall which supports the peanuts and then provide baffle members in the plenum chamber which extend transversely of the direction of flow of the drying gases through the plenum chamber to define separate compartments. Openings are provided through the baffle members of a size for the drying gas to pass therethrough and control the pressure within the compartments whereby substantially equal amounts of drying gas pass laterally through all portions of a mass of materials to be dried.

Apparatus embodying features of my invention is illustrated in the accompanying drawings, forming a part of this application, in which:

FIG. 1 is a vertical sectional view through the drying apparatus;

FIG. 2 is an enlarged sectional view taken generally along the line 2—2 of FIG. 1;

FIG. 3 is an enlarged sectional view taken generally along the line 3—3 of FIG. 1;

FIG. 4 is an enlarged sectional view taken generally along the line 4—4 of FIG. 1;

FIG. 5 is a graph indicating the pressure build-up in each of the individual compartments of the plenum chamber; and,

FIG. 6 is a vertical sectional view showing a modified form of my invention.

Referring now to the drawings for a better understanding of my invention, I show a drying chamber **10** which may be rectangular, as viewed in plan. The drying chamber **10** is provided with vertical side walls **11**, vertical end walls **12** and a perforated bottom wall **13**. The top of the drying chamber **10** may be left open, as shown, whereby the peanuts or the like to be dried may be introduced therein.

As shown in FIGS. 2, 3 and 4, the side walls **11** extend beneath the perforated bottom wall **13** and the lower edges of the side walls **11** are connected to a second bottom wall **14** which is spaced from the perforated bottom wall **13** to define a plenum chamber therebetween. Also, as shown in FIG. 1, the end wall **12** at one end of the apparatus extends beneath the perforated wall **13** and is secured to the bottom wall **14**. The other end wall **12** terminates adjacent the perforated bottom wall **13** to provide a passageway **16** for receiving the drying gas which flows in the direction of the arrows **17**. The drying gas is supplied to the passageway **16** through a suitable supply conduit **18** which may be attached to an inlet conduit **19** for the plenum chamber. A suitable resilient sealing member **21** is employed at the point of connection between the supply conduit **18** and the inlet conduit **19** to prevent the escape of the drying gas at this point.

As shown in FIG. 1, the drying chamber **10** and the plenum chamber associated therewith may be supported by wheels **22** whereby the apparatus and the peanuts dried therein may be transported from place to place. The peanuts may be introduced into the drying chamber **10** or removed therefrom by conventional means well understood in the art.

It is well known that in the steady flow of a fluid, the pressure is least where the velocity is greatest. Accordingly, after the drying gas is introduced through the passageway **16** into the plenum chamber, the velocity of the gas would decrease as it moved toward the opposite end of the plenum chamber. It will thus be seen that the static pressure within the plenum chamber adjacent the inlet conduit **19** would be less than the static pressure adjacent the opposite end of the plenum chamber. That is, the static pressure would gradually increase from the point of introduction into the plenum chamber until it reached the opposite end thereof, as indicated by the graph **23** in FIG. 5 of the drawings. It thus follows that without any restrictions in the plenum chamber, less drying gas would be forced upwardly through the perforated wall **13** adjacent the inlet conduit **19** than would be forced upwardly through the perforated wall adjacent the opposite end thereof.

To provide a substantially uniform static pressure throughout the entire plenum chamber, I mount baffle members **24**, **26** and **27** in the plenum chamber in position to extend transversely of the direction of flow of the drying gas. That is, where the perforated wall **13** extends in a horizontal plane, the baffle members would extend in a vertical plane, as shown in FIG. 1. The baffle members **24**, **26** and **27** thus define separate compartments **28**, **29**, **31** and **32** which are positioned longitudinally of the drying chamber **10**. As shown in FIG. 2, a plurality of openings **33** are provided in the baffle member **24** whereby the drying gas is free to pass therethrough into the adjacent compartment **29**. In like manner, the baffle members **26** and **27** are provided with openings **34** and **36**, respectively, as shown in FIGS. 3 and 4. In order to provide a uniform pressure within each of the compartments **28**, **29**, **31** and **32**, I vary the amount of openings provided in the baffle members. That is, the percentage of the total area of each baffle member openings is progressively smaller in the direction of gas flow. Accordingly, there is no constant build-up of pressure

within the plenum chamber as the drying gas moves along the same. Instead, the pressure within the compartments **28**, **29**, **31** and **32** is indicated by the graph or lines **37**, **38**, **39** and **41**, respectively.

Due to the fact that the pressure increases as the velocity decreases, the provision of the baffle members **24**, **26** and **27** reduces the pressure at the location of each baffle member. The pressure will then increase again since the fluid is being bled off and the velocity is decreasing. Accordingly, by providing a plurality of baffle members, the pressure in the compartments **28**, **29**, **31** and **32** is substantially uniform. This uniform pressure within the various compartments brings about a uniform later flow of the drying gas through the perforated bottom wall **13**.

The pressure drop may be produced by providing the openings **33**, **34** and **36** in the baffle members or a perforated metal screen or the like may be employed. In actual practice, I have found that with a plenum chamber 42 inches wide, 8 inches deep and 14 feet long, the three baffle members **24**, **26** and **27** should be employed. Baffle member **24** is poistioned approximately 2 feet from the inlet conduit **19** while the baffle members **26** and **27** are positioned substantially 6 feet and 10 feet, respectively, from the inlet conduit **19**. With this specific plenum chamber and baffle member arrangement, I find that the percentage of the total area of the baffle member **24** being openings should be approximately 77%. The openings **34** and **36** in the baffle members **26** and **27**, respectively, are progressively smaller whereby the percentage of the total area of the baffle member **26** being openings is approximately 64% and the percentage of the total area of the baffle member **27** being openings is approximaely 44%. It will thus be seen that there is a pressure drop at the location of each of the baffle members **24**, **26** and **27**, as indicated in FIG. 5 by the vertical lines **42**, **43** and **44**, respectively.

From the foregoing description, the operation of my improved apparatus shown in FIGS. 1–4 will be readily understood. The peanuts or the like to be dried are introduced into the drying chamber **10** and the supply conduit **18** is connected to the inlet conduit **19** whereby the hot drying gas is introduced into the plenum chamber through the passageway **16**. As the velocity of the drying gas decreases, the pressure increases as shown by the portion **37** of the graph **23**. As the reduced gases pass through the orifices or openings **33**, the velocity increases whereby there is a decrease in pressure, as indicated by the line **42** in FIG. 5. After the gases pass through the openings **33**, the velocity again decreases and the pressure then increases as indicated by the line **38**, until the drying gas passes through the openings **34** in the baffle member **26**. This brings about an increase in velocity whereby there is a decrease in pressure as indicated by the line **43**. The pressure again increases in compartment **31** as the velocity decreases, as indicated by the line **39**, until the drying gases pass through the openings **36** in the baffle member **27** whereupon there is an increase in velocity and decrease in pressure as indicated by the line **44**. It will thus be seen that the average pressure in each of the compartments **28**, **29**, **31** and **32** is substantially equal whereby uniform amounts of the drying gas pass upwardly through all portions of the perforated wall **13**.

Referring now to FIG. 6 of the drawings, I show a modified form of my invention in which the peanuts or the like indicated at P are supported by a perforated wall **13ª** of a drying chamber indicated generally at **10ª**. Instead of the perforated wall **13ª** extending in a horizontal plane, it converges toward the lower end thereof to define a frustum of a cone. Spaced from the under surface of the perforated wall **13ª** is a second downwardly converging wall **14ª** which defines an annular plenum chamber therebetween.

The peanuts or the like are introduced into the drying

chamber **10ª** by suitable means and are discharged through a conduit **46**. The discharge conduit **46** is separated from the lower end of the perforated wall **13ª** by a valve closure member **47** whereby the flow of peanuts from the drying chamber **10ª** is controlled. The valve control member **47** is actuated by suitable means, such as a fluid pressure operated cylinder **48** which is operatively connected to the valve member **47**, as shown. Drying air is introduced into the annular plenum chamber defined between the walls **13ª** and **14ª** by an inlet conduit **49**.

Mounted within the plenum chamber are annular baffle members **24ª**, **26ª**, **27ª** and **30**. The baffle members **24ª**, **26ª** and **27ª** are provided with openings **33ª**, **34ª** and **36ª**, respectively, which correspond generally to the openings **33**, **34** and **36** employed in the transverse baffle members **24**, **26** and **27**. The baffle member **30** is also provided with openings **30ª**. It will thus be seen that the baffle members **24ª**, **26ª**, **27ª** and **30** divide the annular plenum chamber into separate compartments. The percentage of the total area of each baffle member **24ª**, **26ª**, **27ª** and **30** which is in the form of openings is progressively smaller toward the upper end of the plenum chamber. That is, the baffle member **24ª** would have a larger percentage of openings and the other baffle members would have progressively less openings therein.

To provide substantially the same amount of total volume in each compartment defined between the baffle members **24ª**, **26ª**, **27ª** and **30**, the bottom wall **14ª** may extend inwardly toward the upper end of the perforated bottom wall **13ª**, as shown. Also, the baffle members may be positioned progressively closer to each other toward the top of the plenum chamber.

The operation of the apparatus shown in FIG. 6 is similar to the operation of the apparatus shown in FIGS. 1–4. That is, the hot drying gases are introduced through the inlet conduit **48** whereupon they pass through the passageways **33ª**, **34ª**, **36ª** and **30ª**. By providing the proper size openings in the baffle members the drying gases move laterally and uniformly through the perforated wall **13ª** into the mass of peanuts P within the drying chamber **10ª**. The amount of drying gases passing through the mass of peanuts is smaller adjacent the upper end of the plenum chamber whereby the peanuts are dried uniformly. That is, since the mass of peanuts is greater adjacent the lower end of the plenum chamber, the pressure within the plenum chamber should be greater adjacent the lower end thereof. Accordingly, the pressure should decrease as the gas moves toward the upper end of the plenum chamber rather than remaining substantially uniform throughout the entire surface of the perforated wall **13ª**.

From the foregoing, it will be seen that I have devised improved apparatus for drying peanuts and the like. By maintaining the proper pressure throughout the etire plenum chamber, substantially equal amounts of the drying gas contact the mass of peanuts throughout the entire area of the perforated wall supporting the peanuts. Also, by providing simple and inexpensive means for controlling the pressure throughout the entire length of the plenum chamber, my improved apparatus may be associated with conventional type drying equipment with a minimum of cost and labor. Furthermore, by providing uniform flow of the drying gas throughout the entire mass of peanuts, the peanuts are dried evenly throughout whereby there are no burnt areas or areas having excess moisture therein.

While I have shown my invention in two forms, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various other changes and modifications without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

What I claim is:

1. Apparatus for drying peanuts and the like comprising:

(a) a drying chamber having a downwardly converging perforated bottom wall,

(b) a second downwardly converging wall spaced below said perforated wall to define a plenum chamber therebetween,

(c) means to supply a drying gas adjacent the lower end of said plenum chamber whereby the gas passing through said plenum chamber flows laterally through said perforated wall into said drying chamber,

(d) baffle members within said plenum chamber extending transversely of the direction of flow of said gas through the plenum chamber and dividing said plenum chamber into separate compartments, and

(e) there being openings through said baffle members of a size for said gas to pass therethrough and maintain a progressively decreased static pressure within each of said compartments in the direction of gas flow in response to supplying gas at a constant pressure whereby progressively smaller amounts of drying gas pass laterally through said perforated wall toward the upper end of said drying chamber.

2. Apparatus as defined in claim 1 in which the downwardly converging walls and the baffle members are positioned relative to each other to provide compartments which are substantially equal in volume.

References Cited by the Examiner

UNITED STATES PATENTS

1,323,416	12/1919	Simpson	34—233

FOREIGN PATENTS

891,372	12/1943	France.
319,604	3/1920	Germany.
589,054	6/1947	Great Britain.

FREDERICK L. MATTESON, JR., *Primary Examiner.*

NORMAN YUDKOFF, WILLIAM F. O'DEA, *Examiners.*

J. P. ROBINSON, A. D. HERRMANN, *Assistant Examiners.*