Dec. 9, 1958 C. J. DAVIS, JR 2,863,521

CONTINUOUS DEAERATION APPARATUS

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Fig. 1.

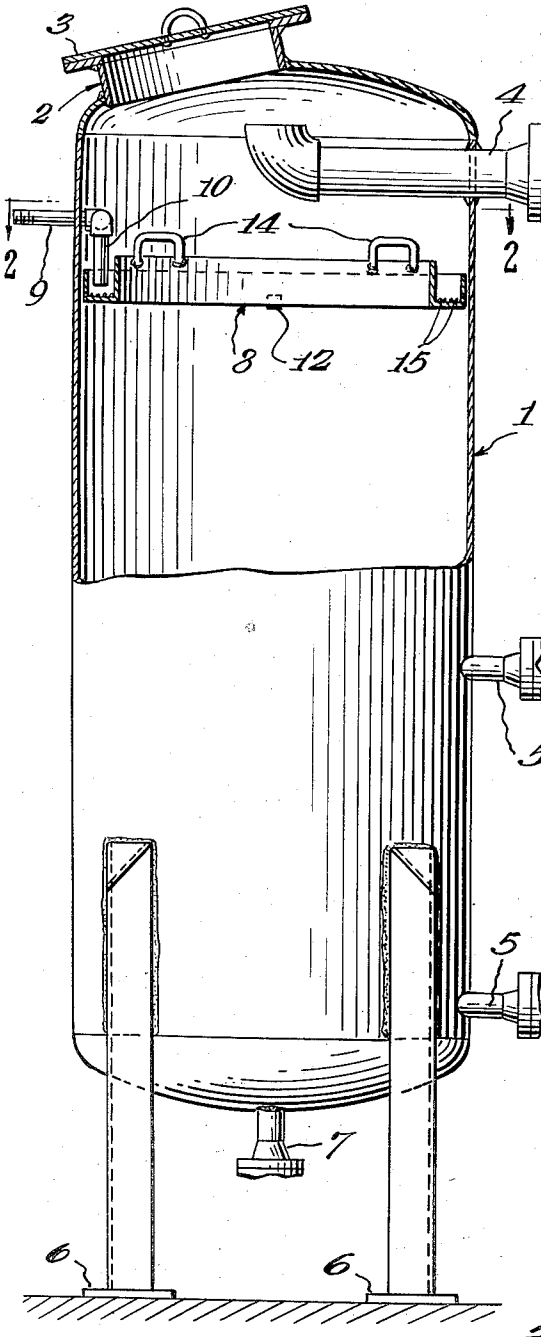


Fig. 3.

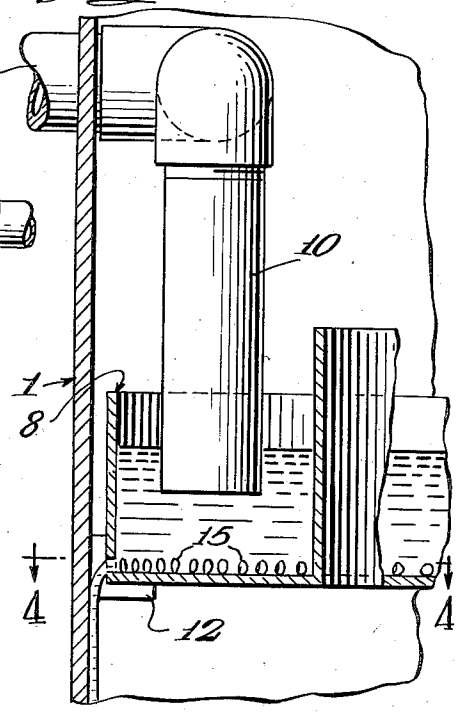
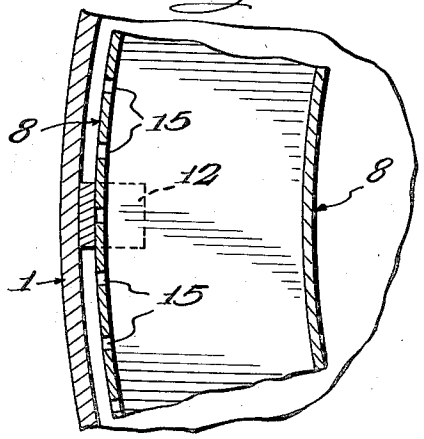


Fig. 4.



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Fig. 2.

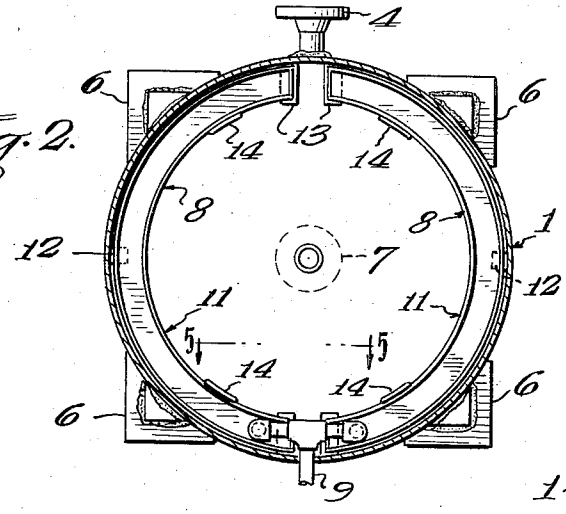


Fig. 7.

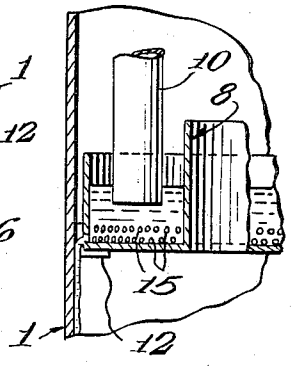
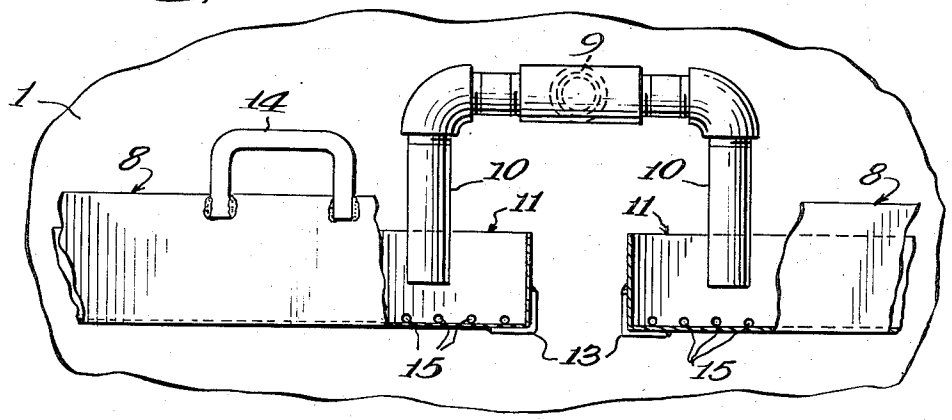


Fig. 5.



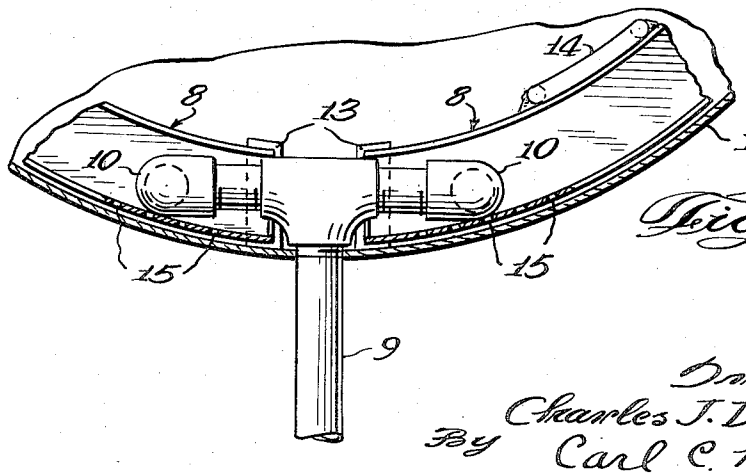


Fig. 6.

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CONTINUOUS DEAERATION APPARATUS

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Application February 27, 1956, Serial No. 568,034

5 Claims. (Cl. 183—2.5)

This invention is an improvement in apparatus for the removal of moisture and air and other gases contained in animal and vegetable oils. It is more specifically an improved apparatus for distributing oil in a film of uniform thickness flowing downward on the internal periphery of a deaerating chamber.

During the process of deodorization of animal and vegetable oils operating temperatures are sufficiently high to promote the oxidation of the oil with resultant darkening and impairment of the quality of the oil. Oxidation is further promoted by the presence in the oil of dissolved and occluded air. The problem of oxidation has been minimized by deaerating the oils before they are subjected to the deodorizing process.

The presence of moisture also is inimical to the refining of animal and vegetable fats and oils and must be removed along with dissolved and occluded air.

Deaeration of the oil has been accomplished by subjecting the oil to reduced pressure, causing dissolved and occluded air in the body of the oil to form bubbles and rise to the surface. Under these conditions moisture is vaporized and is removed from the oil together with the dissolved and occluded air. In the continuous process usually employed the oil is caused to flow under reduced pressure over a vertical surface in a thin film, thereby increasing the rate of deaeration.

It is therefore a general object of this invention to provide an apparatus for the removal of dissolved and occluded air from animal and vegetable fats and oils. A further object of the invention is to provide an apparatus for the removal of water and water vapors from animal and vegetable oils. Another object of the invention is to provide apparatus in which the maintenance of the surface of the apparatus in a horizontal plane is not critical. It is also an object to provide an apparatus which will provide a film of uniform thickness and which will in its design adapt itself to fluctuations in the rate of flow of oil into the chamber. It is still a further object to provide an apparatus which is readily dismantled for cleaning and maintenance. Other objects and advantages of the invention will be apparent as the specification proceeds.

The objects of the invention are accomplished by providing in the deaerating chamber an annular U-shaped trough having perforations positioned on the lower side of the trough adjacent to the chamber wall. The oil is passed through conduits into the trough and is directed through the perforations to the inner wall of the chamber upon which it flows downward in a film of uniform thickness.

One embodiment of the invention is illustrated by the accompanying drawing in which:

Fig. 1 is a vertical sectional view of a deaeration chamber in which this invention is employed.

Fig. 2 is a plan view.

Fig. 3 is an enlarged vertical sectional view showing the trough of improved construction.

Fig. 4 is a plan view of a section of the trough.

Fig. 5 is an enlarged vertical sectional view showing oil supply lines and construction of the trough.

Fig. 6 is an enlarged plan view of oil supply lines and the particular construction of the trough.

Fig. 7 is an enlarged sectional view of a modified trough.

Referring particularly to Fig. 1 a deaeration chamber 1 is mounted upon legs 6 in any convenient location and is constructed to withstand a high vacuum. A manhole 2, with cover 3 to fit is provided at the top of the chamber. Vacuum is drawn within the chamber through vacuum line 4. Flanged outlets 5 for float control of the oil level are provided in the lower portion of the chamber. The annular U-shaped trough 8 described in greater detail below, is stationarily positioned near the top of the chamber. An oil supply line 9, shown in sectional view of Fig. 2 and Fig. 6, passes through the chamber wall at a point above the top of the trough 8. It is divided into two branches 10. A plurality of such oil supply lines could be employed if desired. Deaerated oil is withdrawn from outlet 7 positioned in the bottom of the chamber.

The annular U-shaped trough 8 in the present embodiment of the invention is made up of two sections 11, each separately mounted upon support clips 12 fastened to the inner wall of the chamber. Each section 11 of the annular trough 8 is of arcuate form and is adjacent to the inner periphery of the chamber and is adapted to receive oil from supply line 9 and to direct the flow of oil to the adjacent portion of the vertical inner periphery of the chamber wall. Spacers 13 which may also support the trough, are provided to maintain the outer periphery of the trough at a uniform distance from the inner periphery of the deaeration chamber, and as shown in Fig. 5 prevent rotation of the trough in a horizontal plane. Each section of the trough is provided with handles 14 to facilitate removal from the chamber.

On the trough wall adjacent to the inner periphery of the chamber are located perforations 15. These perforations are a distinctive feature of the invention and provide for a new mode of operation. In the specific embodiment of the invention illustrated in the drawings these perforations are at the lowest level in the trough wall and project the oil in a direction perpendicular to the trough wall and directly on the vertical inner periphery of the chamber. It is apparent that by increasing the size of the perforation the rate of flow of the oil will be increased.

Perforations may also be provided at several levels in the trough wall as shown in Fig. 7. If the rate of flow of oil into the trough is increased beyond the discharge capacity of the lower level of perforations, the oil level will rise and the next higher level of perforations will become operative. Hence the trough by its design may compensate for fluctuations in the rate of oil flow.

The operation of the invention in the deaeration of a typical animal or vegetable oil is as follows: Oil from a feed stock tank (not shown) is passed through oil supply line 9 into the deaeration chamber and is discharged from the oil supply line branches 10 into a section of the annular trough. The oil flows around each section filling it to a level above the perforations. As the oil flows through the perforations it contacts the vertical inner wall of the deaeration chamber and as it flows downward, spreads to form a vertical film of uniform thickness. From this thin film which in the chamber is subjected to a vacuum, the air contained in the oil is discharged. Here also any moisture present is vaporized and discharged from the oil. The deaerated oil collects at the bottom of the chamber and is then withdrawn for further processing.

It is to be understood that the form of the invention

herein shown and described is a preferred example of the same and may be changed and modified by those skilled in the art without departing from the nature and spirit of the invention.

I claim:

1. In an apparatus for the continuous deaeration of animal and vegetable fats and oils, the improvement which comprises a deaeration chamber, a trough fixedly positioned inside and adjacent to the periphery of said deaeration chamber, said trough having perforations on only one side thereof, said side being that side of said trough which is adjacent to the inner periphery of said deaeration chamber, said perforations being adapted to discharge oil on said inner periphery of said deaeration chamber, and means for introducing oil into said trough.

2. In an apparatus for the continuous deaeration of animal and vegetable fats and oils, the improvement which comprises a deaeration chamber, a U-shaped trough, means for maintaining said U-shaped trough in stationary position inside of and adjacent to the periphery of said deaeration chamber, said U-shaped trough having perforations on only one side thereof, said side being that side of said trough which is adjacent to the inner periphery of said deaeration chamber, and means for introducing oil into said U-shaped trough.

3. In an apparatus for the continuous deaeration of animal and vegetable fats and oils, the improvement which comprises a deaeration chamber, a sectional annular U-shaped trough positioned inside the upper portion of said deaeration chamber, said sectional annular U-shaped trough being formed of individual separately mounted stationary sections each having a plurality of perforations only in the side wall thereof which is adjacent to the vertical inner wall of said deaeration chamber, and an oil supply line adapted to introduce oil into each section of said sectional annular U-shaped trough.

4. In an apparatus for the continuous deaeration of animal and vegetable fats and oils, the improvement

which comprises a deaeration chamber, a stationary trough inside said deaeration chamber and positioned near the top thereof, said trough having a bottom, a side wall adjacent to the inner periphery of said chamber and an inside wall and having perforations on only one side wall thereof said side wall being that side wall of said trough which is adjacent to the inner periphery of said deaeration chamber, said perforations being positioned in rows at different levels on said side wall of said trough, said perforations being adapted to discharge oil in uniform continuous flow onto the inner periphery of said deaeration chamber, and means for introducing oil into said trough.

5. In an apparatus for the continuous deaeration of animal and vegetable fats and oils, the improvement which comprises a deaeration chamber, an annular U-shaped trough stationarily positioned near the top of said deaeration chamber and adjacent to the side walls thereof, said annular U-shaped trough being divided into separate and removable sections, each of said sections being stationarily mounted to form said annular U-shaped trough, a supply line adapted to introduce oil into said deaeration chamber and to distribute it to each of said sections of said annular U-shaped trough, a plurality of perforations in said annular U-shaped trough, said plurality of perforations being positioned in the lower portion of the side wall of said annular U-shaped trough which is adjacent to the inner periphery of said deaeration chamber, said perforations being uniformally spaced and being adapted to discharge the contents of said annular U-shaped trough onto the adjacent vertical inner periphery of said deaeration chamber.

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