F. I. GIBSON.

APPARATUS AND PROCESS FOR THE CONTINUOUS DISTILLATION OF LIQUIDS.

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1,340,653. Patented May 18, 1920.

Fig. 1.

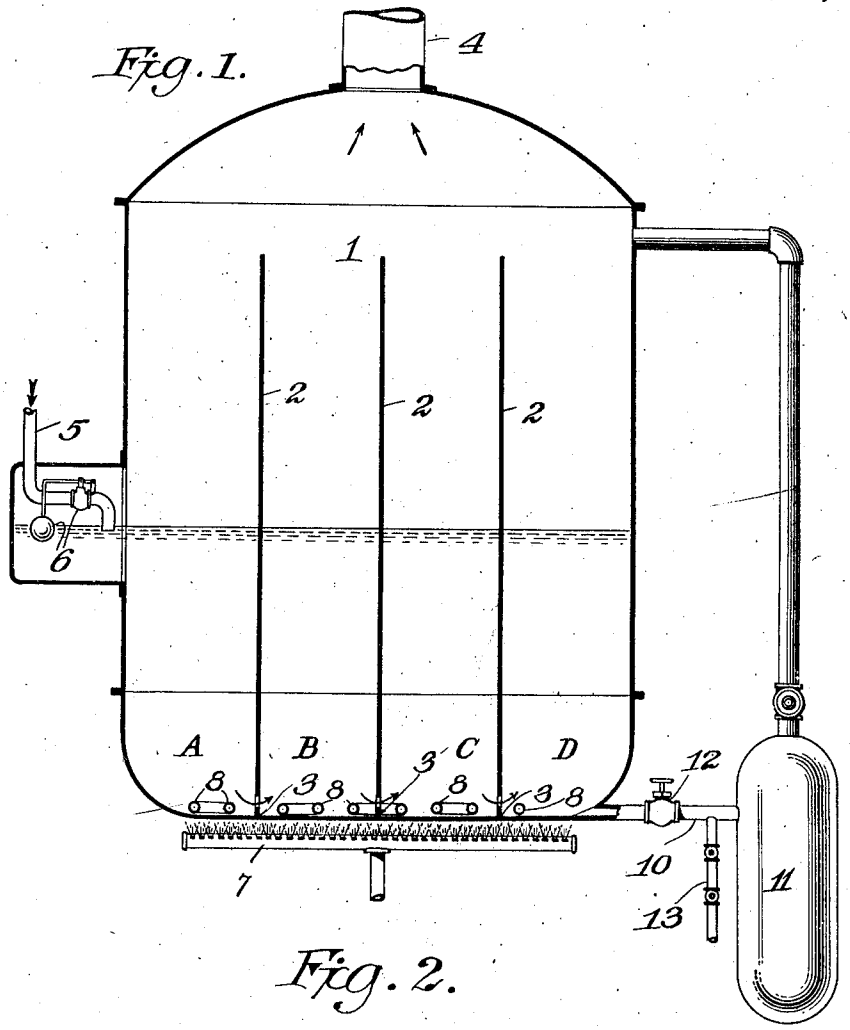
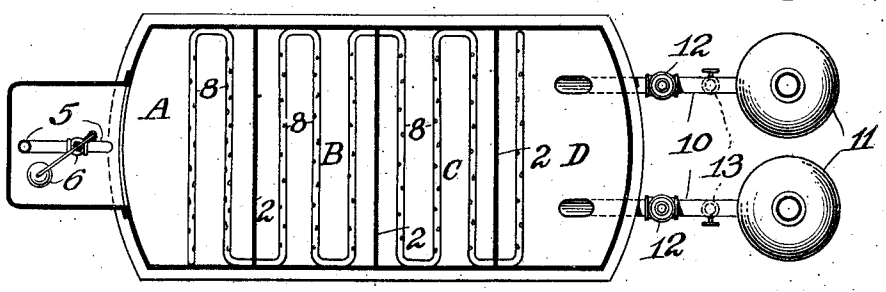


Fig. 2.



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APPARATUS AND PROCESS FOR THE CONTINUOUS DISTILLATION OF LIQUIDS.

1,340,653. Specification of Letters Patent. Patented May 18, 1920.

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To all whom it may concern:

Be it known that I, FREEMAN I. GIBSON, a citizen of the United States, and a resident of Savannah, in the county of Chatham and State of Georgia, have invented certain new and useful Improvements in Apparatus and Processes for the Continuous Distillation of Liquids, of which the following is a full and complete specification, reference being had to the accompanying drawings in which—

Figure 1 is a side elevation and Fig. 2 an end elevation of a type of still for the carrying out of my process.

The object of my invention is to provide a process for the distillation of liquids which may be operated continuously and which will yield uniform distillate and uniform residues. I have found the process very useful in distilling fatty acids, such as oleic acid, stearic acid and palmitic acid from crude mixtures containing them. It is obvious, however, that the process may also be used with advantage in the distillation of other liquids and that it is especially useful whenever a uniform distillate of mixed constituents and a uniform residue are desired.

In the processes heretofore commonly used for the distillation of fatty acids the crude mixture is fed into a still and heated, usually both by the direct heat of a furnace or flame beneath the still and by blowing steam, often superheated, into the crude mixture through perforated steam pipes or spray coils arranged in the still beneath the surface of the crude oil. The distillation is usually conducted under more or less of a vacuum so as to lower the boiling points of the fatty acids and cause the distillation of the fatty acids to proceed at a temperature below that at which they are apt to be decomposed by heat. The distillate is usually obtained in the form of a mixture of several fatty acids such as oleic acid, stearic acid and palmitic acid and is used extensively for the manufacture of soap and similar purposes for which a mixture of the acids of uniform composition is highly desirable.

The residue or "tar" as it is commonly called in the trade, is employed extensively in the manufacture of prepared roofings and in other industries which require a "tar" of uniform consistency.

It is important, therefore, that both the distillate and the residue of the process be of uniform composition. Yet as the process has been heretofore conducted the composition of both the distillate and the residue is uncertain. The usual practice is to feed the crude mixture continuously into a still for some days. During the first part of the time the more volatile fatty acids are principally distilled and will be found to preponderate in the distillate. During the latter part of the time the heavier fatty acids preponderate in the liquid in the still and will therefore be found to preponderate in the distillate. After a time the amount of tar in the residue in the still preponderates to such an extent that the process must be stopped and the still cleaned out. The composition of the residue when the process is stopped and the still cleaned out is more or less a matter of chance. It usually contains a substantial portion of fatty acid which the final stage of the process of distillation did not remove effectively owing to the fact that the large amount of tar present interfered with the complete distillation of the fatty acids.

According to my process, all the foregoing difficulties are overcome by feeding the crude mixture continuously into a still of the general type illustrated in Fig. 1. Referring to Fig. 1, 1 represents the still which may be of any suitable shape, for example, rectangular with a curved bottom and top as shown in the drawing. The still is provided with several partitions 2 dividing it into chambers such as A, B, C and D. These chambers communicate with openings 3, near the bottom of the still. The partitions 2 terminate below the top of the still so that the chambers A, B, C and D all communicate in the upper part of the still above the partitions. A common outlet 4 is provided for the removal of the distilled vapors which are led to a condensing apparatus of the proper type, not shown. The crude oil is fed into the chamber A through the pipe 5 leading from a suitable reservoir which is automatically controlled by a suitable float valve 6 to maintain a constant level of liquid in the still. From the chamber A the liquid flows through the restricted openings 3 to the chamber B, thence to the chamber C and thence to the chamber D. The bottom of the still is heated by a suitable source, for example, the gas burner 7, and may also be

provided with perforated steam spray coils 8 supplied with steam from a suitable source, not shown.

The "tar" or residue is withdrawn from the still by the pipe 10 to suitable reservoirs 11. The withdrawal of the tar may be controlled by valves 12 on the pipe 10. A sampler 13 is advantageously provided. The heat which is applied to the still both by the burner 7 and by the steam coils 8 may be uniform in the several chambers or it may increase progressively, if desired. In this connection it should be noted that although a higher temperature is desirable in the successive chambers this temperature is automatically secured to a large extent if the chambers are uniformly heated, for in the chamber A vaporization of the more volatile fatty acids takes place comparatively rapidly, absorbing, in so doing, a large number of heat units as latent heat and thus cooling the contents of the chamber. Iu the chamber B vaporization takes place less rapidly and therefore less heat units are absorbed as latent heat of vaporization and the contents of the chamber are somewhat warmer. Similarly, the contents of the chamber C are warmer than those of chamber B, and those of chamber D than those of chamber C. The distilled products arising from all the chambers unite and together pass out through the outlet 4 to the condensing apparatus. Thus a uniform distillate is at all times secured. Also, since the residue which is drawn off through the pipe 10 has constantly been subjected to the same treatment, this residue is of uniform composition.

From the foregoing description it will be obvious that many variations may be made in the details of my process and the form of apparatus in which it is carried out without departing from the spirit and scope of my invention.

What I claim is:

1. A continuous process for distilling liquids, comprising continuously feeding the liquid into a still provided with compartments communicating progressively below the level of the liquid in each of said compartments by restricted openings and having a common vapor chamber, heating the still to the distillation temperature, withdrawing the distilled products from the common vapor chamber and withdrawing the residue from the last compartment.

2. A continuous process for distilling mixtures containing fatty acids, comprising continuously feeding the mixture into a still provided with compartments communicating progressively by restricted openings below the level of the mixture in each of said compartments and having a common vapor chamber, heating the still to the distillation temperature, withdrawing the distilled fatty acids from the common vapor chamber and withdrawing the residue from the last compartment.

3. Apparatus for the continuous distillation of liquids, comprising a still having compartments therein communicating serially by restricted openings near the bottom of each compartment, a common vapor chamber above said compartments, means for feeding the liquid into the first compartment of the series, means for withdrawing the residue from the last compartment, and means for withdrawing the distilled products from the common vapor chamber.

FREEMAN I. GIBSON.