(No Model.)

C. W. RAMSAY.

APPARATUS FOR TREATING FERMENTED, FERMENTABLE, AND DISTILLED LIQUORS.

No. 271,656. Patented Feb. 6, 1883.

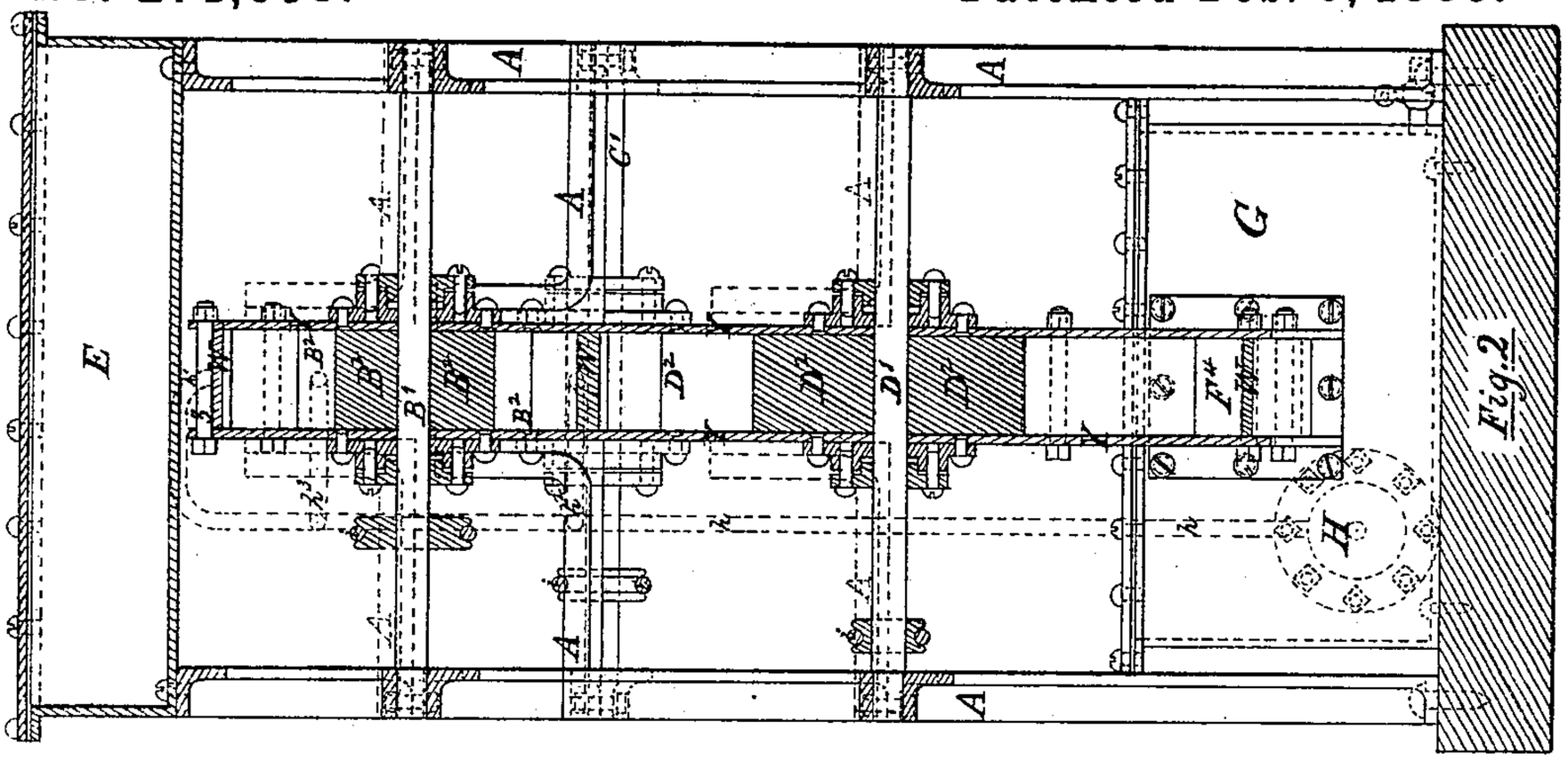

Fig. 2

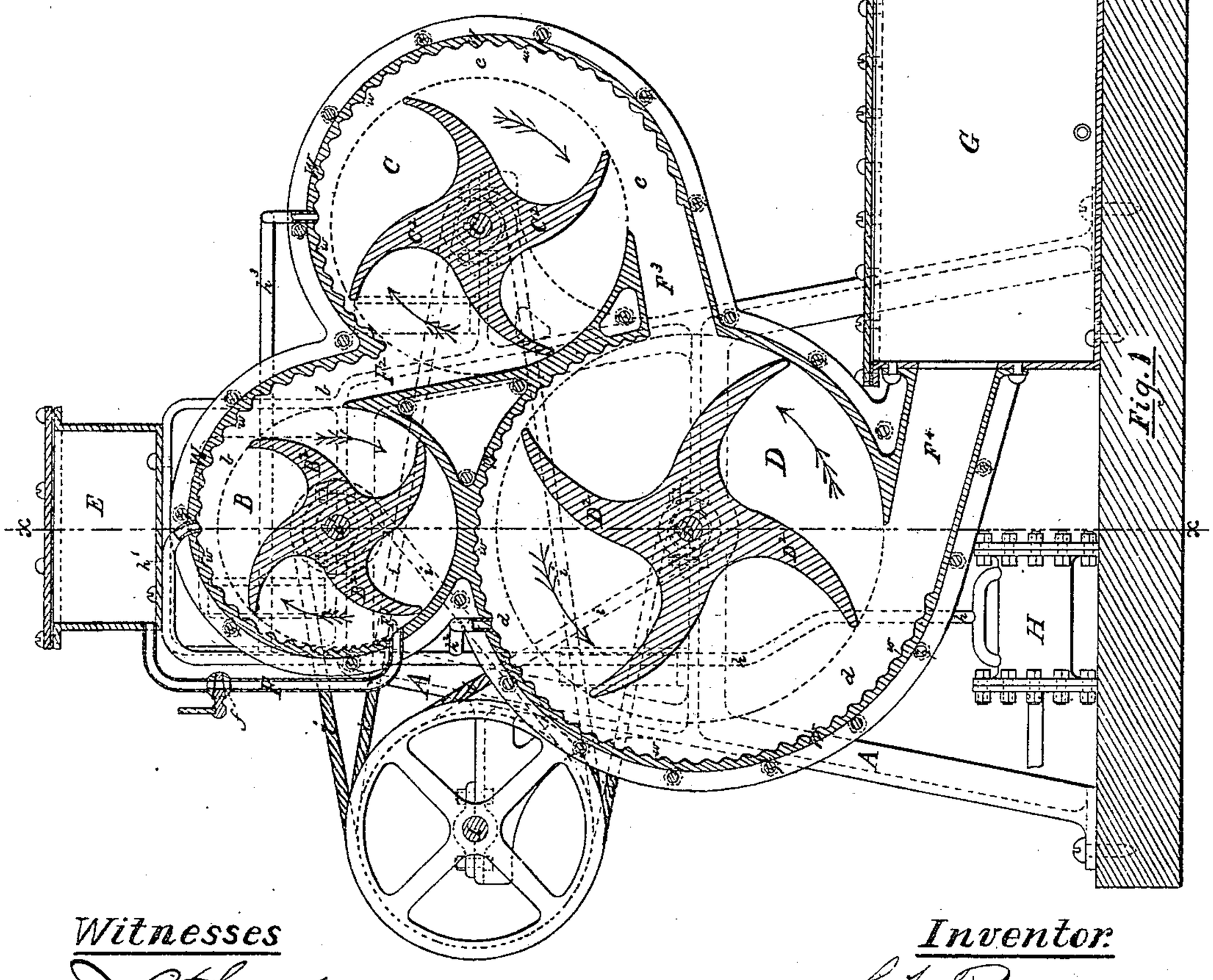

Fig. 1

Witnesses

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APPARATUS FOR TREATING FERMENTED, FERMENTABLE, AND DISTILLED LIQUORS.

SPECIFICATION forming part of Letters Patent No. 271,656, dated February 6, 1883.

Application filed September 13, 1880. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. RAMSAY, of the city of Brooklyn, in the county of Kings and State of New York, have invented an Improved Machine or Apparatus for Treating Fermented, Fermentable, and Distilled Liquids—such as wine, beer, ale, liquors, and other like articles—according to the processes for which Letters Patent have recently been granted to me; and I hereby declare the following to be a full and clear description of the same.

This invention relates to an apparatus containing a series of connected chambers having parallel ends, with sides somewhat in the form of a helix, each successive chamber of the series being larger than the one preceding it, and the interior surface of the curvilinear portion of each chamber being preferably corrugated, so as to break up at the instant of impact into an infinitely-fine spray any fluid thrown against it by revolving drivers or beaters, one set of which is placed within each of the chambers. The fluid to be treated is fed into the first or smallest chamber through a suitable pipe or other opening, and is thence driven by the revolving drivers or beaters into the next chamber of the series, and so on through the whole series of chambers, from the last of which it is discharged into a suitable tank or receiver, where it is allowed to recondense into the form of a fluid. While undergoing this operation the material treated will be in a gaseous or vaporous form, and in such form will be subjected to severe continuous concussions against the smooth or corrugated surfaces of the successive chambers, and by these concussions the contained infusorial or other germ life will be effectually destroyed, and thereby injurious fermentation will thereafter be arrested or prevented. With this same apparatus, also, the liquor or other article treated may be readily oxidized or "aged" by introducing into the chambers the requisite amount of oxygen for that purpose in the form of atmospheric air or pure oxygen.

My invention will be readily understood by reference to the accompanying drawings, Figure 1 of which is a central sectional elevation of the machine, taken diametrically through all of the helical chambers and their rotary distributers. Fig. 2 is a transverse sectional elevation of the same parts shown in Fig. 1, this view being taken on the dotted line *x x* of Fig. 1.

A A represents a supporting-frame for the machine, which frame may be made in any desired or convenient form. Conveniently attached to and supported by this frame is a set of converting or treating chambers, B C D. There should preferably be two or more of these chambers; but for ordinary use I prefer to employ three of them, as I have shown. These chambers have helical or nearly helical sides W, as shown in Fig. 1, and straight parallel ends *y*, as shown in Fig. 2, the ends being tightly fitted to the side or curved plates, so as to form perfectly-tight connections between these parts, which are to be secured together either by stud-bolts, securing each end respectively to the curved side plates, or by through-bolts *z*, passing through both of the end plates and holding them firmly together and to the intervening side plate, as shown in Fig. 2. There are driving-shafts B′ C′ D^2, passing transversely through their respective chambers B C D, and provided with suitable bearings in the frame A A. To these shafts are respectively attached the rotary distributers, drivers, or beaters B^2 C^2 D^2, the construction and operation of which will be presently explained.

The shafts B′ C′ D′ are placed eccentrically across the chambers B C D, to which they respectively belong, as is clearly shown in Fig. 1, so as to bring the side of the rotary drivers or beaters (in each case) nearest the inlet side of its chamber, thus allowing an increased amount of room on the opposite or outlet side of each set of drivers or beaters for the accommodation of the increased and increasing volume of the article under treatment as it assumes the attenuated or gaseous or vaporous form. This increase of the vapor or gaseous cavity from the induction toward the eduction ports of the various chambers of this apparatus is clearly shown in Fig. 1, and the said cavities or sub-chambers are represented in the said Fig. 1 by the supplemental letters *b c d*, wherein it is not only shown that each of these

vapor-cavities increases in size from the inlet end toward the outlet end, but also that the second cavity or sub-chamber, *c*, is larger than the one *b*, and the next one, *d*, is larger than the one, *c*, which precedes it. This arrangement must be adhered to in the construction of the apparatus, whether one or two or more of the converting-chambers are employed. This is a fundamental and important element in the construction of the apparatus—*i. e.*, increasing dimensions of the vaporous or gaseous cavities or sub-chambers must exist in the apparatus to allow for the expansion of the material under treatment, and this increase of size will belong to each separate cavity or sub-chamber, and also to the sectional area of the whole set of chambers, taken as a whole. The interior side of the curved plate W of each of the chambers B C D, from a point contiguous to the inlet or induction port to a point contiguous to the outlet or eduction port, measured in the direction of the rotation of the distributers or beaters, will be corrugated, the said corrugations being represented by the letter *w* in Fig. 1.

The beaters B^2 C^2 D^2 preferably consist of two or more curved arms, attached to or cast solidly with the hub piece belonging thereto, each of the said hubs to be neatly fitted on and secured to the shaft to which it belongs, as shown in Fig. 1. Some effect, though not to so advantageous an extent, may be produced if these arms are straight; but I prefer the mode of construction described. The curvature of the arms of these beaters should be opposite the direction of their rotation. Of course it would be possible to use straight radial arms for this purpose; but they would be liable to gather a considerable amount of the fluid between them during their rotation, and so render ineffective, to a considerable degree, the centrifugal action of the machine. With the curved arms shown in the drawings the centrifugal action of the machine will be positive and certain; but if the arms were straight the effect might be to clog the machine.

An important element in the construction and operation of this apparatus is the construction and location of the ports or apertures through and from which the article treated is to be passed into and out of the converting or treating chambers. The material to be treated should be placed in a suitable tank or reservoir, E, which will for most or all purposes require to be tightly closed, except at its outlet-pipe F, through which the fluid to be treated will pass into the converting-chambers. The pipe F should be provided with a suitable stop-cock, *f*, to prevent or regulate the flow of the fluid into the apparatus, and this pipe will discharge itself through an aperture, F′, into the first chamber, B, and an aperture or duct, F^2, connects the chamber B with the next chamber, C, and an aperture or duct, F^3, connects the chamber C with the chamber D, and so on, should there be more than three of the converting-chambers, while the last duct or aperture, F^4, will lead from the last chamber of the series to the receiver or storage-reservoir G, where the vapor will be allowed to recondense into the form of fluid. As is clearly shown in Fig. 1, the inlet or duct F is placed as nearly as practicable toward the bottom or lowest point of the first converting-chamber, B, and the aperture or duct F^2, leading from the first to the second chamber of the series, is placed tangentially to the first converting-chamber, or as nearly so as practicable, and as far removed circumferentially from the inlet-duct, F′, as the combination of the different cylinders will allow. This is for the purpose of utilizing as much of the corrugated surface *w* as possible, and this arrangement of the inlet and outlet ducts should apply, as far as possible, to each converting-chamber of the set, the important point being that each inlet shall be as near the bottom of its chamber as practicable, and each outlet placed tangentially, or nearly so, to its respective chamber, and as far removed circumferentially from its corresponding inlet as possible, so as to get the full benefit of the operating surface *w*. The first inlet or duct, F′, being only required for the passage of fluid, need only be the size of the pipe to which it is attached; but the duct F^2, being for the passage of vaporized or partly vaporized material, will necessarily be larger than F′, and the duct F^3, being for the passage of the same amount of material as F^2, but in a more rarefied form, will be larger than the duct F^2, and so on, and for the same reason duct F^4 should be larger than duct F^3.

Suitable stop-cocks may be attached to each of the cylinders or chambers to draw off any sedimentary deposit that may accumulate in them.

This apparatus must necessarily be very strongly constructed, and for most purposes will be best built of cast-iron, and be copper or porcelain lined.

At this stage, if desired, oxygen in the form of atmospheric air or pure oxygen may be introduced into the chambers by means of a force-pump, air-compressor, or other suitable device, and this oxygen thus caused to thoroughly permeate the contents of the chambers thereby the "aging" of the liquor or other article treated will be easily and rapidly effected, and for this purpose an air-compressor or blower, H, should be suitably placed and connected with each of the converting-chambers by direct and branch pipes *h h′* h^2 h^3, and this air-compressor may be used to drive atmospheric air or oxygen into the converting-chambers during the process of treating any fluid which will require such auxiliary treatment while it is in a vaporous form for the purpose of aging or oxidizing it.

The method of operating my apparatus is very simply explained. The substance or fluid to be treated is fed into the first converting-chamber through the pipe F, and is driven around by the distributers or beaters B^2 against the smooth or corrugated surface of this cham-

ber B, the material flying off from the rotating arms or beaters of B^2 in centrifugal lines with great force, and striking the corrugations *w* with such a violent impact as to destroy in the first chamber most of the infusorial or other germ life, and in the successive chamber or chambers all of the germ life contained in the article treated. In each successive chamber after the first the rarefaction of the material will be increased and the shocks imparted will be more severe until the final climax is reached in the last converting-chamber. This effect will be produced by reason of the gradually-increasing dimensions of the treating-chambers hereinbefore explained, and by the rotating of each successive distributer or set of beaters after the first more rapidly than the one preceding it. Thus about the proper speed for the first distributer, B^2, should be, say, fifteen hundred revolutions per minute, that for the distributer C^2 should be about two thousand revolutions per minute, and that for the distributer D^2 should be about twenty-five hundred revolutions per minute, and so on. This is of course only intended as a general guide as to the regulation of the proper speed of the respective distributers, and it may in either case be made more or less, as may be desired or best adapted to any particular work. The distributers should preferably be rotated from a common driving-shaft, I, by means of suitable belts, *i*, or corresponding cog-gearing; but the mechanism should be so constructed as to rotate the distributer C^2 against the current from the distributer B^2 and the distributer D^2 against the current from the distributer C^2, as shown by the arrows in Fig. 1. The object of this construction is to cause the distributers to move in a direction opposite to the current of fluid or vapor which strikes them, and thereby to cause this current of fluid or vapor to impinge with great violence upon the distributers, thus very greatly contributing to the production of the general result.

It is important that the apertures or ducts F F′ F^2 F^3 should be located at as low a point as practicable in the chambers that are respectively intended to exhaust, and that the direction of their discharge shall be downwardly, as I have found it to be impracticable to discharge these cold vapors in any other direction than downwardly.

Having described my invention, I claim—

1. A mechanical vaporizing apparatus consisting of a chamber having parallel ends and helical or nearly helical sides, and provided with a suitable inlet-pipe at or near its periphery, and a downwardly-directed tangential discharge-pipe, in combination with a rotary beater within said chamber, substantially as set forth.

2. A mechanical vaporizing apparatus consisting of a chamber having parallel ends and helical or nearly helical sides, and provided with a suitable inlet-pipe at or near its periphery, a downwardly-directed tangential discharge-pipe, and corrugations between the inlet and discharge pipes, in combination with a rotary beater within said chamber, substantially as set forth.

3. A mechanical vaporizing apparatus consisting of a chamber having parallel ends and helical or nearly helical sides, and provided with an inlet-pipe at or near its periphery, and with a downwardly-directed tangential discharge pipe, in combination with a rotary beater, the arms of which are curved, as described, whereby they are made to present a curved surface to the discharge-pipe, substantially as set forth.

4. A mechanical vaporizing apparatus consisting of a chamber having parallel ends and helical or nearly helical sides, and provided with an inlet-pipe, a downwardly-directed tangential discharge-pipe, and corrugations between the inlet and discharge pipes, in combination with a rotary beater the arms of which are curved, as described, whereby they are made to present a curved surface to the discharge-pipe, substantially as set forth.

5. In a mechanical vaporizing apparatus, the combination of two or more chambers arranged in series and provided with rotary beaters, an inlet-pipe at one end of the series, a downwardly-directed discharge-pipe at the other end of the series, and connecting pipes or passages between the chambers, each successive chamber of the series being larger than the preceding chamber, substantially as set forth.

6. In a mechanical vaporizing apparatus, two or more chambers having parallel ends and helical or nearly helical sides, provided with a peripheral inlet-pipe at one end of the series, a downwardly-directed tangential discharge-pipe at the other end of the series, and tangential connecting pipes or passages between the chambers, in combination with rotary beaters within said chambers, substantially as set forth.

7. In a mechanical vaporizing apparatus, a chamber having parallel ends and helical or nearly helical sides, and provided with an inlet-pipe at or near its periphery and a downwardly-directed tangential discharge-pipe, in combination with a rotary beater in said chamber, a gas-compressor, and a pipe connecting the latter with the chamber, substantially as set forth.

8. In a mechanical vaporizing apparatus, the combination of a series of chambers provided with parallel ends and helical or nearly helical sides, a peripheral induction-port, a peripheral downwardly-opening discharge-port, and corrugations between the ports, in combination with rotary beaters within said chambers, and tangential connecting-pipes between the chambers, substantially as described.

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