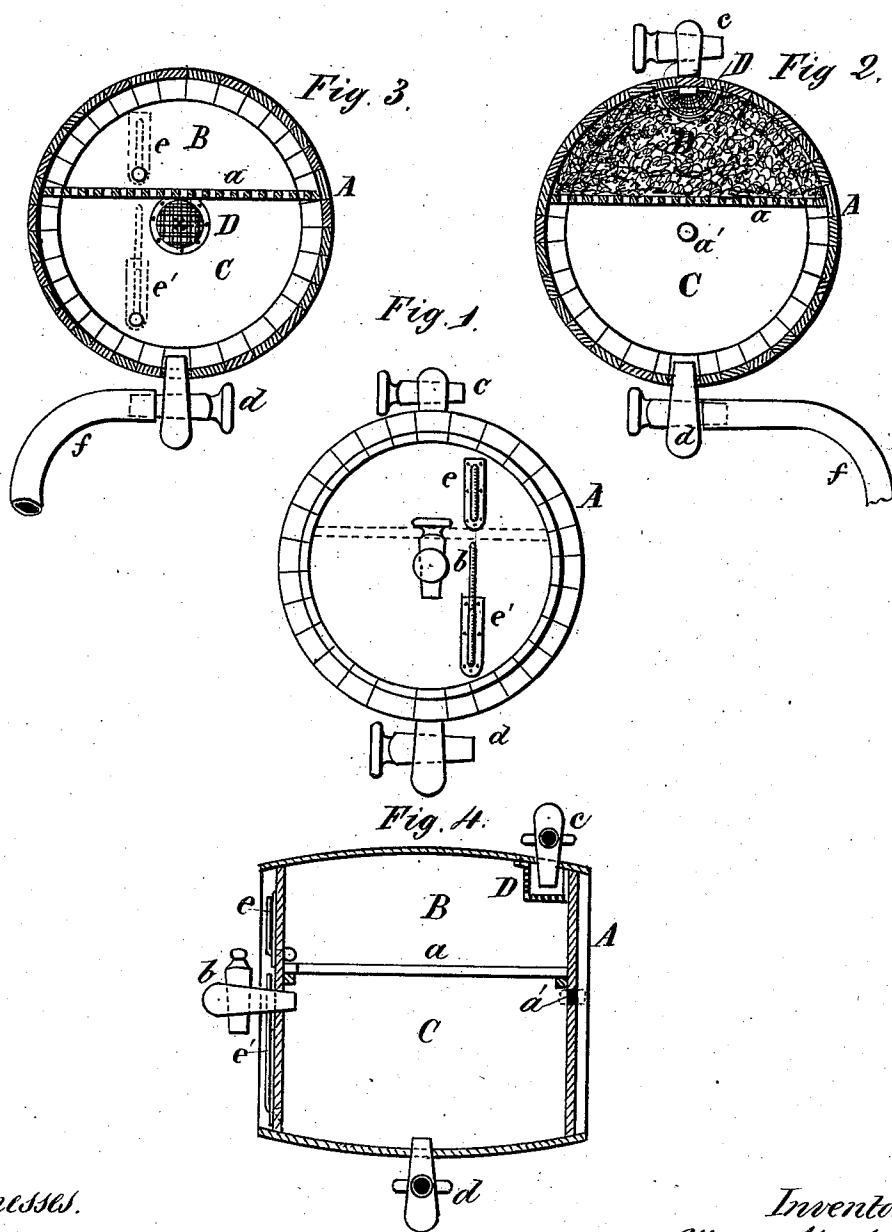


V. MICHAELIS.
Apparatus for Manufacturing Vinegar.

No. 227,564.

Patented May 11, 1880.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR MANUFACTURING VINEGAR.

SPECIFICATION forming part of Letters Patent No. 227,564, dated May 11, 1880.

Application filed January 17, 1880. Patented in France September 26, 1878, in Germany January 11, 1879, in Belgium January 28, 1879, in Italy June 30, 1879, in Spain August 1, 1879, and in England October 6, 1879.

To all whom it may concern:

Be it known that I, VICTOR MICHAELIS, of the firm of FR. MICHAELIS, resident of Rollingergrund, in the Grand Dukedom of Luxembourg, have invented new and useful Improvements in Apparatus for Manufacturing Vinegar, of which the following is a specification, and for which invention I have obtained Letters Patent in France under date of September 26, 1878, in Germany under date of January 11, 1879, Belgium, January 28, 1879, Italy, June 30, 1879, Spain, August 1, 1879, and in England October 6, 1879.

My invention relates to a novel apparatus for manufacturing vinegar, and has for its object the more speedy acetification of the material or liquor employed.

The manner in which this object is effected with the improved apparatus consists in the acetification of the liquor employed by repeatedly saturating an acetifying or fermenting substance with said liquor, drawing off the surplus liquor after each saturation, and subjecting the saturated acetifying or fermenting substance to the action of a current of air to produce alcoholic fermentation and acetification.

The apparatus consists, chiefly, in its peculiar construction and arrangement, whereby the above process is carried out rapidly, economically, and with great facility.

In the accompanying drawings, Figure 1 is a front elevation; Figs. 2 and 3, vertical transverse sections, looking from front to the rear and from the rear to the front of the apparatus, respectively; and Fig. 4 is a vertical longitudinal section of the apparatus.

In carrying out the process I preferably employ beech-wood chips or shavings for producing the necessary fermentation and acetification, though any other well known material may be employed.

In the accompanying drawings, A represents a cask or barrel of any desired dimension, though I have found in practice that casks having a capacity of about six hundred liters give the best results.

The cask A is divided into two unequal chambers, B C, by a wooden grate, *a*, the top space, or that B above the grate, being the

smaller of the two. Immediately below the grate *a*, in the center of the rear head of the cask, is a feed-aperture, *a'*, closed by a bung, stop-cock, or other like device, through which the chamber C is supplied with the liquor to be acetified. The chamber C is further provided with an air-supply cock, *b*, arranged in the front head of the cask, and the chamber B communicates with an air-discharge cock, *c*, arranged on top of the cask near or at the rear head.

d is a drawing-off cock arranged in the bottom of the cask at or near its point of greatest convexity, and communicates with the lower chamber, C, which latter is also provided with a level-indicator, *e'*, arranged in the front head for obvious purposes, while the chamber B is provided with a thermometer, *e*, which enables the operator to ascertain at all times the progress of the operation of acetification, avoiding thereby the necessity of sampling or testing the liquor, as the decrease in temperature will indicate the progress of the operation and enable the operator to regulate the saturation of the beech-wood chips.

The upper chamber, B, having been packed with beech-wood chips or shavings or other like substance, the operation of the apparatus is as follows: When casks of the above-described capacity are employed the lower chamber, C, is supplied with about two hundred and forty liters of liquor, introduced through the feed-aperture *a'* in any convenient manner and by any suitable means, either through an angular funnel, or through a flexible feed-pipe coupled to a feed-cock and connected with a feed-tank, or by means of telescopic-jointed pipe, the drawing-off cock *d* being of course closed.

When the level-indicator indicates that the desired quantity of liquor has been fed to the chamber C the feeding devices are disconnected from the cask and the air supply and escape cocks *b c* are closed and the barrel or cask rolled upside down, to allow the liquor to flow through the grating *a* into chamber B to saturate the beech-wood chips or shavings. The apparatus is allowed to remain in this position for about fifteen minutes, more or less, or until the chips are saturated with the

liquor, when the barrel or apparatus is rolled back again into its normal position with the chamber B on top, as shown in the drawings. All the liquor not absorbed by the chips flows back again into chamber C, and the cocks *b* and *c* being now opened, a current of air is established from the front to the rear of the cask, which will in a very short time cause the temperature of the beech-wood chips to rise, which rise will continue until the temperature in chamber B will be considerably above that of the surrounding atmosphere, and in this condition the apparatus is allowed to remain for a certain number of hours, when the operation of saturation is renewed as before, and repeated until all the liquor in the apparatus is converted into vinegar, the time required being from sixteen to nineteen days.

The number of daily saturations and the time required for the complete acetification of a charge of liquor will depend greatly on the material employed for producing the fermentation and acetification, as well as on the nature of the liquor to be acetified, and when the acetification has taken place (the time for which I have found never to exceed nineteen days) the vinegar is drawn off from chamber C through the drawing-off cock *d* and a new charge of liquor is supplied.

To prevent the beech-wood chips from penetrating in and obstructing the passage of the air-escape cock *e*, I surround the aperture with a wicker grating, D, as shown, or with a wooden perforated box attached to the cask by means of wooden pins.

In practice I arrange the casks in the factory in series of superposed tiers upon longitudinal girts or supports, leaving sufficient room at the end of each tier to roll one cask completely over. By these means one man can attend to a great number of casks, as he has, at stated periods, but to roll the casks of each tier from one side to the other, turning each cask completely over, and by the time he has accomplished this the first casks turned over have remained in this position a sufficient length of time to effect the resaturation of the beech-wood chips, and are then rolled back into their normal position. This operation is effected three or four times daily.

The filling may be effected by means of a flexible pipe, or a series of such pipes, communicating with a common feed tank or reservoir containing the liquor to be converted into vinegar, and, owing to their flexibility and the short distance each cask has to travel when rolled over, need therefore not be disconnected from the cask after each charge, suitable stop-

cocks being provided to cut off the supply from the reservoir to the casks when the level-indicator shows that a sufficient quantity of liquor has been fed to the chambers C, and to facilitate this the level-indicator may be arranged on the rear head of the cask.

In the manufacture of alcohol-vinegar I obtain the same results—*i. e.*, the same percentage of acidity as is obtained with the usual graduators, while my apparatus has the advantage over said graduators in a saving of alcohol as well as in the cost of construction and operation.

When vinegar is manufactured from materials that will, during fermentation, produce large quantities of scum or slime like the juices of fruit or vegetables, or honey, beer, or malt, and other like substances, the advantages of my apparatus over the usual graduators or upright converters will be still more apparent to those conversant with this branch of manufacture, knowing, as they do, the time and labor that are required to free these converters from such scum or slime, which in a short time renders them inoperative, and is to a great extent almost a bar to their use, while the cleaning of my apparatus, or the removing therefrom of any scum or slime, is effected rapidly and with comparatively little labor by coupling a steam-conducting pipe to the air-inlet cock *b*, opening the drawing-off cock *d*, and closing the air-outlet cock *e*. Steam is then introduced into the apparatus until the scum or slime is all removed, which is readily ascertained from the fact that when no more scum or slime is present in the apparatus the condensed steam will run off clear from the cock *d* and the apparatus will then be as efficient as it was when first put up.

Having now described my invention, what I claim, and desire to secure by Letters Patent, is—

An apparatus for manufacturing vinegar, consisting of the cask or receiver A, having open grating *a*, by which it is divided horizontally into two chambers of unequal capacity, the chamber C, having air-inlet *b*, a level-indicator, filling and discharge apertures, the chamber B, having air-outlet *c*, and thermometer *e*, all arranged, constructed, and operating substantially as and for the purpose specified.

In witness that I claim the foregoing I have hereunto set my hand this 16th day of December, 1879.

VICTOR MICHAELIS.

Witnesses:

FOLSEHEID,
KOSTERE.