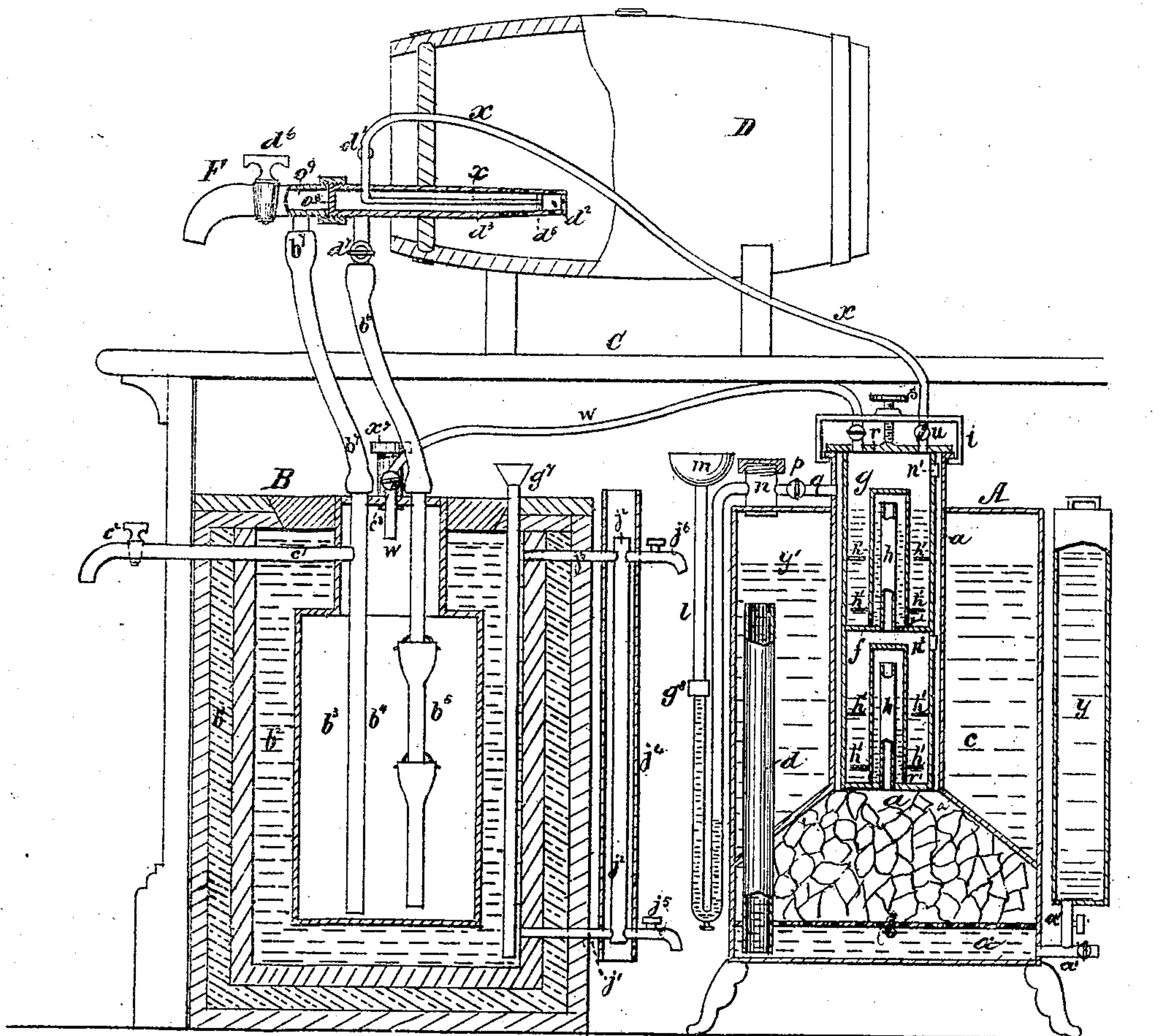


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Apparatus for Preserving and Forcing Beer.

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IMPROVEMENT IN APPARATUS FOR PRESERVING AND FORCING BEER.

Specification forming part of Letters Patent No. 144,987, dated November 25, 1873; application filed April 28, 1873.

To all whom it may concern:

Be it known that I, EDWARD C. KRAUSNICK, of St. Louis, in the county of St. Louis and State of Missouri, have invented a new and Improved Self-Acting Apparatus for Preserving and Forcing Beer; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawing forming part of this specification, in which the figure represents a vertical section of my invention.

The invention relates to an apparatus intended to preserve such fermented or other liquids which may be deteriorated, decomposed, or in any way injured by coming in contact with the atmospheric air, or by coming under a less pressure than they were originally subjected to, or by attaining an improper temperature during the time said liquids are on draft. The invention consists in means for excluding the atmospheric air, and replacing the same by a gas indifferent and not injurious to the liquid to be preserved, and bringing said gas under a sufficient pressure to preserve, increase, or diminish the temperature, and thus keep it in its normal condition, or to improve it.

The apparatus is composed of the generator A, the temperator B, and the reservoir D, with faucet F, which are connected together. The inner part of generator A is lined with lead, and is divided into two chambers. *a* is the alkali-chamber, and *c* the acid-chamber. The proportional size of chambers *a* and *c* must be such that more acid cannot be used than will combine with more than two-thirds of the alkali present. The lower conical part of chamber *a* is subdivided by the perforated plate *b*, on which the alkali is resting. The cylindrical upper part of chamber *a* is occupied by the washers *f* and *g*, said washers being suspended from a plate, *r*, and communicating with each other and with the alkali-chamber through the openings and tube *r'* and *h*, respectively. This plate *r* is caused to close chamber *a* and make it air-tight by means of a screw-clamp, *s t*. Pipe *d* forms an always-open connection between *a* and *c*; also, pipe *q* with faucet *p*. *l* is a siphon, connected with *c* by tube *n* and *y*; an extra acid-vessel, connected by *a'* with *a*. *w* is an elastic pipe connecting washer *g* with the temperator B, and *x* an elastic pipe connecting

washer *g* by means of faucet F with the reservoir D. The temperator B is composed of the square cistern *b²*, lined with zinc, surrounded by a non-conducting mantle, *b¹*, and having in its center the vessel *b³*. The upper and lower parts of cistern *b²* are connected by means of pipe *j¹*, *j²*, and *j³*, passing through the non-conducting mantle. This pipe *j²* has outlets, closed by faucets *j⁵* and *j⁶*, and is surrounded by pipe *j⁴*, which is open on both ends. Pipe *g⁷* passes through the mantle of the cistern into the same down to the bottom, and is open on both ends. Vessel *b³* is of cylindrical shape, should have always twice the height of the diameter, and should have less cubic space than reservoir D. Vessel *b³* is constructed of metal, and lined with such material as will not affect injuriously the liquid to be preserved. Vessel *b³* is closed on all sides. Four tubes are inserted in the top plate of *b³*, through which are passing pipes *b⁴*, *b⁵*, and *w*. Pipe *b⁴* reaches nearly to the bottom of chamber *b³*, is on both ends open, and is connected with pipe *c¹*, as well as with hose *b⁷*, leading to faucet F. Pipe *w* enters vessel *b³*, and is closed by faucet *c³*. The reservoir D, containing the liquid to be preserved, is usually a common barrel with tap-hole, into which faucet F is driven tightly. Faucet F is subdivided by two solid partitions, *o³* and *d⁵*, into three chambers, *d²*, *d³*, and *o⁹*. The sides of *d²* are perforated. Into the partition-plate of *d²* the end of pipe *x* is fastened. Chamber *d³* is connected to and opens into tube and faucet *d⁷* with hose *b⁶*. Pipe *x* passes through the center of this chamber with opening into chamber *d²*. A part of the sides of chamber *d³* are perforated, and thus connected with reservoir D. Chamber *o⁹* is coupled to chamber *d³*, provided with an outlet and faucet, *d⁶*, and connected by means of a tube with hose *b⁷*. C is a counter or table, on which reservoir D is in this case placed, and under which table the temperator and generator are located. D must always be placed above B. A may be placed in any reasonable distance higher or lower than B and D. *h' h' h' h'* are plates arranged in the generator A for the purpose of obstructing the direct passage of the gas, and so as thereby to cause a more perfect washing.

The apparatus is charged and operated as

follows: Close every faucet; remove plate *r* and washers *g f*; fill these washers half-full of the proper solution by means of openings *n¹* and *n²*; next close said openings, and fill the conical lower part of chamber *a* with pieces of natural carbonate of lime about the size of one to two cubic inches. In this apparatus is used only white marble or island spath for generating carbonic acid, or oxide of zinc which has been pressed into proper pieces for generating hydrogen gas. This is to be used when carbonic-acid gas will injure the liquid to be preserved. Next replace plate *r* with the washer, and, opening tube *n*, fill chamber *C* with an equal mixture of muriatic acid of 20° Baumé and water up to line *y'*; next fill siphon *l* with mercury to line *g⁸*, and, closing tube *n*, fill cistern *b²*, through funnel and pipe *g⁷*, with water nearly up to *j³*; next detach the elastic pipe *x* from faucet *u*, and open said faucet; the atmospheric air then filling chamber *a*, and pressed together by the columns of acid in pipe *d* and chamber *c*, will escape. The acid in chamber *a* now will rise through the perforated bottom *b* and come in contact with the alkali and zinc, which will generate carbonic-acid or hydrogen gas, while the atmospheric air will be driven out and replaced by the gas generated. The faucet *u* being now closed, pipe *x* replaced, and faucet *p* opened, the gas will enter chamber *c* and press on the surface of the acid. The mercury in siphon *l* will then indicate the increased pressure. By this means the pressure can be increased, at will of the operator, up to fifteen pounds on a square inch. If the pressure goes beyond this point, the mercury will be blown out, and will collect in vessel *m* until the surplus gas has escaped. After the pressure is regulated, close the faucet *p*. The generator is charged, and will now act automatically as long as the charge lasts, or will generate from eighty to two hundred cubic feet of gas, depending upon the size of the generator. The next step is to loosen cap *x⁷* of the vessel *b³* of the temperator, and open faucet *c³*. This will allow the carbonic acid to pass through pipe *w* into vessel *b³*, and drive out the atmospheric air. Now close cap *x⁷* and open faucets *u*, *d¹*, and *d⁷*, when the liquid in *D*, being from all sides under the same pressure, will pass into vessel *b³* by means of pipe *b⁶*. The gas will thus be forced out of vessel *b³*, through pipe *w*, into washer *g*; from thence it will pass, through pipe *x*, into the reservoir *D*, and press on the balance of liquid remaining therein with the same force indicated by the mercury in siphon *l*. Vessel *b³*, pipes *b⁵* *b⁶*, chamber *d³* of faucet *F*, and part of reservoir *D*, are now filled with the liquid to be preserved. If the temperator *B* is intended to act as a refrigerator to the water in cistern *b²*, the liquid, entering warm, will by degrees cool off, and, on account of its increased specific gravity, sink to the bottom of vessel *b³*, from whence it is drawn off, perfectly cool, through pipe *b⁴* at the outlet of faucet *c²* or *F*. If the temperator is intended

to act as a calorificator, then the water of cistern *b²* is heated by means of a convenient gas or other lamp placed under pipe *j²*. The water passing cold through pipe *j¹*, and being heated in pipe *j²*, will rise and return, through pipe *j³*, into the cistern, and keep on circulating till the proper degree of heat is reached. If, now, hose *b⁶* and hose *b⁷* are detached from pipes *b⁴* *b⁵*, *b⁶* attached to *b⁴*, and *b⁷* attached to *b⁵*, the liquid to be heated will enter vessel *b³* at the bottom through pipe *b⁴*, rise on account of its reduced specific gravity, pass to the top, and be drawn off by means of faucet *F*. For liquids to be cooled, faucet *c²* and *F* (*d⁶*) can be used for drawing off; but for liquids to be warmed, faucet *F* (*d⁶*) only can be used.

If the reservoir or barrel *D* is empty, close faucets *d¹* and *d⁷*, take out faucet *F* and drive the same into the tap-hole of a fresh barrel filled with the liquid to be preserved, and reopen faucets *d¹* *d⁷*.

The advantages of this device consist in its being founded on the laws of specific gravity of fluids of different density and temperature, in its perfect automatic action when once charged and regulated, in having each charge only dependent on the size of the apparatus, and in its perfect exclusion of air and substitution for the same of a gas perfectly innocuous to the liquid to be preserved.

The form and size of generator *A* and its parts, as described in the foregoing, are calculated for a pressure up to one atmosphere, and for the use of muriatic acid to combine with a carbonate of lime; but other acids and other carbonates, salts, metals, or oxides of metals may be used for generating the required gas, provided the salts formed by chemical action are easily and perfectly soluble, at a medium temperature, in the water added always to the acid. Also, the generator, when desired, may be worked with closed or open chamber, depending upon what pressure is required to produce the desired effect.

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

1. The generator *A*, the temperator *B*, and the reservoir *D*, constructed, connected, and combined substantially as and for the purpose described.

2. The chambers *a* and *c*, combined with a pipe, *d*, arranged as and for the purpose described.

3. The siphon *l* for regulating, increasing, or diminishing the pressure of the gas generated by increasing and diminishing the quantity of mercury, applied to serve also as a safety-valve, being of such dimensions that all the gas possibly generated by neglecting the closing of faucet *p* can escape through said siphon *l*.

4. The washers *g* and *f*, so arranged that the generated gas is prevented from passing directly through the washing liquid by the horizontal plates *h' h' h' h'*, as and for the purpose described.

5. The generator *A*, so constructed that, in

a few rare cases, when the use of carbonic acid is injurious to the liquid to be preserved, the hydrogen gas may be generated for the same purpose, to form an indifferent atmosphere.

6. The extra acid-vessel y on generator A, applied as described, whereby the generator may be supplied with fresh acid by filling said vessel with water and adding a few pieces of carbonate of lime, and the operator may keep the generator for a longer time at work without giving a new charge.

7. The faucet F, constructed and applied as described, so that the generated gas can enter the reservoir or barrel D, the preserved liquid can pass through this faucet out of reservoir D into vessel b^3 of the temperator, and, further, can pass from vessel b^3 into the outlet-chamber of said faucet, without coming into contact with the atmospheric air, or without reducing the original pressure, till drawn off for use.

8. The temperator B, constructed and applied as described, so arranged that it may be

used as a refrigerator or a calorificator, being founded on the laws of specific gravity of fluids of different temperatures, without altering the pressure.

9. The reservoir D and vessel b^3 , combined with pipes b^4 b^5 and faucet F, as and for the purpose set forth.

10. The pipe q and faucet p on generator A, combined as described, so that the pressure of the generated gas may be increased at will of the operator.

11. The combination of pipe j^2 and its connections with cistern b^2 of the temperator B, the pipe j^1 , and surrounding pipe j^4 , as described, so that the temperature of the water of cistern b^2 can be regulated and kept uniform, as the liquid to be preserved may require.

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Witnesses:

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