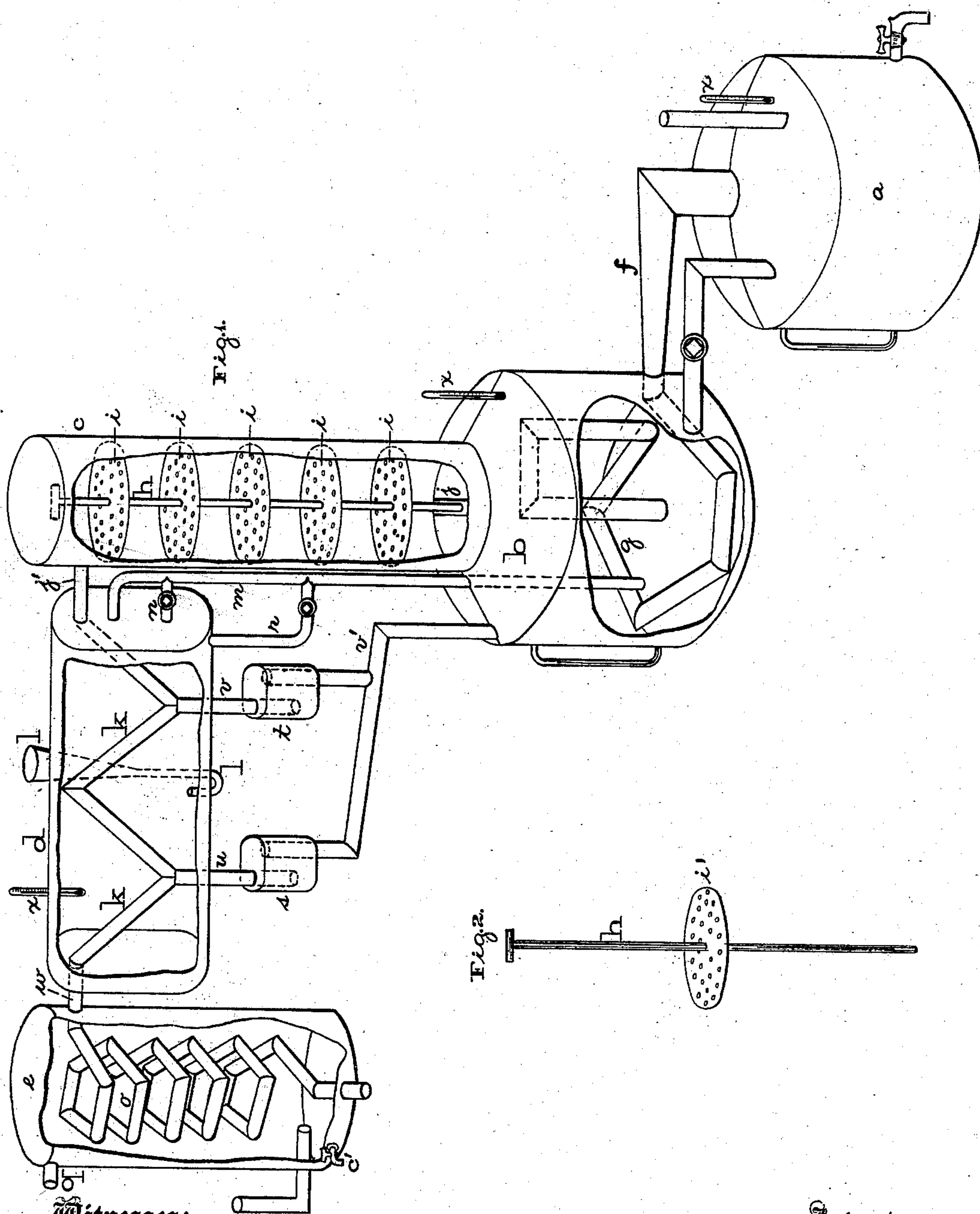


E. F. PRENTISS.  
Apparatus for Rectifying Spirits.

No. 228,113.

Patented May 25, 1880.



Witnesses:

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# UNITED STATES PATENT OFFICE.

E. FREEMAN PRENTISS, OF PHILADELPHIA, PENNSYLVANIA.

## APPARATUS FOR RECTIFYING SPIRITS.

SPECIFICATION forming part of Letters Patent No. 228,113, dated May 25, 1880.

Application filed April 25, 1879.

To all whom it may concern:

Be it known that I, E. FREEMAN PRENTISS, of Philadelphia, Pennsylvania, have invented a new and useful Improvement in Apparatus for Rectifying Spirits, of which improvement the following is a specification.

The invention herein described relates principally to the apparatus for which Letters Patent No. 87,792 were granted jointly to me and Thomas D. Prentiss, March 16, 1869; and it consists of improved primary and secondary condensers, intended to be used in lieu of the primary and secondary condensers marked, respectively, *c* and *d* in said Letters Patent.

The invention herein described consists of, first, the combination of vapor-generators, an atomizer or primary condenser, a secondary condenser, and a final condenser, all constructed substantially as below specified; second, the condenser herein termed a "secondary condenser," constructed substantially as below specified, and susceptible of use, intermediately, in combination with one or more vapor-generators and final condensers, for effecting the removal of impurities from spirits.

In the drawings, Figure 1 is a perspective view of the complete apparatus, a portion of the shell of each column being broken away to show the inclosed parts; Fig. 2, a similar view of the rod *h* and a single diaphragm.

*a* and *b* represent the vapor-generators; *c*, the primary condenser or atomizer; *d*, the secondary condenser, and *e* the final condenser.

The vapor-generators *a* and *b*, the pipe *f*, which connects them together, the worm *g*, contained in the generator *b*, and the final condenser *e*, with its inlet water-pipe *p*, its outlet water-pipe *q*, stop-cock *c'*, and worm *o*, are severally constructed as described in the specification of said Letters Patent, with this exception as regards the vapor-generator *b*, viz: that the column or primary condenser *c* is screwed or attached by ordinary flanges and bolts directly to the top of said generator *b*, into which said column *c* opens with its full cross-sectional capacity. The column *c* has a removable cap, which also is screwed on or fastened in place by ordinary flanges and bolts.

A rod, *h*, bearing a number of perforated

diaphragms, *i*, (the whole being removable,) is supported in the column by a cross-bar, *j*, at the bottom, or by other equivalent means. The diaphragms *i* are perforated with a number of fine holes, the perforations being punched from the top downward, so as to cause them to present a jagged or grater-like surface on the under side.

When flavored products are required, the rod with the several diaphragms *i* (shown in Fig. 1) are removed from the column *c*, and their place supplied by the rod with a single diaphragm, *i'*, (shown in Fig. 2,) aromatic berries, or a spongy material, such as cotton, saturated with the desired essential oil, being placed in the column *c* above the diaphragm *i'*.

*j'* is a pipe for conveying the vapors that rise to the top of column *c* into the zigzag pipe *k* in the secondary condenser *d*.

*l* is the pipe by which the wash is fed into the apparatus. *m* is the main pipe by which the wash passes down into the generator *b*.

*n* is a branch pipe with a stop-cock, through which, when it is desired to raise the temperature of the secondary condenser *d* and hasten the action of the apparatus, the wash is allowed to run off at lower level into pipe *m*. Several branch pipes similar to pipe *n*, similarly regulated and arranged at different levels, may be employed.

*r* is a pipe with stop-cock, employed when it is desired to let the whole of the contents of the condenser *d* flow into the generator *b*. *s* and *t* are traps, respectively connected by pipes *u* and *v* to and opening into the zigzag pipe *k* at its elbows, as shown. *v'* is a pipe by which the fusel-oil and other impurities collected in the traps *s* and *t* are led back into the generator *b*. *w* is a pipe connecting the zigzag pipe *k* with the worm *o* in the final condenser. *x* is a thermometer.

It is not necessary to describe the operation of said apparatus further than relates to the primary and secondary condensers *c* and *d*, since, in a general way, the description contained in said Letters Patent of the operation of the apparatus therein described is applicable here.

After long-continued experimental use of the improved primary and secondary condensers, constructed as hereinabove described, I have



found them to be more effective in removing the impurities from spirits than the parts they are intended to supplant, viz: the primary and secondary condensers described in said Letters Patent.

5 The vapors arising in the column *c* are deprived of the larger part of the fusel-oil, the ether, and other impurities contained in them by the perforated diaphragms *i*. Any fusel-  
10 oil carried along with the vapors into the zigzag *k* lodges at the elbows of the zigzag and runs down into the traps *s* and *t*.

The secondary condenser *d* can be kept at any temperature required by detaining therein  
15 the wash a longer or shorter time—that is to say, by allowing the wash to run off through the mouth of pipe *m*, or through the branch pipe *n*, or through one of the other similar branch pipes arranged at higher or lower level,  
20 as above mentioned.

When the apparatus is designed to produce ten (10) barrels of proof spirits per diem I prefer that the primary condenser *c* should be of  
25 ten (10) inches diameter and five (5) feet in height, (more or less,) the secondary condenser *d* a flattened cylinder five (5) feet long, ten (10) inches in conjugate, and twenty (20) inches in transverse diameter, the zigzag pipe *k* two and a half (2½) inches in diameter  
30 where it joins the pipe *j'*, tapering down to two (2) inches at its opposite extremity, where it joins the pipe *w*.

The vessel or secondary condenser *d* may be used with good results in connection with  
35 vapor-generators and an atomizer and final condenser differing in construction from the generators, atomizer, and final condenser hereinabove described.

I am aware that a patent, No. 78,596, was  
40 granted to Gottlob Kaiser, June 2, 1868, for an improvement in stills for spirits, in which there is described the combination of two stills with a mash-heater, a rectifier, a column, a defecator or dephlegmator, and a condenser.

45 If my apparatus be compared with Kaiser's it will be seen that I employ two vapor-generators, *a* and *b*; but, unlike Kaiser's still, they are arranged at different levels, so that the vapors from the lower one, *a*, heat the wash  
50 in the upper one and thence pass along, with the vapors of the upper generator, into the col-

umn *c*. No vapors pass from Kaiser's mash-heater directly into either his rectifier or his column. Kaiser's column rises from the top of what he terms a "rectifier," which I do not  
55 employ.

My column is differently constructed from Kaiser's, being much simpler in form, as is plainly to be seen without explanation.

My secondary condenser *d* differs in form  
60 and structure from Kaiser's dephlegmator. Thus Kaiser employs a long worm, while I employ a simple zigzag pipe, because I have found, from long experiment, that I get much better results when the vapors are not too long de-  
65 tained on their way to the final condenser. Kaiser surrounds the worm in his dephlegmator with a bath of water, while I admit the wash directly into my secondary condenser *d*  
70 around the zigzag pipe, and regulate the temperature of this condenser by the inflow of the wash, and by requiring the wash to pass out through pipes provided for the purpose, arranged at different levels.

I claim—

75 1. In combination, the following elements, to wit: first, vapor-generators *a* and *b*; second, the atomizer or primary condenser *c*, comprising a column which rises from the top of the vapor-generator *b*, and which contains  
80 one or more perforated removable diaphragms, *i*, on a supporting-rod, *h*; third, the secondary condenser *d*, consisting of a shell provided with an inlet-pipe, *l*, for the wash, draw-off pipes *m* and *n*, arranged at different heights,  
85 and an inclosed zigzag pipe, *k*, connected at its elbows with the traps *s* and *t*; and, fourth, the final condenser *e*, for removing impurities from spirits, substantially as set forth.

2. The condenser *d*, consisting of a shell  
90 provided with an inlet-pipe, *l*, for the wash, outlet-pipes *m* and *n*, arranged at different heights, and an inclosed zigzag pipe, *k*, connected at its elbows with the traps *s* and *t*, used intermediately, in combination with the vapor-genera-  
95 tor and final condenser, for effecting the removal of impurities from spirits, substantially as set forth.

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Witnesses:

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