(No Model.)

J. F. THEURER.

APPARATUS FOR EXTRACTING LUPULINE.

No. 453,678. Patented June 9, 1891.

Fig. 1.

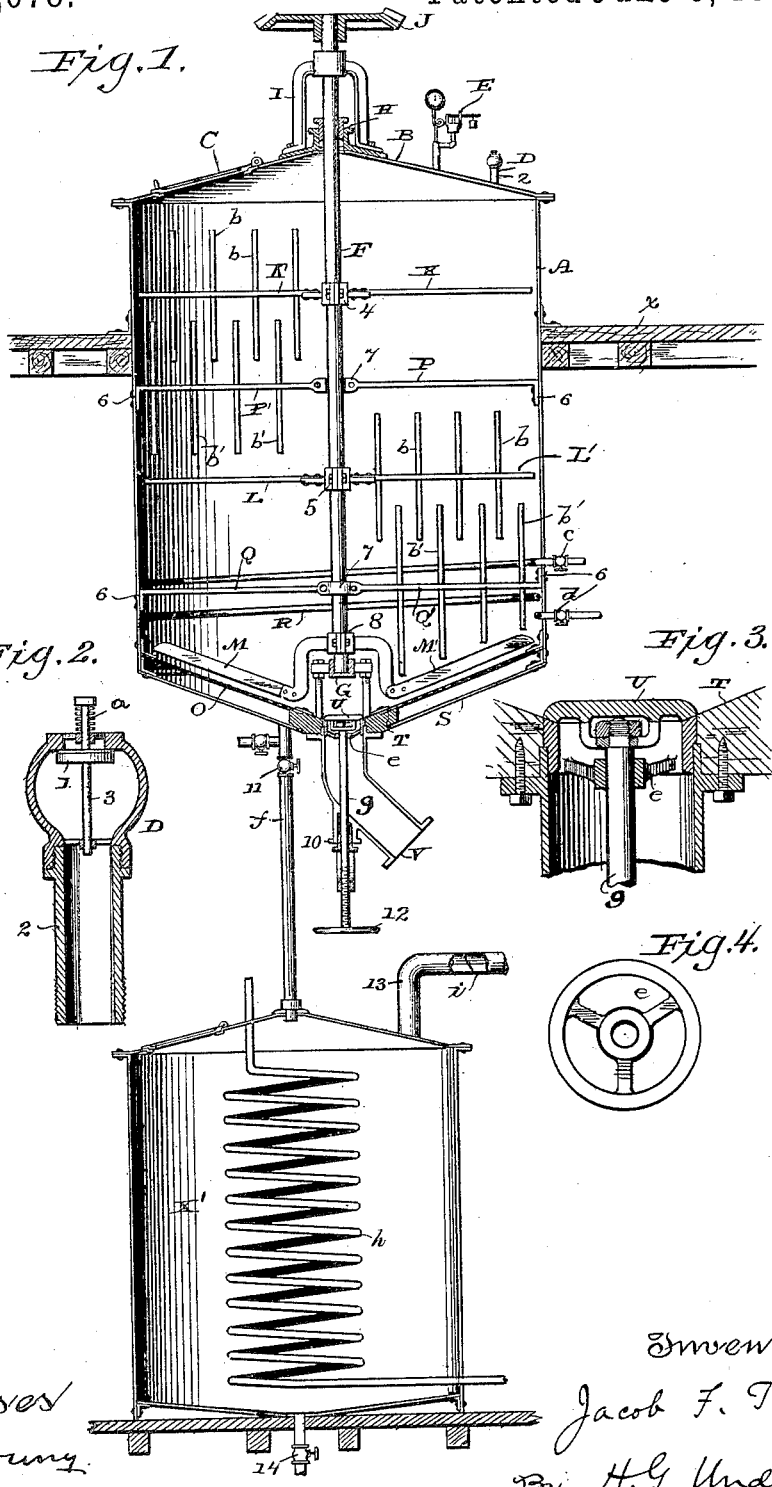

Fig. 2.

Fig. 3.

Fig. 4.

Witnesses
Geo. W. Young.
Wm. Klug

Inventor
Jacob F. Theurer,
By H. G. Underwood
Attorney

UNITED STATES PATENT OFFICE.

JACOB F. THEURER, OF MILWAUKEE, WISCONSIN.

APPARATUS FOR EXTRACTING LUPULINE.

SPECIFICATION forming part of Letters Patent No. 453,678, dated June 9, 1891.

Application filed July 25, 1890. Serial No. 359,920. (No model.)

To all whom it may concern:

Be it known that I, JACOB F. THEURER, of Milwaukee, in the county of Milwaukee, and in the State of Wisconsin, have invented certain new and useful Improvements in Apparatus for Extracting Lupuline; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates to the extraction of "lupuline" or the bitter principle of hops, for use in the manufacture of beer and kindred beverages; and my invention consists in certain peculiar and novel features of construction and arrangement, as hereinafter described, and pointed out in the appended claim.

In order that my invention may be fully understood, I will proceed to describe it with reference to the accompanying drawings, in which—

Figure 1 is a transverse vertical section of a lupuline-extracting apparatus constructed in accordance with my invention. Fig. 2 is a similar view of the air-inlet valve for the steeping-tank. Fig. 3 is a similar view of the outlet-valve for said tank. Fig. 4 is a plan view of the guiding-spider for the outlet-valve.

The objects of my invention are to provide an apparatus which shall thoroughly and rapidly extract lupuline from hops, and the operation of which shall be practically continuous and also inexpensive as compared with previous processes. These objects I attain by virtue of the construction which I will now proceed to describe.

In the drawings, A designates the steeping-tank, which is an oblong cylindrical receptacle, preferably extending a portion of its length through one of the floors of a building, as indicated at *x* in Fig. 1. The top B and bottom S of the tank are conical in cross-section and their apexes extend outwardly, as shown. Above the true bottom S is placed a perforated false bottom O, of similar shape to said bottom S and for a purpose to be hereinafter explained. The top B is formed with a feed-opening which is closed by a door C, said door being designed to be tightly closed by any suitable locking attachment. An air-inlet valve 1 is inclosed in a casing D, and the latter is connected to the top B by a pipe 2, communicating with the interior of the tank A. This valve is held upward against its seat in the upper part of the casing D by a spring *a*, surrounding the upper end of the stem 3 of the valve, and the arrangement is such that when the contents of the tank are drawn off, as hereinafter described, the valve will open automatically and admit air into the tank. A safety-valve E is also connected to the top of the tank and serves to relieve the tank of excessive steam-pressure.

F designates a vertical shaft, which extends centrally within the tank, and the lower end of which is stepped into a bracket-bearing G at the bottom of the tank. The upper part of this shaft extends through a stuffing-box H in the top B of the tank, and works also through a journal in the upper part of a bracket I, said bracket or frame being supported upon the top B of the tank. Upon the upper end of this shaft F is keyed a beveled gear-wheel J, which receives power from any suitable source to revolve the shaft. This shaft F carries four oppositely-extending horizontal arms K K′ and L L′, arranged in pairs, as shown, and bolted together at their inner ends, so as to closely embrace the shaft, as indicated at 4 5. The arms K′ L′ extend from opposite sides of the shaft and carry each a number of vertical arms or agitators *b*.

P P′ Q Q′ designate four horizontal braces or bars, which are arranged in pairs, the former P P′ intermediate of the arms K K′ L L′, and the latter Q Q′ between the said arms L L′ and the bottom of the tank. The outer ends of these arms are bolted to the inner surface of the sides of the tank, as shown at 6, and their inner ends are bolted together, so as to loosely surround the shaft F, as indicated at 7. The braces P′ Q′ are at opposite sides of the shaft F and carry cross-arms *b*′, as shown.

M M′ designate oppositely-extending arms or sweeps, the inner ends of which are bolted tightly about the lower part of shaft F, and which extend thence downward and then upward and outward above and close to the upper surface of the perforated false bottom O.

T designates an annulus, which is located centrally of the bottom S, and to the under

side of this annulus is connected the upper end of a bent outlet or delivery pipe V. This annulus serves as the seat for an upwardly-opening outlet-valve U, the stem 9 of which works through a guiding-spider *e*, located in said annulus, and extends downward through a screw bearing in a stuffing-box 10, which is attached to the under side of the bend of the delivery-pipe V, and which may have a hand-wheel 12 to operate it.

R designates a steam-pipe, which is coiled horizontally in the lower part of the tank A, *c* being the inlet-valve and *d* the outlet-valve of said coil.

X′ designates a cooling-tank, which is preferably located below the steeping-tank A, and the top of this tank is connected by a pipe *f* with the bottom S of said steeping-tank, a valve 11 being provided for opening and closing said pipe. A pipe *h* is coiled within the cooling-tank, and through this coil cold water is forced, preferably upward. An outlet-valve 14 is connected to the bottom of this cooling-tank, and an air-inlet pipe 13, having a suitable valve *i*, is connected to the top of said tank.

The operation of the above-described apparatus is as follows: A quantity of hops (say one-half or one-third of the amount necessary for one brewing) is placed in the steeping-tank A through the opening which is covered by the door C, and after the door has been closed the proper quantity of liquor is pumped into the tank. The shaft F is now revolved so that the agitators and cross-bars will separate the hop-leaves from their stems and from each other. After this separation has been thoroughly effected the valve U is opened and the entire contents of the tank are run off through the pipe V into the beer-kettle. The valve U is now closed and the remainder of the hops necessary to a brewing are placed in the steeping-tank. After the first hops have boiled a sufficient length of time the liquor in the beer-kettle is pumped into the steeping-tank. After again starting the shaft F steam is let into the coil R and the hops are thoroughly steeped, the door C being kept tightly closed. The shaft F is now stopped and the extract is strained off through the perforated false bottom O and pipe *f* into the cooling-tank X′. More liquor is now pumped into the steeping-tank from the beer-kettle, and the shaft F is again revolved to thoroughly mix the hops and liquor, after which the mixture is run out through pipe V into the beer-kettle and boiled therein.

The extract in cooling-tank X′ is, after being cooled, run off through outlet 14 into a tank, where the remainder of the brewing may be added to it, or it may be used separately in any desired manner.

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

An improved apparatus for extracting lupuline from hops, comprising a steeping-tank, a steam-coil in said steeping-tank, revolving agitators within said tank, a perforated screen or false bottom in said tank, revolving scrapers or sweeps working over said false bottom, a discharge-pipe in the bottom of said tank and a valve controlling the same, a cooling-tank located below the steeping-tank and provided with a cold-water coil, and a pipe leading to said cooling-tank from the lower part of said steeping-tank below the false bottom, and a valve in said pipe, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand, at Milwaukee, in the county of Milwaukee and State of Wisconsin, in the presence of two witnesses.

JACOB F. THEURER.

Witnesses:
H. G. UNDERWOOD,
WM. KLUG.