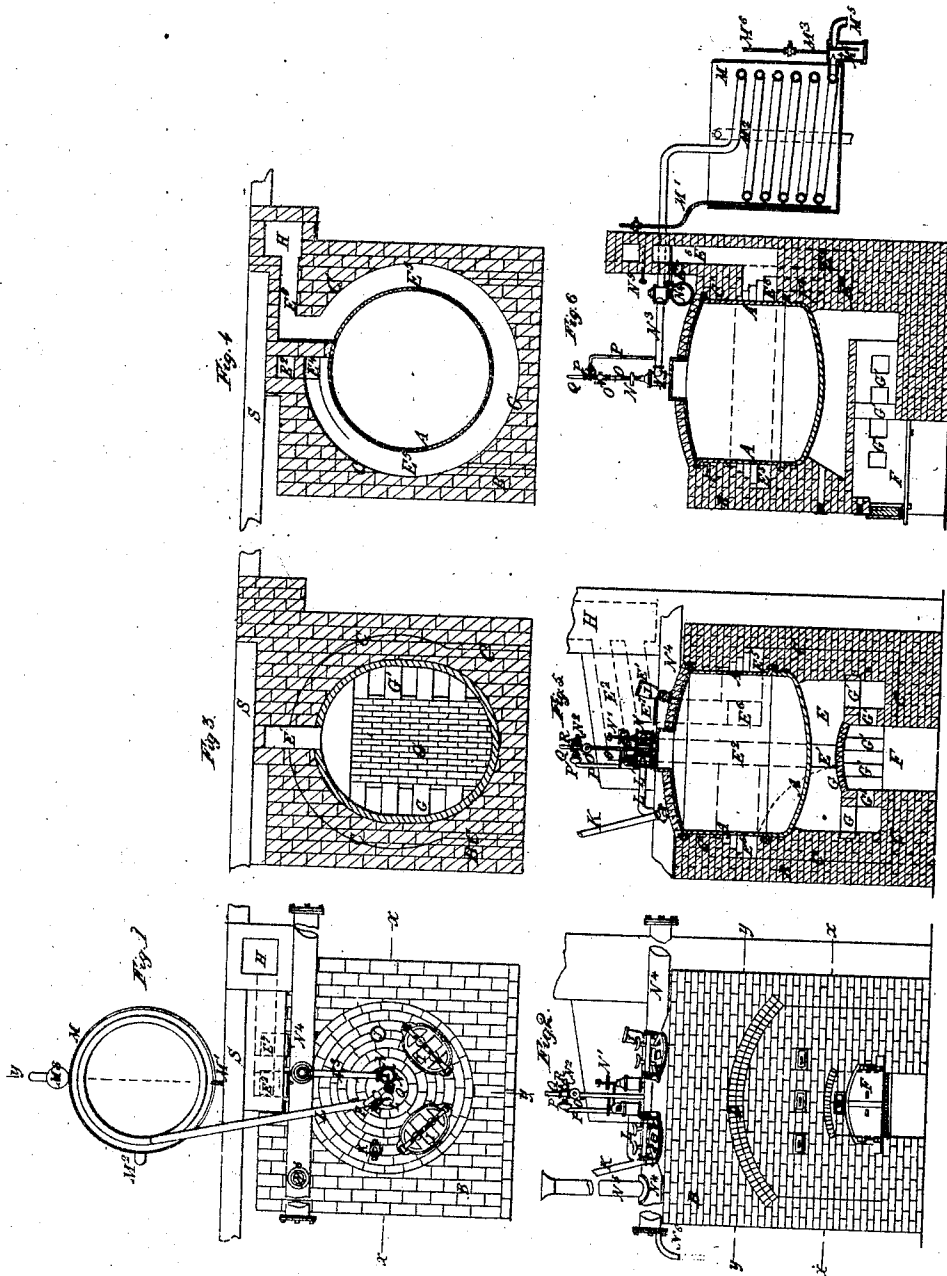


L. ATWOOD.
Oil Still.

No. 27,768.

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Witnesses:

R. C. Anderson
Miner & Co.

Inventor:

Leather Atwood

UNITED STATES PATENT OFFICE.

LUTHER ATWOOD, OF NEW YORK, N. Y.

IMPROVEMENT IN APPARATUS FOR DISTILLATION OF COAL-OILS.

Specification forming part of Letters Patent No. 27,768, dated April 10, 1860.

To all whom it may concern:

Be it known that I, LUTHER ATWOOD, of the city and county of New York, and State of New York, have invented certain new and useful Improvements in Apparatus for Distillation of Volatile Oils; and I do hereby declare that the following is a full and exact description thereof, reference being had to the annexed drawings, forming a part of this specification, and to the letters of reference thereon.

The first part of my invention relates to the body or boiler of the still, which I make of cast-iron; and my improvement thereon consists in casting the bottom and a short section of the sides on one piece and separate from the remaining section of the sides or barrel of the still, and connecting the two parts by flanges and screw-bolts, the joint being made tight by cement or any suitable packing. This form of construction enables me to use a removable still-bottom, the bottom part of which may be entirely or almost entirely exposed to the action of the fire, and at the same time the joint be protected by the setting from contact with the fire, and by its position from such a degree of expansion and contraction as would break the joint and permit the contents of the still to escape.

The second part of my invention consists in combining with the still a weighted safety-valve, connected with a blow-off pipe for the purpose of permitting the vapors to escape from the still when from any cause the condensing apparatus becomes choked.

The third part of my invention consists in the arrangement of pipes and valves in combination with the still and with a steam-boiler, by which steam is passed through the still when the passage to the condenser is closed.

The fourth part of my invention consists in the combination of a pipe connected with a steam-boiler with the pipe leading to the worm-condenser in such manner that by closing the passage between the still and condenser steam may be passed through the worm for the purpose of removing obstructions.

The fifth part of my invention consists in constructing two or more man-holes in the top or cover of the still.

The sixth part of my invention consists in

combining with the safety-valve a main or surface condenser for the purpose of saving the liquid products escaping through the safety-valve.

The seventh part of my invention relates to the setting of the still; and it consists in a mode of setting the still so that the bottom can be removed without disturbing the remainder of the still.

In order to more particularly describe my invention, I will refer to the annexed drawings, of which—

Figure No. 1 is a plan view of the apparatus; Fig. No. 2, front elevation; Fig. No. 3, horizontal section through dotted lines *x x*, Fig. 2; Fig. No. 4, horizontal section through dotted lines *y y*, Fig. 2; Fig. No. 5, transverse section through dotted lines *x x*, Fig. 1; Fig. No. 6, vertical longitudinal section through dotted lines *y y*, Fig. 1.

Letter A represents the body or boiler of the still, which I make of cast-iron, in three pieces, connected by flanges and screw-bolts. The lower part, A', consists of a short section of the sides, and the bottom I prefer the shape indicated by the drawings, and have ascertained, by experimental use, that the proportion of the sides or barrel cast with bottom shown by the drawings is sufficient for a still of about seven feet in diameter, the object being to make the joint at the sides near the bottom and yet at a point sufficiently removed from the bottom to be protected by the brick-work from the fire, and also to avoid breaking the joint by the expansion and contraction of the bottom, which, in distilling oils, is heated to a red heat. By this form of construction I am able to renew the part of the still most liable to crack and burn out in an economical manner.

I make my still-bottoms of the best description of iron, such as is used in casting the best iron cannon. The flange-joints should be faced true in a turning-lathe and the joint packed with any cement that will stand, or with sheet-copper. I use a cement composed of black oxide of manganese, four parts white lead ground in oil, one part mixed with linseed-oil to the consistency of soft putty.

Letter B is a permanent structure of brick, inclosing a chamber, (represented by lines C in Figs. 3, 4, and 5,) and having an arched opening, D, in front of sufficient width to per-

mit of the removal of the still-bottom when necessary. The upper part of the chamber closes in on the sides of the still, holding the still suspended within the chamber by the upper flange at C'.

Letter E is a heat-chamber built inside the chamber C, and supplied with products of combustion from the fire-box F. The sides of this chamber are built up to and inclose the bottom of the still, protecting the lower flange-joint from the fire.

G is a fire-brick arch covering the fire-box and extending back nearly to the back part of the heat-chamber E. It is supported by piers and blocks G', the openings between which divide and distribute the products of combustion from the fire-box, the flame being prevented by the arch from striking upward against the still. The object of this arrangement is to distribute the heat equably over the whole surface of the still-bottom.

E' is a short horizontal draft-passage connecting with the flue E², which connects with the chimney H.

E² is a damper in the flue E², for the purpose of regulating the draft and of closing the passage.

E³ is an uptake leading to the flue E², which passes around the side of the still and opens into the flue E², which connects with the chimney H.

E⁴ is a damper in flue E², for the purpose of regulating the draft and of closing the passage.

Letters I I represent two man-holes, provided with suitable covers and fastenings in the top or cover of the still, which is covered with a layer of brick, for the purpose of retaining heat.

J represents a funnel, provided with a stop-cock, opening into the top of the still.

K is a pipe provided with a stop-cock, shown broken off, but designed to connect the still with a reservoir of unfinished oil.

L is a pipe connecting the worm-condenser with the dome of the still through the angle-valve L'.

M is a tub containing the worm and provided with a supply-pipe, M', and overflow-pipe M². The worm terminates in the separating-vessel M², the liquid products passing around the separating-diaphragm M², and out at M², the gases being conveyed from the vicinity of the still by the gas-pipe M², which is furnished with a stop-cock, to be closed when necessary to blow steam through the separator.

Letter N represents a safety-valve, opening from the dome of the still. The valve-stem is fitted to receive the slotted weight N', and terminates at its upper end in a ring-handle, by which it can be raised up and hooked on the hook N².

N³ is a blow-off pipe connecting the safety-valve with the main N⁴. The main is shown broken off in the drawings, it being designed for a conduit for the escape products of a row of stills.

N⁵ is a discharge-pipe for escape of vapors not condensed in the main N⁴. There is a small pipe, N⁶, at the end of the main for the conveyance of liquid products to a suitable receiver.

Letter O represents a steam-pipe furnished with a valve, O', opening into the dome of the still.

Letter P is also a steam-pipe furnished with a valve, P', and opening into the pipe L between the angle-valve L' and the worm.

The steam-pipes O and P are connected by a — connection with a steam-pipe, Q, which is shown broken off, but must be connected with a steam-boiler.

R is a draw-cock, to relieve the steam-pipes of condensed water, and should always be used before the steam is let into the still, it being very dangerous to inject water into a hot still.

Letter S represents a division-wall between the still and condensing apparatus. I carry up this wall to the roof of the building, (the connecting pipes passing through the wall,) dividing the building into separate and distinct compartments. The condenser and receiving-vessels being thus inclosed in a room separate from the still-room, the liquid products are protected from soot and ashes and from danger of fire. The gas-pipe M² (shown as broken off) I carry up through the roof, or in any convenient direction out of the room containing the condenser. The discharge-pipe N⁵, I also carry out through the roof or side wall of the still-room. The inflammable vapors and gases are thus removed from the vicinity of the still, and the operator and apparatus protected from the consequences of accidental ignition.

When a distillation is completed, I close the angle-valve L', stopping the passage between the still and worm-condenser, remove the weight from the safety-valve, and raise up the valve and hook it by the ring-handle on the hook N². The valve having been raised, there is an unobstructed passage-way from within the still through the safety-valve blow-off pipe N³, main N⁴, and discharge-pipe N⁵ to the open air. I next draw off the condensed water from the steam-pipe through the draw-cock R, temporarily remove or dampen the fire, open the valve in the steam-pipe O, and admit steam into the still in sufficient quantity to expel the vapors and gases remaining therein. When the steam blows out clear and undischarged from the discharge-pipe N⁵, it may be turned off; but I prefer to continue it a short time for the purpose of reducing the temperature of the still. I now take off the man-hole covers and remove the carbonaceous residue from the bottom of the still by means of long-handled picks, scrapers, and scoops, the still being too hot to enter. The operator standing on the top, and working through one of the man-holes, is facilitated by the cross-light coming in through the other, which en-

ables him to see through the smoke arising from the coke. When the residue is removed, I replace the man-hole covers, lute and fasten them, and again turn on the steam through the steam-pipe O until the atmospheric air and the smoke from the combustion of small particles of carbon adhering to the still are expelled from the still. I then let down the safety-valve to its seat and weight it, open the passage to the worm by raising the angle-valve L', admit the charge of oil to the still through the funnel or the reservoir pipe, start the fire under the still, and turn off the steam.

When commencing a distillation, I open the damper E', and close the damper F', forcing the products of combustion from the chamber E to pass through the flue E² around the sides of the still on their way to the chimney. When the distillation is well started, I shut off the heat from the side of the still by closing the damper E' and opening the damper E³ in flue E², which connects the chamber E directly with the chimney.

When from the accumulation of paraffine or other cause the worm becomes choked, the safety-valve permits the vapors and gases to escape from the still into the main N', where the condensable products are saved. Obstructions in the worm are immediately removed by closing the angle-valve L' and opening the valve in the steam-pipe P.

When necessary to renew a still-bottom, I remove a sufficient portion of the brick-work under arch D, together with that portion of the sides of the heat-chamber E inclosing the bottom and flange-joint, disconnect the flange-joint and draw out the still-bottom in front under the arch D without disturbing the remainder of the still or setting, introduce a new bottom piece, make the joint, and replace the setting. The arch piers and blocks connected with the fire-box and the walls of the chamber E may also be removed and renewed without disturbing the main structure, being all built within the chamber C.

My improvements above described enable me to repair large oil-stills with facility and economy, and to operate them continuously while hot and without waiting for them to cool naturally, as heretofore the practice with others.

The time occupied by the first and second applications of steam in a still of about seven feet in diameter need not exceed thirty minutes for each application.

Having described and claimed in cotemporaneous Letters Patent the use of steam broadly for the purpose of expelling the vapors and gases remaining in a hot still after the distillation is completed, and for the purpose of preparing a hot still for the safe admission of a charge of oil, I shall herein confine my claim for so much of the apparatus herein described as I use for that purpose to the especial arrangement shown and set forth. I will also observe that I do not wish to be considered as claiming, broadly, a removable still-bottom; but I wish to limit myself to a removable bottom cast with a short section of the sides and having substantially the features above described.

What I claim as my invention, and desire to secure by Letters Patent of the United States, is—

1. A volatile-oil still capable of being heated at the sides, and constructed with a removable lower section consisting of the bottom and a short section of the sides, substantially as herein described, and substantially for the purposes hereinbefore set forth.

2. The combination of a weighted safety-valve with a volatile-oil still constructed substantially as hereinbefore described, and so arranged as to relieve the still from pressure when the condenser becomes choked.

3. The steam pipe and valve O, safety-valve N, and closed angle-valve L', when used in combination with a still and steam-boiler, the whole substantially as described.

4. The steam pipe and valve P and angle-valve L', when used in combination with the condenser and a steam-boiler, substantially as hereinbefore described, and substantially for the purposes hereinbefore set forth.

5. The use, in combination, of two or more man-holes in the top or cover of the still, substantially as herein described, and substantially for the purposes hereinbefore set forth.

6. The use of the main N', in combination with the safety-valve, substantially as herein described, and substantially for the purposes hereinbefore set forth.

7. The within-described mode, substantially, of setting a still so that the lower section can be removed without disturbing the main body of the still.

LUTHER ATWOOD.

Witnesses:

F. C. TREADWELL, Jr.

DANIEL M. O'BRIEN.