Sheet 1-2 Sheets.

Lockhart & Gracie.

Oil Still.

No. 80,294. Patented Jul. 28, 1868.

Fig. 2

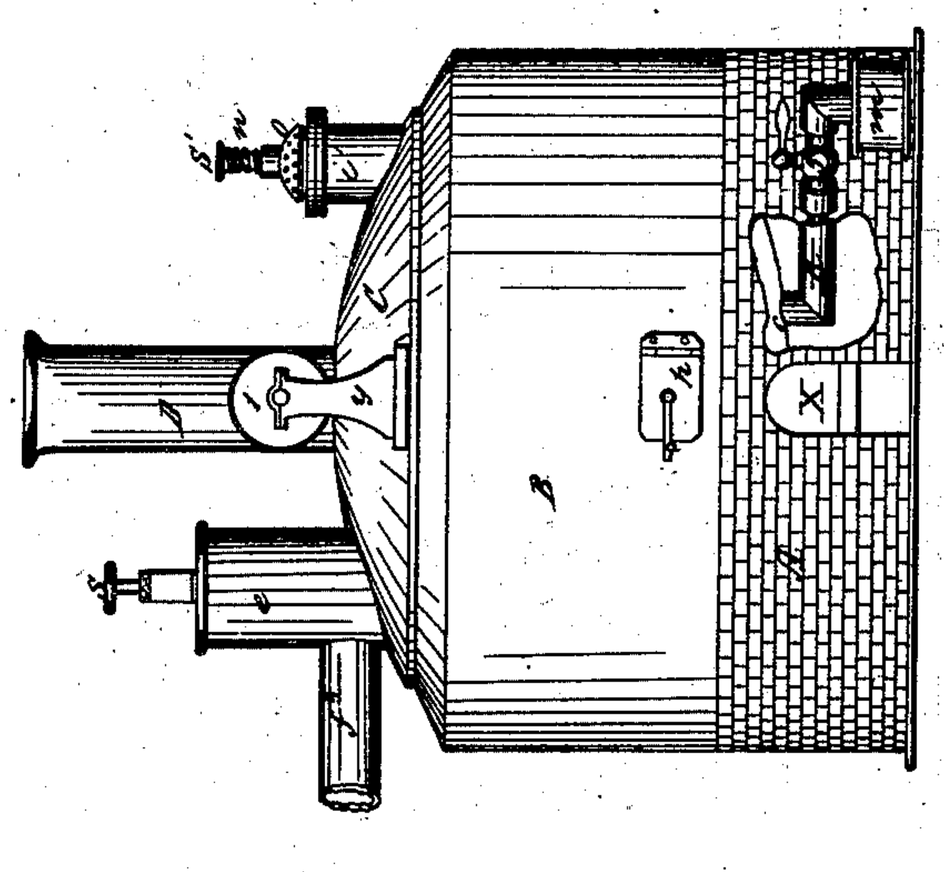
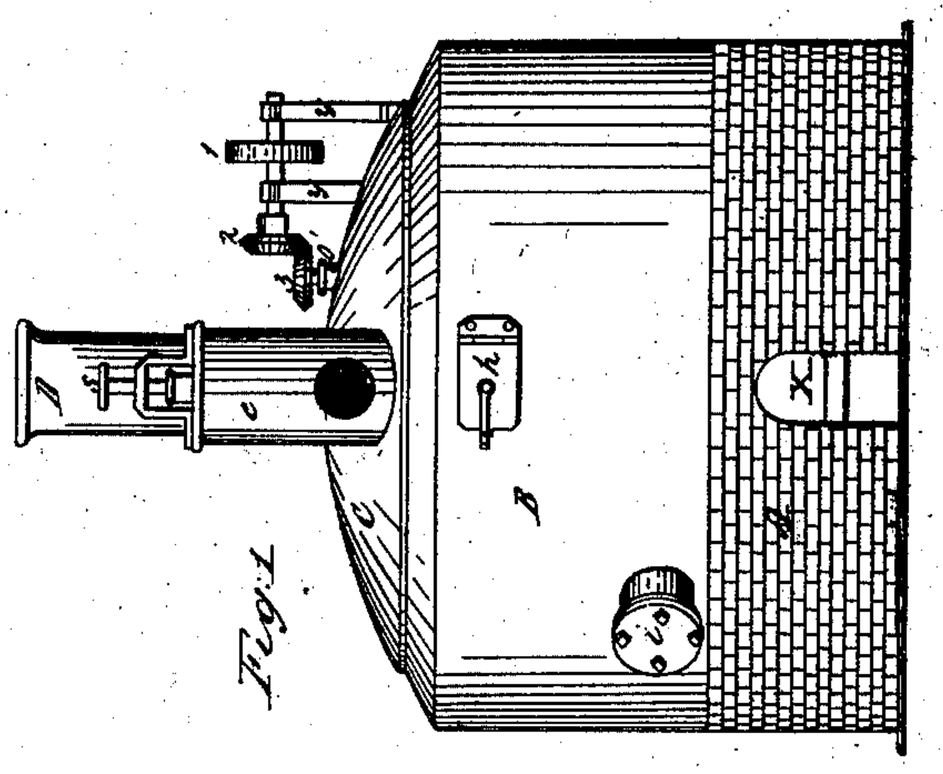


Fig. 1



Witnesses

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Sheet 2-2 Sheets

Lockhart & Gracie.

Oil Still.

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Fig. 6

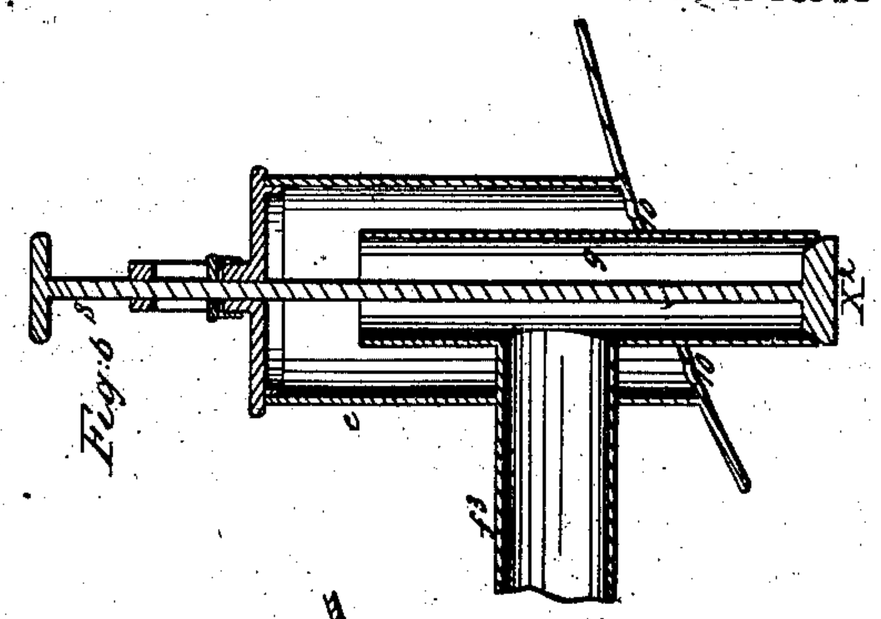


Fig. 7

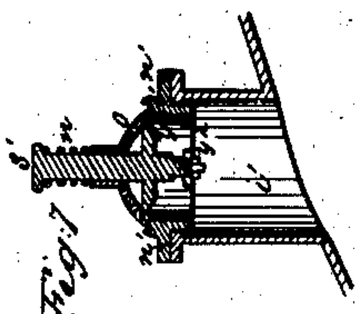


Fig. 3

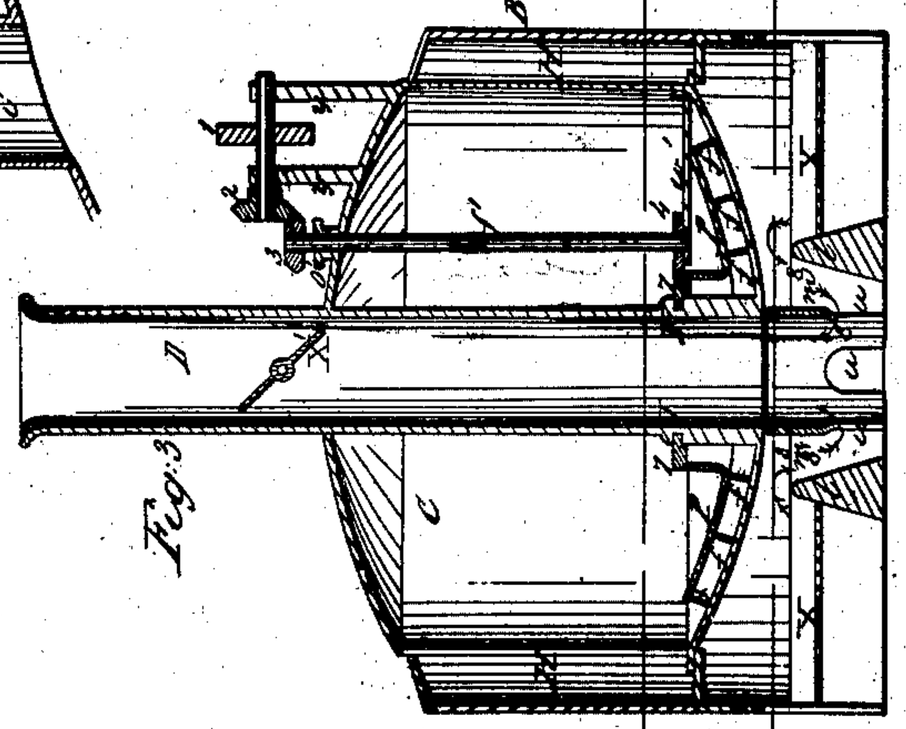


Fig. 4.

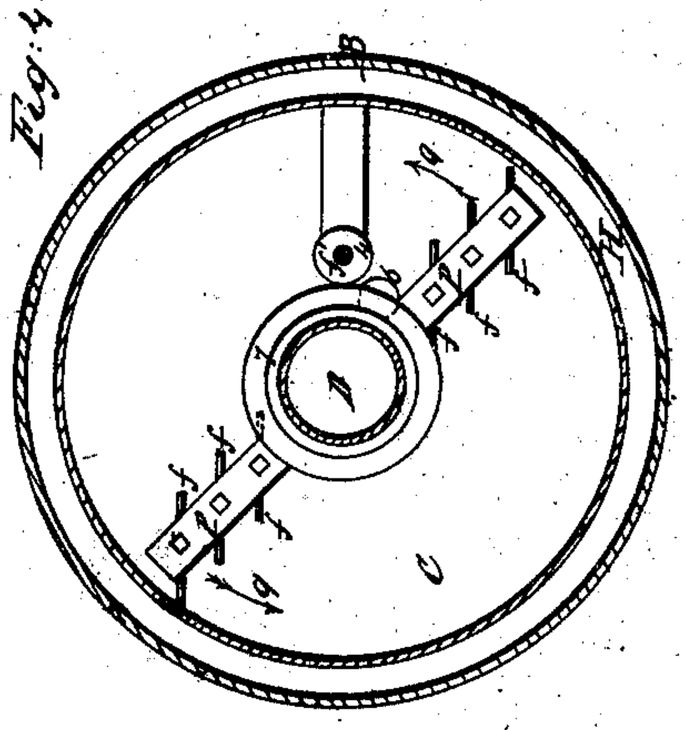
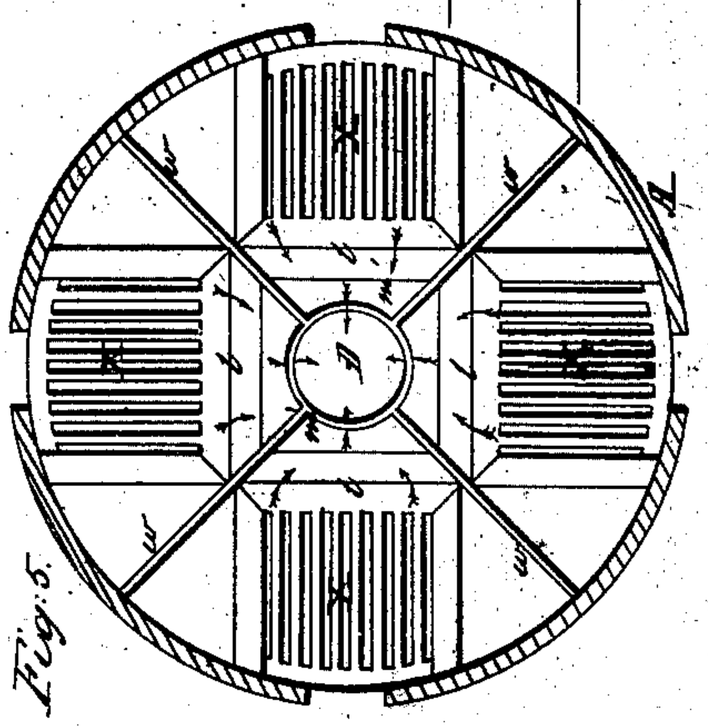


Fig. 5.



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CHARLES LOCKHART AND JOHN GRACIE, OF PITTSBURG, PENNSYLVANIA.

Letters Patent No. 80,294, *dated July* 28, 1868.

IMPROVEMENT IN STILLS FOR HYDROCARBONS.

The Schedule referred is in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that we, CHARLES LOCKHART and JOHN GRACIE, of Pittsburg, in the county of Allegheny, and State of Pennsylvania, have invented a new and useful Improvement in "Stills for Hydrocarbon;" and we do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon.

The nature of our invention consists in providing stills with a flue, passing vertically through the centre of the still, and combining with said flue and still a series of fire-chambers.

Our invention also consists in surrounding the still with an air-chamber, for the purpose of protecting the still from the action of cold air during the distilling process, and also for the purpose of facilitating "cooling off" the still after the distillation is completed.

Our invention also consists in providing stills for petroleum with a safety-valve, for protecting the still from the danger attendant upon the sudden condensation of the vapor in the still, and for protecting the still against internal pressure.

Our invention further consists in providing the still with an apparatus for carrying off, at different heights, the vapor evolved in the process of distillation, and also in providing the still with scrapers, combined with a receiver, for the purpose of collecting the heavy oil and other matter as they settle to the bottom of the still, and thus prevent incrustation of the bottom of the still—

The whole being constructed, arranged, combined, and operating substantially as hereinafter described.

To enable others skilled in the art of constructing stills for the distillation of hydrocarbons to make and use our invention, we will proceed to describe its construction and operation.

In the accompanying drawings, which form part of our specification—

Figures 1 and 2, sheet A, are side elevations of our improvements in stills for hydrocarbons.

Figure 3, sheet B, is a vertical section of the same.

Figures 4 and 5, sheet B, are transverse sections of the same when cut through at lines y^4 and y^5 of fig. 3.

Figure 6 is a vertical section of the apparatus used for carrying off the vapor from the still at different heights.

Figure 7 is a vertical section of the safety-valve for stills used for the distillation of hydrocarbons.

In the drawings, A represents the masonry-work of the furnace of the still.

B represents a sheet-iron case, placed around the still, for the purpose of forming the air-chamber H, which is used for the purpose of protecting the still from the action of the atmosphere during the process of distillation. This case B is provided with a series of doors, h, for the purpose of admitting cold air into the chamber H, for "cooling off" the still after the process of distillation has been completed.

C represents the still, in the centre of which is a smoke-flue for the furnaces x, which are provided with bridge-walls l and division or partition-walls w, upon which rests the bottom of the still. The spaces between the bottom of the still and bridge-walls l are so arranged that the smoke, dust, and heat which pass from the fire-chamber x are drawn into the space, m', around the bottom of the flue D, and from this space m' the smoke and heat pass through the openings u, as indicated by arrows 8, into and up through the flue D, which is provided with a damper, x^1, for regulating the draught of the flue upon the fire-chamber x.

The still is constructed of sheet iron, and is made in the ordinary manner, except that it is provided with a flue in its centre. By constructing the still with the flue D in its centre, great strength is imparted to the still, and it may be made of any desired size, which is a very great desideratum.

The diameter of the flue must, in every case, correspond to the diameter of the still.

The still, C, is provided with "man-hole" openings i and i^2, the caps i^2 and n' of which may be removed from the openings, for the purpose of allowing a current of air to pass through the still to facilitate the "cooling off" of the still after distillation has been completed.

On the man-hole i^1 is placed the safety-valve, which consists of the cap n', stem s', provided with a disk, y^1. The lower end of them is secured to and moves in a cross-piece, y^2, on the stem s', and over the disk y^1 is placed

a valve, the upper side of which is convexed, and the lower side of which is concave, and a large number of small openings pass through it.

The valve *o* is held down in its seat in cap *n'* by means of the spiral spring *n*, which also holds the disk y^1 up against the valve *o*.

As the construction and arrangement of the safety-valve will be readily seen and understood by reference to fig. 7, sheet B, we will proceed to describe its operation, which is as follows: When there is any undue pressure in the still, the valve *o* is forced upwards against the spiral spring *n*, and the surplus force will escape from the still. If a partial vacuum should take place in the still, by a sudden condensation of the vapor, (which is often the case,) the atmosphere, passing through the openings in the valve *o*, will press down the disk y^1, which will be forced down from the valve *o*, and thereby admit air into the still, and prevent it from collapsing.

It will be observed that, by means of the safety-valve described, we provide against the danger caused by undue pressure, either external or internal, as relating to stills used for the distillation of hydrocarbons.

The apparatus for carrying off the vapor at different heights consists in the use of a hollow column, *e*, inside of which is placed a pipe, *g*, the lower end of which is provided with a valve, x^2, which is operated through the medium of the stem, marked *s*.

To the pipe *g* is connected a pipe, f^3, which passes through the side of the column *e*, and connects with the condenser.

The lower end of the column *e* is secured to the top of the still by any of the known means.

A portion of the pipe *g* passes down into the still, as shown in fig. 6, and is secured to the top of the still, so as to be central in the column *e*.

In the top of the still, around the pipe *g*, are a number of openings, marked 10, which lead to the interior of the column *e*.

As the construction and arrangement of the several parts of the apparatus for carrying off the vapor at different heights will be fully understood by reference to fig. 6, we will proceed to describe its operation, which is as follows: When the still is filled to the desired degree with the hydrocarbon, and the process of distillation has commenced, the vapor passes up through the openings 10 into the column *e*, and from it down through pipe *g* into pipe f^3, and from it to the condenser. When the operator observes any decrease in the flow of oil from the condenser, he then lowers the valve x^2, through the medium of the stem *s*. The vapor will then pass up through pipe *g* into the pipe f^3, and from it to the condenser. When the operator observes that the oil flowing from the condenser is becoming yellow, he should then close the valve x^2, and thereby cause the vapor to pass up through the column, and down through pipes *g* and f^3 to the condenser. This will change the color of the oil from yellow to white, for it prevents the paraffine from passing over with the vapor evolved from the oil in the still.

By this arrangement for carrying off the vapor from the still at different heights we are enabled to produce a white burning-oil, having a uniform specific gravity and a desirable "fire-test," and we also obtain a greater yield of good and safe burning-oil, which is a great consideration in the distillation of hydrocarbons.

On the inside of the still, near to its bottom, is placed a wheel, 7, which rotates in a groove made in the flue D, as shown at J, in fig. 3.

To the wheel 7 are attached plates P, to the under side of which are secured scrapers *f*, arranged with relation to the bottom of the still so that they will scrape it without friction. These scrapers are slowly rotated in the still through the medium of the gear-wheels 7 4 3 2 and pulley 1.

The wheel 2 and pulley 1 are held in position by the supports or bearings *y*.

The shaft f^1, upon which are placed the wheels 4 and 3, is held in position, near its upper end, by a stuffing-box, *o'*, and at its lower end by a step, *w'*.

To the bottom of the still, at 6, is attached a pipe, R, provided with a valve, 5. This pipe is connected with a receiver, *m*, for receiving the heavy oil or other matter which may settle down on the bottom of the still during the process of distillation.

The scrapers *f* are so arranged that, by turning them in the direction indicated by the arrows 9 in fig. 4, the heavy matter, as it settles to the bottom of the still, will be forced into the pipe R at the point marked 6, from which it will flow into the receiver *m*. By this arrangement of the scrapers, incrustation of the still-bottom is prevented, the process of distillation facilitated, and the still-bottom prevented from burning.

Having thus described the nature, construction, and operation of our improvement, what we claim as of our invention, is—

1. The chimney D, combined with a series of fire-chambers, *x*, and smoke-chamber *m'*, constructed, arranged, and operating substantially as herein described, and for the purpose set forth.

2. Making the chimney D the axis of the wheel 7, used for rotating the scrapers, in the manner substantially as herein described, and for the purpose set forth.

3. The arrangement of the column *e*, pipes *g* and f^3, openings 10, and valve x^2, constructed, arranged, and operating substantially as herein described, and for the purpose set forth.

4. Providing a still for hydrocarbons with a valve, which will act from an internal or external pressure substantially as herein described, and for the purpose set forth.

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JOHN GRACIE.

Witnesses:
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JAMES J. JOHNSTON