

# John Gracie's Improvement in Stills for Oil

117406

PATENTED JUL 25 1871

Fig. 1

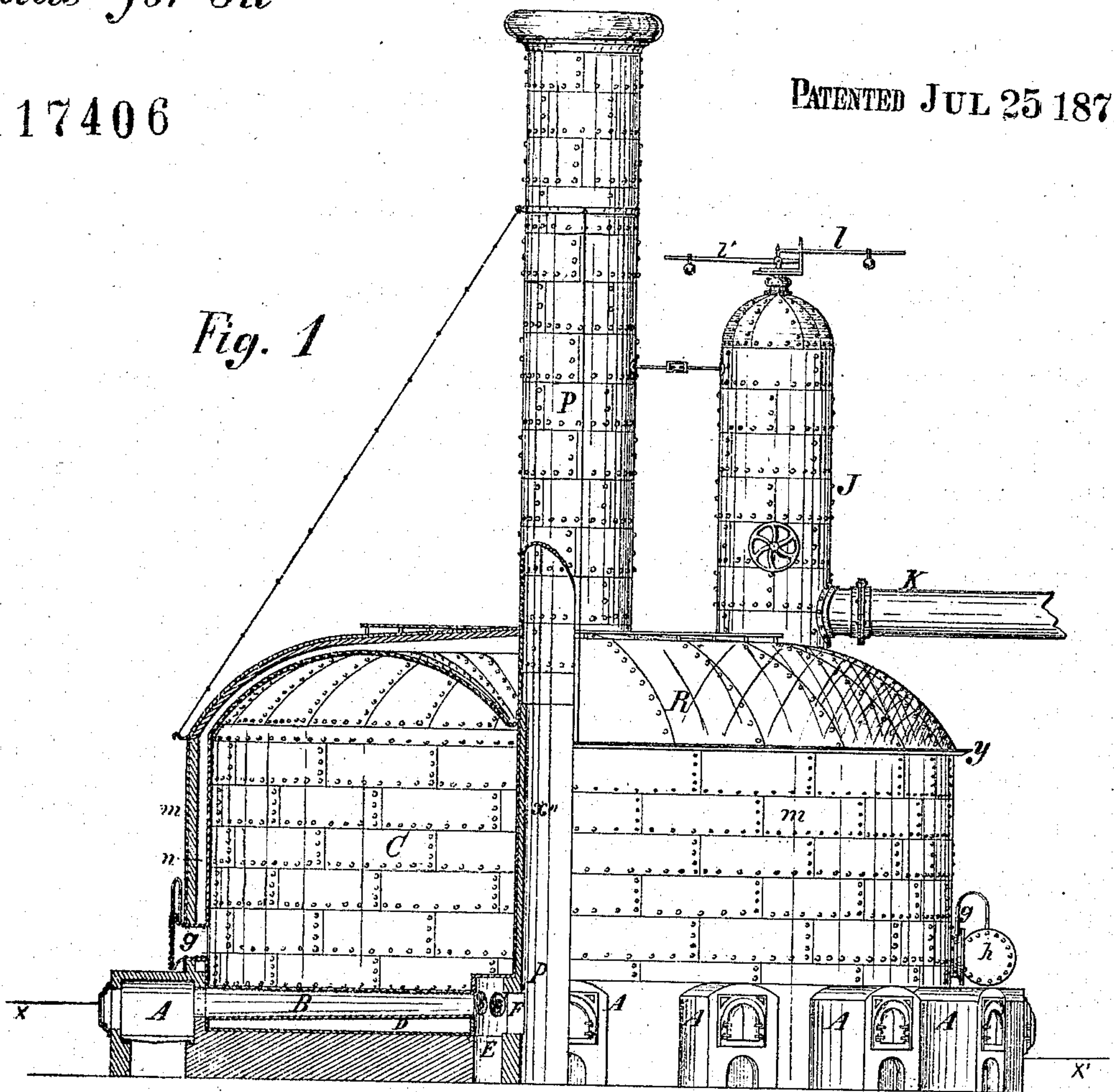
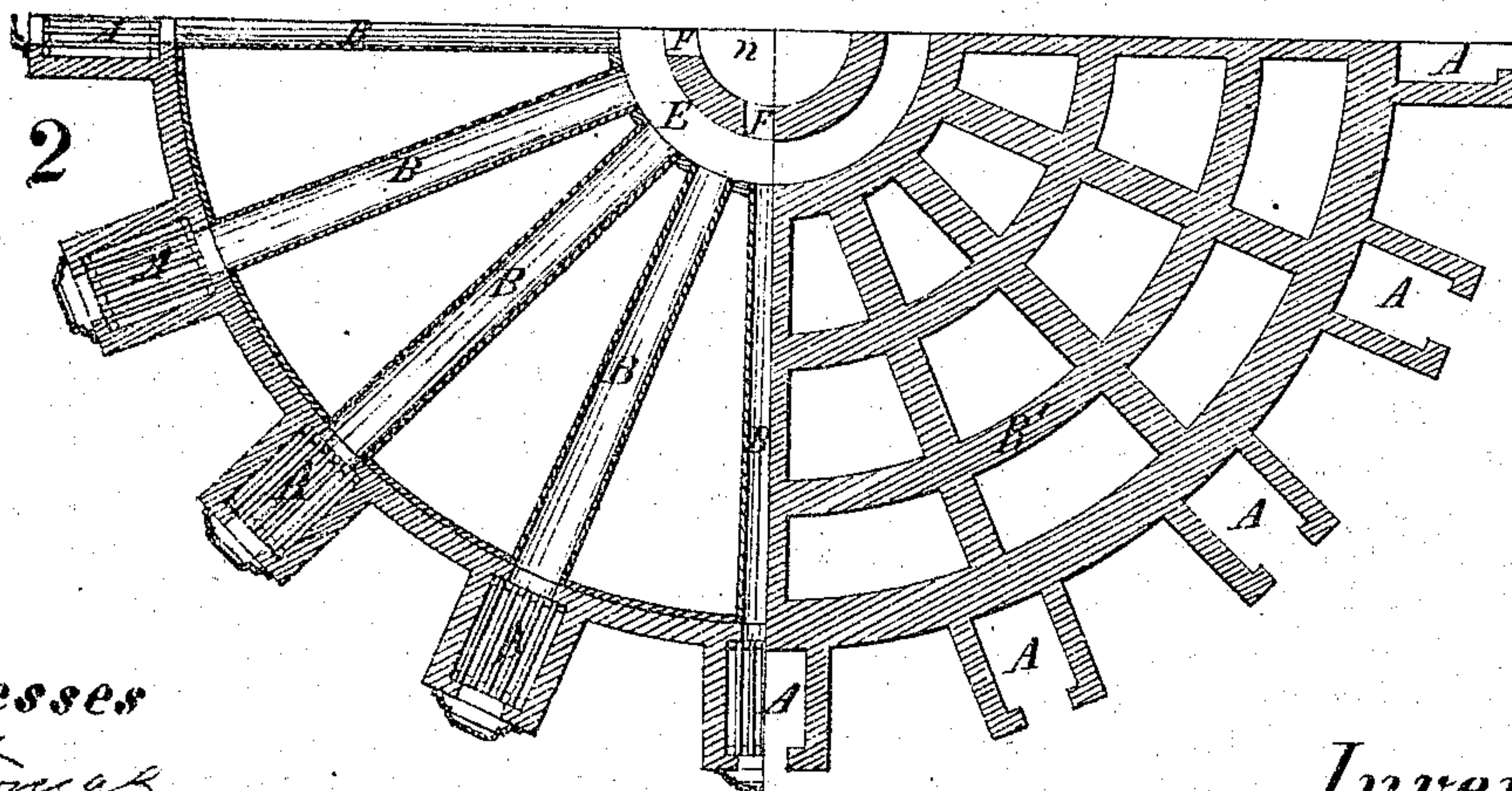


Fig. 2



Witnesses  
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# UNITED STATES PATENT OFFICE.

JOHN GRACIE, OF PITTSBURG, PENNSYLVANIA.

## IMPROVEMENT IN STILLS FOR OIL.

Specification forming part of Letters Patent No. 117,406, dated July 25, 1871.

*To all whom it may concern:*

Be it known that I, JOHN GRACIE, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Stills for Oil; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing and to the letters of reference marked thereon.

In evaporating liquids by the process of distillation a precipitate is generally thrown to the bottom of the still, which deposit acts as a non-conductor of heat, requiring it to be increased in proportion to the depth or thickness of the deposit, whereby incrustation on and burning out of the bottom of the still follows. The heat having to pass through the deposit on the bottom of the still, a coloring matter is thrown off and mixed with the liquid during the process of evaporating it, and a disagreeable odor and an undesirable color imparted to the product of distillation. The object of my improvement is to provide a remedy for these recited difficulties in the process of evaporating liquids. The nature of my invention consists in evaporating liquids by heat passing through a flue or flues arranged horizontally or nearly so in the still or evaporating-vessel at a point above its bottom, and converging to a common center, and without the direct application of a distilling or decomposing heat to the exterior of the still or evaporating-vessel.

To enable others skilled in the art to make and use my invention, I will proceed to describe more fully its construction and operation.

In the accompanying drawing which forms part of my specification, Figure 1 is a side elevation of my improvement in stills for oil, representing a portion of the still and its furnaces cut away. Fig. 2 represents a transverse section of one-fourth of the still-furnaces at line *x*, and also represents a transverse section of one-fourth of the furnaces and masonry used for supporting the bottom of the still at line *x'*.

In the accompanying drawing, A represents a series of furnaces, which is arranged around the still as shown in Figs. 1 and 2. B represents a series of flues, which is arranged horizontally or nearly so in the still C at a point a little above the bottom of the still, as represented in Figs. 1 and 2. The center of the still is provided with a flue or chimney, P, for conducting off the smoke

and heat from the flues B and furnaces A. The still C is surrounded by a casing, *m*, and covered with a roof, R, so as to leave a space, *n*, around and over the still. The casing *m* is lined with brick, and also that part of the flue P leading through the still C, as indicated at *x''*. The casing *m* and covering or roof R are used for the purpose of protecting the still from the action of the atmosphere, and the space *u* is used for the purpose of cooling off the still by admitting cold air into the space *n* through the medium of suitable openings, which may be arranged around in the casing *m*, near the lower edge of it, and at points near the upper edge of it or in the top R. These openings are always closed while the still is in operation. In the sides of the still are openings *g*, which are used for the purpose of cleaning, and are also used for the purpose of cooling it by admitting air into it. These openings are closed by means of caps, the form of which is indicated at *h*, and for convenience of manipulating are suspended on pivoted arms, as indicated at *g'* and *h'*. The bottom D of the still C rests on masonry R', the form of which is clearly shown in Fig. 2. J represents a vapor-dome, which is provided with pressure-valves furnished with levers *l* and *l'*, one valve being for internal pressure and the other for external pressure—that is to say, that in case of undue internal pressure one of the valves will open and relieve the still, and if from any cause—a sudden condensation of the vapor or gas in the still—a partial vacuum is formed, the other valve will open and allow air to flow into the still, and thereby prevent the still from collapsing by the pressure of the atmosphere on its outer surface. K represents the pipe for conducting the vapor from the still to the condenser. Y represents a conductor or trough around the lower edge of the roof R for carrying off the water which flows down on the roof in wet weather. As the construction of the still and the several parts connected therewith will be readily understood by the skillful mechanic from the foregoing description and by reference to the accompanying drawing, I will therefore proceed to describe the operation.

The still is filled to the desired height with oil. Fire is then made in the furnaces A, from which the heat and smoke pass through the flues B into the chamber E, and from it through



openings F into chamber *n*, and from it up and out through the flue or chimney P. It will be readily seen that by this arrangement of the furnaces and flues B the oil in the still C is heated through the medium of the flues B, and without applying a distilling or decomposing heat to the bottom D of the still. When the oil has evaporated and passed off from the still so that there is just enough remaining in the still to cover the flues B, the still is allowed to cool down, and it is again filled with oil and the operation of distilling again repeated, and thus may the operation of charging the still and evaporating its contents be repeated and continued at the will of the operator, care being taken never to allow the oil to fall below the top of flues B. The heavy oil or tarry matter which settles down below the still may be drawn off into a suitable vessel or tank through a pipe provided for that purpose. Distilling hydrocarbon oil by heating it through the medium of flues as hereinbefore described, it will be free from the disagreeable odor and the coloring matter which is thrown off by the action of the heat upon the bottom of the still and upon the heavy oil and tarry matter next to it, which is the case in the ordinary process, where the heat is applied directly to the bottom of the still.

The advantages of my improvement consist:

First, in an increase of the heating capacity by the use of the flues. Second, providing against undue expansion and contraction of the still and its bottom. Third, providing against the incrustation and burning out of the bottom of the still. Fourth, providing against coloring the product of distillation by undue heat and agitation of the liquid in the still. Fifth, obtaining a more uniform result and a greater amount of distilled product from a given quantity of the crude oil. Sixth, economy of labor, time, and expense in the process of distilling hydrocarbon oil.

I wish it clearly understood that I am aware that evaporating-vessels and stills have been constructed with horizontal flues, but in every such case their bottoms have been exposed to the direct action of the fire.

Having thus described the nature, construction, operation, and advantages of my improvement, what I claim as of my invention is—

A still, constructed with a series of flues arranged horizontally, or nearly so, a little above the bottom, and converging to a common center, so that its bottom shall be free from the direct application of a distilling or decomposing heat, substantially as herein described.

Witnesses:

JOHN GRACIE.

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JAMES J. JOHNSTON.