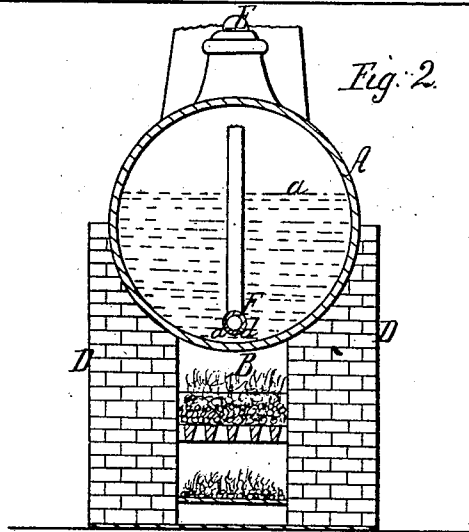
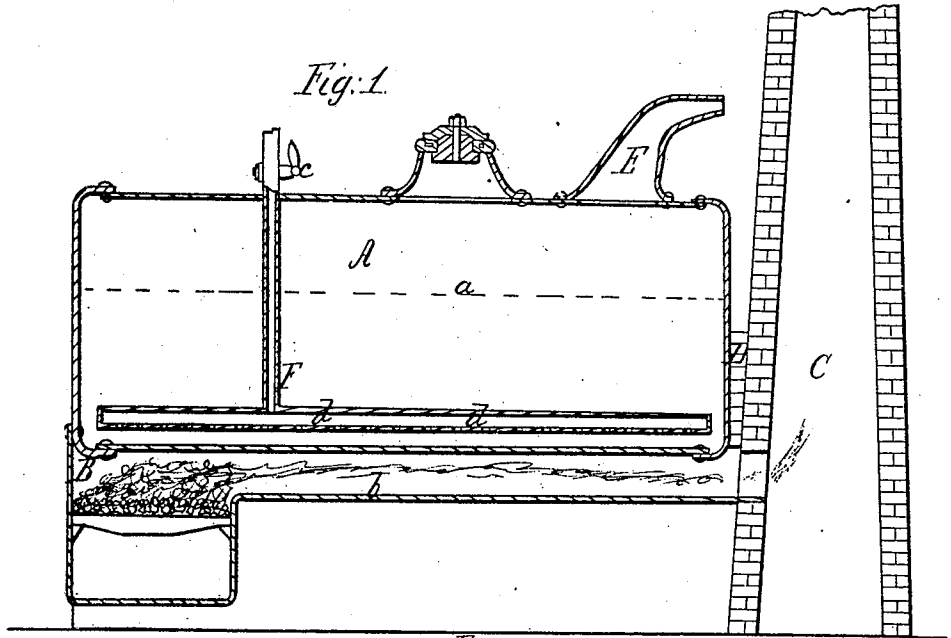


*J. B. Edwards.*

*Oil Still.*

*N<sup>o</sup> 100,874.*

*Patented Mar. 15, 1870.*



*Witnesses;*  
*A. Bellere*  
*A. Kinner*

*Inventor,*  
*J. B. Edwards*  
*per Brown Combs & Co.*  
*attys.*

# United States Patent Office.

JOSEPH B. EDWARDS, OF NORTH GREENBUSH, NEW YORK.

Letters Patent No. 100,874, dated March 15, 1870.

## IMPROVEMENT IN STILLS FOR DISTILLING HYDROCARBONS.

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

To all whom it may concern:

Be it known that I, JOSEPH B. EDWARDS, of North Greenbush, in the county of Rensselaer, and State of New York, have invented a new and useful Improvement in the Distillation of Liquid Hydrocarbons, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing forming part of this specification, and in which—

Figure 1 represents a longitudinal sectional elevation of a horizontal cylinder still, with my improvement applied to it;

Figure 2 is a transverse section of the same; and

Figure 3, a transverse section, on a larger scale, of a perforated horizontal steam-pipe, used in carrying out my improvement.

Similar letters of reference indicate corresponding parts.

In the distillation of petroleum or other liquid hydrocarbons in stills employing outside fires, a very high degree of heat has been necessary, and great care required to prevent burning or coloring the distillate.

Such process also is wanting in rapidity after the most volatile of the vapors have passed off, which has involved a further addition to the heat.

There has consequently been not only a great loss of time and expenditure of fuel necessary, but the intense heat, combined with the absence of motion in the heavy liquids in the stills, as the distilling-process approaches conclusion, has produced coke and caused a crust to form on the bottom of the still. This is very destructive to the still, as it involves frequent scraping, and, unless repeatedly attended to, retards distillation.

Various expedients and devices have been resorted to by way of avoiding these difficulties. Thus some refiners have used mechanical agitators, others movable stills, others heating by superheated steam, and others again have distilled *in vacuo*, but all such methods have been objectionable, either on account of cost, complication, or from some other cause; and, notwithstanding the objections incidental to it, the old plan of progressive heating by outside fire continues, as a general thing, to be resorted to, and certainly has the advantage of simplicity to recommend it; and my invention includes the adoption of the same, shorn, however, of the objections attending its ordinary application.

My improvement consists in constructing stills heated by outside fires in such manner as that steam of suitable pressure can be introduced into the liquid under distillation, so that it will not only regulate the heat inside the still, but also distribute it throughout the liquid, by producing currents therein, and thereby causing a constant and rapid interchange of position

between the portion of the liquid next to the side or sides of the still exposed to the fire and the liquid situated at a distance from the direct action of the fire.

By this improvement not only is a more rapid vaporization of the liquid secured, and with less heat, but also burning or formation of crust on the bottom of the still is prevented; likewise the vapors being mixed with the steam are passed off rapidly, and not scorched or colored as under other plans, excepting where distilling *in vacuo* so commonly occurs.

It will not be necessary here to describe my improvement, which consists in the use of steam, as aid for the purpose above specified, to more than one kind of still, as from such description it will readily be seen how the same can be adapted to stills of any form.

I therefore select, for the purpose of illustration, a horizontal cylinder still, in which the steam may be led into the interior of the still by a pipe terminating in a T-end running lengthwise of the still, and so perforated and located as that the steam will be discharged in jets with adequate force, and in such directions near the bottom of the still as that continuous currents will be established from the steam-pipe outward across such bottom.

In the accompanying drawing—

A is the still, the liquid in which may stand at the level *a*.

B is the furnace, and *b* the flue under the still, the same opening at its rear into the chimney C.

D D are the side walls to the furnace and flue, and E the exit-pipe from the still leading to the worm.

F is the steam-pipe, provided with a cock, *c*, to regulate the admission of steam, which escapes through perforations *d* in the lower or longitudinal run of the pipe.

The operation, where the still is constructed and provided as shown and described, is as follows:

The still having been charged with liquid to be distilled to the requisite height or depth, and fire started, the operation may be continued until the more volatile of the hydrocarbons in the liquid are expelled, or until the temperature is raised to, say, 212° Fahrenheit.

Steam is then admitted by the pipe F, and allowed to enter the liquid through the perforations *d*, and such continued until the distillation is completed. The residuum having no coke in it, can then be drawn off and the still be refilled and its operation repeated, or in the case of petroleum or coal-tar, the operation may be made continuous until the paraffine is also expelled.

Different temperatures of steam should be used for different kinds of liquid—the more refractory the liquid to be distilled the lower the temperature of the steam, as a general thing.

By this my improvement a very large economy in

fuel is effected, a materially-reduced heat sufficing, thus increasing the capacity of the works. Also less acid is required to deodorize the distillate, which, in the distillation of oil, is a standard white instead of a light straw or light straw to white.

Likewise, from the low temperature employed, no incondensable gases are formed, and more of the volatile parts, instead of being run in with the naphtha, are run in with the oil, to the advantage both in yield and quality of the product.

Furthermore, the residuum being fluid, may be readily run off, while the tar, being free from coke and grit, is of increased value, and the frequent cooling off and scraping and burning out of the still-bottom are avoided.

This my invention is in no ways analogous to the use of steam as heretofore practiced in the distillation of coal, to obtain coal-oil for the purpose of conserving the vapors formed and hastening their exit from the hot retort, nor yet to the use, as previously adopted, of superheated steam as a means of heating

oil-stills, both with and without furnace heat, all of which uses of steam are dissimilar to mine, and most of which have required complicated and expensive machinery, while my improvement can be applied or attached to any still with very little expense, is safe, and accomplishes results equal to those obtained from distilling *in vacuo*.

What is here claimed, and desired to be secured by Letters Patent, is—

The use of steam in the distillation of liquid hydrocarbons, in stills heated by external fire, when the steam is introduced into the still in such a manner that the lowest stratum of liquid therein will be continually removed from contact with the bottom of the still by the action of the steam, and its place supplied with fresh liquid from above, substantially as, and for the purpose above described.

J. B. EDWARDS.

Witnesses:

A. LE CLERC,  
A. KINNIER.