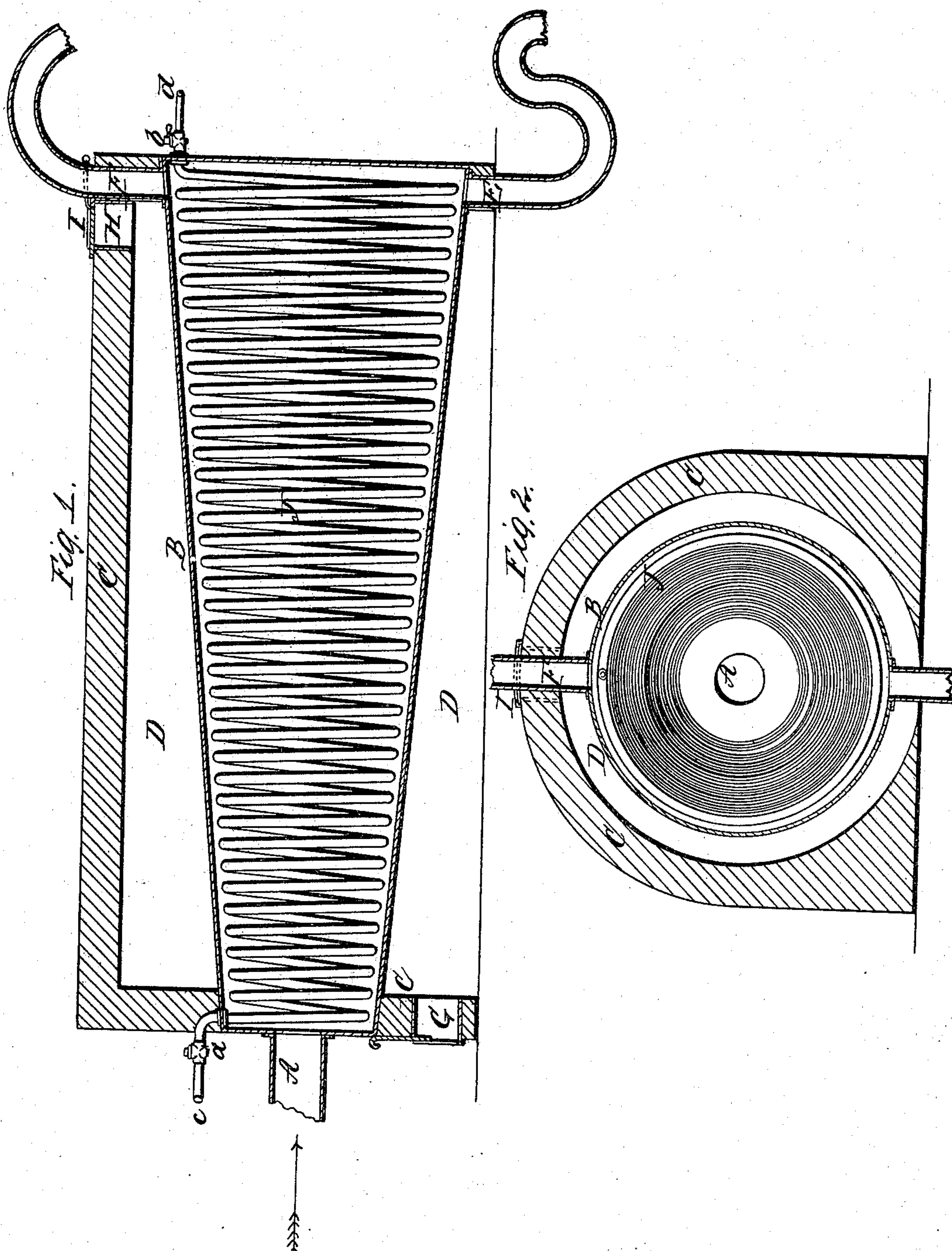


J. R. STAFFORD.  
DISTILLING OILS AND CONDENSER FOR STILLs.

No. 10,813.

Patented Apr. 25, 1854.





# UNITED STATES PATENT OFFICE.

JAMES R. STAFFORD, OF BROOKLYN, NEW YORK.

## IMPROVEMENT IN DISTILLING AND CONDENSING APPARATUS.

Specification forming part of Letters Patent No. 10,813, dated April 25, 1854.

*To all whom it may concern:*

Be it known that I, JAMES R. STAFFORD, of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Condensers for Distilling Oils; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a longitudinal vertical section of what I will term the "separating-condenser." Fig. 2 is a transverse vertical section of the same.

Similar letters of reference indicate corresponding parts in both of the two figures.

It is well known that in the process of distillation of rosin, bitumen, asphaltum, and the residuum of gas-works known as "coal-tar," as also palm-oil, tallow, lard; and other mineral, vegetable, and animal substances from which oil is obtained, the products vary in quality, some being very volatile, while other portions are much less volatile, and that the more volatile oils and acids are generated by the destructive distillation (so termed) of the substances producing the less volatile oils; and it is also well known that to continue the process of distillation of many, if not all, the substances alluded to an increasing heat is required. The condensers now in use for separating the different products and different qualities of oil fail to be perfectly effective by reason of the want of uniformity of their operation consequent upon the absence of proper means of regulating their temperature. As the separation is effected by keeping the temperature of the condenser above the volatilizing-point of a certain portion, but below that of the remainder, it is very desirable that some means be provided for regulating the temperature of the said vessel, more especially as the requisite degree of temperature is not positive, but will vary with the quality of material used and with the nature of the different products to be separated.

My invention consists in a condenser which has its exterior surface surrounded or partly surrounded by a jacket or chamber, into which air or steam is admitted and allowed to escape at the pleasure of the person superintending,

or has a pipe or pipes passing through it, with provision for the admission and escape of air or steam, or in which the volatilized products are conducted through pipes surrounded by air or steam in a chamber furnished with proper means of admission and escape. By properly controlling the admission and escape of air or steam to the pipes or jacket the temperature of the condenser may be always regulated to the required degree.

To enable those skilled in the art to which my invention relates to make and use my invention, I will proceed to describe its construction and operation.

The condenser which I have represented consists of a vessel, B, in the form of a frustum of a cone placed horizontally with the pipe A, which leads from the goose-neck of the still or retort, entering its smaller end. This vessel should be made of some metal—such as copper or galvanized iron—upon which the action of the acids would not be destructive. It is built in brick-work C C in such a way as to leave a flue or chamber, D, surrounding it. A pipe, E, leads from the bottom part of the larger end of the condenser to carry off the oil or condensed products, and another pipe, F, from the top part to carry off the more volatile products, the first pipe leading through a cooler to a suitable reservoir and the second to another condenser.

At the lower part of one end of the apparatus shown there is an opening, G, for the admission of air to the flue or chamber D, which may or may not be furnished with a register, and at the upper part of the opposite end there is an opening, H, for the escape of the air from said flue or chamber, which opening must be furnished with a register, I, to stop or regulate the escape.

In the inside of the condenser B there is a coil of pipe, J, which enters at the smaller end and passes out at the larger end, being provided with cocks *a* and *b* near the ends of and outside the condenser. This pipe may be for air or steam; but in the present apparatus it is supposed to be for steam, and therefore the end *c* is supposed to be in communication with a steam-boiler or a waste-steam pipe, the cock *a* serving to regulate the admission and the cock *b* the escape of the steam from the coil.



I would in most cases use steam as a condensing agent in preference to air, where convenient, as its temperature can be more easily ascertained and regulated. At the commencement of the process of distillation air is admitted to the chamber D and steam to the coil J, and their escape at the register I and cock b is prevented until they acquire the same degree of temperature as the distilled vapor with which the condenser is filled. Then the escape of the heated air and steam and the entrance of the cooler air and steam are allowed until the temperature of the condenser is reduced to a sufficient degree to condense those products which are less volatile, but not those possessing a higher degree of volatility. The proper temperature is maintained by regulating the admission and escape of the air and steam, which pass in currents through the chamber D and coil J. The oils which are condensed flow out of the condenser through the pipe E, and are collected and cooled in any suitable manner. The more volatile products escape through the pipe F to be condensed by some other means.

No uniform rule can be laid down for the degree of heat requisite to be maintained in the condenser, as different substances which contain oils require different degrees of temperature to volatilize them, and many substances require an increasing heat to continue the process of distillation, as I have before stated.

To illustrate my meaning more clearly, I will take as an example one of the substances from which oil is distilled—viz., rosin. For the separation of the oils of rosin from naphtha, creosote, and acids contained in the vapor given out from the rosin in the retort, the temperature within the condenser will usually require to be between 300° and 400° Fahrenheit, as naphtha is volatilized at a temperature of about 300°, while the article of commerce known as "rosin-oil" is not volatilized at a temperature less than 400°. Therefore, if the

condenser is kept at a proper temperature—between 300° and 400°—the rosin-oil may be condensed, and the naphtha and acids will escape.

The condenser may be furnished with a thermometer, which will in many instances serve as a guide to maintain the proper temperature for the particular operation when ascertained: but the proper temperature will in most cases be better regulated by examining the qualities of the two products. Test-cocks should be furnished to the receivers for this examination, and upon the qualities of the products being ascertained the condensation may be hastened or retarded, when necessary, by accelerating or checking the currents of air and steam. The two products obtained by the first separation may undergo further separation by a repetition of the process described.

The particular apparatus which I have described is supposed to be constructed with a view to illustrate the employment of both steam and air as condensing agents, and also to show the application of the condensing agents inside and outside the condenser; but I may use steam or air separately, and apply it either outside or inside only.

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

The employment, for the purpose of separating the more and less volatile products of distillation, of a vessel, B, which has an opening, E, for the escape or withdrawal of condensed matters, and another opening, F, for the escape of the more volatile matters, and which has its temperature regulated by the admission of steam or air through a pipe, J, passing through its interior or through a chamber, D, surrounding it, substantially as set forth.

JAMES R. STAFFORD.

Witnesses:

S. H. WALES,  
S. F. COHEN.