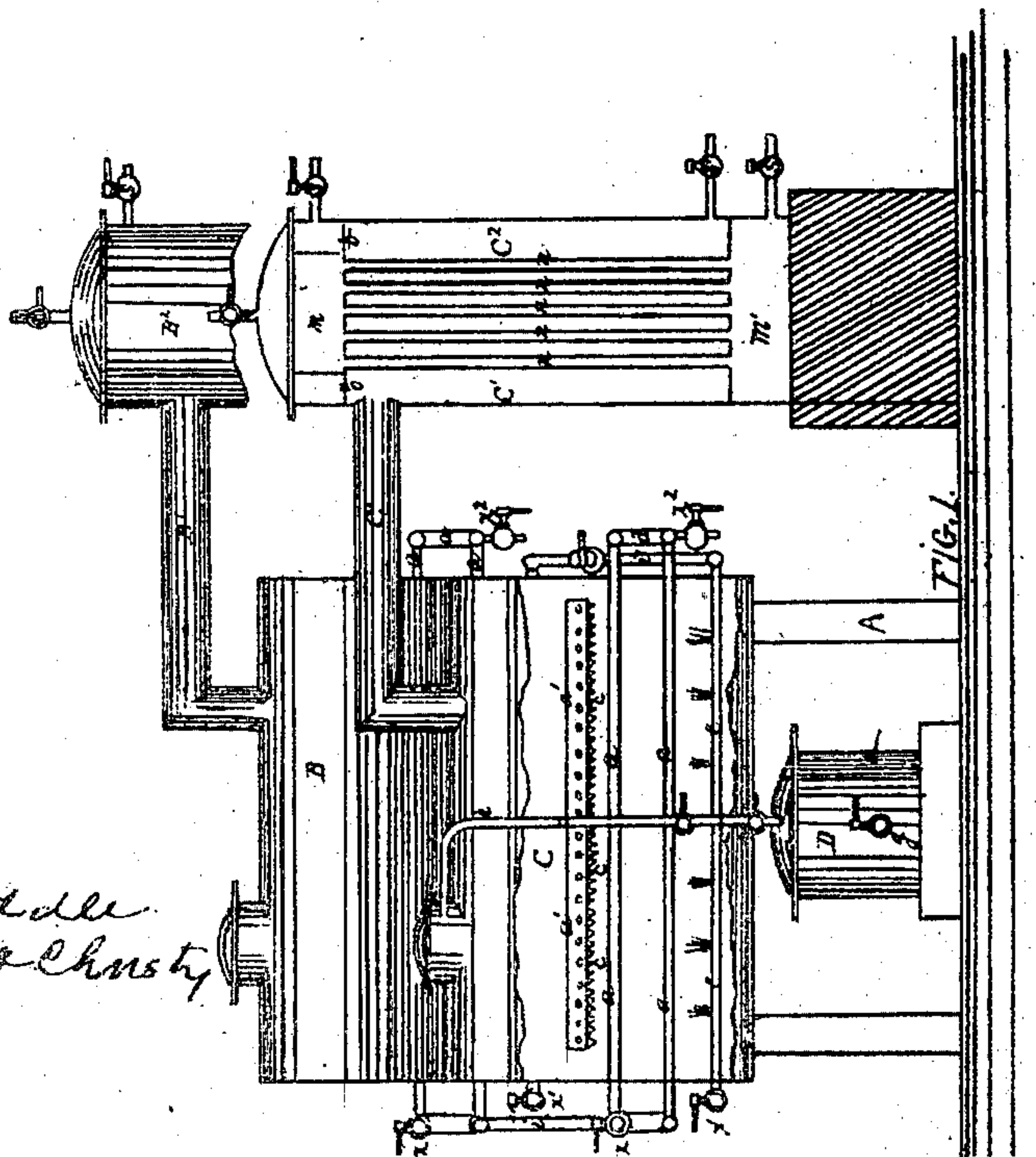
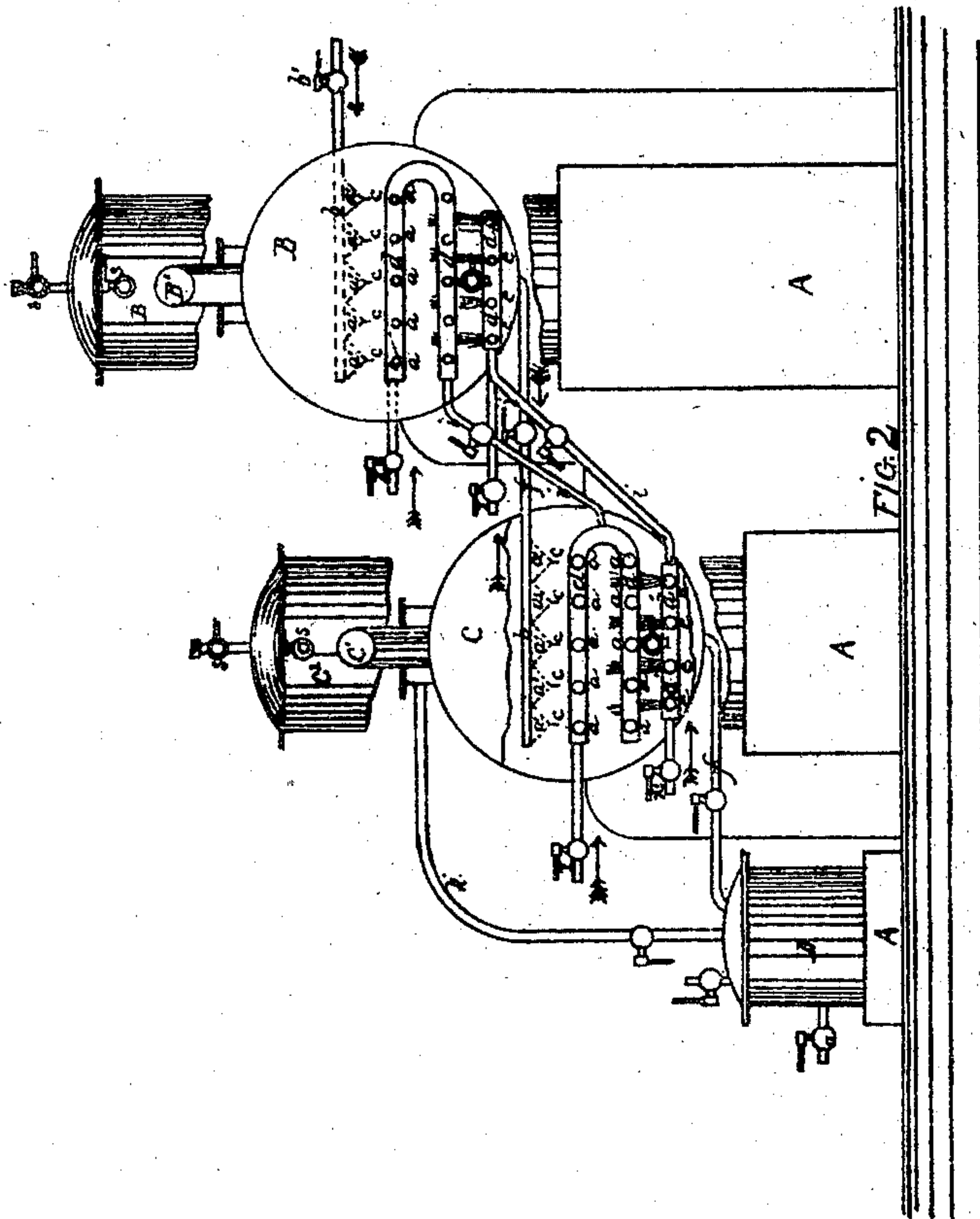


H. W. C. Treddele

Distilling Oils.

N^o 72125

Patented Dec. 10. 1867.



Witness

John B. Kern

Inventor

H. W. C. Treddele
By Bakewell & Christy
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UNITED STATES PATENT OFFICE.

HERBERT W. C. TWEDDLE, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN APPARATUS FOR DISTILLING OILS.

Specification forming part of Letters Patent No. 72,125, dated December 10, 1867.

To all whom it may concern:

Be it known that I, HERBERT W. C. TWEDDLE, of the city of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Apparatus for Distilling Oils; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawing, making a part of this specification, in which—

Figure 1 is partly a side and partly a sectional elevation of my improved apparatus for distilling oil, and Fig. 2 is a rear end view of the same, partly in section.

Like letters of reference indicate like parts in each.

The nature of my invention consists, first, in the construction and arrangement of devices for promoting the evaporation of undistilled or refinable oils by passing the same continuously in a thin film, layer, or stream, produced by dropping or otherwise, over a heated surface, or a succession of such surfaces, in a vacuum-still; second, in combining together two or more such stills in such a way that the heavier oils, which do not vaporize at the temperature to which they are raised in one still, shall be conveyed to another still, where they will, by the use of similar devices, be exposed to a higher degree of heat, and so on successively until only the residuum is left.

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

On any suitable frame or foundation A, I place two or more stills or a battery of stills, B C, one, B, somewhat higher than the other, C, so that the oil may flow readily from at or near the bottom of one into the other, as yet to be described. In these stills I preserve a partial or complete vacuum by the use of an air-pump, or in other known way, and connect them to the condensers B² C² by the goose-necks B¹ C¹ respectively. In each of the stills B C is a series or coil of pipe, *a*, each pipe of the series or coil passing through the still horizontally, but one being arranged over the other in any desirable number of vertical rows, and joined together by a connection-pipe, *d*. Above each vertical row of such pipes *a* is placed a trough, *a'*, which has small perforations in the sides or bottom, as seen in Fig. 1, and a serrated edge, *c*, underneath. Below the lowest of series or coil of pipes *a* is placed a series or coil of perforated pipes, *e*, for admitting superheated steam, such pipes being joined together by a connecting-pipe, *f*.

The crude petroleum is admitted, either cold or in a heated state, as may be deemed advisable, through a cock, *b'*, at the side of the still B, into a pipe, *b*, which, running transversely across over the troughs *a'*, discharges, through a perforation over each such trough, as shown in Fig. 2, the oil into such perforated and serrated troughs *a'*. Through the perforations in each trough *a'* the oil runs down, gathers on the points of the serrated edges *c*, whence it falls onto the steam-pipes *a*, dropping or running from pipe to pipe, and passing in a thin film over the surfaces of such pipes. A current of dry or superheated steam, passing in at the valves *x x*, keeps such pipes *a* heated to a high temperature; consequently the drops or streams of oil coming in contact with and passing over them are subject to the action of a heated surface relatively large, which causes it to volatilize with great rapidity—the more so as the pressure of the atmosphere is already removed from the inside of the still by the air-pump, as already stated. I also sometimes place a serrated edge under each pipe *a*, similar to that shown at *c*, whereby the oil is more evenly distributed in its descent from pipe to pipe. The sheets or strips, the edges of which constitute the serrated edges *c*, whether on the troughs *a'* or pipe *a*, may extend downward, and come in contact with the pipe immediately under, so that the oil will run therefrom onto such pipe, instead of dropping, as above described; and in such case two such sheets or strips may be employed, one coming down so as to discharge the oil on each side of the top line of the surface of the pipe. In the pipe *e*, for the admission of the superheated steam, I make a number of jet-holes, through which jets of superheated steam are discharged into the still in such way as to come in contact with the oil on the surface of the pipes *a*, and still further promote their evaporation. Steam is admitted to the pipes *e* through the valves *x¹ x¹*. *x² x²* are cocks through which to draw off the water formed by condensation of the steam in the pipes *a* and *e* respectively. By the use of these devices the

lighter or more volatile oils are driven off in the first still, B, in the form of vapor, which, being carried over by the goose-neck B¹ to the condenser B², is there condensed, as presently to be described. Such of the heavier oils as are not thus vaporized in the first still, B, fall to the bottom of the still, whence, by a pipe, *f*, they are conducted into the next still, C. There they are discharged into perforated and serrated troughs *a'*, drop onto pipes *a*, and other volatile ingredients driven off in vaporous form by an increased degree of heat received therefrom and from the superheated steam which escapes from the jet-holes in the pipe *e*, in the manner already described. The residuum, with the oils not yet volatilized, if any, falls to the bottom of the still C, whence it is conducted to another still and similarly treated, or, by a pipe, *f'*, is discharged into a receiver, D, in which a vacuum is also preserved. From this it is drawn off by a cock, *g*, at pleasure. A pipe, *h*, connects the receiver D with the still C, for convenience in securing a vacuum in the former and for the purpose of conducting over any vapors which may arise from the residual matter in such receiver.

The steam used in this process may be admitted into the pipes *a* and *e* of each still separately, or it may be at first admitted into the pipes *a* and *e* of the last and lowest of such stills, and conducted thence by pipes *i i'* into the pipes *a* and *e* of the next still, and so on until the first or highest still is reached. In this way I apply the steam when hottest to volatilizing the heavier oils, which, of course, require the greater degree of heat, and, as the temperature is reduced, apply it to driving off the lighter oils in the higher stills. Also, if the character of the oil is such that a higher degree of heat is required or desired than dry or common steam will give out, I use superheated steam in the pipes *a*, as well as in the pipes *e*.

As already stated, the vapors of volatilization in the still B pass by the goose-neck B¹ to the condenser B², which is a combination of a surface and shower condenser.

The condensing apparatus is the same for all the stills, and consists of a condensing-chamber, C², with cold-water chambers *m m'* at either side, connected together by pipes *n*. The upper chamber, *m*, is perforated, as at *o*, so as to discharge jets of cold water into the condensing-chamber C², to condense the oily vapors. Cold water is passed through pipes *n* for the same purpose. Water is admitted and drawn off by the cocks *s s*. The condensed oil is drawn off at the cock *s'* with the condensed water, if there be any, and discharged into a tank or other receptacle.

The advantages of this process of distillation are, among others, first, dispensing entirely with the application of a fire or fire-heat to the stills or to the oil, whereby I avoid all possibility of a fire or of an explosion, which are the great sources of danger in distilling pe-

troleum or hydrocarbon oils; second, collecting the vapors of the lighter and heavier oils and condensing them in separate receivers, whereby a quality of oil can be produced for illuminating purposes perfectly free from the volatile ingredients which render them dangerous in use at the temperatures to which, in such use, they are necessarily raised; third, a cheaper process of distillation; and, fourth, the production of a better article. Another advantage arises from the fact that fluids in motion will evaporate more rapidly than fluids at rest, other things being equal.

It is not absolutely necessary that one still should be higher than another, since, by creating a more complete vacuum in the second still than in the first, and so on, the residual oil in the bottom of each still may be forced into the next at the same or a higher level.

I do not limit myself in my invention to the particular form and arrangement of perforated and serrated pipes and troughs described, but include forms and arrangements of devices substantially similar, whereby the oil is caused to flow through notches, apertures, or perforations in small quantities, and drop or run from both points or projections onto and spread over the heated surfaces of evaporating-pipes in a vacuum-still.

The condensing-pipes *n* may be either vertical or horizontal, at pleasure.

It will be observed that the pipes *h f'*, leading from the last still C to the receiver D, are provided with cocks *z*, by which communication between them is cut off, in order to draw off the contents of such receiver.

In addition to the uses above named, I apply my invention to the redistillation of oil distilled by the ordinary process, by which I entirely avoid the expense and labor of refining, including the expense of acids, alkalies, &c., and at the same time produce an article more perfectly deodorized and otherwise of a superior character.

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

1. A trough or troughs having perforations for the passage of the oil in small quantities, and furnished with points near to such perforations, so as to cause the oil to pass therefrom in drops or fine streams, or thin films or layers, over heated pipes or tubes placed thereunder, when used within a vacuum-still, for the purposes substantially as described.

2. In a vacuum-still for distilling oil, the use of a series or coil of steam-pipe placed horizontally, one under another, as a series of evaporating-surfaces, substantially as and for the purposes above set forth.

3. In a vacuum-still for distilling oil, a series or coil of steam-jet pipes, *e*, in combination with a series or coil of evaporating-pipes, *a*, substantially as and for the purposes above set forth.

4. Combining together a series of apparatus, such as hereinbefore described, for the purpose of procuring a continuous distillation of pe-

troleum, each member of a series consisting of a vacuum-still containing a coil of steam-pipe as evaporating-surfaces, and troughs for the gradual distillation of the oil, in combination with suitable condensing apparatus, substantially as and for the purposes hereinbefore set forth.

5. A vacuum residuum-receiver, D, connected to and in combination with a vacuum-

still, or a battery of such stills, substantially in the manner and for the purposes above set forth.

In testimony whereof I, the said HERBERT W. C. TWEDDLE, have hereunto set my hand.

HERBERT W. C. TWEDDLE.

Witnesses:

A. S. NICHOLSON,
G. H. CHRISTY.